LLWYN ISAF LANDFILL SITE

Annual Environmental Report
January to December 2020

Llwyn Isaf Landfill,
Clynnog Fawr,
Gwynedd,
LL54 5DF

PERMIT NUMBER EPR/YP3138UJ

Prepared by Gwynedd Council (February 2021)

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Environmental monitoring

Summary

The 2020 Annual Environmental Report for Llwyn Isaf has been prepared in accordance with the EP requirements for the site.

In summary the following trends have been noted at the site :-

LEACHATE levels remained below the EP compliance limit of 1.50m. Cells 1 and 2 have shown a similar trend in both ammoniacal nitrogen and chloride concentrations during 2020 with lower levels noted in June increasing in November. However, concentrations in Cell 3 are at a higher concentration in June dropping in November. The leachate results in all three cells in 2020 have shown less variation than noted in previous years and remain within the historical range.

GROUNDWATER levels continue to show seasonal fluctuations and remained within the range of historical data. Groundwater quality continued to show little or no impact from Area 2 and no impact from Area 3. One breach was noted in M36 in June. Follow up sampling were found to be below the trigger level at this location.

SURFACEWATER quality in the River Desach showed no impact from the landfill. Results are comparable with 2019, with low chloride concentrations at all surface water monitoring locations. With the exception of the upstream sample point, SWY, a further drop was noted in the electrical conductivity along the River Desach.
The Infiltration basin saw a slight increase in chloride concentrations in 2019, remaining stable during 2020. However, these levels continue to remain low, showing no impact from the landfill.

LANDFILL GAS monitoring data has shown methane and carbon dioxide concentrations in the external boreholes remained below the EP compliance limits during 2020.

A timer was fitted at the flare in April 2018, with subsequent improvements seen in methane concentrations and a reduction in balance gas.
Surface emissions were undertaken in November 2020, none of the locations recorded levels above the action threshold of 100ppm.
Yearly flare emissions and bulk gases continue to remain compliant.

In 2020 some disruption to the sampling programme was experienced due to the Covid-19 pandemic. However, every effort was made to reschedule sampling whenever possible.

Environmental Monitoring

1. LEACHATE MONITORING

Table S3.1 Leachate level limits and monitoring requirements

Monitoring point	Limit	Monitoring frequency
All leachate monitoring points	1.50meters above base of the cell	Quarterly.

Table S3.8 Leachate – other monitoring requirements

Frequency	Monitoring locations	Measurement/determinand
QUARTERLY unless a reduced frequency is agreed in writing with NRW. Not less than every 6 months	All leachate monitoring points	Leachate level.
SIX – MONTHLY	All leachate wells/abstraction wells/ sumps identified on drawing ESiD 7 of the permit application documents	As monthly plus: Electrical conductivity (EC), Cl, NH4-N, pH, mecaprop, toluene, chemical oxygen demand (COD), Biological oxygen demand (BOD), Ca, Mg, K, Na, Cd, Alkalinity, Total organic carbon (TOC), SO4, Total organic nitrogen (TON) and phenol.
ANNUALLY	All leachate wells/abstraction wells/ sumps identified on drawing ESiD 7 of the permit application documents	As Monthly / quarterly plus: Cr, Cu, Fe, Pb, Mn, Ni, Zn and Hazardous substances.

1.1 LEACHATE REVIEW

1.2.1 Leachate Levels

The leachate compliance level and monitoring frequency in 2020 were carried out on a quarterly basis in accordance with table S3.1 of the permit within all three cells in Area 3.

During 2020, all leachate levels were compliant, with levels remaining below the specified 1.50m level of leachate above the cell's base.

The leachate monitoring points are shown in drawing 1 – Site Layout Plan

Table 1 – Leachate level data for 2020 (m above base)

Date	Monitoring point					
	CELL 1		CELL 2		CELL 3	
	LM1/1	LM1/2	LM2/1	LM2/2	LM3/1	LM3/2
20/01/20	0	0	0.45	1.23	1.36	0.28
27/04/20	0	0	0.59	1.38	1.31	0.21
29/07/20	0	0	0.41	1.19	0.99	0
12/10/20	0	0	0.60	1.39	1.19	0.14

1.2.2 Leachate quality

Leachate sampling was carried out in accordance with Table S3.8 of the permit. Samples of leachate were collected individually from the cells in Area 3 on a six-monthly basis.

A summary of selected results for pH, Electrical conductivity, Ammoniacal nitrogen, chloride and COD in 2020 are presented in Table 2

Table 2 – Selected Leachate Quality Data for 2020

Cell	pH		Electrical conductivity (µs/cm)		Ammoniacal nitrogen (mg/l)		Chloride (mg/l)		COD (mg/l)	
	June	Nov	June	Nov	June	Nov	June	Nov	June	Nov
1	7.6	7.4	4670	7040	341	510	416	724	237	796
2	7.4	7.6	4550	8820	314	699	431	973	220	1270
3	7.9	7.4	5310	3590	374	247	534	329	372	189

Scheduled 6 monthly sampling is usually done April & November. However, April sampling delayed until June (Covid-19)

Graphs for Ammoniacal nitrogen and chloride since 2013 are shown in Appendix 1.

CELL 1 – Ammoniacal nitrogen and chloride levels in cell 1 have shown greater variability in 2020.
Chloride concentrations have risen towards the end of 2020 from 416mg/l recorded in June to 724mg/l in November. The November figure is similar to the results obtained during 2019, a value of approximately 700mg/l.
Ammoniacal nitrogen concentrations have followed a similar trend, rising towards the end of 2020 from 341mg/l in June to 510mg/l in November. Values of between 428 – 462mg/l were recorded in 2019.
Over a 5 year period (2016 – 2020), maximum ammoniacal nitrogen (2330mg/l) and chloride (2760mg/l) levels were both recorded in January 2016. Minimum levels for both ammoniacal nitrogen (162mg/l) and chloride (242mg/l) were recorded in May 2018.

CELL 2 – During 2019 there had been a significant reduction in both the ammoniacal nitrogen levels and Chloride levels in cell 2. These levels continued into the middle of 2020, before increasing in November 2020.
Ammoniacal nitrogen in 2020 ranged between 314mg/l in June, increasing to 699mg/l in November. Chloride levels increased from 431 mg/l in June to 973 mg/l in November.
Over a period of 5 years (2016 – 2020), maximum ammoniacal levels were recorded in November 2016 (1780mg/l) with minimum levels recorded in November 2017 (205mg/l). Maximum chloride concentrations of 2210mg/l were recorded in May 2018; the minimum level of 242mg/l was recorded in May 2017.

CELL 3 – During 2020 the concentrations of both ammoniacal nitrogen and chloride have fallen significantly compared with the previous year. The low 2020 results are comparable with the 2018 set, where the levels were at a 5 year low. Ammoniacal nitrogen levels fell in 2020 from 374mg/l to 247mg/l in November. Falling values were also noted for chloride, which fell from 534 mg/l in June to its lowest recorded value at 329 mg/l in November.

Over a period of 5 years (2016 - 2020) maximum ammoniacal nitrogen levels were recorded in May 2016 (2490mg/l) falling in May 2018 (217mg/l). Maximum chloride concentrations were recorded in November 2017 (2570mg/l), falling to its lowest level in November 2020 (329mg/l).

Between 2016 and 2020, maximum ammoniacal nitrogen and chloride levels were recorded in Cell 1, 2 and 3 during 2016. A 5 year low for both ammoniacal nitrogen and chloride was recorded in both cells 1 and 3 in May 2018. Cell 2 5 year low were recorded in 2017.

The annual extended suite analytical suite comprising additional metals and hazardous organic substances as required by the EP for Area 3 was carried out in June 2020. Most of the hazardous organic substances were found at concentrations below the detection limits. Hazardous organic substances above the detection limit (Table 3) include some pesticides, herbicides and hydrocarbons.

Table 3 - Summary of the Leachate Organic Hazardous Substances Screen 2020 (substances above detection limit)

Hazardous organic substance	Concentration (µg/l)		
	Cell 1	Cell 2	Cell 3
Pesticides			
Mecaprop	3.94	4.43	6.38
Herbicides			
Monuron	0.51	0.87	0.68
Hydrocarbon Band			
EH >C6 – C40	295	80	171
EH>C6 – C8	<40	<40	<40
EH>C8 – C10	<400	<40	<40
EH>C16 – C24	70	<40	52
EH>C24 – C40	88	<40	<40
EH>C10 – C16	138	80	119
BTEX			
Toluene	0.63	0.86	1.09
m&p-Xylene	<4	5.4	<4

A total of 852 tonnes of leachate (648.44 tonnes in 2019) was extracted from Area 3 during 2020. Leachate was removed from a sump in the base of each cell via an upslope riser. The extracted leachate was stored on-site in the leachate collection tank prior to removal off-site by tanker for disposal.

2. GROUNDWATER MONITORING

Area 2 requirements

Frequency	Monitoring locations	Measurement/determinand
MONTHLY	M10, BH1, M18, M19, M20, M21, M22, M30, M31, M33, M34, M35, and soakaway NS	Water level, temperature, pH, Cl, EC, NH4-N, Dissolved oxygen (DO)
QUARTERLY		As monthly plus: Alkalinity, Ca, Cd, Cr, Ni, Pb, K, Mg, Na, SO4, Fe, Mn, Zn, Cu, TOC and TON.

Area 3 requirements

(Table S3.10 groundwater – other monitoring requirements)

Frequency	Monitoring locations	Measurement/determinand
SIX – MONTHLY	M17, M36, M47, DAS, GW2, GW3, GW4 and GW5	Water Level, EC, DO, Cl, NH4-N, Hg (diss), Zn, Mecaprop, Ca, Mg, K, Na, Cd, alkalinity, TOC, SO4, TON and phenol.
ANNUALLY	M17, M36, M47, DAS, GW2, GW3, GW4 and GW5	As six-monthly plus: Cr, Cu, Fe, Pb, Mn, Ni, Zn, hazardous substance suite.

(Table S3.4 Trigger levels for emissions into groundwater and monitoring requirements)

Borehole	Compliance limits					
	Ammoniacal nitrogen	Chloride	Mecaprop	Mercury	Zinc	Toluene
	mg/l	mg/l	µg/l	µg/l	mg/l	µg/l
GW3	0.54	21	0.04	0.1	0.133	3
GW4	0.48	21	0.04	0.1	0.156	3
M36	0.49	22	0.04	0.1	0.094	3

2.1 GROUNDWATER REVIEW

2.1.1 Groundwater Levels

Data from January to December 2020 are summarised in Table 4.
The highest groundwater levels are to the south of the site, with water levels falling towards the north/northeast towards the River Desach and also falling to the north west of the site. During 2020 the largest variations in groundwater levels were seen in Area 2 groundwater monitoring boreholes, which are monitored on a monthly basis. Area 3 is monitored every 6 months, with changes in levels less apparent due to the monitoring frequency.

Table 4 - Summary of Ground Water Levels for 2020

Borehole	Borehole Datum (m AOD)	Groundwater Levels (m AOD)		
		Min	Mean	Max
GW3	134.42	127.11		128.56
GW4	138.07	127.27		128.87
GW5	134.21	130.06		130.77
M10	134.91	124.40	126.15	126.94
BH1	132.64	124.01	125.56	126.94
M17	129.29	125.44		127.29
M18	132.50	127.27	128.16	128.79
M19	127.41			
M20	128.77			
M21	130.98			
M22	127.33			
M31	128.90	122.84	123.78	124.30
M33	134.16	127.26	127.48	127.78
M34	131.18	125.13	126.05	126.69
M35	127.62	122.46	124.21	125.52
M36	138.29	128.30		129.93
M47	139.20	128.98		130.80
DAS	140.68	135.56		135.81

Groundwater levels in Area 2 are monitored monthly and in Area 3 every six months.

2.1.2 Groundwater quality

Although Area 2 and Area 3 are regulated under separate EP's and this report, as with previous ones, discusses these areas separately, some of the monitoring locations may not intuitively belong in the operational areas under which they are being discussed give their location in relation to the two landfill sites.

Analytical results for ammoniacal nitrogen and chloride (site leachate indicators) are presented graphically in Appendix 2. A summary of the data for the reporting period January to December 2020 is provided in Table 5.

Table 5 - Selected Groundwater Quality for 2020

Borehole	pH			Electrical conductivity (µS/cm)			Ammoniacal Nitrogen (mg/l)			Chloride (mg/l)		
	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Area 3 EP												
Upgradient												
GW5	6.6		6.6	172		172	<0.41		<0.41	7.7		8.2
M47	6.5		7.9	99.8		271	<0.41		<0.41	11.2		14.8
Downgradient												
GW3 *	7.1		7.4	324		337	<0.41		<0.41	9.70		13.20
GW4 *	6.5		7.1	146		194	<0.41		<0.41	12.7		18.0
M17	6.6		6.9	200		201	<0.41		<0.41	18.90		19.4
M36 *	6.8		7.2	161		304	<0.41		1.42	13.2		16.9
Other Boreholes												
DAS	7.2		7.4	205		398	<0.41		<0.41	6.2		8.7
Area 2 EP												
BH1	6.8	7.5	8.3	57	320	427	<0.41	0.75	3.84	9.90	13.88	15.70
M18	6.8	7.2	7.7	176	195	207	<0.41	<0.41	<0.41	9.7	12.8	21.6
M19**												
M20**												
M21**												
M22**												
M31	7.1	7.3	7.6	261	278	297	<0.41	<0.41	<0.41	12.9	14.56	16.7
M34	7.1	7.3	7.5	248	267	301	<0.41	<0.41	<0.41	10.5	13.73	17.2
M35	6.0	6.4	6.7	116	137	181	<0.41	0.61	2.23	17.1	23.48	32.60
Other boreholes												
M10	7.3	7.4	7.7	174	193	205	<0.41	<0.41	<0.41	8.1	10.72	12.9
M33	6.8	7.2	7.5	94	117	141	<0.41	<0.41	<0.41	6.2	11.95	18.5

Note : Six monthly data Area 3 (GW5, M47, GW3, GW4, M17, M36 and DAS) and monthly for Area 2.
**Boreholes with EP trigger levels*
***samples have not been collected from these locations in 2020*

Area 3 Monitoring

Upgradient boreholes

Boreholes GW2, GW5 and M47 are situated to the south of, and upgradient of, Area 3 and therefore provide an indication of background groundwater quality. Borehole GW2 continued to remain dry during 2020. Data for the remaining two boreholes, GW5 and M47 indicate:-

- Ammoniacal nitrogen at both locations remained below detection limit (<0.41mg/l).
- Chloride concentrations remain within the previous range, remaining at relatively low concentrations (7.70 – 14.80mg/l), GW5 results continue to remain lower than M47.

Downgradient boreholes

Boreholes GW3, GW4, M17 and M36 are located downgradient of Area 3. Compliance limits for mercury, zinc, ammoniacal nitrogen, chloride, mecaprop and toluene have been set for boreholes GW3, GW4 and M36. Details of the EP compliance limits are shown in *Table S3.4*

The data for the reporting during 2020, shows :-

- Ammoniacal nitrogen levels were below the detection limit (0.41mg/l) and the EP compliance limits at GW3 and GW4. Levels of 1.42mg/l were detected in M36 in June.

Sampling in October recorded levels below detection at <0.41mg/l and below 0.49mg/l compliance level set for this borehole. Details of breach notification are detailed in Appendix 8 of the report.

- Chloride concentrations at GW3 (9.70 -13.20mg/l), GW4 (12.70 – 18.00mg/l) and M36 (13.20 – 16.90mg/l) remained within the historical data range and all locations remained below the EP compliance limits.
- Mecaprop concentrations were below the laboratory detection limit (0.04ug/l) and EP compliance limits at GW3, GW4 and M36.
- Mercury concentrations were below the EP compliance limit (0.10ug/l) in GW3, GW4 and M36.
- Zinc concentrations remained below the detection limit in GW3 and levels of between <18 – 18.6ug/l were noted in M36 and 18.9 – 22.1ug/l were noted in GW4. All three boreholes remained below the EP compliance limits.
- Toluene concentrations were below the laboratory detection limit (1ug/l) in GW3 and GW4, levels of between <1 – 5.61 ug/l were noted in M36.

No upward trend was observed in any of the boreholes with similar results seen in 2019 and 2020. Overall, groundwater quality downgradient of Area 3 for 2019 show no impact from Area 3. Mecaprop levels were below the laboratory detection limits. With the exception of the ammoniacal nitrogen breach in M36 in June, and toluene in M36 in December, no further breaches were noted. Chloride, mercury and zinc were below the specified EP compliance limits for the groundwaters in GW3, GW4 and M36.

Other boreholes

Borehole DAS is situated within and close to the perimeter of Area 2. Historically ammonical nitrogen and chloride concentrations at this borehole have been elevated compared to other boreholes at the site but groundwater quality has improved since 2015. Contamination at this borehole is most likely to be the result of the borehole being within the waste deposits of the unlined closed landfill (Area 2). During the reporting period both the ammoniacal nitrogen and the chloride levels have remained lower than the elevated pre – 2015 data. Chloride concentrations (6.20 – 8.70mg/l) have fallen to within the range measured at the other borehole at the site whilst ammoniacal nitrogen continues to fall, recording levels below the detection level (<0.41mg/l)in 2020.

Area 2 Monitoring

Downgradient boreholes

Boreholes BH1, M18, M19, M20, M21, M22, M30, M31, M34 and M35 are downgradient of the unlined closed landfill (Area 2).

Boreholes M19, M20, M21 and M22 have not been monitored in 2020 due to access issues. Borehole BH1 recorded ammoniacal nitrogen levels of between <0.41 – 3.84mg/l and BH35 between <0.41 – 2.23mg/l, all the remaining boreholes, BH18, M31 and M34, recorded levels below detection (<0.41mg/l).

The largest range in chloride levels were recorded in BH35 ranging between 17.10-32.60mg/l. All boreholes continue to remain within the boundary of historical data. Chloride concentrations are gradually increasing at M35 but continue to remain below pre 2015 levels.

Previous reports have noted that the water quality at these locations are likely to reflect some impact from the unlined landfill, Area 2.

Boreholes within Area 2 boundary
Boreholes M10 and M33 are located within the northern part of Area 2.

All of the samples taken at both locations in 2020 were below the detection limit of <0.41mg/l for ammoniacal nitrogen. Ammoniacal nitrogen levels at both M10 and M33 peaked in early 2019, M10 in February (1.78 mg/l) and M33 in April (0.61mg/l), but have remained below the detection level of <0.41mg/l since the middle of 2019.

Chloride levels in M10 remained low ranging between 8.10 – 12.90mg/l in 2020 a slight increase on the 2019 range of 3.1 - 8.18mg/l. Values in M33, were slightly more variable ranging between 6.20mg/l – 18.50mg/l with the highest value recorded in January 2020 an increase from the previous year where the range of values varied between 5.80 – 12.90mg/l.

In 2020 ammoniacal nitrogen levels in both M10 and M33 have seen an improvement since the 2019. Chloride levels in both M10 and M33 during 2020 has seen a slight increase.

Soakaway
A summary of the monitoring results taken from the Soakaway NS for 2020 are shown in Table 6.

Table 6 - Selected Water Quality Data for Soakaway NS for 2020

	pH			Electrical Conductivity (µs/cm)			Ammoniacal nitrogen (mg/l)			Chloride (mg/l)		
	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
NS	7.4	7.6	7.8	59	102	137	<0.06	-	<0.41	3.7	9.9	16.4

Ammoniacal nitrogen levels remained low, below detection level at <0.06 - <0.41mg/l. Chloride concentrations continued to remain low and varied between 3.7 – 16.4 mg/l, a slight increase on the upper value of 13.40mg/l recorded in 2019. The results from the soakaway indicate no evidence of contamination by leachate in the surface water runoff.

Data plots for Area 2 boreholes and the soakaway are shown in Appendix 3.

An extended analytical suite for hazardous organic substances in groundwater boreholes GW3, GW4, GW5, M17, M36, M47 and DAS was carried out in June and September 2020. The data is summarised in Table 7. The substances detected include a hydrocarbon band downgradient of the site at GW4, M17 and M36 and further organic substances in M36.

Table 7 - Summary of groundwater Organic Hazardous Substances Screen 2020 (substances above detection limit)

Hazardous organic Substance	**upgradient**		**downgradient**				**Within Area 2 perimiter**
	GW5	**M47**	**GW3**	**GW4**	**M17**	**M36**	**DAS**
Organic compounds µg/l)							
Phenol	<4.0	<1.0	<1.0	<1.0	<1.0	6.3	<2.0
3&4-methylphenol	<4.0	<1.0	<1.0	<1.0	<1.0	20.4	<2.0
Hydrocarbon Band (µg/l)							
EH>C10-C16	<20	<10	<10	<10	<10	<40	<10
EH>C16-C24	<20	<10	<10	<10	<10	<40	<10

EH>C24-C40	<20	<10	<10	79	12	73	<10
EH>C6-C40	<20	<10	<10	79	12	73	<10

* As a result of the Covid-19 pandemic; the sampling schedule in 2020 experienced disruptions. Organic Hazardous Substances Screen were done In June (M47, GW3, M36, GW4) and September (GW5, M17 & DAS).

Further analysis was carried out in January 2021 to check for the presence of hydrocarbons in the boreholes. Results showed no presence of hydrocarbons in either groundwater borehole GW4 or M17. Slight traces continue to be detected in M36, values having been reduced from 73ug/l to 17ug/l for the EH>C24-C40 band.

Hydrocarbon Band (µg/l)	GW4	M17	M36
EH>C10-C16	<10	<10	<10
EH>C16-C24	<10	<10	<10
EH>C24-C40	<10	<10	17
EH>C6-C40	<10	<10	17

3. SURFACE WATER MONITORING

3.1 SURFACEWATER REVIEW

The surface waters are monitored at the following locations, show on drawing 1:-
SW B – Tributary of the River Desach, to the north of the site
SW C – River Desach, to the north east of the site
SW D – Discharge point, from the surface water attenuation lagoon, into the River Desach. The attenuation lagoon is fed from the landfill's surface water drainage system, along with an interceptor and much of the surface water on Area 2 installed in September 2012. Emission limits have been set at this location for pH, chloride, ammoniacal nitrogen, suspended solids and BOD.
SW D2 – A sample from a lake located to the north of the site.
SW E – River Desach, approximately 300m downstream of sample point SW C
SW W – River Desach, to the east of the site.
SW Y – River Desach, located upstream of the site to the south east of the site.
Infiltration Basin – Located east of the site near to SW W. Draining surface water collected from Area 3 of the landfill.

Monitoring is carried out in accordance to the requirement of the Environmental Permit

(Table S3.3 Point source emissions to water (other than sewer) – emission limits and monitoring requirements)

Emission point	Parameter	Limit	Reference period	Monitoring Frequency
Point D	Ammoniacal nitrogen	0.3 mg/l	Spot sample	Every two months
	Dissolved oxygen	80% (minimum)		
	BOD	4 mg/l		
	Suspended Solids	25 mg/l		

(Table S3.9 Surface water – other monitoring requirements)

Frequency	Monitoring locations	Measurement/determinand
EVERY TWO MONTHS	SW D (discharge)	NH4-N, DO, BOD and suspended solids
SIX-MONTHLY	Infiltration Basin	EC, pH, Cl, NH4-N, Cd.
SIX-MONTHLY	SWY, SWW, SWD (Discharge), SWB, SWC, SWD2, SWY	EC, pH, Alkalinity, Cl, NH4-N, TOC, BOD, COD, DO
ANNUALLY	SWY, SWW, SWD (Discharge), SWB, SWC, SWD2, SWY	As 6-monthly plus: Ca, Mg, K, Na, SO4, NO3, NO2, TON, Cd, Cu, Fe, Pb, Mn, Ni and Zn.

3.1.1 Surface Water Quality

River Desach – In total 4 samples, SWY, SWW, SW C and SWE are taken along the course of the river over a distance of approximately 800m, sampling upstream, adjacent to and downstream of the site. A further sample is taken at location SW B, a tributary of the river. Similar results are seen at each location along the length of the river and also in the tributary. Ammoniacal nitrogen levels continue remain below detection limits (<0.06mg/l) in both the river and tributary. Chloride levels continue to remain low with a small range of between 9.2 and 12.2mg/l, with the exception of one anomalous result of 101mg/l in SWC taken in November.

Lake – Located to the north of the site, surface water sample SWD2, shows fluctuations in the ammoniacal nitrogen levels. Readings taken in June 2020 are below the detection level (<0.06mg/l) rising to 1.42mg/l in November 2020. As noted in previous reports the elevated peaks in the ammoniacal nitrogen appear to be seasonal and may be associated with agricultural input, such as fertilisers. The peak in November at 1.42mg/l is the highest value noted since November 2017 when a level of 1.97mg/l was recorded at SWD2.

Chloride concentrations have shown a slight increase in 2020 from the 2019 range of 13.3mg/l to 18.8mg/l. In 2020 the levels have varied between 18.1 mg/l (Nov) and 21.2 mg/l (June). However, these concentrations remain below the May 2017 (28.20mg/l) peak.

Discharge Point (SWD) – The discharge point at SWD is monitored every two months. Readings in 2020 were taken in January, March, August, September and November; with no discharge noted at this location during the exceptionally dry period experienced in June and July.

EP compliance limits for ammoniacal nitrogen, Dissolved Oxygen, BOD and Suspended Solids have been specified at this location.

- Ammoniacal nitrogen remained below detection limit (<0.06mg/l)
- Dissolved Oxygen, remaining above the 80% compliance limit,
- BOD remained below the compliance level of 4mg/l, with the majority of 2020 BOD levels below detection at <1mg/l rising to an isolated peak of 2mg/l in August.
- Suspended Solids remained below the compliance level of 25mg/l, ranging between 1 and 3mg/l.

Infiltration Basin – levels were recorded in September and November 2020 with ammoniacal nitrogen levels continuing to remain below the detection limit (<0.06mg/l). Chloride levels continue to remain stable and low at 10.3mg/l in 2020.

In summary, the data continued to shows no discernible impact from Area 3 on the River Desach or on the lake to the north of the site.

Table 8 - Selected Surface Water Quality Data for 2020

Sample Point	pH			Electrical Conductivity (µS/cm)			Ammoniacal Nitrogen (mg/l)			Chloride (mg/l)			Dissolved Oxygen (mg/l) & (%)			Suspended Solids (mg/l)			Biological Oxygen Demand (mg/l)		
	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
B	7.1	-	7.4	64.2	-	71.9	<0.06	-	<0.06	9.2	-	9.3	9.4	-	10.1	n.m.			<1	-	<1
C	7.3	-	7.7	95.1	-	121	<0.06	-	<0.06	10.5	-	101*	7.7	-	9.1	n.m.			1	-	4
D	7.5	7.9	8.2	-	-	-	<0.06	<0.06	<0.06	-	-	-	8.1 (97.8%)	10.5	14.3 (97.7%)	1	1.7	3	<1	1.2	2
D2	7.8	-	8.1	276	-	342	<0.06	-	1.42	18.1	-	21.2	2.4	-	10.6	n.m.			2	-	3
E	7.6	-	7.9	131	-	175	<0.06	-	<0.06	11.9	-	12.2	9.7	-	11.4	n.m.			<1	-	<1
W	7.1	-	7.5	80.7	-	108	<0.06	-	<0.06	10.7	-	11.2	6.6	-	8.0	n.m.			<1	-	<1
Y	6.9	-	7.7	57.3	-	90.2	<0.06	-	<0.06	9.8	-	10.8	7.5	-	-	n.m.			<1	-	<1
Infiltration Basin*	8.1			258			<0.06			10.3			10 (83.3%)			n.m.			-		
EP emission limits for SW D	*6.0*		*9.0*				*<0.3*						*>80%*			*<25*			*<4*		

*SWC, 101mg/l Cl appears anomalous

NOTE :- Suspended solids measurement for sampling point D only , as per the requirements of the EP.

4. GAS MONITORING

(Table S3.5 Landfill gas in external borehole – limits and monitoring requirements)
(Table S3.7 Landfill gas – other monitoring requirements)

Frequency	Monitoring locations	Measurement/determinand
SIX-MONTHLY	Peripheral gas monitoring boreholes G1A, G2, G3, G4, G5 G6 and G7	Methane, Carbon Dioxide, Oxygen, Atmospheric pressure, Differential pressure, Temperature, Meteorological data.
SIX-MONTHLY	In-waste monitoring boreholes (at least two monitoring wells within each cell	Methane, Carbon Dioxide, Oxygen, Carbon monoxide, Atmospheric pressure, Differential pressure, Temperature, Meteorological data.

4.1 GAS MONITORING REVIEW

4.1.1 Perimeter Gas Monitoring

Landfill gas monitoring was carried in accordance toe the EP requirement on a six monthly basis in perimeter gas boreholes G1A, G2 – G7. The locations of the gas monitoring boreholes are shown in drawing 1.
The results of the monitoring undertaken in 2020 along with the compliance limits are shown in Table 9.

Methane detected in G1a and G2 remained below both the compliance and control level. In G1A methane levels ranged between 0.10 – 0.50 %v/v and in April a level of 0.10 %v/v was detected in G2.
No control limits for carbon dioxide were breached, measurements taken in 2020 were below the limits set at the individual boreholes.

Nether methane or carbon dioxide were detected in gas monitoring borehole G7; levels of 0.1% v/v for both methane and carbon dioxide were detected in G6. Both these boreholes are located between the engineered landfill in Area 3 and the unlined landfill in Area 2. Should any methane/carbon dioxide be detected within these boreholes it is most likely to be derived from Area 2.

Table 9 – Monitoring Results from Perimeter Gas Boreholes in 2020

Date	Atmospheric Pressure (differential Pressure) (mb)	G1A			G2			G3			G4		
		CH4 (%v/v)	C02 (%v/v)	O2 (%v/v)	CH4 (%v/v)	C02 (%v/v)	O2 (%v/v)	CH4 (%v/v)	C02 (%v/v)	O2 (%v/v)	CH4 (%v/v)	C02 (%v/v)	O2 (%v/v)
06/04/20	998 (-0.65 to 0.49)	0.1	1.3	0.3	0.1	0.0	21.1	0.0	0.0	21.0	0.0	0.0	21.1
08/10/20	995 - 996 (-1.41 to 0.09)	0.5	3.8	0.2	0.0	0.0	21.4	0.0	0.2	20.8	0.0	0.1	21
Control levels %v/v		*0.8*	*4.7*	-	*0.8*	*1.9*	-	*0.8*	*4.5*	-	*0.8*	*2.0*	-
Compliance levels %v/v		*1.0*	*5.9*	-	*1.0*	*2.3*	-	*1.0*	*5.7*	-	*1.0*	*2.5*	-

Date	Atmospheric Pressure (differential Pressure) (mb)	G5			G6			G7		
		CH4 (%v/v)	C02 (%v/v)	O2 (%v/v)	CH4 (%v/v)	C02 (%v/v)	O2 (%v/v)	CH4 (%v/v)	C02 (%v/v)	O2 (%v/v)
06/04/20	998 (-0.65 to 0.49)	0.1	0.0	20.6	0.1	0.1	20.7	0.0	0.0	20.8
08/10/20	995 - 996 (-1.41 to 0.09)	0.0	0.0	21.3	0.0	0.0	21.3	0.0	0.0	21.5
Control levels %v/v		*2.1*	*5.0*	-	*a*	*a*	-	*a*	*a*	-
Compliance levels %v/v		*2.6*	*6.2*	-	*a*	*a*	-	*a*	*a*	-

Compliance limits and control levels for G6 and G7 have not been set as monitoring data suggests that they are being affected by landfill gas derived from the closed unlined landfill in Area 2

4.1.2 In Waste Gas Monitoring (Area 3)

In waste gas monitoring locations include combined leachate and gas monitoring wells and gas extraction wells shown in figure 1. The data is summarised in Appendix 4 and data shows that the waste is continuing to produce landfill gas.
On the 27th of April 2018 a timer was fitted to the flare. Currently the flare is run for 10 hours in a 24hr cycle. The EP require readings at the flare to be carried out on a 6 monthly basis, however, additional data has been collected following the installation of the timer. The readings taken at the flare during 2020 are summarised in Table 10.

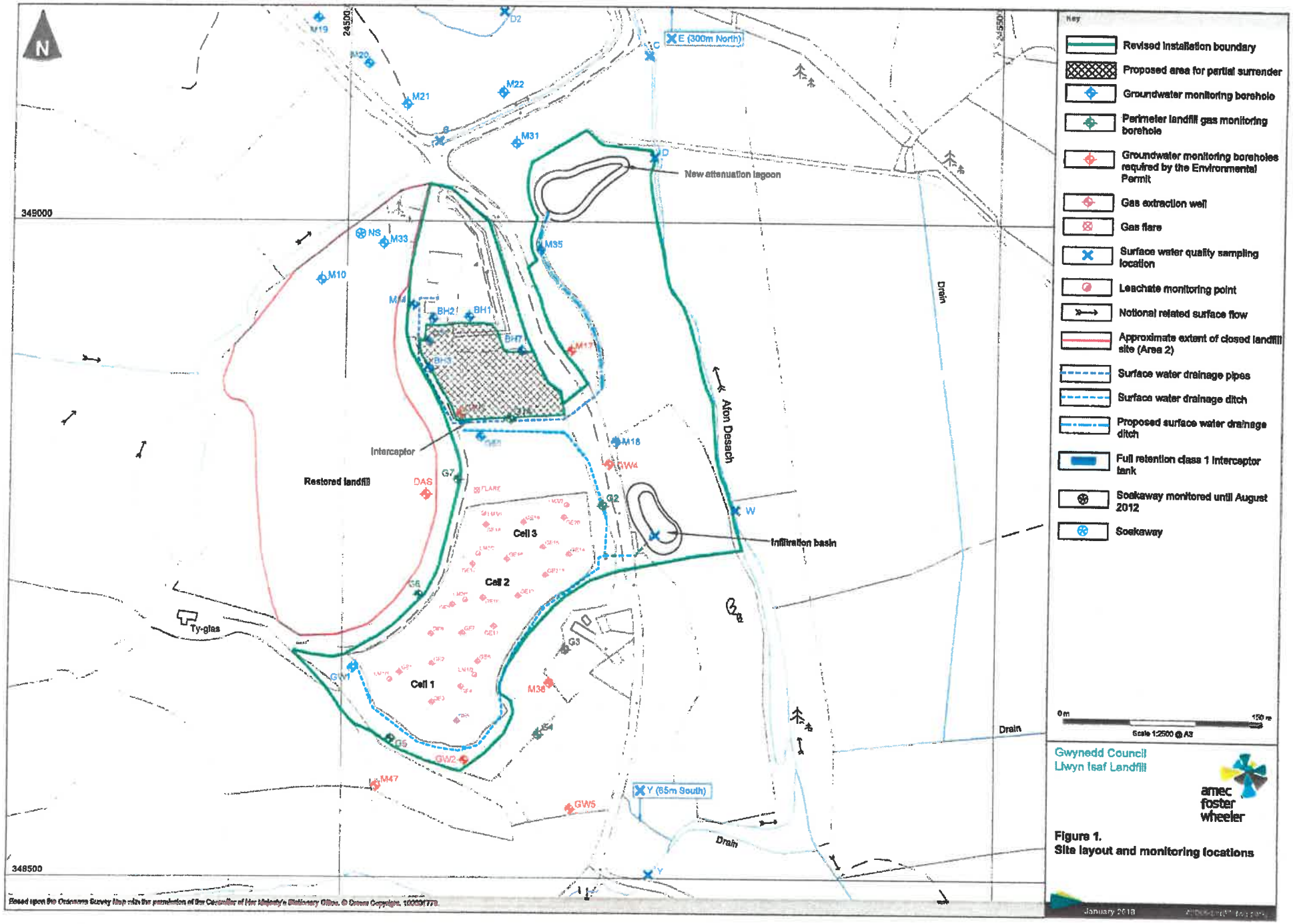
Table 10 - Readings at the flare during 2020

Date	CH4 %v/v	Balance gas	Flow (m3/hr)	Suction (mb)
17/01/20	59.9	12.7	26	-4.37
10/02/20	62.4	9.6	26	-2.13
02/03/20	57.6	15.4	30	-5.70
06/04/20	59.4	13.7	25	-1.65
04/05/20	53.4	20.9	29	-2.49
08/06/20	51.7	23.9	24	-3.73
06/07/20	53.2	12.9	22	-6.96
18/08/20	57.9	15.7	25	-2.36
24/09/20	62.9	9.6	30	-4.63
05/10/20	59.8	11.5	25	-7.29
06/11/20	57.2	15.8	28	-5.61
04/12/20	61.1	10.7	26	-4.09

Meteorological data (details of the rainfall, temperature and wind direction) for the reporting period are presented in Appendix 5.

4.1.3 Surface Emissions (Area 3)
To comply with EP condition *S3.6 Landfill gas from capped surfaces – limits and monitoring requirements.* A surface fugitive emission survey of Area 3 was carried out on the 25th of November 2020. The maximum result for methane emissions during the survey of the cap was 10ppm. No further actions were taken – as no action is required below 100ppm.

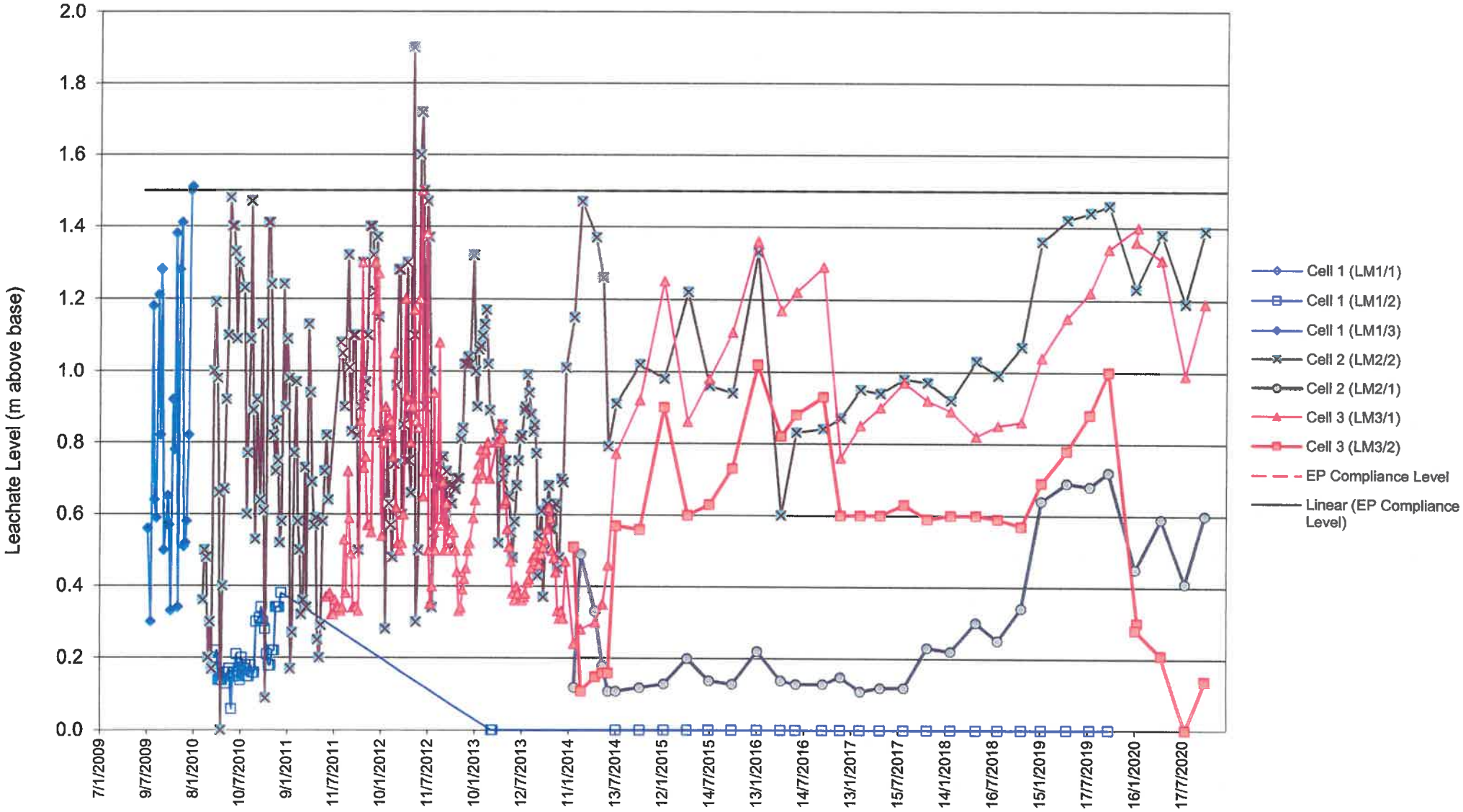
4.1.4 Flare Emissions and Bulk Gases
An Average flow of 26m3/hr continues to be recorded at the flare in 2020 (26m3/hr in 2019 and 27m3/hr in 2018). In total a volume of 101,403m3 of landfill gas was combusted at the site in 2020.
Flare emissions and bulk gas carried out at the site on the 23th of September 2020 are shown in Appendix 6. All results were compliant with table *S3.2 Point source emissions to air – emission limits and monitoring requirements* of the EP.


N
345000
348500
M19
M20
M21
M22
M31
M35
M10
M14
M33
NS
BH2
BH1
BH7
BH3
M17
M18
GW4
GW3
Interceptor
Restored landfill
DAS
G7
G6
G2
G3
G5
GW1
GW2
GW5
M38
M47
Cell 1
Cell 2
Cell 3
Ty-glas
New attenuation lagoon
E (300m North)
C
D
W
Y (65m South)
Y
Afon Desach
Drain
Infiltration basin
Key
Revised installation boundary
Proposed area for partial surrender
Groundwater monitoring borehole
Perimeter landfill gas monitoring borehole
Groundwater monitoring boreholes required by the Environmental Permit
Gas extraction well
Gas flare
Surface water quality sampling location
Leachate monitoring point
Notional related surface flow
Approximate extent of closed landfill site (Area 2)
Surface water drainage pipes
Surface water drainage ditch
Proposed surface water drainage ditch
Full retention class 1 interceptor tank
Soakaway monitored until August 2012
Soakaway
0m
Scale 1:2500 @ A3
Gwynedd Council
Llwyn Isaf Landfill
amec foster wheeler
Figure 1.
Site layout and monitoring locations
January 2018

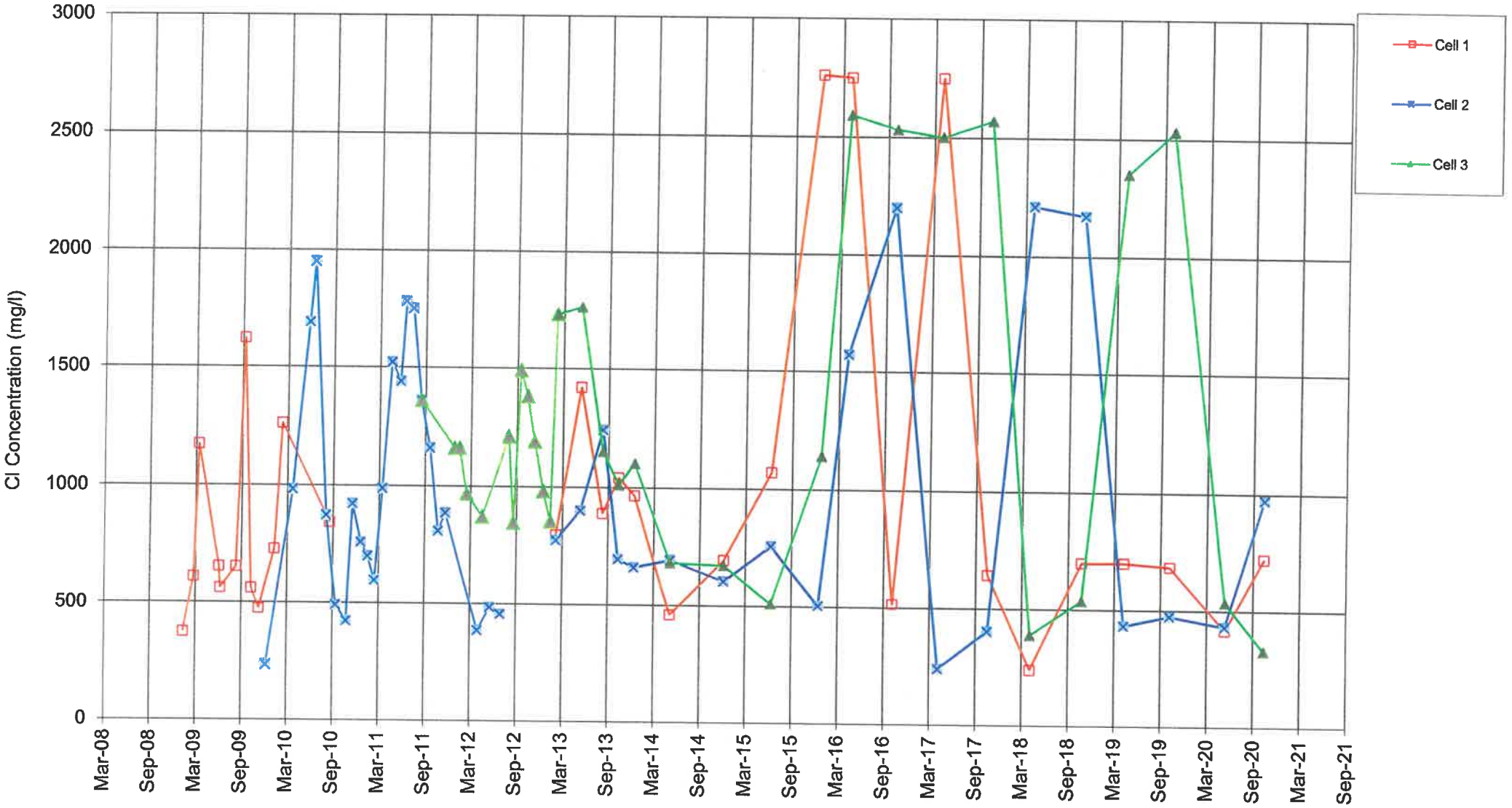
APPENDIX 1 –

Leachate Quality Data Plots

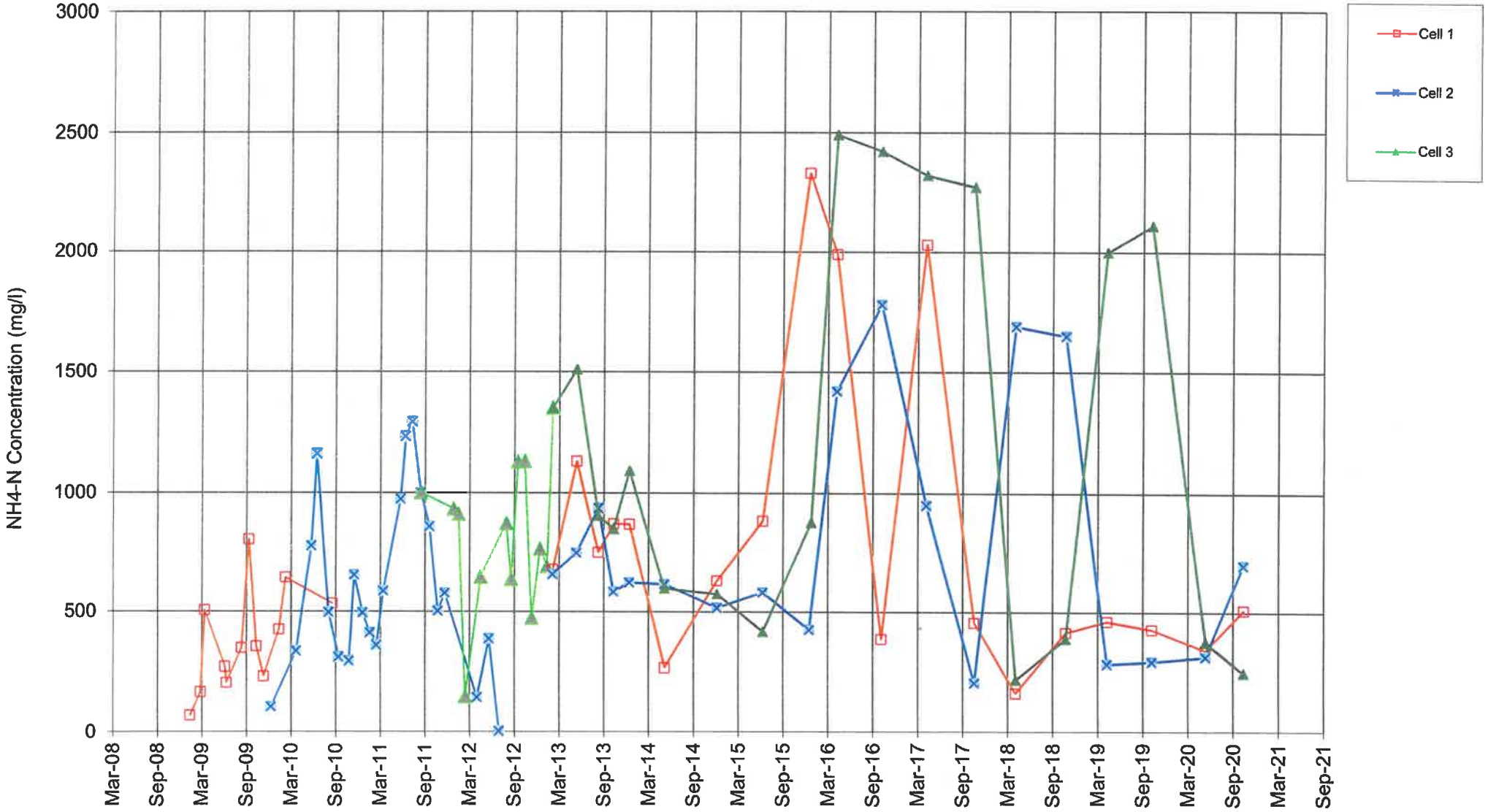
Llwyn Isaf Landfill: Leachate Levels



Llwyn Isaf Landfill: Chloride Concentrations in Landfill Leachate



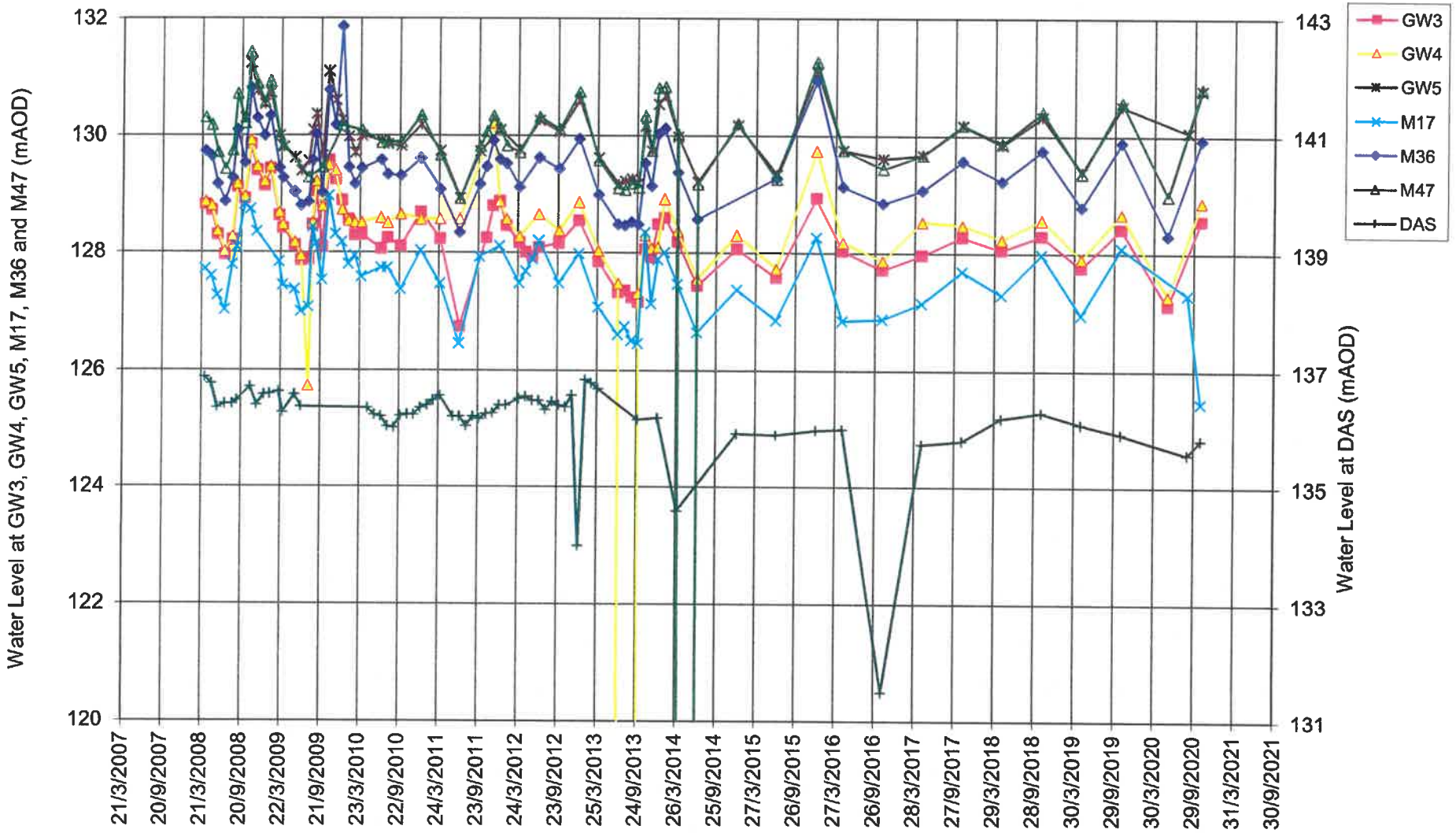
Llwyn Isaf Landfill: Ammoniacal-Nitrogen Concentrations in Landfill Leachate



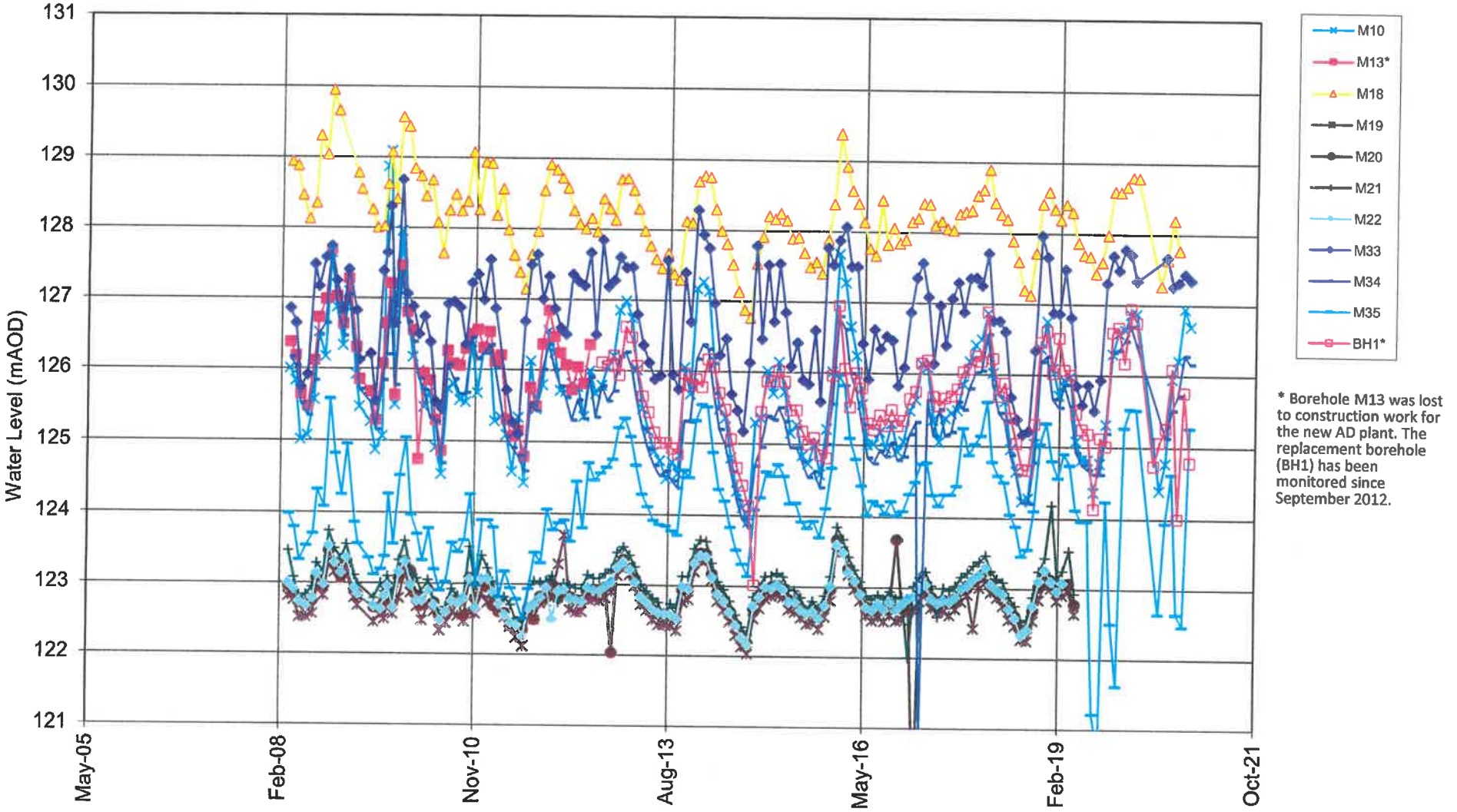
APPENDIX 2 –

Groundwater Quality Data Plots

Llwyn Isaf Landfill: Groundwater Levels (Area 3)

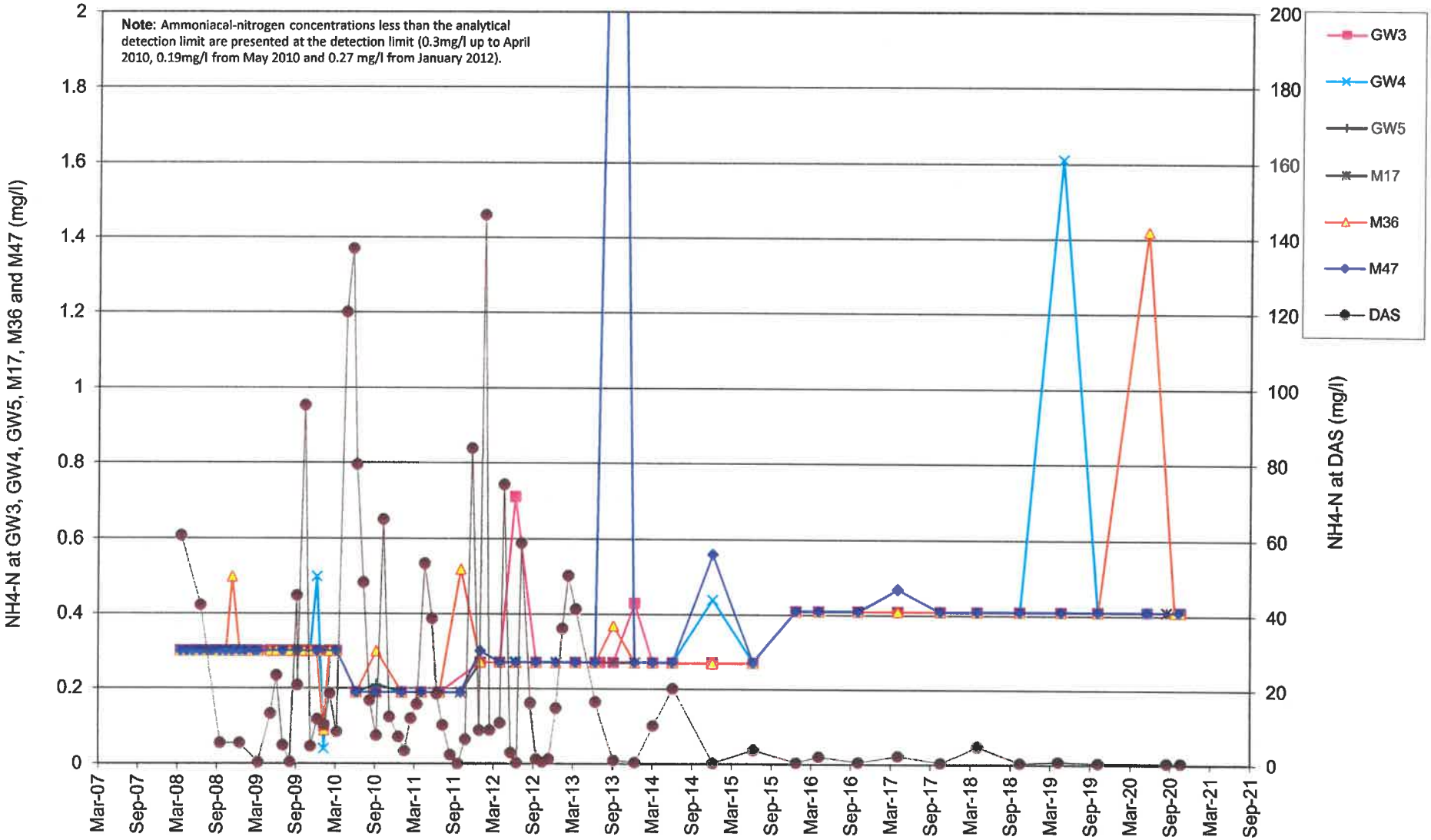


Llwyn Isaf Landfill: Groundwater Levels (Area 2)

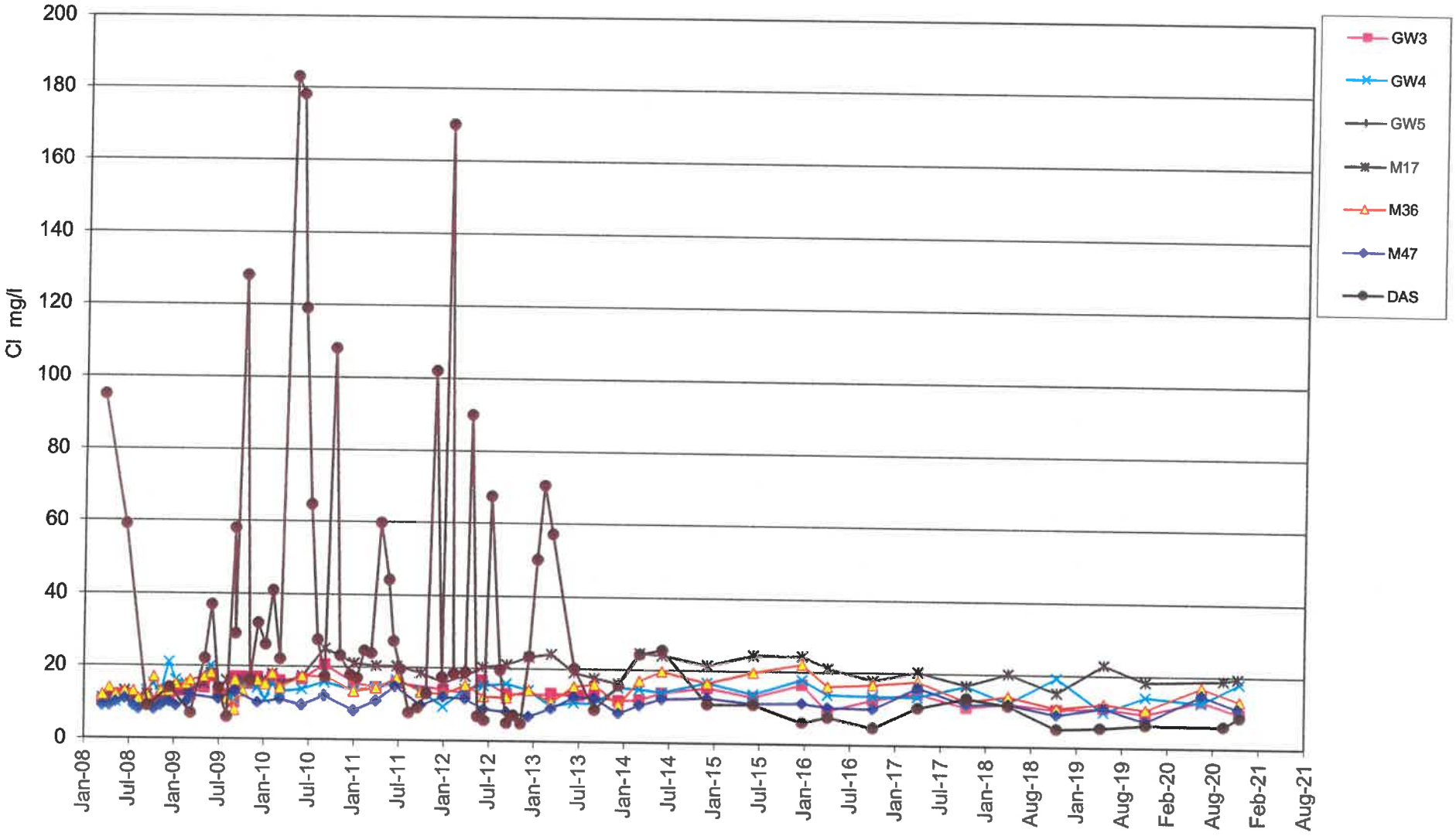


* Borehole M13 was lost to construction work for the new AD plant. The replacement borehole (BH1) has been monitored since September 2012.

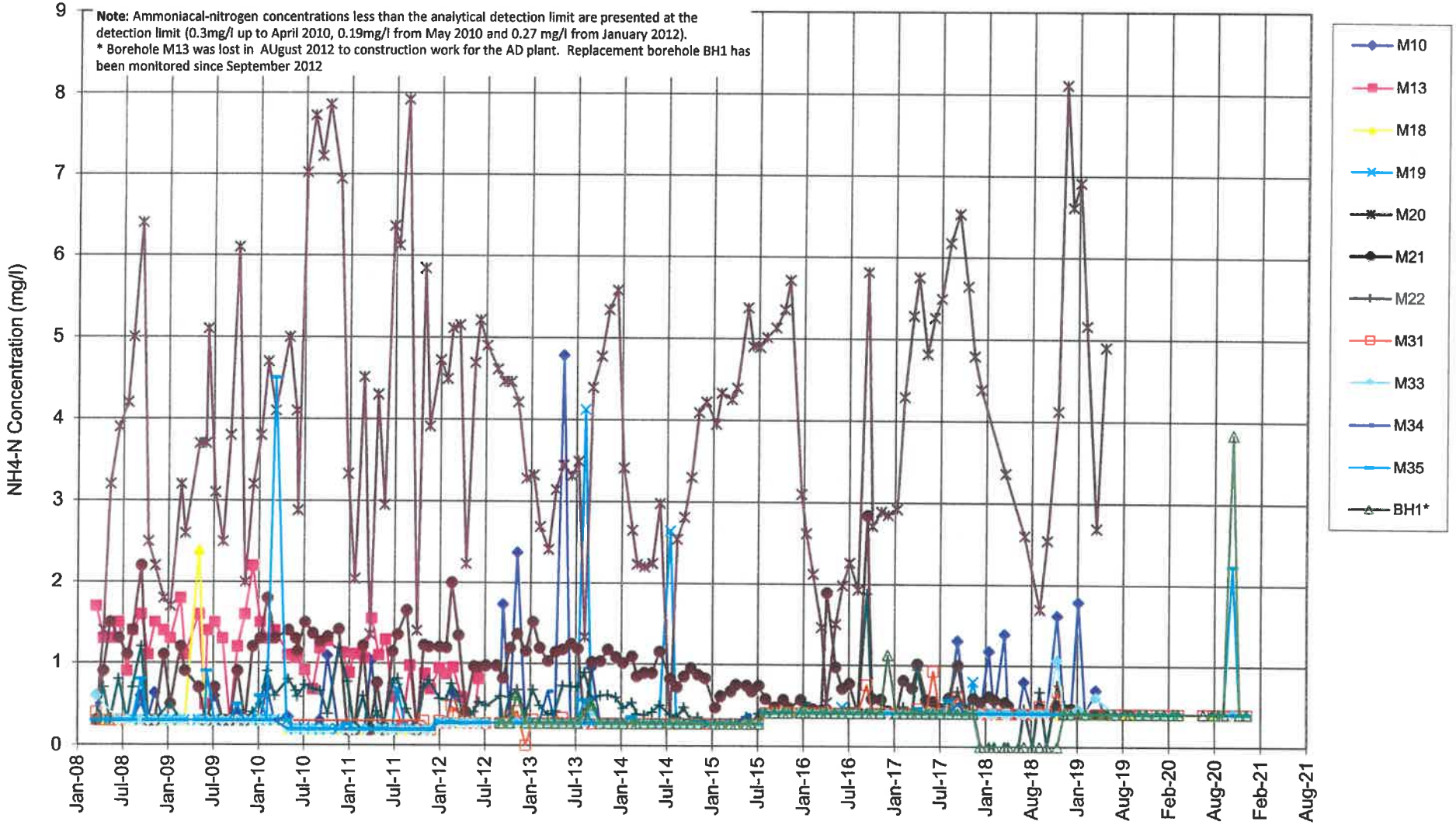
Llwyn Isaf Landfill - Ammoniacal-Nitrogen Groundwater Concentrations (Boreholes under EP for Area 3)



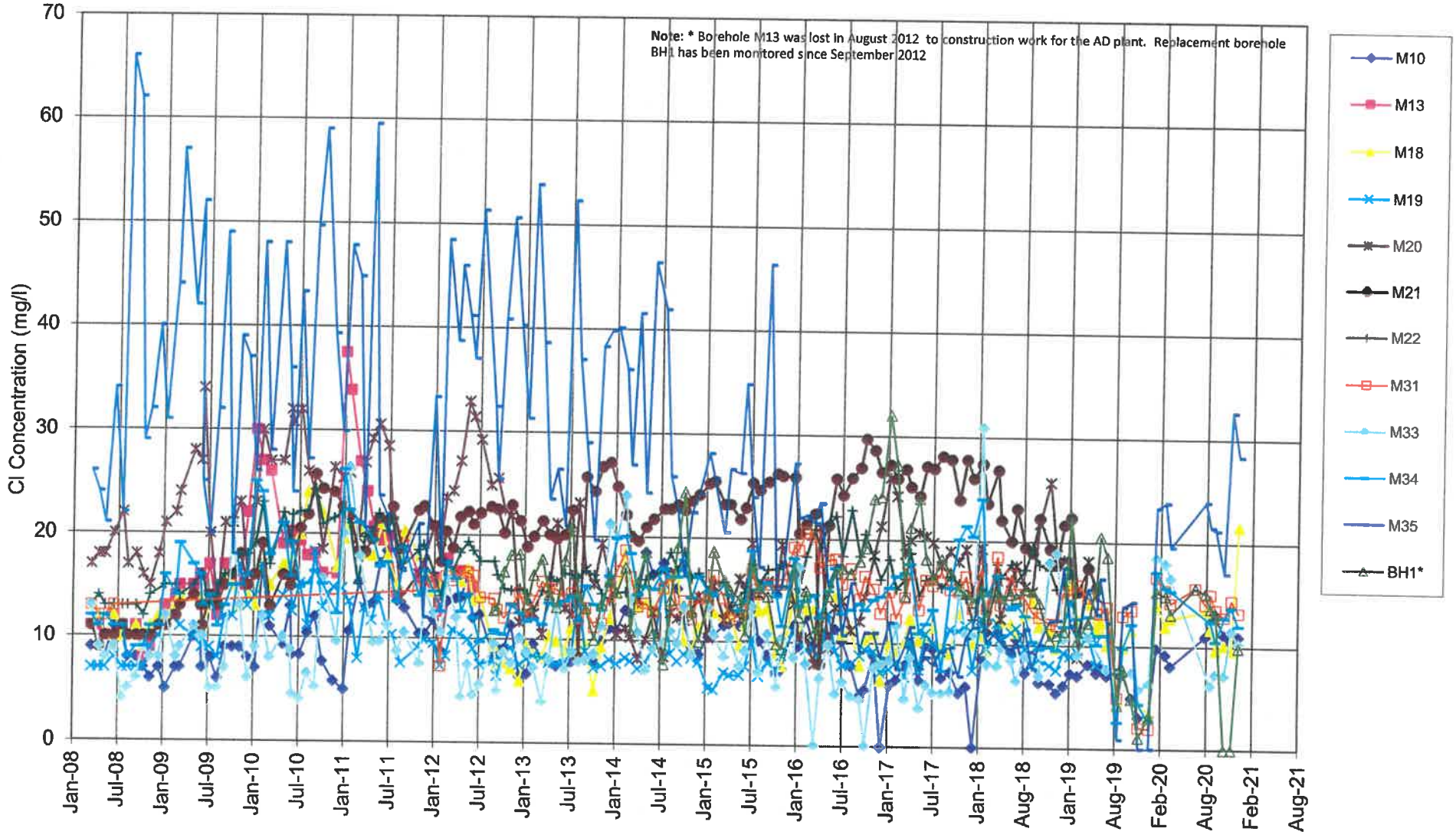
Llwyn Isaf Landfill - Chloride Groundwater Concentrations (Boreholes under EP for Area 3)

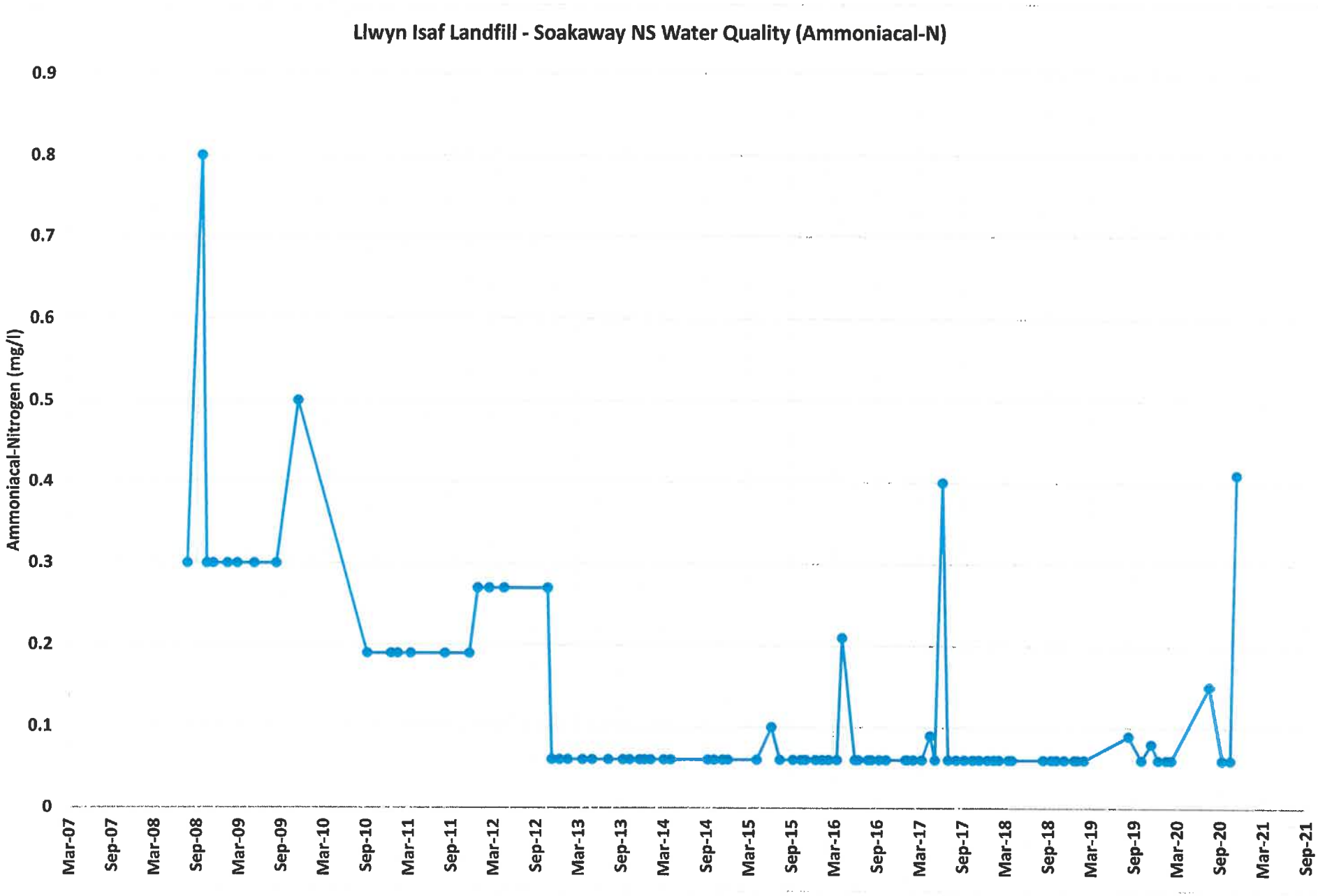


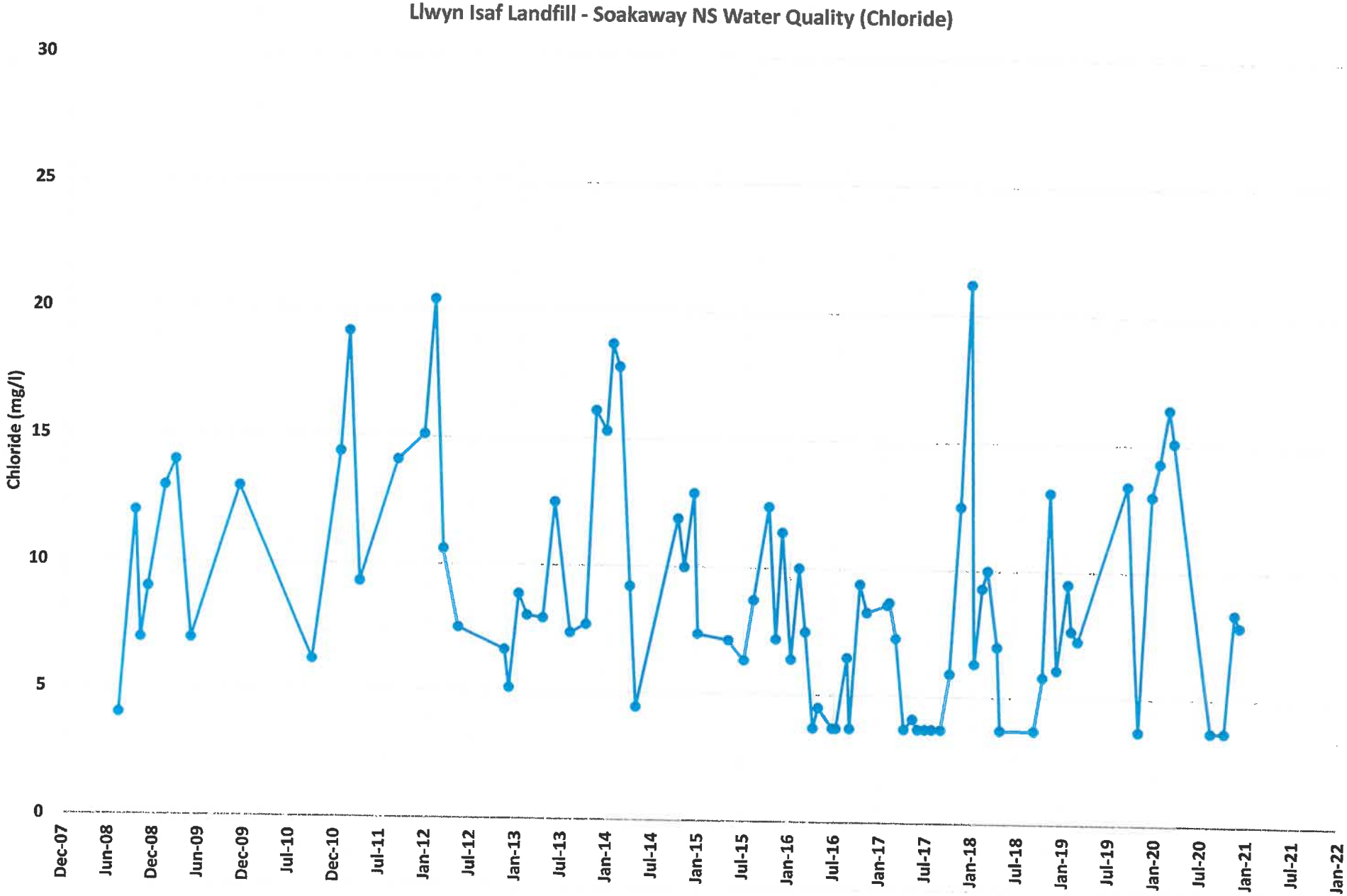
Llwyn Isaf Landfill - Ammoniacal-Nitrogen Groundwater Concentrations (Boreholes under former WML for Area 2)



Llwyn Isaf Landfill - Chloride Groundwater Concentration (Boreholes under former WML for Area 2)



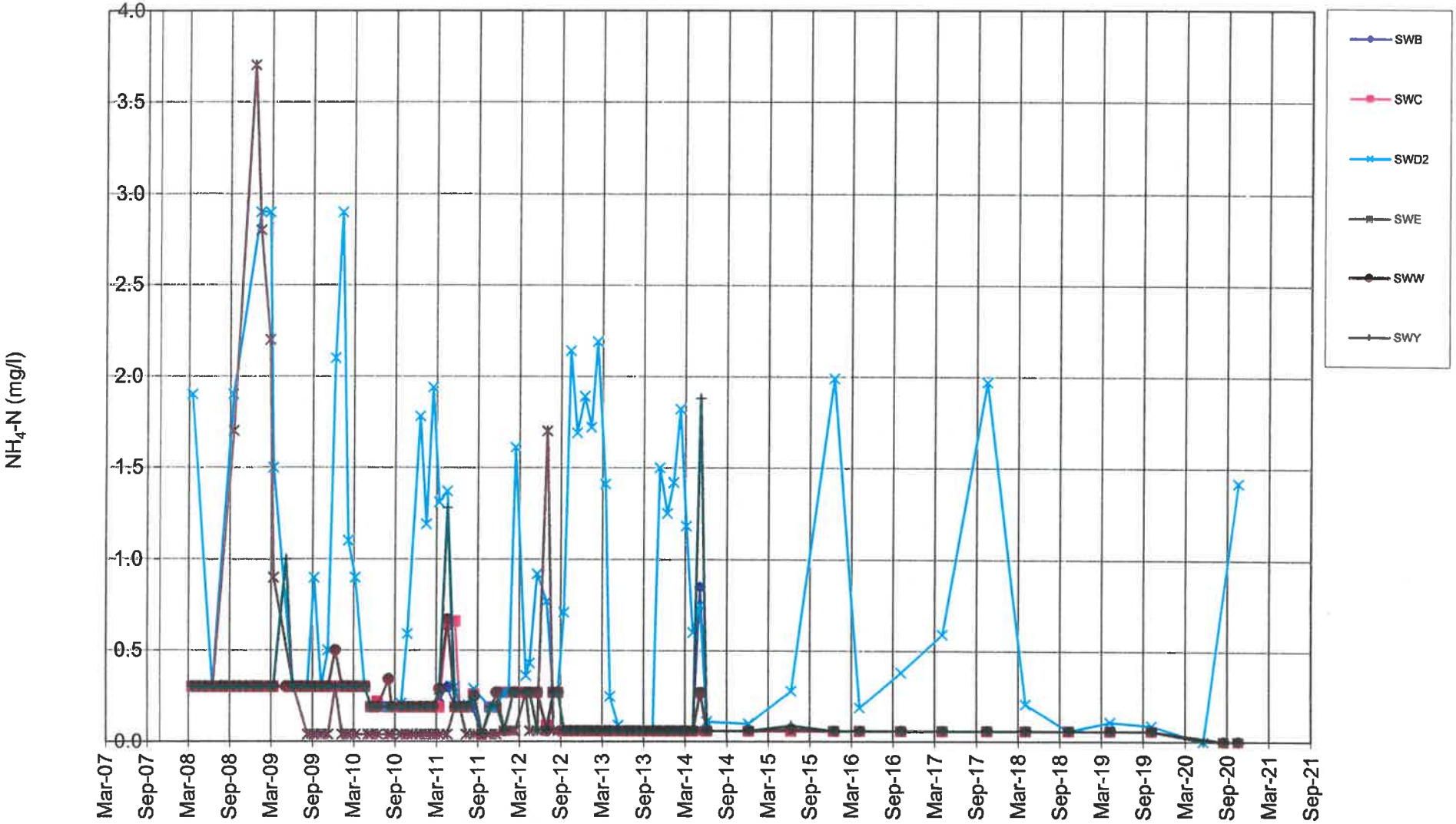

Llwyn Isaf Landfill - Soakaway NS Water Quality (Ammoniacal-N)
Ammoniacal-Nitrogen (mg/l)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Mar-07
Sep-07
Mar-08
Sep-08
Mar-09
Sep-09
Mar-10
Sep-10
Mar-11
Sep-11
Mar-12
Sep-12
Mar-13
Sep-13
Mar-14
Sep-14
Mar-15
Sep-15
Mar-16
Sep-16
Mar-17
Sep-17
Mar-18
Sep-18
Mar-19
Sep-19
Mar-20
Sep-20
Mar-21
Sep-21


Llwyn Isaf Landfill - Soakaway NS Water Quality (Chloride)
Chloride (mg/l)
30
25
20
15
10
5
0
Dec-07
Jun-08
Dec-08
Jun-09
Dec-09
Jul-10
Dec-10
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20
Jul-20
Jan-21
Jul-21
Jan-22

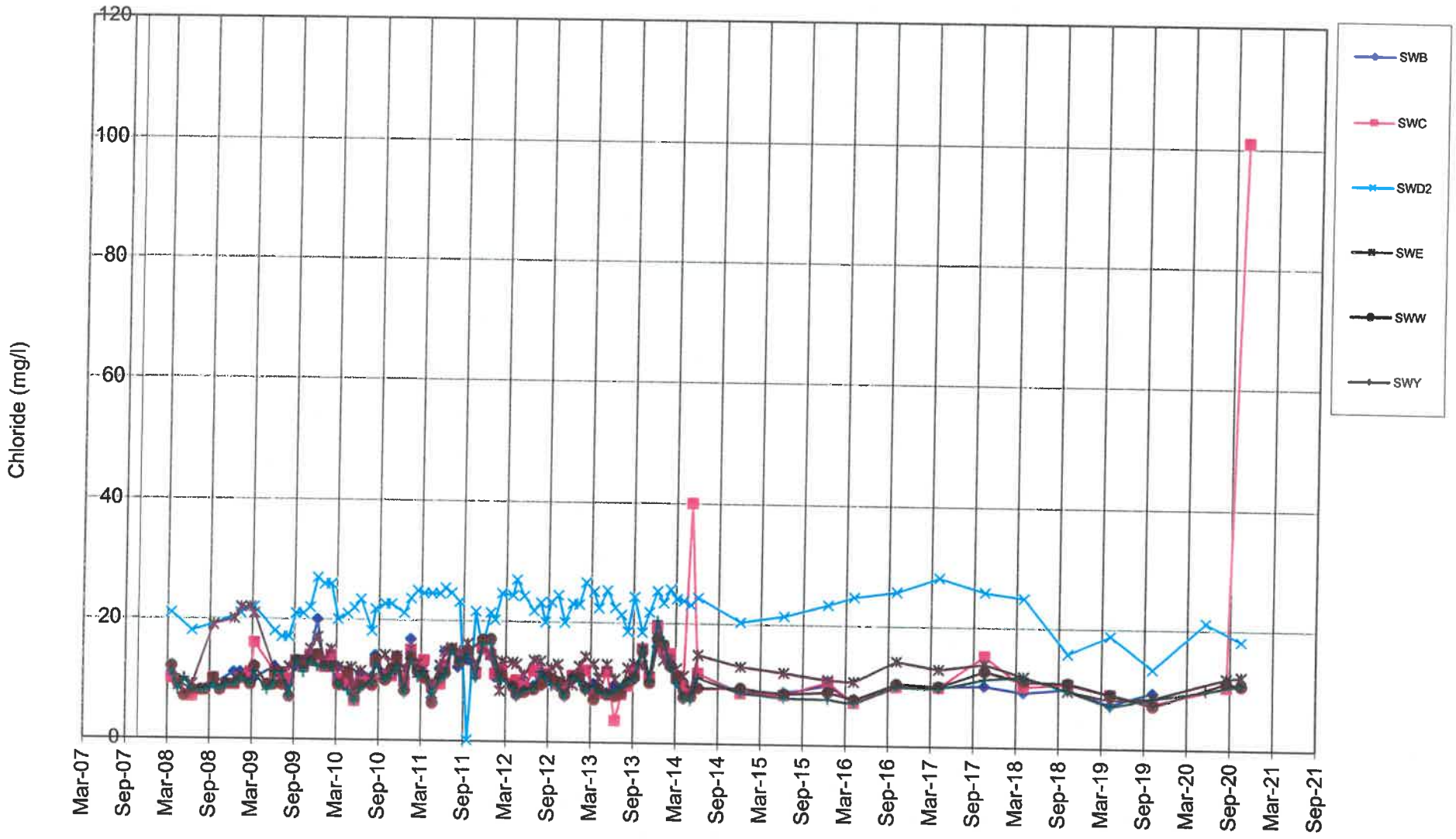
APPENDIX 3 –

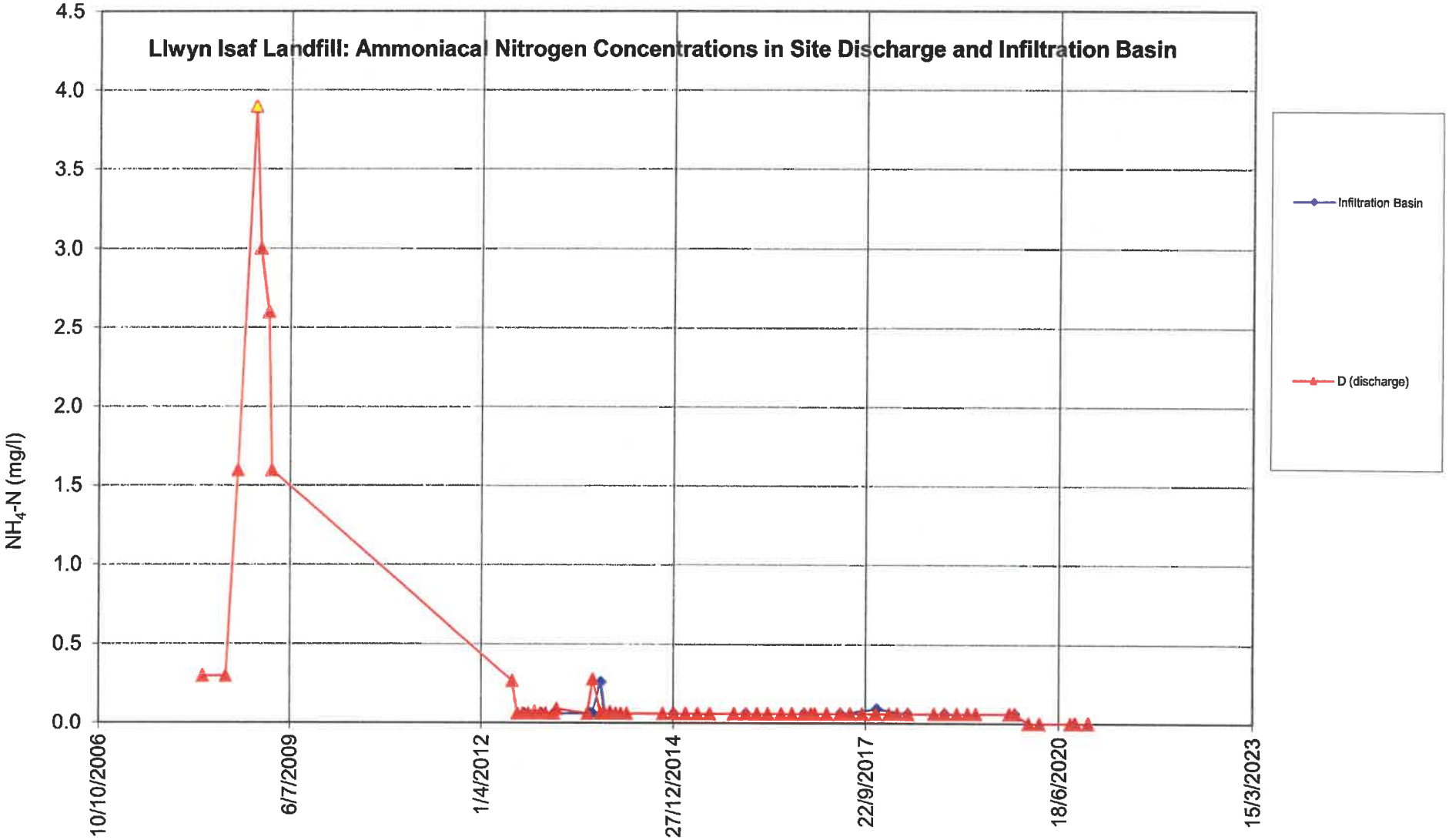
Surfacewater Quality Data Plots

Llwyn Isaf Landfill: Ammoniacal Nitrogen Concentrations in Afon Desach and Lake to the North of Site

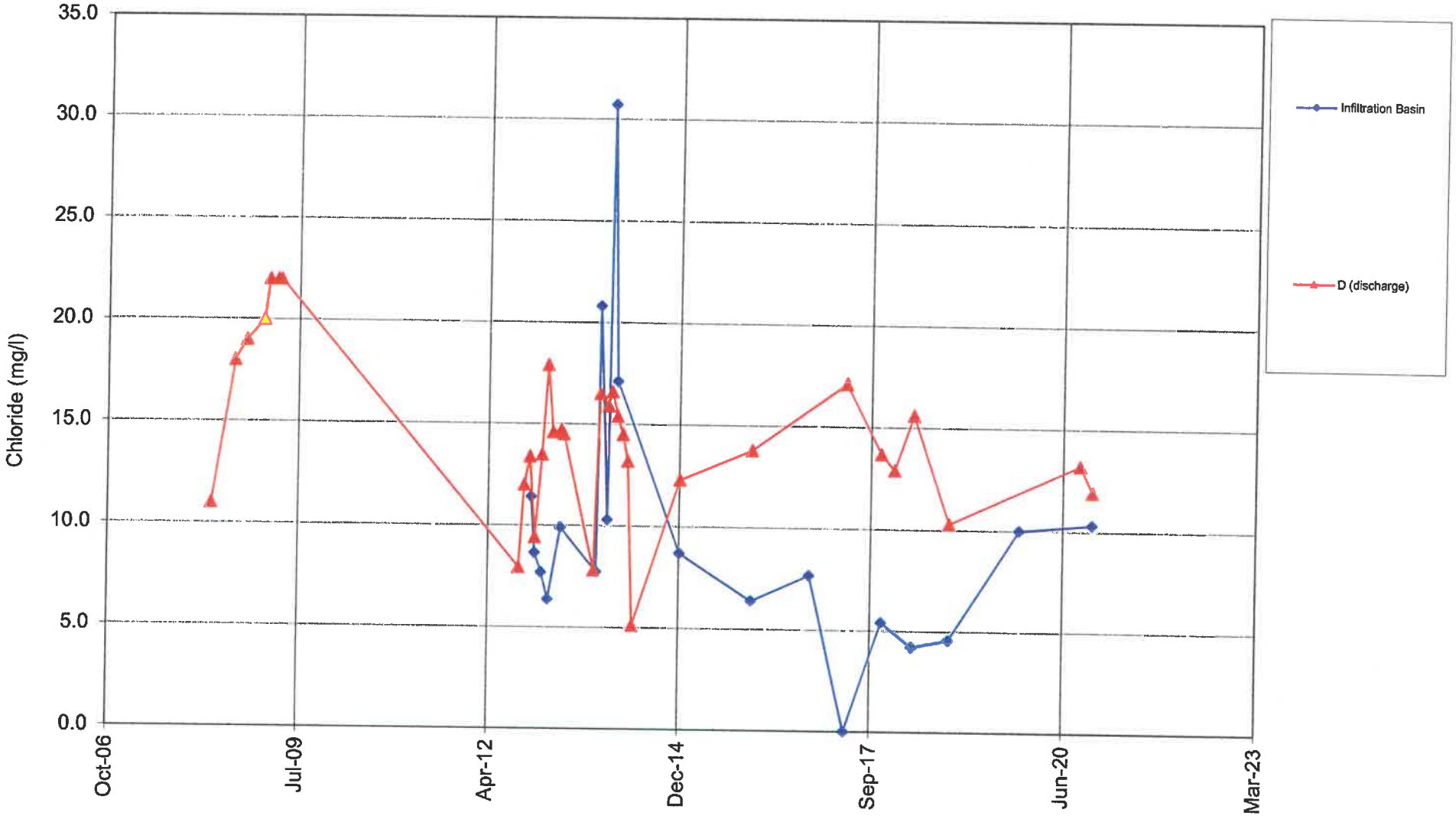


Llwyn Isaf Landfill: Chloride Concentrations in Afon Desach and Lake to the North of Site

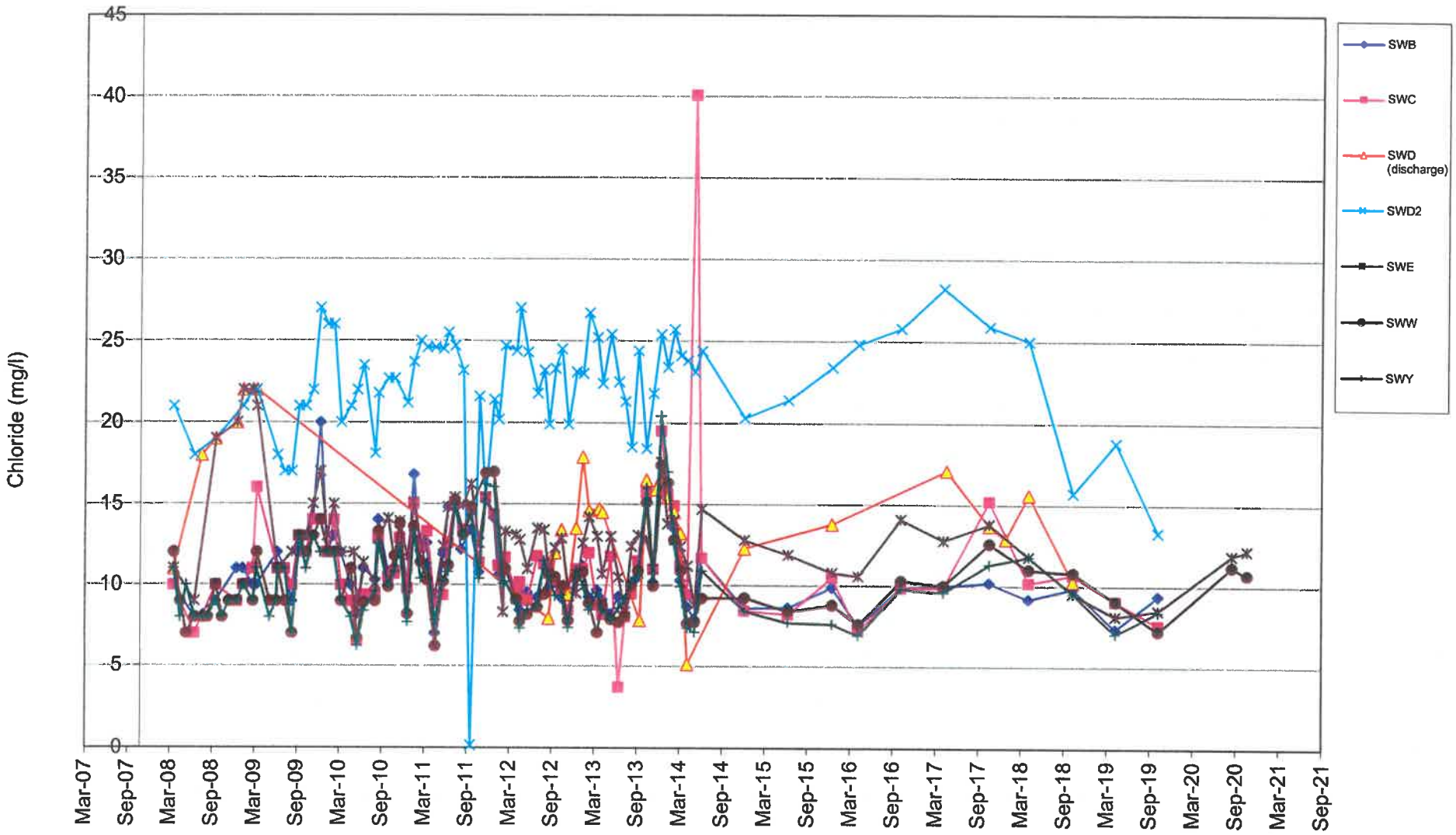



Llwyn Isaf Landfill: Ammoniacal Nitrogen Concentrations in Site Discharge and Infiltration Basin
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
NH4-N (mg/l)
10/10/2006
6/7/2009
1/4/2012
27/12/2014
22/9/2017
18/6/2020
15/3/2023
Infiltration Basin
D (discharge)

Llwyn Isaf Landfill: Chloride Concentrations in Site Discharge and Infiltration Basin



Llwyn Isaf Landfill: Chloride Concentrations in Surface Water



APPENDIX 4 –

Gas Data

GAS FIELD MONITORING SHEET

CH4 Consultants

Site:	**Llwyn Isaf**	**Weather Conditions**	Showers
Date:	17/1/2020	**Flare Hrs**	55898
Name:	Steve Hindle	**Temperature °C**	03 to 05
Equipment Used :	GA2000	**Compressor Hrs**	
Serial No :	GA11066	**Flow Arrival m^3hr**	26m^3hr
Last Calibration Date :	10/12/2019	**Flow after balance m^3hr**	26m^3hr
Calibration Due Date :	10/6/2020	**Flow Leaving m^3hr**	26m^3hr

1	2	3	4	5	6	7	8	9	10	11	12	13
ID	Date/Time	CH4 %	CO2 %	O2 %	BALANCE %	RESIDUAL NITROGEN %	CO ppm	H2S ppm	SUCTION PRESSURE mb	FLOW m3/hr	COMMENTS	VALVE POSITION %
LI_FLARE	17/1/2020 11:25	59.9	27	0.4	12.7	11.19	0	3	-4.37			100
LI_GE018	17/1/2020 11:39	66.2	28.7	1.4	3.7	0	2	24	-4.25			100
LI_GE016	17/1/2020 11:41	66.6	26.9	0.3	6.2	5.07	3	12	-4.27			50
LI_GE019	17/1/2020 11:45	2.2	4	19.2	74.6	2.02	3	0	-3.11			0
LI_GE020	17/1/2020 11:48	52.5	24.7	0.6	22.2	19.93	2	19	-4.28			25
LI_GE014	17/1/2020 11:51	8.1	4.4	17.1	70.4	5.76	10	0	-3.49			0
LI_GE015	17/1/2020 11:53	65	25.5	0.3	9.2	8.07	3	6	-4.24			50
LI_GE013	17/1/2020 11:55	67.3	35.2	0.1	0	0	4	12	-4.3			10
LI_GE012	17/1/2020 11:56	68.2	37.9	0.2	0	0	5	49	-4.33			100
LI_GE011	17/1/2020 11:59	64.5	35.5	0.9	0	0	6	14	-4.31			10
LI_GE010	17/1/2020 12:00	70.5	30.6	0.5	0	0	6	23	-4.32			50
LI_LM1/3	17/1/2020 12:02	28.2	17.2	4.3	50.3	34.05	5	0	0.24			0
LI_GE007	17/1/2020 12:04	73.4	27.8	0.2	0	0	5	9	-5.38			10
LI_GE006	17/1/2020 12:05	72.6	29.1	0.1	0	0	6	15	-4.33			10
LI_GE004	17/1/2020 12:06	72	28.4	0	0	0	6	1	-4.26			50
LI_GE005	17/1/2020 12:08	69.4	30.7	0	0	0	6	7	-4.12			50
LI_GE003	17/1/2020 12:12	73.4	30.3	0	0	0	5	7	-4.28			50
LI_GE002	17/1/2020 12:14	69.7	26.6	0.6	3.1	0.83	6	0	-4.26			50
LI_GE001	17/1/2020 12:16	71.5	31.4	0.1	0	0	5	9	-4.21			50
LI_GE008	17/1/2020 12:18	70.1	30.8	0.1	0	0	6	15	-4.25			50
LI_GE009	17/1/2020 12:20	60.4	27.5	0.1	12	11.62	6	10	-4.25			25
LI_LM2/1	17/1/2020 12:22	0.5	0.8	20.4	78.3	1.19	4	0	-0.36			0
LI_GE017	17/1/2020 12:23	54.2	26.5	0.2	19.1	18.34	5	14	-3.93			25
LI_LM2/2	17/1/2020 12:25	15.1	11.8	12.3	60.8	14.31	5	0	-3.46			0
A2LIGW29	17/1/2020 12:30	72.5	25.5	0.2	1.8	1.04	3	6	-3.53			25
A2LIGW28	17/1/2020 12:31	45.4	26.3	0.1	28.2	27.82	3	4	-0.23			25
A2LIGW27	17/1/2020 12:33	10.7	8.4	0.5	80.4	78.51	2	0	-0.01			0
A2LIGW26	17/1/2020 12:35	58.7	27.6	0.1	13.6	13.22	2	7	-1.56			25
A2LIGW25	17/1/2020 12:38	52.9	24.9	2	20.2	12.64	2	0	0.14			0
A2LIGW22	17/1/2020 12:40	61.6	25.5	0.2	12.7	11.94	2	2	-1.16			25
A2LIGW19	17/1/2020 12:42	20.1	3.2	0.9	75.8	72.4	1	0	-0.42			0
A2LIGW21	17/1/2020 12:44	30.1	8.8	6.8	54.3	28.6	5	0	-0.55			0
A2LIGW10	17/1/2020 12:46	0.6	2	15.7	81.7	22.35	2	0	0.57			0
A2LIGW20	17/1/2020 12:47	28.4	6.7	1.2	63.7	59.16	1	0	-0.21			0
A2LIGW14	17/1/2020 12:48	28.5	3.1	10.3	58.1	19.17	1	0	0.13			0
A2LIGW15	17/1/2020 12:50	0	1.5	20.1	78.4	2.42	1	0	0.13			0
A2LIGW18	17/1/2020 12:51	14.7	6.2	3	76.1	64.76	0	0	-0.4			0
A2LIGW31	17/1/2020 12:54	55	26.6	0.1	18.3	17.92	1	4	-1.67			25
A2LIGW30	17/1/2020 12:56	0.4	3	16.9	79.7	15.82	0	0	-0.45			0
LIA2SPUR	17/1/2020 13:01	58.7	26.2	0.1	15	14.62	1	4	-2.63			15
LI_FLARE	17/1/2020 13:03	59.5	26.5	0	14	14	1	5	-4.42			100

GAS FIELD MONITORING SHEET

CH4 Consultants

Site:	**Llwyn Isaf**	**Weather Conditions**	heavy rain
Date:	10/2/2020	**Flare Hrs**	56123
Name:	Steve Hindle	**Temperature °C**	02 to 04
Equipment Used :	GA2000	**Compressor Hrs**	
Serial No :	GA11066	**Flow Arrival m^3hr**	26m^3hr
Last Calibration Date :	10/12/2019	**Flow after balance m^3h**	26m^3hr
Calibration Due Date :	10/6/2020	**Flow Leaving m^3hr**	26m^3hr

1	2	3	4	5	6	7	8	9	10	11	12	13
ID	Date/Time	CH4 %	CO2 %	O2 %	BALANCE %	RESIDUAL NITROGEN %	CO ppm	H2S ppm	SUCTION PRESSURE mb	FLOW m3/hr	COMMENTS	VALVE POSITION %
LI_FLARE	10/2/2020 10:29	62.6	27.9	0.2	9.3	8.54	1	4	-2.79			100
LI_GE018	10/2/2020 10:31	70.6	30.6	0.1	0	0	2	27	-3.2			100
LI_GE016	10/2/2020 10:32	66.6	27.3	0.2	5.9	5.14	2	12	-2.7			50
LI_GE019	10/2/2020 10:34	70.7	28.5	0.3	0.5	0	5	0	-0.85			5
LI_GE020	10/2/2020 10:36	54.3	24.7	0.5	20.5	18.61	4	15	-2.46			25
LI_GE014	10/2/2020 10:38	66	24.2	0.6	9.2	6.93	6	0	-0.74			5
LI_GE015	10/2/2020 10:39	66	25.9	0.2	7.9	7.14	4	7	-2.24			50
LI_GE013	10/2/2020 10:41	66.1	35.2	0.2	0	0	5	9	-2.39			10
LI_GE012	10/2/2020 10:42	67.4	38.1	0.2	0	0	5	47	-2.32			100
LI_GE011	10/2/2020 10:45	62.9	35	1.5	0.6	0	6	0	-2.43			10
LI_GE010	10/2/2020 10:46	71.1	31.8	0	0	0	6	23	-2.57			50
LI_LM1/3	10/2/2020 10:48	27.6	16.2	5.1	51.1	31.82	5	0	-0.91			0
LI_GE007	10/2/2020 10:49	71.9	29.4	0.2	0	0	5	4	-2.48			10
LI_GE006	10/2/2020 10:50	71	30.1	0.1	0	0	5	1	-2.39			10
LI_GE004	10/2/2020 10:52	71.8	28.8	0.2	0	0	6	1	-2.3			50
LI_GE005	10/2/2020 10:54	70	30.9	0	0	0	5	2	-2.2			50
LI_GE003	10/2/2020 10:56	72.5	28.5	0	0	0	5	1	-2.27			50
LI_GE002	10/2/2020 10:57	61.8	25.5	1.1	11.6	7.44	6	0	-2.17			50
LI_GE001	10/2/2020 10:59	70.6	31.7	0	0	0	5	7	-3.61			50
LI_GE008	10/2/2020 11:01	67.5	30.8	0	1.7	1.7	5	14	-2.23			50
LI_GE009	10/2/2020 11:03	64.5	28.2	0.1	7.2	6.82	6	6	-2.25			50
LI_LM2/1	10/2/2020 11:04	4.9	3.6	16.6	74.9	12.15	5	0	0.02			0
LI_GE017	10/2/2020 11:06	55.7	27.1	0.3	16.9	15.77	4	10	-1.56			25
LI_LM2/2	10/2/2020 11:09	14.8	11.7	12.5	61	13.75	3	0	-0.89			0
A2LIGW29	10/2/2020 11:14	73.2	25.1	0.4	1.3	0	3	1	-0.88			25
A2LIGW28	10/2/2020 11:15	52.4	26.9	0.1	20.6	20.22	3	3	0.23			25
A2LIGW27	10/2/2020 11:17	7.7	11.3	1.8	79.2	72.4	2	0	0.21			0
A2LIGW26	10/2/2020 11:19	59.1	28.1	0	12.8	12.8	2	2	-0.53			25
A2LIGW25	10/2/2020 11:21	55.8	25.6	1.2	17.4	12.86	2	0	0.31			0
A2LIGW22	10/2/2020 11:24	63.6	27	0.1	9.3	8.92	2	1	0.01			25
A2LIGW19	10/2/2020 11:25	21.7	4.5	0.6	73.2	70.93	1	0	0.41			0
A2LIGW21	10/2/2020 11:27	0	0.1	17.2	82.7	17.68	1	0	0.32			0
A2LIGW10	10/2/2020 11:28	0.2	0.8	20.4	78.6	1.49	1	0	-0.45			0
A2LIGW14	10/2/2020 11:30	30	3.3	5.8	60.9	38.98	1	0	1.8			0
A2LIGW20	10/2/2020 11:30	23.2	6.5	1.6	68.7	62.65	0	0	0.37			0
A2LIGW15	10/2/2020 11:32	0	1.8	19.1	79.1	6.9	1	0	-9.62			0
A2LIGW18	10/2/2020 11:33	15.4	6.8	10.4	67.4	28.09	0	0	0.38			0
A2LIGW31	10/2/2020 11:35	53.6	27.2	0.1	19.1	18.72	1	0	-0.28			25
A2LIGW30	10/2/2020 11:37	0.2	2.9	14.2	82.7	29.02	1	0	-0.7			0
LIA2SPUR	10/2/2020 11:41	62.8	27.9	0.2	9.1	8.34	1	2	3.47			15
LI_FLARE	10/2/2020 11:42	62.4	27.8	0.2	9.6	8.84	1	4	-2.13			100

GAS FIELD MONITORING SHEET

CH4 Consultants

Site:	**Llwyn Isaf**	**Weather Conditions**	Sunshine
Date:	8/6/2020	**Flare Hrs**	56123
Name:	Steve Hindle	**Temperature °C**	16 to 18
Equipment Used :	GA5000	**Compressor Hrs**	
Serial No :	G500196	**Flow Arrival m^3hr**	25m^3hr
Last Calibration Date :	28/4/2020	**Flow after balance m^3h**	24m^3hr
Calibration Due Date :	28/10/2020	**Flow Leaving m^3hr**	24m^3hr

1	2	3	4	5	6	7	8	9	10	11	12	13
ID	Date/Time	CH4 %	CO2 %	O2 %	BALANCE %	RESIDUAL NITROGEN %	CO ppm	H2S ppm	SUCTION PRESSURE mb	FLOW m3/hr	COMMENTS	VALVE POSITION %
LI FLARE	8/6/2020 10:34	51.8	24.3	0.2	23.7	22.94	3	1	1004	-2.61		100
LI GE018	8/6/2020 10:36	68.6	27.6	0.2	3.6	2.84	3	9	1004	-1.19		100
LI GE016	8/6/2020 10:38	65	22.8	0.2	12	11.24	3	1	1004	-2.39		50
LI GE019	8/6/2020 10:40	60.3	26.1	0.6	13	10.73	18	0	1004	-0.55		25
LI GE020	8/6/2020 10:43	45.6	21.1	0.1	33.2	32.82	6	0	1004	-2.15		10
LI GE014	8/6/2020 10:45	42.7	25.8	0.1	31.4	31.02	6	0	1004	-2.08		5
LI GE015	8/6/2020 10:47	60.7	21.6	0.1	17.6	17.22	7	0	1004	-2.17		50
LI GE013	8/6/2020 10:49	59.7	31.4	0	8.9	8.9	7	4	1005	-2.13		25
LI GE012	8/6/2020 10:50	67.1	33.6	0.1	0	0	8	30	1004	-2.24		100
LI GE011	8/6/2020 10:54	47.4	26.6	4.8	21.2	3.06	8	0	1004	-2.13		5
LI GE010	8/6/2020 10:56	69.3	28.3	0.1	2.3	1.92	9	7	1004	-2.08		50
LI LM1/3	8/6/2020 10:58	31.6	14.2	6.3	47.9	24.09	7	0	1004	-1.03		0
LI GE007	8/6/2020 11:00	60.4	25	0.1	14.5	14.12	9	1	1004	-1.94		25
LI GE006	8/6/2020 11:01	63.4	26	0.4	10.2	8.69	9	0	1004	-2.18		25
LI GE004	8/6/2020 11:03	62	24.6	0.6	12.8	10.53	9	0	1004	-1.94		50
LI GE005	8/6/2020 11:05	62.4	28	0.1	9.5	9.12	9	0	1005	-1.93		50
LI GE003	8/6/2020 11:08	65.5	24.7	0.3	9.5	8.37	8	0	1005	-2.08		50
LI GE002	8/6/2020 11:09	70.2	23.9	0.1	5.8	5.42	8	0	1005	-1.98		50
LI GE001	8/6/2020 11:11	67.9	28.1	0	4	4	8	6	1005	-2.08		50
LI GE008	8/6/2020 11:13	62.6	26.7	0.1	10.6	10.22	10	6	1005	-1.91		50
LI GE009	8/6/2020 11:15	53.8	23.7	0	22.5	22.5	10	0	1005	-1.87		25
LI LM2/1	8/6/2020 11:17	0	0.1	20.2	79.7	3.34	5	0	1005	0.14		0
LI GE017	8/6/2020 11:19	47	23.5	0.2	29.3	28.54	9	0	1005	-1.87		10
LI LM2/2	8/6/2020 11:21	3.5	4.7	15.1	76.7	19.62	6	0	1005	0		0
A2LIGW29	8/6/2020 11:26	50.1	21.4	0.8	27.7	24.68	8	3	1006	0.19		25
A2LIGW28	8/6/2020 11:27	30.6	23.2	0.1	46.1	45.72	8	1	1006	0.29		0
A2LIGW27	8/6/2020 11:30	0.3	2.2	19.2	78.3	5.72	2	0	1005	0.34		0
A2LIGW26	8/6/2020 11:32	56.9	25.3	0.2	17.6	16.84	6	3	1005	0.33		25
A2LIGW25	8/6/2020 11:36	18.6	14.8	7.6	59	30.27	4	0	1005	0.38		0
A2LIGW22	8/6/2020 11:39	47	22.4	0.1	30.5	30.12	5	0	1004	0.14		25
A2LIGW19	8/6/2020 11:43	42.3	25.7	1.5	30.5	24.83	4	0	1005	0.4		0
A2LIGW21	8/6/2020 11:45	19.1	8.4	7.9	64.6	34.74	3	0	1005	0.34		0
A2LIGW10	8/6/2020 11:48	11.9	1.7	17.3	69.1	3.71	1	0	1005	0.34		0
A2LIGW20	8/6/2020 11:49	11.8	9.5	2.7	76	65.79	4	0	1005	0.28		0
A2LIGW14	8/6/2020 11:51	0.4	0.3	21.1	78.2	0	9	0	1005	0.28		0
A2LIGW15	8/6/2020 11:53	30.5	6.1	7	56.4	29.94	3	0	1005	0.34		0
A2LIGW18	8/6/2020 11:56	10.2	13	5	71.8	52.9	2	0	1005	0.28		0
A2LIGW31	8/6/2020 11:58	42.7	23.1	0.2	34	33.24	3	2	1005	-0.02		25
A2LIGW30	8/6/2020 12:01	44.1	12.5	7.3	36.1	8.51	1	0	1005	0.36		0
LIA2SPUR	8/6/2020 13:06	49.2	22.9	0.3	27.6	26.47	4	4	1006	-0.57		10
LI FLARE	8/6/2020 13:08	51.1	22.5	2.2	24.2	15.88	5	1	1005	-3.08		100
LI FLARE	8/6/2020 16:34	51.7	22.5	1.9	23.9	16.72	9	2	1006	-3.73		100

GAS FIELD MONITORING SHEET

CH4 Consultants

Site:	**Llwyn Isaf**	**Weather Conditions**	Sunshine & showers
Date:	24/9/2020	**Flare Hrs**	58320
Name:	Steve Hindle	**Temperature °C**	16 to 18
Equipment Used :	GA5000	**Compressor Hrs**	
Serial No :	G500196	**Flow Arrival m^3hr**	30m^3hr
Last Calibration Date :	28/4/2020	**Flow after balance m^3h**	30m^3hr
Calibration Due Date :	28/10/2020	**Flow Leaving m^3hr**	30m^3hr

1	2	3	4	5	6	7	8	9	10	11	12	13
ID	Date/Time	CH4 %	CO2 %	O2 %	BALANCE %	RESIDUAL NITROGEN %	CO ppm	H2S ppm	SUCTION PRESSURE mb	FLOW m3/hr	COMMENTS	VALVE POSITION %
LI_FLARE	24/9/2020 10:42	63.9	27.2	0.4	8.5	6.99	4	1	974	-3.63		100
LI_GE018	24/9/2020 10:44	70.2	29.4	0.1	0.3	0	5	19	975	-3.7		100
LI_GE016	24/9/2020 10:46	69.1	27.3	0.1	3.5	3.12	5	7	974	-3.18		50
LI_GE019	24/9/2020 10:48	56.3	27.6	0	16.1	16.1	20	7	974	-2.6		10
LI_GE020	24/9/2020 10:50	47	22.7	0.1	30.2	29.82	5	1	974	-2.46		10
LI_GE014	24/9/2020 10:51	67.7	22.9	0	9.4	9.4	5	0	974	-0.36		5
LI_GE015	24/9/2020 10:53	58.9	23.2	0	17.9	17.9	6	0	974	-2.82		50
LI_GE013	24/9/2020 10:55	60.7	32.1	0.1	7.1	6.72	6	0	975	-3.2		10
LI_GE012	24/9/2020 10:57	68.8	35.4	0.1	0	0	7	48	975	-3.34		100
LI_GE011	24/9/2020 11:00	67.5	33.9	0.7	0	0	7	0	975	2.27		5
LI_GE010	24/9/2020 11:01	70	32.7	0.1	0	0	7	16	975	-2.49		50
LI_LM1/3	24/9/2020 11:04	13.9	9	6.1	71	47.94	16	0	975	-0.83		0
LI_GE007	24/9/2020 11:05	70	28.7	0.1	1.2	0.82	7	6	975	-3.39		10
LI_GE006	24/9/2020 11:06	69.8	29.3	0.2	0.7	0	7	10	974	-3.18		10
LI_GE004	24/9/2020 11:08	66.9	28.6	0	4.5	4.5	7	0	975	-3.34		50
LI_GE005	24/9/2020 11:10	65.8	31.3	0.1	2.8	2.42	6	9	974	-3.22		50
LI_GE003	24/9/2020 11:12	70.9	29.2	0.1	0	0	5	8	974	-3.47		50
LI_GE002	24/9/2020 11:13	72.5	27.5	0	0	0	5	2	975	-3.47		50
LI_GE001	24/9/2020 11:15	66.6	32	0.1	1.3	0.92	5	14	974	-3.66		50
LI_GE008	24/9/2020 11:17	62.3	26.8	0.1	10.8	10.42	6	12	975	-3.53		50
LI_GE009	24/9/2020 11:19	52	24.2	0	23.8	23.8	7	8	975	-3.39		25
LI_LM2/1	24/9/2020 11:21	37.5	16.4	6.3	39.8	15.99	13	1	975	-0.29		0
LI_GE017	24/9/2020 11:23	72.2	27.3	0.1	0.4	0.02	7	0	975	-0.53		10
LI_LM2/2	24/9/2020 11:27	45.6	21.7	4.5	28.2	11.19	10	3	975	-0.95		0
A2LIGW30	24/9/2020 12:42	0.2	3.4	18.6	77.8	7.49	0	0	974	-0.55		0
A2LIGW29	24/9/2020 12:44	64.8	24.7	1.4	9.1	3.81	1	0	975	-2.79		25
A2LIGW28	24/9/2020 12:45	55.2	24.2	2.1	18.5	10.56	1	0	975	0.89		10
A2LIGW27	24/9/2020 12:48	14.6	16.4	0.3	68.7	67.57	0	0	974	-2.06		0
A2LIGW26	24/9/2020 12:50	65.6	27.9	0.1	6.4	6.02	1	0	975	-0.29		25
A2LIGW25	24/9/2020 12:52	55.3	24.8	1.2	18.7	14.16	2	0	974	-0.31		0
A2LIGW22	24/9/2020 12:56	64	27	0.1	8.9	8.52	1	1	974	-0.38		25
A2LIGW19	24/9/2020 12:57	63	18	0.4	18.6	17.09	0	0	975	-0.36		10
A2LIGW21	24/9/2020 13:01	11.1	4	16.3	68.6	6.99	0	0	975	-0.5		0
A2LIGW10	24/9/2020 13:03	9.2	1.5	17	72.3	8.04	0	0	975	-0.65		0
A2LIGW20	24/9/2020 13:04	39.9	9.4	0.9	49.8	46.4	0	0	975	-0.45		0
A2LIGW14	24/9/2020 13:06	62.1	5.8	3.1	29	17.28	10	0	976	-3.61		0
A2LIGW15	24/9/2020 13:08	0.5	0.7	20.8	78	0	0	0	976	-5.4		0
A2LIGW18	24/9/2020 13:09	27.3	9.9	0.4	62.4	60.89	0	0	975	-0.95		0
A2LIGW31	24/9/2020 13:12	53.8	24.1	0.2	21.9	21.14	0	0	975	-0.4		10
LIA2SPUR	24/9/2020 13:22	63.9	27.2	0	8.9	8.9	1	2	975	-0.77		15
LI_FLARE	24/9/2020 13:24	62.6	27.8	0	9.6	9.6	3	3	976	-4.63		100

GAS FIELD MONITORING SHEET

CH4 Consultants

Site:	Llwyn Isaf	**Conditions**	Rain
Date:	17/11/2020	**Flare Hrs**	58861
Name:	Steve Hindle	**Temperature °C**	10 to 12
Equipment Used :	GA2000	**Compressor Hrs**	
Serial No :	GA11066	**Flow Arrival m^3hr**	24m^3hr
Last Calibration Date :	14/5/2020	**Flow after balance m^3h**	26m^3hr
Calibration Due Date :	14/11/2020	**Flow Leaving m^3hr**	26m^3hr

1	2	3	4	5	6	7	8	9	10	11	12	13
ID	Date/Time	CH4 %	CO2 %	O2 %	BALANCE %	RESIDUAL NITROGEN %	CO ppm	H2S ppm	SUCTION PRESSURE mb	FLOW m3/hr	COMMENTS	VALVE POSITION %
LI_FLARE	17/11/2020 10:15	56.7	27.2	0.2	15.9	15.14	1	5	-4.47			100
LI_GE018	17/11/2020 10:17	67.2	29.5	0	3.3	3.3	3	21	-4.45			100
LI_GE016	17/11/2020 10:19	59.8	26.7	0	13.5	13.5	4	10	-4.28			50
LI_GE019	17/11/2020 10:20	46.4	26.6	0.2	26.8	26.04	10	16	-3.7			50
LI_GE020	17/11/2020 10:22	39.3	23.3	0	37.4	37.4	4	7	-3.67			0
LI_GE014	17/11/2020 10:24	37.7	26.9	0	35.4	35.4	4	0	-4.22			0
LI_GE015	17/11/2020 10:26	53.9	24.4	0	21.7	21.7	5	0	-4.46			25
LI_GE013	17/11/2020 10:27	51.1	32.8	0	16.1	16.1	6	8	-4.63			50
LI_GE012	17/11/2020 10:29	66.7	35.9	0.3	0	0	7	44	-4.72			100
LI_GE011	17/11/2020 10:32	64.8	36.1	0.6	0	0	8	14	-4.75			25
LI_GE010	17/11/2020 10:33	65.2	31.9	0	2.9	2.9	8	23	-4.73			50
LI_LM1/3	17/11/2020 10:34	0.6	0.6	20.1	78.7	2.72	7	1	-2.22			0
LI_GE007	17/11/2020 10:35	63.4	26.9	0.5	9.2	7.31	6	4	-4.66			25
LI_GE006	17/11/2020 10:36	66.7	28.9	0	4.4	4.4	7	7	-4.68			25
LI_GE004	17/11/2020 10:38	61.8	28	0	10.2	10.2	7	2	-4.6			50
LI_GE005	17/11/2020 10:40	63	30.9	0	6.1	6.1	6	12	-4.53			50
LI_GE003	17/11/2020 10:43	70.4	29.2	0	0.4	0.4	5	11	-4.7			50
LI_GE002	17/11/2020 10:44	70	28.1	0	1.9	1.9	5	4	-4.68			50
LI_GE001	17/11/2020 10:46	65.2	32.4	0	2.4	2.4	5	17	-3.75			50
LI_GE008	17/11/2020 10:48	52	28.5	0	19.5	19.5	6	12	-4.57			50
LI_GE009	17/11/2020 10:49	48.3	24.8	0	26.9	26.9	6	2	-4.31			50
LI_LM2/1	17/11/2020 10:51	1.7	5.9	15	77.4	20.7	4	0	-1.64			0
LI_GE017	17/11/2020 10:52	47.5	26.3	0.1	26.1	25.72	5	1	-2.71			10
LI_LM2/2	17/11/2020 10:54	2.8	1.9	19.7	75.6	1.13	4	0	-1.9			0
A2LIGW30	17/11/2020 13:16	0	8.6	14.8	76.6	20.66	0	0	-0.2			0
A2LIGW29	17/11/2020 13:18	68.6	23.4	0.9	7.1	3.7	0	16	-0.57			25
A2LIGW28	17/11/2020 13:19	58.4	26.3	1.5	13.8	8.13	0	0	-0.12			25
A2LIGW27	17/11/2020 13:22	16.7	11.4	0.3	71.6	70.47	0	0	-0.44			0
A2LIGW26	17/11/2020 13:24	63.2	28.9	0	7.9	7.9	0	4	-0.42			25
A2LIGW25	17/11/2020 13:26	0.3	2.6	18.3	78.8	9.63	0	0	-0.02			0
A2LIGW22	17/11/2020 13:29	64.6	26.4	0	9	9	0	6	-0.31			25
A2LIGW19	17/11/2020 13:31	62.6	26.7	0	10.7	10.7	0	12	-0.5			5
A2LIGW21	17/11/2020 13:33	4	1	16.3	78.7	17.09	12	0	-0.09			0
A2LIGW10	17/11/2020 13:34	1.1	1.4	17.6	79.9	13.37	1	0	0.07			0
A2LIGW20	17/11/2020 13:36	39.3	8.1	1	51.6	47.82	1	0	-1.15			0
A2LIGW14	17/11/2020 13:37	30.1	3.1	11.9	54.9	9.92	1	0	0			0
A2LIGW15	17/11/2020 13:38	0	1.2	20.6	78.2	0.33	0	0	0.02			0
A2LIGW18	17/11/2020 13:39	13.9	7.2	1.4	77.5	72.21	0	0	-0.02			0
A2LIGW31	17/11/2020 13:42	58	26.9	0.8	14.3	11.28	0	3	-0.29			25
LIA2SPUR	17/11/2020 13:56	63.4	26.5	0	10.1	10.1	0	7	-1.26			10
LI_FLARE	17/11/2020 13:58	58.2	27.9	0	13.9	13.9	1	5	-3.29			100

APPENDIX 5 –

Meteorological Data

CYNGOR GWYNEDD - GWASANAETH TRIN GWASTRAFF

RAINFALL / WEATHER RECORD - LLWYN ISAF LANDFILL SITE

JANUARY 2020		RAINFALL						
DATE	HOUR	DAILY	MONTH TODATE	WIND		CLOUD DESCRIPTION	WEATHER DESCRIPTION
1	A.M. / P.M.	MM.	MM.	M.P.H.			
2	A.M. / P.M.	MM.	MM.	M.P.H.			
3	A.M. / P.M.	20 MM.	20 MM.	–	M.P.H.	Clear	Dry
4	A.M. / P.M.	MM.	MM.	M.P.H.			
5	A.M. / P.M.	MM.	MM.	M.P.H.			
6	A.M. / P.M.	.70 MM.	90 MM.	20	M.P.H.	Cloudy	Dry
7	A.M. / P.M.	12 MM.	102 MM.	20	M.P.H.	V Cloudy	Rain
8	A.M. / P.M.	14 MM.	116 MM.	5	M.P.H.	Clear	Dry
9	A.M. / P.M.	15 MM.	131 MM.	–	M.P.H.	Clear	Dry
10	A.M. / P.M.	– MM.	131 MM.	–	M.P.H.	Cloudy	Dry
11	A.M. / P.M.	MM.	MM.	M.P.H.			
12	A.M. / P.M.	MM.	MM.	M.P.H.			
13	A.M. / P.M.	.48 MM.	179 MM.	25	M.P.H.	V Cloudy	Heavy Rain
14	A.M. / P.M.	30 MM.	209 MM.	25	M.P.H.	Cloudy	Heavy Rain
15	A.M. / P.M.	– MM.	209 MM.	10	M.P.H.	Some Cloud.	Dry
16	A.M. / P.M.	8 MM.	217 MM.	20	M.P.H.	V Cloudy	Heavy Showers
17	A.M. / P.M.	23 MM.	240 MM.	10	M.P.H.	Cloudy	Rain
18	A.M. / P.M.	MM.	MM.	M.P.H.			
19	A.M. / P.M.	MM.	MM.	M.P.H.			
20	A.M. / P.M.	.5 MM.	245 MM.	–	M.P.H.	Cloudy	Dry
21	A.M. / P.M.	– MM.	245 MM.	10	M.P.H.	Cloudy	Slight Rain
22	A.M. / P.M.	5 MM.	250 MM.	–	M.P.H.	Clear	Dry
23	A.M. / P.M.	– MM.	250 MM.	+	M.P.H.	Foggy	Dry
24	A.M. / P.M.	5 MM.	255 MM.	–	M.P.H.	Clear	Dry
25	A.M. / P.M.	MM.	MM.	M.P.H.			
26	A.M. / P.M.	MM.	MM.	M.P.H.			
27	A.M. / P.M.	16 MM.	271 MM.	–	M.P.H.	Clear	Dry
28	A.M. / P.M.	18 MM.	289 MM.	10	M.P.H.	Clear	Dry/ Cold
29	A.M. / P.M.	– MM.	289 MM.	–	M.P.H.	Clear	Dry/ Cold
30	A.M. / P.M.	MM.	MM.	M.P.H.			
31	A.M. / P.M.	MM.	MM.	M.P.H.			

CYNGOR GWYNEDD - GWASANAETH TRIN GWASTRAFF

RAINFALL / WEATHER RECORD - LLWYN ISAF LANDFILL SITE

FEBRUARY 2020		RAINFALL					
DATE	HOUR	DAILY	MONTH TODATE	WIND	CLOUD DESCRIPTION	WEATHER DESCRIPTION
1	A.M. / P.M.	MM.	MM.	M.P.H.		
2	A.M. / P.M.	MM.	MM.	M.P.H.		
3	A.M. / P.M.	MM.	MM.	M.P.H.		
4	A.M. / P.M.	MM.	MM.	M.P.H.		
5	A.M. / P.M.	MM.	MM.	M.P.H.		
6	A.M. / P.M.	MM.	MM.	M.P.H.		
7	A.M. / P.M.	MM.	MM.	M.P.H.		
10 8	A.M. / P.M.	37 MM.	37 MM.	— M.P.H.	Clear	Dry/ Cold
11 9	A.M. / P.M.	69 MM.	106 MM.	30 M.P.H.	Cloudy	Dry/ Rain
10	A.M. / P.M.	— MM.	106 MM.	30 M.P.H.	Some Cloud	Dry/ Cold
11	A.M. / P.M.	MM.	MM.	M.P.H.		
12	A.M. / P.M.	MM.	MM.	M.P.H.		
13	A.M. / P.M.	— MM.	106 MM.	20 M.P.H.	Clear	
14	A.M. / P.M.	16 MM.	122 MM.	10 M.P.H.	Some Cloud	Cold/Dry
15	A.M. / P.M.	— MM.	122 MM.	20 M.P.H.	Cloudy	Showers
16	A.M. / P.M.	MM.	MM.	M.P.H.		Rain
17	A.M. / P.M.	MM.	MM.	M.P.H.		
18	A.M. / P.M.	45 MM.	167 MM.	20 M.P.H.	Clear	
19	A.M. / P.M.	— MM.	167 MM.	20 M.P.H.	Clear	Dry/ Cold
20	A.M. / P.M.	5 MM.	172 MM.	10 M.P.H.	Cloudy	Cold/Dry
21	A.M. / P.M.	52 MM.	224 MM.	10 M.P.H.	Cloudy	Rain
22	A.M. / P.M.	20 MM.	244 MM.	10 M.P.H.	Cloudy	Rain
23	A.M. / P.M.	MM.	MM.	M.P.H.		Dry/ Windy
24	A.M. / P.M.	MM.	MM.	M.P.H.		
25	A.M. / P.M.	70 MM.	314 MM.	10 M.P.H.	Cloudy	
26	A.M. / P.M.	— MM.	314 MM.	— M.P.H.	Clear	Rain
27	A.M. / P.M.	— MM.	314 MM.	15 M.P.H.	Cloudy	Dry/ Cold
28	A.M. / P.M.	— MM.	314 MM.	— M.P.H.	Slight Cloud	Dry/ Cold
29	A.M. / P.M.	15 MM.	329 MM.	20 M.P.H.	Cloudy	Dry/ Cold
30	A.M. / P.M.	MM.	MM.	M.P.H.		Rain
31	A.M. / P.M.	MM.	MM.	M.P.H.		
		MM.	MM.	M.P.H.		

CYNGOR GWYNEDD - GWASANAETH TRIN GWASTRAFF

RAINFALL / WEATHER RECORD - LLWYN ISAF LANDFILL SITE

MARCH 2020		RAINFALL				WIND		CLOUD DESCRIPTION	WEATHER DESCRIPTION
DATE	HOUR	DAILY		MONTH TODATE					
1	A.M. / P.M.		MM.		MM.		M.P.H.		
2	A.M. / P.M.	4.2	MM.	4.2	MM.	—	M.P.H.	Clear	Dry
3	A.M. / P.M.	—	MM.	4.2	MM.	—	M.P.H.	Clear	Dry
4	A.M. / P.M.	—	MM.	4.2	MM.	—	M.P.H.	Clear	Dry / Cold
5	A.M. / P.M.	—	MM.	4.2	MM.	—	M.P.H.	Clear	Dry
6	A.M. / P.M.	—	MM.	4.2	MM.	—	M.P.H.	Clear	Dry
7	A.M. / P.M.		MM.		MM.		M.P.H.		
8	A.M. / P.M.		MM.		MM.		M.P.H.		
9	A.M. / P.M.	2.0	MM.	6.2	MM.	—	M.P.H.	Clear	Dry
10	A.M. / P.M.	—	MM.	6.2	MM.	2.0	M.P.H.	Cloudy	Rain
11	A.M. / P.M.	2.2	MM.	9.0	MM.	1.0	M.P.H.	Cloudy	Rain
12	A.M. / P.M.	—	MM.	9.0	MM.	2.0	M.P.H.	Clear	Dry
13	A.M. / P.M.	—	MM.	9.0	MM.	—	M.P.H.	Cloudy	Rain
14	A.M. / P.M.		MM.		MM.		M.P.H.		
15	A.M. / P.M.		MM.		MM.		M.P.H.		
16	A.M. / P.M.	3.5	MM.	12.5	MM.	—	M.P.H.	Clear	Dry / Cold
17	A.M. / P.M.	1.6	MM.	14.1	MM.	1.0	M.P.H.	Cloudy	Rain
18	A.M. / P.M.	1.6	MM.	15.7	MM.	1.0	M.P.H.	Cloudy	Rain
19	A.M. / P.M.	—	MM.	15.7	MM.	1.0	M.P.H.	Clear	Dry
20	A.M. / P.M.	—	MM.	15.7	MM.	—	M.P.H.	Clear	Dry
21	A.M. / P.M.		MM.		MM.		M.P.H.		
22	A.M. / P.M.		MM.		MM.		M.P.H.		
23	A.M. / P.M.	—	MM.	15.7	MM.	—	M.P.H.	Clear	Dry
24	A.M. / P.M.	—	MM.	15.7	MM.	—	M.P.H.	Clear	Dry
25	A.M. / P.M.		MM.		MM.		M.P.H.		
26	A.M. / P.M.	—	MM.	15.7	MM.	—	M.P.H.	Clear	Dry
27	A.M. / P.M.		MM.		MM.		M.P.H.		
28	A.M. / P.M.		MM.		MM.		M.P.H.		
29	A.M. / P.M.		MM.		MM.		M.P.H.		
30	A.M. / P.M.	—	MM.	15.7	MM.	5	M.P.H.	Clear	Dry
31	A.M. / P.M.		MM.		MM.		M.P.H.		

CYNGOR GWYNEDD - GWASANAETH TRIN GWASTRAFF

RAINFALL / WEATHER RECORD - LLWYN ISAF LANDFILL SITE

APRIL 2020		RAINFALL				
DATE	HOUR	DAILY	MONTH TODATE	WIND	CLOUD DESCRIPTION	WEATHER DESCRIPTION
1	A.M. / P.M.	MM.	MM.	M.P.H.		
2	A.M. / P.M.	MM.	MM.	M.P.H.		
3	A.M. / P.M.	MM.	MM.	M.P.H.		
4	A.M. / P.M.	MM.	MM.	M.P.H.		
5	A.M. / P.M.	MM.	MM.	M.P.H.		
6	A.M. / P.M.	8 MM.	8 MM.	M.P.H.		
7	A.M. / P.M.	MM.	MM.	— M.P.H.	Clear	Dry / Good
8	A.M. / P.M.	MM.	MM.	M.P.H.		
9	A.M. / P.M.	MM.	MM.	M.P.H.		
10	A.M. / P.M.	MM.	MM.	M.P.H.		
11	A.M. / P.M.	MM.	MM.	M.P.H.		
12	A.M. / P.M.	MM.	MM.	M.P.H.		
13	A.M. / P.M.	— MM.	MM.	M.P.H.		
14	A.M. / P.M.	MM.	8 MM.	— M.P.H.	Clear	Dry
15	A.M. / P.M.	MM.	MM.	M.P.H.		
16	A.M. / P.M.	MM.	MM.	M.P.H.		
17	A.M. / P.M.	MM.	MM.	M.P.H.		
18	A.M. / P.M.	MM.	MM.	M.P.H.		
19	A.M. / P.M.	MM.	MM.	M.P.H.		
20	A.M. / P.M.	— MM.	MM.	M.P.H.		
21	A.M. / P.M.	MM.	8 MM.	— M.P.H.	Clear	Dry
22	A.M. / P.M.	MM.	MM.	M.P.H.		
23	A.M. / P.M.	MM.	MM.	M.P.H.		
24	A.M. / P.M.	MM.	MM.	M.P.H.		
25	A.M. / P.M.	MM.	MM.	M.P.H.		
26	A.M. / P.M.	MM.	MM.	M.P.H.		
27	A.M. / P.M.	— MM.	MM.	M.P.H.		
28	A.M. / P.M.	MM.	8 MM.	— M.P.H.	Clear	Dry / Good
29	A.M. / P.M.	16 MM.	MM.	M.P.H.		
30	A.M. / P.M.	15 MM.	18 MM.	— M.P.H.	Clear	Dry / Good
31	A.M. / P.M.	MM.	33 MM.	— M.P.H.	Clear	Dry
			MM.	M.P.H.		

CYNGOR GWYNEDD - GWASANAETH TRIN GWASTRAFF

RAINFALL / WEATHER RECORD - LLWYN ISAF LANDFILL SITE

MAY 2020		RAINFALL		WIND	CLOUD DESCRIPTION	WEATHER DESCRIPTION
DATE	HOUR	DAILY	MONTH TODATE			
1	A.M. / P.M.	MM.	MM.	M.P.H.		
2	A.M. / P.M.	MM.	MM.	M.P.H.		
3	A.M. / P.M.	MM.	MM.	M.P.H.		
4	A.M. / P.M.	. — MM.	— MM.	— M.P.H.	Clear	Dry
5	A.M. / P.M.	MM.	MM.	M.P.H.		
6	A.M. / P.M.	MM.	MM.	M.P.H.		
7	A.M. / P.M.	MM.	MM.	M.P.H.		
8	A.M. / P.M.	— MM.	— MM.	— M.P.H.	Clear	Dry
9	A.M. / P.M.	MM.	MM.	M.P.H.		
10	A.M. / P.M.	MM.	MM.	M.P.H.		
11	A.M. / P.M.	MM.	MM.	M.P.H.		
12	A.M. / P.M.	MM.	MM.	M.P.H.		
13	A.M. / P.M.	— MM.	— MM.	— M.P.H.	Clear	Dry
14	A.M. / P.M.	MM.	MM.	M.P.H.		
15	A.M. / P.M.	MM.	MM.	M.P.H.		
16	A.M. / P.M.	MM.	MM.	M.P.H.		
17	A.M. / P.M.	MM.	MM.	M.P.H.		
18	A.M. / P.M.	MM.	MM.	M.P.H.		
19	A.M. / P.M.	— MM.	— MM.	10 M.P.H.	Clear	Dry
20	A.M. / P.M.	— MM.	— MM.	— M.P.H.	Clear	Dry
21	A.M. / P.M.	— MM.	— MM.	— M.P.H.	Clear	Dry
22	A.M. / P.M.	15 MM.	15 MM.	20 M.P.H.	Clear	Dry
23	A.M. / P.M.	MM.	MM.	M.P.H.		
24	A.M. / P.M.	MM.	MM.	M.P.H.		
25	A.M. / P.M.	MM.	MM.	M.P.H.		
26	A.M. / P.M.	. — MM.	15 MM.	— M.P.H.	Misty	Dry
27	A.M. / P.M.	— MM.	15 MM.	— M.P.H.	Clear	Dry / Sunny
28	A.M. / P.M.	MM.	MM.	M.P.H.		
29	A.M. / P.M.	— MM.	15 MM.	— M.P.H.	Clear	Dry
30	A.M. / P.M.	MM.	MM.	M.P.H.		
31	A.M. / P.M.	MM.	MM.	M.P.H.		

CYNGOR GWYNEDD - GWASANAETH TRIN GWASTRAFF

RAINFALL / WEATHER RECORD - LLWYN ISAF LANDFILL SITE

JUNE 2020		RAINFALL					
DATE	HOUR	DAILY	MONTH TODATE	WIND	CLOUD DESCRIPTION	WEATHER DESCRIPTION
1	A.M. / P.M.	— MM.	— MM.	— M.P.H.	Clear	Dry / Sunny
2	A.M. / P.M.	— MM.	— MM.	— M.P.H.	Clear	Dry / Sunny
3	A.M. / P.M.	— MM.	— MM.	— M.P.H.	Clouds	Rain.
4	A.M. / P.M.	5 MM.	5 MM.	— M.P.H.	Clear	Dry
5	A.M. / P.M.	MM.	MM.	M.P.H.		
6	A.M. / P.M.	MM.	MM.	M.P.H.		
7	A.M. / P.M.	MM.	MM.	M.P.H.		
8	A.M. / P.M.	5 MM.	10 MM.	— M.P.H.	Clear	Dry
9	A.M. / P.M.	— MM.	10 MM.	— M.P.H.	Clear	Dry
10	A.M. / P.M.	10 MM.	20 MM.	10 M.P.H.	Clear	Dry
11	A.M. / P.M.	15 MM.	35 MM.	— M.P.H.	Clear	Dry
12	A.M. / P.M.	— MM.	35 MM.	— M.P.H.	Clear	Dry
13	A.M. / P.M.	MM.	MM.	M.P.H.		
14	A.M. / P.M.	MM.	MM.	M.P.H.		
15	A.M. / P.M.	10 MM.	45 MM.	— M.P.H.	Clear	Dry
16	A.M. / P.M.	— MM.	45 MM.	— M.P.H.	Clear	Dry
17	A.M. / P.M.	— MM.	45 MM.	— M.P.H.	Clear	Dry
18	A.M. / P.M.	— MM.	45 MM.	— M.P.H.	Clear	Dry
19	A.M. / P.M.	15 MM.	60 MM.	— M.P.H.	Clear	Rain
20	A.M. / P.M.	MM.	MM.	M.P.H.		
21	A.M. / P.M.	MM.	MM.	M.P.H.		
22	A.M. / P.M.	18 MM.	78 MM.	20 M.P.H.	Clear	Dry
23	A.M. / P.M.	13 MM.	91 MM.	20 M.P.H.	Clear	Dry
24	A.M. / P.M.	— MM.	91 MM.	— M.P.H.	Clear	Dry
25	A.M. / P.M.	— MM.	91 MM.	— M.P.H.	Clear	Dry
26	A.M. / P.M.	— MM.	91 MM.	— M.P.H.	Clear	Dry
27	A.M. / P.M.	MM.	MM.	M.P.H.		
28	A.M. / P.M.	MM.	MM.	M.P.H.		
29	A.M. / P.M.	MM.	MM.	M.P.H.		
30	A.M. / P.M.	MM.	MM.	M.P.H.		
31	A.M. / P.M.	MM.	MM.	M.P.H.		

CYNGOR GWYNEDD - GWASANAETH TRIN GWASTRAFF

RAINFALL / WEATHER RECORD - LLWYN ISAF LANDFILL SITE

JULY 2020		RAINFALL					
DATE	HOUR	DAILY	MONTH TODATE	WIND	CLOUD DESCRIPTION	WEATHER DESCRIPTION
1	A.M. / P.M.	30 MM.	30 MM.	— M.P.H.	Clear	Dry
2	A.M. / P.M.	5 MM.	35 MM.	10 M.P.H.	Cloudy	Rain
3	A.M. / P.M.	8 MM.	43 MM.	15 M.P.H.	Cloudy	Rain
4	A.M. / P.M.	MM.	MM.	M.P.H.		
5	A.M. / P.M.	MM.	MM.	M.P.H.		
6	A.M. / P.M.	32 MM.	75 MM.	20 M.P.H.	Clear	Dry
7	A.M. / P.M.	— MM.	75 MM.	10 M.P.H.	Cloudy	Rain
8	A.M. / P.M.	13 MM.	88 MM.	— M.P.H.	Clear	Dry
9	A.M. / P.M.	14 MM.	102 MM.	— M.P.H.	Cloudy	Dry
10	A.M. / P.M.	— MM.	102 MM.	— M.P.H.	Clear	Dry
11	A.M. / P.M.	MM.	MM.	M.P.H.		
12	A.M. / P.M.	MM.	MM.	M.P.H.		
13	A.M. / P.M.	MM.	MM.	M.P.H.		
14	A.M. / P.M.	MM.	MM.	M.P.H.		
15	A.M. / P.M.	.10 MM.	112 MM.	5 M.P.H.	Cloudy	Rain
16	A.M. / P.M.	— MM.	112 MM.	— M.P.H.	Cloudy	Slight Rain
17	A.M. / P.M.	— MM.	112 MM.	— M.P.H.	Clear	Dry
18	A.M. / P.M.	MM.	MM.	M.P.H.		
19	A.M. / P.M.	MM.	MM.	M.P.H.		
20	A.M. / P.M.	15 MM.	127 MM.	— M.P.H.	Clear	Dry
21	A.M. / P.M.	— MM.	127 MM.	— M.P.H.	Clear	Dry
22	A.M. / P.M.	— MM.	127 MM.	— M.P.H.	Clear	Dry
23	A.M. / P.M.	3 MM.	130 MM.	— M.P.H.	Cloudy	Rain
24	A.M. / P.M.	— MM.	130 MM.	— M.P.H.	Clear	Dry
25	A.M. / P.M.	MM.	MM.	M.P.H.		
26	A.M. / P.M.	MM.	MM.	M.P.H.		
27	A.M. / P.M.	MM.	MM.	M.P.H.		
28	A.M. / P.M.	MM.	MM.	M.P.H.		
29	A.M. / P.M.	.65 MM.	195 MM.	— M.P.H.	Clear	Dry
30	A.M. / P.M.	10 MM.	205 MM.	20 M.P.H.	Cloudy	Dry
31	A.M. / P.M.	— MM.	205 MM.	— M.P.H.	Clear	Dyl Llwyn

CYNGOR GWYNEDD - GWASANAETH TRIN GWASTRAFF

RAINFALL / WEATHER RECORD - LLWYN ISAF LANDFILL SITE

AUGUST 2020		RAINFALL						
DATE	HOUR	DAILY		MONTH TODATE		WIND	CLOUD DESCRIPTION	WEATHER DESCRIPTION
1	A.M. / P.M.		MM.		MM.	M.P.H.		
2	A.M. / P.M.		MM.		MM.	M.P.H.		
3	A.M. / P.M.	5	MM.	5	MM.	— M.P.H.	Clear	Dry
4	A.M. / P.M.	—	MM.	5	MM.	20 M.P.H.	V Cloudy	Rain
5	A.M. / P.M.	47	MM.	52	MM.	10 M.P.H.	Cloudy	Rain
6	A.M. / P.M.	10	MM.	62	MM.	10 M.P.H.	Cloudy	Rain
7	A.M. / P.M.	—	MM.	62	MM.	— M.P.H.	Cloudy	Rain
8	A.M. / P.M.		MM.		MM.	M.P.H.		
9	A.M. / P.M.		MM.		MM.	M.P.H.		
10	A.M. / P.M.		MM.		MM.	M.P.H.		
11	A.M. / P.M.		MM.		MM.	M.P.H.		
12	A.M. / P.M.	5	MM.	67	MM.	— M.P.H.	Clear	Dry
13	A.M. / P.M.	—	MM.	67	MM.	— M.P.H.	Clear	Dry/Rain
14	A.M. / P.M.	10	MM.	~~77~~	MM.	5 M.P.H.	Clear	Dry
15	A.M. / P.M.		MM.		MM.	M.P.H.		
16	A.M. / P.M.		MM.		MM.	M.P.H.		
17	A.M. / P.M.	35	MM.	112	MM.	10 M.P.H.	V Cloudy	V. Rain
18	A.M. / P.M.	37	MM.	149	MM.	— M.P.H.	Clear	Dry
19	A.M. / P.M.	—	MM.	149	MM.	— M.P.H.	Clear	Dry
20	A.M. / P.M.	15	MM.	164	MM.	20 M.P.H.	Clear	Dry
21	A.M. / P.M.	12	MM.	176	MM.	25 M.P.H.	Cloudy	Rain
22	A.M. / P.M.		MM.		MM.	M.P.H.		
23	A.M. / P.M.		MM.		MM.	M.P.H.		
24	A.M. / P.M.	7	MM.	183	MM.	5 M.P.H.	Clear	Dry
25	A.M. / P.M.	40	MM.	223	MM.	20 M.P.H.	Cloudy	Very Rain
26	A.M. / P.M.	55	MM.	~~278~~	MM.	— M.P.H.	Clear	Dry
27	A.M. / P.M.	5	MM.	283	MM.	— M.P.H.	Clear	Dry
28	A.M. / P.M.	22	MM.	305	MM.	10 M.P.H.	Cloudy	Rain
29	A.M. / P.M.		MM.		MM.	M.P.H.		
30	A.M. / P.M.		MM.		MM.	M.P.H.		
31	A.M. / P.M.		MM.		MM.	M.P.H.		

CYNGOR GWYNEDD - GWASANAETH TRIN GWASTRAFF

RAINFALL / WEATHER RECORD - LLWYN ISAF LANDFILL SITE

SEPTEMBER 2020		RAINFALL					
DATE	HOUR	DAILY	MONTH TODATE	WIND	CLOUD DESCRIPTION	WEATHER DESCRIPTION
1	A.M. / P.M.	MM.	MM.	M.P.H.		
2	A.M. / P.M.	MM.	MM.	M.P.H.		
3	A.M. / P.M.	MM.	MM.	M.P.H.		
4	A.M. / P.M.	MM.	MM.	M.P.H.		
5	A.M. / P.M.	MM.	MM.	M.P.H.		
6	A.M. / P.M.	MM.	MM.	M.P.H.		
7	A.M. / P.M.	32 MM.	32 MM.	— M.P.H.	Clear	Dry/Sunny
8	A.M. / P.M.	10 MM.	42 MM.	— M.P.H.	Clear	Dry
9	A.M. / P.M.	9 MM.	51 MM.	— M.P.H.	Clear	Dry
10	A.M. / P.M.	— MM.	51 MM.	— M.P.H.	Clear	Dry
11	A.M. / P.M.	— MM.	51 MM.	— M.P.H.	Clear	Dry
12	A.M. / P.M.	MM.	MM.	M.P.H.		
13	A.M. / P.M.	MM.	MM.	M.P.H.		
14	A.M. / P.M.	— MM.	51 MM.	— M.P.H.	Clear	Dry
15	A.M. / P.M.	— MM.	51 MM.	— M.P.H.	Clear	Dry
16	A.M. / P.M.	— MM.	51 MM.	— M.P.H.	Foggy	Dry
17	A.M. / P.M.	— MM.	51 MM.	— M.P.H.	Clear	Dry
18	A.M. / P.M.	— MM.	51 MM.	— M.P.H.	Clear	Dry
19	A.M. / P.M.	MM.	MM.	M.P.H.		
20	A.M. / P.M.	MM.	MM.	M.P.H.		
21	A.M. / P.M.	MM.	MM.	M.P.H.		
22	A.M. / P.M.	MM.	MM.	M.P.H.		
23	A.M. / P.M.	25 MM.	76 MM.	10 M.P.H.	Clear	Cool
24	A.M. / P.M.	— MM.	76 MM.	— M.P.H.	Clear	Dry / Hot
25	A.M. / P.M.	— MM.	76 MM.	— M.P.H.	Clear	Dry
26	A.M. / P.M.	MM.	MM.	M.P.H.		
27	A.M. / P.M.	MM.	MM.	M.P.H.		
28	A.M. / P.M.	. — MM.	76 MM.	— M.P.H.	Clear	Dry
29	A.M. / P.M.	15 MM.	91 MM.	— M.P.H.	Clear	Dry
30	A.M. / P.M.	20 MM.	111 MM.	20 M.P.H.	Cloudy	Hot
31	A.M. / P.M.	1 MM.	MM.	M.P.H.		

CYNGOR GWYNEDD - GWASANAETH TRIN GWASTRAFF

RAINFALL / WEATHER RECORD - LLWYN ISAF LANDFILL SITE

OCTOBER 2020		RAINFALL				WIND		CLOUD DESCRIPTION	WEATHER DESCRIPTION
DATE	HOUR	DAILY		MONTH TODATE					
1	A.M. / P.M.	20	MM.	20	MM.	20	M.P.H.	Cloudy	Wet.
2	A.M. / P.M.	14	MM.	34	MM.	—	M.P.H.	Clear	Dry/ Clear
3	A.M. / P.M.	—	MM.	34	MM.	—	M.P.H.	Clear	Dry
4	A.M. / P.M.		MM.		MM.		M.P.H.		
5	A.M. / P.M.	23.	MM.	57	MM.	10	M.P.H.	Cloudy	Rain
6	A.M. / P.M.	10	MM.	67	MM.	10	M.P.H.	Cloudy	Rain
7	A.M. / P.M.	12	MM.	79	MM.	—	M.P.H.	Clear	Dry
8	A.M. / P.M.	27	MM.	106	MM.	10	M.P.H.	Clear	Dry
9	A.M. / P.M.	9.	MM.	115	MM.	—	M.P.H.	Cloudy	Dry
10	A.M. / P.M.		MM.		MM.		M.P.H.		
11	A.M. / P.M.		MM.		MM.		M.P.H.		
12	A.M. / P.M.	10	MM.	125	MM.	10	M.P.H.	Cloudy	Rain
13	A.M. / P.M.	13	MM.	138	MM.	20	M.P.H.	Cloudy	Rain
14	A.M. / P.M.	5	MM.	143	MM.	—	M.P.H.	Clear	Dry
15	A.M. / P.M.	—	MM.	143	MM.	—	M.P.H.	Clear	Dry
16	A.M. / P.M.	—	MM.	143	MM.	5	M.P.H.	Clear	Dry
17	A.M. / P.M.		MM.		MM.		M.P.H.		
18	A.M. / P.M.		MM.		MM.		M.P.H.		
19	A.M. / P.M.		MM.		MM.		M.P.H.		
20	A.M. / P.M.	.8	MM.	151	MM.	10	M.P.H.	Cloudy	Showers
21	A.M. / P.M.		MM.		MM.		M.P.H.		
22	A.M. / P.M.		MM.		MM.		M.P.H.		
23	A.M. / P.M.	.15	MM.	166	MM.	10	M.P.H.	Cloudy	Rain
24	A.M. / P.M.	40	MM.	206	MM.	10	M.P.H.	Cloudy	Dry
25	A.M. / P.M.		MM.		MM.		M.P.H.		
26	A.M. / P.M.		MM.		MM.		M.P.H.		
27	A.M. / P.M.		MM.		MM.		M.P.H.		
28	A.M. / P.M.		MM.		MM.		M.P.H.		
29	A.M. / P.M.	. 40	MM.	246	MM.	20	M.P.H.	Cloudy	Heavy Rain
30	A.M. / P.M.	40	MM.	286	MM.	10	M.P.H.	Cloudy	Rain
31	A.M. / P.M.		MM.		MM.		M.P.H.		

CYNGOR GWYNEDD - GWASANAETH TRIN GWASTRAFF

RAINFALL / WEATHER RECORD - LLWYN ISAF LANDFILL SITE

NOVEMBER 2020		RAINFALL		WIND	CLOUD DESCRIPTION	WEATHER DESCRIPTION
DATE	HOUR	DAILY	MONTH TODATE			
1	A.M. / P.M.	MM.	MM.	M.P.H.		
2	A.M. / P.M.	90 MM.	90 MM.	20 M.P.H.	Cloudy	Dry
3	A.M. / P.M.	— MM.	90 MM.	30 M.P.H.	Clear	Showers
4	A.M. / P.M.	8 MM.	98 MM.	— M.P.H.	Clear	Dry
5	A.M. / P.M.	— MM.	98 MM.	— M.P.H.	Clear	Dry
6	A.M. / P.M.	— MM.	98 MM.	5 M.P.H.	Clear	Dry
7	A.M. / P.M.	MM.	MM.	M.P.H.		
8	A.M. / P.M.	MM.	MM.	M.P.H.		
9	A.M. / P.M.	5 MM.	103 MM.	— M.P.H.	Clear	Dry
10	A.M. / P.M.	5 MM.	108 MM.	— M.P.H.	Clear	Some Rain
11	A.M. / P.M.	10 MM.	118 MM.	10 M.P.H.	Cloudy	Rain
12	A.M. / P.M.	10 MM.	128 MM.	— M.P.H.	Clear	Dry
13	A.M. / P.M.	8 MM.	136 MM.	— M.P.H.	Clear	Dry
14	A.M. / P.M.	MM.	MM.	M.P.H.		
15	A.M. / P.M.	MM.	MM.	M.P.H.		
16	A.M. / P.M.	42 MM.	188 MM.	20 M.P.H.	Cloudy	Rain
17	A.M. / P.M.	10 MM.	198 MM.	— M.P.H.	Cloudy	Some Showers
18	A.M. / P.M.	35 MM.	233 MM.	20 M.P.H.	Cloudy	Heavy Rain
19	A.M. / P.M.	20 MM.	253 MM.	20 M.P.H.	Clear	Dry
20	A.M. / P.M.	10 MM.	263 MM.	20 M.P.H.	Cloudy	Heavy Rain
21	A.M. / P.M.	MM.	MM.	M.P.H.		
22	A.M. / P.M.	MM.	MM.	M.P.H.		
23	A.M. / P.M.	MM.	MM.	M.P.H.		
24	A.M. / P.M.	MM.	MM.	M.P.H.		
25	A.M. / P.M.	MM.	MM.	M.P.H.		
26	A.M. / P.M.	MM.	MM.	M.P.H.		
27	A.M. / P.M.	MM.	MM.	M.P.H.		
28	A.M. / P.M.	MM.	MM.	M.P.H.		
29	A.M. / P.M.	MM.	MM.	M.P.H.		
30	A.M. / P.M.	35 MM.	298 MM.	20 M.P.H.	Cloudy	Rain
31	A.M. / P.M.	MM.	MM.	M.P.H.		

CYNGOR GWYNEDD - GWASANAETH TRIN GWASTRAFF

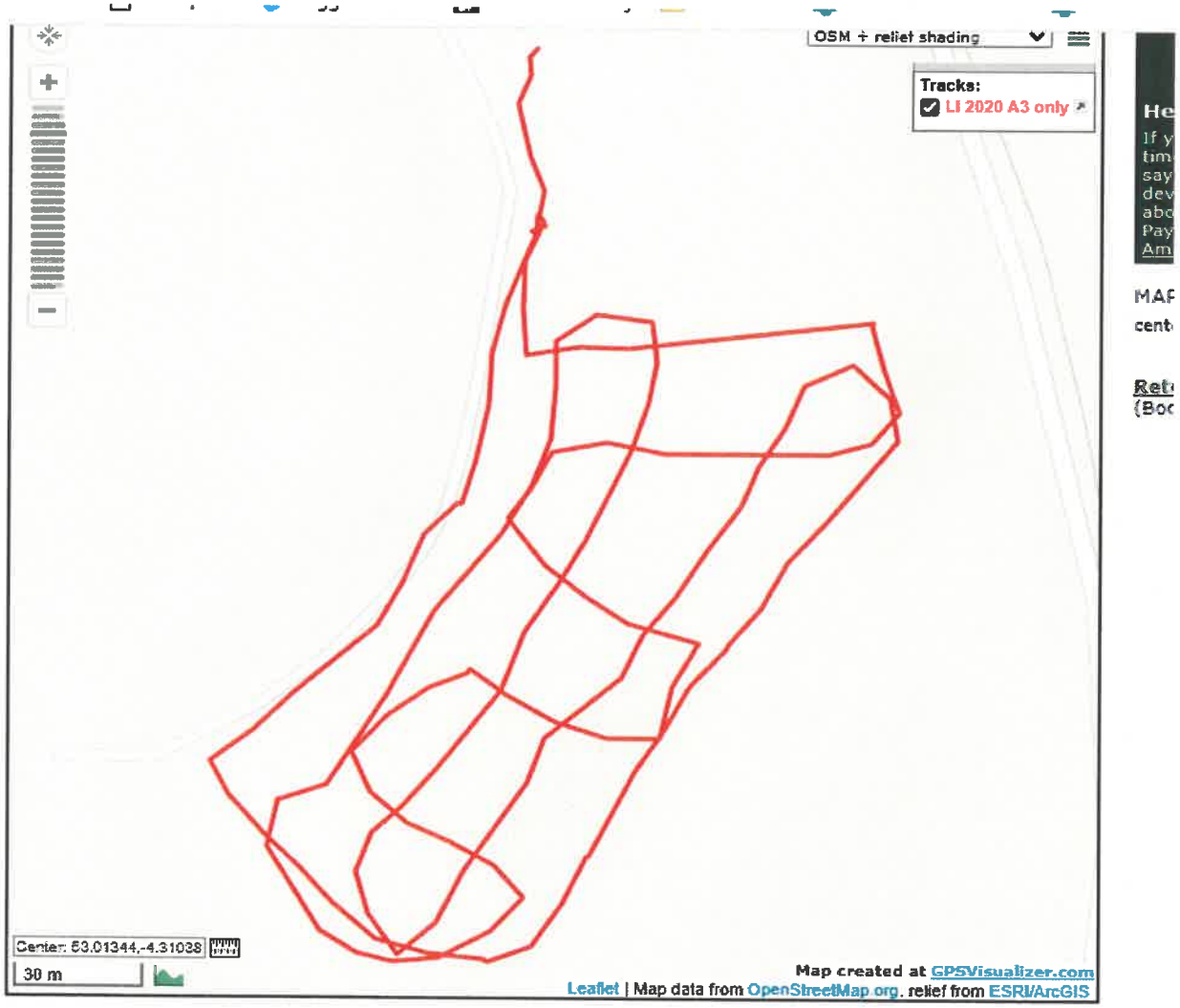
RAINFALL / WEATHER RECORD - LLWYN ISAF LANDFILL SITE

DECEMBER 2020		RAINFALL					
DATE	HOUR	DAILY	MONTH TODATE	WIND	CLOUD DESCRIPTION	WEATHER DESCRIPTION
1	A.M. / P.M.	5 MM.	5 MM.	— M.P.H.	Clear	Dry
2	A.M. / P.M.	— MM.	5 MM.	— M.P.H.	Clear	Dry
3	A.M. / P.M.	15 MM.	20 MM.	— M.P.H.	Clear	Cold / Dry
4	A.M. / P.M.	14 MM.	34 MM.	20 M.P.H.	Clear	Dry
5	A.M. / P.M.	MM.	MM.	M.P.H.		
6	A.M. / P.M.	MM.	MM.	M.P.H.		
7	A.M. / P.M.	10 MM.	44 MM.	— M.P.H.	Clear	Dry
8	A.M. / P.M.	5 MM.	49 MM.	5 M.P.H.	Cloudy	Dry / Rain
9	A.M. / P.M.	5 MM.	54 MM.	5 M.P.H.	Cloudy	Damp / Cold
10	A.M. / P.M.	8 MM.	62 MM.	10 M.P.H.	Cloudy	Rain
11	A.M. / P.M.	— MM.	62 MM.	5 M.P.H.	Cloudy	Showers
12	A.M. / P.M.	MM.	MM.	M.P.H.		
13	A.M. / P.M.	MM.	MM.	M.P.H.		
14	A.M. / P.M.	60 MM.	122 MM.	20 M.P.H.	V Cloudy	Heavy Rain.
15	A.M. / P.M.	30 MM.	152 MM.	10 M.P.H.	Cloudy	Showers.
16	A.M. / P.M.	5 MM.	157 MM.	20 M.P.H.	Cloudy	Showers.
17	A.M. / P.M.	10 MM.	167 MM.	— M.P.H.	Cloudy	Rain
18	A.M. / P.M.	28 MM.	195 MM.	20 M.P.H.	Cloudy	Heavy Rain
19	A.M. / P.M.	MM.	MM.	M.P.H.		
20	A.M. / P.M.	MM.	MM.	M.P.H.		
21	A.M. / P.M.	35 MM.	230 MM.	10 M.P.H.	Cloudy	Slight Rain
22	A.M. / P.M.	— MM.	230 MM.	— M.P.H.	Clear	Dry
23	A.M. / P.M.	15 MM.	245 MM.	— M.P.H.	Cloudy	Damp
24	A.M. / P.M.	— MM.	245 MM.	— M.P.H.	Cloudy	Dry.
25	A.M. / P.M.	MM.	MM.	M.P.H.		
26	A.M. / P.M.	MM.	MM.	M.P.H.		
27	A.M. / P.M.	MM.	MM.	M.P.H.		
28	A.M. / P.M.	MM.	MM.	M.P.H.		
29	A.M. / P.M.	33 MM.	278 MM.	5 M.P.H.	Cloudy	Wet
30	A.M. / P.M.	— MM.	278 MM.	5 M.P.H.	Clear	Dry / Cold
31	A.M. / P.M.	7 MM.	285 MM.	— M.P.H.	Clear	Snow Showers / Ice

APPENDIX 6 –

Surface Emissions, Flare Emissions and Bulk Gases

LLWYN ISAF
A3 emissions survey
5/11/2020



Element Materials Technology, Unit C6, Emery Court, The Embankment Business Park, Heaton Mersey, Stockport, SK4 3GL
Your Element Contact: James Eldridge (07826 916 684)
E: james.eldridge@element.com

Stack Emissions Testing Report Commissioned by
Gwynedd Council

Installation Name & Address
Gwynedd Council
Llwyn Isaf Landfill Site
Clynnog Fawr
Gwynedd
LL54 5DF

PPC Permit: YP3138UJ

Stack Reference
Raw Landfill Gas

Dates of the Monitoring Campaign
23rd September 2020

Job Reference Number
EST-5852

Report Written by
Brian Jacob Assistant Operations Manager MCERTS Level 2 MM 06 693 TE1 TE2 TE3 TE4

Report Approved by
Matthew Pendlebury Team Leader MCERTS Level 2 MM 04 535 TE1 TE2 TE3 TE4

Report Date
21st October 2020

Version
Version 1

Signature of Report Approver


CONTENTS

Opinions and interpretations expressed herein are outside the scope of Element's ISO 17025 accreditation.

Executive Summary

MONITORING OBJECTIVES

Gwynedd Council, Llwyn Isaf Landfill
Raw Landfill Gas
23rd September 2020

Overall Aim of the Monitoring Campaign

Element were commissioned by Gwynedd Council to carry out stack emissions testing on the Raw Landfill Gas at Llwyn Isaf Landfill.

The aim of the monitoring campaign was to demonstrate compliance with a set of emission limit values (ELVs) as specified in the Site's Permit.

Special Requirements

There were no special requirements.

Target Parameters

Arsenic , Methanal (Formaldehyde) , Ethanal (Acetaldehyde) , Total Chlorinated Compounds , Total Fluorinated Compounds , Total Organosulphur Compounds , Total Chlorinated Compounds as Cl , Total Chlorinated Compounds as F , Total Organosulphur Compounds as S , Total Volatile Organic Compounds , Hexamethylcyclotrisiloxane, Octamethylcyclotetrasiloxane, Decamethylcyclopentasiloxane, Hexamethyldisiloxane, Octamethyltrisiloxane, Decamethyltetrasiloxane, Dodecamethylpentasiloxane, Dodecamethylcyclohexasiloxane, Trimethyl Silanol (toluene equivalent), Hydrogen Sulphide, Carbon Monoxide, Methane, Carbon Dioxide, Nitrogen, Oxygen, Hydrogen, Ethylene, Ethane, Acetylene, Dichloromethane , 1,1,1-Trichloroethane , Trichloroethylene , Tetrachloroethylene , 1,1-Dichloroethane , 1,2-Dichloroethylene , Vinyl Chloride , 1,1-Dichloroethylene , 1,2-Dichloroethane , Chloroethane , Carbon Tetrachloride , Carbon Disulphide , Dimethylsulphide , Dimethyldisulphide , Ethane Thiol , Methane Thiol , Trimethylbenzenes , 1,3-Butadiene , 1-Pentene , Furan , Benzene , 1-Propanethiol , 1-Butanethiol , Toluene , Ethyl Butyrate , Xylenes , 2-Butoxy Ethanol , Styrene , Butyric Acid , 1,1,2,2-Tetrachloroethane

Executive Summary

MONITORING RESULTS

Gwynedd Council, Llwyn Isaf Landfill
Raw Landfill Gas
23rd September 2020

where MU = Measurement Uncertainty associated with the Result

		Concentration		
Parameter	**Units**	**Result**	**MU +/-**	**Limit**
Arsenic [1]	mg/m³	< 0.02	0.003	-
Methanal (Formaldehyde) [1]	mg/m³	0.02	0.005	-
Ethanal (Acetaldehyde) [1]	mg/m³	0.02	0.004	-
Total Chlorinated Compounds [1]	mg/m³	0.86	0.17	-
Total Fluorinated Compounds [1]	mg/m³	0.86	0.17	-
Total Organosulphur Compounds [1]	mg/m³	0.35	0.07	-
Total Chlorinated Compounds as Cl [1]	mg/m³	1.04	0.21	-
Total Chlorinated Compounds as F [1]	mg/m³	0.35	0.07	-
Total Organosulphur Compounds as S [1]	mg/m³	0.35	0.07	-
Total Volatile Organic Compounds [1]	mg/m³	337	67.3	-
Hexamethylcyclotrisiloxane [1]	mg/m³	< 1.00	-	-
Octamethylcyclotetrasiloxane [1]	mg/m³	1.60	-	-
Decamethylcyclopentasiloxane [1]	mg/m³	2.00	-	-
Hexamethyldisiloxane [1]	mg/m³	2.30	-	-
Octamethyltrisiloxane [1]	mg/m³	< 1.00	-	-
Decamethyltetrasiloxane [1]	mg/m³	< 1.00	-	-
Dodecamethylpentasiloxane [1]	mg/m³	< 1.00	-	-
Dodecamethylcyclohexasiloxane [1]	mg/m³	< 1.00	-	-
Trimethyl Silanol (toluene equivalent) [1]	mg/m³	< 1.00	-	-
Hydrogen Sulphide [1]	ppm	< 10.0	-	-
Carbon Monoxide [1]	mg/m³	< 5.00	-	-
Methane [1]	% v/v	61.4	-	-
Carbon Dioxide [1]	% v/v	24.2	-	-
Nitrogen [1]	% v/v	13.6	-	-
Oxygen [1]	% v/v	0.80	-	-
Hydrogen [1]	ppm	< 20.0	-	-
Ethylene [1]	ppm	< 5.00	-	-
Ethane [1]	ppm	8.00	-	-
Acetylene [1]	ppm	< 5.00	-	-
Dichloromethane [1]	mg/m³	0.63	0.13	-
1,1,1-Trichloroethane [1]	mg/m³	< 0.30	0.06	-
Trichloroethylene [1]	mg/m³	< 0.13	0.03	-
Tetrachloroethylene [1]	mg/m³	< 0.17	0.03	-
1,1-Dichloroethane [1]	mg/m³	< 0.14	0.03	-
1,2-Dichloroethylene [1]	mg/m³	< 0.17	0.03	-
Vinyl Chloride [1]	mg/m³	< 0.24	0.05	-
1,1-Dichloroethylene [1]	mg/m³	< 0.15	0.03	-
1,2-Dichloroethane [1]	mg/m³	0.08	0.02	-
Chloroethane [1]	mg/m³	0.17	0.03	-
Carbon Tetrachloride [1]	mg/m³	< 0.07	0.01	-
Carbon Disulphide [1]	mg/m³	< 0.36	0.07	-
Dimethylsulphide [1]	mg/m³	< 0.16	0.03	-
Dimethyldisulphide [1]	mg/m³	< 0.03	0.01	-
Ethane Thiol [1]	mg/m³	< 0.60	0.12	-
Methane Thiol [1]	mg/m³	< 2.00	0.40	-
Trimethylbenzenes [1]	mg/m³	1.48	0.30	-
1,3-Butadiene [1]	mg/m³	< 1.57	0.31	-
1-Pentene [1]	mg/m³	0.60	0.12	-
Furan [1]	mg/m³	< 0.16	0.03	-
Benzene [1]	mg/m³	0.80	0.16	-
1-Propanethiol [1]	mg/m³	< 0.21	0.04	-
1-Butanethiol [1]	mg/m³	< 0.10	0.02	-
Toluene [1]	mg/m³	2.68	0.54	-
Ethyl Butyrate [1]	mg/m³	< 0.10	0.02	-
Xylenes [1]	mg/m³	2.54	0.51	-
2-Butoxy Ethanol [1]	mg/m³	< 0.16	0.03	-
Styrene [1]	mg/m³	< 0.26	0.05	-
Butyric Acid [1]	mg/m³	< 2.00	0.40	-
1,1,2,2-Tetrachloroethane [1]	mg/m³	< 1.31	0.26	-

[1] Reference Conditions (REF) are: 273K, 101.3kPa, without correction for water vapour content.

Executive Summary

MONITORING DATE(S) & TIMES

Gwynedd Council, Llwyn Isaf Landfill
Raw Landfill Gas
23rd September 2020

Parameter		Units	Concentration	Sampling Date(s)	Sampling Times	Duration mins
Arsenic	R1	mg/m³	< 0.02	23/09/2020	12:31 - 12:56	25
Methanal (Formaldehyde)	R1	mg/m³	0.02	23/09/2020	12:57 - 13:22	25
Ethanal (Acetaldehyde)	R1	mg/m³	0.02	23/09/2020	12:57 - 13:22	25
Total Chlorinated Compounds	R1	mg/m³	0.86	23/09/2020	Gas bags taken at 12:01, 12:02 & 12:03 in lieu of tubes samples	1
Total Fluorinated Compounds	R1	mg/m³	0.86	23/09/2020		1
Total Organosulphur Compounds	R1	mg/m³	0.35	23/09/2020		1
Total Chlorinated Compounds as Cl	R1	mg/m³	1.04	23/09/2020		1
Total Chlorinated Compounds as F	R1	mg/m³	0.35	23/09/2020		1
Total Organosulphur Compounds as S	R1	mg/m³	0.35	23/09/2020		1
Total Volatile Organic Compounds	R1	mg/m³	337	23/09/2020		1
Dichloromethane	R1	mg/m³	0.63	23/09/2020		1
1,1,1-Trichloroethane	R1	mg/m³	< 0.30	23/09/2020		1
Trichloroethylene	R1	mg/m³	< 0.13	23/09/2020		1
Tetrachloroethylene	R1	mg/m³	< 0.17	23/09/2020		1
1,1-Dichloroethane	R1	mg/m³	< 0.14	23/09/2020		1
1,2-Dichloroethylene	R1	mg/m³	< 0.17	23/09/2020		1
Vinyl Chloride	R1	mg/m³	< 0.24	23/09/2020		1
1,1-Dichloroethylene	R1	mg/m³	< 0.15	23/09/2020		1
1,2-Dichloroethane	R1	mg/m³	0.08	23/09/2020		1
Chloroethane	R1	mg/m³	0.17	23/09/2020		1
Carbon Tetrachloride	R1	mg/m³	< 0.07	23/09/2020		1
Carbon Disulphide	R1	mg/m³	< 0.36	23/09/2020		1
Dimethylsulphide	R1	mg/m³	< 0.16	23/09/2020		1
Dimethyldisulphide	R1	mg/m³	< 0.03	23/09/2020		1
Ethane Thiol	R1	mg/m³	< 0.60	23/09/2020		1
Methane Thiol	R1	mg/m³	< 2.00	23/09/2020		1
Trimethylbenzenes	R1	mg/m³	1.48	23/09/2020		1
1,3-Butadiene	R1	mg/m³	< 1.57	23/09/2020		1
1-Pentene	R1	mg/m³	0.60	23/09/2020		1
Furan	R1	mg/m³	< 0.16	23/09/2020		1
Benzene	R1	mg/m³	0.80	23/09/2020		1
1-Propanethiol	R1	mg/m³	< 0.21	23/09/2020		1
1-Butanethiol	R1	mg/m³	< 0.10	23/09/2020		1
Toluene	R1	mg/m³	2.68	23/09/2020		1
Ethyl Butyrate	R1	mg/m³	< 0.10	23/09/2020		1
Xylenes	R1	mg/m³	2.54	23/09/2020		1
2-Butoxy Ethanol	R1	mg/m³	< 0.16	23/09/2020		1
Styrene	R1	mg/m³	< 0.26	23/09/2020		1
Butyric Acid	R1	mg/m³	< 2.00	23/09/2020		1
1,1,2,2-Tetrachloroethane	R1	mg/m³	< 1.31	23/09/2020		1

All results are expressed at the respective reference conditions.

PROCESS DETAILS

Gwynedd Council, Llwyn Isaf Landfill
Raw Landfill Gas
23rd September 2020

Standard Operating Conditions

Parameter	Value
Process Status	Normal Operation
Capacity (of 100%) and Tonnes / Hour	N/A
Continuous or Batch Process	Continuous
Feedstock (if applicable)	Raw Gas Supply
Abatement System	N/A
Abatement System Running Status	N/A
Fuel	N/A
Plume Appearance	None Visible

MONITORING & ANALYTICAL METHODS

Gwynedd Council, Llwyn Isaf Landfill
Raw Landfill Gas
23rd September 2020

Parameter	Monitoring				Analysis					
	Standard	Technical Procedure	Sampling Status	Testing Lab	Analytical Procedure	Analytical Technique	Analysis Status	Analysis Lab	Overall Status	LOD (Average)
Arsenic	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not Listed	Not Listed	None	LUC	None	0.02 mg/m³
Methanal (Formaldehyde)	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	None	LUC	None	0.006 mg/m³
Ethanal (Acetaldehyde)	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	None	LUC	None	0.006 mg/m³
Total Chlorinated Compounds	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	None	LUC	None	0.20 mg/m³
Total Fluorinated Compounds	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	None	LUC	None	0.20 mg/m³
Total Organosulphur Compounds	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	None	LUC	None	0.20 mg/m³
Total Chlorinated Compounds as Cl	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	None	LUC	None	0.20 mg/m³
Total Chlorinated Compounds as F	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	None	LUC	None	0.20 mg/m³
Total Organosulphur Compounds as S	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	None	LUC	None	0.20 mg/m³
Total Volatile Organic Compounds	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	None	LUC	None	0.20 mg/m³
Dichloromethane	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	0.30 mg/m³
1,1,1-Trichloroethane	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	None	LUC	None	0.30 mg/m³
Trichloroethylene	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	0.13 mg/m³
Tetrachloroethylene	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	0.17 mg/m³
1,1-Dichloroethane	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	0.14 mg/m³
1,2-Dichloroethylene	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	0.17 mg/m³
Vinyl Chloride	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	0.24 mg/m³
1,1-Dichloroethylene	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	0.15 mg/m³
1,2-Dichloroethane	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	0.03 mg/m³
Chloroethane	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	None	LUC	None	0.11 mg/m³
Carbon Tetrachloride	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	None	LUC	None	0.07 mg/m³
Carbon Disulphide	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	0.36 mg/m³
Dimethylsulphide	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	0.16 mg/m³
Dimethyldisulphide	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	0.03 mg/m³
Ethane Thiol	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	None	LUC	None	0.60 mg/m³
Methane Thiol	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	None	LUC	None	2.00 mg/m³
Trimethylbenzenes	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	None	LUC	None	1.31 mg/m³
1,3-Butadiene	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	1.57 mg/m³
1-Pentene	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	0.26 mg/m³
Furan	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	0.16 mg/m³
Benzene	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	0.10 mg/m³
1-Propanethiol	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	0.21 mg/m³
1-Butanethiol	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	0.10 mg/m³
Toluene	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	0.10 mg/m³
Ethyl Butyrate	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	0.10 mg/m³
Xylenes	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	0.10 mg/m³
2-Butoxy Ethanol	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	17025	LUC	17025	0.16 mg/m³
Styrene	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	None	LUC	None	0.26 mg/m³
Butyric Acid	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	None	LUC	None	2.00 mg/m³
1,1,2,2-Tetrachloroethane	CEN/TS 13649	CAT-TP-16	MCERTS	EET	Not listed	Not Listed	None	LUC	None	1.31 mg/m³

ANALYSIS LABORATORIES

(with short name reference as appears in the table above)

Lucideon (LUC)	ISO 17025 Accreditation Number: 0013

SUMMARY OF SAMPLING DEVIATIONS

Parameter	Run	Deviation
Methanal	1	The absorption efficiency was less than the required 95%.

SUITABILITY OF SAMPLING LOCATION

Duct Characteristics

Parameter	Units	Value
Type	-	Circular
Depth	m	-
Width	m	-
Area	m^2	-
Port Depth	cm	-
Orientation of Duct	-	Vertical
Number of Ports	-	1
Sample Port Size	-	Valve

Location of Sampling Platform

General Platform Information	Value
Permanent / Temporary Platform	On Ground
Inside / Outside	Outside

Platform Details

EA Technical Guidance Note M1 / EN 15259 Platform Requirements	Value
Sufficient working area to manipulate probe and operate the measuring instruments	Yes
Platform has 2 levels of handrails (approx. 0.5m & 1.0m high)	N/A
Platform has vertical base boards (approx. 0.25m high)	N/A
Platform has chains / self closing gates at top of ladders	N/A
There are no obstructions present which hamper insertion of sampling equipment	Yes
Safe Access Available	Yes
Easy Access Available	Yes

Executive Summary

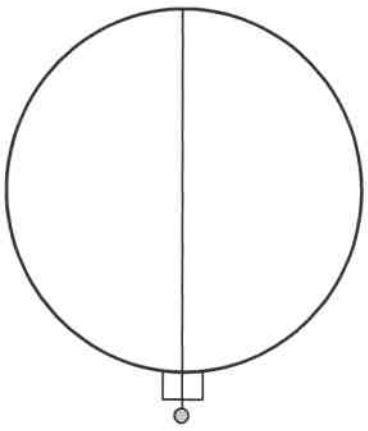
PLANT PHOTOS

Photo 1

Photo 2

Photo 3

SAMPLE POINTS



where ○ = isokinetic point sampled at
● = isokinetic point not sampled at
● = combustion gases sample point
○ = non-isokinetic sample point

APPENDIX CONTENTS

APPENDIX 1

STACK EMISSIONS MONITORING PERSONNEL

Position	Name	MCERTS Accreditation	MCERTS Number	Technical Endorsements
Team Leader	Brian Jacob	MCERTS Level 2	MM 06 693	TE1 TE2 TE3 TE4

LIST OF EQUIPMENT

Extractive Sampling	
Equipment Type	**Equipment I.D.**
Control Box DGM (1)	-
Control Box DGM (2)	-
Box Thermocouples (1)	-
Box Thermocouples (2)	-
Umbilical (1)	-
Umbilical (2)	-
Oven Box (1)	-
Oven Box (2)	-
Heated Probe (1)	-
Heated Probe (2)	-
Heated Probe (3)	-
S-Pitot (1)	-
S-Pitot (2)	-
L-Pitot	-
Site Balance	-
500g / 1Kg Check Weights	-
Last Impinger Arm	-
Callipers	-
Tubes Kit Thermocouple	-

Instrumental Analysers	
Equipment Type	**Equipment I.D.**
Horiba PG-250	-
Horiba PG-250	-
Servomex 4900	-
Eco Physics CLD 822Mh	-
ABB AO2020-URAS26	-
Testo 350 XL	-
JCT JCC P1 Cooler	-
Gasmet DX4000	-
Gasmet Sampling System	-
Bernath 3006 FID	-
M&C PSS	-
Mass Flow Controller (1)	-
Mass Flow Controller (2)	-
Mass View (1)	CAT 25.43
Mass View (2)	CAT 25.53
Hioki 5043 (V)	-
Easylogger EN-EL-12 Bit	-
Bioaerosols Temperature Logger	-
Electronic Refrigerator	-

Miscellaneous Items	
Equipment Type	**Equipment I.D.**
Digital Manometer (1)	-
Digital Manometer (2)	-
Digital Temperature Meter	-
Stopwatch	CAT 14.53
Barometer	CAT MET
Stack Thermocouple (1)	-
Stack Thermocouple (2)	-
Stack Thermocouple (3)	-
1m Heated Line (1)	-
1m Heated Line (2)	-
1m Heated Line (3)	-
5m Heated Line (1)	-
15m Heated Line (1)	-
20m Heated Line (1)	-
20m Heated Line (2)	-
Dual Channel Heater Controller	-
Single Channel Heater Controller	-
Laboratory Balance	
Tape Measure	-

METHODS & TECHNICAL PROCEDURES USED

Parameter	Standard	Technical Procedure
Arsenic	CEN/TS 13649	CAT-TP-16
Methanal (Formaldehyde)	CEN/TS 13649	CAT-TP-16
Ethanal (Acetaldehyde)	CEN/TS 13649	CAT-TP-16
Total Chlorinated Compounds	CEN/TS 13649	CAT-TP-16
Total Fluorinated Compounds	CEN/TS 13649	CAT-TP-16
Total Organosulphur Compounds	CEN/TS 13649	CAT-TP-16
Total Chlorinated Compounds as Cl	CEN/TS 13649	CAT-TP-16
Total Chlorinated Compounds as F	CEN/TS 13649	CAT-TP-16
Total Organosulphur Compounds as S	CEN/TS 13649	CAT-TP-16
Total Volatile Organic Compounds	CEN/TS 13649	CAT-TP-16
Dichloromethane	CEN/TS 13649	CAT-TP-16
1,1,1-Trichloroethane	CEN/TS 13649	CAT-TP-16
Trichloroethylene	CEN/TS 13649	CAT-TP-16
Tetrachloroethylene	CEN/TS 13649	CAT-TP-16
1,1-Dichloroethane	CEN/TS 13649	CAT-TP-16
1,2-Dichloroethylene	CEN/TS 13649	CAT-TP-16
Vinyl Chloride	CEN/TS 13649	CAT-TP-16
1,1-Dichloroethylene	CEN/TS 13649	CAT-TP-16
1,2-Dichloroethane	CEN/TS 13649	CAT-TP-16
Chloroethane	CEN/TS 13649	CAT-TP-16
Carbon Tetrachloride	CEN/TS 13649	CAT-TP-16
Carbon Disulphide	CEN/TS 13649	CAT-TP-16
Dimethylsulphide	CEN/TS 13649	CAT-TP-16
Dimethyldisulphide	CEN/TS 13649	CAT-TP-16
Ethane Thiol	CEN/TS 13649	CAT-TP-16
Methane Thiol	CEN/TS 13649	CAT-TP-16
Trimethylbenzenes	CEN/TS 13649	CAT-TP-16
1,3-Butadiene	CEN/TS 13649	CAT-TP-16
1-Pentene	CEN/TS 13649	CAT-TP-16
Furan	CEN/TS 13649	CAT-TP-16
Benzene	CEN/TS 13649	CAT-TP-16
1-Propanethiol	CEN/TS 13649	CAT-TP-16
1-Butanethiol	CEN/TS 13649	CAT-TP-16
Toluene	CEN/TS 13649	CAT-TP-16
Ethyl Butyrate	CEN/TS 13649	CAT-TP-16
Xylenes	CEN/TS 13649	CAT-TP-16
2-Butoxy Ethanol	CEN/TS 13649	CAT-TP-16
Styrene	CEN/TS 13649	CAT-TP-16
Butyric Acid	CEN/TS 13649	CAT-TP-16
1,1,2,2-Tetrachloroethane	CEN/TS 13649	CAT-TP-16

APPENDIX 2

ARSENIC : RESULTS SUMMARY

Gwynedd Council, Llwyn Isaf Landfill
Raw Landfill Gas

Sample Runs

Parameter	Units	Run 1	Mean
Arsenic	mg/m³	< 0.02	< 0.02

General Sampling Information

Parameter	Value	
Standard	CEN/TS 13649	
Technical Procedure	CAT-TP-16	
Name of Analytical Laboratory	LUC	
Analytical Laboratory's Procedure	Not Listed	
ISO 17025 Accredited Analysis?	See Executive Summary	
Date of Sample Analysis	19/10/2020	
Probe Material	Titanium	
Sample Tube Type	Coconut Shell Charcoal	
Dynamic Dilution Employed	No	
Number of Sampling Lines Used	1 / 1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1 / 1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

Reference Conditions

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

ARSENIC : SAMPLING DETAILS

RUN 1

Parameter	Units	Value
Sampling Times	-	12:31 - 12:56
Sampling Dates	-	23/09/2020
Sampling Device	-	MV
Duration	mins	25
N_2 to Stack Gas Dilution Ratio	: 1	0
Volume Sampled (REF)	m^3	0.0130

Where: MV stands for Mass View (Mass Flow Controller Technology)

Parameter	Lab Result (Front) µg	Lab Result (Back) µg	Lab Result (Total) µg	LOD (Front) µg	LOD (Back) µg	LOD (Total) µg	Concentration mg/m^3	Reported Concentration (Blank Reviewed) mg/m^3	Reported LOD mg/m^3	Adsorption Efficiency %
Arsenic	< 0.10	< 0.10	0.20	0.10	0.10	0.20	< 0.02	< 0.02	0.02	100.0

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

ARSENIC : SAMPLING DETAILS

BLANK 1

Parameter	Units	Value
Sampling Dates	-	23/09/2020
Sampling Device	-	MV
Average Volume Sampled (REF)	m^3	0.0130

Where: MV stands for Mass View (Mass Flow Controller Technology)

Parameter	Lab Result (Front) µg	Lab Result (Back) µg	Lab Result (Total) µg	Concentration mg/m^3
Arsenic	< 0.10	< 0.10	0.20	< 0.02

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

ARSENIC : QUALITY ASSURANCE

(PAGE 1 OF 2)

Sample Runs

Leak Test Results	Units	Run 1
Mean Sampling Rate	l/min	0.47
Pre-Sampling Leak Rate	l/min	0.00
Post-Sampling Leak Rate	l/min	0.00
Allowable Leak Rate	l/min	0.02
Leak Test Acceptable	-	Yes

Adsorption Efficiency	Units	Run 1
Arsenic	%	100.0
Allowable Adsorption Efficiency	%	95.0
Adsorption Efficiency Acceptable	-	Yes

Temperature at Sample Tubes	Units	Run 1
Temperature	°C	10
Allowable Temperature	°C	40
Temperature Acceptable	-	Yes

Test Conditions	Units	Run 1
Ambient Temperature Recorded?	-	Yes

ARSENIC : QUALITY ASSURANCE

(PAGE 2 OF 2)

Blank Runs

Leak Test Results	Units	Blank 1
Expected Sampling Rate	l/min	0.50
Sampling Leak Rate	l/min	0.00
Allowable Leak Rate	l/min	0.03
Leak Test Acceptable	-	Yes

Validity of Blank vs ELV	Units	Blank 1	Allowed
Allowable for Arsenic	mg/m^3	0.02	N/A

Method Deviations

Nature of Deviation (x = deviation applies to the associated run)	Run Number 1	
There are no deviations associated with the sampling employed.	x	

ARSENIC : MEASUREMENT UNCERTAINTY CALCULATIONS

	Value		Standard uncertainty		
Measured Quantities	**Symbol**	**Run 1**	**Symbol**	**Units**	**Run 1**
Sampled Volume (STP)	V_m	0.01	uV_m	m^3	0.0003
Leak	L	0.00	uL	%	-
Laboratory Result	L_r	10.0	uL_r	%	-

	Uncertainty as a Percentage		
Measured Quantities	**Units**	**Run 1**	**Requirement of Standard**
Sampled Volume (STP)	%	2.00	≤2%
Leak	%	0.00	≤5%
Laboratory Result	%	10.0	No Requirement

	Uncertainty in Measurement Units			Sensitivity Coefficient
Measured Quantities	**Symbol**	**Units**	**Run 1**	**Run 1**
Sampled Volume (STP)	V_m	m^3	0.013	1.20
Leak	L	mg/m^3	0.000	1.00
Laboratory Result	L_r	mg/m^3	0.002	1.00

	Uncertainty in Result	
Measured Quantities	**Units**	**Run 1**
Sampled Volume (STP)	mg/m^3	0.0003
Leak	mg/m^3	0.0000
Laboratory Result	mg/m^3	0.0015

	Oxygen Correction Part of MU Budget	
Measured Quantities	**Units**	**Run 1**
O_2 Correction Factor	-	N/A
Stack Gas O_2 Content	% v/v	N/A
MU for O_2 Correction	-	N/A
Overall MU For O_2 Measurement	%	N/A

Parameter	**Units**	**Run 1**
Combined uncertainty	mg/m^3	0.002
Expanded uncertainty (95% confidence), without Oxygen Correction	mg/m^3	0.003
Expanded uncertainty (95% confidence), with Oxygen Correction	mg/m^3	N/A
Expanded uncertainty (95% confidence), estimated with Method Deviations	mg/m^3	0.003
Reported Uncertainty	mg/m^3	0.003
Expanded uncertainty (95% confidence), without Oxygen Correction	%	20.0
Expanded uncertainty (95% confidence), with Oxygen Correction	%	N/A
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	20.0
Reported Uncertainty	%	20.0

NOTE: Uncertainties reported in mg/m^3 are based upon the summation of all Speciated VOCs Measured.

APPENDIX 2

ALDEHYDES : RESULTS SUMMARY

Gwynedd Council, Llwyn Isaf Landfill

Raw Landfill Gas

Sample Runs

Parameter	Units	Run 1		Mean
Methanal (Formaldehyde)	mg/m³	0.02		0.02
Ethanal (Acetaldehyde)	mg/m³	0.02		0.02

General Sampling Information

Parameter	Value	
Standard	CEN/TS 13649	
Technical Procedure	CAT-TP-16	
Name of Analytical Laboratory	LUC	
Analytical Laboratory's Procedure	Not listed	
ISO 17025 Accredited Analysis?	See Executive Summary	
Date of Sample Analysis	27/10/2020	
Probe Material	Titanium	
Sample Tube Type	DNPH Coated Silica Gel	
Dynamic Dilution Employed	No	
Number of Sampling Lines Used	1 / 1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1 / 1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

Reference Conditions

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

ALDEHYDES : SAMPLING DETAILS

RUN 1

Parameter	Units	Value
Sampling Times	-	12:57 - 13:22
Sampling Dates	-	23/09/2020
Sampling Device	-	MV
Duration	mins	25
N_2 to Stack Gas Dilution Ratio	: 1	0
Volume Sampled (REF)	m^3	0.0129

Where: MV stands for Mass View (Mass Flow Controller Technology)

Parameter	Lab Result (Front) µg	Lab Result (Back) µg	Lab Result (Total) µg	LOD (Front) µg	LOD (Back) µg	LOD (Total) µg	Concentration mg/m^3	Reported Concentration (Blank Reviewed) mg/m^3	Reported LOD mg/m^3	Adsorption Efficiency %
Methanal (Formaldehyde)	0.19	0.12	0.31	0.04	0.04	0.08	0.024	0.024	0.006	62.1
Ethanal (Acetaldehyde)	0.19	< 0.04	0.23	0.04	0.04	0.08	0.018	0.018	0.006	100.0

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

APPENDIX 2

ALDEHYDES : SAMPLING DETAILS

BLANK 1

Parameter	Units	Value
Sampling Dates	-	23/09/2020
Sampling Device	-	MV
Average Volume Sampled (REF)	m^3	0.0129

Where: MV stands for Mass View (Mass Flow Controller Technology)

Parameter	Lab Result (Front) µg	Lab Result (Back) µg	Lab Result (Total) µg	Concentration mg/m^3
Methanal (Formaldehyde)	< 0.04	< 0.04	0.08	< 0.006
Ethanal (Acetaldehyde)	< 0.04	< 0.04	0.08	< 0.006

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

ALDEHYDES : QUALITY ASSURANCE

(PAGE 1 OF 2)

Sample Runs

Leak Test Results	Units	Run 1
Mean Sampling Rate	l/min	0.47
Pre-Sampling Leak Rate	l/min	0.00
Post-Sampling Leak Rate	l/min	0.00
Allowable Leak Rate	l/min	0.02
Leak Test Acceptable	-	Yes

Adsorption Efficiency	Units	Run 1
Methanal (Formaldehyde)	%	62.1
Ethanal (Acetaldehyde)	%	100.0
Allowable Adsorption Efficiency	%	95.0
Adsorption Efficiency Acceptable	-	No

Temperature at Sample Tubes	Units	Run 1
Temperature	°C	23
Allowable Temperature	°C	40
Temperature Acceptable	-	Yes

Test Conditions	Units	Run 1
Ambient Temperature Recorded?	-	Yes

ALDEHYDES : QUALITY ASSURANCE

Blank Runs

Leak Test Results	Units	Blank 1
Expected Sampling Rate	l/min	0.20
Sampling Leak Rate	l/min	0.00
Allowable Leak Rate	l/min	0.01
Leak Test Acceptable	-	Yes

Validity of Blank vs ELV	Units	Blank 1	Allowed
Allowable for Methanal (Formaldehyde)	mg/m^3	0.01	N/A
Allowable for Ethanal (Acetaldehyde)	mg/m^3	0.01	N/A

Method Deviations

Nature of Deviation (x = deviation applies to the associated run)	Run Number 1
The absorption efficiency was less than the required 95%. [50 - 75%]	x

ALDEHYDES : MEASUREMENT UNCERTAINTY CALCULATIONS

	Value			Standard uncertainty		
Measured Quantities	**Symbol**	**Run 1**		**Symbol**	**Units**	**Run 1**
Sampled Volume (STP)	V_m	0.01		uV_m	m^3	0.0003
Leak	L	0.00		uL	%	-
Laboratory Result	L_r	10.0		uL_r	%	-

	Uncertainty as a Percentage		
Measured Quantities	**Units**	**Run 1**	**Requirement of Standard**
Sampled Volume (STP)	%	2.00	≤2%
Leak	%	0.00	≤5%
Laboratory Result	%	10.0	No Requirement

	Uncertainty in Measurement Units			Sensitivity Coefficient
Measured Quantities	**Symbol**	**Units**	**Run 1**	**Run 1**
Sampled Volume (STP)	V_m	m^3	0.013	3.26
Leak	L	mg/m^3	0.000	1.00
Laboratory Result	L_r	mg/m^3	0.004	1.00

	Uncertainty in Result	
Measured Quantities	**Units**	**Run 1**
Sampled Volume (STP)	mg/m^3	0.001
Leak	mg/m^3	0.000
Laboratory Result	mg/m^3	0.004

	Oxygen Correction Part of MU Budget	
Measured Quantities	**Units**	**Run 1**
O_2 Correction Factor	-	N/A
Stack Gas O_2 Content	% v/v	N/A
MU for O_2 Correction	-	N/A
Overall MU For O_2 Measurement	%	N/A

Parameter	**Units**	**Run 1**
Combined uncertainty	mg/m^3	0.004
Expanded uncertainty (95% confidence), without Oxygen Correction	mg/m^3	0.008
Expanded uncertainty (95% confidence), with Oxygen Correction	mg/m^3	N/A
Expanded uncertainty (95% confidence), estimated with Method Deviations	mg/m^3	0.008
Reported Uncertainty	mg/m^3	0.008
Expanded uncertainty (95% confidence), without Oxygen Correction	%	20.0
Expanded uncertainty (95% confidence), with Oxygen Correction	%	N/A
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	20.0
Reported Uncertainty	%	20.0

NOTE: Uncertainties reported in mg/m^3 are based upon the summation of all Speciated VOCs Measured.

APPENDIX 2

SPECIATED VOC SCREEN : RESULTS SUMMARY

Gwynedd Council, Llwyn Isaf Landfill

Raw Landfill Gas

Sample Runs

Parameter	Units	Run 1	Mean
Total Chlorinated Com	mg/m³	0.86	0.86
Total Fluorinated Compounds	mg/m³	0.86	0.86
Total Organosulphur Compounds	mg/m³	0.35	0.35
Total Chlorinated Compounds as Cl	mg/m³	1.04	1.04
Total Chlorinated Compounds as F	mg/m³	0.35	0.35
Total Organosulphur Compounds as S	mg/m³	0.35	0.35
Total Volatile Organic Compounds	mg/m³	337	337

General Sampling Information

Parameter	Value	
Standard	CEN/TS 13649	
Technical Procedure	CAT-TP-16	
Name of Analytical Laboratory	LUC	
Analytical Laboratory's Procedure	Not listed	
ISO 17025 Accredited Analysis?	See Executive Summary	
Date of Sample Analysis	27/10/2020	
Probe Material	Stainless Steel	
Sample Tube Type	ATD	
Dynamic Dilution Employed	No	
Number of Sampling Lines Used	1 / 1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1 / 1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

Reference Conditions

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

APPENDIX 2

SPECIATED VOC SCREEN : SAMPLING DETAILS

RUN 1

Parameter	Units	Value
Sampling Times	-	Gas bags taken at 12:01, 12:02 & 12:03 in lieu of tubes samples
Sampling Dates	-	23/09/2020
Sampling Device	-	MV
Duration	mins	1
N_2 to Stack Gas Dilution Ratio	: 1	0
Volume Sampled (REF)	m^3	1.0000

Where: MV stands for Mass View (Mass Flow Controller Technology)

Parameter	Lab Result (Front) µg	Lab Result (Back) µg	Lab Result (Total) µg	LOD (Front) µg	LOD (Back) µg	LOD (Total) µg	Concentration mg/m³	Reported Concentration (Blank Reviewed) mg/m³	Reported LOD mg/m³	Adsorption Efficiency %
Total Chlorinated Compounds	559	296	855	100	100	200	0.86	0.86	0.20	65.4
Total Fluorinated Compounds	756	< 100	856	100	100	200	0.86	0.86	0.20	100.0
Total Organosulphur Compounds	250	< 100	350	100	100	200	0.35	0.35	0.20	100.0
Total Chlorinated Compounds as Cl	795	247	1042	100	100	200	1.04	1.04	0.20	76.3
Total Chlorinated Compounds as F	251	< 100	351	100	100	200	0.35	0.35	0.20	100.0
Total Organosulphur Compounds as S	250	< 100	350	100	100	200	0.35	0.35	0.20	100.0
Total Volatile Organic Compounds	300720	35990	336710	100	100	200	337	337	0.20	89.3

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

SPECIATED VOC SCREEN : SAMPLING DETAILS

BLANK 1

Parameter	Units	Value
Sampling Dates	-	23/09/2020
Sampling Device	-	MV
Average Volume Sampled (REF)	m^3	1.0000

Where: MV stands for Mass View (Mass Flow Controller Technology)

Parameter	Lab Result (Front) µg	Lab Result (Back) µg	Lab Result (Total) µg	Concentration mg/m^3
Total Chlorinated Compounds	< 100	< 100	200	< 0.20
Total Fluorinated Compounds	< 100	< 100	200	< 0.20
Total Organosulphur Compounds	< 100	< 100	200	< 0.20
Total Chlorinated Compounds as Cl	< 100	< 100	200	< 0.20
Total Chlorinated Compounds as F	< 100	< 100	200	< 0.20
Total Organosulphur Compounds as S	< 100	< 100	200	< 0.20
Total Volatile Organic Compounds	< 100	< 100	200	< 0.20

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

SPECIATED VOC SCREEN : QUALITY ASSURANCE

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Sample Runs

Leak Test Results	Units	Run 1
Mean Sampling Rate	l/min	1000
Pre-Sampling Leak Rate	l/min	0.00
Post-Sampling Leak Rate	l/min	0.00
Allowable Leak Rate	l/min	50.0
Leak Test Acceptable	-	Yes

Adsorption Efficiency	Units	Run 1
Total Chlorinated Compounds	%	65.4
Total Fluorinated Compounds	%	100.0
Total Organosulphur Compounds	%	100.0
Total Chlorinated Compounds as Cl	%	76.3
Total Chlorinated Compounds as F	%	100.0
Total Organosulphur Compounds as S	%	100.0
Total Volatile Organic Compounds	%	89.3
Allowable Adsorption Efficiency	%	95.0
Adsorption Efficiency Acceptable	-	No

Temperature at Sample Tubes	Units	Run 1
Temperature	°C	20
Allowable Temperature	°C	40
Temperature Acceptable	-	Yes

Test Conditions	Units	Run 1
Ambient Temperature Recorded?	-	No

SPECIATED VOC SCREEN : QUALITY ASSURANCE

(PAGE 2 OF 2)

Blank Runs

Leak Test Results	Units	Blank 1
Expected Sampling Rate	l/min	0.20
Sampling Leak Rate	l/min	0.00
Allowable Leak Rate	l/min	0.01
Leak Test Acceptable	-	Yes

Validity of Blank vs ELV	Units	Blank 1	Allowed
Allowable for Total Chlorinated Compou	mg/m³	0.20	N/A
Allowable for Total Fluorinated Compou	mg/m³	0.20	N/A
Allowable for Total Organosulphur Comp	mg/m³	0.20	N/A
Allowable for Total Chlorinated Compou	mg/m³	0.20	N/A
Allowable for Total Chlorinated Compou	mg/m³	0.20	N/A
Allowable for Total Organosulphur Comp	mg/m³	0.20	N/A
Allowable for Total Volatile Organic Com	mg/m³	0.20	N/A

Method Deviations

Nature of Deviation (x = deviation applies to the associated run)	Run Number 1	
There are no deviations associated with the sampling employed.	x	

SPECIATED VOC SCREEN : MEASUREMENT UNCERTAINTY CALCULATIONS

	Value		Standard uncertainty		
Measured Quantities	**Symbol**	**Run 1**	**Symbol**	**Units**	**Run 1**
Sampled Volume (STP)	V_m	1.00	uV_m	m^3	0.02
Leak	L	0.00	uL	%	-
Laboratory Result	L_r	10.0	uL_r	%	-

	Uncertainty as a Percentage		
Measured Quantities	**Units**	**Run 1**	**Requirement of Standard**
Sampled Volume (STP)	%	2.00	≤2%
Leak	%	0.00	≤5%
Laboratory Result	%	10.0	No Requirement

	Uncertainty in Measurement Units			Sensitivity Coefficient
Measured Quantities	**Symbol**	**Units**	**Run 1**	**Run 1**
Sampled Volume (STP)	V_m	m^3	1.00	341
Leak	L	mg/m^3	0.00	1.00
Laboratory Result	L_r	mg/m^3	34.1	1.00

	Uncertainty in Result	
Measured Quantities	**Units**	**Run 1**
Sampled Volume (STP)	mg/m^3	6.81
Leak	mg/m^3	0.00
Laboratory Result	mg/m^3	34.1

	Oxygen Correction Part of MU Budget	
Measured Quantities	**Units**	**Run 1**
O_2 Correction Factor	-	N/A
Stack Gas O_2 Content	% v/v	N/A
MU for O_2 Correction	-	N/A
Overall MU For O_2 Measurement	%	N/A

Parameter	**Units**	**Run 1**
Combined uncertainty	mg/m^3	34.7
Expanded uncertainty (95% confidence), without Oxygen Correction	mg/m^3	68.1
Expanded uncertainty (95% confidence), with Oxygen Correction	mg/m^3	N/A
Expanded uncertainty (95% confidence), estimated with Method Deviations	mg/m^3	68.1
Reported Uncertainty	mg/m^3	68.1
Expanded uncertainty (95% confidence), without Oxygen Correction	%	20.0
Expanded uncertainty (95% confidence), with Oxygen Correction	%	N/A
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	20.0
Reported Uncertainty	%	20.0

NOTE: Uncertainties reported in mg/m^3 are based upon the summation of all Speciated VOCs Measured.

APPENDIX 2

SPECIATED VOC SCREEN : RESULTS SUMMARY

Gwynedd Council, Llwyn Isaf Landfill

Raw Landfill Gas

Sample Runs

Parameter	Units	Run 1	Mean
Dichloromethane	mg/m³	0.63	0.63
1,1,1-Trichloroethane	mg/m³	< 0.30	< 0.30
Trichloroethylene	mg/m³	< 0.13	< 0.13
Tetrachloroethylene	mg/m³	< 0.17	< 0.17
1,1-Dichloroethane	mg/m³	< 0.14	< 0.14
1,2-Dichloroethylene	mg/m³	< 0.17	< 0.17
Vinyl Chloride	mg/m³	< 0.24	< 0.24
1,1-Dichloroethylene	mg/m³	< 0.15	< 0.15
1,2-Dichloroethane	mg/m³	0.08	0.08
Chloroethane	mg/m³	0.17	0.17
Carbon Tetrachloride	mg/m³	< 0.07	< 0.07
Carbon Disulphide	mg/m³	< 0.36	< 0.36
Dimethylsulphide	mg/m³	< 0.16	< 0.16
Dimethyldisulphide	mg/m³	< 0.03	< 0.03
Ethane Thiol	mg/m³	< 0.60	< 0.60
Methane Thiol	mg/m³	< 2.00	< 2.00
Trimethylbenzenes	mg/m³	1.48	1.48
1,3-Butadiene	mg/m³	< 1.57	< 1.57
1-Pentene	mg/m³	0.60	0.60
Furan	mg/m³	< 0.16	< 0.16
Benzene	mg/m³	0.80	0.80
1-Propanethiol	mg/m³	< 0.21	< 0.21
1-Butanethiol	mg/m³	< 0.10	< 0.10
Toluene	mg/m³	2.68	2.68
Ethyl Butyrate	mg/m³	< 0.10	< 0.10
Xylenes	mg/m³	2.54	2.54
2-Butoxy Ethanol	mg/m³	< 0.16	< 0.16
Styrene	mg/m³	< 0.26	< 0.26
Butyric Acid	mg/m³	< 2.00	< 2.00
1,1,2,2-Tetrachloroethane	mg/m³	< 1.31	< 1.31

General Sampling Information

Parameter	Value	
Standard	CEN/TS 13649	
Technical Procedure	CAT-TP-16	
Name of Analytical Laboratory	LUC	
Analytical Laboratory's Procedure	Not listed	
ISO 17025 Accredited Analysis?	See Executive Summary	
Date of Sample Analysis	27/10/2020	
Probe Material	Stainless Steel	
Sample Tube Type	ATD	
Dynamic Dilution Employed	No	
Number of Sampling Lines Used	1 / 1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1 / 1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

Reference Conditions

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

APPENDIX 2

SPECIATED VOC SCREEN : SAMPLING DETAILS

RUN 1

Parameter	Units	Value
Sampling Times	-	Gas bags taken at 12:01, 12:02 & 12:03 in lieu of tubes samples
Sampling Dates	-	23/09/2020
Sampling Device	-	MV
Duration	mins	1
N_2 to Stack Gas Dilution Ratio	: 1	0
Volume Sampled (REF)	m^3	1.0000

Where: MV stands for Mass View (Mass Flow Controller Technology)

Parameter	Lab Result (Front) µg	Lab Result (Back) µg	Lab Result (Total) µg	LOD (Front) µg	LOD (Back) µg	LOD (Total) µg	Concentration mg/m³	Reported Concentration (Blank Reviewed) mg/m³	Reported LOD mg/m³	Adsorption Efficiency %
Dichloromethane	334.0	296.0	630.0	149.0	149.0	298.0	0.63	0.63	0.30	53.0
1,1,1-Trichloroethane	< 149.0	< 149.0	298.0	149.0	149.0	298.0	< 0.30	< 0.30	0.30	100.0
Trichloroethylene	< 63.0	< 63.0	126.0	63.0	63.0	126.0	< 0.13	< 0.13	0.13	100.0
Tetrachloroethylene	< 86.0	< 86.0	172.0	86.0	86.0	172.0	< 0.17	< 0.17	0.17	100.0
1,1-Dichloroethane	< 71.0	< 71.0	142.0	71.0	71.0	142.0	< 0.14	< 0.14	0.14	100.0
1,2-Dichloroethylene	< 84.0	< 84.0	168.0	84.0	84.0	168.0	< 0.17	< 0.17	0.17	100.0
Vinyl Chloride	< 120.0	< 120.0	240.0	120.0	120.0	240.0	< 0.24	< 0.24	0.24	100.0
1,1-Dichloroethylene	< 73.0	< 73.0	146.0	73.0	73.0	146.0	< 0.15	< 0.15	0.15	100.0
1,2-Dichloroethane	63.0	< 16.0	79.0	16.0	16.0	32.0	0.08	0.08	0.03	100.0
Chloroethane	111.0	< 55.0	166.0	55.0	55.0	110.0	0.17	0.17	0.11	100.0
Carbon Tetrachloride	< 37.0	< 37.0	74.0	37.0	37.0	74.0	< 0.07	< 0.07	0.07	100.0
Carbon Disulphide	< 180.0	< 180.0	360.0	180.0	180.0	360.0	< 0.36	< 0.36	0.36	100.0
Dimethylsulphide	< 81.0	< 81.0	162.0	81.0	81.0	162.0	< 0.16	< 0.16	0.16	100.0
Dimethyldisulphide	< 13.0	< 13.0	26.0	13.0	13.0	26.0	< 0.03	< 0.03	0.03	100.0
Ethane Thiol	< 300.0	< 300.0	600.0	300.0	300.0	600.0	< 0.60	< 0.60	0.60	100.0
Methane Thiol	< 1000.0	< 1000.0	2000.0	1000.0	1000.0	2000.0	< 2.00	< 2.00	2.00	100.0
Trimethylbenzenes	828.0	< 653.0	1481.0	653.0	653.0	1306.0	1.48	1.48	1.31	100.0
1,3-Butadiene	< 784.0	< 784.0	1568.0	784.0	784.0	1568.0	< 1.57	< 1.57	1.57	100.0
1-Pentene	469.0	< 131.0	600.0	131.0	131.0	262.0	0.60	0.60	0.26	100.0
Furan	< 78.0	< 78.0	156.0	78.0	78.0	156.0	< 0.16	< 0.16	0.16	100.0
Benzene	750.0	53.0	803.0	50.0	50.0	100.0	0.80	0.80	0.10	93.4
1-Propanethiol	< 104.0	< 104.0	208.0	104.0	104.0	208.0	< 0.21	< 0.21	0.21	100.0
1-Butanethiol	< 52.0	< 52.0	104.0	52.0	52.0	104.0	< 0.10	< 0.10	0.10	100.0
Toluene	2632.0	< 52.0	2684.0	52.0	52.0	104.0	2.68	2.68	0.10	100.0
Ethyl Butyrate	< 52.0	< 52.0	104.0	52.0	52.0	104.0	< 0.10	< 0.10	0.10	100.0
Xylenes	2485.0	< 52.0	2537.0	52.0	52.0	104.0	2.54	2.54	0.10	100.0
2-Butoxy Ethanol	< 78.0	< 78.0	156.0	78.0	78.0	156.0	< 0.16	< 0.16	0.16	100.0
Styrene	< 131.0	< 131.0	262.0	131.0	131.0	262.0	< 0.26	< 0.26	0.26	100.0
Butyric Acid	< 1000.0	< 1000.0	2000.0	1000.0	1000.0	2000.0	< 2.00	< 2.00	2.00	100.0
1,1,2,2-Tetrachloroethane	< 653.0	< 653.0	1306.0	653.0	653.0	1306.0	< 1.31	< 1.31	1.31	100.0

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

SPECIATED VOC SCREEN : SAMPLING DETAILS

BLANK 1

Parameter	Units	Value
Sampling Dates	-	23/09/2020
Sampling Device	-	MV
Average Volume Sampled (REF)	m^3	1.0000

Where: MV stands for Mass View (Mass Flow Controller Technology)

Parameter	Lab Result (Front) µg	Lab Result (Back) µg	Lab Result (Total) µg	Concentration mg/m^3
Dichloromethane	< 149.0	< 149.0	298.0	< 0.30
1,1,1-Trichloroethane	< 149.0	< 149.0	298.0	< 0.30
Trichloroethylene	< 63.0	< 63.0	126.0	< 0.13
Tetrachloroethylene	< 86.0	< 86.0	172.0	< 0.17
1,1-Dichloroethane	< 71.0	< 71.0	142.0	< 0.14
1,2-Dichloroethylene	< 84.0	< 84.0	168.0	< 0.17
Vinyl Chloride	< 120.0	< 120.0	240.0	< 0.24
1,1-Dichloroethylene	< 73.0	< 73.0	146.0	< 0.15
1,2-Dichloroethane	< 16.0	< 16.0	32.0	< 0.03
Chloroethane	< 55.0	< 55.0	110.0	< 0.11
Carbon Tetrachloride	< 37.0	< 37.0	74.0	< 0.07
Carbon Disulphide	< 180.0	< 180.0	360.0	< 0.36
Dimethylsulphide	< 81.0	< 81.0	162.0	< 0.16
Dimethyldisulphide	< 13.0	< 13.0	26.0	< 0.03
Ethane Thiol	< 300.0	< 300.0	600.0	< 0.60
Methane Thiol	< 1000.0	< 1000.0	2000.0	< 2.00
Trimethylbenzenes	< 653.0	< 653.0	1306.0	< 1.31
1,3-Butadiene	< 784.0	< 784.0	1568.0	< 1.57
1-Pentene	< 131.0	< 131.0	262.0	< 0.26
Furan	< 78.0	< 78.0	156.0	< 0.16
Benzene	< 50.0	< 50.0	100.0	< 0.10
1-Propanethiol	< 104.0	< 104.0	208.0	< 0.21
1-Butanethiol	< 52.0	< 52.0	104.0	< 0.10
Toluene	< 52.0	< 52.0	104.0	< 0.10
Ethyl Butyrate	< 52.0	< 52.0	104.0	< 0.10
Xylenes	< 52.0	< 52.0	104.0	< 0.10
2-Butoxy Ethanol	< 78.0	< 78.0	156.0	< 0.16
Styrene	< 131.0	< 131.0	262.0	< 0.26
Butyric Acid	< 1000.0	< 1000.0	2000.0	< 2.00
1,1,2,2-Tetrachloroethane	< 653.0	< 653.0	1306.0	< 1.31

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

SPECIATED VOC SCREEN : QUALITY ASSURANCE

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Sample Runs

Leak Test Results	Units	Run 1
Mean Sampling Rate	l/min	1000
Pre-Sampling Leak Rate	l/min	0.00
Post-Sampling Leak Rate	l/min	0.00
Allowable Leak Rate	l/min	50.0
Leak Test Acceptable	-	Yes

Adsorption Efficiency	Units	Run 1
Dichloromethane	%	53.0
1,1,1-Trichloroethane	%	100.0
Trichloroethylene	%	100.0
Tetrachloroethylene	%	100.0
1,1-Dichloroethane	%	100.0
1,2-Dichloroethylene	%	100.0
Vinyl Chloride	%	100.0
1,1-Dichloroethylene	%	100.0
1,2-Dichloroethane	%	100.0
Chloroethane	%	100.0
Carbon Tetrachloride	%	100.0
Carbon Disulphide	%	100.0
Dimethylsulphide	%	100.0
Dimethyldisulphide	%	100.0
Ethane Thiol	%	100.0
Methane Thiol	%	100.0
Trimethylbenzenes	%	100.0
1,3-Butadiene	%	100.0
1-Pentene	%	100.0
Furan	%	100.0
Benzene	%	93.4
1-Propanethiol	%	100.0
1-Butanethiol	%	100.0
Toluene	%	100.0
Ethyl Butyrate	%	100.0
Xylenes	%	100.0
2-Butoxy Ethanol	%	100.0
Styrene	%	100.0
Butyric Acid	%	100.0
1,1,2,2-Tetrachloroethane	%	100.0
Allowable Adsorption Efficiency	%	95.0
Adsorption Efficiency Acceptable	-	No

Temperature at Sample Tubes	Units	Run 1
Temperature	°C	20
Allowable Temperature	°C	40
Temperature Acceptable	-	Yes

Test Conditions	Units	Run 1
Ambient Temperature Recorded?	-	No

SPECIATED VOC SCREEN : QUALITY ASSURANCE

Blank Runs

Leak Test Results	Units	Blank 1
Expected Sampling Rate	l/min	0.20
Sampling Leak Rate	l/min	0.00
Allowable Leak Rate	l/min	0.01
Leak Test Acceptable	-	Yes

Validity of Blank vs ELV	Units	Blank 1	Allowed
Allowable for Dichloromethane	mg/m³	0.30	N/A
Allowable for 1,1,1-Trichloroethane	mg/m³	0.30	N/A
Allowable for Trichloroethylene	mg/m³	0.13	N/A
Allowable for Tetrachloroethylene	mg/m³	0.17	N/A
Allowable for 1,1-Dichloroethane	mg/m³	0.14	N/A
Allowable for 1,2-Dichloroethylene	mg/m³	0.17	N/A
Allowable for Vinyl Chloride	mg/m³	0.24	N/A
Allowable for 1,1-Dichloroethylene	mg/m³	0.15	N/A
Allowable for 1,2-Dichloroethane	mg/m³	0.03	N/A
Allowable for Chloroethane	mg/m³	0.11	N/A
Allowable for Carbon Tetrachloride	mg/m³	0.07	N/A
Allowable for Carbon Disulphide	mg/m³	0.36	N/A
Allowable for Dimethylsulphide	mg/m³	0.16	N/A
Allowable for Dimethyldisulphide	mg/m³	0.03	N/A
Allowable for Ethane Thiol	mg/m³	0.60	N/A
Allowable for Methane Thiol	mg/m³	2.00	N/A
Allowable for Trimethylbenzenes	mg/m³	1.31	N/A
Allowable for 1,3-Butadiene	mg/m³	1.57	N/A
Allowable for 1-Pentene	mg/m³	0.26	N/A
Allowable for Furan	mg/m³	0.16	N/A
Allowable for Benzene	mg/m³	0.10	N/A
Allowable for 1-Propanethiol	mg/m³	0.21	N/A
Allowable for 1-Butanethiol	mg/m³	0.10	N/A
Allowable for Toluene	mg/m³	0.10	N/A
Allowable for Ethyl Butyrate	mg/m³	0.10	N/A
Allowable for Xylenes	mg/m³	0.10	N/A
Allowable for 2-Butoxy Ethanol	mg/m³	0.16	N/A
Allowable for Styrene	mg/m³	0.26	N/A
Allowable for Butyric Acid	mg/m³	2.00	N/A
Allowable for 1,1,2,2-Tetrachloroethane	mg/m³	1.31	N/A
Allowable for TOTAL	mg/m³	12.7	N/A

Method Deviations

Nature of Deviation (x = deviation applies to the associated run)	Run Number 1	
There are no deviations associated with the sampling employed.	x	

SPECIATED VOC SCREEN : MEASUREMENT UNCERTAINTY CALCULATIONS

	Value		Standard uncertainty		
Measured Quantities	**Symbol**	**Run 1**	**Symbol**	**Units**	**Run 1**
Sampled Volume (STP)	V_m	1.00	uV_m	m^3	0.02
Leak	L	0.00	uL	%	-
Laboratory Result	L_r	10.0	uL_r	%	-

	Uncertainty as a Percentage		
Measured Quantities	**Units**	**Run 1**	**Requirement of Standard**
Sampled Volume (STP)	%	2.00	≤2%
Leak	%	0.00	≤5%
Laboratory Result	%	10.0	No Requirement

	Uncertainty in Measurement Units			Sensitivity Coefficient
Measured Quantities	**Symbol**	**Units**	**Run 1**	**Run 1**
Sampled Volume (STP)	V_m	m^3	1.00	19.4
Leak	L	mg/m^3	0.00	1.00
Laboratory Result	L_r	mg/m^3	1.94	1.00

	Uncertainty in Result	
Measured Quantities	**Units**	**Run 1**
Sampled Volume (STP)	mg/m^3	0.39
Leak	mg/m^3	0.00
Laboratory Result	mg/m^3	1.94

	Oxygen Correction Part of MU Budget	
Measured Quantities	**Units**	**Run 1**
O_2 Correction Factor	-	N/A
Stack Gas O_2 Content	% v/v	N/A
MU for O_2 Correction	-	N/A
Overall MU For O_2 Measurement	%	N/A

Parameter	**Units**	**Run 1**
Combined uncertainty	mg/m^3	1.97
Expanded uncertainty (95% confidence)	mg/m^3	3.87
Expanded uncertainty (95% confidence), with Oxygen Correction	mg/m^3	N/A
Expanded uncertainty (95% confidence), estimated with Method Deviations	mg/m^3	3.87
Reported Uncertainty	mg/m^3	3.87
Expanded uncertainty (95% confidence)	%	20.0
Expanded uncertainty (95% confidence), with Oxygen Correction	%	N/A
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	20.0
Reported Uncertainty	%	20.0

NOTE: Uncertainties reported in mg/m^3 are based upon the summation of all Speciated VOCs Measured.

Version Number	Record of changes made within this version of the document
V1	The original document issued to the client

APPENDIX 7 –

Laboratory Analysis Certificate References (2020)

Month	ALS Report number		
January (14th)	1822681		
February (17th)	1838050		
March (9th)	1847546		
April	No sampling undertaken – disruption due to Covid-19		
May			
June (10th & 18th)	1879768	1883705	
July (29th)	1904286		
August (18th)	1912727	1912733	1912735
September (7th & 14th)	1921750	1924617	
October (12th)	1937244	1937247	
November (10th & 17th)	1949935	1953353	
December (8TH)	1963816	1963826	

APPENDIX 8 –

Schedule 6 notifications 2020

Francis Susan Jane (PAB)

From: Francis Susan Jane (PAB)
Sent: 23 February 2021 15:29
To: Francis Susan Jane (PAB)
Subject: FW: Llwyn Isaf - schedule 6 part A and B
Attachments: Llwyn Isaf June 2020 schedule 6 Part A and B.doc

From: Roberts, Anthony <Anthony.Roberts@cyfoethnaturiolcymru.gov.uk>
Sent: 23 October 2020 08:09
To: Francis Susan Jane (PAB) <susanjanefrancis@gwynedd.llyw.cymru>; North Wales PPC <north.wales.ppc@cyfoethnaturiolcymru.gov.uk>; Bradford, Julie <Julie.Bradford@cyfoethnaturiolcymru.gov.uk>
Cc: Baldwin Rhian Haf (PAB) <rhianhafbaldwin@gwynedd.llyw.cymru>; Edwards Steven (PAB) <stevenedwards@gwynedd.llyw.cymru>
Subject: Re: Llwyn Isaf - schedule 6 part A and B

Good Morning Sue,

Thanks you for the Schedule 6.

The breach in June in GW M36 had no significant consequences and the follow up sample was below the limit of detection. On this issue I intend to take no further action as there was no impact.

I would iterate that it is vital that schedule 6 reports are submitted to NRW within the time limits specified in the permit. Failing to do so may result in a technical breach and a CCS score in the future.

Best wishes

Tony

Tony Roberts
Cyfoeth Naturiol Cymru / Natural Resources Wales
Senior Officer/Landfill-Landfill Gas Technical Specialist
Waste and Industry Regulation Team, Maes Y Fynnon,
Bangor. LL57 2DW
Ffôn/Tel: 03000 653752
Ffôn symudol / Mobile: 07468 742602

E-Bost/E-mail

Anthony.Roberts@naturalresourceswales.gov.uk

From: Francis Susan Jane (PAB) <susanjanefrancis@gwynedd.llyw.cymru>
Sent: 22 October 2020 15:19
To: North Wales PPC <north.wales.ppc@cyfoethnaturiolcymru.gov.uk>
Cc: Roberts, Anthony <Anthony.Roberts@cyfoethnaturiolcymru.gov.uk>; Baldwin Rhian Haf (PAB) <rhianhafbaldwin@gwynedd.llyw.cymru>; Edwards Steven (PAB) <stevenedwards@gwynedd.llyw.cymru>
Subject: Llwyn Isaf - schedule 6 part A and B

Good afternoon,

Please find attached schedule 6 part A and B notification for permit :-

YP3138UJ, Llwyn Isaf Landfill Site.

A breach of the NH4 level in groundwater borehole M36 occurred in a sample collected at the site in June 2020.
A further sample taken in October 2020, was found to be below the trigger level.
Please accept my apologies for not having issued the Part A separately when the results became available.

Regards
Sue

Susan Francis
Assistant Engineer/Peiriannydd Cynorthwyol
Tel : 01286 679508

Schedule 6 – Notification

This page outlines the information that the operator must provide.

Units of measurement in the information supplied under Part A and B requirements shall be appropriate to the circumstances of the emission. Where appropriate, a comparison should be made of actual emissions and authorised emission limits.

If any information is considered commercially confidential, it should be separated from non-confidential information, supplied on a separate sheet and accompanied by an application for commercial confidentiality under the provisions of the PPC Regulations.

Part A

Permit number	YP3138UJ
Name of operator	Gwynedd Council
Location of installation	Llwyn Isaf Landfill, Gwynedd Council, Clynnog Fawr,
	Gwynedd, LL54 5DF
Time and date of detection	Results received off the lab on 10/07/20 & 20/10/20

(a) Notification requirements for any malfunction, breakdown or failure of equipment or technique, accident, or fugitive emission which has caused, is causing or may cause significant pollution
To be notified within 24 hours of detection

Date and Time of the event	
Reference or description of the location of the event	
Description of where any release into the environment took place	
Substance(s) potentially released	
Best estimate of the quality or rate of release of substances	
Measures taken, or intended to be taken, to stop any emission	
Description of the failure or accident.	

(b) Notification requirements for the breach of limit		
To be notified within 24 hours of detection unless otherwise specified below		
Emission point reference/source	M36	
Parameter(s)	NH4	
Limit	0.49 mg/l	
Measured value and uncertainty	1.42 mg/l	<0.41 mg/l
Date and time of monitoring	18/06/20	20/10/20
Measures taken, or intended to be taken, to stop the emission		

Time periods for notification following detection of a breach of a limit	
Parameter	**Notification period**

(c) Notification requirements for the detection of any significant adverse environmental effect	
To be notified within 24 hours of detection	
Description of where the effect on the environment was detected	
Substance(s) detected	
Concentrations of substances detected	
Date of monitoring/sampling	

Part B to be supplied as soon as practicable

Any more accurate information on the matters for notification under Part A	
Measures taken, or intended to be taken, to prevent a recurrence of the incident	
Measures taken, or intended to be taken, to rectify, limit or prevent any pollution of the environment which has been or may be caused by the emission	Following the breach in June at groundwater location M36. A repeat sample was carried out in October. The October sample NH4 results were below the detection level at <0.41mg/l; below the 0.49mg/l NH4 trigger level. No further action.
The dates of any unauthorised emissions from the installation in the proceeding 24 months	

Name *	Susan Francis
Post	Assistant Engineer
Signature	
Date	22/10/20

* authorised to sign on behalf of Gwynedd Council