Caulmert Limited

Engineering, Environmental & Planning
Consultancy Services

Standard Landfill Site

Flintshire County Council Waste Management Services

Quarterly Monitoring Review

January – March 2017

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Approved	Diana Brookshaw	**Date**	25/04/2017

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1.0 INTRODUCTION

1.1 Background

1.1.1 This report reviews environmental monitoring data collected during the final quarter of 2016 at Standard Landfill Site, Buckley, as required by Natural Resources Wales (NRW). The data reviewed by this report was collected between the 1st of January and the 3rd of April 2017.

1.1.2 This report records and discusses the monitoring data collected for landfill gas, groundwater, leachate, and surface water. Third party information supplied by Flintshire County Council (FCC) Waste Management Services has been used in good faith within this document. Caulmert Ltd has not attempted to verify the information.

1.1.3 For details regarding the site location, surrounding land-use, site history and development and environmental context please refer to the Standard Landfill Site Annual Monitoring Review 2016, document reference 2596.14.FCC.SDB.DB.A0, submitted to Natural Resources Wales by Caulmert Ltd, on behalf of Flintshire County Council Waste Management Services in February 2017.

2.0 LANDFILL GAS

2.1 Introduction

2.1.1 Routine landfill gas (LFG) monitoring was carried out on a weekly basis at 28 perimeter boreholes during the review period. Methane, carbon dioxide, oxygen, relative pressure and atmospheric pressure were recorded at each borehole.

2.1.2 Borehole locations are shown on the drawing 'Environmental Monitoring Locations' 0987/1/002, enclosed. A summary table displaying methane and carbon dioxide concentrations can be found in Appendix 1.

2.2 Methane

2.2.1 Methane was only detected in BH22, where the maximum concentration was 0.4 %. A methane trigger level of 1.0 % was proposed for BH22 in EPR Compliance Assessment Report (CAR) ID 37073/0202764 issued by Natural Resources Wales (NRW) on the 27th of February 2014. The proposed trigger level was not exceeded at BH22 during this review period, with a maximum concentration of 0.4 %.

2.3 Carbon Dioxide

2.3.1 Carbon dioxide trigger levels were agreed with the Environment Agency (now NRW) during Q3 of 2011 and can be found in Appendix 1 along with the monitoring data. The carbon dioxide trigger values for boreholes BH16 and BH22, 3.0 % and 3.1 % respectively, were approved in EPR Compliance Assessment Report (CAR) ID 37073/0202764.

2.3.2 Carbon dioxide concentrations remained below the trigger levels in all locations throughout the review period.

3.0 LEACHATE

3.1 Introduction

3.1.1 Leachate levels were recorded monthly at nine leachate monitoring locations, LC2, LC3, LC4, LC7, S1, S2, S3, SSR5 (LS5) and SSR6 (LS6). On this monitoring occasion, the nearest well to LC2 was sampled as there was no access to LC2.

3.1.2 Well locations are shown on the enclosed Environmental Monitoring Location drawing.

3.2 Leachate Levels

3.2.1 Leachate levels were recorded on a monthly basis. A summary table displaying leachate levels, in metres below ground level (mBGL) and in metres above Ordnance Datum (mAOD), can be found in Appendix 3.

3.2.2 Table 1 below displays minimum, maximum and average leachate head levels in metres above well base. Leachate levels remained low over the review period. Average levels range between 1.19 m above well base in LS6 to 1.80 m above well base in LC7.

Table 1: Leachate Head Levels in metres above well base

Location	Leachate head (m above cell base)		
	Min	Max	Average
LC2.1	1.39	1.42	1.40
LC3	1.53	1.59	1.56
LC4	1.51	1.56	1.54
LC7	1.78	1.82	1.80
LS5	1.29	1.32	1.30
LS6	1.18	1.20	1.19
S1	1.29	1.34	1.32
S2	1.70	1.80	1.74
S3	1.47	1.51	1.49

3.3 Leachate Quality

3.3.1 A summary of the leachate quality is shown in Table 3.2 in Appendix 3.

3.3.2 Concentrations of ammoniacal nitrogen (as N) within the leachate ranged between 16.6 mg/l in LC3 and a maximum concentration of 1530 mg/l in LC4. Chloride concentrations ranged from 365 mg/l in S3 to 2110 mg/l in LC2. COD concentrations ranged from 41 mg/l in S1 to 3690 mg/l in LC7.

4.0 GROUNDWATER

4.1 Introduction

4.1.1 During the review period groundwater levels were recorded on a monthly basis at seven groundwater monitoring boreholes, GW1, GW2R, GW3, GW4R, GW5, GW6 and GW7R. Location GW2R was installed in October 2016 to replace GW2. Samples collected at these locations were analysed for the quarterly suite of chemicals.

4.2 Groundwater Levels

4.2.1 Groundwater level data was recorded on a monthly basis in metres below ground level (mBGL). Where borehole cover level to Ordinance Datum was available this was used to calculate the groundwater level in metres above Ordnance Datum (mAOD).

4.2.2 Groundwater levels, in mBGL and mAOD are displayed in a summary table included in Appendix 2. Groundwater levels remained stable over the review period.

4.3 Groundwater Quality

4.3.1 A groundwater quality summary table for this review period is included in Appendix 2.

4.3.2 Ammoniacal nitrogen and chloride concentrations in GW6 have shown a generally decreasing trend since a leachate outbreak in 2013. The concentration of ammoniacal nitrogen decreased slightly from 51 mg/l in December 2016 to 27 mg/l during this quarter, whilst the chloride concentration decreased from 195 mg/l in December to 95 mg/l during this quarter.

4.3.3 Ammoniacal nitrogen concentrations were below the detection limit in GW1 and GW4R. Where ammoniacal nitrogen was detected (GW2R, GW3, GW5 and GW7), the concentrations were significantly lower than at GW6 (typically XXX mg/l/on average XXX mg/l).

4.3.4 Chemical oxygen demand (COD) was highest in GW5, at 156 mg/l which is significantly lower than the concentration detected in December 2016 (870 mg/l). COD concentrations were comparatively low in all other groundwater monitoring points.

4.3.5 No creosols, phenols or xylenols were detected in the groundwater during this review period.

4.3.6 Only trace concentrations of mercury were detected in GW1, GW5 and GW6.

4.3.7 The pH in GW6 was 5.4, similar to that detected in the previous review (5.3).

4.3.8 Nitrite was detected at GW6 and GW7 alone, with relatively low concentrations of 0.08 mg/l and 0.31 mg/l respectively. Nitrate concentration at GW6 was 130 mg/l, similar to that detected in the previous review (110 mg/l).

5.0 SURFACE WATER

5.1 Introduction

5.1.1 Surface water samples were collected at three locations; SW2, SW4 and SW5 which are shown on the enclosed Environmental Monitoring Locations drawing.

5.1.2 Surface water samples were analysed for the quarterly suite of parameters. Summary tables displaying the surface water analysis results are presented in Appendix 4.

5.2 Surface Water Quality

5.2.1 Ammoniacal nitrogen was not detected in any of the surface water locations during this period.

5.2.2 Chemical oxygen demand concentration decreased significantly at SW1 from 273.6 mg/l to 37 mg/during this review period. Concentrations decreased slightlyat SW2 and SW4, but increased marginally at SW5.

5.2.3 Metal concentrations were low across the surface water locations.

6.0 CONCLUSIONS

6.1 Landfill gas

6.1.1 None of the permitted trigger levels for methane or carbon dioxide were exceeded during this review period.

6.1.2 Methane was only detected in BH22, remaining below the trigger level of 1.0 % throughout the review period, with an average concentration of 0.3 %.

6.2 Leachate

6.2.1 Leachate levels remained low for the duration of the review period.

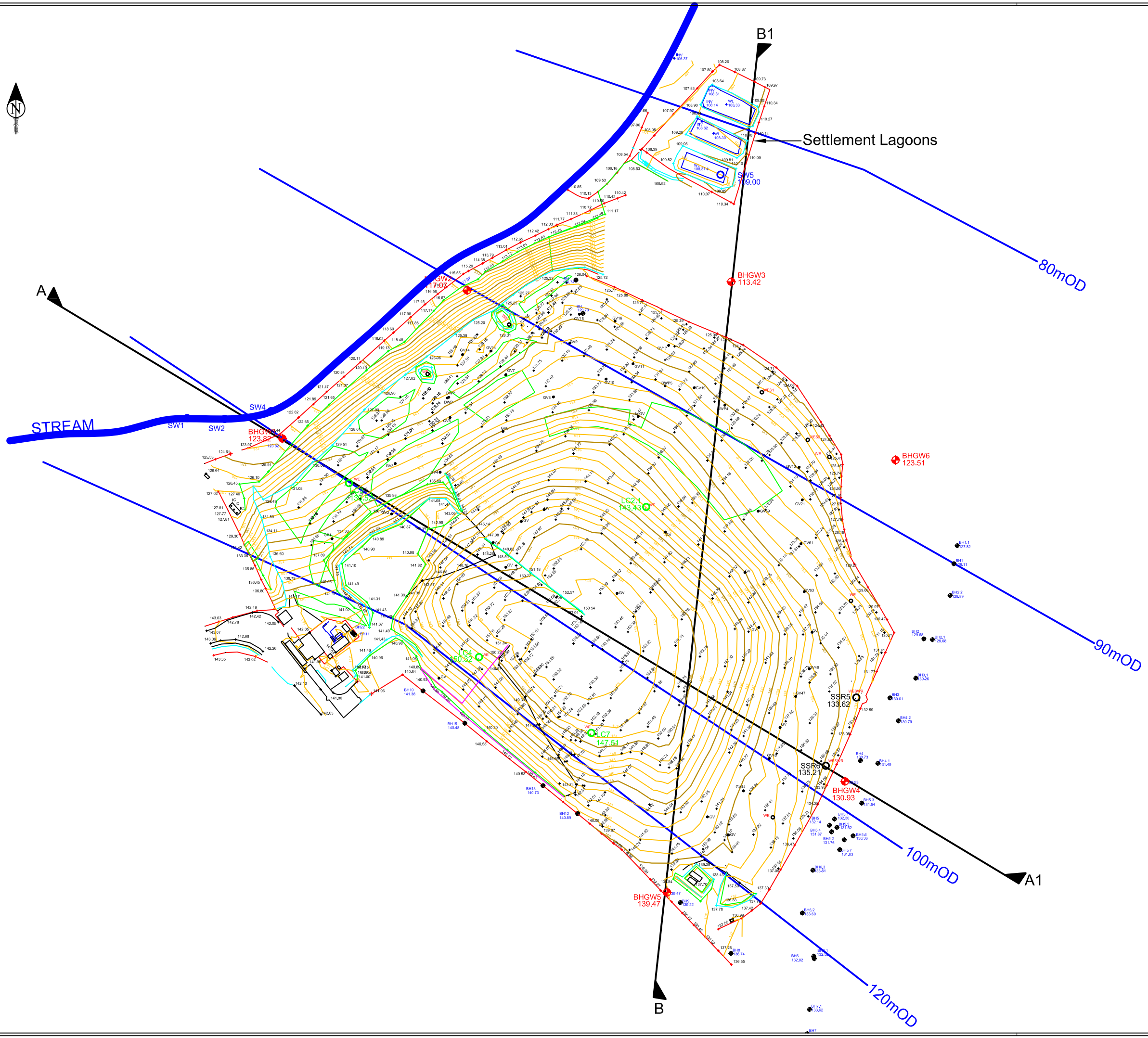
6.2.2 Leachate quality results indicate that a medium to strong leachate is present. This is to be expected given the age of the waste mass and the closed and capped nature of the site.

6.3 Groundwater

6.3.1 GW6 continued to display the highest concentrations of most parameters potentially due to the residual impact of the leachate outbreak close to this borehole which was detected in May 2013. The concentrations of key leachate indicator parameters have decreased considerably since the outbreak. Ammoniacal nitrogen and COD concentrations further decreased since the previous review

6.4 Surface Water

6.4.1 Surface water was generally of good quality across the sampled locations.



Notes

- Groundwater Borehole
- Side Slope Riser
- Leachate Chamber
- Surface Water Monitoring Point
- Cross Section
- Ground Water Contours

Notes

Monitoring Point Height (mOD) Given Below Identity Number

Ground Water Contour Based on 2005 Levels

TerraConsult

Bold Business Centre, Bold Lane, Sutton, St Helens WA9 4TX

Client

A D Waste Limited

Site

Standard Landfill Buckley

Title

Environmental Monitoring Locations

Scale	1:1500	@ A2
Drawing No.	0987/1/002	
Rev	Date	Description
File	Standard Landfill3863a-TCL Revision001.dwg	
Date 03/09	Engineer CB	
Drawn SH	Checked JB	

APPENDIX 1

APPENDIX 1

Table 1 – Summary of Landfill Gas Concentrations

Location	Methane (%v/v)					Carbon Dioxide (%v/v)				
	Min	Max	Ave	Count	Limit	Min	Max	Ave	Count	Limit
BH 1	0.0	0.0	0.0	12	**1.0**	1.7	2.5	2.2	12	**5.4**
BH 1.1	0.0	0.0	0.0	12	**1.0**	1.9	2.6	2.2	12	**5.4**
BH 2.0	0.0	0.0	0.0	12	**1.0**	1.5	2.6	1.9	12	**7.1**
BH 2.1	0.0	0.0	0.0	12	**1.0**	1.2	2.1	1.8	12	**7.6**
BH 2.2	0.0	0.0	0.0	12	**1.0**	1.2	2.0	1.7	12	**5.8**
BH 3.0	0.0	0.0	0.0	12	**1.0**	1.5	2.9	2.0	12	**6.7**
BH 3.1	0.0	0.0	0.0	12	**1.0**	1.5	2.1	1.8	12	**7.8**
BH 4.0	0.0	0.0	0.0	12	**1.0**	1.6	2.6	2.2	12	**10.7**
BH 4.1	0.0	0.0	0.0	12	**1.0**	1.4	2.5	1.9	12	**7.1**
BH 4.2	0.0	0.0	0.0	12	**1.0**	1.2	2.0	1.7	12	**8.6**
BH 5.0	0.0	0.0	0.0	12	**1.0**	2.0	2.6	2.2	12	**19.4**
BH 5.1	0.0	0.0	0.0	12	**1.0**	1.0	2.9	1.9	12	**5.8**
BH 5.2	0.0	0.0	0.0	12	**1.0**	2.0	2.9	2.4	12	**9.6**
BH 5.3	0.0	0.0	0.0	12	**1.0**	1.6	2.6	2.1	12	**6.0**
BH 5.4	0.0	0.0	0.0	12	**1.0**	1.2	1.9	1.6	12	**16.0**
BH 5.5	0.0	0.0	0.0	12	**1.0**	1.9	2.5	2.2	12	**17.1**
BH 5.7	0.0	0.0	0.0	12	**1.0**	2.0	2.6	2.3	12	**7.1**
BH 6.0	0.0	0.0	0.0	12	**1.0**	1.1	2.5	1.8	12	**8.9**
BH 6.1	0.0	0.0	0.0	12	**1.0**	1.7	2.6	2.1	12	**3.7**
BH 6.2	0.0	0.0	0.0	12	**1.0**	1.3	2.1	1.8	12	**6.1**
BH 6.3	0.0	0.0	0.0	12	**1.0**	1.5	2.4	2.0	12	**8.2**
BH 7.0	0.0	0.0	0.0	12	**1.0**	1.5	2.6	2.2	12	**6.2**
BH 7.1	0.0	0.0	0.0	12	**1.0**	1.2	1.9	1.7	12	**5.5**
BH 12	0.0	0.0	0.0	12	**1.0**	2.0	2.6	2.4	12	**6.5**
BH 13	0.0	0.0	0.0	12	**1.0**	1.5	2.0	1.8	12	**5.2**
BH 15	0.0	0.0	0.0	12	**1.0**	1.4	1.9	1.6	12	**8.3**
BH 16	0.0	0.0	0.0	12	**1.0**	1.4	2.0	1.7	12	**3.0**
BH 22	0.2	0.4	0.3	12	**1.0**	1.4	2.3	1.9	12	**3.1**

APPENDIX 2

APPENDIX 2

Table 2.1 - Leachate Levels

Location	Date	Dip Level (mBGL)	Leachate Level (mAOD)	Leachate Level Head (m)
LC2.1	03/01/2017	29.61	111.44	1.39
	07/02/2017	29.58	111.47	1.42
	07/03/2017	29.61	111.44	1.39
LC3	03/01/2017	3.31	130.65	1.53
	07/02/2017	3.25	130.71	1.59
	07/03/2017	3.27	130.69	1.57
LC4	03/01/2017	17.44	131.21	1.56
	07/02/2017	17.49	131.16	1.51
	07/03/2017	17.46	131.19	1.54
LC7	03/01/2017	18.49	132.8	1.82
	07/02/2017	18.53	132.76	1.78
	07/03/2017	18.5	132.79	1.81
LS5	03/01/2017	28.69	104.62	1.32
	07/02/2017	28.74	104.57	1.30
	07/03/2017	28.77	104.54	1.29
LS6	03/01/2017	30.01	104.85	1.19
	07/02/2017	30.04	104.82	1.18
	07/03/2017	30	104.86	1.20
S1	03/01/2017	3.09	124.89	1.34
	07/02/2017	3.11	124.87	1.32
	07/03/2017	3.14	124.84	1.29
S2	03/01/2017	1.55	127.31	1.80
	07/02/2017	1.62	127.24	1.73
	07/03/2017	1.65	127.21	1.70
S3	03/01/2017	3.58	124.92	1.51
	07/02/2017	3.62	124.88	1.47
	07/03/2017	3.59	124.91	1.50

Table 2.2 - Leachate Quality Data Summary

Parameter	Unit	LC2	LC3	LC4	LC7	S1	S2	S3	SSR5	SSR6
Inorganics										
Alkalinity, Total as CaCO3	mg/l	7280	6800	7660	4900	1100	2400	1670	4150	1030
Ammoniacal Nitrogen as N	mg/l	1430	16.6	1530	309	31.2	182	190	756	757
Ammoniacal Nitrogen as NH4	mg/l	1840	21.3	1970	397				972	973
BOD, unfiltered	mg/l	123	<10	333	267		24.5		66.5	87.1
Chloride	mg/l	2110	1860	2150	1130	567	622	365	1090	1080
Chlorine, Total (Residual)	mg/l	3.6	3.5	2.9	0.17	0.45	0.49	0.21	2.6	2.4
COD, unfiltered	mg/l	2300	185	2350	3690	40.5	297	247	1090	1110
Conductivity @ 20 deg.C	mS/cm	15.8	14.9	16.3	7.36	5.46	5.96	3.86	9.95	9.48
pH	pH Units	7.88	8.06	7.9	7.87	7.84	7.88	7.44	8.06	8.02
Total Oxidised Nitrogen as N	mg/l	0.51	<0.5	<0.5	<0.1	0.414	0.309	0.194	<0.5	0.957
Total Oxidised Nitrogen as NO3	mg/l	2.26	2.02	2.21	0.423				<1.5	4.23
Filtered (Dissolved) Metals										
Magnesium (diss.filt)	mg/l	92.6	90.3	97.9	121	47.1	54.6	70.7	69.7	70.5
Potassium (diss.filt)	mg/l	740	707	813	210	180	172	123	416	430
Sodium (diss.filt)	mg/l	1850	1640	1840	651	475	502	306	1030	1090

APPENDIX 3

APPENDIX 3

Table 3.1 - Groundwater Levels

Location	Date	Dip Level (mBGL)	Groundwater Level (m AOD)
GW 1	24/01/2017	28.41	95.67
	21/02/2017	30.25	93.83
	03/04/2017	34.67	89.41
GW 2R	24/01/2017	48.32	-
	21/02/2017	50.10	-
	03/04/2017	43.36	-
GW 3	24/01/2017	38.35	75.07
	21/02/2017	40.21	73.21
	03/04/2017	39.99	73.43
GW 4R	24/01/2017	46.08	84.92
	21/02/2017	46.55	84.45
	03/04/2017	47.89	83.11
GW 5	24/01/2017	1.99	132.87
	21/02/2017	2.09	132.77
	03/04/2017	2.51	132.35
GW 6	24/01/2017	24.08	99.49
	21/02/2017	26.32	97.25
	03/04/2017	28.10	95.47
GW 7R	24/01/2017	60.21	81.79
	21/02/2017	61.76	80.24
	03/04/2017	62.58	79.42

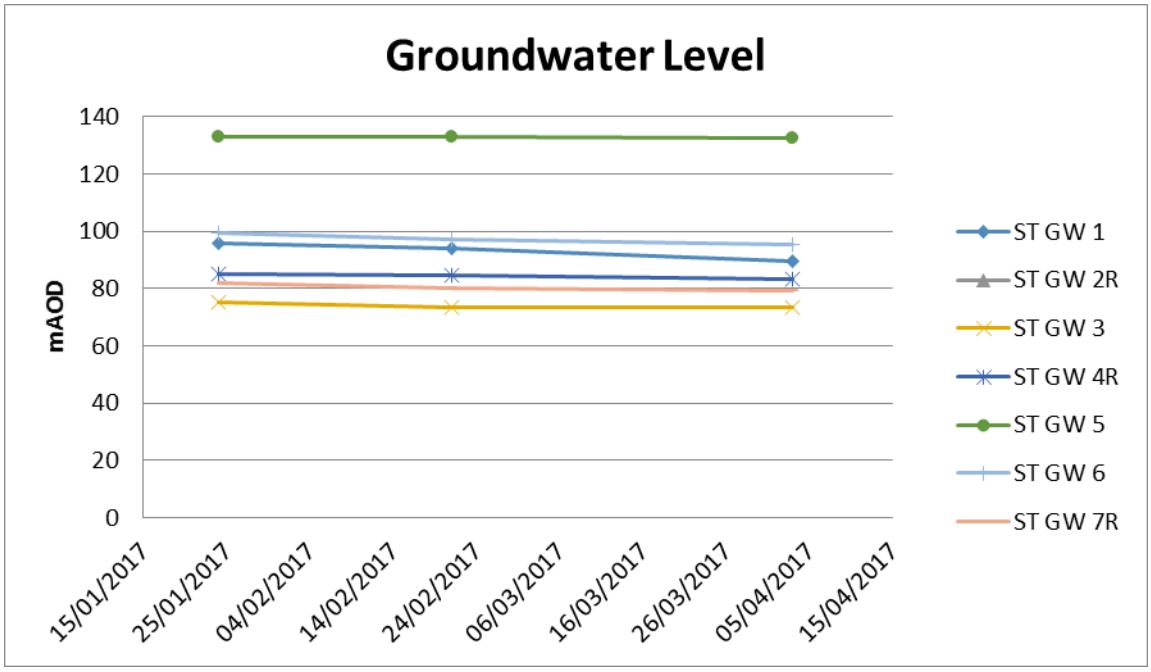

Groundwater Level
mAOD
140
120
100
80
60
40
20
0
15/01/2017
25/01/2017
04/02/2017
14/02/2017
24/02/2017
06/03/2017
16/03/2017
26/03/2017
05/04/2017
15/04/2017
ST GW 1
ST GW 2R
ST GW 3
ST GW 4R
ST GW 5
ST GW 6
ST GW 7R

Table 3.2 - Groundwater Quality Data Summary

Parameter		GW1	GW2R	GW3	GW4R	GW5	GW6	GW7
Carbon								
Organic Carbon, Total	mg/l	<3	4.71	<3	4.83	<3	12.6	3.02
Inorganics								
Alkalinity, Total as CaCO3	mg/l	50	105	210	160	120	19	280
Ammoniacal Nitrogen as N	mg/l	<0.2	0.319	1.3	<0.2	0.366	21	1.72
Ammoniacal Nitrogen as NH4	mg/l	<0.3	0.41	1.67	<0.3	0.471	27	2.21
BOD, unfiltered	mg/l	<1	<10	<1	<1	<1	<1	<1
Chloride	mg/l	55.5	85.1	36.7	35.4	6.8	91.8	61.9
Chlorine, Total (Residual)	mg/l	0.01	0.04	0.01	0.01	0.01	0.1	0.04
COD, unfiltered	mg/l	131	72.6	10.1	38.3	156	62.7	34
Cyanide, Total	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrate as NO3	mg/l	7.01	5.55	<0.3	1.21	0.72	130	0.954
Nitrite as NO2	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	0.083	0.306
pH	pH	6	6.36	6.91	6.52	6.61	5.39	6.9
Sulphate	mg/l	211	196	174	326	8.7	445	134
Total Oxidised Nitrogen as NO3	mg/l	7.03	5.58	<0.3	1.23	0.752	130	1.37
Filtered (Dissolved) Metals								
Iron (diss.filt)	mg/l	<0.019	<0.019	<0.019	<0.019	0.0504	0.0565	<0.019
Magnesium (diss.filt)	mg/l	27.5	35.3	34.2	40.3	5.09	31.7	29.1
Potassium (diss.filt)	mg/l	10.3	9.62	13.9	9.71	4.16	32.2	12.8
Sodium (diss.filt)	mg/l	30.1	41.1	28.9	27.7	6.05	114	76.3
Unfiltered (Total) Metals								
Arsenic (tot.unfilt)	mg/l	0.00685	0.0262	<0.002	0.0111	0.0366	0.00294	0.0359
Cadmium (tot.unfilt)	mg/l	<0.0005	<0.0005	<0.0005	0.0053	<0.0005	0.00224	0.000632
Calcium (tot.unfilt)	mg/l	62.4	73.3	87.8	134	44.6	74.6	85.1
Copper (tot.unfilt)	mg/l	0.0229	0.0126	<0.004	0.0599	0.0533	0.0122	0.0127
Lead (tot.unfilt)	mg/l	0.00556	0.00593	0.00203	0.103	0.118	0.00643	0.0139
Mercury (tot.unfilt)	mg/l	0.00158	<0.00002	<0.00002	<0.00002	0.000021	0.000049	<0.00002
Nickel (tot.unfilt)	mg/l	0.0164	0.0577	0.00249	0.498	0.0309	0.0872	0.0235
Zinc (tot.unfilt)	mg/l	0.221	0.0581	0.104	0.629	0.152	0.13	0.154
Phenols								
Cresols	mg/l	<0.6	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Phenol	mg/l	<0.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Phenols, Total Detected monohydric	mg/l	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016
Xylenols	mg/l	<0.8	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008

APPENDIX 4

APPENDIX 4

Table 4 –Surface Water Quality

Parameter	Units	SW1	SW2	SW4	SW5
Inorganics					
Alkalinity, Total as CaCO3	mg/l	115	140	185	100
Ammoniacal Nitrogen as N	mg/l	<0.2	<0.2	<0.2	<0.2
BOD, unfiltered	mg/l	4.16	<1	<1	10.1
Chloride	mg/l	69.7	95.1	72.2	24.5
Chlorine, Total (Residual)	mg/l	0.05	0.05	0.04	0.06
COD, unfiltered	mg/l	37.4	19.2	12.4	44.3
Conductivity @ 20 deg.C	mS/cm	0.768	0.752	0.731	0.458
Nitrate as NO3	mg/l	<0.3	0.476	12.3	<0.3
pH	pH Units	7.62	7.76	7.98	7.77
Sulphate	mg/l	229	175	158	116
Total Oxidised Nitrogen as N	mg/l	<0.1	0.116	2.78	<0.1
Filtered (Dissolved) Metals					
Calcium (diss.filt)	mg/l	94.1	91.5	111	49.8
Iron (diss.filt)	mg/l	0.0441	0.043	0.0449	0.0559
Magnesium (diss.filt)	mg/l	26.3	20.2	17.7	17.5
Potassium (diss.filt)	mg/l	6.84	8.15	10.6	7.45
Sodium (diss.filt)	mg/l	46.4	61.7	44.6	24.4

APPENDIX 5

Date	06/01/2017	
Weather:	Dry	
Wind conditions:	Breezy	
Air Temperature:	5	°C
Instrument:	GEM 2000	
Serial No:	GM12289	
Calibrated To:	29/03/2017	
Operatives	AS	

Monitoring Point	Time Hrs	CH4 %	CO2 %	O2 %	Balance %	CO ppm	H2S ppm	Baro mb	Rel Pressur mb	Trigger lev CH4 %	Trigger lev CO2
STBH 1	11:26	0	1.7	20	78.3	0	0	1000	-0.2	1	5.4
STBH 1.1	11:23	0	2	19.8	78.2	0	0	1000	-0.02	1	5.4
STBH 2.0	11:30	0	1.5	19.7	78.8	0	0	1000	-0.59	1	7
STBH 2.1	11:18	0	1.6	19.9	78.5	0	0	1000	-0.81	1	7.6
STBH 2.2	11:21	0	1.8	20	78.2	0	0	1000	-0.62	1	5.8
STBH 3.0	11:35	0	2.1	20.1	77.8	0	0	1000	-0.29	1	6.7
STBH 3.1	11:16	0	1.5	19.5	79	0	0	1000	0.39	1	7.8
STBH 4.0	11:39	0	2.3	19.4	78.3	0	0	1000	0.9	10	10.6
STBH 4.1	11:07	0	2.1	20	77.9	0	0	1000	1.29	1	7.1
STBH 4.2	11:12	0	1.9	19.8	78.3	0	0	1000	1.04	1	8.6
STBH 5.0	11:42	0	2.6	19.9	77.5	0	0	1000	0.63	15	19.4
STBH 5.1	11:46	0	2.4	20	77.6	0	0	1000	0.42	1	5.8
STBH 5.2	10:59	0	2.1	19.5	78.4	0	0	1000	0.34	1	9.6
STBH 5.3	11:02	0	1.8	19.8	78.4	0	0	1000	-0.13	1	6
STBH 6.0	12:04	0	2.5	19.9	77.6	0	0	1000	-0.91	1	5.4
STBH 6.1	10:48	0	1.7	20	78.3	0	0	1000	-0.24	1	5.4
STBH 6.2	10:52	0	2.1	19.6	78.3	0	0	1000	1.28	1	5.4
STBH 6.3	10:56	0	2	19.5	78.5	0	0	1000	0.98	1	8.2
STBH 7.0	12:08	0	1.9	19.3	78.8	0	0	1000	0.49	1	6.2
STBH 7.1	10:44	0	1.2	19.5	79.3	0	0	1000	0.54	1	5.5
STBH 9.0	Buried										
STBH 12	12:22	0	2	20.1	77.9	0	0	1000	-0.94	10	6.5
STBH 13	12:26	0	1.8	19.5	78.7	0	0	1000	-0.17	10	5.2
STBH 15	12:30	0	1.9	19.6	78.5	0	0	1000	0.83	1	8.3
STBH 16	12:34	0	1.7	19.9	78.4	0	0	1000	-0.75	1	3
STBH 22	12:38	0.2	1.4	20	78.4	0	0	1000	0.61	1.6	3.1
STMBH 5.4	11:50	0	1.6	19.8	78.6	0	0	1000	-0.7	1	16
STMBH 5.5	11:52	0	1.9	19.9	78.2	0	0	1000	-0.01	1	17.1
STMBH 5.7	11:55	0	2	19.8	78.2	0	0	1000	-0.18	1	7.1

Standard Landfill Borehole Gas Monitoring

Date	13/01/2017	
Weather:	Dry	
Wind conditions:	Breezy	
Air Temperature:	5	°C
Instrument:	GEM 2000	
Serial No:	GM12289	
Calibrated To:	29/03/2017	
Operatives	AS	

Monitoring Point	Time Hrs	CH4 %	CO2 %	O2 %	Balance %	CO ppm	H2S ppm	Baro mb	Rel Pressur mb	Trigger lev CH4 %	Trigger lev CO2
STBH 1	11:11	0	1.9	20.1	78	0	0	1004	0.03	1	5.4
STBH 1.1	11:08	0	2.2	19.7	78.1	0	0	1004	-0.13	1	5.4
STBH 2.0	11:15	0	1.7	19.6	78.7	0	0	1004	0.5	1	7
STBH 2.1	11:03	0	1.9	19.5	78.6	0	0	1004	0.79	1	7.6
STBH 2.2	11:06	0	2	19.9	78.1	0	0	1004	0.57	1	5.8
STBH 3.0	11:20	0	2.4	19.8	77.8	0	0	1004	0.63	1	6.7
STBH 3.1	11:01	0	1.6	19.8	78.6	0	0	1004	0.24	1	7.8
STBH 4.0	11:24	0	2.6	19.1	78.3	0	0	1004	1.23	10	10.6
STBH 4.1	10:52	0	2	19.8	78.2	0	0	1004	1.26	1	7.1
STBH 4.2	10:57	0	1.5	19.2	79.3	0	0	1004	1.07	1	8.6
STBH 5.0	11:27	0	2.1	19.6	78.3	0	0	1004	0.66	15	19.4
STBH 5.1	11:31	0	2.9	20	77.1	0	0	1004	0.41	1	5.8
STBH 5.2	10:44	0	2	20.2	77.8	0	0	1004	0.31	1	9.6
STBH 5.3	10:47	0	1.6	19.8	78.6	0	0	1004	1	1	6
STBH 6.0	11:49	0	2.2	19.9	77.9	0	0	1004	-0.9	1	5.4
STBH 6.1	10:33	0	1.9	20	78.1	0	0	1004	0.71	1	5.4
STBH 6.2	10:37	0	2	20.1	77.9	0	0	1004	1.35	1	5.4
STBH 6.3	10:41	0	2.3	20	77.7	0	0	1004	0.99	1	8.2
STBH 7.0	11:53	0	1.5	19.6	78.9	0	0	1004	0.15	1	6.2
STBH 7.1	10:29	0	1.6	19.5	78.9	0	0	1004	0.58	1	5.5

STBH 9.0	Buried										
STBH 12	12:07	0	2.3	19.9	77.8	0	0	1004	0.9	10	6.5
STBH 13	12:11	0	1.5	19.8	78.7	0	0	1004	-0.2	10	5.2
STBH 15	12:15	0	1.6	19.6	78.8	0	0	1004	0.83	1	8.3
STBH 16	12:19	0	2	19.8	78.2	0	0	1004	0.62	1	3
STBH 22	12:23	0.3	1.7	20.1	77.9	0	0	1004	0.51	1.6	3.1
STMBH 5.4	11:35	0	1.9	19.9	78.2	0	0	1004	0.53	1	16
STMBH 5.5	11:37	0	2.3	19.8	77.9	0	0	1004	-0.16	1	17.1
STMBH 5.7	11:40	0	2.4	20	77.6	0	0	1004	-0.18	1	**7.1**

Standard Landfill Borehole Gas Monitoring

Date	20/01/2017	
Weather:	Dry	
Wind conditions:	Calm	
Air Temperature:	8	^{o}C
Instrument:	GEM 2000	
Serial No:	GM12289	
Calibrated To:	29/03/2017	
Operatives	AS	

Monitoring Point	Time Hrs	CH4 %	CO2 %	O2 %	Balance %	CO ppm	H2S ppm	Baro mb	Rel Pressur mb	Trigger lev CH4 %	Trigger lev CO2
STBH 1	11:23	0	2	19.9	78.1	0	0	1001	-0.12	1	5.4
STBH 1.1	11:20	0	2.6	20	77.4	0	0	1001	-0.05	1	5.4
STBH 2.0	11:27	0	1.8	19.8	78.4	0	0	1001	-0.55	1	7
STBH 2.1	11:15	0	2	19.9	78.1	0	0	1001	-0.77	1	7.6
STBH 2.2	11:18	0	1.8	20	78.2	0	0	1001	-0.58	1	5.8
STBH 3.0	11:32	0	2.9	19.8	77.3	0	0	1001	-0.26	1	6.7
STBH 3.1	11:13	0	1.9	19.6	78.5	0	0	1001	0.3	1	7.8
STBH 4.0	11:36	0	2.3	19.5	78.2	0	0	1001	0.86	10	10.6
STBH 4.1	11:04	0	2.5	19.8	77.7	0	0	1001	1.22	1	7.1
STBH 4.2	11:09	0	1.7	19.6	78.7	0	0	1001	1.03	1	8.6
STBH 5.0	11:39	0	2.4	20	77.6	0	0	1001	0.62	15	19.4
STBH 5.1	11:43	0	2.5	20.1	77.4	0	0	1001	0.44	1	5.8
STBH 5.2	10:56	0	2.6	19.8	77.6	0	0	1001	0.27	1	9.6
STBH 5.3	10:59	0	1.9	19.9	78.2	0	0	1001	-0.1	1	6
STBH 6.0	12:01	0	2.5	20	77.5	0	0	1001	-0.94	1	5.4
STBH 6.1	10:45	0	1.8	19.8	78.4	0	0	1001	-0.3	1	5.4
STBH 6.2	10:49	0	1.6	19.7	78.7	0	0	1001	1.19	1	5.4
STBH 6.3	10:53	0	2.1	19.9	78	0	0	1001	1.08	1	8.2
STBH 7.0	12:05	0	1.9	20	78.1	0	0	1001	0.46	1	6.2
STBH 7.1	10:41	0	1.8	20.1	78.1	0	0	1001	0.58	1	5.5
STBH 9.0	Buried										
STBH 12	12:19	0	2.5	19.8	77.7	0	0	1001	-0.9	10	6.5
STBH 13	12:23	0	1.9	19.6	78.5	0	0	1001	-0.19	10	5.2
STBH 15	12:27	0	1.4	19.9	78.7	0	0	1001	0.87	1	8.3
STBH 16	12:31	0	1.8	19.8	78.4	0	0	1001	-0.78	1	3
STBH 22	12:35	0.2	1.9	19.4	78.5	0	0	1001	0.65	1.6	3.1
STMBH 5.4	11:47	0	1.5	20	78.5	0	0	1001	-0.64	1	16
STMBH 5.5	11:49	0	2.5	19.8	77.7	0	0	1001	0.01	1	17.1
STMBH 5.7	11:52	0	2.6	19.9	77.5	0	0	1001	-0.14	1	**7.1**

Standard Landfill Borehole Gas Monitoring

Date	27/01/2017	
Weather:	Dry	
Wind conditions:	Calm	
Air Temperature:	6	^{o}C
Instrument:	GEM 2000	
Serial No:	GM12289	
Calibrated To:	29/03/2017	
Operatives	AS	

Monitoring Point	Time Hrs	CH4 %	CO2 %	O2 %	Balance %	CO ppm	H2S ppm	Baro mb	Rel Pressur mb	Trigger lev CH4 %	Trigger lev CO2
STBH 1	11:39	0	2.5	19.5	78	0	0	996	0.1	1	5.4
STBH 1.1	11:36	0	2.2	19.8	78	0	0	996	-0.07	1	5.4
STBH 2.0	11:43	0	1.6	19.6	78.8	0	0	996	0.5	1	7
STBH 2.1	11:31	0	2.1	19.6	78.3	0	0	996	0.85	1	7.6
STBH 2.2	11:34	0	2	19.8	78.2	0	0	996	0.51	1	5.8
STBH 3.0	11:48	0	2.5	20	77.5	0	0	996	0.58	1	6.7
STBH 3.1	11:29	0	1.8	19.9	78.3	0	0	996	0.28	1	7.8

STBH 4.0	11:52	0	2.1	19.2	78.7	0	0	996	1.25	10	10.6
STBH 4.1	11:20	0	2.4	19.9	77.7	0	0	996	1.26	1	7.1
STBH 4.2	11:25	0	1.9	19.9	78.2	0	0	996	1.05	1	8.6
STBH 5.0	11:55	0	2.5	20.1	77.4	0	0	996	0.64	15	19.4
STBH 5.1	11:59	0	2.2	19.6	78.2	0	0	996	0.42	1	5.8
STBH 5.2	11:12	0	2.1	19.8	78.1	0	0	996	0.22	1	9.6
STBH 5.3	11:15	0	1.6	19.5	78.9	0	0	996	0.94	1	6
STBH 6.0	12:17	0	2.1	19.8	78.1	0	0	996	-0.88	1	5.4
STBH 6.1	11:01	0	1.9	20	78.1	0	0	996	0.69	1	5.4
STBH 6.2	11:05	0	1.8	20	78.2	0	0	996	1.37	1	5.4
STBH 6.3	11:09	0	2.4	19.9	77.7	0	0	996	1.04	1	8.2
STBH 7.0	12:21	0	2	19.9	78.1	0	0	996	0.12	1	6.2
STBH 7.1	10:57	0	1.9	20.1	78	0	0	996	0.56	1	5.5
STBH 9.0	Buried										
STBH 12	12:35	0	2.4	19.8	77.8	0	0	996	0.82	10	6.5
STBH 13	12:39	0	1.8	19.5	78.7	0	0	996	-0.16	10	5.2
STBH 15	12:43	0	1.6	19.7	78.7	0	0	996	0.86	1	8.3
STBH 16	12:47	0	1.9	19.9	78.2	0	0	996	0.59	1	3
STBH 22	12:51	0.4	2	19.8	77.8	0	0	996	0.51	1.6	3.1
STMBH 5.4	12:03	0	1.7	19.6	78.7	0	0	996	0.58	1	16
STMBH 5.5	12:05	0	2.4	19.8	77.8	0	0	996	-0.16	1	17.1
STMBH 5.7	12:08	0	2.2	20	77.8	0	0	996	-0.18	1	**7.1**

Standard Landfill Borehole Gas Monitoring

Date 03/02/2017
Weather: Dry
Wind conditions: Calm
Air Temperature: 8 °C

Instrument: GEM 2000
Serial No: GM12289
Calibrated To: 29/03/2017
Operatives AS

Monitoring Point	Time Hrs	CH4 %	CO2 %	O2 %	Balance %	CO ppm	H2S ppm	Baro mb	Rel Pressur mb	Trigger lev CH4 %	Trigger lev CO2
STBH 1	10:19	0	2.2	19.9	77.9	0	0	999	-0.12	1	5.4
STBH 1.1	10:16	0	2.6	19.9	77.5	0	0	999	-0.05	1	5.4
STBH 2.0	10:23	0	1.7	20	78.3	0	0	999	-0.55	1	7
STBH 2.1	10:11	0	2	19.7	78.3	0	0	999	-0.77	1	7.6
STBH 2.2	10:14	0	1.9	19.9	78.2	0	0	999	-0.58	1	5.8
STBH 3.0	10:28	0	2.2	20.1	77.7	0	0	999	-0.26	1	6.7
STBH 3.1	10:09	0	1.6	20	78.4	0	0	999	0.3	1	7.8
STBH 4.0	10:32	0	2	20	78	0	0	999	0.86	10	10.6
STBH 4.1	10:00	0	1.8	20.1	78.1	0	0	999	1.22	1	7.1
STBH 4.2	10:05	0	2	19.8	78.2	0	0	999	1.03	1	8.6
STBH 5.0	10:35	0	2.4	19.6	78	0	0	999	0.62	15	19.4
STBH 5.1	10:39	0	2	19.6	78.4	0	0	999	0.44	1	5.8
STBH 5.2	09:52	0	2.6	19.8	77.6	0	0	999	0.27	1	9.6
STBH 5.3	09:55	0	1.9	19.6	78.5	0	0	999	-0.1	1	6
STBH 6.0	10:57	0	2	19.8	78.2	0	0	999	-0.94	1	5.4
STBH 6.1	09:41	0	2.6	19.5	77.9	0	0	999	-0.3	1	5.4
STBH 6.2	09:45	0	2	19.3	78.7	0	0	999	1.19	1	5.4
STBH 6.3	09:49	0	2.1	19.8	78.1	0	0	999	1.08	1	8.2
STBH 7.0	11:01	0	2.3	20	77.7	0	0	999	0.46	1	6.2
STBH 7.1	09:37	0	1.6	19.8	78.6	0	0	999	0.58	1	5.5
STBH 9.0	Buried										
STBH 12	11:15	0	2.5	19.9	77.6	0	0	999	-0.9	10	6.5
STBH 13	11:19	0	1.9	19.7	78.4	0	0	999	-0.19	10	5.2
STBH 15	11:23	0	1.5	19.9	78.6	0	0	999	0.87	1	8.3
STBH 16	11:27	0	1.8	19.5	78.7	0	0	999	-0.78	1	3
STBH 22	11:31	0.3	2.3	19.5	77.9	0	0	999	0.65	1.6	3.1
STMBH 5.4	10:43	0	1.5	19.9	78.6	0	0	999	-0.64	1	16
STMBH 5.5	10:45	0	2.1	19.9	78	0	0	999	0.01	1	17.1
STMBH 5.7	10:48	0	2.5	19.8	77.7	0	0	999	-0.14	1	**7.1**

Standard Landfill Borehole Gas Monitoring

Date 10/02/2017
Weather: Dry
Wind conditions: Breezy
Air Temperature: 6 °C

Instrument: GEM 2000

Serial No: GM12289
Calibrated To: 29/03/2017
Operatives AS

Monitoring Point	Time Hrs	CH4 %	CO2 %	O2 %	Balance %	CO ppm	H2S ppm	Baro mb	Rel Pressur mb	Trigger lev CH4 %	Trigger lev CO2
STBH 1	11:35	0	2.5	19.6	77.9	0	0	996	-0.17	1	5.4
STBH 1.1	11:32	0	2.4	20	77.6	0	0	996	-0.04	1	5.4
STBH 2.0	11:39	0	1.6	19.7	78.7	0	0	996	-0.58	1	7
STBH 2.1	11:27	0	1.9	19.2	78.9	0	0	996	-0.84	1	7.6
STBH 2.2	11:30	0	2	19.5	78.5	0	0	996	-0.58	1	5.8
STBH 3.0	11:44	0	2	19.8	78.2	0	0	996	-0.28	1	6.7
STBH 3.1	11:25	0	1.9	19.6	78.5	0	0	996	0.34	1	7.8
STBH 4.0	11:48	0	2.3	19.8	77.9	0	0	996	0.9	10	10.6
STBH 4.1	11:16	0	1.6	19.6	78.8	0	0	996	1.27	1	7.1
STBH 4.2	11:21	0	1.9	20	78.1	0	0	996	0.97	1	8.6
STBH 5.0	11:51	0	2	19.8	78.2	0	0	996	0.65	15	19.4
STBH 5.1	11:55	0	1.8	19.2	79	0	0	996	0.42	1	5.8
STBH 5.2	11:08	0	2.4	19.8	77.8	0	0	996	0.3	1	9.6
STBH 5.3	11:11	0	2	20	78	0	0	996	-0.17	1	6
STBH 6.0	12:13	0	1.6	19.9	78.5	0	0	996	-0.9	1	5.4
STBH 6.1	10:57	0	2.2	19.7	78.1	0	0	996	-0.3	1	5.4
STBH 6.2	11:01	0	1.8	19.6	78.6	0	0	996	1.18	1	5.4
STBH 6.3	11:05	0	2	19.5	78.5	0	0	996	1.05	1	8.2
STBH 7.0	12:17	0	2.5	19.9	77.6	0	0	996	0.5	1	6.2
STBH 7.1	10:53	0	1.9	20	78.1	0	0	996	0.6	1	5.5
STBH 9.0	Buried										
STBH 12	12:31	0	2.4	19.8	77.8	0	0	996	-0.91	10	6.5
STBH 13	12:35	0	1.5	19.5	79	0	0	996	-0.12	10	5.2
STBH 15	12:39	0	1.9	20	78.1	0	0	996	0.91	1	8.3
STBH 16	12:43	0	1.5	19.9	78.6	0	0	996	-0.77	1	3
STBH 22	12:47	0.2	2.1	19.6	78.1	0	0	996	0.67	1.6	3.1
STMBH 5.4	11:59	0	1.9	20	78.1	0	0	996	-0.62	1	16
STMBH 5.5	12:01	0	2	19.8	78.2	0	0	996	0.01	1	17.1
STMBH 5.7	12:04	0	2.4	20	77.6	0	0	996	-0.13	1	**7.1**

Standard Landfill Borehole Gas Monitoring

Date 17/02/2017
Weather: Dry
Wind conditions: Calm
Air Temperature: 5 °C

Instrument: GEM 2000
Serial No: GM12289
Calibrated To: 29/03/2017
Operatives AS

Monitoring Point	Time Hrs	CH4 %	CO2 %	O2 %	Balance %	CO ppm	H2S ppm	Baro mb	Rel Pressur mb	Trigger lev CH4 %	Trigger lev CO2
STBH 1	10:37	0	2.2	20.1	77.7	0	0	999	0.52	1	5.4
STBH 1.1	10:34	0	1.9	19.1	79	0	0	999	-0.71	1	5.4
STBH 2.0	10:41	0	1.8	19.6	78.6	0	0	999	0.78	1	7
STBH 2.1	10:29	0	2	20	78	0	0	999	0.56	1	7.6
STBH 2.2	10:32	0	1.8	19.9	78.3	0	0	999	0.62	1	5.8
STBH 3.0	10:46	0	1.6	19.7	78.7	0	0	999	0.67	1	6.7
STBH 3.1	10:27	0	2.1	19.8	78.1	0	0	999	0.69	1	7.8
STBH 4.0	10:50	0	2.2	19.6	78.2	0	0	999	1.05	10	10.6
STBH 4.1	10:18	0	1.9	19.8	78.3	0	0	999	1.14	1	7.1
STBH 4.2	10:23	0	1.6	20.1	78.3	0	0	999	0.78	1	8.6
STBH 5.0	10:53	0	2.3	20	77.7	0	0	999	0.82	15	19.4
STBH 5.1	10:57	0	1.5	19.9	78.6	0	0	999	0.63	1	5.8
STBH 5.2	10:10	0	2.5	19.8	77.7	0	0	999	0.57	1	9.6
STBH 5.3	10:13	0	2.3	19.5	78.2	0	0	999	0.63	1	6
STBH 6.0	11:15	0	1.9	19.9	78.2	0	0	999	-0.87	1	5.4
STBH 6.1	09:59	0	2.1	19.8	78.1	0	0	999	0.49	1	5.4
STBH 6.2	10:03	0	1.9	20	78.1	0	0	999	0.85	1	5.4
STBH 6.3	10:07	0	2.2	19.9	77.9	0	0	999	0.7	1	8.2
STBH 7.0	11:19	0	2.3	19.6	78.1	0	0	999	0.65	1	6.2
STBH 7.1	09:55	0	1.5	19.9	78.6	0	0	999	0.89	1	5.5
STBH 9.0	Buried										
STBH 12	11:33	0	2.6	19.7	77.7	0	0	999	1.36	10	6.5
STBH 13	11:37	0	1.9	19.6	78.5	0	0	999	-0.87	10	5.2
STBH 15	11:41	0	1.5	19.8	78.7	0	0	999	0.6	1	8.3
STBH 16	11:45	0	1.4	19.6	79	0	0	999	0.74	1	3
STBH 22	11:49	0.3	2.3	19.8	77.6	0	0	999	0.56	1.6	3.1

STMBH 5.4	11:01	0	1.8	20.1	78.1	0	0	999	0.89	1	16
STMBH 5.5	11:03	0	2.3	19.9	77.8	0	0	999	0.75	1	17.1
STMBH 5.7	11:06	0	2.1	19.9	78	0	0	999	-0.69	1	**7.1**

Standard Landfill Borehole Gas Monitoring

Date 24/02/2017
Weather: Dry
Wind conditions: Breezy
Air Temperature: 8 °C

Instrument: GEM 2000
Serial No: GM12289
Calibrated To: 29/03/2017
Operatives AS

Monitoring Point	Time Hrs	CH4 %	CO2 %	O2 %	Balance %	CO ppm	H2S ppm	Baro mb	Rel Pressur mb	Trigger lev CH4 %	Trigger lev CO2
STBH 1	09:54	0	2.1	19.9	78	0	0	996	0.46	1	5.4
STBH 1.1	09:51	0	2.3	19.5	78.2	0	0	996	-0.68	1	5.4
STBH 2.0	09:58	0	2.1	19.9	78	0	0	996	0.89	1	7
STBH 2.1	09:46	0	1.8	20	78.2	0	0	996	0.52	1	7.6
STBH 2.2	09:49	0	1.5	19.8	78.7	0	0	996	0.6	1	5.8
STBH 3.0	10:03	0	1.9	19.9	78.2	0	0	996	0.74	1	6.7
STBH 3.1	09:44	0	2	20	78	0	0	996	0.71	1	7.8
STBH 4.0	10:07	0	2	19.8	78.2	0	0	996	1.13	10	10.6
STBH 4.1	09:35	0	1.5	19.6	78.9	0	0	996	1.37	1	7.1
STBH 4.2	09:40	0	1.8	19.8	78.4	0	0	996	0.66	1	8.6
STBH 5.0	10:10	0	2.1	20	77.9	0	0	996	0.9	15	19.4
STBH 5.1	10:14	0	1	20.1	78.9	0	0	996	0.62	1	5.8
STBH 5.2	09:27	0	2.9	19.6	77.5	0	0	996	0.48	1	9.6
STBH 5.3	09:30	0	2.5	19.7	77.8	0	0	996	0.74	1	6
STBH 6.0	10:32	0	1.5	20	78.5	0	0	996	-0.79	1	5.4
STBH 6.1	09:16	0	2.3	19.6	78.1	0	0	996	0.52	1	5.4
STBH 6.2	09:20	0	2	19.8	78.2	0	0	996	0.87	1	5.4
STBH 6.3	09:24	0	1.8	19.8	78.4	0	0	996	0.69	1	8.2
STBH 7.0	10:36	0	2	20	78	0	0	996	0.63	1	6.2
STBH 7.1	09:12	0	1.8	19.5	78.7	0	0	996	0.84	1	5.5
STBH 9.0	Buried										
STBH 12	10:50	0	2.2	19.6	78.2	0	0	996	1.36	10	6.5
STBH 13	10:54	0	1.6	19.9	78.5	0	0	996	-0.84	10	5.2
STBH 15	10:58	0	1.4	19.9	78.7	0	0	996	0.65	1	8.3
STBH 16	11:02	0	1.9	20	78.1	0	0	996	0.7	1	3
STBH 22	11:06	0.2	2.1	19.5	78.2	0	0	996	0.52	1.6	3.1
STMBH 5.4	10:18	0	1.5	19.8	78.7	0	0	996	0.82	1	16
STMBH 5.5	10:20	0	2	20	78	0	0	996	0.73	1	17.1
STMBH 5.7	10:23	0	2.2	19.6	78.2	0	0	996	-0.67	1	**7.1**

Standard Landfill Borehole Gas Monitoring

Date 03/03/2017
Weather: Dry
Wind conditions: Breezy
Air Temperature: 6 °C

Instrument: GEM 2000
Serial No: GM12289
Calibrated To: 29/03/2017
Operatives AS

Monitoring Point	Time Hrs	CH4 %	CO2 %	O2 %	Balance %	CO ppm	H2S ppm	Baro mb	Rel Pressur mb	Trigger lev CH4 %	Trigger lev CO2
STBH 1	11:16	0	2.3	20	77.7	0	0	999	0.4	1	5.4
STBH 1.1	11:13	0	2.2	19.6	78.2	0	0	999	-0.65	1	5.4
STBH 2.0	11:20	0	2	19.8	78.2	0	0	999	0.82	1	7
STBH 2.1	11:08	0	1.5	19.6	78.9	0	0	999	0.45	1	7.6
STBH 2.2	11:11	0	1.3	19.9	78.8	0	0	999	0.66	1	5.8
STBH 3.0	11:25	0	1.6	20	78.4	0	0	999	0.62	1	6.7
STBH 3.1	11:06	0	1.8	19.9	78.3	0	0	999	0.77	1	7.8
STBH 4.0	11:29	0	2.3	19.9	77.8	0	0	999	1.2	10	10.6
STBH 4.1	10:57	0	1.4	20	78.6	0	0	999	1.49	1	7.1
STBH 4.2	11:02	0	1.5	19.6	78.9	0	0	999	0.78	1	8.6
STBH 5.0	11:32	0	2	20.1	77.9	0	0	999	0.89	15	19.4
STBH 5.1	11:36	0	1.6	19.8	78.6	0	0	999	0.72	1	5.8
STBH 5.2	10:49	0	2.5	19.7	77.8	0	0	999	0.4	1	9.6

STBH 5.3	10:52	0	2.6	19.6	77.8	0	0	999	0.82	1	6
STBH 6.0	11:54	0	1.4	19.2	79.4	0	0	999	-0.68	1	5.4
STBH 6.1	10:38	0	2.1	19.5	78.4	0	0	999	0.46	1	5.4
STBH 6.2	10:42	0	1.8	19.8	78.4	0	0	999	0.8	1	5.4
STBH 6.3	10:46	0	1.5	19.7	78.8	0	0	999	0.63	1	8.2
STBH 7.0	11:58	0	2.6	19.3	78.1	0	0	999	0.54	1	6.2
STBH 7.1	10:34	0	1.9	19.9	78.2	0	0	999	0.86	1	5.5
STBH 9.0	Buried										
STBH 12	12:12	0	2.5	20	77.5	0	0	999	1.22	10	6.5
STBH 13	12:16	0	2	19.8	78.2	0	0	999	-0.87	10	5.2
STBH 15	12:20	0	1.9	19.6	78.5	0	0	999	0.71	1	8.3
STBH 16	12:24	0	1.5	19.8	78.7	0	0	999	0.63	1	3
STBH 22	12:28	0.3	1.8	19.6	78.3	0	0	999	0.45	1.6	3.1
STMBH 5.4	11:40	0	1.2	19.9	78.9	0	0	999	0.88	1	16
STMBH 5.5	11:42	0	2.3	19.5	78.2	0	0	999	-0.67	1	17.1
STMBH 5.7	11:45	0	2.6	19.7	77.7	0	0	999	-0.57	1	**7.1**

Standard Landfill Borehole Gas Monitoring

Date	10/03/2017	
Weather:	Dry	
Wind conditions:	Breezy	
Air Temperature:	6	^{o}C
Instrument:	GEM 2000	
Serial No:	GM12289	
Calibrated To:	29/03/2017	
Operatives	AS	

Monitoring Point	Time Hrs	CH4 %	CO2 %	O2 %	Balance %	CO ppm	H2S ppm	Baro mb	Rel Pressur mb	Trigger lev CH4 %	Trigger lev CO2
STBH 1	10:37	0	2.5	19.9	77.6	0	0	1004	0.5	1	5.4
STBH 1.1	10:34	0	2	19.8	78.2	0	0	1004	-0.62	1	5.4
STBH 2.0	10:41	0	2.6	19.9	77.5	0	0	1004	0.87	1	7
STBH 2.1	10:29	0	1.9	19.9	78.2	0	0	1004	0.61	1	7.6
STBH 2.2	10:32	0	1.2	20	78.8	0	0	1004	0.79	1	5.8
STBH 3.0	10:46	0	1.5	19.8	78.7	0	0	1004	0.62	1	6.7
STBH 3.1	10:27	0	1.9	19.6	78.5	0	0	1004	0.77	1	7.8
STBH 4.0	10:50	0	2.1	19.8	78.1	0	0	1004	1.01	10	10.6
STBH 4.1	10:18	0	1.6	20.1	78.3	0	0	1004	1.06	1	7.1
STBH 4.2	10:23	0	1.2	19.9	78.9	0	0	1004	0.92	1	8.6
STBH 5.0	10:53	0	2.3	19.7	78	0	0	1004	0.84	15	19.4
STBH 5.1	10:57	0	1.7	19.5	78.8	0	0	1004	0.63	1	5.8
STBH 5.2	10:10	0	2.4	19.6	78	0	0	1004	0.71	1	9.6
STBH 5.3	10:13	0	2.5	19.9	77.6	0	0	1004	0.69	1	6
STBH 6.0	11:15	0	1.1	20	78.9	0	0	1004	-0.83	1	5.4
STBH 6.1	09:59	0	2	19.8	78.2	0	0	1004	0.53	1	5.4
STBH 6.2	10:03	0	1.6	20.1	78.3	0	0	1004	0.79	1	5.4
STBH 6.3	10:07	0	1.9	20	78.1	0	0	1004	0.66	1	8.2
STBH 7.0	11:19	0	2.5	19.5	78	0	0	1004	0.51	1	6.2
STBH 7.1	09:55	0	1.8	19.6	78.6	0	0	1004	0.9	1	5.5
STBH 9.0	Buried										
STBH 12	11:33	0	2.4	19.8	77.8	0	0	1004	1.17	10	6.5
STBH 13	11:37	0	1.8	19.5	78.7	0	0	1004	-0.79	10	5.2
STBH 15	11:41	0	1.6	19.3	79.1	0	0	1004	0.69	1	8.3
STBH 16	11:45	0	1.4	19.8	78.8	0	0	1004	0.89	1	3
STBH 22	11:49	0.2	1.9	20	77.9	0	0	1004	0.54	1.6	3.1
STMBH 5.4	11:01	0	1.5	19.9	78.6	0	0	1004	0.84	1	16
STMBH 5.5	11:03	0	2.2	19.6	78.2	0	0	1004	0.76	1	17.1
STMBH 5.7	11:06	0	2.1	19.9	78	0	0	1004	-0.69	1	**7.1**

Standard Landfill Borehole Gas Monitoring

Date	17/03/2017	
Weather:	Dry	
Wind conditions:	Breezy	
Air Temperature:	12	^{o}C
Instrument:	GEM 2000	
Serial No:	GM12289	
Calibrated To:	29/03/2017	
Operatives	AS	

Monitoring	Time	CH4	CO2	O2	Balance	CO	H2S	Baro	Rel Pressur	Trigger lev	Trigger lev

Point	Hrs	%	%	%	%	ppm	ppm	mb	mb	CH4 %	CO2
STBH 1	09:54	0	2.3	19.8	77.9	0	0	1002	0.08	1	5.4
STBH 1.1	09:51	0	2.1	19.3	78.6	0	0	1002	0.14	1	5.4
STBH 2.0	09:58	0	2.5	19.2	78.3	0	0	1002	0.41	1	7
STBH 2.1	09:46	0	1.6	19.5	78.9	0	0	1002	0.32	1	7.6
STBH 2.2	09:49	0	1.5	19.5	79	0	0	1002	1.01	1	5.8
STBH 3.0	10:03	0	1.9	19	79.1	0	0	1002	0.26	1	6.7
STBH 3.1	09:44	0	1.8	19.1	79.1	0	0	1002	0.01	1	7.8
STBH 4.0	10:07	0	2	19.3	78.7	0	0	1002	0.2	10	10.6
STBH 4.1	09:35	0	1.9	19.9	78.2	0	0	1002	0.48	1	7.1
STBH 4.2	09:40	0	1.6	20	78.4	0	0	1002	0.96	1	8.6
STBH 5.0	10:10	0	2.1	19.9	78	0	0	1002	1.06	15	19.4
STBH 5.1	10:14	0	1.8	19.7	78.5	0	0	1002	1.23	1	5.8
STBH 5.2	09:27	0	2.5	19.5	78	0	0	1002	1.09	1	9.6
STBH 5.3	09:30	0	2.4	19.6	78	0	0	1002	0.34	1	6
STBH 6.0	10:32	0	1.5	19.8	78.7	0	0	1002	-0.09	1	5.4
STBH 6.1	09:16	0	2.3	19.6	78.1	0	0	1002	0.05	1	5.4
STBH 6.2	09:20	0	1.5	19.8	78.7	0	0	1002	0.1	1	5.4
STBH 6.3	09:24	0	1.8	20.1	78.1	0	0	1002	0.62	1	8.2
STBH 7.0	10:36	0	2.4	19.9	77.7	0	0	1002	0.38	1	6.2
STBH 7.1	09:12	0	1.6	19.9	78.5	0	0	1002	0.23	1	5.5
STBH 9.0	Buried										
STBH 12	10:50	0	2.3	19.7	78	0	0	1002	0.86	10	6.5
STBH 13	10:54	0	1.6	19.6	78.8	0	0	1002	0.91	10	5.2
STBH 15	10:58	0	1.5	19.5	79	0	0	1002	-0.08	1	8.3
STBH 16	11:02	0	1.9	19.8	78.3	0	0	1002	0.14	1	3
STBH 22	11:06	0.4	1.5	19.6	78.5	0	0	1002	0.32	1.6	3.1
STMBH 5.4	10:18	0	1.7	19.8	78.5	0	0	1002	0.87	1	16
STMBH 5.5	10:20	0	2	19.9	78.1	0	0	1002	-0.19	1	17.1
STMBH 5.7	10:23	0	2.3	20.1	77.6	0	0	1002	0.29	1	**7.1**

Standard Landfill Borehole Gas Monitoring

Date 24/03/2017
Weather: Dry
Wind conditions: Calm
Air Temperature: 13 °C

Instrument: GEM 2000
Serial No: GM12289
Calibrated To: 29/03/2017
Operatives AS

Monitoring Point	Time Hrs	CH4 %	CO2 %	O2 %	Balance %	CO ppm	H2S ppm	Baro mb	Rel Pressur mb	Trigger lev CH4 %	Trigger lev CO2
STBH 1	09:32	0	2.1	20	77.9	0	0	1005	0.09	1	5.4
STBH 1.1	09:29	0	2	19	79	0	0	1005	0.08	1	5.4
STBH 2.0	09:36	0	2.3	18.9	78.8	0	0	1005	-0.46	1	7
STBH 2.1	09:24	0	1.2	19.6	79.2	0	0	1005	-0.15	1	7.6
STBH 2.2	09:27	0	1.6	19.8	78.6	0	0	1005	-0.29	1	5.8
STBH 3.0	09:41	0	1.5	19.6	78.9	0	0	1005	-0.17	1	6.7
STBH 3.1	09:22	0	2	19.5	78.5	0	0	1005	0.3	1	7.8
STBH 4.0	09:45	0	1.6	19.9	78.5	0	0	1005	0.55	10	10.6
STBH 4.1	09:13	0	1.5	20	78.5	0	0	1005	0.67	1	7.1
STBH 4.2	09:18	0	1.7	19.3	79	0	0	1005	-0.93	1	8.6
STBH 5.0	09:48	0	2	19.4	78.6	0	0	1005	0.8	15	19.4
STBH 5.1	09:52	0	1.5	19.5	79	0	0	1005	0.2	1	5.8
STBH 5.2	09:05	0	2.6	19.8	77.6	0	0	1005	0.46	1	9.6
STBH 5.3	09:08	0	2.3	19.7	78	0	0	1005	-0.41	1	6
STBH 6.0	10:10	0	1.6	19.9	78.5	0	0	1005	-0.18	1	5.4
STBH 6.1	08:54	0	2	20	78	0	0	1005	-0.43	1	5.4
STBH 6.2	08:58	0	1.3	20.1	78.6	0	0	1005	0.96	1	5.4
STBH 6.3	09:02	0	1.6	19.9	78.5	0	0	1005	0.72	1	8.2
STBH 7.0	10:14	0	2.4	20.1	77.5	0	0	1005	0.41	1	6.2
STBH 7.1	08:50	0	1.8	19.6	78.6	0	0	1005	0.38	1	5.5
STBH 9.0	Buried										
STBH 12	10:28	0	2.5	19.5	78	0	0	1005	0.98	10	6.5
STBH 13	10:32	0	1.9	19.7	78.4	0	0	1005	0.03	10	5.2
STBH 15	10:36	0	1.7	19.9	78.4	0	0	1005	0.33	1	8.3
STBH 16	10:40	0	2	19.9	78.1	0	0	1005	-0.19	1	3
STBH 22	10:44	0.3	1.8	20	77.9	0	0	1005	0.43	1.6	3.1
STMBH 5.4	09:56	0	1.6	19.6	78.8	0	0	1005	-0.21	1	16
STMBH 5.5	09:58	0	2.2	20	77.8	0	0	1005	-0.18	1	17.1
STMBH 5.7	10:01	0	2.5	19.6	77.9	0	0	1005	-0.89	1	**7.1**

Standard Landfill Borehole Gas Monitoring

Date	31/03/2017	
Weather:	Dry	
Wind conditions:	Calm	
Air Temperature:	14	°C

Instrument:	GEM 2000
Serial No:	GM12289
Calibrated To:	29/09//2017
Operatives	AS

Monitoring Point	Time Hrs	CH4 %	CO2 %	O2 %	Balance %	CO ppm	H2S ppm	Baro mb	Rel Pressur mb	Trigger lev CH4 %	Trigger lev CO2
STBH 1	11:07	0	2.5	19.8	77.7	0	0	997	0.01	1	5.4
STBH 1.1	11:04	0	2.1	19.6	78.3	0	0	997	-0.14	1	5.4
STBH 2.0	11:11	0	2.6	19.5	77.9	0	0	997	0.58	1	7
STBH 2.1	10:59	0	1.8	19.8	78.4	0	0	997	0.83	1	7.6
STBH 2.2	11:02	0	1.5	20.1	78.4	0	0	997	0.58	1	5.8
STBH 3.0	11:16	0	1.4	19.8	78.8	0	0	997	0.63	1	6.7
STBH 3.1	10:57	0	2.3	19.9	77.8	0	0	997	0.23	1	7.8
STBH 4.0	11:20	0	1.5	19.7	78.8	0	0	997	1.28	10	10.6
STBH 4.1	10:48	0	1.4	19.5	79.1	0	0	997	1.31	1	7.1
STBH 4.2	10:53	0	1.5	20	78.5	0	0	997	1.08	1	8.6
STBH 5.0	11:23	0	2.1	19.6	78.3	0	0	997	0.62	15	19.4
STBH 5.1	11:27	0	1.9	19.3	78.8	0	0	997	0.45	1	5.8
STBH 5.2	10:40	0	2.4	19.6	78	0	0	997	0.24	1	9.6
STBH 5.3	10:43	0	2.1	20	77.9	0	0	997	0.98	1	6
STBH 6.0	11:45	0	1.9	19.8	78.3	0	0	997	-0.88	1	5.4
STBH 6.1	10:29	0	2.1	19.6	78.3	0	0	997	0.74	1	5.4
STBH 6.2	10:33	0	1.5	19.8	78.7	0	0	997	1.32	1	5.4
STBH 6.3	10:37	0	1.7	20	78.3	0	0	997	0.99	1	8.2
STBH 7.0	11:49	0	2.3	19.8	77.9	0	0	997	0.09	1	6.2
STBH 7.1	10:25	0	1.9	19.9	78.2	0	0	997	0.5	1	5.5
STBH 9.0	Buried										
STBH 12	12:03	0	2.3	19.6	78.1	0	0	997	0.9	10	6.5
STBH 13	12:07	0	1.5	20	78.5	0	0	997	-0.19	10	5.2
STBH 15	12:11	0	1.5	19.5	79	0	0	997	0.82	1	8.3
STBH 16	12:15	0	2.3	19.6	78.1	0	0	997	0.64	1	3
STBH 22	12:19	0.2	1.9	19.8	78.1	0	0	997	0.56	1.6	3.1
STMBH 5.4	11:31	0	1.5	19.5	79	0	0	997	0.58	1	16
STMBH 5.5	11:33	0	2	19.9	78.1	0	0	997	-0.12	1	17.1
STMBH 5.7	11:36	0	1.9	20	78.1	0	0	997	-0.2	1	**7.1**

STANDARD **Gas Well Balance / Monitoring**

Date	10/01/2017
Weather:	Dry
Wind conditions:	Calm
Air Temperature:	6

Instrument:	GEM 2000
Serial No:	GM12289
Calibrated To:	29/03/2017
Operative	AS

Monitoring Point	**Time**	**CH4 %**	**CO2 %**	**O2 %**	**Balance %**	**CO ppm**	**H2S ppm**	**Baro mb**	**Rel Pressur**	**Comments**
GV1	09:30	49.5	36.5	0.3	13.7	5	10	1001		Open Full
GV2		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No Access
GV3		50.1	35.2	0.3	14.4	7	11	1001	-25.2	open full
GV4		49.9	35.6	0.5	14.0	5	9	1001	-25.0	Open full
GV5		48.6	35.9	0.6	14.9	2	6	1001	-25.3	Open full
GV6		49.6	34.5	0.2	15.7	6	11	1001	-25.9	Open full
GV7		49.0	35.1	0.4	15.5	5	12	1001	-25.4	Open full
GV8		50.0	36.2	0.6	13.2	6	8	1001	-25.9	Open full
GV9		50.2	34.9	0.5	14.4	4	7	1001	-25.8	Left Open Full
GV10		50.4	34.5	0.4	14.7	9	10	1001	-25.4	Open full
GV11		39.9	29.9	1.5	28.7	6	8	1001	0.0	Left Off
GV18		50.2	36.0	0.2	13.6	8	6	1001	-25.0	Open Full
GV19		49.0	35.9	0.5	14.6	12	2	1001	-25.9	Open full
GV20		49.6	35.2	0.4	14.8	10	5	1001	-25.8	Left open full
GV22		49.8	36.0	0.6	13.6	9	11	1001	-25.5	Open full
GV24		49.5	35.4	0.4	14.7	12	14	1001	-25.4	Open full (pumped)
GV25		49.3	35.6	0.6	14.5	8	6	1001	-25.3	Open Full
GV27		49.5	36.0	0.5	14.0	9	8	1001	-25.9	Left Open Full
GV31		50.0	35.6	0.6	13.8	10	9	1001	-25.1	Open full (pumped)

GV32		49.3	34.9	0.2	15.6	7	6	1001	-25.8	Left Open Full
GV33		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off (pumped)
GV34		46.9	34.9	2.5	15.7	6	7	1001	-0.2	Left Closed
GV35		50.6	35.8	0.4	13.2	8	6	1001	-25.1	Open full
GV51		49.6	36.1	0.5	13.8	9	8	1001	-25.9	open full
GV55		50.1	36.9	0.3	12.7	7	6	1001	-25.5	Open full
Manifold C		50.3	35.9	0.2	13.6	6	5	1001	-25.4	
GV38		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	left off
GV39		48.2	36.1	2.9	12.8	11	11	1001	0.0	Left Off
GV40		50.2	36.0	0.3	13.5	9	8	1001	-25.3	Open full
GV41		49.5	35.9	0.6	14.0	9	8	1001	-25.4	Open full
GV42		49.8	35.5	0.5	14.2	12	5	1001	-25.1	Open full
GV43		50.0	35.4	0.6	14.0	8	5	1001	-25.6	Left Open Full
Manifold B		49.6	36.2	0.2	14.0	6	6	1001	-25.7	
GV44		50.1	36.9	0.3	12.7	9	7	1001	-25.6	left open full
GV45		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off
GV46		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off
GV47		50.2	36.5	0.3	13.0	10	8	1001	-25.9	Left Open Full
GV48		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off
GV49		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off
GV50		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off
GV52		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off
GV53		50.9	36.9	0.6	11.6	9	10	1001	-25.9	Left open good gas
GV54		49.8	35.1	0.5	14.6	11	7	1001	-25.4	Open full
GV56		49.6	35.9	0.9	13.6	8	8	1001	-25.3	Open full
GV57		48.8	36.8	0.8	13.6	12	9	1001	-25.8	Open full
GV58		50.3	37.0	0.4	12.3	10	5	1001	-25.5	left opened full
GV59		50.5	36.9	0.6	12.0	6	6	1001	-25.6	Open full
Manifold A		49.6	35.9	0.5	14.0	8	5	1001	-25.5	
GV60		50.0	36.9	0.4	12.7	9	8	1001	-25.9	Left Open Full
GV61		50.9	35.4	0.2	13.5	12	7	1001	-25.4	Open Full
GV62		50.4	34.5	0.6	14.5	8	9	1001	-25.9	Open full
GV63		n/a	n/a	n/a	n/a	n/a	n/a	1001	n/a	Closed
GV64		50.8	35.9	0.4	12.9	9	8	1001	-25.8	Open full
GV65		50.9	36.9	0.3	11.9	10	10	1001	-25.7	Open full
GV66		49.8	36.2	0.6	13.4	8	9	1001	-25.3	Open full
New Wells										
GW60		50.9	35.9	0.3	12.9	9	6	1001	-25.9	Open full (pumped)
GW61		51.6	35.9	0.5	12.0	10.0	8.0	1001	-25.4	LEFT Open full
GW62		35.9	36.9	3.5	23.7	8	9	1001	0.2	Left Turned Off
GW63		50.6	36.4	0.5	12.5	8	7	1001	-25.9	Open full
GW64		48.5	36.5	0.2	14.8	6	5	1001	-25.4	Open full (pumped)
GW65		49.9	35.2	0.2	14.7	5	8	1001	-25.9	Open full
GW66		49.1	36.0	0.3	14.6	9	6	1001	-25.7	Left open full
Engine	15:20	49.8	36.5	0.3	13.4	4	10	1001		Flare running 400 KW (Engine now run at night

STANDARD **Gas Well Balance / Monitoring**

Date	14/02/2017
Weather:	Dry
Wind conditions:	Calm
Air Temperature:	8
Instrument:	GEM 2000
Serial No:	GM12289
Calibrated To:	29/03/2017
Operative	AS

Monitorin Point	**Time**	**CH4 %**	**CO2 %**	**O2 %**	**Balance %**	**CO ppm**	**H2S ppm**	**Baro mb**	**el Pressur**	**Comments**
GV1	10:30	49.9	36.8	0.4	12.9	3	8	997		Open Full
GV2		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No Access
GV3		50.2	35.6	0.5	13.7	8	8	997	-26.5	open full
GV4		49.6	36.1	0.6	13.7	9	5	997	-26.2	Open full
GV5		49.6	36.3	0.3	13.8	6	6	997	-26.9	Open full
GV6		50.2	35.4	0.4	14.0	5	11	997	-26.8	Open full
GV7		49.9	35.6	0.5	14.0	8	4	997	-26.4	Open full
GV8		50.2	35.8	0.3	13.7	9	7	997	-26.8	Open full
GV9		51.9	35.2	0.4	12.5	7	1	997	-26.3	Left Open Full
GV10		50.0	35.6	0.6	13.8	11	9	997	-26.8	Open full
GV11		41.2	32.2	1.7	24.9	7	8	997	0.0	Left Off
GV18		50.3	36.2	0.3	13.2	6	12	997	-26.8	Open Full
GV19		49.6	36.0	0.5	13.9	12	9	997	-26.7	Open full
GV20		49.9	35.9	0.9	13.3	16	9	997	-26.3	Left open full
GV22		50.0	36.3	0.5	13.2	14	8	997	-26.8	Open full

GV24		49.6	35.9	0.4	14.1	11	5	997	-26.9	Open full (pumped)
GV25		49.8	35.2	0.6	14.4	8	6	997	-26.1	Open Full
GV27		49.8	36.5	0.5	13.2	9	11	997	-26.8	Left Open Full
GV31		50.2	35.9	0.2	13.7	3	8	997	-26.3	Open full (pumped)
GV32		49.6	35.0	0.3	15.1	8	8	997	-26.5	Left Open Full
GV33		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off (pumped)
GV34		46.0	35.9	2.6	15.5	10	8	997	-0.3	Left Closed
GV35		50.2	35.4	0.3	14.1	9	11	997	-26.5	Open full
GV51		49.9	35.9	0.2	14.0	9	10	997	-26.9	open full
GV55		50.0	36.2	0.3	13.5	8	8	997	-27.0	Open full
Manifold C		49.8	36.0	0.5	13.7	7	6	997	-26.4	
GV38		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	left off
GV39		46.0	36.6	3.0	14.4	10	8	997	0.0	Left Off
GV40		50.4	35.7	0.3	13.6	8	6	997	-26.9	Open full
GV41		50.3	35.1	0.5	14.1	6	7	997	-26.9	Open full
GV42		49.8	36.4	0.8	13.0	5	9	997	-26.4	Open full
GV43		49.3	35.5	0.4	14.8	9	10	997	-26.8	Left Open Full
Manifold B		50.0	35.9	0.6	13.5	4	8	997	-26.3	
GV44		49.5	36.5	0.6	13.4	10	6	997	-26.3	left open full
GV45		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off
GV46		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off
GV47		50.4	36.4	0.2	13.0	9	10	997	-26.5	Left Open Full
GV48		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off
GV49		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off
GV50		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off
GV52		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off
GV53		50.5	36.0	0.7	12.8	10	11	997	-26.9	Left open good gas
GV54		49.9	35.6	0.6	13.9	9	8	997	-26.4	Open full
GV56		50.2	35.4	0.8	13.6	8	10	997	-26.8	Open full
GV57		49.2	35.5	0.9	14.4	6	6	997	-26.0	Open full
GV58		50.1	36.2	0.4	13.3	5	5	997	-26.3	left opened full
GV59		50.6	36.4	0.5	12.5	8	9	997	-26.5	Open full
Manifold A		50.0	36.0	0.8	13.2	11	7	997	-26.9	
GV60		49.9	35.4	0.3	14.4	14	4	997	-25.9	Left Open Full
GV61		50.5	36.9	0.6	12.0	10	11	997	-26.9	Open Full
GV62		50.1	35.6	0.5	13.8	3	14	997	-26.8	Open full
GV63		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Closed
GV64		50.5	35.4	0.2	13.9	10	10	997	-26.9	Open full
GV65		50.4	36.5	0.5	12.6	7	9	997	-26.5	Open full
GV66		50.1	36.6	0.4	12.9	8	6	997	-26.4	Open full
New Wells										
GW60		50.5	35.6	0.4	13.5	10	8	997	-26.9	Open full (pumped)
GW61		51.1	36.2	0.3	12.4	9.0	10.0	997	-26.3	LEFT Open full
GW62		35.2	36.5	3.9	24.4	12	6	997	0.2	Left Turned Off
GW63		50.1	35.8	0.4	13.7	6	8	997	-26.8	Open full
GW64		49.5	36.2	0.3	14.0	9	5	997	-26.4	Open full (pumped)
GW65		49.5	35.9	0.6	14.0	8	9	997	-26.9	Open full
GW66		49.6	36.5	0.4	13.5	10	10	997	-26.2	Left open full
Engine	16:00	50.0	36.9	0.4	12.7	4	9	997		Flare running 400 KW (Engine now run at night

STANDARD **Gas Well Balance / Monitoring**

Date 14/03/2017
Weather: Dry
Wind conditions: Breezy
Air Temperature: 10

Instrument: GEM 2000
Serial No: GM12289
Calibrated To: 29/03/2017
Operative AS

Monitorin Point	Time	CH4 %	CO2 %	O2 %	Balance %	CO ppm	H2S ppm	Baro mb	el Pressur	Comments
GV1	10:00	50.1	37.0	0.5	12.4	2	6	1001		Open Full
GV2		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No Access
GV3		50.3	35.4	0.6	13.7	5	6	1001	-27.2	open full
GV4		50.1	36.3	0.5	13.1	10	4	1001	-27.3	Open full
GV5		49.8	35.9	0.3	14.0	3	6	1001	-27.8	Open full
GV6		50.0	35.4	0.5	14.1	4	10	1001	-27.3	Open full
GV7		49.6	36.0	0.4	14.0	6	6	1001	-27.5	Open full
GV8		50.0	35.9	0.5	13.6	10	5	1001	-27.1	Open full
GV9		51.3	35.8	0.3	12.6	6	6	1001	-27.6	Left Open Full
GV10		50.3	36.0	0.5	13.2	10	4	1001	-27.6	Open full

GV11		43.2	33.6	1.9	21.3	8	8	1001	0.0	Left Off
GV18		50.5	36.5	0.5	12.5	8	10	1001	-27.1	Open Full
GV19		49.9	36.3	0.5	13.3	10	8	1001	-27.0	Open full
GV20		50.3	36.2	0.9	12.6	12	6	1001	-27.3	Left open full
GV22		50.4	36.4	0.8	12.4	7	5	1001	-27.8	Open full
GV24		49.3	36.0	0.5	14.2	10	4	1001	-27.2	Open full (pumped)
GV25		50.2	35.8	0.4	13.6	6	8	1001	-27.6	Open Full
GV27		50.1	36.3	0.6	13.0	10	10	1001	-27.4	Left Open Full
GV31		50.4	35.4	0.3	13.9	5	7	1001	-27.3	Open full (pumped)
GV32		49.8	35.5	0.8	13.9	10	5	1001	-27.8	Left Open Full
GV33		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off (pumped)
GV34		46.5	36.0	2.5	15.0	7	6	1001	-0.2	Left Closed
GV35		50.4	35.8	0.2	13.6	8	10	1001	-27.3	Open full
GV51		50.1	36.1	0.4	13.4	5	7	1001	-27.5	open full
GV55		50.6	36.5	0.3	12.6	6	10	1001	-27.4	Open full
Manifold C		50.1	36.5	0.4	13.0	11	9	1001	-27.8	
GV38		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	left off
GV39		45.9	36.0	2.8	15.3	8	9	1001	0.1	Left Off
GV40		50.6	35.4	0.2	13.8	3	5	1001	-27.3	Open full
GV41		50.4	35.8	0.3	13.5	2	6	1001	-27.5	Open full
GV42		50.2	36.2	0.5	13.1	5	3	1001	-27.4	Open full
GV43		49.8	35.8	0.4	14.0	9	9	1001	-27.3	Left Open Full
Manifold B		50.2	36.3	0.6	12.9	6	11	1001	-27.8	
GV44		49.6	36.4	0.5	13.5	11	4	1001	-27.1	left open full
GV45		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off
GV46		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off
GV47		50.2	36.8	0.3	12.7	7	11	1001	-27.0	Left Open Full
GV48		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off
GV49		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off
GV50		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off
GV52		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Turned off
GV53		50.2	36.2	0.2	13.4	9	12	1001	-27.0	Left open good gas
GV54		50.2	35.4	0.2	14.2	11	8	1001	-27.3	Open full
GV56		49.9	35.8	0.3	14.0	12	9	1001	-27.4	Open full
GV57		49.8	36.2	0.5	13.5	8	10	1001	-27.5	Open full
GV58		50.4	35.8	0.6	13.2	6	6	1001	-27.1	left opened full
GV59		50.3	35.9	0.8	13.0	6	8	1001	-27.9	Open full
Manifold A		50.2	35.4	0.7	13.7	10	11	1001	-27.4	
GV60		50.1	35.8	0.4	13.7	11	8	1001	-27.7	Left Open Full
GV61		50.2	36.5	0.5	12.8	14	10	1001	-27.3	Open Full
GV62		50.8	36.0	0.6	12.6	4	12	1001	-27.0	Open full
GV63		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Closed
GV64		50.6	35.8	0.3	13.3	6	8	1001	-27.6	Open full
GV65		50.5	36.8	0.6	12.1	8	10	1001	-27.1	Open full
GV66		50.0	36.9	0.5	12.6	5	3	1001	-27.8	Open full
New Wells										
GW60		50.9	35.8	0.5	12.8	12	7	1001	-27.5	Open full (pumped)
GW61		51.0	36.5	0.6	11.9	8.0	9.0	1001	-27.3	LEFT Open full
GW62		37.8	35.0	3.5	23.7	11	5	1001	0.2	Left Turned Off
GW63		50.5	35.4	0.3	13.8	5	7	1001	-27.3	Open full
GW64		50.2	36.0	0.5	13.3	10	6	1001	-27.1	Open full (pumped)
GW65		49.6	36.2	0.8	13.4	7	10	1001	-27.3	Open full
GW66		49.9	36.5	0.3	13.3	11	9	1001	-27.5	Left open full
Engine	15:35	50.2	37.2	0.5	12.1	3	6	1001		Flare running 400 KW (Engine now run at night

Standard Leachate Monitoring

Date 03/01/2017
Weather: Dry
Wind conditions: Calm
Air Temperature: 6 ^{o}C

Instrument: Dip-Metre

Operative AS

Monitoring Point	Time Hrs	Dip Level (m)	Base Level	Leachate Depth	Pumping Yes/No	Comments
LC	10:06	29.61	31	1.39	YES	Pneumatic pumps
LC3	10:30	3.31	4.84	1.53	YES	Pneumatic pumps
LC4	10:40	17.44	19	1.56	YES	Pneumatic pumps
LC7	10:55	18.49	20.31	1.82	YES	Pneumatic pumps
LS5	11:15	28.69	32	1.32	YES	Electric Pump - Direct To Tanks
LS6	11:24	30.01	33	1.19	YES	Electric Pump - Direct To Tanks

S1	11:40	3.09	4.43	1.34	YES	Pneumatic pumps
S2	12:11	1.55	3.35	1.8	YES	Pneumatic pumps
S3	12:30	3.58	5.09	1.51	YES	Pneumatic pumps

Standard Leachate Monitoring

Date 07/02/2017
Weather: Dry
Wind conditions: Breezy
Air Temperature: 9 °C

Instrument: Dip-Metre

Operative AS

Monitoring Point	Time Hrs	Dip Level (m)	Base Level	Leachate Depth	Pumping Yes/No	Comments
LC	10:16	29.58	31	1.42	YES	Pneumatic pumps
LC3	10:40	3.25	4.84	1.59	YES	Pneumatic pumps
LC4	10:50	17.49	19	1.51	YES	Pneumatic pumps
LC7	11:05	18.53	20.31	1.78	YES	Pneumatic pumps
LS5	11:25	28.74	32	1.30	YES	Electric Pump - Direct To Tanks
LS6	11:34	30.04	33	1.18	YES	Electric Pump - Direct To Tanks
S1	11:50	3.11	4.43	1.32	YES	Pneumatic pumps
S2	12:20	1.62	3.35	1.73	YES	Pneumatic pumps
S3	12:40	3.62	5.09	1.47	YES	Pneumatic pumps

Standard Leachate Monitoring

Date 07/03/2017
Weather: Dry
Wind conditions: Breezy
Air Temperature: 14 °C

Instrument: Dip-Metre

Operative AS

Monitoring Point	Time Hrs	Dip Level (m)	Base Level	Leachate Depth	Pumping Yes/No	Comments
LC	10:26	29.61	31	1.39	YES	Pneumatic pumps
LC3	10:51	3.27	4.84	1.57	YES	Pneumatic pumps
LC4	11:02	17.46	19	1.54	YES	Pneumatic pumps
LC7	11:17	18.5	20.31	1.81	YES	Pneumatic pumps
LS5	11:35	28.77	32	1.29	YES	Electric Pump - Direct To Tanks
LS6	11:48	30	33	1.20	YES	Electric Pump - Direct To Tanks
S1	12:02	3.14	4.43	1.29	YES	Pneumatic pumps
S2	12:30	1.65	3.35	1.7	YES	Pneumatic pumps
S3	12:52	3.59	5.09	1.5	YES	Pneumatic pumps

Standard Groundwater Monitoring

Date 24/01/2017
Weather: dry
Wind conditions: Breezy
Air Temperature: 6 °C

Instrument: Dip-Metre

Operative AS

Monitoring Point	Time Hrs	Dip-Lev Metres	Dip-Base Metres	Water-Lev Metres	
ST GW 1	12:15	28.41	55.77	27.36	
ST GW 2	12:25	9.1	9.1	0	)ld Borehole
ST GW 2R	12:30	48.32	59.5	11.18	
ST GW 3	13:05	38.35	53.25	14.9	
ST GW 4R	12:40	46.08	53	6.92	
ST GW 5	12:00	1.99	10	8.01	
ST GW 6	13:50	24.08	45.46	21.38	
ST GW 7R	11:15	60.21	71	10.79	

Standard Groundwater Monitoring

Date 21/02/2017
Weather: dry
Wind conditions: Calm
Air Temperature: 7 ^{o}C

Instrument: Dip-Metre

Operative AS

Monitoring Point	Time Hrs	Dip-Lev Metres	Dip-Base Metres	Water-Lev Metres	
ST GW 1	11:17	30.25	55.77	25.52	
ST GW 2	11:22	9.1	9.1	0	)ld Borehole
ST GW 2R	11:30	50.1	59.5	9.4	
ST GW 3	12:10	40.21	53.25	13.04	
ST GW 4R	11:40	46.55	53	6.45	
ST GW 5	11:02	2.09	10	7.91	
ST GW 6	12:48	26.32	45.46	19.14	
ST GW 7R	10:13	61.76	71	9.24	

Standard Groundwater Monitoring

Date 03/04/2017
Weather: dry
Wind conditions: Calm
Air Temperature: 12 ^{o}C

Instrument: Dip-Metre

Operative AS

Monitoring Point	Time Hrs	Dip-Lev Metres	Dip-Base Metres	Water-Lev Metres	
ST GW 1	11:05	34.67	55.77	21.1	
ST GW 2	11:10	9.1	9.1	0	ole (no Sample taken)
ST GW 2R	11:15	43.36	59.5	16.14	
ST GW 3	11:55	39.99	53.25	13.26	
ST GW 4R	11:25	47.89	53	5.11	
ST GW 5	10:48	2.51	10	7.49	
ST GW 6	12:32	28.1	45.46	17.36	
ST GW 7R	10:00	62.58	71	8.42	

All Quarterly samples Taken

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

Flintshire County Council
Waste Management Services
Brookhill Landfill Site
Pinfold Industrial Estate
Buckley
Flintshire
CH7 3PL

Attention: Paul Murphy

CERTIFICATE OF ANALYSIS

Date:	18 April 2017
Customer:	H_FLINTCCO_BUC
Sample Delivery Group (SDG):	170405-9
Your Reference:	Leachate Chambers Quarterly
Location:	Standard Landfill
Report No:	405080

We received 6 samples on Tuesday April 04, 2017 and 6 of these samples were scheduled for analysis which was completed on Tuesday April 18, 2017. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

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

Approved By:

Sonia McWhan

Operations Manager

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.

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
15285117	LC3			03/04/2017
15285118	LC4			03/04/2017
15285119	LC7			03/04/2017
15285116	LC2 (NEAREST WELL)			03/04/2017
15285120	SSR5			03/04/2017
15285121	SSR6			03/04/2017

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

Validated

CERTIFICATE OF ANALYSIS

SDG:	170405-9	**Client Reference:**	Leachate Chambers Quarterl	**Report Number:**	405080
Location:	Standard Landfill	**Order Number:**	P01133657	**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)			15285117			15285118			15285119			15285116			15285120			15285121	
Customer Sample Reference			LC3			LC4			LC7			LC2 (NEAREST WELL)			SSR5			SSR6	
AGS Reference																			
Depth (m)																			
Container			1lplastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	1lplastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	1lplastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	1lplastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	1lplastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	1lplastic (ALE221)	250ml BOD (ALE212)
Sample Type			LE	LE	LE	LE	LE	LE	LE	LE	LE	LE	LE	LE	LE	LE	LE	LE	LE
Alkalinity as CaCO3	All	NDPs: 0 Tests: 6	X			X			X			X			X			X	
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 6			X			X			X			X			X		
Anions by Kone (w)	All	NDPs: 0 Tests: 6	X			X			X			X			X			X	
BOD True Total	All	NDPs: 0 Tests: 6		X			X			X			X			X			X
Chlorine	All	NDPs: 0 Tests: 6	X			X			X			X			X			X	
COD Unfiltered	All	NDPs: 0 Tests: 6		X			X			X			X			X			X
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 6	X			X			X			X			X			X	
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 6	X			X			X			X			X			X	
pH Value	All	NDPs: 0 Tests: 6	X			X			X			X			X			X	

10:32:01 18/04/2017

15285121	SSR6			H2SO4 (ALE244)	LE				X												

Validated

CERTIFICATE OF ANALYSIS

SDG:	170405-9	**Client Reference:**	Leachate Chambers Quarterl	**Report Number:**	405080
Location:	Standard Landfill	**Order Number:**	P01133657	**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.			LC3	LC4	LC7	LC2 (NEAREST WELL)	SSR5	SSR6
Depth (m)			.	.	.	.	.	.
Sample Type			Land Leachate (LE)	Land Leachate (LE)	Land Leachate (LE)	Land Leachate (LE)	Land Leachate (LE)	Land Leachate (LE)
Date Sampled			03/04/2017	03/04/2017	03/04/2017	03/04/2017	03/04/2017	03/04/2017
Sample Time			.	.	.	.	.	.
Date Received			04/04/2017	04/04/2017	04/04/2017	04/04/2017	04/04/2017	04/04/2017
SDG Ref			170405-9	170405-9	170405-9	170405-9	170405-9	170405-9
Lab Sample No.(s)			15285117	15285118	15285119	15285116	15285120	15285121
AGS Reference								
Component	**LOD/Units**	**Method**						
Chlorine, Total (Residual)	<0.01 mg/l	TM037	3.5	2.9	0.17	3.6	2.6	2.4
Alkalinity, Total as CaCO3	<2 mg/l	TM043	6800 #	7660 #	4900 #	7280 #	4150 #	1030 #
BOD, unfiltered	<1 mg/l	TM045	<10 ♦ #	333 ♦ #	267 ♦ #	123	66.5 ♦ #	87.1 ♦ #
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	16.6	1530	309	1430	756	757
Ammoniacal Nitrogen as NH4	<0.3 mg/l	TM099	21.3	1970	397	1840	972	973
COD, unfiltered	<7 mg/l	TM107	185 #	2350 #	3690 #	2300 #	1090 #	1110 #
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120	14.9 #	16.3 #	7.36 #	15.8 #	9.95 #	9.48 #
Chloride	<2 mg/l	TM184	1860	2150	1130	2110	1090	1080
Total Oxidised Nitrogen as NO3	<0.3 mg/l	TM184	2.02	2.21	0.423	2.26	<1.5	4.23
Total Oxidised Nitrogen as N	<0.1 mg/l	TM184	<0.5	<0.5	<0.1	0.51	<0.5	0.957
Sodium (diss.filt)	<0.076 mg/l	TM228	1640	1840	651	1850	1030	1090
Magnesium (diss.filt)	<0.036 mg/l	TM228	90.3	97.9	121	92.6	69.7	70.5
Potassium (diss.filt)	<1 mg/l	TM228	707	813	210	740	416	430
pH	<1 pH Units	TM256	8.06 #	7.9 #	7.87 #	7.88 #	8.06 #	8.02 #

10:32:01 18/04/2017

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
TM037	MEWAM Chlorine demand HMSO 1988	Determination of Free, Combined and Total Chlorine in Waters and Wastewaters using Colourimetry		
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples		
TM045	MEWAM BOD5 2nd Ed.HMSO 1988 / Method 5210B, AWWA/APHA, 20th Ed., 1999; SCA Blue Book 130	Determination of BOD5 (ATU) Filtered by Oxygen Meter on liquids		
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser		
TM107	ISO 6060-1989	Determination of Chemical Oxygen Demand using COD Dr Lange Kit		
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES		
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		

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

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

Validated

CERTIFICATE OF ANALYSIS

SDG:	170405-9	**Client Reference:**	Leachate Chambers Quarterl	**Report Number:**	405080
Location:	Standard Landfill	**Order Number:**	P01133657	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	15285117	15285118	15285119	15285116	15285120	15285121
Customer Sample Ref.	LC3	LC4	LC7	LC2 (NEAREST WE LL)	SSR5	SSR6
AGS Ref.						
Depth						
Type	Land Leachate	Land Leachate	Land Leachate	Land Leachate	Land Leachate	Land Leachate
Alkalinity as CaCO3	06-Apr-2017	06-Apr-2017	11-Apr-2017	06-Apr-2017	10-Apr-2017	07-Apr-2017
Ammoniacal Nitrogen	06-Apr-2017	12-Apr-2017	11-Apr-2017	12-Apr-2017	12-Apr-2017	12-Apr-2017
Anions by Kone (w)	11-Apr-2017	11-Apr-2017	12-Apr-2017	11-Apr-2017	11-Apr-2017	11-Apr-2017
BOD True Total	12-Apr-2017	11-Apr-2017	11-Apr-2017	18-Apr-2017	11-Apr-2017	11-Apr-2017
Chlorine	08-Apr-2017	08-Apr-2017	06-Apr-2017	08-Apr-2017	08-Apr-2017	08-Apr-2017
COD Unfiltered	12-Apr-2017	12-Apr-2017	12-Apr-2017	12-Apr-2017	12-Apr-2017	12-Apr-2017
Conductivity (at 20 deg.C)	07-Apr-2017	07-Apr-2017	07-Apr-2017	07-Apr-2017	12-Apr-2017	07-Apr-2017
Metals by iCap-OES Dissolved (W)	11-Apr-2017	11-Apr-2017	13-Apr-2017	11-Apr-2017	11-Apr-2017	13-Apr-2017
pH Value	11-Apr-2017	11-Apr-2017	10-Apr-2017	11-Apr-2017	10-Apr-2017	10-Apr-2017

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%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

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

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 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 the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

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

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

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (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

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.

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Website: www.alsenvironmental.co.uk

Flintshire County Council
Waste Management Services
Brookhill Landfill Site
Pinfold Industrial Estate
Buckley
Flintshire
CH7 3PL

Attention: Paul Murphy

CERTIFICATE OF ANALYSIS

Date:	21 April 2017
Customer:	H_FLINTCCO_BUC
Sample Delivery Group (SDG):	170405-31
Your Reference:	
Location:	Standard Quarterly
Report No:	405612

We received 3 samples on Tuesday April 04, 2017 and 3 of these samples were scheduled for analysis which was completed on Friday April 21, 2017. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

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

Approved By:

Sonia McWhan

Operations Manager

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.

Validated

CERTIFICATE OF ANALYSIS

SDG:	170405-31	**Client Reference:**		**Report Number:**	405612
Location:	Standard Quarterly	**Order Number:**	PO1133657	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
15285832	S1			03/04/2017
15285833	S2			03/04/2017
15285834	S3			03/04/2017

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

Validated

CERTIFICATE OF ANALYSIS

SDG:	170405-31	**Client Reference:**		**Report Number:**	405612
Location:	Standard Quarterly	**Order Number:**	PO1133657	**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)			15285832			15285833			15285834		
Customer Sample Reference			S1			S2			S3		
AGS Reference											
Depth (m)											
Container			1lplastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	1lplastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	1lplastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)
Sample Type			UNL	UNL	UNL	UNL	UNL	UNL	UNL	UNL	UNL
Alkalinity as CaCO3	All	NDPs: 0 Tests: 3	X			X			X		
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 3			X			X			X
Anions by Kone (w)	All	NDPs: 0 Tests: 3	X			X			X		
BOD True Total	All	NDPs: 0 Tests: 3		X			X			X	
Chlorine	All	NDPs: 0 Tests: 3	X			X			X		
COD Unfiltered	All	NDPs: 0 Tests: 3		X			X			X	
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 3	X			X			X		
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 3	X			X			X		
pH Value	All	NDPs: 0 Tests: 3	X			X			X		

Validated

CERTIFICATE OF ANALYSIS

SDG:	170405-31	**Client Reference:**		**Report Number:**	405612
Location:	Standard Quarterly	**Order Number:**	PO1133657	**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.			S1	S2	S3			
Depth (m)			.	.	.			
Sample Type			Unspecified Liquid (UNL)	Unspecified Liquid (UNL)	Unspecified Liquid (UNL)			
Date Sampled			03/04/2017	03/04/2017	03/04/2017			
Sample Time			.	.	.			
Date Received			04/04/2017	04/04/2017	04/04/2017			
SDG Ref			170405-31	170405-31	170405-31			
Lab Sample No.(s)			15285832	15285833	15285834			
AGS Reference								
Component	**LOD/Units**	**Method**						
Chlorine, Total (Residual)	<0.01 mg/l	TM037	0.45	0.49	0.21			
Alkalinity, Total as CaCO3	<2 mg/l	TM043	1100	2400	1670			
BOD, unfiltered	<1 mg/l	TM045	<1 ♦	24.5 ♦	<10 ♦			
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	31.2	182	190			
COD, unfiltered	<7 mg/l	TM107	40.5	297	247			
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120	5.46	5.96	3.86			
Chloride	<2 mg/l	TM184	567	622	365			
Total Oxidised Nitrogen as N	<0.1 mg/l	TM184	0.414	0.309	0.194			
Sodium (diss.filt)	<0.076 mg/l	TM228	475	502	306			
Magnesium (diss.filt)	<0.036 mg/l	TM228	47.1	54.6	70.7			
Potassium (diss.filt)	<1 mg/l	TM228	180	172	123			
pH	<1 pH Units	TM256	7.84	7.88	7.44			

10:16:20 21/04/2017

Validated

CERTIFICATE OF ANALYSIS

SDG:	170405-31	**Client Reference:**		**Report Number:**	405612
Location:	Standard Quarterly	**Order Number:**	PO1133657	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
TM037	MEWAM Chlorine demand HMSO 1988	Determination of Free, Combined and Total Chlorine in Waters and Wastewaters using Colourimetry		
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples		
TM045	MEWAM BOD5 2nd Ed.HMSO 1988 / Method 5210B, AWWA/APHA, 20th Ed., 1999; SCA Blue Book 130	Determination of BOD5 (ATU) Filtered by Oxygen Meter on liquids		
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser		
TM107	ISO 6060-1989	Determination of Chemical Oxygen Demand using COD Dr Lange Kit		
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES		
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		

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

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

Validated

CERTIFICATE OF ANALYSIS

SDG:	170405-31	**Client Reference:**		**Report Number:**	405612
Location:	Standard Quarterly	**Order Number:**	PO1133657	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	15285832	15285833	15285834
Customer Sample Ref.	S1	S2	S3
AGS Ref.			
Depth			
Type	Unspecified Liq	Unspecified Liq	Unspecified Liq
Alkalinity as CaCO3	11-Apr-2017	11-Apr-2017	10-Apr-2017
Ammoniacal Nitrogen	06-Apr-2017	06-Apr-2017	07-Apr-2017
Anions by Kone (w)	11-Apr-2017	11-Apr-2017	12-Apr-2017
BOD True Total	21-Apr-2017	12-Apr-2017	21-Apr-2017
Chlorine	06-Apr-2017	06-Apr-2017	06-Apr-2017
COD Unfiltered	11-Apr-2017	11-Apr-2017	12-Apr-2017
Conductivity (at 20 deg.C)	07-Apr-2017	07-Apr-2017	07-Apr-2017
Metals by iCap-OES Dissolved (W)	11-Apr-2017	13-Apr-2017	10-Apr-2017
pH Value	06-Apr-2017	06-Apr-2017	06-Apr-2017

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%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

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

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 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 the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

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

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

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (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

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
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Tel: (01244) 528700
Fax: (01244) 528701
email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

Flintshire County Council
Waste Management Services
Brookhill Landfill Site
Pinfold Industrial Estate
Buckley
Flintshire
CH7 3PL

Attention: Paul Murphy

CERTIFICATE OF ANALYSIS

Date:	18 April 2017
Customer:	H_FLINTCCO_BUC
Sample Delivery Group (SDG):	170405-4
Your Reference:	Groundwater Quarterly
Location:	Standard Landfill
Report No:	405073

We received 7 samples on Tuesday April 04, 2017 and 7 of these samples were scheduled for analysis which was completed on Tuesday April 18, 2017. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

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

Approved By:

Sonia McWhan

Operations Manager

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.

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
15284983	GW1			03/04/2017
15284985	GW3			03/04/2017
15284987	GW5			03/04/2017
15284988	GW6			03/04/2017
15284989	GW7			03/04/2017
15284984	GW2A			03/04/2017
15284986	GW4R			03/04/2017

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

Validated

CERTIFICATE OF ANALYSIS

SDG:	170405-4	**Client Reference:**	Groundwater Quarterly	**Report Number:**	405073
Location:	Standard Landfill	**Order Number:**	PO1133657	**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)			15284983					15284985					15284987					15284988	
Customer Sample Reference			GW1					GW3					GW5					GW6	
AGS Reference																			
Depth (m)																			
Container			1000ml glass bottle (ALE220)	1lplastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	NaOH (ALE245)	1000ml glass bottle (ALE220)	1lplastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	NaOH (ALE245)	1000ml glass bottle (ALE220)	1lplastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	NaOH (ALE245)	1000ml glass bottle (ALE220)	1lplastic (ALE221)
Sample Type			GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Alkalinity as CaCO3	All	NDPs: 0 Tests: 7		X					X					X					X
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 7				X					X					X			
Anions by Kone (w)	All	NDPs: 0 Tests: 7		X					X					X					X
BOD True Total	All	NDPs: 0 Tests: 7			X					X					X				
Chlorine	All	NDPs: 0 Tests: 7		X					X					X					X
COD Unfiltered	All	NDPs: 0 Tests: 7			X					X					X				
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 7					X					X					X		
Mercury Unfiltered	All	NDPs: 0 Tests: 7	X					X					X					X	
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 7		X					X					X					X
Metals by iCap-OES Unfiltered (W)	All	NDPs: 0 Tests: 7		X					X					X					X
Nitrite by Kone (w)	All	NDPs: 0 Tests: 7					X					X					X		
pH Value	All	NDPs: 0 Tests: 7		X					X					X					X
Phenols by HPLC (W)	All	NDPs: 0 Tests: 7				X					X					X			
Total Metals by ICP-MS	All	NDPs: 0 Tests: 7		X					X					X					X
Total Organic and Inorganic Carbon	All	NDPs: 0 Tests: 7	X					X					X					X	

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15284986	GW4R			NaOH (ALE245)	GW							x				x				
				H2SO4 (ALE244)	GW		x											x		
				250ml BOD (ALE212)	GW				x		x									
				1lplastic (ALE221)	GW	x		x		x				x	x		x		x	
				1000ml glass bottle (ALE220)	GW								x							x
15284984	GW2A			NaOH (ALE245)	GW							x				x				
				H2SO4 (ALE244)	GW		x											x		
				250ml BOD (ALE212)	GW				x		x									
				1lplastic (ALE221)	GW	x		x		x				x	x		x		x	
				1000ml glass bottle (ALE220)	GW								x							x
15284989	GW7			NaOH (ALE245)	GW							x				x				
				H2SO4 (ALE244)	GW		x											x		
				250ml BOD (ALE212)	GW				x		x									
				1lplastic (ALE221)	GW	x		x		x				x	x		x		x	
				1000ml glass bottle (ALE220)	GW								x							x
15284988	GW6			NaOH (ALE245)	GW							x				x				
				H2SO4 (ALE244)	GW		x											x		
				250ml BOD (ALE212)	GW				x		x									

Validated

CERTIFICATE OF ANALYSIS

SDG:	170405-4	**Client Reference:**	Groundwater Quarterly	**Report Number:**	405073
Location:	Standard Landfill	**Order Number:**	PO1133657	**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.			GW1	GW3	GW5	GW6	GW7	GW2A
Depth (m)			.	.	.	.	.	.
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
Date Sampled			03/04/2017	03/04/2017	03/04/2017	03/04/2017	03/04/2017	03/04/2017
Sample Time			.	.	.	.	.	.
Date Received			04/04/2017	04/04/2017	04/04/2017	04/04/2017	04/04/2017	04/04/2017
SDG Ref			170405-4	170405-4	170405-4	170405-4	170405-4	170405-4
Lab Sample No.(s)			15284983	15284985	15284987	15284988	15284989	15284984
AGS Reference								
Component	**LOD/Units**	**Method**						
Chlorine, Total (Residual)	<0.01 mg/l	TM037	0.01	0.01	0.01	0.1	0.04	0.04
Alkalinity, Total as CaCO3	<2 mg/l	TM043	50 #	210 #	120 #	19 #	280 #	105 #
BOD, unfiltered	<1 mg/l	TM045	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<1 ♦ #	<10 ♦ #
Organic Carbon, Total	<3 mg/l	TM090	<3 #	<3 #	<3 #	12.6 #	3.02 #	4.71 #
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	<0.2 #	1.3 #	0.366 #	21 #	1.72 #	0.319 #
Ammoniacal Nitrogen as NH4	<0.3 mg/l	TM099	<0.3 #	1.67 #	0.471 #	27 #	2.21 #	0.41 #
COD, unfiltered	<7 mg/l	TM107	131 #	10.1 #	156 #	62.7 #	34 #	72.6 #
Mercury (tot.unfilt)	<0.00002 mg/l	TM183	0.00158 #	<0.00002 #	0.000021 #	0.000049 #	<0.00002 #	<0.00002 #
Nitrite as NO2	<0.05 mg/l	TM184	<0.05 #	<0.05 #	<0.05 #	0.083 #	0.306 #	<0.05 #
Sulphate	<2 mg/l	TM184	211 #	174 #	8.7 #	445 #	134 #	196 #
Chloride	<2 mg/l	TM184	55.5 #	36.7 #	6.8 #	91.8 #	61.9 #	85.1 #
Total Oxidised Nitrogen as NO3	<0.3 mg/l	TM184	7.03 #	<0.3 #	0.752 #	130 #	1.37 #	5.58 #
Nitrate as NO3	<0.3 mg/l	TM184	7.01	<0.3	0.72	130	0.954	5.55
Arsenic (tot.unfilt)	<0.002 mg/l	TM191	0.00685	<0.002	0.0366	0.00294	0.0359	0.0262
Cadmium (tot.unfilt)	<0.0005 mg/l	TM191	<0.0005	<0.0005	<0.0005	0.00224	0.000632	<0.0005
Copper (tot.unfilt)	<0.004 mg/l	TM191	0.0229	<0.004	0.0533	0.0122	0.0127	0.0126
Nickel (tot.unfilt)	<0.0005 mg/l	TM191	0.0164	0.00249	0.0309	0.0872	0.0235	0.0577
Lead (tot.unfilt)	<0.0005 mg/l	TM191	0.00556	0.00203	0.118	0.00643	0.0139	0.00593
Zinc (tot.unfilt)	<0.003 mg/l	TM191	0.221	0.104	0.152	0.13	0.154	0.0581
Cyanide, Total	<0.05 mg/l	TM227	<0.05 #	<0.05 #	<0.05 #	<0.05 #	<0.05 #	<0.05 #
Calcium (tot.unfilt)	<0.057 mg/l	TM228	62.4	87.8	44.6	74.6	85.1	73.3
Sodium (diss.filt)	<0.076 mg/l	TM228	30.1	28.9	6.05	114	76.3	41.1
Magnesium (diss.filt)	<0.036 mg/l	TM228	27.5	34.2	5.09	31.7	29.1	35.3
Potassium (diss.filt)	<1 mg/l	TM228	10.3	13.9	4.16	32.2	12.8	9.62
Iron (diss.filt)	<0.019 mg/l	TM228	<0.019	<0.019	0.0504	0.0565	<0.019	<0.019
pH	<1 pH Units	TM256	6 #	6.91 #	6.61 #	5.39 #	6.9 #	6.36 #
Phenol	<0.002 mg/l	TM259	<0.2 #	<0.002 #	<0.002 #	<0.002 #	<0.002 #	<0.002 #
Cresols	<0.006 mg/l	TM259	<0.6 #	<0.006 #	<0.006 #	<0.006 #	<0.006 #	<0.006 #
Xylenols	<0.008 mg/l	TM259	<0.8 #	<0.008 #	<0.008 #	<0.008 #	<0.008 #	<0.008 #
Phenols, Total Detected monohydric	<0.016 mg/l	TM259	<0.016 #	<0.016 #	<0.016 #	<0.016 #	<0.016 #	<0.016 #

09:03:25 18/04/2017

Validated

CERTIFICATE OF ANALYSIS

SDG:	170405-4	**Client Reference:**	Groundwater Quarterly	**Report Number:**	405073
Location:	Standard Landfill	**Order Number:**	PO1133657	**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.	GW4R
Depth (m)	.
Sample Type	Ground Water (GW)
Date Sampled	03/04/2017
Sample Time	.
Date Received	04/04/2017
SDG Ref	170405-4
Lab Sample No.(s)	15284986
AGS Reference	

Component	LOD/Units	Method	GW4R
Chlorine, Total (Residual)	<0.01 mg/l	TM037	0.01
Alkalinity, Total as CaCO3	<2 mg/l	TM043	160 #
BOD, unfiltered	<1 mg/l	TM045	<1 ♦ #
Organic Carbon, Total	<3 mg/l	TM090	4.83 #
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	<0.2 #
Ammoniacal Nitrogen as NH4	<0.3 mg/l	TM099	<0.3 #
COD, unfiltered	<7 mg/l	TM107	38.3 #
Mercury (tot.unfilt)	<0.00002 mg/l	TM183	<0.00002 #
Nitrite as NO2	<0.05 mg/l	TM184	<0.05 #
Sulphate	<2 mg/l	TM184	326 #
Chloride	<2 mg/l	TM184	35.4 #
Total Oxidised Nitrogen as NO3	<0.3 mg/l	TM184	1.23 #
Nitrate as NO3	<0.3 mg/l	TM184	1.21
Arsenic (tot.unfilt)	<0.002 mg/l	TM191	0.0111
Cadmium (tot.unfilt)	<0.0005 mg/l	TM191	0.0053
Copper (tot.unfilt)	<0.004 mg/l	TM191	0.0599
Nickel (tot.unfilt)	<0.0005 mg/l	TM191	0.498
Lead (tot.unfilt)	<0.0005 mg/l	TM191	0.103
Zinc (tot.unfilt)	<0.003 mg/l	TM191	0.629
Cyanide, Total	<0.05 mg/l	TM227	<0.05 #
Calcium (tot.unfilt)	<0.057 mg/l	TM228	134
Sodium (diss.filt)	<0.076 mg/l	TM228	27.7
Magnesium (diss.filt)	<0.036 mg/l	TM228	40.3
Potassium (diss.filt)	<1 mg/l	TM228	9.71
Iron (diss.filt)	<0.019 mg/l	TM228	<0.019
pH	<1 pH Units	TM256	6.52 #
Phenol	<0.002 mg/l	TM259	<0.002 #
Cresols	<0.006 mg/l	TM259	<0.006 #
Xylenols	<0.008 mg/l	TM259	<0.008 #
Phenols, Total Detected monohydric	<0.016 mg/l	TM259	<0.016 #

09:03:25 18/04/2017

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
TM037	MEWAM Chlorine demand HMSO 1988	Determination of Free, Combined and Total Chlorine in Waters and Wastewaters using Colourimetry		
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples		
TM045	MEWAM BOD5 2nd Ed.HMSO 1988 / Method 5210B, AWWA/APHA, 20th Ed., 1999; SCA Blue Book 130	Determination of BOD5 (ATU) Filtered by Oxygen Meter on liquids		
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		
TM107	ISO 6060-1989	Determination of Chemical Oxygen Demand using COD Dr Lange Kit		
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		
TM191	Standard Methods for the examination of waters and wastewaters 16th Edition, ALPHA, Washington DC, USA. ISBN 0-87553-131-8.	Determination of Unfiltered Metals in Water Matrices by ICP-MS		
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate		
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES		
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		
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC		

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

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

Validated

CERTIFICATE OF ANALYSIS

SDG:	170405-4	**Client Reference:**	Groundwater Quarterly	**Report Number:**	405073
Location:	Standard Landfill	**Order Number:**	PO1133657	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	15284983	15284985	15284987	15284988	15284989	15284984	15284986
Customer Sample Ref.	GW1	GW3	GW5	GW6	GW7	GW2A	GW4R
AGS Ref.							
Depth							
Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
Alkalinity as CaCO3	10-Apr-2017	10-Apr-2017	10-Apr-2017	11-Apr-2017	10-Apr-2017	10-Apr-2017	10-Apr-2017
Ammoniacal Nitrogen	11-Apr-2017	11-Apr-2017	11-Apr-2017	11-Apr-2017	10-Apr-2017	11-Apr-2017	11-Apr-2017
Anions by Kone (w)	13-Apr-2017	13-Apr-2017	13-Apr-2017	13-Apr-2017	13-Apr-2017	13-Apr-2017	13-Apr-2017
BOD True Total	12-Apr-2017	12-Apr-2017	11-Apr-2017	11-Apr-2017	11-Apr-2017	12-Apr-2017	11-Apr-2017
Chlorine	06-Apr-2017	06-Apr-2017	06-Apr-2017	06-Apr-2017	06-Apr-2017	06-Apr-2017	06-Apr-2017
COD Unfiltered	12-Apr-2017	12-Apr-2017	12-Apr-2017	12-Apr-2017	12-Apr-2017	12-Apr-2017	12-Apr-2017
Cyanide Comp/Free/Total/Thiocyanate	10-Apr-2017	11-Apr-2017	11-Apr-2017	12-Apr-2017	12-Apr-2017	12-Apr-2017	10-Apr-2017
Mercury Unfiltered	13-Apr-2017	11-Apr-2017	10-Apr-2017	10-Apr-2017	13-Apr-2017	10-Apr-2017	10-Apr-2017
Metals by iCap-OES Dissolved (W)	13-Apr-2017	13-Apr-2017	11-Apr-2017	11-Apr-2017	13-Apr-2017	11-Apr-2017	11-Apr-2017
Metals by iCap-OES Unfiltered (W)	07-Apr-2017	07-Apr-2017	07-Apr-2017	07-Apr-2017	07-Apr-2017	07-Apr-2017	07-Apr-2017
Nitrite by Kone (w)	12-Apr-2017	12-Apr-2017	12-Apr-2017	12-Apr-2017	12-Apr-2017	12-Apr-2017	12-Apr-2017
pH Value	10-Apr-2017	11-Apr-2017	10-Apr-2017	10-Apr-2017	10-Apr-2017	11-Apr-2017	10-Apr-2017
Phenols by HPLC (W)	18-Apr-2017	11-Apr-2017	11-Apr-2017	12-Apr-2017	13-Apr-2017	11-Apr-2017	13-Apr-2017
Total Metals by ICP-MS	12-Apr-2017	12-Apr-2017	12-Apr-2017	12-Apr-2017	12-Apr-2017	12-Apr-2017	12-Apr-2017
Total Organic and Inorganic Carbon	11-Apr-2017	10-Apr-2017	10-Apr-2017	10-Apr-2017	11-Apr-2017	10-Apr-2017	10-Apr-2017

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%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

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

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 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 the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

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

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

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (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

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

Flintshire County Council
Waste Management Services
Brookhill Landfill Site
Pinfold Industrial Estate
Buckley
Flintshire
CH7 3PL

Attention: Paul Murphy

CERTIFICATE OF ANALYSIS

Date:	13 April 2017
Customer:	H_FLINTCCO_BUC
Sample Delivery Group (SDG):	170405-21
Your Reference:	
Location:	Standard Quarterly
Report No:	404947

We received 4 samples on Tuesday April 04, 2017 and 4 of these samples were scheduled for analysis which was completed on Thursday April 13, 2017. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

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

Approved By:

Sonia McWhan

Operations Manager

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.

Validated

CERTIFICATE OF ANALYSIS

SDG:	170405-21	**Client Reference:**		**Report Number:**	404947
Location:	Standard Quarterly	**Order Number:**	PO1133657	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
15285437	SW1			03/04/2017
15285440	SW2			03/04/2017
15285442	SW4			03/04/2017
15285443	SW5			03/04/2017

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

Validated

CERTIFICATE OF ANALYSIS

SDG:	170405-21	**Client Reference:**		**Report Number:**	404947
Location:	Standard Quarterly	**Order Number:**	PO1133657	**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)			15285437			15285440			15285442			15285443		
Customer Sample Reference			SW1			SW2			SW4			SW5		
AGS Reference														
Depth (m)														
Container			1lplastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	1lplastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	1lplastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)	1lplastic (ALE221)	250ml BOD (ALE212)	H2SO4 (ALE244)
Sample Type			SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
Alkalinity as CaCO3	All	NDPs: 0 Tests: 4	X			X			X			X		
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 4			X			X			X			X
Anions by Kone (w)	All	NDPs: 0 Tests: 4	X			X			X			X		
BOD True Total	All	NDPs: 0 Tests: 4		X			X			X			X	
Chlorine	All	NDPs: 0 Tests: 4	X			X			X			X		
COD Unfiltered	All	NDPs: 0 Tests: 4		X			X			X			X	
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 4	X			X			X			X		
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 4	X			X			X			X		
pH Value	All	NDPs: 0 Tests: 4	X			X			X			X		

Validated

CERTIFICATE OF ANALYSIS

SDG:	170405-21	**Client Reference:**		**Report Number:**	404947
Location:	Standard Quarterly	**Order Number:**	PO1133657	**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.			SW1	SW2	SW4	SW5		
Depth (m)			.	.	.	.		
Sample Type			Surface Water (SW)	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)		
Date Sampled			03/04/2017	03/04/2017	03/04/2017	03/04/2017		
Sample Time			.	.	.	.		
Date Received			04/04/2017	04/04/2017	04/04/2017	04/04/2017		
SDG Ref			170405-21	170405-21	170405-21	170405-21		
Lab Sample No.(s)			15285437	15285440	15285442	15285443		
AGS Reference								
Component	**LOD/Units**	**Method**						
Chlorine, Total (Residual)	<0.01 mg/l	TM037	0.05	0.05	0.04	0.06		
Alkalinity, Total as CaCO3	<2 mg/l	TM043	115 #	140 #	185 #	100 #		
BOD, unfiltered	<1 mg/l	TM045	4.16 ♦ #	<1 ♦ #	<1 ♦ #	10.1 ♦ #		
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	<0.2 #	<0.2 #	<0.2 #	<0.2 #		
COD, unfiltered	<7 mg/l	TM107	37.4 #	19.2 #	12.4 #	44.3 #		
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120	0.768 #	0.752 #	0.731 #	0.458 #		
Sulphate	<2 mg/l	TM184	229 #	175 #	158 #	116 #		
Chloride	<2 mg/l	TM184	69.7 #	95.1 #	72.2 #	24.5 #		
Nitrate as NO3	<0.3 mg/l	TM184	<0.3	0.476	12.3	<0.3		
Total Oxidised Nitrogen as N	<0.1 mg/l	TM184	<0.1 #	0.116 #	2.78 #	<0.1 #		
Calcium (diss.filt)	<0.012 mg/l	TM228	94.1 #	91.5 #	111 #	49.8 #		
Sodium (diss.filt)	<0.076 mg/l	TM228	46.4 #	61.7 #	44.6 #	24.4 #		
Magnesium (diss.filt)	<0.036 mg/l	TM228	26.3 #	20.2 #	17.7 #	17.5 #		
Potassium (diss.filt)	<1 mg/l	TM228	6.84 #	8.15 #	10.6 #	7.45 #		
Iron (diss.filt)	<0.019 mg/l	TM228	0.0441 #	0.043 #	0.0449 #	0.0559 #		
pH	<1 pH Units	TM256	7.62 #	7.76 #	7.98 #	7.77 #		

14:53:10 13/04/2017

Validated

CERTIFICATE OF ANALYSIS

SDG:	170405-21	**Client Reference:**		**Report Number:**	404947
Location:	Standard Quarterly	**Order Number:**	PO1133657	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
TM037	MEWAM Chlorine demand HMSO 1988	Determination of Free, Combined and Total Chlorine in Waters and Wastewaters using Colourimetry		
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples		
TM045	MEWAM BOD5 2nd Ed.HMSO 1988 / Method 5210B, AWWA/APHA, 20th Ed., 1999; SCA Blue Book 130	Determination of BOD5 (ATU) Filtered by Oxygen Meter on liquids		
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser		
TM107	ISO 6060-1989	Determination of Chemical Oxygen Demand using COD Dr Lange Kit		
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES		
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		

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

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

Validated

CERTIFICATE OF ANALYSIS

SDG:	170405-21	**Client Reference:**		**Report Number:**	404947
Location:	Standard Quarterly	**Order Number:**	PO1133657	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	15285437	15285440	15285442	15285443
Customer Sample Ref.	SW1	SW2	SW4	SW5
AGS Ref.				
Depth				
Type	Surface Water	Surface Water	Surface Water	Surface Water
Alkalinity as CaCO3	10-Apr-2017	10-Apr-2017	10-Apr-2017	10-Apr-2017
Ammoniacal Nitrogen	11-Apr-2017	11-Apr-2017	10-Apr-2017	11-Apr-2017
Anions by Kone (w)	13-Apr-2017	13-Apr-2017	13-Apr-2017	13-Apr-2017
BOD True Total	11-Apr-2017	11-Apr-2017	11-Apr-2017	11-Apr-2017
Chlorine	06-Apr-2017	06-Apr-2017	06-Apr-2017	06-Apr-2017
COD Unfiltered	12-Apr-2017	12-Apr-2017	12-Apr-2017	12-Apr-2017
Conductivity (at 20 deg.C)	12-Apr-2017	12-Apr-2017	12-Apr-2017	12-Apr-2017
Metals by iCap-OES Dissolved (W)	11-Apr-2017	11-Apr-2017	11-Apr-2017	11-Apr-2017
Nitrite by Kone (w)	11-Apr-2017	12-Apr-2017	11-Apr-2017	12-Apr-2017
pH Value	10-Apr-2017	10-Apr-2017	10-Apr-2017	10-Apr-2017

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%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

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

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 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 the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

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

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

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (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

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.

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