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**WROXTON FIELDS QUARRY LANDFILL GAS RISK
ASSESSMENT TO SUPPORT ENVIRONMENTAL PERMIT
APPLICATION - LANDFILL FOR INERT WASTE**

For
EARTHLINE LIMITED

May 2023

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WROXTON FIELDS QUARRY LANDFILL GAS RISK ASSESSMENT TO SUPPORT ENVIRONMENTAL PERMIT APPLICATION - LANDFILL FOR INERT WASTE

1. INTRODUCTION

1.1 Report Context

Wroxton Fields Quarry currently operates under extant Planning Permission 19/00407/CM which provides for mineral extraction (limestone and ironstone) and low-level restoration of the excavation void with indigenous material (overburden soils and crushing/screening fines) and suitably selected imported inert waste.

This report presents an Environmental Setting and Site Design (ESSD) and has been prepared to support an EPR Permit application to provide for site restoration to original levels in Phases 5a, 5b, 6a and 6b for agricultural use using indigenous material (overburden soils and crushing/screening fines) and imported inert waste at Wroxton Fields Quarry.

1.1.1 *Operator of the proposed installation*

Earthline Limited, The Upper Lime Kiln Works, Bytham Road, Ogbourne St. George, Marlborough, Wiltshire, SN8 1TD.

1.1.2 *Agent who completed this report*

GWP Consultants LLP, Upton House, Market Street, Charlbury, Oxfordshire, OX7 3PJ.

1.1.3 *Outline of the proposed installation*

The EPR Permit application is to provide for site restoration to original levels in Phases 5a, 5b, 6a and 6b for agricultural use using indigenous material (overburden soils and crushing/screening fines) and imported inert waste at Wroxton Fields Quarry.

Drawing No. ELWROX2207-1 shows the site location and Drawing No. ELWROX2207-2 shows the EPR Permit application area. Drawing No. ELWROX2207-3 shows the location of Phases 5a, 5b, 6a and 6b.

The EPR Permit application area is c. 21.9ha.

The inert landfill capacity to be provided for by the EPR Permit is c. 540,000m³, based on a tonnage of 1.0Mt and a conversion factor of 1.85t/m³. The rate of inert waste importation will be c. 110,000t – 150,000t depending on market conditions.

Details of the site setting and installation design are presented in the Environmental Setting and Site Design (ESSD) report prepared by GWP Consultants LLP (GWP) (GWP Report No. 210522) which accompanies the EPR Permit variation application (Appendix Hii) and which should be read in conjunction with this report.

1.2 Conceptual Model - Sources

The site will receive Landfill Directive compliant inert waste only.

The waste types provided for by the EPR Permit application are listed below in Table 1. These wastes are, by definition, of insignificant ecotoxicity and are not subject to bio-degradation and consequently they do not have the potential to generate landfill gas.

Given the inert nature of the waste and strict waste acceptance procedures and protocols, which will be put in place, there is no potential source of any significant quantities of landfill gas from the proposed landfill area. Therefore, there is no potential for landfill gas generation and no requirement for landfill gas management.

However, it is proposed that proportionate monitoring is undertaken to confirm that the site poses a negligible risk from landfill gas throughout the operational and post closure phases of site development.

Table 1 – Waste types

Waste types	
Exclusions	
Wastes having any of the following characteristics shall not be accepted: Consisting solely or mainly of dusts, powders or loose fibres Hazardous wastes Wastes in liquid form	
Waste Code	Description
10	WASTES FROM THERMAL PROCESSES
10 11	waste from manufacture of glass and glass products
10 11 03	waste glass-based fibrous materials
15	WASTE PACKAGING; ABSORBENTS, WIPING CLOTHS, FILTER MATERIALS AND PROTECTIVE CLOTHING NOT OTHERWISE SPECIFIED
15 01	packaging (including separately collected municipal packaging waste)
15 01 07	glass packaging
17	CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)
17 01	concrete, bricks, tiles and ceramics
17 01 01	Concrete ⁽²⁾
17 01 02	Bricks ⁽²⁾
17 01 03	Tiles and ceramics ⁽²⁾
17 01 07	mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06 ⁽²⁾
17 02	wood, glass and plastic
17 02 02	glass
17 05	soil (including excavated soil from contaminated sites), stones and dredging spoil
17 05 04	soil and stones (excluding topsoil and peat) other than those mentioned in 17 05 03 ⁽¹⁾
19	WASTES FROM WASTE MANAGEMENT FACILITIES, OFF SITE WASTE WATER TREATMENT PLANTS AND PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE
19 12	wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified
19 12 05	glass
19 12 09	Minerals (for example sand, stones) from the treatment of waste aggregates that are otherwise naturally occurring minerals – excludes fines from treatment of any non-hazardous waste or gypsum from recovered plasterboard ⁽²⁾
20	MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS
20 01	Separately collected fractions (except 15 01)
20 01 02	glass
20 02	garden and park wastes (including cemetery waste)
20 02 02	soil and stones (excluding topsoil and peat) ⁽¹⁾

¹ For the purposes of waste acceptance, soil includes naturally occurring sands and clays.

² Selected construction and demolition waste (C & D waste): with low contents of other types of materials (like metals, plastic, organics, wood, rubber, etc.). No C & D waste from constructions, 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.

If it is unsure whether the waste fulfils the definition of inert waste, or is uncontaminated, then testing of the waste must be undertaken to confirm compliance with the criteria for inert waste as specified in The Landfill (England and Wales) Regulations 2002 as amended. The origin of all waste must be known.

2. LANDFILL GAS RISK ASSESSMENT

2.1 The Nature of the Landfill Gas Risk Assessment

Environment Agency guidance proposes a tiered approach to risk assessment whereby the complexity of the assessment reflects the potential risk posed by a particular site, the sensitivity of the site settings and the probability of a risk being realised.

The initial risk screening is based upon the source – pathway – receptor approach. Whilst such an approach is iterative, with regular reviews built into the process, the initial Tier 1 risk screening has not identified a source of landfill gas. This indicates that no further assessment is required as without a source, the pathway – receptor linkages are academic and the site therefore presents a negligible risk to potential receptors.

However, for completeness, the following potential receptors for landfill gas have been identified.

- site operatives, visitors and passers-by;
- on-site offices;
- residential properties;
- crops in adjacent fields;
- global atmosphere.

Having completed the risk screening, it has been established that there is no source of landfill gas and therefore there is no need to move to more sophisticated forms of analysis. This is in accordance with available Environment Agency guidance (LFTGN03 – Guidance on the management of landfill gas). Strict management control and adherence to the waste acceptance criteria and protocols are considered sufficiently robust to ensure that the landfill gas source is demonstrably negligible and will remain negligible.

2.2 Proposed Assessment Scenarios

No further assessment is required as the risk screening completed in accordance with guidance provided by the Environment Agency (LFTGN03 – Guidance on the management of landfill gas) has revealed no potential for the generation of significant landfill gas.

2.3 Accidents and their Consequences

The only conceivable accident that would result in a release of landfill gas at this site is the accidental acceptance of biodegradable wastes. Due to the robust waste acceptance procedures which will be employed on site, it is considered highly unlikely that any biodegradable wastes will enter the site in significant quantities.

However, for the purposes of a simulated accident it has been assumed that c. 2000t of non-inert waste is accidentally accepted at the site during a single day. If it is conservatively assumed that 10% of this waste was biodegradable waste then the total gas yield can be calculated over a 1 year period from the following equation which assumes that each tonne of waste produces 10m³ of gas (which is an overestimate based on Environment Agency Guidance):

$$Q = M \times 10 \times T / 8760 \quad \text{or} \quad Q = 200 \times 10 \times 1 / 8760$$

Where:

Q = methane flow in m³/hour

M = annual quantity of biodegradable waste in tonnes

T = time in years

Even if such a set of circumstances were to arise, the gas production is estimated at only 0.228 m³/hr and this from an isolated location. This should be compared with a minimum flow for gas flaring of c. 50m³/hr. Clearly, any such accident would not be significant in altering the outcome of the screening risk assessment. Consideration of this highly unlikely accident reveals no elevated landfill gas risk to receptors around the site.

2.4 Numerical Modelling

No numerical modelling is required as the risk screening completed in accordance with guidance provided by the Environment Agency (LFTGN03 – Guidance on the management of landfill gas) has revealed no potential for the generation of significant landfill gas.

2.5 Risks to the Environment and Human Health

The landfill gas emissions estimated from the site are insignificant. Accordingly, there is no landfill gas risk associated with:

- sub-surface migration;
- atmospheric dispersion and odour;
- atmospheric pollution; or
- human exposure

or to the potential receptors for landfill gas listed in Section 2.1 above.

2.6 Landfill Gas Completion Criteria

Risk screening and simple risk assessment has indicated that even if a small amount of biodegradable waste is accidentally accepted at the site, this will not lead to landfill gas emissions which could cause pollution or harm to human health as landfill gas will preferentially migrate to the surface and disperse in the atmosphere.

Post-closure monitoring will be required to demonstrate that the landfill is performing as designed. The site will be considered to no longer pose a risk from landfill gas when the concentration compliance criteria have been met at the site for at least 2 years based on the Environment Agency guidance (Landfill (EPR 5.02) and other permanent deposits of waste; How to surrender your environmental permit).

3. LANDFILL GAS MANAGEMENT PLAN

3.1 Control Measures

No control measures are required as the risk screening completed in accordance with guidance provided by the Environment Agency (LFTGN03 – Guidance on the management of landfill gas) has revealed no potential for the generation of significant landfill gas.

3.2 Monitoring and Sampling Plan

Given the inert nature of the waste and strict waste acceptance procedures and protocols, and consistent with the findings of this LGRA, there is no potential source of any significant quantities of landfill gas from the proposed landfilling with imported inert waste.

However, it is proposed that proportionate monitoring is undertaken to confirm that the site poses a negligible risk from landfill gas throughout the operational phase and post closure phases of site development.

Landfill gas monitoring in 5 No. in-waste monitoring boreholes is proposed. Proposed monitoring locations are shown on Drawing No. ELWROX2207-17.

Landfill gas monitoring boreholes will be installed in accordance with a Construction Quality Assurance Plan approved by the Environment Agency. The landfill gas monitoring boreholes will be retro-drilled on a phased basis as soon as it is operationally practicable to do so once the landfill has reached final level.

The following schedule of landfill gas monitoring is proposed:

Table 2 – Landfill gas monitoring schedule

Monitoring point reference	Parameter	Monitoring frequency
IGW1, IGW2, IGW3, IGW4, IGW5 (to be retro-drilled at locations shown on Drawing No. ELWROX2207-17)	Oxygen Carbon dioxide Methane Atmospheric pressure Flow	Quarterly

Given that the acceptance of inert waste at the site will be strictly controlled using robust waste acceptance criteria and protocols, it is considered that landfilling with imported inert waste at Wroxton Fields Quarry will not result in any significant or measurable levels of landfill gas being produced.

In the unlikely event that significant concentrations of landfill gas are detected within monitoring boreholes, the frequency of monitoring will be increased and additional management procedures may be considered in consultation with the Environment Agency.

3.3 Post Closure Controls

At 6 months prior to completion of the site, a Post Closure Management Plan will be submitted to the Environment Agency detailing the proposed post closure monitoring programme. Following the approval of this Post Closure Management Plan, completion of the site and completion of immediate post closure monitoring (2 years), providing there have been no indications of groundwater contamination or landfill gas generation, then the EPR Permit will be surrendered. The Post Closure Management Plan will also detail the procedures to be adopted should compliance limits for landfill gas be exceeded.

Post-closure monitoring will be required to demonstrate that the landfill is performing as designed. The site will be considered to no longer pose a risk when compliance criteria have been met at the site for at least 2 years based on the Environment Agency Guidance (Landfill (EPR 5.02) and other permanent deposits of waste; How to surrender your environmental permit).

4. CONCLUSIONS – COMPLIANCE WITH THE LANDFILL DIRECTIVE

The Landfill Directive requires that appropriate measures are taken in order to control the accumulation and migration of landfill gas. As this site will not produce any significant landfill gas there are no measures required to control the accumulation and migration of gas. In this respect the site will be Landfill Directive compliant.

The Landfill Directive also requires that if the landfill is to receive biodegradable wastes the landfill gas will be collected, treated and where possible utilised. As this site will not accept any biodegradable wastes there are no requirements to collect, treat or use the gas. In this respect the site will be Landfill Directive compliant.

Given that the acceptance of inert waste at the site will be strictly controlled using robust waste acceptance criteria and protocols, it is considered that landfilling with imported inert waste and indigenous material (overburden soils and crushing/screening fines) in Phases 5a, 5b, 6a and 6b at Wroxton Fields Quarry will not result in any significant or measurable levels of landfill gas being produced.

GWP CONSULTANTS
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