

**PWLLFAWATKIN LANDFILL SITE****PPC PERMIT BU88119IV variation no. YP3333MK****PWLLFAWATKIN ANNUAL ENVIRONMENTAL DATA REVIEW****1ST JANUARY 2020 – 31ST DECEMBER 2020****January 2021**

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1.0 Introduction

A variation to the permit BU8819IV was issued on the 28th March 2008. This report has been produced in accordance with the requirements of the variation permit (YP3333MK), Condition 4.2.1a. It includes all the environmental monitoring data gathered between 1st January 2020 and 31st December 2020 at Pwllfawatkin Landfill Site, and reviews the key environmental issues for the site during 2020.

The report includes:

- Landfill Gas Analysis
- Leachate Quality and Levels
- Groundwater Quality
- Surface Water Quality
- Conclusions

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2.0 Landfill Gas

2.1 Perimeter Gas

Landfill gas monitoring was undertaken on a monthly basis from 17 boreholes/probes located around the perimeter of Phases 1 and 2 in accordance with Condition 3.6.1d and Table S4.5 of the variation permit. The results obtained from monitoring of the perimeter gas boreholes are provided in **Appendix A**;

At each of the boreholes the following parameters were monitored along with appropriate weather conditions.

Methane (%v/v by volume)
Carbon Dioxide (%v/v by volume)
Oxygen (%v/v by volume)
Atmospheric Pressure (mb)

Trigger levels were taken from table S4.5 of PPC Permit BU88191IV

With reference to the PPC Permit there is a 1.0%v/v by volume trigger level set for methane concentrations at Pwllfawatkin covering all boreholes. The carbon dioxide trigger level is set at 1.5%v/v for boreholes with the exception of BHGP16 where a revised trigger level of 8.1%v/v was agreed in the revised permit dated 29th March 2011 (BU88191IV/V006)

Overall compliance figures have been calculated for the both carbon dioxide and methane for the whole of the review period and are detailed below:

Carbon Dioxide Compliance	90% v/v
Methane Compliance	99% v/v

Table 1 below provides a summary of the methane gas compliance for each borehole that exceeded the trigger level at Pwllfawatkin during the review period.

Table 1 Methane Gas Summary

Borehole	Compliance %v/v
GP16	92%
GP21	92%

There were only two breaches methane during the review period with 6.7% being recorded in borehole GP16 on the 12/06/20 and 3.7% in GP21 on the 25/03/20. Both these breaches were isolated incidences.

Carbon Dioxide breached the permitted limits in boreholes GPD, E, 16 and 17 with a maximum concentration of 10.7% in GP16 on the 06/10/20.

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2.2 Surface Emissions

A monthly FID survey is carried out along the downwind site boundary with no emissions being detected during the review period.

2.3 In Waste Gas Wells

Gas wells across the site monitored monthly in accordance with table S4.7 of the permit. There are no trigger levels associated with the gas wells, however any readings where oxygen is present above 5% then remedial action is undertaken to return it to lower concentration.

All gas well results are detailed in **Appendix B**.

2.4 Point Source Emissions

Monitoring of the emissions to air from the engines is undertaken on an annual basis in accordance with Table S4.2 of the varied permit. Engine emission monitoring was undertaken during May 2020 with the results forwarded to the Agency.

All levels were within acceptable limits and detailed within the report.

Total gas volumes for 2020 are as follows:

LFG to generation:	4,532,740m ³
LFG to flare:	530,035m ³

The predicted bulk gas generation for 2014 according to the 2014 GRA was 10,950,000m³ with 5,062,775m³ actually being generated in 2020.

The trace gas emission report was submitted in May 2020 with all the parameters falling within acceptable limits.

There were numerous odour complaints (100+) from October 2020 onwards until the end of the review period, complaining of strong odours in all directions of the site and all times of the days, regardless of wind directions. We undertook a joint site visit with NRW who did not substantiate the odours complaints and only identified minor issues to look at.

Capping works have been ongoing along with installation of gas wells and horizontal wells.

We also undertook TDL surveys and had a 3rd monitoring company carry out weekly odour checks. None of these investigations detected the odours that were being complained about.

Since the planning application to extend the life of the site has been rejected the odour complaints have also stopped.

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3.0 Leachate Levels and Quality

Leachate quality monitoring was undertaken on a quarterly basis from leachate wells located in Phases 1 and 2 in accordance with Condition 3.6.1a and Table S4.8 of the variation permit. Leachate quality monitoring from the holding tanks was undertaken quarterly. Leachate levels were recorded fortnightly (Phase 1) (as agreed with EAW) and monthly (Phase 2) in accordance with Condition 3.6.1a and assessed in line with Table S4.1.

3.1 Leachate Levels

Leachate levels in Phase 1 were recorded on a fortnightly basis from six wells LW41, 51, 74, 82, 91 and 101, plus 6 piezo wells known as PZC1C-1, PZC1C-2, PZC2A-1, PZC2A-2, PZC3A-1 and PZC3A-2.

Leachate levels have been tabulated in **Appendix D**.

We had one well in well phase 2 cell 1 (LMW1B) that had become sheared this was redrilled during the review period.

Following issues with elevated sulphide concentrations in the leachate in 2019 which led to restricted tankering and elevated leachate levels, since March All Phase 1 leachate levels recorded a compliant status during 2020.

FCC extraction rates since 2010 are tabulated below. The volume of leachate removed from site during 2019 increased significantly compared to previous years. This was due to excessively wet weather increasing the need to pump, despite the vast majority of the site being capped.

Year	Volume Removed (m3)
2010	23841.53
2011	30268.31
2012	38314.64
2013	41138.35
2014	36316.22
2015	19799.11
2016	27336.89
2017	23204.25
2018	20082.89
2019	27606.75
2020	25127.00

Phase 1 Quality

The leachate quality at Pwllfawatkin indicates that the majority of the samples collected have a BOD to COD ratio of 10:1 or greater indicating that phase 1 is methanogenic. No other issues have been identified with regards to the quality of leachate.

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Phase 2 Quality

The majority of the analysis returned results within the expected range as identified by the HRA in November 2003. No other issues have been identified with regards to the quality of leachate.

4.0 Groundwater Level and Quality

Groundwater levels are taken from 15 boreholes across the site on a monthly basis. A summary of the groundwater level data is detailed in Appendix F.

Generally water levels across the site have remained constant with minor fluctuations being observed due to seasonal variations. The largest fluctuation recorded was in PWWBH016A that of 1.69m, which is in line with historical trends for this borehole.

Groundwater samples were taken from 15 locations on a quarterly basis during the review period.

The groundwater quality remained within permitted concentrations for the majority of the parameters and boreholes with the exception of ammoniacal nitrogen which recorded elevated readings within boreholes BH11B and BH12B.

Borehole BH11B breached the ammoniacal nitrogen trigger of 1mg/l for the majority of the review period with an average concentration of 1.8mg/l. It is thought that these elevated concentrations are due to background influences as a mine adit runs in the close vicinity. A revised trigger level will be presented as part of a permit variation.

Chloride was compliant throughout the whole of the review period with no other parameter exceeding permitted concentrations.

All groundwater quality data is detailed within **Appendix E**.

5.0 Surface Water

Surface water quality monitoring was undertaken on a monthly basis at four locations in accordance with Condition 3.6.1e and Tables S4.3 and S4.9 of the variation permit. During Quarter 3 of 2014 the surface water regime was amended to focus on the discharge point and the point on ingress into the site. The number of sample locations has been reduced from eleven in agreement with NRW.

There are trigger levels set for surface water points WP12 and WP13; suspended solids 40mg/l, pH between 6 and 9 and thirdly no visible oil and grease.

Surface water flow at the site is north to south in the Upper Clydach River that is situated on the eastern boundary. There is the potential for surface water contamination from non-landfill sources such as surface water flows from old mine adits and shallow workings in the hill to the west of the site, and also seepages from colliery spoil on site and from fertilisers and animal waste.

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All locations were within permitted levels for the site with one elevated suspended solid result in WP20 on the 4th November with 141mg/k being recorded. This is assumed to be an erroneous result possibly from incorrect sampling technique.

All surface water results have been tabulated in **Appendix G**

6.0 General Summary and Conclusions

Landfill gas methane concentrations across the site recorded a 99% compliant status for the review period.

Groundwater quality remained compliant for the majority of the review period in the majority of the boreholes, with only BH11B and BH12B exceeding limits.

Leachate levels across the site display a mostly compliant status when compared against leachate trigger levels.

Surface water quality downstream of the site remains good with little or no impact being detected from the landfilling activities.

Pwllfawatkin Landfill is operating to a very high standard of environmental control with little or no impact being detected upon the surrounding environment. The operating methods deployed on site are being effective and with continue on an ongoing basis to maintain the status of the site.

7.0 Recommendations

Based upon the information acquired by the review, highlighted below, are proposals and recommended courses of action that may be appropriate at Pwllfawatkin in the forthcoming review period.

- Continue to maximise leachate removal
- Continual renewal of gas infrastructure and de-watering of gas wells.
- Continued maintenance of infrastructure such as pumps and knock out pots.
- Vary permit to take into account GW quality in the breached boreholes.

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