



**Gas Management Plan
Hendy Quarry Landfill Permit Reference
EPR/KP3795FU**

**Plan Reference: HNDY/GMP April 2019
Version 2.0**

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HNDY/GMP/01 Monitoring Location Points

1 GAS MANAGEMENT PLAN

1.1 Introduction

1.1.1 Report Context

The site is located at Hendy Quarry, Miskin, Pontyclun, National Grid Reference ST052810 and is permitted to accept inert waste only.

A Gas Management Plan (GMP) was produced in August 2008 in accordance with Table S1.3 'Improvement Programme Requirements', Reference 3 of the Permit, which states:

'A Landfill Gas Management Plan shall be submitted to the Agency for written approval. The plan shall be written in accordance with Agency Guidance Note LFTGN03 entitled "The management of landfill gas". The plan shall include a scheme for the installation of peripheral external gas monitoring points required in accordance with Agency Guidance Note LFTGN03.'

Following the submission of the 2008 Gas Management Plan it was proposed to progressively install 18 in-waste gas monitoring points at a frequency of 2 per hectare. In 2008 eleven monitoring points were drilled within the existing waste mass at the site. As the monitoring points were installed within areas of the site that were still operational over time a number of these boreholes have been lost due to vehicle movements and waste placement activities and only five now remain (BH2, 5, 7, 8 and 9). Following discussions with NRW, Tarmac proposed to install replacement in-waste gas monitoring points and future in-waste gas monitoring points once area of the site were restored. In addition it was agreed to fit caps and taps to the remaining in waste locations and undertake FID walkover surveys and update the Gas Management Plan to reflect the changes.

1.1.2 Objectives

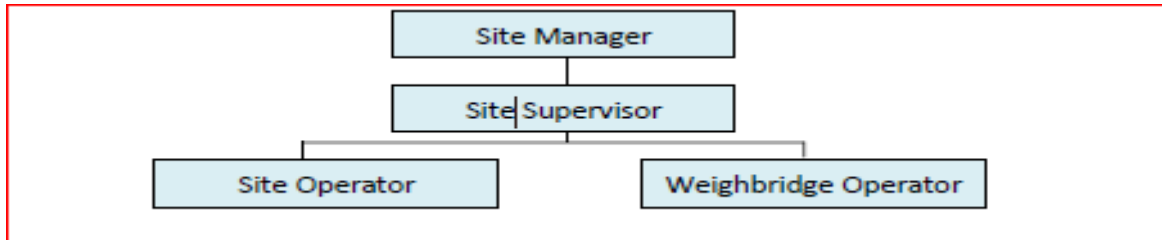
In addition to the above the objectives of this GMP are to provide a summary of the methods, procedures and actions to be implemented at the landfill site during the operational phase. The GMP has been developed to demonstrate that the gas control and monitoring is appropriate for the site conditions during the operational phase. Once the site ceases acceptance waste permanently, the gas monitoring for the post closure period up to surrender will be agreed in the Closure Plan.

The GMP will be reviewed and updated on a regular basis as the site develops to ensure adequate controls are in place to meet the identified standards and objectives. Any changes will be agreed with the NRW.

1.2 Management Structure and Technical Competence

The Site Manager, who is supported by the Site Supervisor, undertakes overall management and supervision of the site.

The management structure relating to Hendy Quarry Landfill is as follows:



Gas monitoring is undertaken by the Permitting and Performance Monitoring Team / and or contractors appointed by them. The Monitoring Team are independent from the Operational Team at the site and have a separate management structure.

Suitably qualified technicians who are experienced and trained in the use of monitoring and sampling equipment and interpretation of the data obtained will carry out all gas monitoring at the site. Standard operating procedures are in place for landfill gas monitoring.

1.3 Waste Inputs

The type of waste deposited at the site are strictly inert wastes.

All waste to be deposited at the site will be accepted in accordance with the sites Waste Acceptance Procedure and in particular waste characterisation, which will ensure the waste is correctly characterised and inert in accordance with the above. It is therefore considered highly unlikely that the waste types accepted at the site will generate significant quantities of landfill gas to cause a pollution risk to the surrounding environment and sensitive receptors outside the site boundary.

1.4 Borehole Installation

There are currently three number combined monitoring boreholes external to the body of waste at the site which are currently used to monitor for landfill gas. The location of these boreholes (B, E and H) are shown on drawing number HNDY/GMP/01 'Monitoring Location Points'. Borehole E is no longer accessible on health and safety grounds due to it's proximity to exposed quarry faces. In addition gas readings are also taken from PZ01/08, PZ02/08, PZ03/08, PZ05/08, PZ06/08, PZ07/08 and PZ08/08. Whilst there is no requirement for perimeter monitoring to be undertaken at inert landfills it is proposed to continue monitoring the locations until the permanent in-waste monitoring boreholes are installed.

In accordance with the current guidance it is proposed to install 2 number internal landfill gas monitoring boreholes per hectare of waste which equates to a total of 18

monitoring boreholes. The boreholes will be installed within 6 months of areas of the site being completed to final restoration level. In-waste boreholes are shown on drawing HNDY/GMP/01, the locations are indicative only.

The boreholes will be drilled to a nominal diameter of 150mm to a minimum of 2m above the base of the infill material. The well installation will consist of a minimum 63mm OD HDPE or MDPE slotted pipe, with an open hole area of 10%, and a maximum slot size of 2mm. The screened section will be installed from the base of the hole to around 2.0 m below ground level. From 2.0m bgl to approximately 0.5m above ground level the casing will be plain. The casings will be joined by threaded connections to give a flush internal and external fitting. An end cap will be installed on the bottom of each well screen. The annulus of each well will be filled with 10mm gravel pack. The well annulus will be sealed using a bentonite mix, the seal will be a minimum of 2m below ground level. Each well will be finished with a MDPE or HDPE cap incorporating a gas sampling tap. The borehole well will be finished with a lockable protective cover, with the borehole number clearly marked.

In accordance with condition 2.7.4 of the Permit a CQA Plan for the installation of the boreholes will be submitted to NRW for approval. The installation works will be supervised by an independent CQA Engineer and following each phase of the installation works a CQA Validation Report will be submitted to NRW.

1.5 Control Measures

As the installation is not likely to generate significant quantities of landfill gas, there is no requirement for gas extraction and utilisation at the site.

As there is no requirement to contain, collect and treat landfill gas at the installation, control measures are not included as part of the landfill gas management plan.

1.6 Monitoring and Sampling Plan

The monitoring and sampling plan allows the performance of the gas monitoring system at the site to be established and assessed, offering increased confidence in the protection of the local environment and providing a warning mechanism if adverse impacts are found.

1.6.1 Landfill Gas Monitoring Schedule

The proposed landfill gas monitoring schedule details the frequency of the landfill gas monitoring and specific data collection during the operational phase. The schedule is detailed below in Table 1.

Table 1

Location	Frequency	Determinands
External Boreholes		
B, H, PZ01/08, PZ02/08, PZ03/08, PZ05/08, PZ06/08, PZ07/08 and PZ08/08	Quarterly	Methane (%v/v), carbon dioxide (%v/v), oxygen (%v/v), Atmospheric pressure (Mb), Other meteorological data.
Internal Boreholes		
BH2, 5, 7, 8 and 9. In-waste boreholes installed following completion to restoration levels.	Quarterly	Methane (%v/v), carbon dioxide (%v/v), oxygen (%v/v), Atmospheric pressure (Mb), relative pressure, Other meteorological data.
Walk over gas survey (FID or Leak Dectector)	Six Monthly	Flammable gas (ppm)

1.6.2 Measurement Techniques and Monitoring Strategy

Suitably qualified technicians who are experienced and trained in the use of monitoring and sampling equipment and interpretation of the data obtained will carry out all gas monitoring at the installation. Standard operating procedures are in place for landfill gas monitoring.

Gas monitoring is undertaken by the Permitting and Performance Monitoring Team / and or contractors appointed by them. The Monitoring Team are independent from the Operational Team at the site and have a separate management structure.

Sub-surface gas concentration will be monitoring using Geotechnical Instruments GA 5000 portable gas monitor or similar. The gas monitoring equipment will be sent on a six monthly basis to be calibrated and the records of calibration will be kept at Head Office.

The accuracy of these instruments is as detailed in Table 2 below: -

Table 2

Cell	Range	Typical Accuracy (range:accuracy)	Typical Accuracy (range:accuracy)
CH ₄	0 – 100%	0-70% : ±0.5%	70-100% : ±1.5%
CO ₂	0 – 100%	0-60% : ±0.5%	60-100% : ±1.5%
O ₂	0 – 25%	0-25% : ±1.0%	

In addition during monitoring the technician will record any damage to the monitoring installation and report any findings to the site manager.

The monitoring results will then be downloaded from the portable instruments into a computer database.

Gas walk over surveys will be undertaken using a FID or Leak Detector which records flammable gas concentrations.

The Technician will walk over the surface of the inert waste with the instrument probe as close the surface as possible (<5cm). Where elevated flammable gas concentrations are detected the survey should deviate to identify the source, which is likely to be upwind. Once the source has been identified the affected area should be surveyed on a closer grid to identify the extent of the feature. The survey on the wider grid can then be resumed.

The locations where readings are taken is logged on a handheld GPS unit.

1.6.3 Data Storage, Retrieval, Presentation and Reporting

The monitoring results are downloaded from the portable instruments and imported into a computer database.

The results are reviewed to highlight any breaches of trigger levels. Any breaches

will be notified to Site Management and NRW as required by the Permit.

The results of the walkover survey will be shown on an aerial photograph of the site.

Gas monitoring results will be reported quarterly to NRW in accordance with Table S5.1 of the Permit.

1.6.4 Trigger Levels

The landfill gas trigger levels are outlined in Table S4.3 of the Permit and are presented in Table 3 below:

Table 3

Substance	Trigger level, detection limit and accuracy
Methane ~	1% v/v; %; $\pm 0.1\%$
Carbon dioxide*	1.5% v/v; %; $\pm 0.1\%$
~ The trigger level for methane is based on the 20% of the lower explosive limit for gas Trigger levels as outline in permit Table S4.3. *Carbon dioxide limits are no longer set for perimeter borehole due to presence of naturally elevated levels.	

It is proposed that trigger levels will be reviewed as required and after 12 months following installation of any new in-waste boreholes.

1.6.5 Contingency Action Plan

This GMP includes actions to be taken by the operator as a result of any abnormal changes observed in the collected monitoring data.

The contingency action plan, Table 4 below will be followed in the event trigger levels are exceeded at the site.

Table 4

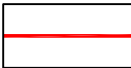
Contingency action	Timescales
Advise Site Management	Immediately
Advise NRW	Within 24 hours
Confirm by repeat sampling	Within one month
If exceedance is repeated assess risk associated with elevated concentration.	Within one month
If risk is acceptable reassess the assessment criteria	Within three month
If risks are unacceptable implement corrective measures and or additional monitoring which may include the installation of additional boreholes and / or review of waste acceptance procedures.	Agreed time table with NRW

DRAWINGS

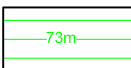
HNDY/GMP/01 Monitoring Location Points



Legend:



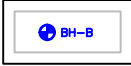
Environmental Permit Boundary
Reference BT1088ID



Permitted Restoration Contours



Location of Proposed Internal
Landfill Gas Monitoring Boreholes



Approximate Location of Existing
External Monitoring Boreholes



Approximate Location of Proposed
External Monitoring Boreholes

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

Consultant:



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Site:	HENDY QUARRY LANDFILL		
Drawing Title:	LANDFILL GAS MONITORING LOCATION POINTS		
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J.D.	21 August '08	1:2,000	A3
Status:	Final Revision:	Drawing No:	
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