



2024 Annual Report

Hendy Quarry Landfill

Report No. C57/1986/AYE/R/ENV/00015

January 2025

Revision 00

Tarmac Trading Limited

Document Control

Project

Hendy Quarry Landfill

Client

Tarmac Trading Limited

Document

2024 Annual Report

Report Number:

C57/1986/AYE/R/ENV/00015

Document Checking:

Date	Rev	Details of Issue	Prepared by	Checked by	Approved by
January 2025	00				

Disclaimer: Please note that this report is based on specific information, instructions, and information from our Client and should not be relied upon by third parties.



www.ayesaeng.com

www.ayesa.com/en

Contents

[1] Introduction.....	1
[1.1] Report Objectives	1
[2] Site Setting.....	2
[3] Review of Monitoring Results (Condition 4.2.1 a)	2
[3.1] Gas Monitoring	2
[3.2] Groundwater Monitoring	3
[3.2.1] Groundwater Levels (mAOD)	4
[3.2.2] Groundwater Quality	4
[3.2.3] Surface Water Monitoring	5
[4] Other Information (Condition 4.2.1 b to k).....	6
[4.1] Condition 4.2.1 b) – Targets / Management System	6
[4.2] Condition 4.2.1 c) – Annual energy consumption (Table S5.3).....	6
[4.3] Condition 4.2.1 d) – Annual water consumption (Table S5.3).....	6
[4.4] Condition 4.2.1 e) – Annual production/treatment (Table S5.2)	6
[4.5] Condition 4.2.1 f) – Details of any contamination or decontamination	6
[4.6] Condition 4.2.1 g) – Topographical Surveys	6
[4.7] Condition 4.2.1 h) – Volumetric difference	6
[4.8] Condition 4.2.1 i) – Settlement Behaviour	6
[4.9] Condition 4.2.1 j) – Remaining Void Space.....	6
[4.10] Condition 4.2.1 k) – Compliance Testing.....	6

Drawings

H0744 HENDY 2025-01-16 QU SETTLEMENT	Settlement Survey
CE/HNDY/08	Monitoring Plan

Appendices

Appendix A	Gas Monitoring Data
Appendix B	Groundwater Quality Data

[1] Introduction

[1.1] Report Objectives

A permit (number BT1088ID) was originally issued to Tarmac for Hendy Quarry Landfill on 17th September 2002, which was further varied (V002) in December 2005 to remove the daily limit for importation of waste. This permit was subsequently varied (as V003) and incorporated the discharge consent which had previously been permitted separately.

The permit was varied (V004) in October 2009 following an application from Tarmac to revise the site groundwater trigger levels and then varied (V005) in November 2013 to change the company name to Lafarge Tarmac Trading Ltd and given a number permit number (ref. KP3795FU). The company name was changed again (V006) in November 2015, and then additional waste codes and an increase in discharge volume were made in May 2019 (V007). The most recent variation (V008) included changing the company address and issuing the permit in the name of Tarmac Trading Ltd in September 2022.

This report has been prepared to address condition 4.2.1 of the most recent version of the environmental permit (V008) which requires an annual report to be submitted to the regulator by 31st January each year, and which includes as a minimum the following:

- a) A review of the monitoring and assessment carried out in accordance with the EP 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 energy 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.

This annual report provides the above information for the review period 1st January 2024 to 31st December 2024. Environmental monitoring is in line with current permit requirements.

[2] Site Setting

Hendy Quarry Landfill is located at Grid Reference ST 05423 81045 and lies close to the town of Miskins in Rhondda Cynon Taf, Wales. The site is accessed off B4264 (School Road); Pontyclun, Rhondda Cynon Taf.

The site is bordered to the:

- east by the A4119 road;
- north by the B4264 (School Road); and
- west and south by Glyn Park, with Miskin Wood and Mill Wood.

Hendy Quarry was developed to quarry limestone, with the landfilling planned to restore the void under an environmental permit. The site is permitted to accept inert waste which comprises principally glass, concrete, demolition material and soils from construction.

[3] Review of Monitoring Results (Condition 4.2.1 a)

[3.1] Gas Monitoring

Landfill gas is monitored in accordance with Table S4.3 of the permit which requires quarterly monitoring at all landfill gas monitoring locations for methane, carbon dioxide, oxygen, atmospheric pressure and relative pressure. A permit limit of 1%v/v is set for methane and 1.5%v/v set for carbon dioxide.

A Gas Management Plan was submitted in 2008 which included the installation of 18 in-waste gas monitoring points, at a frequency of 2 per hectare. A total of 11 were drilled; however due to on-going operations at the site a number were lost and only five remain (BH02, BH05, BH07, BH08 and BH09). On the back of discussions with the regulator, Tarmac proposed to install replacement in-waste gas monitoring points and future gas monitoring points once the site was restored. They also proposed to undertake a FID walkover survey every six-months.

In total, there are nine gas monitoring points external of the waste (Hole B, Hole H, PZ01/08, PZ02/08, PZ03/08, PZ05/08, PZ06/08, PZ07/08R and PZ08/08R) around the perimeter of the site, which are also subject to the same monitoring frequency and compliance limits.

The monitoring locations relative to the site are illustrated on Drawing CE/HNDY/08 and are as follows:

- PZ02/08 and PZ03/08 are along the eastern boundary of the site;
- PZ05/08 and PZ06/08 are located along the southern boundary,
- PZ07/08R and PZ08/08R are located along the western boundary; and
- Hole B, Hole H and PZ01/08 along the northern boundary.

A summary of the monitoring data collected in 2024 for methane and carbon dioxide is presented in Table 1. The complete gas data is also presented in Table A1 of Appendix A.

During 2024, the methane permit limit was not exceeded in locations; whilst the carbon dioxide permit limit was exceeded on one occasion (2.4%v/v during July 2024 in PZ07/08R).

Table 1 Gas Data Summary (2024)

Monitoring Location	Methane (%v/v)		Carbon Dioxide (%v/v)	
	Mean	Max	Mean	Max
<i>In-waste gas monitoring points</i>				
BH02	0	0	0.1	0.1
BH05	0	0	0.3	0.9
BH07	0	0	0.1	0.2
BH08	0	0	0.1	0.1
BH09	0	0	0.2	0.2
<i>Perimeter gas monitoring points</i>				
BH0B	0	0	0.7	0.8
BH0H	0	0	0.1	0.1
PZ01/08	0	0	0.8	1.4
PZ02/08	0	0.1	0.4	0.6
PZ03/08	0	0	0.3	0.4
PZ05/08	0	0	0.1	0.1
PZ06/08	0	0	1.0	1.5
PZ07/08R	0	0	1.1	2.4
PZ08/08R	0	0	0.1	0.2

Highlighted cells exceed the permit limit

Methane was only detected on one occasion, in PZ02/08 during October 2024, with a concentration of 0.1%v/v. All other locations, both in-waste and perimeter, throughout 2024 reported no methane.

Across the site carbon dioxide is low at less than 1.5%v/v. Although there is a single exceedance of the permit limit at PZ07/08R in July, the reported value of 2.4%v/v is environmentally insignificant and consistent with concentrations expected for a background soil *i.e.* from *in-situ* soil respiration.

Two walkover FID surveys were conducted during 2024, in April and in October. No flammable gas was detected at any location across the site during either FID survey. The results of the FID surveys are presented in Table A2 of Appendix A.

[3.2] Groundwater Monitoring

Groundwater monitoring has been undertaken in accordance with Tables S4.2 and S4.4 of the permit, at four locations:

- PZ02/08 at the northern end of the eastern boundary (upgradient);
- PZ03/08 at the southern end of the eastern boundary (upgradient);
- PZ07/08R at the southern end of the western boundary (downgradient); and
- PZ08/08R at the northern end of the western boundary (downgradient).

The locations are illustrated on Drawing CE/HNDY/08. Monitoring is required quarterly for the parameters detailed in the 2009 permit variation. Compliance limits are only set for PZ07/08R and PZ08/08R as shown in Table 2.

Table 2 Groundwater Compliance Limits

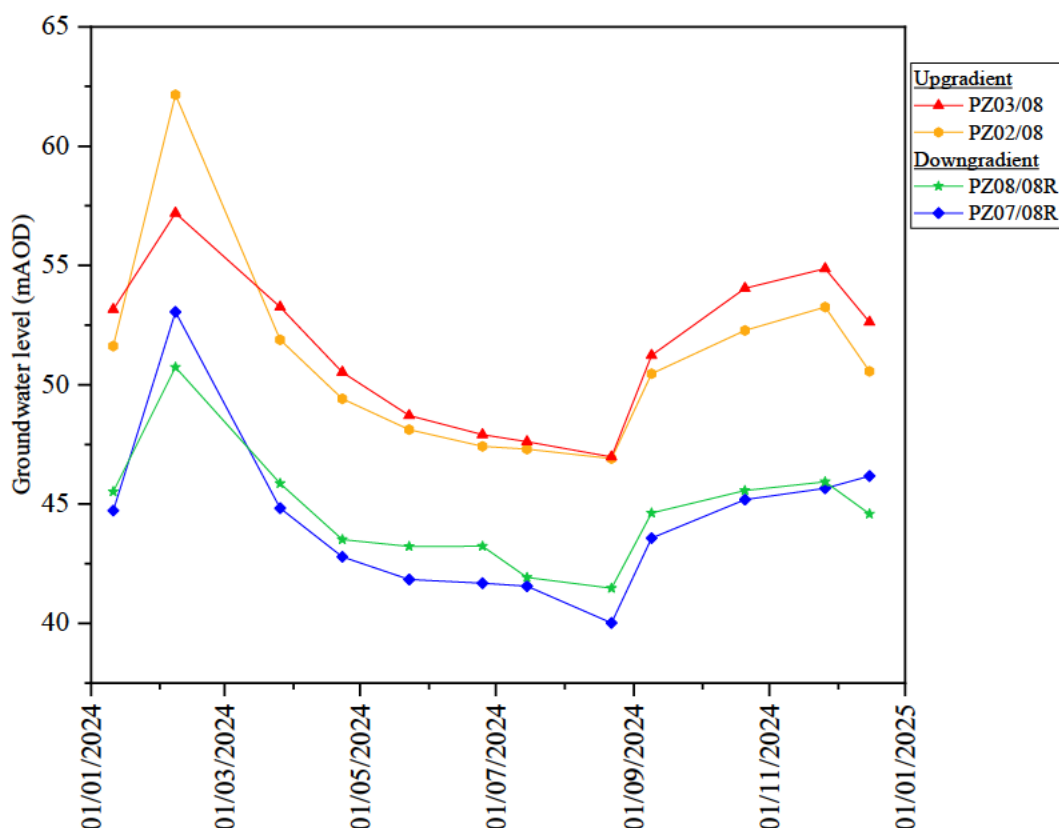
Location	Parameter	Permit Limit (mg/l)
PZ07/08R and PZ08/08R	Chloride	150
	Ammoniacal nitrogen	0.5
	Sulphate	200
	Nickel	0.2
	Cadmium	0.001
	Naphthalene	0.01

[3.2.1] Groundwater Levels (mAOD)

Groundwater level data for 2024 is presented in Figure 1 below. All four boreholes monitor groundwater within the Pembrokeshire Limestone Group within which the site has been developed.

The groundwater level is highest in the east at PZ03/08 and PZ02/08 at an average of 51.5mAOD and 51.0mAOD throughout 2024, and lowest in the west at PZ07/08R and PZ08/08R (average of 44.3mAOD and 44.7mAOD respectively). Groundwater level data collected during 2024 is in-line with historical results.

Figure 1 Groundwater Levels



[3.2.2] Groundwater Quality

The groundwater quality monitoring was conducted on a monthly basis throughout 2024. This is a greater frequency than the quarterly basis required by the permit and is an extension of the monthly monitoring performed in 2023 to enable the collection of a suitable dataset for the re-drilled monitoring points. Groundwater monitoring results are presented in Table B1 in Appendix B.

There were no exceedances of any of the compliance limits in either PZ07/08R or PZ08/08R during the reporting period.

Ammoniacal nitrogen was predominantly below the limit of detection (0.01mg/l) during 2024, with PZ02/08 having the highest concentration at 0.02mg/l. These concentrations are below the compliance limit of 0.5mg/l.

Naphthalene and nickel were also consistently below the limit of detection for all monitoring locations, with only PZ08/08R having a single detection of naphthalene above the limit of detection throughout 2024 (0.02µg/l).

Chloride in upgradient groundwater ranges from 6mg/l to 49mg/l, with highest concentrations in PZ03/08, whilst downgradient groundwater has chloride concentrations ranging from 3mg/l to 26mg/l. Chloride is consistently below the compliance limit throughout 2024.

Cadmium in the downgradient groundwater ranges from <0.00002mg/l to 0.0003mg/l, and as with the other compliance limit substances, is consistently below the permit limit. Other non-compliance limited metals are typically below their respective limits of detection during the reporting period.

Groundwater is analysed for PAH's and TPH on a quarterly basis, with the PAH concentrations ranging from <0.01µg/l up to 0.37µg/l and TPH ranging from <0.16µg/l to 70µg/l.

Groundwater quality does not appear to be impacted significantly by the permitted activity and no other significant trends have been identified.

[3.2.3] Surface Water Monitoring

Monitoring of surface water is required by Table S4.1 of the permit (as set out in the 2019 version) at the discharge point to the to the soakaway at NGR ST 0538 8136. Monitoring requirements and compliance limits are outlined below.

Table 3 Limits for point source emissions to water (discharge to soakaway)

Parameter	Limit
Daily Volume	5,000 m ³ /day
Rate of Discharge	58 l/s
Suspended Solids	100mg/l
pH	>6 and <9
Mineral Oil	5mg/l

During the review period, the site has been unmanned and as such daily meter readings have not been possible. Therefore, discussion on the compliance on daily volume and rate of discharge cannot be made. It is noted in the 2023 Annual Review that the daily average volume of discharge was 267.16m³ in December, which is below the compliance limit of 5,000m³/day.

Suspended solids, pH and mineral oil (Total Petroleum Hydrocarbons) were all monitored quarterly, will no concentrations above the permit limits.

Table 4 Surface Water Quality Discharge Results

Location	Parameter	Limit	11/01/2024	23/04/2024	15/07/2024	21/10/2024
Discharge to Soakaway	Suspended Solids	100mg/l	<5	22	24	<5
	pH	>6 and <9	7.5	7.5	7.5	7.7
	Mineral Oil	5mg/l	<0.3	<0.3	<0.3	<0.3

[4] Other Information (Condition 4.2.1 b to k)

[4.1] Condition 4.2.1 b) – Targets / Management System

The following management improvements are set for the site:

- to install a suitable meter to allow the monitoring and recording discharge flow rate and monitor on a weekly basis;
- to report daily discharge readings; and
- to maintain access to all permit monitoring points.

[4.2] Condition 4.2.1 c) – Annual energy consumption (Table S5.3)

No data is available for the total energy consumption for Hendy Quarry Landfill during 2024.

[4.3] Condition 4.2.1 d) – Annual water consumption (Table S5.3)

No data is available for the total water consumption for Hendy Quarry Landfill during 2024.

[4.4] Condition 4.2.1 e) – Annual production/treatment (Table S5.2)

Annual production/treatment at Hendy Quarry Landfill during the period January to December 2024 is presented below:

Table S5.2 Annual production/treatment	
Surface water and/or groundwater:	Cubic metres/year
Disposed of offsite	Unable to calculate
Disposed of to any onsite effluent treatment plant	Nil

[4.5] Condition 4.2.1 f) – Details of any contamination or decontamination

No contamination is known to have taken place during the reporting period.

[4.6] Condition 4.2.1 g) – Topographical Surveys

The annual topographical survey is presented as Drawing H074-HENDY-2025-01-16 QU SETT.

[4.7] Condition 4.2.1 h) – Volumetric difference

No waste was accepted during the period, therefore there is no volumetric difference between 2023 and 2024.

[4.8] Condition 4.2.1 i) – Settlement Behaviour

A settlement survey is presented on Drawing H074-HENDY-2025-01-16 QU SETT. This indicates that there is insignificant settlement across the site between surveys.

[4.9] Condition 4.2.1 j) – Remaining Void Space

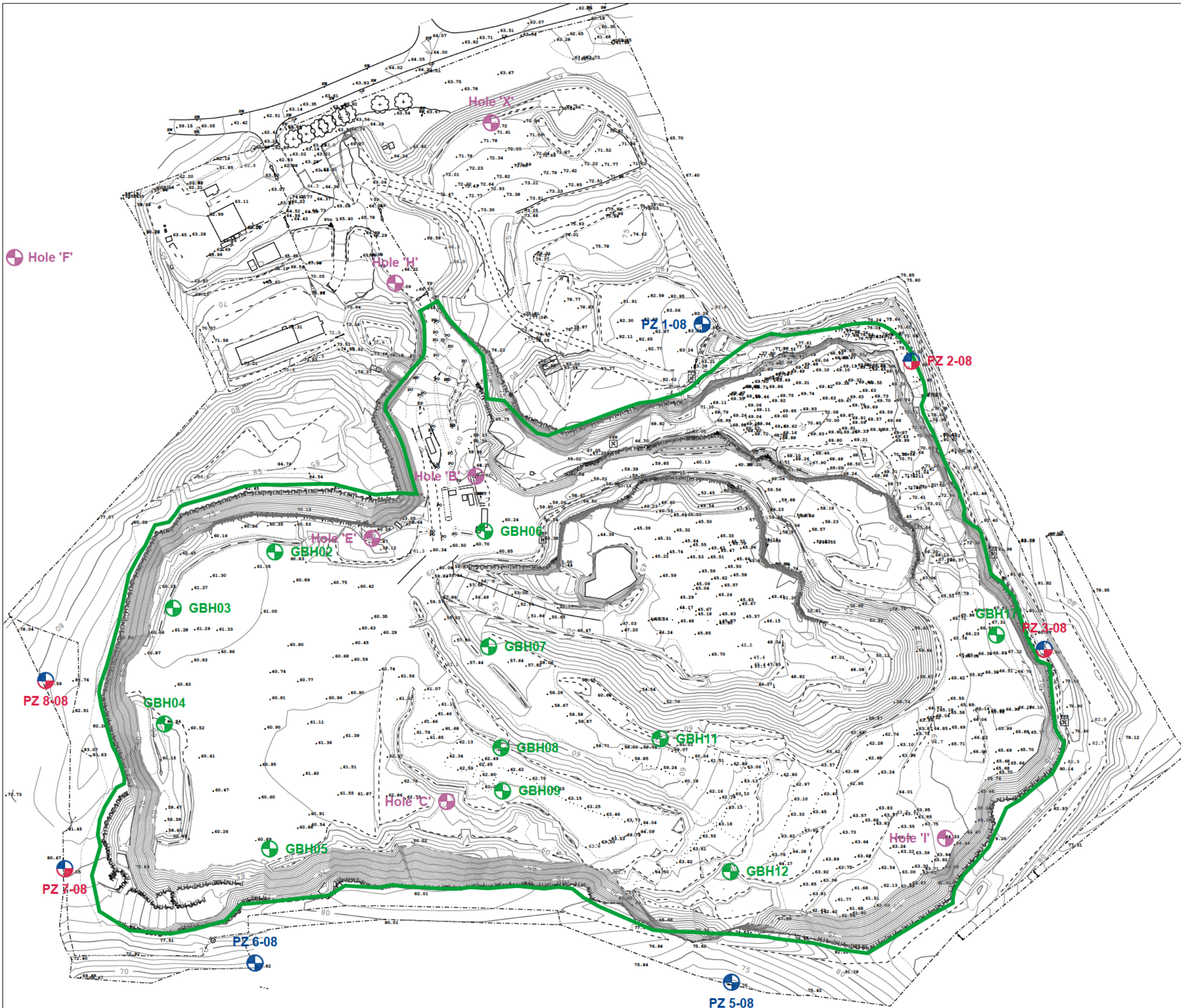
The remaining void as of 16th January 2025 is 1,300,054m³.

[4.10] Condition 4.2.1 k) – Compliance Testing

No compliance testing has been carried out during the reporting period, as no waste was accepted.



Drawings



- 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:
-	-	-
-	-	-

Consultant:



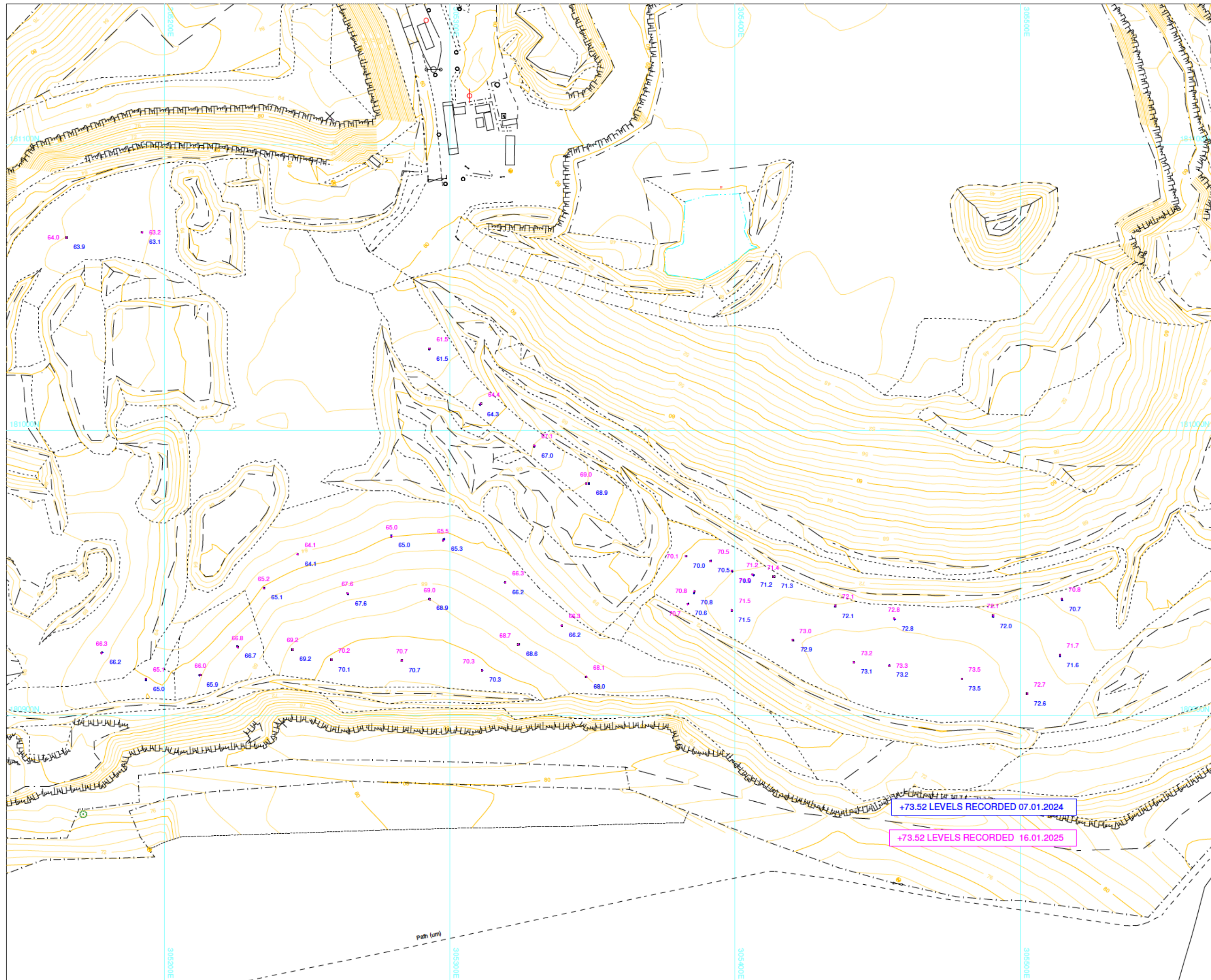
Crestwood Environmental
The Technology Centre
Glaisher Drive
Wolverhampton Science Park
Wolverhampton WV10 9RU
Tel: 01902 824037
Fax: 01902 824036
Email: info@crestwoodenvironmental.co.uk

Client:



Tarmac Ltd
Millfields Road
Ettingshall
Wolverhampton WV4 6JP
Tel: 01902 353522
Fax: 01902 408870

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	



© Crown copyright and database rights 2004 Ordnance Survey 100030964
This is Crown Copyright and is reproduced
with the permission of Land & Property Services
under delegated authority the Controller of Her Majesty's Stationery Office
© Crown Copyright. Department of Infrastructure, Isle of Man

NOTE: Certain information on this plan
has been digitised and therefore its
accuracy cannot be guaranteed.
Do not scale off plan/building.



Land Survey,
Stancombe Lane, Flax Bourton,
Bristol, Avon, BS48 3QD
Tel +44(0)1275 465714
e-mail: richard.donkin@tarmac.com

H074 HENDY

SETTLEMENT SURVEY
16th JANUARY 2025

LSS Models Used To Create Plot
H074 HENDY 2025-01-16 QU SETTLEMENT

Drawn By
RPD

Date
JANUARY 2025

Scale
1 : 1250

Drawing No.
N/A

+73.52 LEVELS RECORDED 07.01.2024

+73.52 LEVELS RECORDED 16.01.2025

Appendix A

A1 - Gas Monitoring Results

A2 - FID Survey Results

A1 Gas Monitoring Results

Sample Point	Date	Methane (%Vol)	Carbon Dioxide (%Vol)	Oxygen (%Vol)	Balance (%v/v)	Atmospheric Pressure (mb)	Relative Pressure (mb)
BH02	11/01/24	Monitoring point could not be located					
BH02	15/07/24	0	0.1	20.9	79.0	1,001	0.14
BH02	21/10/24	0	0.1	20.8	79.1	1012	
BH05	11/01/24	0	0.1	20.2	79.7	1030	-1.14
BH05	23/04/24	0	0.1	21.1	78.8	1017	0.17
BH05	15/07/24	0	0.9	18.7	80.4	1001	-1
BH05	21/10/24	0	0.1	20.8	79.1	1012	-2.17
BH07	11/01/24	Monitoring point could not be located					
BH07	23/04/24	0	0.2	20.6	79.2	1017	-4.18
BH07	15/07/24	0	0.1	21.1	78.8	1001	-2.84
BH07	21/10/24	0	0.1	20.9	79.0	1012	-2.3
BH08	11/01/24	0	0.1	20.2	79.7	1030	-0.5
BH08	23/04/24	0	0.1	20.9	79.0	1016	1.12
BH09	11/01/24	0	0.2	20.1	79.7	1030	-2.64
BH09	15/07/24	Monitoring point could not be located due to overgrown vegetation					
BH0B	11/01/24	0	0.7	19.2	80.1	1030	-0.5
BH0B	23/04/24	0	0.7	19.5	79.8	1018	0.33
BH0B	15/07/24	0	0.8	19.8	79.4	1001	0.1
BH0B	21/10/24	0	0.6	16.5	82.9	1012	-0.15
BH0H	11/01/24	0	0.1	20.1	79.8	1,031	-0.24
BH0H	23/04/24	0	0.1	20.8	79.1	1018	0.19
BH0H	15/07/24	0	0.1	21.0	78.9	1001	0.09
BH0H	21/10/24	0	0.1	20.2	79.7	1011	-0.17
PZ01/08	11/01/24	0	1.4	18.8	79.8	1027	-0.12
PZ01/08	23/04/24	0	0.9	20.8	78.3	1015	0.21
PZ01/08	15/07/24	0	0.1	21.2	78.7	998	0.19
PZ01/08	21/10/24	0	0.9	20.6	78.5	1010	-0.29
PZ02/08	11/01/24	0	0.1	20.2	79.7	1028	-0.22
PZ02/08	23/04/24	0	0.1	20.9	79.0	1016	0.62
PZ02/08	15/07/24	0	0.6	20.2	79.2	999	0.19
PZ02/08	21/10/24	0.1	0.6	20.5	78.8	1009	-0.26
PZ03/08	11/01/24	0	0.2	20.0	79.8	1030	-0.14
PZ03/08	23/04/24	0	0.2	20.9	78.9	1016	0.07
PZ03/08	15/07/24	0	0.2	21.2	78.6	999	0.09
PZ03/08	21/10/24	0	0.4	20.7	78.9	1011	-0.24
PZ05/08	11/01/24	0	0.1	20.2	79.7	1029	-0.05
PZ05/08	23/04/24	0	0.1	21	78.9	1017	0.31
PZ05/08	15/07/24	Monitoring point could not be located due to overgrown vegetation					
PZ06/08	11/01/24	0	0.9	19.1	80.0	1031	-0.09
PZ06/08	23/04/24	0	1.1	19.6	79.3	1017	0.29
PZ06/08	15/07/24	0	0.3	20.7	79.0	998	0.15
PZ06/08	21/10/24	0	1.5	20.1	78.4	1011	-0.31
PZ07/08R	11/01/24	0	1.4	18.9	79.7	1027	-0.17
PZ07/08R	23/04/24	0	0.3	21.0	78.7	1014	0.05
PZ07/08R	15/07/24	0	2.4	19.0	78.6	-	0.24
PZ07/08R	21/10/24	0	0.1	21.1	78.8	1011	-0.26
PZ08/08R	11/01/24	0	0.1	20.4	79.5	1029	-0.12
PZ08/08R	23/04/24	0	0.2	21.1	78.7	1014	-
PZ08/08R	15/07/24	0	0.1	21.2	78.7	998	0.12
PZ08/08R	21/10/24	0	0.1	20.9	79.0	1010	-0.24

Shaded cells signify exceedance of permit limit (1%v/v for methane and 1.5%v/v for carbon dioxide)

A2 – FID Walkover Survey Results

Sample Point	Date	Flammable Gas	Temp (Air)	Pressure Trend	Wind Speed	Wind Direction	Ground Conditions	Weather
		ppm	°C		Force			
SE 01	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 01	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 02	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 02	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 03	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 03	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 04	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 04	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 05	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 05	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 06	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 06	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 07	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 07	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 08	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 08	02/10/24	Impossible to access point; unsafe access						
SE 09	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 09	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 10	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 10	02/10/24	Impossible to access point; unsafe access						
SE 11	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 11	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 12	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 12	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 13	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 13	02/10/24	Impossible to access point; unsafe access						
SE 14	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 14	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 15	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 16	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 17	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 17	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 18	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 18	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 19	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 19	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 20	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 21	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 22	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 23	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 23	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 24	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 24	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 25	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 25	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 26	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 27	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 28	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 29	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 30	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 30	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 31	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 31	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 32	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 33	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 34	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 35	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 35	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 36	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 36	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 37	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 38	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 38	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 39	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 40	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 40	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 41	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 41	02/10/24	0	14	S	17	NE	Moist	Overcast
SE 42	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 43	25/04/24	0	8	Falling	6	WSW	Moist	Overcast
SE 44	25/04/24	0	8	Falling	6	WSW	Moist	Overcast



Appendix B

Groundwater Monitoring Results

Table B1 – Groundwater Monitoring Data Matrix and Metals

Sample Point	Date	pH	EC µs/cm	DO mg/l	TOC mg/l	NH ₄ -N mg/l	TON mg/l	Ca mg/l	K mg/l	Mg mg/l	Na mg/l	Cl mg/l	SO ₄ mg/l	Alk mg/l	Cd µg/l	Cr µg/l	Cu µg/l	Fe µg/l	Mn µg/l	Ni µg/l	Pb µg/l	Zn µg/l
PZ02/08	11/01/24	7.7	402	12.6	0.6	<0.01	<0.2	71	9	<1	11	21	10	173	<0.02	<1	<1	<10	72	<1	<1	42
	26/03/24	7.7	369	10.7	0.73	<0.01	<0.2	64	7	<1	7	14	6	163	<0.02	<1	<1	<10	<2	<1	<1	3
	23/04/24	7.8	377	10.6	1.46	<0.01	<0.2	58	9	<1	10	16	11	356	<0.02	<1	<1	<10	5	<1	<1	3
	23/05/24	7.8	362	9.5	4.55	<0.01	<0.2	61	9	<1	8	12	8	165	0.29	<1	<1	<10	17	<1	<1	4
	25/06/24	7.8	377	11.4	<0.40	<0.01	<0.2	56	8	<1	9	16	10	164	<0.02	<1	<1	<10	3	<1	<1	4
	15/07/24	7.7	374	10.2	2.16	<0.01	<0.2	59	9	<1	8	15	9	171	<0.02	<1	<1	<10	<2	<1	<1	3
	22/08/24	7.8	425	9.8	<0.40	<0.01	0.9	61	9	<1	14	26	10	183	<0.02	<1	<1	<10	<2	<1	<1	3
	09/09/24	7.6	420	11.3	0.63	0.02	0.4	78	7	<1	5	7	<3	201	<0.02	<1	<1	<10	<2	<1	<0.2	3
	21/10/24	8	402	10	0.6	<0.01	<0.2	79	7	<1	5	6	<3	209	0.03	<1	<1	<10	<2	<1	<0.2	4
	26/11/24	7.4	410	10.5	0.48	<0.01	0.3	88	8	<1	7	6	3	198	0.03	<1	<1	<10	<2	<1	<0.2	3
PZ03/08	16/12/24	7.8	370	12	<0.40	<0.01	<0.2	63	10	<1	8	10	6	173	<0.02	<1	<1	<10	<2	<1	<0.2	3
	08/02/24	7.8	370	10.8	3.1	<0.01	<0.2	65	9	<1	4	9	4	178	0.02	<1	<1	<10	<2	<1	<1	<2
	23/04/24	7.4	714	9.4	1.92	<0.01	0.5	97	31	<1	20	32	9	270	0.51	<1	<1	<10	<2	<1	3	121
	23/05/24	7.9	658	10	1.65	<0.01	0.6	85	32	1	25	37	9	271	<0.02	<1	<1	<10	<2	<1	<1	4
	25/06/24	7.4	749	9	4.14	<0.01	0.9	91	27	1	29	46	11	327	0.56	<1	<1	<10	3	<1	7	113
	15/07/24	7.4	703	9.8	3.11	0.01	0.7	89	27	1	25	42	9	305	0.47	<1	<1	<10	<2	<1	4	102
	22/08/24	7.5	772	11.4	1.54	<0.01	1.5	93	29	1	30	49	10	336	0.3	<1	<1	<10	<2	<1	3	61
	09/09/24	7.5	658	9.4	0.6	<0.01	1.1	83	26	1	22	33	8	283	0.42	<1	<1	<10	<2	<1	3.4	92
	21/10/24	7.6	649	9.4	0.73	<0.01	<0.2	87	27	1	22	32	8	303	0.46	<1	<1	<10	5	<1	3.8	98
	26/11/24	7.5	622	11.2	0.57	<0.01	0.9	93	29	1	22	26	8	284	0.45	<1	<1	<10	3	<1	2.7	97
PZ07/08R	16/12/24	7.4	743	11.7	0.67	<0.01	0.9	102	31	2	26	34	9	342	0.54	<1	<1	<10	<2	<1	4.8	122
	11/01/24	7.1	688	11.1	2.13	<0.01	<0.2	98	37	4	13	25	41	307	0.03	<1	<1	<10	227	<1	4	3
	08/02/24	8.1	241	10.6	4.04	<0.01	<0.2	41	6	1	2	3	9	114	<0.02	<1	1	<10	<2	<1	<1	<2
	26/03/24	7.5	717	10.4	1.84	0.01	<0.2	98	37	3	13	24	40	312	<0.02	<1	<1	<10	4	<1	<1	2
	23/04/24	7.4	708	10.3	2.1	<0.01	2.2	94	36	3	12	22	41	317	<0.02	<1	<1	10	<2	<1	<1	4
	23/05/24	7.5	581	8.3	1.08	<0.01	0.3	88	25	<1	10	16	18	270	0.08	<1	<1	<10	<2	<1	2	15
	25/06/24	7.4	699	8	2.46	0.01	<0.2	88	32	2	13	24	36	311	0.04	<1	<1	<10	185	<1	2	9
	15/07/24	7.4	694	9.5	2.14	<0.01	0.5	97	29	2	12	22	34	311	<0.02	<1	<1	<10	<2	<1	<1	7
	22/08/24	7.5	654	9	1.68	<0.01	0.8	87	25	<1	19	26	12	309	<0.02	<1	<1	<10	<2	<1	<1	3
	09/09/24	7.4	723	9.5	1.32	<0.01	0.9	99	30	2	15	22	35	319	0.04	<1	<1	<10	<2	<1	0.4	7
PZ08/08R	21/10/24	7.5	697	9.5	1.51	<0.01	<0.2	100	32	3	15	23	38	327	0.03	<1	<1	<10	<2	<1	<1	8
	26/11/24	7.5	549	11.1	0.42	0.01	0.3	92	25	<1	8	8	7	273	0.07	<1	<1	<10	<2	<1	0.2	8
	16/12/24	7.5	708	11.4	0.81	<0.01	<0.2	98	35	3	15	22	38	322	0.03	<1	<1	<10	3	<1	0.4	6
	11/01/24	7.2	668	11.7	2.46	<0.01	1.5	110	31	2	13	21	23	317	0.02	<1	<1	<10	<2	<1	<1	4
	08/02/24	8.1	322	10.7	2.95	<0.01	0.4	56	8	2	2	4	14	150	<0.02	<1	2	<10	<2	<1	<1	4
	26/03/24	7.5	658	9.5	2.08	0.01	0.6	94	30	2	13	22	22	295	0.05	<1	<1	<10	58	<1	<1	5
	23/04/24	7.5	610	9.6	1.9	<0.01	0.5	88	24	<1	15	19	9	313	0.04	<1	<1	<10	<2	<1	<1	9
	23/05/24	7.4	620	9	2	<0.01	0.4	88	25	<1	18	22	10	284	0.2	<1	<1	<10	<2	<1	<1	7
	25/06/24	7.3	832	8.6	4.64	0.01	1.2	116	33	3	19	24	60	365	0.09	<1	2	<10	17	<1	<1	43
	15/07/24	7.4	846	9.8	2.72	<0.01	1.3	121	35	3	17	24	66	374	0.04	<1	<1	<10	2	<1	<1	7
PZ08/08R	22/08/24	7.4	710	10.8	0.96	<0.01	0.9	99	28	2	15	24	31	323	0.04	<1	<1	<10	<2	<1	<1	5
	09/09/24	7.5	739	10.4	1.53	<0.01	1.7	102	30	3	14	15	30	339	0.05	<1	<1	<10	5	<1	<0.2	11
	21/10/24	7.6	685	9.8	1.3	<0.01	1.1	104	30	2	13	14	23	339	0.07	<1	<1	<10	<2	<1	<0.2	10
	26/11/24	7.4	663	11.4	0.93	<0.01	0.8	106	30	1	21	24	11	307	0.04	<1	<1	<10	<2	<1	<0.2	7
	16/12/24	7.5	702	12.2	1.64	<0.01	1	108	30	1	17	22	11	345	0.3	<1	<1	<10	13	<1	0.3	59