



Hendy Quarry Landfill

Annual Report

Permit Reference BT1088ID

01 January 2018 to 31 December 2018

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1.0 Introduction

1.1 Background

This report has been compiled in compliance with condition 4.2.1 of the Environmental Permit EPR/BT1088ID for Hendy Quarry Landfill.

The Permit was originally issued to Tarmac on 17 September 2002. The EP was varied by Tarmac in December 2005 in order to remove a daily limit for the importation of waste. A further variation reference XP3933MR was issued on 22 June 2007 by the Environment Agency to introduce the standard Permit template and conditions for landfills, combine the separate discharge consent into the single permit, introduce trigger levels for groundwater and increase the monitoring frequency.

As a result of changes to the conditions of the new EP, Tarmac submitted an application to vary the Permit further to revise the groundwater trigger levels, and also to increase the annual permitted tonnage from 200,000t to 450,000t. Before the trigger levels could be amended, Tarmac installed a further 8 perimeter monitoring boreholes at the request of the Environment Agency. The monitoring frequency of groundwater at the site was increased to obtain enough data for a detailed review of the hydrogeology to be undertaken. The independent hydrogeological assessment identified contaminants in the groundwater which were arising from an up-stream source. As a result of this contamination in the locality, the site could not comply with groundwater trigger levels, even in up-stream boreholes. This was accepted by the Environment Agency following extensive investigation and sampling and a varied EP establishing revised site trigger levels was issued on 09 October 2009, reference PP3738XM. The permitted annual tonnage was also increased to 450,000t. The varied Permit contained a number of Improvement Conditions which have been discharged.

Section 4.2.1 of the Permit, requires that a report on the performance of the activities over the previous year shall be submitted to the Environment Agency (now Natural Resources Wales) by 31 January (or other date agreed in writing by the Agency).

The report shall include as a minimum:

- a) A review of the monitoring and assessment carried out in accordance with the Permit against the relevant assumptions, parameters and results in the risk assessments submitted with the Application;
- b) Where the operator's management system encompasses annual improvement targets, a summary report of the previous year's progress against such targets;
- c) The energy consumed at the Site, reported in the format set out in Schedule 5 Table S5.3;
- d) The water consumed at the Site, reported in the format set out in Schedule 5 Table S5.3;
- e) The annual production/treatment set out in Schedule 5 Table S5.2;
- f) Details of any contamination or decontamination of the site which has occurred;
- g) The topographical surveys required by condition 3.6.3 other than those submitted as part of a CQA validation report;
- h) The volumetric difference (reported in cubic metres) between the most recent topographical survey and the previous annual topographical survey i.e. the additional volume of the landfill void that is occupied by waste;

- i) An assessment of the settlement behaviour of the landfill body based on the difference between the most recent topographical survey and previous annual topographical survey for the areas of the landfill which did not receive waste between the surveys;
- j) A calculation of the remaining capacity (reported in cubic metres) derived from the pre-settlement contours and the most recent topographical survey;
- k) The compliance testing undertaken in the period.

The review period consists of 12 months of monitoring, from 1 January to 31 December 2018.

1.2 Site Location and Surrounding Land-use

Hendy Quarry Landfill is located at Grid Reference ST 05423 81045.

The site is located to the east of Miskin in Rhondda Cynon Taf, Wales. To the east of the site is the A4119 road. To the south of the site is Glyn Park, which comprises of the Miskin Wood and Mill Wood. The B4264 (School Road) is situated to the north of the site.

2.0 Landfill Gas

2.1 Introduction

Landfill gas (LFG) monitoring was performed quarterly during the review period. Methane, carbon dioxide, oxygen, atmospheric pressure and relative pressure were recorded during the monitoring visits.

HY1/08, HY2/08, HY3/08, HY4/08, HY5/08, HY6/08, HY7/08 and HY8/08 (also referred to as PZ1-08 – PZ8-08) denote perimeter gas monitoring boreholes. HY1/08 is situated north of the landfill, HY2/08 and HY3/08 to the east, HY5/08 and HY6/08 on the southern boundary, while HY7/08 and HY8/08 are located to the west of the site. BH-B, BH-E, BH-H, BH-X and BH-Y are also perimeter monitoring locations.

In-waste gas monitoring boreholes are denoted as BH01 – BH12, and are also monitored quarterly.

Gas monitoring borehole locations are shown on the Monitoring Plan in Appendix A. Landfill gas data is presented in Appendix B.

The following monitoring locations could not be sampled throughout the entire study period, either because of unsafe access or being lost: PZ04/08, BH0E, BH01, BH03, BH04, BH06, BH10, BH11 and BH12.

Further, sample points PZ01/08, BH0Y, BH07, BH08 and BH09 were not able to be monitored on at least one occasion during the study period.

Compliance limits are set for both in-waste and perimeter wells as per Table S4.3 of the Permit; these are reproduced in Table 1.

Table 1: EP Limits for Landfill Gas in external and internal wells

LFG parameter	EP Limit
Methane (CH ₄)	1.0 % v/v
Carbon dioxide (CO ₂)	1.5 % v/v

2.2 Landfill Gas Data

The following general points can be made with regard to the gas data from the gas wells over the review period:

In Waste Boreholes

Zero to negligible methane concentrations were detected in the in-waste monitoring boreholes during the review period.

Carbon dioxide concentrations ranged from zero to a maximum of 1.4% v/v in the in-waste boreholes. There were no exceedances of the EP trigger.

Perimeter Boreholes

Zero to negligible methane was recorded in any of the perimeter monitoring locations during the review period.

Carbon dioxide concentrations ranged from zero to a maximum of 3.2% v/v in BH07/08. There were four further exceedances of the 1.5%v/v EP trigger; however, three of these could be considered to be below trigger when considering the gas analyser uncertainty of $\pm 0.42\%$ v/v.

Groundwater

Four boreholes are specified in Table S4.4 of the Permit as requiring sampling on a quarterly basis these are PZ2/08 and PZ3/08 which are considered to be up gradient locations and PZ07/08 and PZ08/08 which are considered down gradient and as such have quality trigger limits as presented in Table S4.2 of the Permit. These limits have been reviewed in the recent HRA review¹ and the compliance limit for Nickel reduced; limits are presented in Table 1, and groundwater quality during the study period is reviewed on this basis.

Table 2: Groundwater Compliance Limits (PZ07/08 & PZ08/08)

Parameter	Permit Limits	HRA Review Limits
Chloride (mg/l)	150	150
Ammoniacal Nitrogen (mg/l)	0.5	0.5
Cadmium (ug/l)	1	1
Nickel (mg/l)	0.2	0.034
Sulphate (mg/l)	200	200
Napthalene (ug/l)	10	10

The locations of the boreholes are shown on the Monitoring Plan in Appendix A.

Tables of groundwater levels and water quality, in addition to time-series graphs are presented in Appendix C.

2.3 Groundwater Levels

Groundwater levels ranged from 41.73mAOD in PZ01/08 to 66.498mAOD recorded in PZ05/08. Groundwater levels displayed a slight seasonal variation with lower levels during the summer months as would be expected.

¹ 3145-CAU-XX-XX-RP-O-0301: HENDY LANDFILL SITE HYDROGEOLOGICAL RISK ASSESSMENT REVIEW 2017. CAULMERT LTD 12 JANUARY 2018.

2.4 Groundwater Quality

Up-gradient

Up-gradient locations PZ2/08 and PZ3/08 recorded low concentrations of ammoniacal nitrogen with a maximum of 0.23 mg/l recorded at PZ3/08 in April 2018.

Chloride concentrations ranged from 14mg/l to 49mg/l in PZ2/08 and 72mg/l to 100mg/l in PZ3/08.

Sulphate concentrations ranged from 3.7mg/l to 14mg/l in PZ2/08 and 9.8mg/l to 12mg/l in PZ3/08.

Cadmium concentrations were below the laboratory LOD of <0.02ug/l in PZ2/08 on all occasions and ranged from 0.34ug/l to 0.46ug/l in PZ3/08.

Concentrations of other metals were low; nickel concentrations were between <1ug/l and 1ug/l in the up-gradient boreholes.

Lead concentrations ranged from below detection limits in PZ02/08 to 2.8ug/l in PZ03/08.

PAHs were all reported at below the limit of detection with the exception of PZ02/08 during April 2018 and PZ03/08 during January 2018 both recording 0.02ug/l).

Concentrations of total petroleum hydrocarbons (TPH in the range C10 to C40) were recorded, ranging between the laboratory 50 and 140ug/l in the up-gradient locations.

Down gradient

Groundwater monitoring was undertaken quarterly. Down-gradient borehole PZ07/08 was sampled during April 2018, the remaining months were dry or insufficient to sample. Down-gradient borehole PZ08/08 was sampled during November 2018, this borehole has proved difficult to obtain a sample. During 2019 replacement boreholes are planned to be re-drilled at these locations

Ammoniacal nitrogen concentrations in PZ08/08 ranged between 0.06mg/l and 0.36mg/l below the 0.5mg/l trigger level.

Chloride concentrations were low ranging from 40mg/l to 53mg/l and were below the trigger level of 150mg/l.

Sulphate concentrations ranged from 8mg/l to 29mg/l and were below the trigger level of 200mg/l.

Cadmium concentrations ranged from 0.04ug/l to 0.09ug/l and therefore recorded below the trigger level of 1ug/l.

Nickel concentrations were low, both recording 1ug/l; below the trigger level of 34ug/l.

Naphthalene was not detected above the laboratory limit of detection and was below the trigger level of 10ug/l.

Concentrations of metals detected at PZ07/08 and PZ8/08 remained low throughout the review period.

No PAHs were detected in the down gradient groundwater monitoring locations during the review period.

Concentrations of TPH were low and within the down gradient locations with 110ug/l detected at PZ07/08 and 70ug/l at PZ8/08.

3.0 Surface Water

Water samples were collected quarterly from the discharge to determine the quality of point source emissions to soak-away from the site. The discharge is analysed for: pH, suspended solids, and mineral oil. The point at which the surface water collects on site 'Quarry sump' has been included to provide more monitoring data

Results were compared to the limits specified in Table S4.1 of the Permit, and presented in Table 3. The Compliance levels were not breached in the study period with the exception of suspended solids during April 2018; however, with the laboratory uncertainty (38% QC+PT) the concentration potentially records below the trigger.

Table 3: Discharge results and compliance levels

Sample Point	Date	Mineral Oil (mg/l)	pH	Suspended Solids (mg/l)	Data Comments
HEN_Discharge	16-Jan-18	0.19			
HEN_Discharge	12-Feb-18		7.7	88	
HEN_Discharge	12-Apr-18	0.15		140	
HEN_Discharge	12-Jul-18				No discharge
HEN_Discharge	27-Nov-18	0.21	7.6	37	
HEN_Quarry Sump	12-Feb-18		8	<10.0	
HEN_Quarry Sump	12-Jul-18	0.28		29	
HEN_Quarry Sump	04-Oct-18	0.22	8.2	390	
HEN_Quarry Sump	27-Nov-18	0.19	8.3	27	
Compliance Level		5	6-9	100	

4.0 Annual Performance Data

Annual production/treatment at Hendy Quarry Landfill during the period 01 January to December 2018 is reported in accordance with the Permit for the site. Information required by Table S5.2 and 5.3 of the Permit is presented as Table 4 below.

Table 4: Annual Production/Treatment and performance parameters

Surface water and/or groundwater	Cubic metres/year
Disposed of off site:	88,089
Disposed of to any onsite effluent treatment plant:	0
Parameter	Annual total
Total Energy Consumption:	155.916 MWh

5.0 Contamination/Decontamination

No contamination events were reported at the site during 2018.

6.0 Annual Topographical Surveys and Waste Volumes.

6.1 Annual Topographical Survey

The annual topographical survey was completed on 4th June 2018 and is presented in Appendix A, drawing reference H074 HENDY LF 2018-06-04_A1L.

6.2 Annual Waste Volume

The calculated void consumed at the site between the topographical surveys of June 2017 and June 2018 is 53,043m³.

6.3 Settlement Behaviour

No areas of the site are restored.

6.4 Remaining Void Capacity

The calculated remaining void from the survey undertaken in June 2018 is 1,324,448m³ with 71,293m³ created between the survey dates.

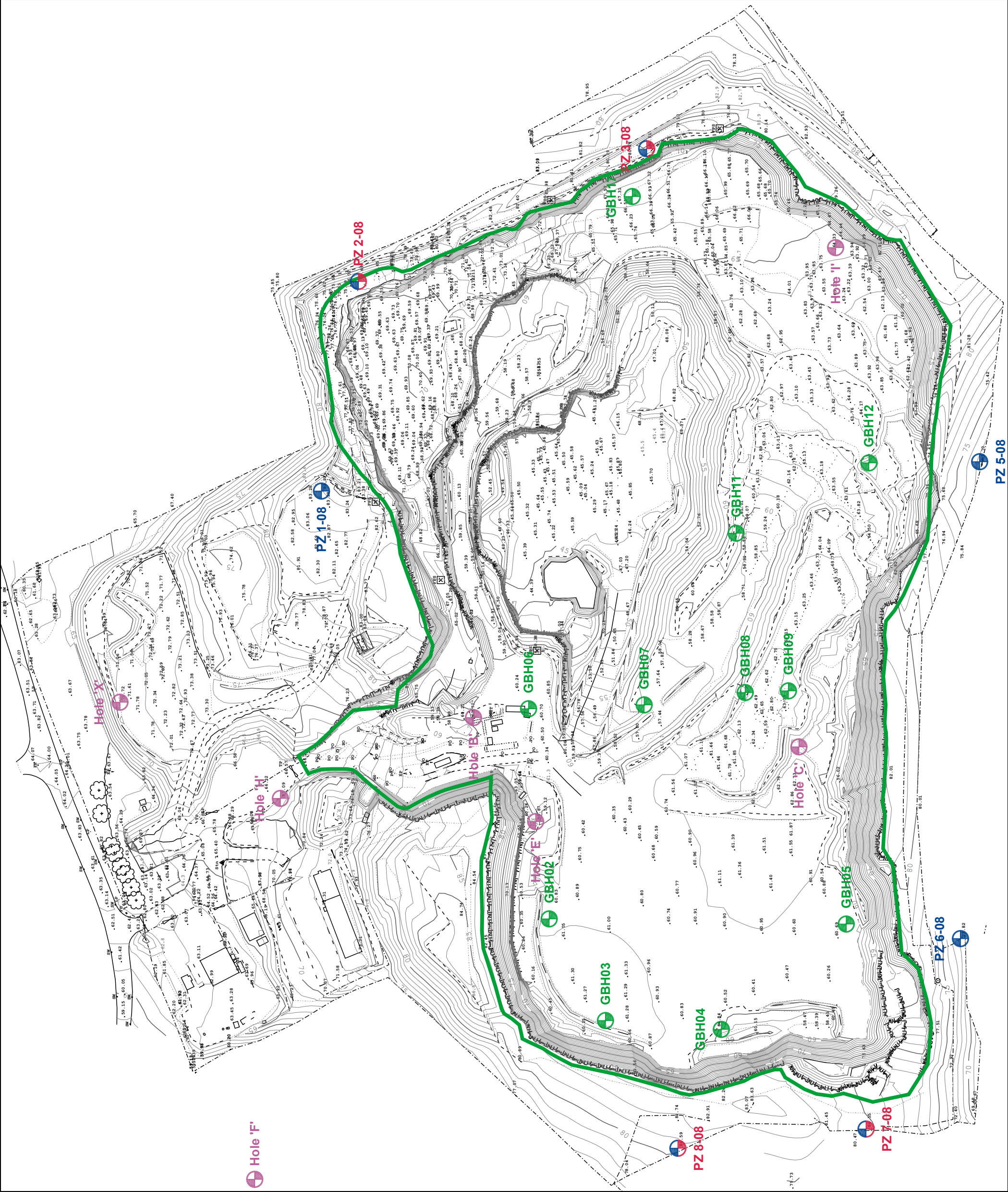
7.0 Compliance Testing

Compliance testing has not been undertaken in the reporting period.

Appendix A

Figure: Monitoring Plan (CE/HNDY/08)

Figure: H074 HENDY LF 2018-06-04_A1L



Legend:



Environmental Permit area



Groundwater monitoring boreholes to be included within the Permit



Internal landfill gas monitoring boreholes



Landfill gas monitoring boreholes external to the body of waste



Existing/former boreholes at the site

Final revision:	Date:	Description:
-	-	-
-	-	-

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Site: **HENDY QUARRY LANDFILL**

Drawing Title:

MONITORING PLAN

Drawn By: PSW	Date: 4th June '09	Scale: 1:2,000	Page Size: A3
Status: FINAL	Final Revision: -	Drawing No: CE/HNDY/08	

Appendix B

Landfill Gas Data

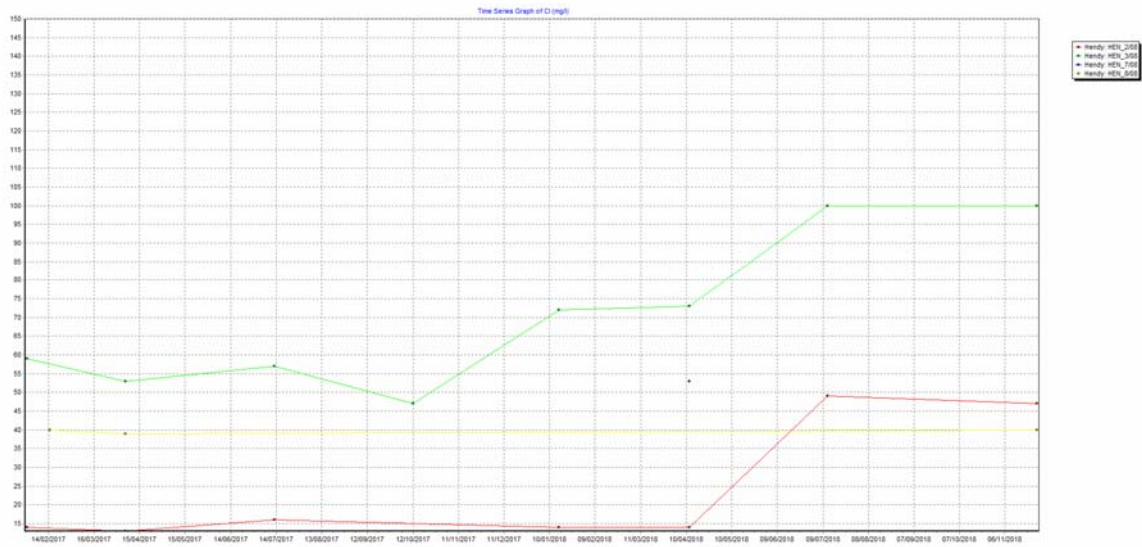
			%Vol CH4	%Vol CO2	%Vol O2	mb Atm Press	mb Rel Pressure
HEN_BH01	16/January 18 00:00	lost					
	12/April 18 00:00	lost					
	12/July 18 00:00	lost					
	04/October 18 00:00	lost					
HEN_BH02	16/January 18 00:00		0	0.1	21	991	-1.09
	12/April 18 00:00		0	0.1	20.6	999	-0.75
	12/July 18 00:00		0.1	1	18.2	1016	0.24
	04/October 18 00:00	Could not access due to site works					
HEN_BH03	16/January 18 00:00	lost					
	12/April 18 00:00	lost					
	12/July 18 00:00	lost					
	04/October 18 00:00	lost					
HEN_BH04	16/January 18 00:00	lost					
	12/April 18 00:00	lost					
	12/July 18 00:00	lost					
	04/October 18 00:00	lost					
HEN_BH05	16/January 18 00:00	open pipe	0	0.1	20.6	991	-1.02
	12/April 18 00:00	open pipe	0	0.2	20	998	-0.87
	12/July 18 00:00	open pipe	0	0.5	19	1014	0.26
	04/October 18 00:00		0	1.4	17.8	1017	-0.03
HEN_BH06	16/January 18 00:00	lost					
	12/April 18 00:00	lost					
	12/July 18 00:00	lost					
	04/October 18 00:00	lost					
HEN_BH07	16/January 18 00:00		0	0.1	21.3	991	-1.18
	12/April 18 00:00		0	0.1	20.8	998	-0.87
	12/July 18 00:00		0	0.1	20.6	1014	0.33
	04/October 18 00:00	Could not access due to site works					
HEN_BH08	16/January 18 00:00	un-safe access					
	12/April 18 00:00	open pipe	0	0.1	20.9	998	-0.85
	12/July 18 00:00	open pipe	0	0.1	20.7	1014	0.17
	04/October 18 00:00	Destroyed					
HEN_BH09	16/January 18 00:00	destroyed					
	12/April 18 00:00	open pipe	0	0.1	21	998	-0.94
	12/July 18 00:00	open pipe - unsafe access					
	04/October 18 00:00	open pipe - unsafe access					
HEN_BH0B	16/January 18 00:00		0	0.2	20.9	992	-1.04
	12/April 18 00:00		0	0.2	20.5	1000	-0.92
	12/July 18 00:00		0	1	13.8	1015	0.19
	04/October 18 00:00	Could not find/ get access					
HEN_BH0E	27/November 18 00:00		0	0.9	17.7	1004	-0.14
	16/January 18 00:00	unsafe access - danger of falling rocks					
	12/April 18 00:00	unsafe access - danger of falling rocks					
	12/July 18 00:00	unsafe access - danger of falling rocks					
HEN_BH0H	04/October 18 00:00	unsafe access - danger of falling rocks					
	27/November 18 00:00	unsafe access - danger of falling rocks					
	16/January 18 00:00		0	0.1	20.9	992	-1.08
	12/April 18 00:00		0	0.1	20.7	997	-0.8
HEN_BH0X	12/July 18 00:00		0	0.1	20.9	1015	0.4
	04/October 18 00:00		0	0.1	20.4	1017	0.02
	27/November 18 00:00		0	0.2	20.9	1004	-0.14
	16/January 18 00:00		0	0.1	20.7	990	-1.13
HEN_BH0Y	12/April 18 00:00		0	0.1	21	997	-0.63
	12/July 18 00:00		0	0.2	20.7	1014	0.17
	04/October 18 00:00	Could not find/ get access					
	27/November 18 00:00		0	0.3	18.5	1004	-0.26
HEN_BH10	16/January 18 00:00		0	0.1	20.8	991	-1.11
	12/April 18 00:00	compound access gate locked					
	12/July 18 00:00	dry / blocked	0	0.1	20.9	1015	0.45
	04/October 18 00:00	compound access gate locked					
HEN_BH11	27/November 18 00:00	dry / blocked	0	1.6	19.7	1003	-0.29
	16/January 18 00:00	lost					
	12/April 18 00:00	lost					
	12/July 18 00:00	lost					
HEN_BH12	04/October 18 00:00	lost					
	16/January 18 00:00	lost					
	12/April 18 00:00	lost					
	12/July 18 00:00	lost					
HEN_PZ01/08	04/October 18 00:00	lost					
	16/January 18 00:00		0	0.6	20.5	989	-1.23
	12/April 18 00:00		0	0.5	20.5	996	-0.84
	12/July 18 00:00		0	0.1	21	1012	0.92
HEN_PZ02/08	04/October 18 00:00		0.1	0.2	20.4	1017	0
	27/November 18 00:00		0	1.7	19.9	1001	-0.33
	16/January 18 00:00		0	0.1	20.9	990	-1.23
	12/April 18 00:00		0	0.1	20.6	998	-0.77
HEN_PZ03/08	12/July 18 00:00		0	0.1	20.7	1013	0.62
	04/October 18 00:00		0	0.1	20.4	1017	-0.12
	27/November 18 00:00		0	0.2	21	1000	-0.34
	16/January 18 00:00		0	0.2	20.5	990	-1.06
HEN_PZ05/08	12/April 18 00:00		0	0.1	20.5	997	-0.72
	12/July 18 00:00		0	0.1	20.9	1012	0.54
	04/October 18 00:00		0	0.1	20.9	1017	-0.15
	27/November 18 00:00		0	0.3	21.1	1001	-0.34
HEN_PZ06/08	16/January 18 00:00		0	0.7	18.9	991	-1.18
	12/April 18 00:00		0	0.7	18.2	998	-0.7
	12/July 18 00:00		0	1	18	1015	0.57
	04/October 18 00:00	Could not locate					
HEN_PZ07/08	27/November 18 00:00		0	1.2	19.5	997	-0.19
	16/January 18 00:00		0	0.9	20	992	-1.25
	12/April 18 00:00		0	1.1	19.3	998	-0.7
	12/July 18 00:00		0	0.7	20.1	1015	0.55
HEN_PZ08/08	04/October 18 00:00	Could not locate					
	27/November 18 00:00		0	1.4	19.7	997	-0.33
	16/January 18 00:00		0	0.6	20.4	990	-1.3
	12/April 18 00:00		0	2.3	17.5	997	-0.79
HEN_PZ08/08	12/July 18 00:00		0	1.8	18.9	1013	0.52
	04/October 18 00:00		0.2	0.6	20.3	1017	0.02
	27/November 18 00:00	dry/blocked at 36.34m	0	3.2	18.7	996	-0.33
	16/January 18 00:00		0	0.3	20.7	990	-1.28
	12/April 18 00:00		0	0.8	19.1	996	-0.92
	12/July 18 00:00		0	0.8	19.9	1014	0.45
	04/October 18 00:00	Could not locate					
	27/November 18 00:00		0	0.8	18.9	997	-0.36
Min			0	0.1	13.8	989	-1.3
Max			0.2	3.2	21.3	1017	0.92
Mean			0.01	0.54	19.99	1002.49	-0.41

Appendix C

Groundwater Data

		Data Comments	m AOD		
			Dip to water	Datum	Groundwater level
HEN_BH0B	16/January 18 00:00		14.9	60.7	45.8
	12/April 18 00:00		15.24	60.7	45.46
	12/July 18 00:00		16.39	60.7	44.31
	04/October 18 00:00	Could not find/ get access		60.7	
	27/November 18 00:00		15.35	60.7	45.35
HEN_BH0H	16/January 18 00:00		21.65	67.08	45.43
	12/April 18 00:00		21.38	67.08	45.7
	12/July 18 00:00		24.16	67.08	42.92
	04/October 18 00:00		23.03	67.08	44.05
	27/November 18 00:00		23.44	67.08	43.64
HEN_BH0X	16/January 18 00:00		24.96	71.71	46.75
	12/April 18 00:00		24.5	71.71	47.21
	12/July 18 00:00		27.69	71.71	44.02
	04/October 18 00:00	Could not find/ get access			
	27/November 18 00:00		27.72	71.71	43.99
HEN_BH0Y	16/January 18 00:00		8.93		
	12/April 18 00:00	compound access gate locked			
	12/July 18 00:00	dry and partially blocked at @ 9.00m			
	04/October 18 00:00	Could not find/ get access			
	27/November 18 00:00	blocked at 17.34m (originally drilled to 35m)			
HEN_PZ01/08	16/January 18 00:00		34.89	80.59	45.7
	12/April 18 00:00		35.29	80.59	45.3
	12/July 18 00:00		38.86	80.59	41.73
	04/October 18 00:00		38.49	80.59	42.1
	27/November 18 00:00		38.25	80.59	42.34
HEN_PZ02/08	16/January 18 00:00		23.03	76.685	53.655
	12/April 18 00:00		23.66	76.685	53.025
	12/July 18 00:00		30.19	76.685	46.495
	04/October 18 00:00		29.56	76.685	47.125
	27/November 18 00:00		28.99	76.685	47.695
HEN_PZ03/08	16/January 18 00:00		27.51	80.505	52.995
	12/April 18 00:00		26.3	80.505	54.205
	12/July 18 00:00		33.77	80.505	46.735
	04/October 18 00:00		32.64	80.505	47.865
	27/November 18 00:00		31.83	80.505	48.675
HEN_PZ05/08	16/January 18 00:00		6.97	72.698	65.728
	12/April 18 00:00		6.2	72.698	66.498
	12/July 18 00:00		10.18	72.698	62.518
	04/October 18 00:00	Could not locate		72.698	
	27/November 18 00:00		8.24	72.698	64.458
HEN_PZ06/08	16/January 18 00:00		12.72	71.817	59.097
	12/April 18 00:00		11.37	71.817	60.447
	12/July 18 00:00		16.56	71.817	55.257
	04/October 18 00:00	Could not locate		71.817	
	27/November 18 00:00		15.35	71.817	56.467
HEN_PZ07/08	16/January 18 00:00		34.16	80.545	46.385
	12/April 18 00:00		33.37	80.545	47.175
	12/July 18 00:00			80.545	
	04/October 18 00:00	water in base only		80.545	
	27/November 18 00:00	water in base only		80.545	
HEN_PZ08/08	16/January 18 00:00	dry/blocked at 36.34m		80.545	
	12/April 18 00:00		35.28	80.593	45.313
	12/July 18 00:00		35.16	80.593	45.433
	04/October 18 00:00		38.38	80.593	42.213
	27/November 18 00:00	Could not locate		80.593	
			36.59	80.593	44.003
	Min				41.73
	Max				66.498

Determinand		Water Quality Parameters																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
		Units	pH		Zinc		Total Oxidised Nitrogen		Total Organic Carbon		TPH (C10-C40)		Sulphate		Sodium		Potassium		PAH(total)		Nickel		Naphthalene		Manganese		Magnesium		Lead		Iron		Electrical Conductivity us/cm		Diss Oxygen		Chromium		Chloride		Calcium		Cadmium		Ammoniacal nitrogen		Alkalinity expressed as CaCO3																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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Appendix D

Surface water data

[illegible]