



Sandgate Quarry

Environmental Permit Application

Gas Screening Report

June 2020

Prepared on behalf of Inert Recycling UK Ltd





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1.0 Introduction

1.1 Report Context

- 1.1.1 Inert Recycling UK Limited (Inert Recycling) has commissioned WYG to undertake a Gas Screening Report for the proposed waste operation at Sandgate Quarry. Inert Recycling seeks to gain a bespoke environmental permit for the permanent deposit of inert waste to land to facilitate the restoration scheme that has been approved by West Sussex County Council under planning permission WSCC/044/18/SR.
- 1.1.2 The objective of the Gas Screening Report is to support the application for the above proposal and to assess the potential risk to sensitive receptors associated with gas.
- 1.1.3 The potential source of the gas (LFG), potential pathways through the geosphere and atmosphere by which gas 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 Setting

2.1.1 Sandgate Quarry is located on the northern side of Washington Road (A283) approximately 500 metres (m) north of Sullington, 1 kilometre (km) to the east of Storrington and 2km north east of Washington. The A24 lies approximately 2km to the east. The site is approximately 7km to the north of Worthing. The site is situated outside the South Downs National Park with the border located on the southern side of Washington Road. The site is centred at National Grid Reference (NGR) TQ 10201 14110. The site lies in the District of Horsham and the County of West Sussex. The site location and boundary is detailed on Drawing Number INR/A113100/LOC/01.

2.1.2 The site is bounded by Sandgate Country Park to the north, Hampers Lane to the east, Washington Lane to the south and Water Lane to the west. Access to the site is gained via an access road off Water Lane located on the western side of the site. Within the wider environment agricultural land is located to the south of the site with residential areas located on the west, north and eastern sides of the site.

2.2 Geology

2.2.1 There are few superficial deposits within the site boundary and the surrounding area. With reference to the British Geological Survey (BGS) Geology Map of Britain, there are isolated areas of Head Deposits comprised of clay, silt, sand and gravel. The Head Deposits are sedimentary superficial deposits formed between 2,588 million years ago and the present during the Quaternary period.

2.2.2 The bedrock geology beneath the site is Folkestone Formation Sandstone, this is a sedimentary bedrock formed between 126.3 and 100.5 million years ago during the Cretaceous Period. The Folkestone Formation forms part of the Lower Greensand Group.

2.3 Hydrogeology

2.3.1 The Multi-Agency's Geographic Information for the Countryside's (MAGIC) website shows that the bedrock (Folkestone Formation) is a bedrock aquifer and is designated as a principal aquifer. Principal aquifers are described by the Environment Agency as *'layers of rock or drift deposits that have high intergranular and/or fracture permeability, meaning they usually*



provide a high

level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.'

2.4 Hydrology

- 2.4.1 According to the MAGIC website, the site is not situated within a Groundwater Source Protection Zone (SPZ). The nearest groundwater SPZ is located 1.9km north and 2km south of the site.
- 2.4.2 With the exception of the water bodies that are currently situated within the application boundary, the nearest surface water feature is a Tributary located north of the site running towards the north west located approximately 65m north of the site. In addition, the site is located within the catchment of the River Stor which is located 800m west of the site.
- 2.4.3 The site is located within Flood Risk Zone 1 which is land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding.

2.5 Ecology

- 2.5.1 A 'Nature and Heritage Conservation Screen' (EPR/JB3102MM/A001) was requested from the Environment Agency. The screen determines the presence of any site of nature and heritage conservation, or protected species or habitats that may be impacted by the proposal. A copy of the results is provided in the Environmental Risk Assessment (Appendix D of the main application)
- 2.5.2 The results of the screen identified the following within the relevant screening distance:-
- Sullington Warren – Site of Special Scientific Interest (SSSI);
 - Chantry Mill – SSSI;
 - Ancient Woodland; and
 - Protected Habitat – Deciduous Woodland.
- 2.5.3 In addition to the above, the MAGIC website shows that the South Downs National Park (SDNP), which is a nationally important landscape, is located along the southern boundary of the A283 on the southern side of the site.



- 2.5.4 In terms of non-statutory designated areas within the vicinity of the site, Sandgate Park Site of Nature Conservation Importance (SNCI) (local designations) lies immediately north of the site.



3.0 Conceptual Gas Model

3.0.1 The source, pathway, receptor approach has been used to derive a conceptual model showing the proposed engineering arrangements and to assess the potential risks of gas from the proposed activity at Sandgate Quarry.

3.1 Source

3.1.1 The main potential source for this gas risk assessment is the permanent deposit of waste to land at Sandgate Quarry. However, the waste types that will be accepted will be inert which will therefore not give rise to significant levels of gas. The definition of inert waste is provided in Regulation 35(2)(d) and Schedule 10 of the Environmental Permitting (England and Wales) Regulations 2010 (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. To meet the inert classification, only the wastes identified in Table 1 below will be accepted at the site.

Table 1: Proposed Waste Types

EWG Code	Description	Restriction
01	Waste resulting from exploration, mining, quarrying and physical and chemical treatment of minerals	
01 01	Wastes from mineral excavation	
01 01 02	Waste glass-based fibrous materials	Restricted to waste overburden and interburden only
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 04 04 06	
01 04 09	Waste sand and clay	
10	WASTES FROM THERMAL PROCESSES	
10 12	Wastes from manufacture of ceramic goods, bricks, tiles and construction products	



10 12 08	Waste ceramics, brick, tiles and construction products (after thermal processing)	
10 13	Wastes from manufacture of cement, lime and plaster and articles and products made from them	
10 13 14	Waste concrete	
17	CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)	
17 01	Concrete, bricks, tiles and ceramics	
17 01 01	Concrete	Selected C&D waste only
17 01 02	Bricks	Selected C&D waste only
17 01 03	Tiles and ceramics	Selected C&D waste only
17 01 07	Mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06	Selected C&D waste only. Metal from reinforced concrete must have been removed.
17 05	Soil (including excavated soil from contaminated sites), stones and dredging spoil	
17 05 04	Soil and stones other than those mentioned in 17 05 03	Excluding topsoil, peat; excluding soil and stones from contaminated sites
19	WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE 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 09	Minerals only	Wastes from the treatment of waste aggregates that are otherwise naturally occurring minerals. Does not include fines from treatment of any non-hazardous waste or gypsum from recovered plasterboard.
19 12 12	Other wastes from mechanical treatment of wastes other than those mentioned in 19 12 12	Restricted to crushed bricks, tiles, concrete and ceramics only. Metal from reinforced concrete must be removed. Does not include fines from treatment of any non-hazardous waste or gypsum from recovered plasterboard.
20	MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS	
20 02	Garden and park wastes (including cemetery waste)	
20 02 02	Soil and stones	Only from garden and parks waste; excluding topsoil, peat.

NB: 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 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 gas generation at Sandgate Quarry, no organic matter will be present and it is therefore considered that the inert waste materials deposited at the site will not give rise to significant quantities of gas. The potential for the generation of gas is therefore considered to be negligible.



- 3.1.4 Strict waste acceptance procedures will be put in place at the site 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 gas. Details of these procedures are provided in the Operating Techniques (Appendix B of the main application).
- 3.1.5 Taking into account the above, it is considered unlikely that there will be any source of significant 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 gas generated within the site. The Environment Agency's guidance document LFTGN03 entitled '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 gas migration; and
 - Direct release of combustion products to atmosphere e.g. from flares/engines.
- 3.2.2 The primary pathway for gas generated within this site would be vertically to atmosphere through the 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 gas to migrate from an inorganic or low carbon site. The report acknowledges that inorganic waste does not generate substantial quantities of gas, and that there will generally be an insufficient pressure differential to drive the gas through low permeability waste. Thus, as there will be an insignificant quantity of organic/biodegradable waste deposited within the proposed Sandgate Quarry 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 engineered attenuation layer with a hydraulic permeability of less than 1×10^{-8} m/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.

3.3 Receptors

3.3.1 Table 2 below lists all of the potential sensitive receptors located within 1km of Sandgate Quarry:

Table 2: Location of potential receptors within 1km of Sandgate Quarry

Receptor	Direction from operational area	Approximate minimum distance from proposed permit boundary (m)
Designated sites e.g. Ramsars, SAC, SPA, SSSI		
Sullington Warren SSSI	W	15
Chantry Mills SSSI	SW	215
Other Designations e.g. National Parks, AONB, World Heritage Site		
South Downs National Park/Heath Common LNR & LWS	S & E	15
Non-Statutory Designations		
Sandgate Country Park	N	Northern boundary
Historic Environment – Scheduled Monuments		
Group of three bowl barrows 350m SE of Trinity Methodist Church, forming part of a round barrow cemetery on Sullington Warren	W	300
Pair of bowl barrows 280m SE of Trinity Methodist Church, forming part of a round barrow cemetery on Sullington Warren	W	450
Bowl barrow 260m east of Trinity Methodist Church, forming part of a round barrow cemetery on Sullington Warren	W	500
Bowl barrow 200m SE of Trinity Methodist Church, forming part of a round barrow cemetery on Sullington Warren	W	510
Bowl barrow 240m east of Trinity Methodist Church, forming part of a round barrow cemetery on Sullington Warren	W	525
Bowl barrow 120m SE of Trinity Methodist Church, forming part of a round barrow cemetery on Sullington Warren	W	550
Bowl barrow 230m NE of Trinity Methodist Church, forming part of a round barrow cemetery on Sullington Warren	W	570
Historic Environment – Listed Buildings		
Jasmine Cottage School Cottage (Grade II)	W	15
Chanctonbury Lodge (Grade II)	E	260
Old Clayton (Grade II)	E	475
Leather Bottle Cottage (Grade II)		575
Penfold (Grade II)	N	600
Water Lane Farmhouse (Grade II)	N	610
The Old Rectory (Grade II)	S	615



Chantry Mill (Grade II)	SW	700
Barn at Sullington Farm to the NE of Sullington Manor House (Grade II)	S	725
Sullington Manor (Grade II)	S	775
The Parish Church of St Mary (Grade I)	S	800
The Old House Cottage (Grade II)	W	840
Byne (Grade II)	W	920
Snapes Cottage (Grade II)	N	950
No. 41 and the Garden Wall and Gate Piers to SE (Grade II)	W	950
Brook House (Grade II)	W	950
Brook Cottage (Grade II)	W	970
2 and 4, East Brook (Grade II)	W	1000
2, School Hill (Grade II)	W	1000
Domestic Dwellings		
Properties on Water Lane (north of site entrance)	W	20
Properties on Water Lane (south of site entrance)	W	25
Abbots Leigh	S	25
Sandgate Lodge	S	25
Properties on Badgers Holt	E	45
Properties on Sandgate Lane	N	175
Properties on John Ireland Way	E	325
Commercial and Industrial Premises		
Old Clayton Kennels and Cattery	E	450
Gatley's Country Store & Saddlery	S	525
Schools/Hospitals/Shops		
Gatley's Country Store & Saddlery	S	525
Thakeham Primary School	N	550
Steyning Grammar School	N	550
Browns Lane Pre-School	W	1000
Highways or Minor Roads		
Water Lane	W	Western boundary of site
A283 (Washington Road)	S	Southern boundary of site
Sullington Lane	S	15
Hampers Lane	E	215
Barns Farm Lane	SE	90
Public Rights of Way		
Footpath 3506	W	152
Footpath 2631	W	70
Bridleway 2627	E	280
Bridleway 2691	S	100
Priority Habitats		
Deciduous Woodland	N/A	Within permit boundary
Deciduous Woodland	N/A	Within permit boundary
Deciduous Woodland	N/A	Within permit boundary
Deciduous Woodland	N/A	Within permit boundary
Deciduous Woodland	N	Northern boundary of site
Deciduous Woodland	W	20
Deciduous Woodland – Ash Copse	S	150
Lowland Heathland	W	310
Deciduous Woodland	SW	410



Deciduous Woodland	NW	430
Deciduous Woodland	NE	480
Deciduous Woodland	N	550
Deciduous Woodland	E	650
Ancient Woodland		
Ancient & Semi-Natural Woodland	S	200
Ancient & Semi-Natural Woodland	S	390
Ancient & Semi-Natural Woodland	S	415
Ancient & Semi-Natural Woodland	SE	750
Sensitive Land Uses		
Greenacres Farm	S	15
Sandgate Farm	S	500
East Clayton Farm	E	580
Barns Farm	S	770
Orchardway Farm	N	790
Sullington Manor Farm	S	850
Chantry Farm	SW	850
Surface Water		
Water bodies within the quarry	-	On site
Tributary located north of the site running towards the north west	N	65
River Stor	W	800
Groundwater		
The site is located on a principal bedrock aquifer however the site is not located within a source protection zone.		

3.4 Current Monitoring

- 3.4.1 Gas monitoring is currently undertaken on a monthly basis at boreholes GW06, GW07, GW08, GW09 and GW10 since June 2018. The location of these boreholes is shown on Drawing Number INR/A113100/BHP/01.
- 3.4.2 A copy of the gas monitoring data is provided in Appendix A of this report.
- 3.4.3 The monitoring data in Appendix A indicates that the background concentrations of methane are negligible in all of the boreholes with the highest level recorded of 0.2% v/v in boreholes GW07 in October 2019. Monitoring data across the site indicates that methane is within the region of 0.0% to 0.2% v/v, with an overall average of 0.01% v/v.
- 3.4.4 The levels of carbon dioxide have been more variable, with a range from between 0.0% v/v to 7.9% v/v (recorded at borehole GW09 in October 2019) with an overall average of 1.38% v/v.
- 3.4.5 Concentrations of oxygen recorded during the monitoring period were at or close to normal atmospheric levels.



3.5 Environment Assessment Levels (EALs)

- 3.5.1 For the sub-surface migration of 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 Levels (EALs) for methane at the site is considered to be 1.0% by volume for all 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:-
- 3.5.3 *'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....'*
- 3.5.4 *'An alternative to regulating on compliance limits is to regulate on the reaction to exceeding a carbon dioxide action level'.*
- 3.5.5 This is also addressed in the Environment Agency's Position Statement 'Industry code of practice on perimeter soil gas' (August 2011) which states:-
- 3.5.6 *'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'.*
- 3.5.7 The above document considers that for background Carbon Dioxide concentrations between 0 to 20% by volume, it is appropriate in this circumstance to set limits in accordance with the ICoP and therefore Carbon Dioxide action levels have been proposed based on monitoring data obtained to date. The site specific EALs for methane and carbon dioxide are shown in Table 3 below.
- 3.5.8 The industry guidance document 'Perimeter soil gas emissions criteria and associated management' (January 2011) states for:-
- 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
- For every well the action level will be 3% carbon dioxide above the highest carbon dioxide concentration if the highest carbon dioxide concentration is between 10 - 20%.

3.5.9 This means that for each borehole an action level should be calculated separately as follows:-

- All boreholes apart from GW09 and GW10 should have an action level 1% above the highest monitoring level; and
- Boreholes GW09 and GW10 should have an action level 2% above the highest monitoring level.

3.5.10 For methane, as the majority of the boreholes show levels of 0.0% v/v, it is appropriate to assign an EAL of 1.0% respectively to the existing background levels as is consistent with the ICoP, with an action level for methane of 0.5% v/v above background.

Table 3: Site Specific EALs for Methane and Carbon Dioxide

Monitoring Location	Parameter	Proposed Compliance Level (v/v%)	Monitoring Frequency	Proposed Action Level (v/v%)
All locations	Methane	1.0	Monthly	0.5
GW06	Carbon Dioxide	-	Monthly	2.9
GW07		-		3.9
GW08		-		5.1
GW09		-		9.7
GW10		-		8.5



4.0 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 Sandgate Quarry is predicted to generate negligible quantities of gas due to the inert nature of the waste. The Operator has strict waste acceptance procedures which will be implemented to 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. It is therefore 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 gas at the site.

4.1 Accidents and Their Consequences

4.1.1 The Environment Agency's guidance (LFTGN03) requires a number of accident and failure scenarios to be assessed in order to quantify the impact of given events. The reliability of 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 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; and
- Failure of leachate extraction system and the effect on gas extraction.

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

4.2 Qualitative Gas Risk Assessment

4.2.1 The potential hazards that exist from gas are:-

- Toxicity (acute and chronic);
- Ecotoxicity;
- Fire and explosion;

- Asphyxiation; and
- Odour.

4.2.2 The trace components of 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 risks are 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.

4.2.3 A qualitative assessment for potential receptors located within 1km of the site is provided in Table 3.

Table 3: Qualitative Risk Assessment

Receptor	Hazard	Sensitivity of Receptor	Likelihood of Exposure
Designated sites listed in Table 2	Eco-toxicity	Low	Very Unlikely
Domestic dwellings listed in Table 2	Odour, toxicity, asphyxiation	High	Very Unlikely
Workforce of commercial and industrial premises listed in Table 2	Odour, toxicity, asphyxiation	High	Very Unlikely
Schools and shops listed in Table 2	Odour, toxicity, asphyxiation	High	Very Unlikely
Users of public Rights of Way footpaths and bridleways listed in Table 2	Odour, toxicity, asphyxiation	High	Very Unlikely
Priority habitats and sensitive land uses listed in Table 2	Eco-toxicity	Low	Very Unlikely

4.2.4 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 6 provides a justification of the 'likelihood' scores for each of the accident or failure scenarios set out in Table 5.

Table 4: Qualitative Risk Assessment for Accident and Failure Scenarios

Accident/Failure Scenario	Likelihood	Severity of Consequence	Score	Magnitude of Risk
Loss of containment (e.g.	Extremely unlikely (1)	Minor (1)	1	Insignificant



leakage, liner failure, spillage)				
Explosions and fires	Extremely unlikely (1)	Minor (1)	1	Insignificant
Biodegradable waste input	Unlikely (3)	Significant (3)	9	Acceptable

Table 5: Justification for assigned 'likelihood' scores

Accident/Failure Scenario	Justification for 'likelihood' score
Loss of containment (e.g. leakage, attenuation layer failure, spillage)	The site will be engineered to a high standard and the containment system will be subject to Construction Quality Assurance (CQA) testing. It is therefore extremely unlikely that the containment system will fail or leak.
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.
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.

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

4.2.6 As set out in the Operating Techniques (Appendix B of the main 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 these procedures and the requirements of the company policy. Furthermore, the Operating Techniques details the measures to be taken in the event that unauthorised waste is identified within a load.

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



5.0 Gas Management Plan

5.1 Control Measures

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

5.2 Gas Monitoring Plan

5.2.1 In accordance with the Environment Agency’s ‘Waste Recovery Plans and Permits’ guidance, if an operator intends to deposit waste more than 2m below the surrounding ground level, they must monitor the waste for methane, carbon dioxide and oxygen. The atmospheric pressure must also be recorded when taking gas readings.

5.2.2 Gas monitoring boreholes have been installed around the site, as shown on Drawing Number INR/A113100/BHP/01. The boreholes are currently monitored on a monthly basis for concentrations of methane, carbon dioxide and oxygen.

5.2.3 Gas monitoring will be carried out in accordance with the procedures set out in Environment Agency’s ‘Waste Recovery Plans and Permits’ guidance. The proposed monitoring programme is detailed in Table 7 below.

Table 7: Proposed Monitoring Programme

Borehole Reference	Parameter Recorded	Monitoring Frequency
GW06, GW07, GW08, GW09 and GW10	Methane, carbon dioxide, oxygen, meteorological data, atmospheric pressure, differential pressure, temperature.	Monthly for 12 months (i.e. 12 data sets) then quarterly.

5.3 Compliance Levels

5.3.1 Compliance Levels have been set for each borehole, based on guidance set out in Environment Agency Technical Guidance Note 03 (LFTGN03). These Compliance Levels are detailed within Table 3 of this Gas Screening Report and are based on concentrations of 1% above agreed background levels for methane. Compliance Levels will be reviewed following the collection of 12 months of gas monitoring data, and if required they will be revised accordingly.

5.3.2 This Gas Risk Screening Report has demonstrated that the potential for high concentrations of



gas is low due to the nature of the waste. However, an appropriate Action Plan is required in the unlikely event that Action Levels set for each borehole are exceeded.

5.4 Action Plan

Methane

5.4.1 Action Levels for gas have been set in Table 3, which give Inert Recycling the opportunity to take timely and appropriate action in order to avoid the Compliance Levels being exceeded. 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% by volume, the following actions will be taken:

- The Site Manager will be informed;
- The Site Manager will assess the risk and may increase the frequency of 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 unlikely event that methane or flammable gas is being detected within the perimeter boreholes at concentrations exceeding 20% of the LEL, i.e. 1% methane by volume, the following actions will be taken:-

- The Site Manager will be informed;
- The Site Manager will assess the risk and may increase the frequency of 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;
- Monitoring of the perimeter boreholes will be undertaken daily until the concentrations of methane recorded in the boreholes fall below 1% by volume (20% LEL) and the Site Manager determines that the normal frequency of monitoring can be resumed; and
- If methane (flammable gas) concentrations continue to remain elevated, the 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 have been set in Table 3, which currently equate to the highest background concentration (% by volume) recorded during the pre-operational phase plus a variable amount above background. The Action Levels will be reviewed at the end of this period.



5.4.4 In the event of carbon dioxide being recorded within the perimeter monitoring boreholes at concentrations exceeding the Action Levels specified in Table 3, the following action will be taken.

- The Site Manager will be informed;
- The Site Manager will assess the risk and may increase the frequency of 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.



6.0 Conclusion

- 6.0.1 The proposed waste types to be accepted for infilling at Sandgate Quarry will be inert in nature and therefore will not give rise to significant quantities of gas. The qualitative risk assessment which was conducted in accordance with Environment Agency document LFTGN03 determined that the negligible quantities of gas generated are unlikely to be under significant pressure which will minimise the likelihood of gas migration.
- 6.0.2 As set out in the Operating Techniques of this Environmental Permit Application (Appendix B of the main application), detailed waste acceptance criteria will be implemented to ensure that only inert wastes listed in Table 1 of this report are to be accepted at Sandgate Quarry. The waste acceptance criteria will prevent unauthorised waste being accepted. Due to the nature of the inert waste to be accepted, this will ensure the absence of biodegradable material within the site. As a result, this will ensure that significant quantities of gas are not produced within the site from waste and risk to receptors remain low. Furthermore, this shall ensure that odour nuisance, vegetation stress and global atmospheric damage are also avoided.
- 6.0.3 This Gas Screening Report has determined that the site will not give rise to significant quantities of 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 gas, the site will be compliant with the requirements of the Landfill Directive.



Drawings

INR/A113100/LOC/01 – Site Boundary and Location Plan

INR/A113100/BHP/01 - Borehole Plan



Appendices



Appendix A – Gas Monitoring Data