Appendix 3

Soil Sampling Analysis Results

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:	12 August 2018
Customer:	D_FTIM_DUB
Sample Delivery Group (SDG):	180804-62
Your Reference:	P1444
Location:	Cartron Big
Report No:	468044

We received 1 sample on Saturday August 04, 2018 and 1 of these samples were scheduled for analysis which was completed on Sunday August 12, 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

SDG:	180804-62	**Client Reference:**	P1444	**Report Number:**	468044
Location:	Cartron Big	**Order Number:**		**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
18060638	TP11		0.90 - 0.90	03/08/2018

Maximum Sample/Coolbox Temperature (°C) : **13.6**

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.

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

SDG:	180804-62	**Client Reference:**	P1444	**Report Number:**	468044
Location:	Cartron Big	**Order Number:**		**Superseded Report:**	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)			18060638		
Customer Sample Reference			TP11		
AGS Reference					
Depth (m)			0.90 - 0.90		
Container			1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)
Sample Type			S	S	S
ANC at pH4 and ANC at pH 6	All	NDPs: 0 Tests: 1		X	
Anions by Kone (w)	All	NDPs: 0 Tests: 1	X		
CEN Readings	All	NDPs: 0 Tests: 1	X		
Coronene	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		
Fluoride	All	NDPs: 0 Tests: 1	X		
Loss on Ignition in soils	All	NDPs: 0 Tests: 1		X	
Mercury Dissolved	All	NDPs: 0 Tests: 1	X		
Mineral Oil	All	NDPs: 0 Tests: 1		X	
PAH 16 & 17 Calc	All	NDPs: 0 Tests: 1		X	
PAH by GCMS	All	NDPs: 0 Tests: 1		X	
PCBs by GCMS	All	NDPs: 0 Tests: 1		X	
pH	All	NDPs: 0 Tests: 1		X	
Phenols by HPLC (W)	All	NDPs: 0 Tests: 1	X		

Validated

CERTIFICATE OF ANALYSIS

SDG:	180804-62	**Client Reference:**	P1444	**Report Number:**	468044
Location:	Cartron Big	**Order Number:**		**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)			18060638		
Customer Sample Reference			TP11		
AGS Reference					
Depth (m)			0.90 - 0.90		
Container			1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)
Sample Type			S	S	S
Sample description	All	NDPs: 0 Tests: 1		X	
Total Dissolved Solids	All	NDPs: 0 Tests: 1	X		
Total Organic Carbon	All	NDPs: 0 Tests: 1		X	
VOC MS (S)	All	NDPs: 0 Tests: 1			X

CERTIFICATE OF ANALYSIS

SDG:	180804-62	**Client Reference:**	P1444	**Report Number:**	468044
Location:	Cartron Big	**Order Number:**		**Superseded Report:**	

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
18060638	TP11	0.90 - 0.90	Dark Brown	Silt Loam	Stones	Vegetation

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

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

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

Validated

CERTIFICATE OF ANALYSIS

SDG:	180804-62	**Client Reference:**	P1444	**Report Number:**	468044
Location:	Cartron Big	**Order Number:**		**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS 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.	TP11
	Depth (m)	0.90 - 0.90
	Sample Type	Soil/Solid (S)
	Date Sampled	03/08/2018
	Sample Time	.
	Date Received	04/08/2018
	SDG Ref	180804-62
	Lab Sample No.(s)	18060638
	AGS Reference	

Component	LOD/Units	Method	
Moisture Content Ratio (% of as received sample)	%	PM024	18
Loss on ignition	<0.7 %	TM018	3.58 M
Mineral oil >C10-C40	<1 mg/kg	TM061	50.3
Mineral Oil Surrogate % recovery**	%	TM061	75.1
Organic Carbon, Total	<0.2 %	TM132	0.948 M
pH	1 pH Units	TM133	7.86 M
PCB congener 28	<3 µg/kg	TM168	<3 M
PCB congener 52	<3 µg/kg	TM168	<3 M
PCB congener 101	<3 µg/kg	TM168	<3 M
PCB congener 118	<3 µg/kg	TM168	<3 M
PCB congener 138	<3 µg/kg	TM168	<3 M
PCB congener 153	<3 µg/kg	TM168	<3 M
PCB congener 180	<3 µg/kg	TM168	<3 M
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168	<21
ANC @ pH 4	<0.03 mol/kg	TM182	0.555
ANC @ pH 6	<0.03 mol/kg	TM182	0.0721
PAH Total 17 (inc Coronene) Moisture Corrected	<10 mg/kg	TM410	<10
Coronene	<200 µg/kg	TM410	<200

Validated

CERTIFICATE OF ANALYSIS

SDG:	180804-62	**Client Reference:**	P1444	**Report Number:**	468044
Location:	Cartron Big	**Order Number:**		**Superseded Report:**	

PAH by GCMS

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS 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	Customer Sample Ref.	TP11
			Depth (m)	0.90 - 0.90
			Sample Type	Soil/Solid (S)
			Date Sampled	03/08/2018
			Sample Time	.
			Date Received	04/08/2018
			SDG Ref	180804-62
			Lab Sample No.(s)	18060638
			AGS Reference	
WAC	mg/kg	TM218		10

Validated

CERTIFICATE OF ANALYSIS

SDG:	180804-62	**Client Reference:**	P1444	**Report Number:**	468044
Location:	Cartron Big	**Order Number:**		**Superseded Report:**	

VOC MS (S)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS 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	Customer Sample Ref.	Depth (m)	Sample Type	Date Sampled	Sample Time	Date Received	SDG Ref	Lab Sample No.(s)	AGS Reference
			TP11	0.90 - 0.90	Soil/Solid (S)	03/08/2018	.	04/08/2018	180804-62	18060638	
Dibromofluoromethane**	%	TM116	102								
Toluene-d8**	%	TM116	92								
4-Bromofluorobenzene**	%	TM116	79.5								
Methyl Tertiary Butyl Ether	<10 µg/kg	TM116	<10 M								
Benzene	<9 µg/kg	TM116	<9 M								
Toluene	<7 µg/kg	TM116	<7 M								
Ethylbenzene	<4 µg/kg	TM116	<4 M								
p/m-Xylene	<10 µg/kg	TM116	<10 #								
o-Xylene	<10 µg/kg	TM116	<10 M								

Validated

CERTIFICATE OF ANALYSIS

SDG:	180804-62	**Client Reference:**	P1444	**Report Number:**	468044
Location:	Cartron Big	**Order Number:**		**Superseded Report:**	

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Cartron Big
Mass Sample taken (kg)	0.110	**Natural Moisture Content (%)**	22
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	82
Particle Size <4mm	>95%		

Case	
SDG	180804-62
Lab Sample Number(s)	18060638
Sampled Date	03-Aug-2018
Customer Sample Ref.	TP11
Depth (m)	0.90 - 0.90

Solid Waste Analysis	**Result**	**Landfill Waste Acceptance Criteria Limits**		
		Inert Waste Landfill	**Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon (%)	0.948	3	5	6
Loss on Ignition (%)	3.58	-	-	10
Sum of BTEX (mg/kg)	-	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	50.3	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	7.86	-	>6	-
ANC to pH 6 (mol/kg)	0.0721	-	-	-
ANC to pH 4 (mol/kg)	0.555	-	-	-

Eluate Analysis	**C_2 Concⁿ in 10:1 eluate (mg/l)**		**A_2 10:1 concⁿ leached (mg/kg)**		**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Arsenic	0.00214	<0.0005	0.0214	<0.005	0.5	2	25
Barium	0.0655	<0.0002	0.655	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.0034	<0.0003	0.034	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	0.0106	<0.003	0.106	<0.03	0.5	10	30
Nickel	0.00177	<0.0004	0.0177	<0.004	0.4	10	40
Lead	<0.0002	<0.0002	<0.002	<0.002	0.5	10	50
Antimony	0.00258	<0.001	0.0258	<0.01	0.06	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	<0.001	<0.001	<0.01	<0.01	4	50	200
Chloride	<2	<2	<20	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	7.6	<2	76	<20	1000	20000	50000
Total Dissolved Solids	172	<5	1720	<50	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	5.87	<3	58.7	<30	500	800	1000

Leach Test Information

Date Prepared	07-Aug-2018
pH (pH Units)	8.05
Conductivity (µS/cm)	220.00
Temperature (°C)	20.20
Volume Leachant (Litres)	0.880

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
12/08/2018 16:16:34

16:16:21 12/08/2018

CERTIFICATE OF ANALYSIS

SDG:	180804-62	**Client Reference:**	P1444	**Report Number:**	468044
Location:	Cartron Big	**Order Number:**		**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition
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
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM123	BS 2690: Part 121:1981	The Determination of Total Dissolved Solids in Water
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM168	EPA Method 8082, Polychlorinated Biphenyls by Gas Chromatography	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils
TM182	CEN/TC 292 - WI 292046-chacterization of waste-leaching Behaviour Tests- Acid and Base Neutralization Capacity Test	Determination of Acid Neutralisation Capacity (ANC) Using Autotitration in Soils
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
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM410	Shaker extraction-In house coronene method	Determination of Coronene in soils 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

SDG:	180804-62	**Client Reference:**	P1444	**Report Number:**	468044
Location:	Cartron Big	**Order Number:**		**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	18060638
Customer Sample Ref.	TP11
AGS Ref.	
Depth	0.90 - 0.90
Type	Soil/Solid (S)
ANC at pH4 and ANC at pH 6	08-Aug-2018
Anions by Kone (w)	09-Aug-2018
CEN 10:1 Leachate (1 Stage)	07-Aug-2018
CEN Readings	08-Aug-2018
Coronene	09-Aug-2018
Dissolved Metals by ICP-MS	10-Aug-2018
Dissolved Organic/Inorganic Carbon	10-Aug-2018
Fluoride	10-Aug-2018
Loss on Ignition in soils	10-Aug-2018
Mercury Dissolved	10-Aug-2018
Mineral Oil	10-Aug-2018
PAH 16 & 17 Calc	09-Aug-2018
PAH by GCMS	09-Aug-2018
PCBs by GCMS	08-Aug-2018
pH	07-Aug-2018
Phenols by HPLC (W)	10-Aug-2018
Sample description	06-Aug-2018
Total Dissolved Solids	09-Aug-2018
Total Organic Carbon	12-Aug-2018
VOC MS (S)	09-Aug-2018

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35ºC) 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 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).

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 presevation 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:	13 August 2018
Customer:	D_FTIM_DUB
Sample Delivery Group (SDG):	180803-55
Your Reference:	P1444
Location:	Cartron Big
Report No:	468081

We received 4 samples on Friday August 03, 2018 and 4 of these samples were scheduled for analysis which was completed on Monday August 13, 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

SDG:	180803-55	**Client Reference:**	P1444	**Report Number:**	468081
Location:	Cartron Big	**Order Number:**		**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
18053550	TP1		1.80 - 1.80	31/07/2018
18053555	TP3		2.50 - 2.50	31/07/2018
18053560	TP4		1.20 - 1.20	31/07/2018
18053565	TP5		1.80 - 1.80	31/07/2018

Maximum Sample/Coolbox Temperature (°C) : **19.8**

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.

Validated

CERTIFICATE OF ANALYSIS

SDG:	180803-55	**Client Reference:**	P1444	**Report Number:**	468081
Location:	Cartron Big	**Order Number:**		**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)				18053550			18053555			18053560			18053565
Customer Sample Reference				TP1			TP3			TP4			TP5
AGS Reference													
Depth (m)				1.80 - 1.80			2.50 - 2.50			1.20 - 1.20			1.80 - 1.80
Container				1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)
Sample Type				S	S	S	S	S	S	S	S	S	S	S	S
ANC at pH4 and ANC at pH 6	All	NDPs: 0 Tests: 4			X			X			X			X	
Anions by Kone (w)	All	NDPs: 0 Tests: 4		X			X			X			X		
CEN Readings	All	NDPs: 0 Tests: 4		X			X			X			X		
Coronene	All	NDPs: 0 Tests: 4			X			X			X			X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 4		X			X			X			X		
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 4		X			X			X			X		
Fluoride	All	NDPs: 0 Tests: 4		X			X			X			X		
Loss on Ignition in soils	All	NDPs: 0 Tests: 4			X			X			X			X	
Mercury Dissolved	All	NDPs: 0 Tests: 4		X			X			X			X		
Mineral Oil	All	NDPs: 0 Tests: 4			X			X			X			X	
PAH 16 & 17 Calc	All	NDPs: 0 Tests: 4			X			X			X			X	
PAH by GCMS	All	NDPs: 0 Tests: 4			X			X			X			X	
PCBs by GCMS	All	NDPs: 0 Tests: 4			X			X			X			X	
pH	All	NDPs: 0 Tests: 4			X			X			X			X	
Phenols by HPLC (W)	All	NDPs: 0 Tests: 4		X			X			X			X		

Validated

CERTIFICATE OF ANALYSIS

SDG:	180803-55	**Client Reference:**	P1444	**Report Number:**	468081
Location:	Cartron Big	**Order Number:**		**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)			18053550			18053555			18053560			18053565
Customer Sample Reference			TP1			TP3			TP4			TP5
AGS Reference												
Depth (m)			1.80 - 1.80			2.50 - 2.50			1.20 - 1.20			1.80 - 1.80
Container			1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)
Sample Type			S	S	S	S	S	S	S	S	S	S	S	S
Sample description	All	NDPs: 0 Tests: 4		X			X			X			X	
Total Dissolved Solids	All	NDPs: 0 Tests: 4	X			X			X			X		
Total Organic Carbon	All	NDPs: 0 Tests: 4		X			X			X			X	
VOC MS (S)	All	NDPs: 0 Tests: 4			X			X			X			X

CERTIFICATE OF ANALYSIS

SDG:	180803-55	**Client Reference:**	P1444	**Report Number:**	468081
Location:	Cartron Big	**Order Number:**		**Superseded Report:**	

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
18053550	TP1	1.80 - 1.80	Black	Sludge	Stones	None
18053555	TP3	2.50 - 2.50	Black	Loamy Sand	Vegetation	Oil/Petroleum
18053560	TP4	1.20 - 1.20	Dark Brown	Loamy Sand	Stones	Vegetation
18053565	TP5	1.80 - 1.80	Dark Brown	Loamy Sand	Stones	Vegetation

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

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

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

Validated

CERTIFICATE OF ANALYSIS

SDG:	180803-55	**Client Reference:**	P1444	**Report Number:**	468081
Location:	Cartron Big	**Order Number:**		**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS 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.	TP1	TP3	TP4	TP5		
Depth (m)	1.80 - 1.80	2.50 - 2.50	1.20 - 1.20	1.80 - 1.80		
Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)		
Date Sampled	31/07/2018	31/07/2018	31/07/2018	31/07/2018		
Sample Time	.	.	.	.		
Date Received	03/08/2018	03/08/2018	03/08/2018	03/08/2018		
SDG Ref	180803-55	180803-55	180803-55	180803-55		
Lab Sample No.(s)	18053550	18053555	18053560	18053565		
AGS Reference						

Component	LOD/Units	Method											
Moisture Content Ratio (% of as received sample)	%	PM024	35		44		56		50				
Loss on ignition	<0.7 %	TM018	15.7	#	18.9	M	36.7	M	22.4	M			
Mineral oil >C10-C40	<1 mg/kg	TM061	898		1080		1160		2390				
Mineral Oil Surrogate % recovery**	%	TM061	76.4		80.7		77.8		71.4				
Organic Carbon, Total	<0.2 %	TM132	4.13	#	7.08	M	10.7	M	7.17	M			
pH	1 pH Units	TM133	8.68	#	7.02	M	7.77	M	7.67	M			
PCB congener 28	<3 µg/kg	TM168	<15	#	<3	M	<3	M	<15	M			
PCB congener 52	<3 µg/kg	TM168	<15	#	<3	M	<3	M	<15	M			
PCB congener 101	<3 µg/kg	TM168	<15	#	<3	M	<3	M	<15	M			
PCB congener 118	<3 µg/kg	TM168	<15	#	<3	M	<3	M	<15	M			
PCB congener 138	<3 µg/kg	TM168	<15	#	<3	M	<3	M	<15	M			
PCB congener 153	<3 µg/kg	TM168	<15	#	<3	M	<3	M	<15	M			
PCB congener 180	<3 µg/kg	TM168	<15	#	<3	M	<3	M	<15	M			
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168	<105		<21		<21		<105				
ANC @ pH 4	<0.03 mol/kg	TM182	2.01		1.57		1.3		0.837				
ANC @ pH 6	<0.03 mol/kg	TM182	0.235		0.0936		0.154		0.192				
PAH Total 17 (inc Coronene) Moisture Corrected	<10 mg/kg	TM410	<10		<10		<10		<10				
Coronene	<200 µg/kg	TM410	<200		<200		<200		<200				

Validated

CERTIFICATE OF ANALYSIS

SDG:	180803-55	**Client Reference:**	P1444	**Report Number:**	468081
Location:	Cartron Big	**Order Number:**		**Superseded Report:**	

PAH by GCMS

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS 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	Customer Sample Ref.	TP1	TP3	TP4	TP5		
			Depth (m)	1.80 - 1.80	2.50 - 2.50	1.20 - 1.20	1.80 - 1.80		
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)		
			Date Sampled	31/07/2018	31/07/2018	31/07/2018	31/07/2018		
			Sample Time	.	.	.	.		
			Date Received	03/08/2018	03/08/2018	03/08/2018	03/08/2018		
			SDG Ref	180803-55	180803-55	180803-55	180803-55		
			Lab Sample No.(s)	18053550	18053555	18053560	18053565		
			AGS Reference						
WAC	mg/kg	TM218		10	10	10	10		

CERTIFICATE OF ANALYSIS

SDG:	180803-55	**Client Reference:**	P1444	**Report Number:**	468081
Location:	Cartron Big	**Order Number:**		**Superseded Report:**	

VOC MS (S)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS 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	Customer Sample Ref.	TP1	TP3	TP4	TP5		
			Depth (m)	1.80 - 1.80	2.50 - 2.50	1.20 - 1.20	1.80 - 1.80		
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)		
			Date Sampled	31/07/2018	31/07/2018	31/07/2018	31/07/2018		
			Sample Time	.	.	.	.		
			Date Received	03/08/2018	03/08/2018	03/08/2018	03/08/2018		
			SDG Ref	180803-55	180803-55	180803-55	180803-55		
			Lab Sample No.(s)	18053550	18053555	18053560	18053565		
			AGS Reference						
Dibromofluoromethane**	%	TM116		102	105	102	99.7		
Toluene-d8**	%	TM116		98.2	96.1	95.6	96.1		
4-Bromofluorobenzene**	%	TM116		95.4	95.1	86.4	91.7		
Methyl Tertiary Butyl Ether	<10 µg/kg	TM116		<100 #	<100 M	<100 M	<100 M		
Benzene	<9 µg/kg	TM116		<90 #	<90 M	<90 M	<90 M		
Toluene	<7 µg/kg	TM116		<70 #	<70 M	<70 M	<70 M		
Ethylbenzene	<4 µg/kg	TM116		117 #	<40 M	<40 M	<40 M		
p/m-Xylene	<10 µg/kg	TM116		<100 #	<100 #	<100 #	<100 #		
o-Xylene	<10 µg/kg	TM116		<100 #	<100 M	<100 M	<100 M		

Validated

CERTIFICATE OF ANALYSIS

SDG:	180803-55	**Client Reference:**	P1444	**Report Number:**	468081
Location:	Cartron Big	**Order Number:**		**Superseded Report:**	

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Cartron Big
Mass Sample taken (kg)	0.138	**Natural Moisture Content (%)**	53.8
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	65
Particle Size <4mm	>95%		

Case	
SDG	180803-55
Lab Sample Number(s)	18053550
Sampled Date	31-Jul-2018
Customer Sample Ref.	TP1
Depth (m)	1.80 - 1.80

Solid Waste Analysis	**Result**	**Landfill Waste Acceptance Criteria Limits**		
		Inert Waste Landfill	**Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon (%)	4.13	3	5	6
Loss on Ignition (%)	15.7	-	-	10
Sum of BTEX (mg/kg)	-	-	-	-
Sum of 7 PCBs (mg/kg)	<0.105	1	-	-
Mineral Oil (mg/kg)	898	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.68	-	>6	-
ANC to pH 6 (mol/kg)	0.235	-	-	-
ANC to pH 4 (mol/kg)	2.01	-	-	-

Eluate Analysis	**C_2 Concⁿ in 10:1 eluate (mg/l)**		**A_2 10:1 concⁿ leached (mg/kg)**		**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Arsenic	0.0371	<0.0005	0.371	<0.005	0.5	2	25
Barium	0.0244	<0.0002	0.244	<0.002	20	100	300
Cadmium	0.000431	<0.00008	0.00431	<0.0008	0.04	1	5
Chromium	0.541	<0.001	5.41	<0.01	0.5	10	70
Copper	0.0213	<0.0003	0.213	<0.003	2	50	100
Mercury Dissolved (CVAF)	0.0000295	<0.00001	0.000295	<0.0001	0.01	0.2	2
Molybdenum	0.0284	<0.003	0.284	<0.03	0.5	10	30
Nickel	0.0617	<0.0004	0.617	<0.004	0.4	10	40
Lead	0.016	<0.0002	0.16	<0.002	0.5	10	50
Antimony	0.00387	<0.001	0.0387	<0.01	0.06	0.7	5
Selenium	0.00184	<0.001	0.0184	<0.01	0.1	0.5	7
Zinc	0.048	<0.001	0.48	<0.01	4	50	200
Chloride	812	<10	8120	<100	800	15000	25000
Fluoride	0.604	<0.5	6.04	<5	10	150	500
Sulphate (soluble)	<10	<10	<100	<100	1000	20000	50000
Total Dissolved Solids	3100	<10	31000	<100	4000	60000	100000
Total Monohydric Phenols (W)	7.58	<0.016	75.8	<0.16	1	-	-
Dissolved Organic Carbon	188	<12	1880	<120	500	800	1000

Leach Test Information

Date Prepared	06-Aug-2018
pH (pH Units)	8.41
Conductivity (µS/cm)	3,980.00
Temperature (°C)	20.40
Volume Leachant (Litres)	0.852

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
13/08/2018 08:51:34

08:51:25 13/08/2018

Validated

CERTIFICATE OF ANALYSIS

SDG:	180803-55	**Client Reference:**	P1444	**Report Number:**	468081
Location:	Cartron Big	**Order Number:**		**Superseded Report:**	

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Cartron Big
Mass Sample taken (kg)	0.161	**Natural Moisture Content (%)**	78.6
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	56
Particle Size <4mm	>95%		

Case	
SDG	180803-55
Lab Sample Number(s)	18053555
Sampled Date	31-Jul-2018
Customer Sample Ref.	TP3
Depth (m)	2.50 - 2.50

Solid Waste Analysis	**Result**	**Landfill Waste Acceptance Criteria Limits**		
		Inert Waste Landfill	**Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon (%)	7.08	3	5	6
Loss on Ignition (%)	18.9	-	-	10
Sum of BTEX (mg/kg)	-	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	1080	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	7.02	-	>6	-
ANC to pH 6 (mol/kg)	0.0936	-	-	-
ANC to pH 4 (mol/kg)	1.57	-	-	-

Eluate Analysis	**C_2 Conc^n in 10:1 eluate (mg/l)**		**A_2 10:1 conc^n leached (mg/kg)**		**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Arsenic	0.00665	<0.0005	0.0665	<0.005	0.5	2	25
Barium	0.0657	<0.0002	0.657	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	<0.0003	<0.0003	<0.003	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	0.0546	<0.003	0.546	<0.03	0.5	10	30
Nickel	0.00134	<0.0004	0.0134	<0.004	0.4	10	40
Lead	<0.0002	<0.0002	<0.002	<0.002	0.5	10	50
Antimony	0.00192	<0.001	0.0192	<0.01	0.06	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	<0.001	<0.001	<0.01	<0.01	4	50	200
Chloride	4.7	<2	47	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	44.1	<2	441	<20	1000	20000	50000
Total Dissolved Solids	298	<5	2980	<50	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	20.6	<3	206	<30	500	800	1000

Leach Test Information

Date Prepared	06-Aug-2018
pH (pH Units)	8.11
Conductivity (µS/cm)	394.00
Temperature (°C)	20.50
Volume Leachant (Litres)	0.829

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
13/08/2018 08:51:34

08:51:25 13/08/2018

Validated

CERTIFICATE OF ANALYSIS

SDG:	180803-55	**Client Reference:**	P1444	**Report Number:**	468081
Location:	Cartron Big	**Order Number:**		**Superseded Report:**	

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Cartron Big
Mass Sample taken (kg)	0.205	**Natural Moisture Content (%)**	127
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	44
Particle Size <4mm	>95%		

Case	
SDG	180803-55
Lab Sample Number(s)	18053560
Sampled Date	31-Jul-2018
Customer Sample Ref.	TP4
Depth (m)	1.20 - 1.20

Solid Waste Analysis	**Result**	**Landfill Waste Acceptance Criteria Limits**		
		Inert Waste Landfill	**Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon (%)	10.7	3	5	6
Loss on Ignition (%)	36.7	-	-	10
Sum of BTEX (mg/kg)	-	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg)	1160	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	7.77	-	>6	-
ANC to pH 6 (mol/kg)	0.154	-	-	-
ANC to pH 4 (mol/kg)	1.3	-	-	-

Eluate Analysis	**C_2 Conc^n in 10:1 eluate (mg/l)**		**A_2 10:1 conc^n leached (mg/kg)**		**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Arsenic	0.00705	<0.0005	0.0705	<0.005	0.5	2	25
Barium	0.0935	<0.0002	0.935	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	<0.0003	<0.0003	<0.003	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	0.0117	<0.003	0.117	<0.03	0.5	10	30
Nickel	0.00207	<0.0004	0.0207	<0.004	0.4	10	40
Lead	<0.0002	<0.0002	<0.002	<0.002	0.5	10	50
Antimony	<0.001	<0.001	<0.01	<0.01	0.06	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	0.00205	<0.001	0.0205	<0.01	4	50	200
Chloride	21.3	<2	213	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	15.3	<2	153	<20	1000	20000	50000
Total Dissolved Solids	319	<5	3190	<50	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	14.7	<3	147	<30	500	800	1000

Leach Test Information

Date Prepared	06-Aug-2018
pH (pH Units)	8.11
Conductivity (µS/cm)	408.00
Temperature (°C)	19.90
Volume Leachant (Litres)	0.786

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
13/08/2018 08:51:34

08:51:25 13/08/2018

Validated

CERTIFICATE OF ANALYSIS

SDG:	180803-55	**Client Reference:**	P1444	**Report Number:**	468081
Location:	Cartron Big	**Order Number:**		**Superseded Report:**	

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Cartron Big
Mass Sample taken (kg)	0.180	**Natural Moisture Content (%)**	100
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	50
Particle Size <4mm	>95%		

Case	
SDG	180803-55
Lab Sample Number(s)	18053565
Sampled Date	31-Jul-2018
Customer Sample Ref.	TP5
Depth (m)	1.80 - 1.80

Solid Waste Analysis	**Result**	**Landfill Waste Acceptance Criteria Limits**		
		Inert Waste Landfill	**Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon (%)	7.17	3	5	6
Loss on Ignition (%)	22.4	-	-	10
Sum of BTEX (mg/kg)	-	-	-	-
Sum of 7 PCBs (mg/kg)	<0.105	1	-	-
Mineral Oil (mg/kg)	2390	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	7.67	-	>6	-
ANC to pH 6 (mol/kg)	0.192	-	-	-
ANC to pH 4 (mol/kg)	0.837	-	-	-

Eluate Analysis	**C_2 Concⁿ in 10:1 eluate (mg/l)**		**A_2 10:1 concⁿ leached (mg/kg)**		**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Arsenic	0.00382	<0.0005	0.0382	<0.005	0.5	2	25
Barium	0.0249	<0.0002	0.249	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	<0.0003	<0.0003	<0.003	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	0.0627	<0.003	0.627	<0.03	0.5	10	30
Nickel	0.00287	<0.0004	0.0287	<0.004	0.4	10	40
Lead	<0.0002	<0.0002	<0.002	<0.002	0.5	10	50
Antimony	0.00244	<0.001	0.0244	<0.01	0.06	0.7	5
Selenium	0.00192	<0.001	0.0192	<0.01	0.1	0.5	7
Zinc	0.00264	<0.001	0.0264	<0.01	4	50	200
Chloride	5.1	<2	51	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	314	<2	3140	<20	1000	20000	50000
Total Dissolved Solids	670	<5	6700	<50	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	14.2	<3	142	<30	500	800	1000

Leach Test Information

Date Prepared	06-Aug-2018
pH (pH Units)	7.96
Conductivity (µS/cm)	869.00
Temperature (°C)	21.30
Volume Leachant (Litres)	0.810

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
13/08/2018 08:51:34

08:51:25 13/08/2018

CERTIFICATE OF ANALYSIS

SDG:	180803-55	**Client Reference:**	P1444	**Report Number:**	468081
Location:	Cartron Big	**Order Number:**		**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition
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
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM123	BS 2690: Part 121:1981	The Determination of Total Dissolved Solids in Water
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM168	EPA Method 8082, Polychlorinated Biphenyls by Gas Chromatography	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils
TM182	CEN/TC 292 - WI 292046-chacterization of waste-leaching Behaviour Tests- Acid and Base Neutralization Capacity Test	Determination of Acid Neutralisation Capacity (ANC) Using Autotitration in Soils
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
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM410	Shaker extraction-In house coronene method	Determination of Coronene in soils 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

SDG:	180803-55	**Client Reference:**	P1444	**Report Number:**	468081
Location:	Cartron Big	**Order Number:**		**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	18053550	18053555	18053560	18053565
Customer Sample Ref.	TP1	TP3	TP4	TP5
AGS Ref.				
Depth	1.80 - 1.80	2.50 - 2.50	1.20 - 1.20	1.80 - 1.80
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
ANC at pH4 and ANC at pH 6	06-Aug-2018	06-Aug-2018	06-Aug-2018	06-Aug-2018
Anions by Kone (w)	09-Aug-2018	09-Aug-2018	10-Aug-2018	09-Aug-2018
CEN 10:1 Leachate (1 Stage)	06-Aug-2018	06-Aug-2018	06-Aug-2018	06-Aug-2018
CEN Readings	07-Aug-2018	07-Aug-2018	07-Aug-2018	07-Aug-2018
Coronene	08-Aug-2018	08-Aug-2018	08-Aug-2018	08-Aug-2018
Dissolved Metals by ICP-MS	09-Aug-2018	09-Aug-2018	09-Aug-2018	10-Aug-2018
Dissolved Organic/Inorganic Carbon	10-Aug-2018	09-Aug-2018	10-Aug-2018	09-Aug-2018
Fluoride	08-Aug-2018	08-Aug-2018	08-Aug-2018	08-Aug-2018
Loss on Ignition in soils	09-Aug-2018	09-Aug-2018	09-Aug-2018	09-Aug-2018
Mercury Dissolved	09-Aug-2018	09-Aug-2018	09-Aug-2018	09-Aug-2018
Mineral Oil	09-Aug-2018	10-Aug-2018	09-Aug-2018	10-Aug-2018
PAH 16 & 17 Calc	08-Aug-2018	13-Aug-2018	08-Aug-2018	13-Aug-2018
PAH by GCMS	08-Aug-2018	08-Aug-2018	08-Aug-2018	10-Aug-2018
PCBs by GCMS	09-Aug-2018	08-Aug-2018	08-Aug-2018	09-Aug-2018
pH	07-Aug-2018	07-Aug-2018	07-Aug-2018	07-Aug-2018
Phenols by HPLC (W)	10-Aug-2018	09-Aug-2018	09-Aug-2018	09-Aug-2018
Sample description	03-Aug-2018	03-Aug-2018	03-Aug-2018	03-Aug-2018
Total Dissolved Solids	08-Aug-2018	08-Aug-2018	08-Aug-2018	08-Aug-2018
Total Organic Carbon	12-Aug-2018	12-Aug-2018	12-Aug-2018	12-Aug-2018
VOC MS (S)	10-Aug-2018	10-Aug-2018	10-Aug-2018	10-Aug-2018

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35ºC) 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 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).

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 presevation 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.