



Aberthaw Works Quarry Site
Annual Environmental Report
Permit Reference BT1088ID
01 January to 31 December 2023

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1.0 Introduction

1.1 Background

This report has been compiled in compliance with condition 32.1 of the Environmental Permit HB3799FH (WML Number 25 Modification 3). Which requires:

“The Licence Holder shall provide the Agency on an annual basis within one month of the end of the financial year, or such other time as is agreed in writing with the Agency, a report on the environmental performance of the site, which shall include the following information:

- a) an analysis and review of the results of environmental monitoring required under these conditions, with an interpretation of the trend of the results;*
- b) a review of the risk assessment for the site, taking account of the findings under 'a' above;*
- c) where changes to the risk assessment are identified under 'b' above, a review of the risk management systems provided at the site.”*

The review period consists of 12 months of monitoring, from 1 January to 31 December 2023, and is provided within one month of the end of the financial year (31 March).

It is understood that Modification 3 is the only available version of the Permit (by the operator or the Regulator). It is not known whether the site is definitively closed although a Closure Plan was prepared in February 2005 by Merebrook Projects Limited (ref LCR-1879-04-150revA) for the purpose of a closure application. This report has therefore been relied upon for details of groundwater monitoring, as none are included in the Permit.

1.2 Site Location and Surrounding Land-use

Aberthaw Works is located north of the village of East Aberthaw in South Glamorgan and the site lies in the south-western corner of the associated quarry. The site has been licensed as a landfill since 21 April 1978, following its former use as a working quarry and is operating under a current WML, reference number 30016 (25).

There is an historic landfill 350m to the west of the site.

The geological sheet indicates that Aberthaw Works is underlain by interbedded sandstone and shale of the Porthkerry Formation which belongs to the Jurassic age Lower Lias and is indicated to be greater than 120 m in thickness in places.

Drift deposits comprising estuarine alluvium associated with the River Thaw immediately border the main works buildings to the northwest of the quarry and landfill.

The site lies in an area classed by the EA as a Minor Aquifer with soils of high leaching potential (unclassified). However, elsewhere in the region the Lower Lias (marginal facies) is designated as a Major Aquifer.

The site does not lie within an EA designated Groundwater Source Protection Zone (SPZ).

The nearest surface water feature to the site is the River Thaw which lies approximately 750m to the west.

A tidal floodplain is located approximately 1200 m to the west.

2.0 Landfill Gas

2.1 Introduction

Table 25A of the Permit requires the installation of 2/ha in-waste boreholes. Table 25B outlines the monitoring requirements for these boreholes thus:

Table 25B Standards for internal landfill gas monitoring and sampling programme			
Landfill gas monitoring determinands	Monitoring frequencies	Units and accuracy	Trigger levels
Methane	Six monthly, from date of modification	% v/v and to 0.1%	No trigger level –information supporting analyses of methanogenic status of cell or phase
Carbon dioxide	Six monthly, with methane monitoring	% v/v and to 0.1%	No trigger level –information supporting analyses of methanogenic status of cell or phase
Oxygen	Six monthly with methane monitoring	% v/v and to 0.1%	No trigger level –information supporting analyses of methanogenic status of cell or phase
Atmospheric pressure	Six monthly with methane monitoring	mbar to 1mbar, and whether rising or falling	No trigger level –information supporting analyses of methanogenic status of cell or phase

Four in-waste gas monitoring installations were installed termed BH1, BH2, BH3, and BH4. However, BH2 has been lost, and as such could not be monitored in the period. A plan showing the location of monitoring points is presented in Appendix A.

2.2 Landfill Gas Data

Monitoring Results are presented below:

Sample Point	Date	Methane (%Vol)	Carbon Dioxide (%Vol)	Oxygen (%Vol)	Balance (%Vol)	Atm. pressure (mb)	Rel. Pressure (mb)	Flow (lts/hr)	Data Comments
BH1	27/04/2023	0.5	0	20.9	78.6	1011	-0.69	0.9	
BH1	25/10/2023	0.2	0	17.5	82.3	997	0.14	0	
BH2	27/04/2023					1011			Lost, buried by tipping
BH2	25/10/2023					997			Lost, buried by tipping.
BH3	27/04/2023	0.5	0	19.2	80.3	1011	-0.62	0.9	
BH3	25/10/2023	0.2	0	17	82.8	997	0.11	0.1	
BH4	27/04/2023	0.5	0	19.2	80.3	1011	1.84	1	
BH4	25/10/2023	0.2	0	17.6	82.2	997	0.21	0	
	Max	0.5	0	20.9	82.8	1011	1.84	1	
	Min	0.2	0	17	78.6	997	-0.69	0	

Methane concentrations were low with a maximum of 0.5%v/v in the in-waste monitoring boreholes during the review period.

Carbon dioxide concentrations were 0%v/v in all locations on all occasions.

There is not considered to be any significant risk to human health or the environment as a result of landfill gas emissions from the site.

3.0 Groundwater

3.1 Introduction

Condition 26.3 of the Permit states that: *“Groundwater monitoring frequencies and determinands shall be agreed in writing with the Agency following acceptance of investigation and risk assessment required for groundwater protection under the other conditions of this licence.”*

It is not known what was agreed with the regulator with regard to the installation of groundwater monitoring boreholes, or the determinands which need to be monitored. It is standard practice to provide 1 up gradient and 2 down gradient groundwater monitoring locations.

The Closure Plan requires that *“Water samples would be collected and sent to a UKAS accredited laboratory for determination of a standard set of parameters to include metals, chloride, sulphate, dissolved oxygen, total organic carbon and pH.”*

Historically, groundwater monitoring has been carried out at six-monthly intervals at three existing groundwater wells, two of which are hydraulically downstream of the landfill site (MW4 (replacement for GW1 from 2006) and GW2), and a third which is hydraulically upstream (GW3). GW2 has subsequently been buried in a rock fall and should be replaced.

A plan showing the location of monitoring points is presented in Appendix A. Borehole datums are not available, so the hydraulic gradient can not be verified. There are no known compliance limits for groundwater quality.

3.2 Groundwater Quality

Groundwater quality data was collected on a 6-monthly frequency in the study period, and is presented in Appendix B. Only the data for 2023 is available in the Tarmac Database; as such trends in groundwater quality can not be assessed due to insufficient datapoints.

The data shows the following:

- Ammoniacal nitrogen concentrations ranged from 0.02mg/l to a maximum of 2.5mg/l in MW4. This is above the EAL of 0.5mg/l.
- Chloride concentrations were low ranging from 29mg/l at MW4 to a maximum of 97mg/l at GW3 and so were below the 250mg/l EAL.
- Potassium concentrations ranged from 2mg/l to 10mg/l with the maximum at MW4 in October 2023.
- Cadmium concentrations were <0.00002mg/l for the entire study period.
- Nickel concentrations ranged from below detection limits to a maximum of 0.001mg/l.
- Zinc ranged from <0.002mg/l at MW4 in October 2023 to 0.041mg/l at GW3 in April 2023.

Metal concentrations are generally low.

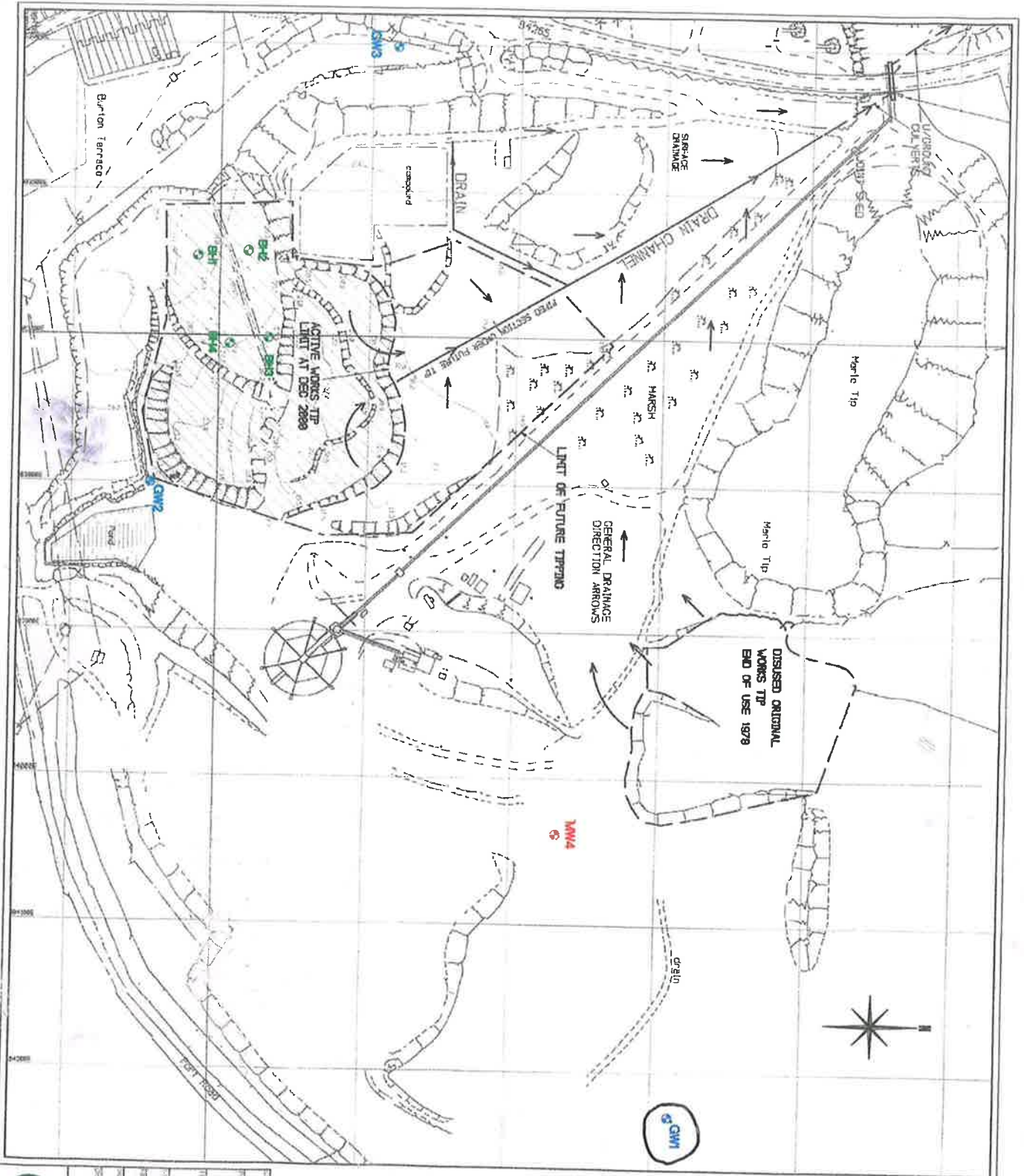
On the basis of the information available, it is not possible to ascertain with any level of confidence if the site is impacting groundwater; in general nitrogen compounds appear to be elevated in the one available downgradient borehole, but the lack of chloride in the groundwater is indicative of a non-landfill source.

4.0 Recommendations

Missing boreholes should be replaced, and all installations surveyed in to allow an assessment of hydraulic gradient. In order to build a dataset to allow permit surrender, an increased frequency (monthly) would be required.

Appendix A

Monitoring Plan



Legend
 BH-GW1 Current boreholes for groundwater monitoring
 BH-GW2 Gas monitoring boreholes
 GW1 Disused boreholes
 MWA New borehole for groundwater monitoring

BH4 intact
 BH1 intact - no plug
 BH2 lost
 BH3 intact
 labelling
 GW3 pierce
 GW2 not present
 Exposed waste?
 Breakout MWA



Lafarge Cement UK Ltd	
Monitoring Report, Aberthaw	
Borehole Location Plan	
ECS	JH HC HC HC 12/08/10
512260	10514740013
A3	As Shown Report Issue
2	

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Appendix B

Groundwater Data

Sample Point	Date	Alkalinity (mg/l)	Ammoniacal Nitrogen (mg/l)	Arsenic (mg/l)	Boron (mg/l)	Cadmium (mg/l)	Calcium (mg/l)	Chloride (mg/l)	Chromium (mg/l)	Copper (mg/l)	Dip to Base (m)	Dip to water (m)	EC (field) (us/cm)	Electrical conductivity (us/cm)	Iron (mg/l)	Lead (mg/l)	Magnesium (mg/l)	Manganese (mg/l)	Mercury (mg/l)	Nickel (mg/l)	Nitrate-N (mg/l)	Nitrite-N (mg/l)	pH (field) (pH units)	pH (liquid) (pH units)	Potassium (mg/l)	Selenium (mg/l)	Sodium (mg/l)	Sulphide (mg/l)	Temperature (Water Field) (Deg C)	Total Oxidised Nitrogen (mg/l)	Water Level (m AOD)	Zinc (mg/l)
MW4	28/04/2023	251	1.3	0.001	0.58	<0.00002	66	29	<0.001	<0.001	6.2	0.97	1703	833	0.15	<0.001	35	0.022	<0.00003	<0.001	<0.2	<0.01	7.9	7.7	6	<0.001	67	0.39	10.8	<0.2		0.008
MW4	26/10/2023	318	2.5	0.001	0.84	<0.00002	93	67	<0.001	<0.001	6.2	1.12	1102	1120	<0.01	<0.001	40	0.064	<0.00003	0.001	<0.2	<0.01	7.3	7.1	10	<0.001	90	2.74	10.7	<0.2		<0.002
GW2	27/04/2023	Lost																														
GW2	25/10/2023	Lost																														
GW3	28/04/2023	296	0.02	<0.001	<0.01	<0.00002	165	74	<0.001	<0.001	20.95	14.38	1280	925	<0.01	<0.001	18	0.003	<0.00003	<0.001	6	<0.01	8.2	7.3	2	<0.001	25	0.09	10.5	6		0.041
GW3	26/10/2023	298	0.7	<0.001	0.04	<0.00002	170	97	<0.001	<0.001	20.95	13.6	773	971	<0.01	<0.001	16	0.024	<0.00003	<0.001	1.3	0.15	8.6	7	2	<0.001	23	0.15	10.8	1.5		0.005
	Max	318	2.5	0.001	0.84	<0.00002	170	97	<0.001	<0.001	20.95	14.38	1703	1120	0.15	<0.001	40	0.064	<0.00003	0.001	6	0.15	8.6	7.7	10	<0.001	90	2.74	10.8	6		0.041
	Min	251	0.02	<0.001	<0.01	<0.00002	66	29	<0.001	<0.001	6.2	0.97	773	833	<0.01	<0.001	16	0.003	<0.00003	<0.001	<0.2	<0.01	7.3	7	2	<0.001	23	0.09	10.5	<0.2		<0.002