Watlington Quarry — Landfill Gas Screening Report

A117209
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1.0 INTRODUCTION

1.1 REPORT CONTEXT

1.1.1 Mick George Limited (Mick George) has commissioned Tetra Tech to undertake a Landfill Gas Screening Report for Watlington Quarry.

1.1.2 The objective of the Landfill Gas Screening Report is to support the application of a bespoke waste disposal permit and to assess the potential risk to sensitive receptors associated with landfill gas.

1.1.3 The potential source of landfill gas (LFG), potential pathways through the geosphere and atmosphere by which LFG can migrate and the potential receptors are identified.

1.1.4 The proposed waste types, which would be accepted at the site, are inert in nature. Consequently, a quantitative gas risk assessment (for example using the Environment Agency's approved GasSim software) is not considered appropriate and has not been used. However, this qualitative gas risk assessment uses a number of sources of guidance, which include:-

- Environment Agency (2007), 'Potential Gas Production From Landfilling Of Inorganic Wastes', Report reference SC030144/SR, March 2007;
- Environment Agency (2007), 'Investigation And Quantification Of Gas Produced From Landfilling Of Inorganic Wastes' Report reference P1-516/2b, August 2007; and
- Environment Agency, Landfill Technical Guidance 03 (LFTGN03) 'Guidance on the Management of Landfill Gas', September 2004.

2.0 SITE DESCRIPTION

2.1 SITE LOCATION

2.1.1 The application site forms part of the wider Watlington Quarry site in Norfolk and is located approximately 1.5km north east from the village of Watlington. The site is centred at approximate National Grid Reference (NGR) TF 63427 11556 and the environmental permit boundary is shown on Drawing Number MGL/A117209/PER/01.

2.2 SITE SETTING

2.1.2 Access to the site is achieved from an access road of Watlington Road located to the north of the site. Beyond the wider quarry site, the site is surrounded by agricultural land. The nearest residential property is considered to be Oak House which is located approximately 575m north of the application site.

2.1.3 The site is located 1.4km south of the River Nar within the River Nar valley. The surface water features, and groundwater elevation are controlled by the artificial drainage channels which all ultimately drain to the Polver Drain, via Hobbs Drain to the north. The site itself and the low-lying area surrounding the site falls within the Inland Drainage Board (IDB) area of the East of Ouse, Polver and Nar IDB. Hobb's Drain, is located approximately 400m northwest of the site and drains a substantial catchment to the west of the site and is set in a shallow valley. Hobb's Drain flows northwards to join the Polver Drain which, in turn, flows eastwards to join with the River Great Ouse.

2.1.4 The Kimmeridge Clay and the Nar Valley sediments to the north of the site are classified as Unproductive Strata. The Tottenhill Gravels and the Sandringham Sands Formation are classified as Secondary A and Principal Aquifers respectively. The site is not located within a source protection zone (SPZ), the closest of which is associated with the West Melbury Marly chalk abstraction some 8.8km to the east at Narborough. These abstraction points are physically and hydrogeologically separate from the gravel deposits.

2.1.5 According to the Multi Agency Geographic Information for the Countryside's (MAGIC) website, there are two Local Wildlife Sites (LWS) within of the site, Tottenhill Village Green located approximately 157m south east and Tottenhill Row Common located 367 north west of the site. The MAGIC website also indicated that there is a number of priority habitats adjacent to the site and within the vicinity (full list is displayed in Table 2 of the ERA).

3.0 CONCEPTUAL LANDFILL GAS MODEL

3.0.1 The source, pathway, receptor approach has been used to assess the potential risks of landfill gas from the Wakerley Inert Landfill site.

3.1 SOURCE

3.1.1 The main potential source for this gas risk assessment is the inert waste that would be deposited permanently Watlington Quarry. The site will be progressively infilled and it is estimated that the annual input rate will be in the region of 250000m^3 per annum with a total volume of 800,000m^3. The definition of inert waste is provided in Regulation 35(2) (d) and Schedule 10 of the Environmental Permitting (England and Wales) Regulations 2016 (as amended) which states:-

'inert waste' means waste that does not undergo any significant physical, chemical or biological transformations. Inert waste will not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm to human health. The total leachability and pollutant content and the ecotoxicity of its leachate are insignificant and, in particular, do not endanger the quality of any surface water or groundwater.'

3.1.2 Regulation 35(2) (d) of the Environmental Permitting Regulations provides a table of materials that can be assumed to be inert because of their nature and source. As a result, these materials can be accepted at an inert landfill site without testing. To meet the inert classification, only wastes identified in **Table 1**below will be accepted at the site without testing.

Table 1: Inert wastes which do not require testing

EWC Code	Description
01	**WASTES RESULTING FROM EXPLORATION, MINING, QUARRYING AND PHYSICAL AND CHEMICAL TREATMENT OF MINERALS**
01 04	Wastes from physical and chemical processing of non-metalliferous minerals
01 04 08	Waste gravel and crushed rocks other than those mentioned in 01 04 07
01 04 09	Waste sand and clays
17	**CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOILS FROM CONTAMINATED SITES)**
17 01	Concrete, bricks, tiles and ceramics
17 01 01	Concrete
17 01 02	Bricks
17 01 03	Tiles and ceramics
17 01 07	Mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06

17 05	Soil (including excavated soil from contaminated sites) soil and dredging spoil
17 05 04¤	Soil and stones other than those mentioned in 17 05 03
19	**WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION / INDUSTRIAL WASTE**
19 12	Wastes from the mechanical treatment of wastes
19 12 09	Minerals (for example sand, stones)
19 12 12	Other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11
20	**MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES INLCUDING SEPARATELY COLLECTED FRACTIONS**
20 02	Garden and park wastes
20 02 02	Soil and stones

**Selected construction and demolition waste with low contents of other types of materials (like metals, plastic, soil, organics, wood, rubber etc). The origin of the waste must be known.*

- No C&D waste from construction, polluted with inorganic or organic dangerous substances e.g. because of production processes in the construction, soil pollution, storage and usage of pesticides or other dangerous substances etc., unless it is made clear that the demolished construction was not significantly polluted.

- No C&D waste from constructions treated, covered or painted with materials, containing dangerous substances in significant amounts.

- The origin of the wastes must be known and they will have low contents (<5% by mass per load of other types of materials (like metals, plastics, soil, organics, wood, rubber, etc).

3.1.3 Landfill gas is produced by the biological degradation of organic components. Microbial processes degrade organic matter in the absence of oxygen and produce methane and carbon dioxide. In terms of landfill gas generation at the Watlington Quarry, no organic matter will be present, and it is therefore considered that inert waste materials deposited at the site will not give rise to significant quantities of landfill gas. The potential for the generation of landfill gas is therefore considered to be negligible.

3.1.4 The site will have strict waste acceptance procedures in place to ensure that only inert wastes are accepted at the site. This will minimise the risk of acceptance of non-conforming wastes, such as biodegradable wastes, which would have the potential to cause the generation of landfill gas.

3.1.5 Taking into account the above, it is considered unlikely that there will be any source of significant landfill gas generation at the site.

3.2 PATHWAYS

3.2.1 A number of potential pathways exist which would provide a link between the sensitive receptors and landfill gas generated within the landfill site. The Environment Agency's guidance document LFTGN03 'Guidance on the Management of Landfill Gas' (September 2004) identifies the following generic potential pathways:-

- Direct release to atmosphere;
- Sub-surface migration, through the ground or along service ducts or pipelines;
- Indirect release to atmosphere e.g. from sub-surface landfill gas migration; and
- Direct release of combustion products to atmosphere e.g. from flares/engines.

3.2.2 It is considered that the primary pathway for landfill gas generated within the site would be vertically to atmosphere through unrestored areas of waste. Pathways that are considered to be less preferential would be vertically through the restored areas of the site or laterally through the engineered side slope liner.

3.2.3 The Environment Agency's Report 'Investigation and Quantification of Gas Produced from Landfilling of Inorganic Wastes' (August 2007) considers the potential for landfill gas to migrate from an inorganic or low carbon landfill site. The report acknowledges that inorganic waste does not generate substantial quantities of landfill gas, and that there will generally be an insufficient pressure differential to drive the landfill gas through low permeability waste. Thus, as there will be an insignificant quantity of organic/biodegradable waste deposited within the proposed site, it is considered that there will be an insufficient driving pressure for the gas to create a viable pathway.

3.2.4 Furthermore, the waste will be deposited within a site which has an non-engineered clay base and an engineered side slope liner (geological barrier) with a hydraulic permeability of less than 1 x 10m-7m/s. On completion of filling to final levels, the site will be capped with 1m of restoration soils comprising not less than 0.3m of topsoil. In accordance with the requirements of the Landfill Directive, an engineered cap (clay or plastic) is not required.

3.2.5 In addition to the extremely limited potential for landfill gas migration due to the negligible quantities of organic/biodegradable waste that will be deposited, the proposed engineering design will further limit the potential for any viable pathways.

3.3 RECEPTORS

3.3.1 LFTGN 03 'Guidance on the Management of Landfill Gas' details the process of prioritising receptors which is a qualitative process based on consideration of the estimated impact, the sensitivity of the receptor and the likelihood of exposure.

3.3.2 The details of all receptors within 1km of the waste operation boundary are summarised in Table 2 below.

Table 2: Location of Potential Receptors in relation to waste operations

ID	Receptor	Direction from Operational Area	Minimum Distance from the Permit Application Boundary (approx. m)
Designated ecological habitats/sites of geological importance e.g. Ramsar, SAC, SPA, SSSI, LNR, NNR, LWS			
1	Tottenhill Village Green (LWS)	SE	175
2	Tottenhill Row Common (LWS)	NW	367
Domestic Dwellings			
3	Oak House	N	575
4	Residential area of Tottenhill	SE	193
5	Residential area of Watlington	SW	840
6	Residential area of Tottenhill Row	NW	560
7	Laundry Cottage	NW	460
Commercial and Industrial Premises			
N/A			
Highways or Minor Roads			
8	A10	N	590
9	Watlington Road	N	435
Priority Habitats			
10	Priority Habitat Inventory – Deciduous Woodland	E	Adjacent
11	Priority Habitat Inventory – Deciduous Woodland (Runs Wood)	S	Adjacent
12	Priority Habitat Inventory – Deciduous Woodland	NW	Adjacent
13	Priority Habitat Inventory – Deciduous Woodland (Long Wood)	W	530
14	Priority Habitat Inventory – Deciduous Woodland (Oak Wood)	N	631
15	Priority Habitat Inventory – Deciduous Woodland (The Spinney)	E	440
16	Priority Habitat Inventory – Deciduous Woodland (Willow Holt)	NE	940
17	Priority Habitat Inventory – Deciduous Woodland (Whin Common)	SE	Adjacent
18	Priority Habitat Inventory – Deciduous Woodland	S	300
19	Priority Habitat Inventory – Deciduous Woodland	SE	295
20	Priority Habitat Inventory – Deciduous Woodland	SE	617
21	Priority Habitat Inventory – Deciduous Woodland	S	772
22	Priority Habitat Inventory – Deciduous Woodland	NW	410

23	Priority Habitat Inventory – Deciduous Woodland	NW	565
24	Priority Habitat Inventory – Deciduous Woodland (Davidson's Plantation)	NW	980
25	Priority Habitat Inventory – Traditional Orchard	SW	900
Sensitive land uses e.g. farmland, allotments, commercial fish farms			
26	Woodlands Farm	E	490
27	East Hall Farm	E	894
28	Meadow Farm	SE	720
29	Thieves Bridge Farm	S	975
Surface Water e.g. rivers and streams			
N/A			
Groundwater (sensitivity)			
With reference to the Multi Agency Geographic Information for the Countryside's (MAGIC) website under the Groundwater Vulnerability Map, the site is situated within an area of Medium – Low vulnerability Minor Aquifer High vulnerability but does not lie in a Groundwater Source protection Zone. In terms of aquifers, the MAGIC website shows that the site doesn't overlie an aquifer in bedrock however it does overlie a secondary A aquifer in the superficial deposits			

3.4 CURRENT MONITORING

3.4.1 Landfill gas monitoring is currently undertaken at boreholes BH 1, BH 2, BH 3, BH 4, and BH 5.

3.4.2 A copy of gas monitoring data is provided in Appendix A of this report. The monitoring data in Appendix A indicates that the background concentrations of methane are negligible in all of the boreholes. The recorded methane levels did not exceed 0.0% v/v in every borehole.

3.4.3 The levels of carbon dioxide range between 0.2% v/v to 4.8% v/v with the highest % v/v recorded at BH 2 in August 2019.

3.4.4 Concentrations of oxygen recorded during the monitoring period were at or close to normal atmospheric levels.

3.5 ENVIRONMENTAL ASSESSMENT LEVELS (EALS)

3.5.1 For the sub-surface migration of landfill gas, Technical Guidance Note LFTGN03 'Guidance on the Management of Landfill Gas' considers that an appropriate environmental benchmark for methane and carbon dioxide is 1% and 1.5% by volume above background respectively. A suitable site-specific Environmental Assessment Level (EAL) for methane at the site is considered to be 1.0% by volume for all landfill gas monitoring boreholes.

3.5.2 In terms of compliance levels for carbon dioxide, industry guidance document 'Perimeter soil gas emissions criteria and associated management' (January 2011) states:-

'Carbon dioxide is a poor choice of gas to regulate emissions from landfills because there are alternative sources in the sub-surface. Because emission based regulation of a gas generated naturally in the environment at concentrations 0 -20% is not logical, carbon dioxide should not be used for regulating the sub-surface strata outside a landfill unless there is a site specific high risk receptor nearby, such as an underground confined space....'

'An alternative to regulating on compliance limits is to regulate on the reaction to exceeding a carbon dioxide action level'.

3.5.3 This is also addressed in the Environment Agency's Position Statement 'Industry code of practice on perimeter soil gas' (August 2011) which states:-

'We will require operators to set action levels as part of their gas management plan and to monitor perimeter boreholes and assess carbon dioxide concentrations against the action level to prompt investigatory action and inform regular reviews of the conceptual model'.

3.5.4 The document considers that:-

For every well the action level will be 1% carbon dioxide above the highest carbon dioxide concentration if the highest carbon dioxide concentration is less than 5%;

For every well the action level will be 2% carbon dioxide above the highest carbon dioxide concentration if the highest carbon dioxide concentration is between 5 - 10%; and

3.5.5 The site specific EALs for methane and carbon dioxide are shown in Table 3 below which will be subject to review following the completion of 12 months background monitoring.

Table 3: Site Specific EALS for Methane and Carbon Dioxide

Borehole Reference	Parameter	Proposed Compliance Levels (% by vol)	Monitoring Frequency	Proposed Action Levels (% by vol)
BH 1, BH 2, BH 3, BH 4 and BH 5	Methane	1.0	Quarterly	0.5
BH 1	Carbon Dioxide	None	Quarterly	1.9
BH 2				5.8
BH 3				2.8
BH 4				5.2
BH 5				2.2

4.0 LANDFILL GAS RISK ASSESSMENT

4.0.1 Landfill Technical Guidance Note LFTGN03 'Guidance on the Management of Landfill Gas' provides guidance on the level of risk assessment that is considered appropriate for different types of sites and states that Tier 1 Hazard Identification and Risk Screening should be sufficient to deal with most of the risks from inert sites. However, this is also dependent on the level of risk and uncertainty specific to the site.

4.0.2 Watlington Quarry is predicted to generate negligible quantities of landfill gas due to the inert nature of the waste. Furthermore, the operator's detailed waste acceptance procedures and Environmental Management and Monitoring Plan will ensure that only inert waste is deposited at the site, thus removing any uncertainty with respect to the potential for the deposition of non-inert wastes. Taking these factors into consideration, it is concluded that the overall level of risk associated with the site is low. A qualitative risk assessment is therefore considered appropriate in order to determine the level of risk from landfill gas at the site.

4.1 ACCIDENTS AND THEIR CONSEQUENCES

4.1.1 The Environment Agency's guidance (LFTGN03) requires that a number of accident and failure scenarios be assessed in order to quantify the impact of given events. The reliability of landfill gas control measures and site engineering should be assessed in the risk assessment and the main hazards that could lead to accidental emissions should be identified. LFTGN03 provides examples of general categories of accidents that may potentially affect landfill gas control:

- Loss of containment e.g. leakage, liner failure, spillage;
- Loss of collection and/or treatment capability e.g. failure of pipework, control system, etc;
- Explosions and fires e.g. deep seated landfill fire; and
- Failure of leachate extraction system and the effect on landfill gas extraction.

4.1.2 These scenarios have been assessed as part of the gas risk screening process.

4.2 QUALITATIVE LANDFILL GAS RISK ASSESSMENT

4.2.1 The potential hazards that exist from landfill gas are:-

- Toxicity (acute and chronic);
- Ecotoxicity;

- Fire and explosion;
- Asphyxiation; and
- Odour

4.2.2 The trace components of landfill gas pose an odour and toxicity risk whilst the bulk gases pose a risk of explosion and asphyxiation, although carbon dioxide is also toxic and should be considered in the assessment of toxicity. Explosion and asphyxiation risk is generally related to sub-surface migration and accumulations in enclosed spaces, such as residential or commercial properties, or underground services. Environment Agency document LFTGN03 states that whilst this is more difficult to quantify, for the risk screening stage, the impact assessment should be based on:

- The presence of potential pathways and site specific receptors; and
- A qualitative assessment of the severity of the consequences.
- The qualitative assessment for potential receptors located within 1km of the site is provided in Table 2.

Table 4: Qualitative Risk Assessment

Receptor	Hazard	Sensitivity of Receptor	Likelihood of Exposure
Residential areas	Odour, toxicity, asphyxiation and eco-toxicity	High	Very Unlikely
Public Highways	Odour, toxicity, asphyxiation and eco-toxicity	High	Very Unlikely
Sensitive Land Uses	Odour, toxicity, asphyxiation and eco-toxicity	High	Very Unlikely
Surface Water	Odour, toxicity, asphyxiation and eco-toxicity	High	Very Unlikely

4.2.3 Table 4 details the qualitative risk assessment which has been undertaken for the accident and failure scenarios using the risk assessment process and scoring system set out within Environment Agency document LFTGN03. Table 5 provides a justification of the 'likelihood' scores for each of the accident or failure scenarios set out in Table 4.

Table 5: Qualitative Risk Assessment for Accident and Failure Scenarios

Accident/Failure Scenario	Likelihood	Severity of Consequence	Score	Magnitude of Risk
Loss of containment (e.g. leakage, liner failure, spillage)	Extremely unlikely (1)	Minor (1)	1	Insignificant
Loss of collection (e.g. pipework etc)	Extremely unlikely (1)	Minor (1)	1	Insignificant
Explosions and fires	Very unlikely (2)	Significant (3)	6	Insignificant
Leachate system failure	Extremely unlikely (1)	Minor (1)	1	Insignificant
Biodegradable waste input	Unlikely (3)	Significant (3)	9	Acceptable

Table 6: Justification for Assigned 'Likelihood' Scores

Accident/Failure Scenario	Justification for 'likelihood' score
Loss of containment (e.g. leakage, liner failure, spillage)	The site will be engineered to a high standard and the landfill containment system will be subject to Construction Quality Assurance (CQA) testing. It is therefore extremely unlikely that the containment system will fail or leak.
Loss of collection (e.g. pipework etc)	There will be no landfill gas collection system and any low or negligible concentrations of landfill gas would vent to atmosphere.
Explosions and fires	The proposed waste types are inert in nature and therefore will not be combustible or explosive. Waste acceptance procedures will ensure that potentially flammable or explosive materials are not accepted at the site.
Leachate system failure	The proposed waste types are inert in nature and will not generate leachate. Therefore, there will be no leachate collection or management system within the landfill.
Biodegradable waste input	The proposed waste types are inert in nature. However, all wastes entering the site will be subject to detailed waste acceptance procedures. Wastes will only be accepted onto the site if they comply with the list of wastes included in the permit. Basic characterisation will ensure that the waste is suitable for acceptance at the regulated facility however if there is uncertainty regarding the acceptance of wastes at the site, testing may be required. No wastes will be accepted onto the site if there is uncertainty as to its source, conformance with the conditions in the permit and/or its suitability for the intended use. Consequently, it is considered unlikely that biodegradable waste will be accepted at the site.

4.2.4 The results of the qualitative risk assessment show that the most significant accident /failure scenario is the acceptance of biodegradable waste into the landfill site which would arise from a failure in the operator's waste acceptance procedures.

4.2.5 As set out in the Operating Techniques (Appendix B of the Environmental Permit Application), there will be

strict waste acceptance procedures in place to minimise the risk of non-compliant wastes being accepted. All site staff will be made aware of the procedures and the requirements of the company Environmental Management. Furthermore, the Operating Techniques details the measures to be taken in the event that unauthorised waste is identified within a load.

4.2.6 As such, is it considered unlikely that biodegradable waste will be deposited within the landfill site.

5.0 GAS MANAGEMENT PLAN

5.1 CONTROL MEASURES

5.1.1 Negligible quantities of landfill gas are predicted to be generated from the site and no active gas management is therefore proposed within the site. The negligible quantities of landfill gas generated would vent passively to atmosphere from the body of waste.

5.2 LANDFILL GAS MONITORING PLAN

5.2.1 The landfill gas monitoring is carried out in accordance with the procedures set out in the Environment Agency's Guidance document LFTGN03 'Guidance on the Management of Landfill Gas'. The proposed monitoring programme is detailed in Table 7.

Table 7: Monitoring Programme

Location	Parameter	Monitoring Frequency
BH 1, BH 2, BH 3, BH 4, and BH 5	Methane, carbon dioxide, oxygen, meteorological data, atmospheric pressure, differential pressure, temperature	Quarterly

5.3 COMPLIANCE LEVELS

5.3.1 Compliance Levels have been set for each prior to the placement of waste within any landfill cell.

5.3.2 This Landfill Gas Risk Screening Report has demonstrated that the potential for the generation of landfill gas is low. However, an appropriate Action Plan is required in the unlikely event that Action Levels set for each borehole are exceeded. Action Levels will be set at a level which enables the site management to take timely and appropriate action, so that Compliance Levels are not exceeded. Further actions are however documented, in the event that both Action Levels and Compliance Levels are exceeded. The following sections set out the proposed Action Plan for Watlington Quarry.

5.4 ACTION PLAN

5.4.1 Action Levels for landfill gas will be set following a 12 month background monitoring period and implemented through a pre-operational condition. In the event of methane or flammable gas being recorded within the perimeter monitoring boreholes at concentrations exceeding 10% of the Lower Explosive Limit (LEL), i.e. 0.5% v/v, the following action will be taken:-

- The Landfill Manager will be informed; and
- The Landfill Manager will assess the risk and may increase the frequency of landfill gas monitoring to determine whether there is an increasing trend in gas concentrations. The Manager will inform the Environment Agency if the trend is considered to be rising.

5.4.2 In the event of methane or flammable gas being detected within the perimeter boreholes at concentrations exceeding 20% of the LEL i.e. 1.0% methane by volume, the following action will be taken:

- The Landfill Manager will be informed;
- The Landfill Manager will assess the risk and may increase the frequency of landfill gas monitoring to determine whether there is an increasing trend in gas concentrations. The Manager may inform the Environment Agency if the trend is considered to be rising;
- The Landfill Manager will make an assessment of whether any receptors are potentially at risk from elevated methane concentrations and if this is considered likely, the need for receptor monitoring will be determined;
- Regular monitoring of the perimeter boreholes will be undertaken until concentrations of methane recorded in the boreholes fall below 1% by volume (20% LEL) and the Landfill Site Manager determines that the normal frequency of monitoring can be resumed; and
- In the unlikely event that methane (flammable gas) concentrations continue to remain elevated, the Landfill Site Manager will determine if remedial action is required. Any action taken will be agreed with the Environment Agency and recorded in the Site Diary.

Carbon Dioxide

5.4.3 Action Levels for carbon dioxide will be set following a 12 month background monitoring period and implemented through a pre-operational condition. The concentrations will be derived using the highest background concentration (%v/v) recorded during the pre-operational phase plus 1.0%.

5.4.4 In the event of carbon dioxide being recorded within the perimeter monitoring boreholes at concentrations

exceeding the specified Action Levels, the following action will be taken.

- The Landfill Manager will be informed;
- The Landfill Manager will assess the risk and may increase the frequency of landfill gas monitoring to determine whether there is an increasing trend in gas concentrations. The Manager may inform the Environment Agency if the trend is considered to be rising.

5.5 IN WASTE BOREHOLE

5.5.1 In accordance with LFTGN03 in-waste landfill gas monitoring infrastructure will be installed within each completed cell or phase of filling as per MGL/A117209/MON/01 - Borehole Location Plan.

5.5.2 In-waste landfill gas monitoring will be carried out in accordance with the procedures set out in LFTGN03. The proposed monitoring programme is detailed in the **Table 8**.

Table 8: Monitoring Programme

Parameter	Monitoring Frequency
Methane, carbon dioxide, oxygen, meteorological data, atmospheric pressure, differential pressure, temperature.	Quarterly

6.0 CONCLUSION

6.0.1 The proposed waste types will be inert in nature and will not give rise to significant quantities of landfill gas. The negligible quantities of landfill gas generated are unlikely to be under significant pressure which will minimise the likelihood of gas migration. Furthermore, the site will be engineered with a low permeability clay side slope and basal liner, which will further reduce the risk of lateral gas migration. The risk to nearby sensitive receptors associated with the generation and migration of landfill gas is therefore considered to be low.

6.0.2 Background landfill gas monitoring has been undertaken during the pre-operational phase of the site. The results of the monitoring show that negligible concentrations of methane and low to slightly elevated background concentrations of carbon dioxide are recorded within the perimeter monitoring boreholes. These results have been used to set both Action Levels and Compliance Levels for the site.

6.0.3 Detailed waste acceptance criteria will be used to ensure that only inert wastes are accepted at the site. This will prevent unauthorised wastes being accepted. The absence of biodegradable material within the landfill site shall ensure that significant quantities of landfill gas are not produced within the site from waste and the risk to receptors remains low. Furthermore, this shall ensure that odour nuisance, vegetation stress and global atmospheric damage are also avoided.

6.0.4 This Landfill Gas Screening Report has determined that the site will not give rise to significant quantities of landfill gas due to the inert nature of the proposed waste types. The site will be engineered in accordance with the requirements of the Landfill Directive 1999/31/EC. It is considered that, with respect to landfill gas, the site will be compliant with the requirements of the Landfill Directive.

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