CAULMERT LIMITED

Engineering, Environmental & Planning
Consultancy Services

Brookhill Landfill Site

Flintshire County Council Waste Management Services

Surface Emissions Monitoring Survey

August 2020

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APPROVAL RECORD

Site: **Brookhill Landfill Site**

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DISCLAIMER

BROOKHILL LANDFILL SITE
SURFACE EMISSIONS MONITORING REPORT

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1.0 INTRODUCTION

1.0.1 Caulmert Ltd was appointed by Flintshire County Council Waste Management Services (Flintshire CC) to carry out a surface emissions monitoring survey, comprising a Flame Ionisation Detector (FID) walkover at Brookhill Landfill Site in Buckley, Flintshire.

1.0.2 The survey was undertaken on the 11th of August 2020 and covered the entirety of the site, as shown in the drawing in Appendix 1.

1.0.3 This report presents the findings of the survey and recommends remediation where required.

2.0 METHODOLOGY

2.0.1 The survey was undertaken in accordance with Environment Agency Technical Guidance Note LFTGN07 'Guidance on monitoring landfill gas surface emissions' 2010.

2.0.2 An FID walkover survey was carried out across the permanently-capped Site following a 50 m square grid. Where methane was detected, the line was altered slightly to locate the source. The sampling probe was kept within the recommended 5 cm of the cap surface.

2.0.3 Landfill infrastructure features were assessed on an individual basis, including:

- gas wells and monitoring points;
- junctions in gas collection pipework;
- pathways where pipework may be buried in trenches; and
- leachate sumps, towers risers and other monitoring points.

2.0.4 A Crowcon Gas-Tec FID was used for the walkover survey. A calibration certificate for the unit is enclosed in Appendix 4.

2.0.5 Flux box monitoring was undertaken across all Cells in 2017 and since no change to the capping has been made in the interim, did not require monitoring in 2020. As stated in LFTGN07 and the environmental permit, when an area has demonstrated that it is within compliance of the emission standards via a flux box survey, monitoring by a walkover survey alone in the following 4 years is sufficient to verify its continued compliance unless there is a change to the cap. If the cap is altered during this period, a new flux box survey will be required to confirm the effectiveness of the changes.

3.0 RESULTS

3.0.1 Brookhill Landfill is permanently capped with established vegetation and has landfill gas and leachate extraction infrastructure. Solar panel installations are situated across the top and southern facing flank of the landfill, shown on the Drawing in Appendix 1.

3.0.2 An FID walkover survey was undertaken on the 11th of August. The gas extraction engine and flare were not operational during the walkover survey. As such, this monitoring was carried out under a worst case scenario where no landfill gas extraction was taking place.

3.0.3 Weather conditions on the 11th of August were sunny, with clear skies and a light north easterly breeze. No persistent or heavy rain was experienced prior to the monitoring period and the ground conditions remained dry during the visit. On site observations were made to monitor changes in temperature, wind speed and precipitation to ensure monitoring was conducted in suitable conditions.

3.0.4 Table 3.1 below details the highest concentration Point Source Emissions (PSEs) detected during the FID walkover survey with references for the corresponding Photographic Log (Appendix 3). In total, 40 PSE's were detected, details of which are included in Appendix 2. The location of each PSE is displayed on drawing 4403-CAU-XX-XX-DR-V-18001 in Appendix 1.

Table 3.1: Summary of highest concentration PSEs

PSE	ID/Location	Methane Concentration (ppm)	Source of Emission	Photo No.
1	R6	>10,000	tefen valve	
2	R6B	>10,000	well head, top plate	
7	GV47	>10,000	base of well	
9	GV45	>10,000	base of well	
10	GV03	>10,000	inside chamber	
14	GV44	>10,000	base of well	
15	GV07	>10,000	well head, top plate	
18	LC1B	>10,000	well head, top plate & fittings (500 ppm from flexi-pipe in ground near well base)	
21	LC1	>10,000	well head, top plate & fittings	
22	GV10	>10,000	base of gas connection line from new LW1	2
23	manifold	>10,000	monitoring tap for LC1B connection at manifold	
24	LC3	>10,000	inside chamber	
25	GV28	>10,000	base of well	
26	GV37	>10,000	base of well	
28	LC4	>10,000	well head, top plate	
29	R4B	>10,000	tefen valve	
30	LC4B	>10,000	well head top plate, fittings and flexible boot (dry rotted & cracked)	3
32	GV46	>10,000	well head; LC extraction top fittings	4
34	LC2B	>10,000	well head top fittings	
38	LC5	>10,000	well head top fittings	
40	GV33	>10,000	inside chamber	

3.0.5 The highest methane emissions detected were at the maximum limit of the FID (10,000 ppm) at 21 locations. Most of these maximum concentrations were detected at leachate and gas extraction wells, with the majority identified as perished seals on extraction line connections or well cap plates. Five of these maximum concentrations, however, were detected at the

base of the wells. Four other lower concentration PSEs were detected at the bases of specific wells.

3.0.6 Two discreet features were identified at LC6 which were resulting in PSEs; the fittings were a source of relatively low concentrations (1000 ppm) while the clay around the well recorded a concentration of 5000 ppm. This higher concentration was potentially from the buried gas line, which may have been damaged by heavy machinery during the recent installation of nearby LW6.

3.0.7 Two different sources of emissions were also noted at LC1B. The well head top plate and fittings recorded a high concentration above the maximum limit of detection, however, open flexi pipes buried to the side of the well also recorded a low concentration of 500 ppm. This was potentially due to accumulation from the high concentration PSE at the well head.

3.0.8 The concentrations detected at several of the gas extraction wells were ambient inside the concrete chambers and a specific fault could not be identified.

3.0.9 All of the detected emissions were from marked leachate or gas extraction wells, with no emissions detected from surface locations. No vegetation die-back was observed on the site.

4.0 RECOMMENDATIONS

4.0.1 The surface emissions survey was carried out under a worst case scenario, while there was no landfill gas extraction. As such, minor faults in the gas and leachate extraction system were detected that might not have produced point source emissions under normal operating conditions. The 21 locations where PSEs were detected at the upper limit of detection (Table 3.1) should be addressed as a priority.

4.0.2 It is recommended that the well headworks be serviced at all PSEs identified at specific wells, or within the chambers these wells are housed in. Fixtures such as pump connections, monitoring points, clamps, valves and the main head works seal should be serviced to improve the seal on these wells.

4.0.3 As identified in the previous review, the rubber well head boot on LC4B was noted to be dry rotting and has now cracked. The flexible boots at R5 and LC6B are similarly dry rotting and should be replaced.

4.0.4 Dense vegetation prevented access to GV04, GV08, GV11 and GV42 during this visit. It is recommended that access to these is improved and all seals and fittings serviced to reduce the likelihood of point source emissions at these locations.

4.0.5 Overall, a significant increase in point source emissions were detected during this survey (40) than during the previous surface emissions monitoring survey in 2019, where 5 emissions were recorded. This is largely due to the lack of extraction during the monitoring exercise.

4.0.6 Following remediation of the point source emissions outlined above, and under normal operating conditions with the GEX plant being operational, it is considered that the surveyed areas of the site are compliant with the emission standards in LFTGN07.

Appendix 1

NOTES

1. DO NOT SCALE FROM THIS DRAWING, WORK FROM FIGURED DIMENSIONS ONLY. ALL DIMENSIONS ARE IN MILLIMETRES AND ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS NOTED OTHERWISE.

2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALIST DRAWINGS AND SPECIFICATIONS.

LEGEND

- LC5 — LEACHATE WELL
- GV31 — GAS VENT SWITCHED ON
- SOLAR PANEL
- POINT SOURCE EMISSION

P01	ISSUED FOR INFORMATION	AAR	SO	SO	27.08.20
REV	MODIFICATIONS	BY	RE	AP	DATE

PURPOSE OF ISSUE: INFORMATION — STATUS: S3

CLIENT:

PROJECT: BROOKHILL LANDFILL

TITLE: BROOKHILL SUFRACE EMISSIONS MONITORING 2020

DESIGNED BY	DRAWN BY	REVIEWED BY	AUTHORISED BY
SO	AAR	SO	SO
DATE	SCALE @ A1	JOB REF:	REVISION
27.08.20	1:500	4403	P01

DRAWING NUMBER: 4403-CAU-XX-XX-DR-V-1801

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Appendix 2

Table 1: Point Source Emissions' Details

PSE	ID/Location	Methane Concentration (ppm)	Source of Emission
1	R6	>10,000	tefen valve
2	R6B	>10,000	well head, top plate
3	LC6	5,000	clay outside chamber 5,000 ppm, fittings 1,000 ppm
4	GV22	1,000	inside chamber
5	GV23	1,000	inside chamber
6	GV24	5,000	inside chamber
7	GV47	>10,000	base of well
8	GV01	1,000	inside chamber
9	GV45	>10,000	base of well
10	GV03	>10,000	inside chamber
11	R1B	1,000	top fittings
12	R1	200	inside chamber
13	GV06	500	inside chamber
14	GV44	>10,000	base of well
15	GV07	>10,000	well head, top plate
16	GV43	1,000	base of well
17	LC2R	1,000	well head control valve
18	LC1B	>10,000	well head, top plate & fittings (500 ppm from flexi-pipe in ground near well base)
19	GV09	5,000	inside chamber
20	LW1	1,000	well head, top plate
21	LC1	>10,000	well head, top plate & fittings
22	GV10	>10,000	base of gas connection line from new LW1
23	manifold	>10,000	monitoring tap for LC1B connection at manifold
24	LC3	>10,000	inside chamber
25	GV28	>10,000	base of well
26	GV37	>10,000	base of well
27	GV19	5,000	base of well
28	LC4	>10,000	well head, top plate
29	R4B	>10,000	tefen valve
30	LC4B	>10,000	well head top plate, fittings and flexible boot (dry rotted & cracked)
31	R3	5,000	well head top fittings
32	GV46	>10,000	well head; LC extraction top fittings
33	GV41	1,000	base of well
34	LC2B	>10,000	well head top fittings
35	R2B	5,000	well head top plate and boot
36	R5	500	well head boot
37	GV31	5000	inside chamber
38	LC5	>10,000	well head top fittings
39	LC6B	1,000	well head boot
40	GV33	>10,000	inside chamber

Appendix 3

PHOTOGRAPHIC LOG

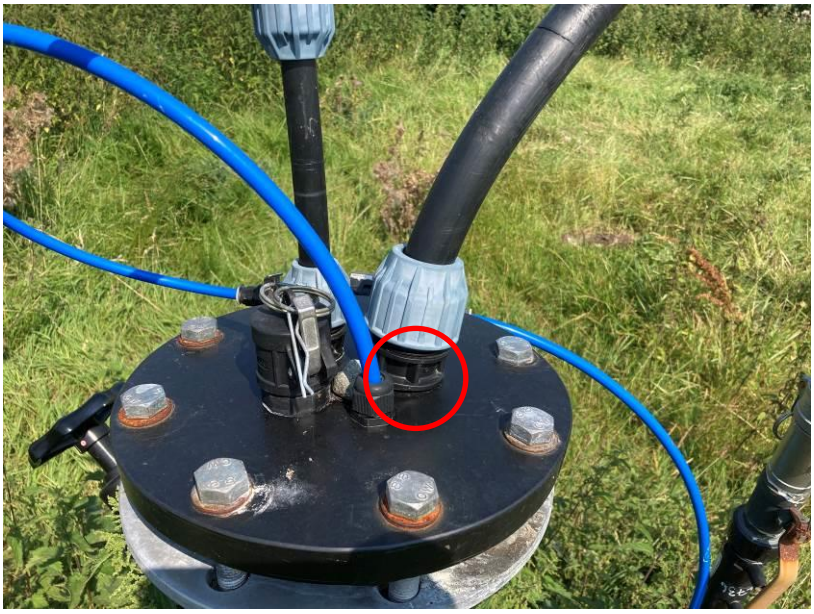
Plate No.	PSE No	ID	Comments
1	3	LC6	PSE from top fittings and at ground level, outside chamber
2	22	GV10	Gas line connection from LW1
3	30	LC4B	Well head flexi boot, top plate & fittings
4	32	GV46	LC extraction fitting cross threaded

Photo 1

Photo 2

Photo 3

Photo 4



Appendix 4

Calibration Certificate

Issued by	**Environmental monitoring**	**Certificate number**	4001
Customer	stock	**Calibration date**	19/Aug/2019
Instrument	**Gastec MKiv**	**Calibrated by**	**AT**

Serial no	41085	**Ambient temp**	24
Service done	19th Aug 2019	**Ambient pressure**	1015mBar
Service interval	One year	**Calibration due**	19th Aug 2020
Job number	n/a	**Linearity check**	n/a
Logger	n/a	**Battery**	Pass
Filter	New pass	**Overall result**	Pass

Test Method
The instrument was calibrated by applying a know concentration of gas at a set flow rate.
The results are recorded on this sheet **after** adjustment and a constant reading is obtained

Test reference	Cert tracability	Instrument reading	pass/fail
Methane 200ppm Balance air	**618167**	**200ppm**	**pass**

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