



PWLLFAWATKIN LANDFILL SITE

VARIATION NOTICE NUMBER: YP3333MK
PERMIT NUMBER: BU8819IV

PWLLFAWATKIN ANNUAL MONITORING REPORT

1ST JANUARY 2022 – 31ST DECEMBER 2022

February 2023



Author	Approval	Subject	Date	Status
Surjit Duley	Martin Greaves	Pwllfawatkin Annual Monitoring Report 2022	February 2023	

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Pwllfawatkin Landfill Site

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Annual Report of Monitoring 2022

1. Introduction

This annual report is submitted in accordance with Condition 4.2.1 of Permit BU8819IV and covers the period January 2022 to December 2022 inclusive. All monitoring data has been separately reported to the Agency on a quarterly basis and so only selected data is repeated in this report. This report concentrates on those aspects of the monitoring that have been given exceedance levels by the Agency and/or are indicators of landfill impact. It does not attempt to review all the quantitative monitoring that has been carried out but instead attempts to assess whether or not the landfill is having an impact and whether the monitoring results are as anticipated and comply with trigger levels set in the PPC permit.

2. Landfill Gas

2.1. Perimeter Gas

There was one methane limit exceedance during 2022. This breach occurred in August at GP16 where a methane concentration of 4.7% was recorded (permitted limit 1.0%). This breach seems to have been a localised and temporary issue and is now resolved, co-incidentally this breach occurred in 2021 at the same borehole in August. Several boreholes have recorded Carbon Dioxide concentrations above the limit of 1.5%. There is a permit variation submitted with an ICoP to adjust the CO₂ limits set out in the permit. The table below shows the proposed carbon dioxide action levels. Based on the proposed action levels there were 3 exceedances for carbon dioxide.

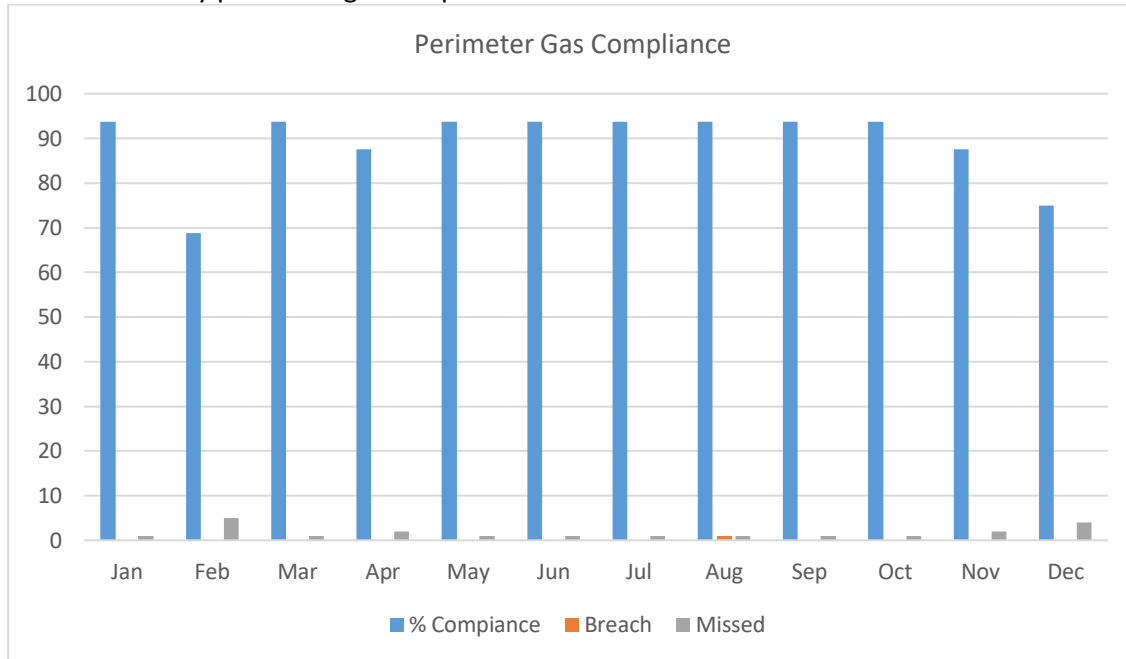
Table 2 - Proposed Carbon Dioxide (CO₂) Action Levels (%v/v)

BH IDs	Current compliance limit	Proposed CO ₂ Action Level (%v/v)
BH20	1.5	2.3
GBH A	1.5	1.5
GBH B	1.5	3.3
GBH C	1.5	1.5
GBH D	1.5	5.5
GBH E	1.5	4.5
GP16	8.1	13.7
GP17	1.5	4.5
GP18	1.5	2.4
GP19	1.5	1.5
GP20	1.5	1.5
GP21	1.5	1.5
GP22	1.5	2.0
GP23	1.5	1.5
GP24	1.5	2.5
GP25	1.5	2.1

Monitoring points that were missed during monthly monitoring are summarised below (table 1.) with details as to why these points were missed.

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Chart 1: Monthly perimeter gas compliance.



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Table 1. Perimeter gas compliance summary.

	% Compliance	Breach	Missed	Comment/Reason for being missed
Jan	93.8		1	GBHA - flooded
Feb	68.8		5	GBHA - flooded GBHD- no safe access GBHE- no safe access GP23- no safe access GP24- no safe access
Mar	93.8		1	GBHA - flooded
Apr	87.5		2	GBHA – flooded, GB00HE- no safe access
May	93.8		1	GBHA - flooded
Jun	93.8		1	GBHA - flooded
Jul	93.8		1	GBHA - flooded
Aug	93.8	1	1	GBHA – flooded, GP16 - methane breach.
Sep	93.8		1	GBHA - flooded
Oct	93.8		1	GBHA - flooded
Nov	87.5		2	GBHA – flooded, GP25- access flooded
Dec	75		4	GBHA – flooded GP17- Gas flow failed - GA drew water from the sample point. GP18- Gas flow failed - Water present in well. GP19- Gas flow failed - water was drawn out of well.

2.2. FID Walkover Survey

An annual FID walkover was carried out in July 2022.

In total, 4 points of gas emission were detected, as in the table below, the exceedances were all from the base of infrastructure. Weekly meetings are held to address issues of odour and rectification measures

Zone	Reference	HC Concentration in ppm	Comments
Z1	L00B1	5,000	Bentonite at base of well
Z1	PWLMW2A	10,000	Between base of well and geomembrane boot
Z1	W1310	5,000	Base of well
Z1	W1406	2,000	Bentonite at base of well

None of the other readings exceeded the elevated hydrocarbon threshold of >100 ppm for a feature, and >1000 ppm for an infrastructure/installation. Therefore, the reported results from the survey were favourable.

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2.3. In-Waste Gas Wells

Landfill gas is controlled by an active gas extraction system, which creates an inward pressure gradient across the landfill to minimise potential off-site migration. This is achieved by the installation of appropriately spaced gas wells across the landfill. These are connected to the extraction plant located in the Waste to Energy Compound.

Gas wells are monitored on a monthly basis, in line with Table S4.7 of the Permit. There are no exceedance levels associated with these wells.

2.4. Flare and Engine Emissions

Monitoring of emissions to air from the flare and engines are scheduled on an annual basis in accordance with Table S4.7 of the Permit. Engine and flare emissions monitoring were carried out in March 2022. The engine emissions were compliant with the permit limits for NO_x, CO and TVOC

3. Leachate

3.1. Leachate Quality

There are currently no exceedance levels set for leachate quality.

Leachate is sampled on a 6 monthly basis (June/December) and the last leachate quality data was submitted to the Environment Agency, sampled during quarter 4.

3.2. Leachate Levels

Leachate level data is recorded as per Condition 3.6.1 (Tables S4.1 and S4.8) of the Permit and the results are summarised in Table 2 and Chart 2b.

The leachate levels have remained relatively stable during the year except for cells 3 and 4 in phase two. There has been a collapse and silt build up identified by a camera survey in December in wells LMW4NB (collapsed at 24m down) and LMW3SB (silty mud at 26m down). These two wells have adversely affected the compliance for phase two cells 4 and 3, excluding this effect, on average, per cell, the leachate levels remained below the permitted breach limits, and it is envisaged that this compliance will remain in place going forward, with desilting of LMW3SB and redrill of LMW4NB when access allows.

Numerous works have been done on the leachate system as a whole, including the replacing of pumps, valves, slam shuts, as associated infrastructure.

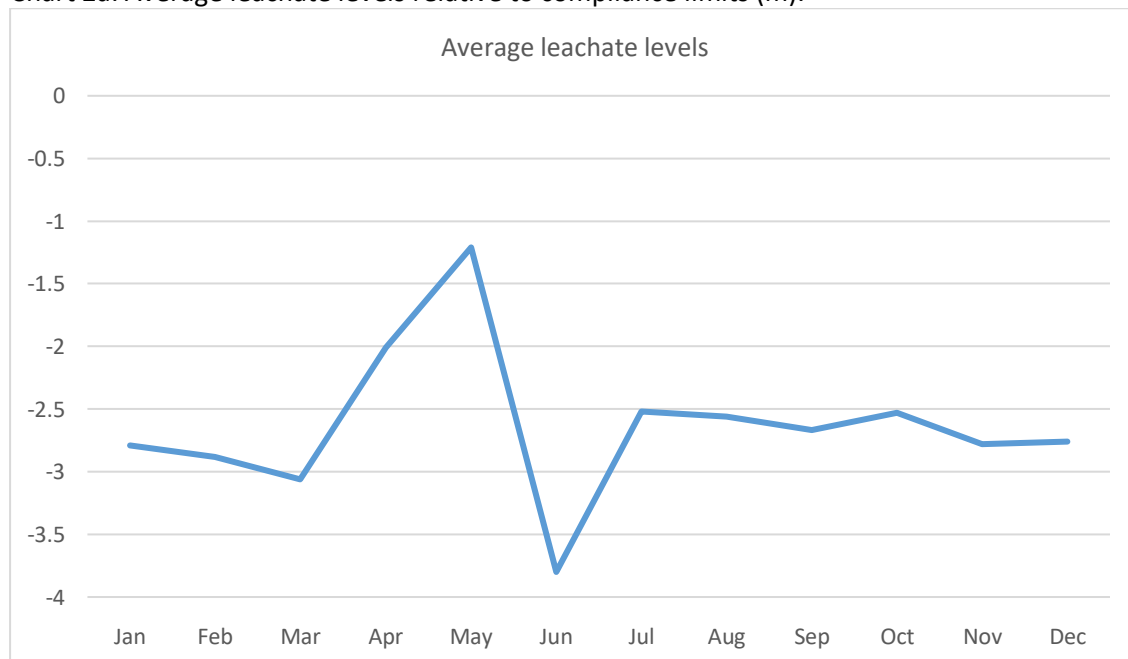
Chart 2a depicts the average leachate levels for the entire site relative to compliance limits in metres. whereby, Chart 2c depicts the average leachate levels by cell relative to compliance limits in metres.

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Table 2: Average leachate compliance levels relative to cell (m).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Phase 1 Cell 1C	-6.13	-5.99	-5.77	-6.14	-6.12	-6.16	-6.19	-6.26	-5.69	-6.25	-6.22	-6.20
Phase 1 Cell 2A	-4.41	-2.27	-1.23	-4.11	-4.50	-5.47	-5.33	-5.34	-5.01	-4.00	-5.32	-5.35
Phase 1 Cell 3A	-8.36	-7.50	-7.31	-7.38	-8.04	-8.58	-8.39	-8.55	-8.49	-8.13	-8.42	-8.24
Phase 2 Cell 1	-0.87	-1.13	-1.00	-1.43	-1.30	-1.32	-1.28	-1.48	-1.49	-1.52	-1.46	-1.46
Phase 2 Cell 2	-3.77	-3.74	-0.57	-1.55	-2.21	-3.55	-0.73	-0.73	-1.96	-2.02	-2.00	-2.02
Phase 2 Cell 3	-1.03	-1.71	-0.16	0.49	3.73	-3.23	-0.08	-0.10	-0.62	-0.34	-0.07	-0.13
Phase 2 Cell 4	2.98	2.19	-5.37	6.03	9.96	1.72	4.37	4.52	4.57	4.57	4.05	4.07
Average	-2.79	-2.88	-3.06	-2.01	-1.21	-3.80	-2.52	-2.56	-2.67	-2.53	-2.78	-2.76

Chart 2a: Average leachate levels relative to compliance limits (m).



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Chart 2b: Average leachate levels per compliance well (mAOD).

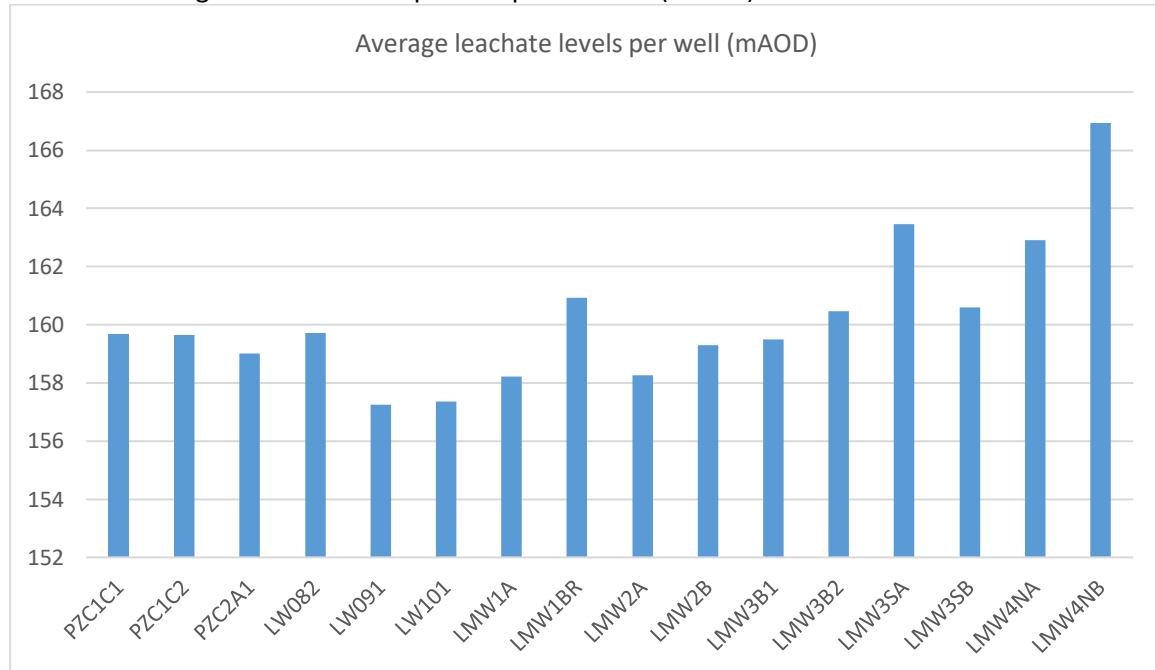
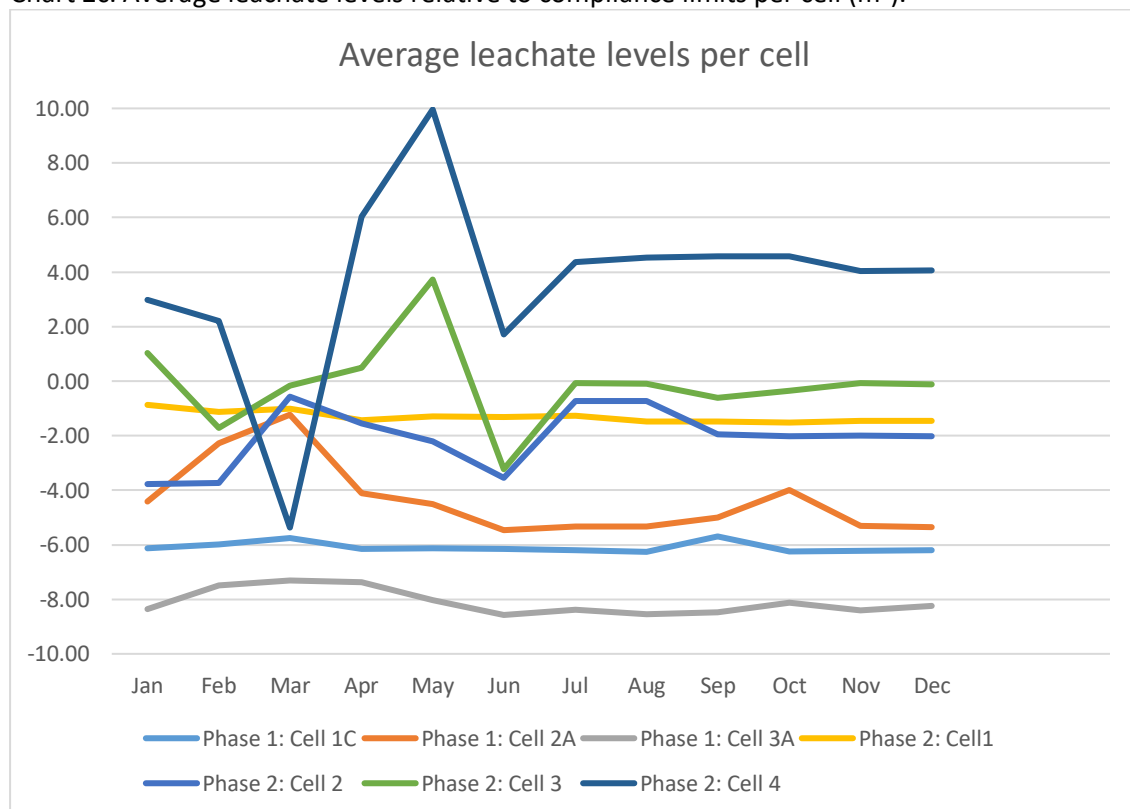


Chart 2c: Average leachate levels relative to compliance limits per cell (m³).



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In order to maintain and improve leachate levels against compliance, FCC tankers leachate to be treated offsite. Around 20,316 m³ of leachate was treated during 2022. Total volumes treated each month are represented in Table 3.

Table 3: Volumes of leachate treated in 2022.

Month	Treated volume (m3)
Jan-22	1,319
Feb-22	2,306
Mar-22	2,089
Apr-22	2,017
May-22	1,892
Jun-22	1,644
Jul-22	1,352
Aug-22	1,555
Sep-22	1,211
Oct-22	1,357
Nov-22	1,443
Dec-22	2,129
Total	20,316

4. Groundwater

4.1. Groundwater quality

Groundwater is sampled on a quarterly basis and results are reported as per table S4.4 and S4.10.

Groundwater compliance limits are summarised in Table 4, which are relevant to groundwater boreholes monitored on a monthly basis.

Table 5. provides a summary of the groundwater breaches that were present per quarterly monitoring, with comments provided on the limit exceedances. Other parameter limits are to be agreed on in accordance with improvement condition 6.

Table 4: Groundwater compliance limits.

Determinant	Exceedance Level
Ammoniacal Nitrogen	1.0 mg/l (WB10A, WB10B, WB11A, WB11B, WB12A, WB12B, WB18, WB19, WB5A, WB5B, WB16A, WB16B) and 1.5 mg/l (WB17A, WB17B, WB20)
Chloride	250 mg/l (WB10A, WB10B, WB11A, WB11B, WB12A, WB12B, WB18, WB19, WB5A, WB5B, WB16A, WB16B, WB17A, WB17B) and 50 mg/l (WB18, WB19, WB20)

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Table 5: Ground water monitoring breaches per quarter.

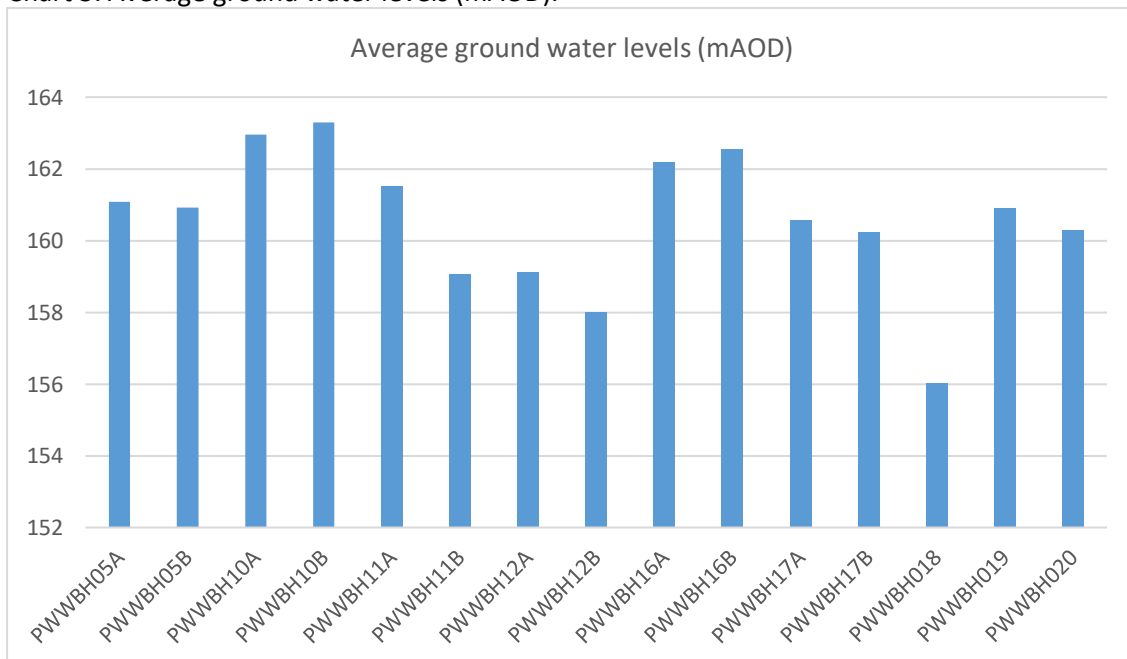
Period	Breaches	Comments
Quarter 1	WB11B, WB17B (Jan) WB11B (Feb) WB11B, WB17B (Mar)	A permit variation has currently been submitted for review that varies the limit for ammoniacal nitrogen.
Quarter 2	WB11B (Apr) WB19 (Apr) WB11B (May) WB11B (Jun)	A permit variation has currently been submitted for review that varies the limit for ammoniacal nitrogen.
Quarter 3	WB11B (Jul) WB11B (Aug) WB11B, WB16B (Sep)	A permit variation has currently been submitted for review that varies the limit for ammoniacal nitrogen.
Quarter 4	WB11B (Oct) WB11B (Nov) WB11B (Dec)	A permit variation has currently been submitted for review that varies the limit for ammoniacal nitrogen.

4.2. Groundwater Levels

Groundwater levels are measured on a quarterly basis at the same time that samples are taken to ensure an adequate purge volume is calculated. Chart 3 depicts the average groundwater levels per monitored borehole.

The groundwater levels have remained constant over the year with no significant fluctuations recorded between monitoring intervals.

Chart 3: Average ground water levels (mAOD).



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5. Surface Waters

The site has four surface water monitoring points, two of which are permitted location for surface water discharge. The monitoring parameters and frequency are undertaken as per Table S4.9 of the permit.

There were no recorded surface water breaches in 2022.

6. Conclusions

After reviewing the monitoring data collected throughout 2022 it is possible to conclude that Pwllfawatkin landfill has had an insignificant impact on the nearby environment. There has been an ICoP submitted as part of a planned permit variation to adjust trigger levels for some of the monitoring requirements, which will undoubtedly increase site performance. The site is therefore deemed as operating within expected limits.

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February 2023



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