

Lamby Way Open Windrow Composting Facility

Kelda Organic Energy (Cardiff) Limited

Environmental Permit (EP) Partial Transfer Application

Site Specific Bioaerosol Risk Assessment (SSBRA)

SLR Ref: 407.04012.00009/SSBRA



February 2015

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Drawing 001	Site Location Plan
Drawing 002	Environmental Permit Boundary and Site Layout
Drawing 003	Sources, Pathways and Receptors
Drawing 004	Cultural and Natural Heritage

1.0 INTRODUCTION

Kelda Organic Energy (Cardiff) Limited (Kelda) has instructed SLR Consulting Limited (SLR) to prepare a Site Specific Bioaerosol Risk Assessment (SSBRA) to support the operations at the Open Windrow Composting (OWC) Facility.

The facility will treat green waste by open-windrow composting. As a natural effect of receiving, handling and processing waste including the aerobic decomposition of waste by microorganisms, the potential exists for the release of bioaerosols from the site.

The objective of the SSBRA is to assess the potential for significant risks to human health at potentially sensitive receptors within the vicinity of the plant as a result of bioaerosol releases and to demonstrate that bioaerosols can be managed to minimise their release to the environment.

2.0 RELEVANT GUIDANCE AND STANDARDS

The risks associated with bioaerosol release from composting and the potential impacts have been considered in detail in literature studies however there remains a lack of knowledge and scientific consensus with regards to dispersal of bioaerosols and the exposure to sensitive receptors¹.

The Environment Agency (EA) has issued an interim position statement on composting and potential health effects from bioaerosols. In the absence of specific guidance produced by Natural Resources Wales (NRW), this bioaerosol risk assessment has been undertaken in accordance with EA guidance for the evaluation of bioaerosol risk assessments for composting facilities².

Where a new composting facility is to be located within 250m of a sensitive receptor, the EA requires an SSBRA to be undertaken to account for the release of potentially harmful bioaerosols³.

For new permit applications, the EA's position statement states that "*For some time we have required applicants for environmental permits for new composting operations within 250 metres of workplaces or dwellings to carry out a [SSBRA] in support of the permit application. Before granting a permit we need to be satisfied that the SSBRA shows that bioaerosols can, and will, be maintained no higher than acceptable levels at the sensitive receptors.*"

The interim position for such sites is that, subject to the SSBRA assessment, applicants will be issued permits where:

- a) *the maximum quantity of waste handled at any one time does not exceed 500 tonnes, or*
- b) *if the quantity of waste handled exceeds 500 tonnes, the operations are carried out in a way and with the necessary measures (e.g. negative aerations, enclosure) to ensure that they are not likely to result in the uncontrolled release of high levels of bioaerosols.*"

The statement goes on to state that "*Similar considerations may apply to permit variations, depending on the scale and nature of the proposed variation*". However no further guidance is provided within the statement on the scope of considerations for variation type i.e minor technical, normal or substantial variation or examples based on the nature of the permit variation.

2.1 Receptors

Human health and welfare is the focus for SSBRA's. EA guidance makes reference to achieving acceptable levels of bioaerosols at '*sensitive receptors*'. In the context of a SSBRA, a sensitive receptor is defined as meaning people likely to be within a 250m range

¹ Wéry N – Bioaerosols from Composting Facilities – A Review, Frontiers in Cellular and Infection Microbiology, April 2014.

² Drew GH, Deacon LJ, Pollard SJT, Tyrell SF – Guidance on the Evaluation of Bioaerosol Risk Assessment for Composting Facilities, Environment Agency, 2009.

³ Environment Agency - Composting and Potential Health Effects from Bioaerosols: Our Interim Guidance for Permit Applications, November 2010, Version 1.0.

of composting activities (storage, process and handling areas as opposed to the site's environmental permit boundary) on a frequent basis or for prolonged periods. As such, it normally refers to dwellings and workplaces. It does not apply to employees at the composting facility as their health and safety is provided for under separate cover within health and safety legislation.

2.2 Environmental Standards

'Acceptable levels' for bioaerosols, as identified in the EA's position statement, are shown in Table 1. These are derived from values for an 8-hour working day.

Table 1 – Acceptable Levels for Bioaerosols

Bioaerosol Species	Level (cfu/m³)
Gram-negative bacteria	300
<i>Aspergillus fumigatus</i>	500
Total bacteria	1000

3.0 ASSESSMENT METHODOLOGY

3.1 Overview of Risk Assessment Approach

The EA's guidance for the evaluation of bioaerosol risk assessments for composting facilities refers to guidelines produced by the Department for Environmental, Farming and Rural Affairs (DEFRA)⁴ and the EA⁵ for a tiered and staged risk assessment. The methodology described within these documents, and used for the undertaking of this risk assessment, is summarised below.

3.2 Tier 1 – Risk Screening

Risk screening prioritises issues for assessment. Tier 1 assessment, covering all environmental aspects of waste management summarises the existence of a potential hazard-pathway-receptor linkage.

In the case of bioaerosol risk assessment, the presence of sensitive receptors within 250m of the site boundary is applied when identifying a hazard-pathway-receptor linkage.

3.3 Tier 2 – Generic Risk Assessment

The generic risk assessment to determine the significance of risk is undertaken on the basis of the probability and consequences of exposure as follows:

The probability of exposure is the likelihood of the sensitive receptors being exposed to the hazard.

- High – exposure is probable: direct exposure likely with no / few barriers between hazard source and receptor;
- Medium – exposure is fairly probable: feasible exposure possible, barriers to exposure less controllable;
- Low – exposure is unlikely: several barriers exist between hazards source and receptors to mitigate against exposure;
- Very Low – exposure is very unlikely: effective, multiple barriers in place to mitigate against exposure.

The consequences of a hazard being realised may be actual or potential harm.

- High – the consequences are severe: sufficient evidence that short or long-term exposure may result in serious damage;
- Medium – consequences are significant: sufficient evidence that exposure to hazard may result in damage that is not severe in nature and reversible once exposure ceases;
- Low – consequences are minor: damage not apparent though reversible adverse changes may occur;
- Very Low – consequences negligible: no evidence of adverse changes after exposure.

⁴ DEFRA – Guidelines for Environmental Risk Assessment and Management, November 2011.

⁵ Pollard SJT, Purchase D, Herbert S – A Practical Guide to Environmental Risk Assessment for Waste Management Facilities, Environment Agency, November 2000.

The overall risk (magnitude) is determined by combining the probability with the potential consequences using a matrix to categorise as high, medium, low or very low. The overall risk matrix is provided in Table 2 below.

Table 2 – Tier 2 Assessment – Overall Risk Matrix²

		Consequence			
		<i>Very Low</i>	<i>Low</i>	<i>Medium</i>	<i>High</i>
Probability	<i>High</i>	Low	Medium	High	High
	<i>Medium</i>	Low	Medium	Medium	High
	<i>Low</i>	Low	Low	Medium	Medium
	<i>Very Low</i>	Very Low	Low	Low	Medium

Where a conclusion of 'not significant' (Low or Very Low) has been reached, measures in place would normally be sufficient to ensure that there will be no impact at the surrounding environment, though periodic review would still be required. Medium risks would require additional assessment and would be likely to require active management and / or monitoring. High risks would require additional assessment and would be likely to be in need of active management and monitoring.

3.4 Tier 3 – Tailored Quantitative Risk Assessment

A tailored quantitative risk assessment extends the site-specific assessment to include estimations based on information such as wind direction frequency and duration of site activity. It develops categories for the assessment of the magnitude of consequences and relevant exposure to bioaerosol concentration.

4.0 DESCRIPTION OF DEVELOPMENT

4.1 Location Setting and Conditions

The site is located on the western edge of the Wentlooge Levels approximately 4km north east of Cardiff City Centre and 1km south of Rhymney. Access to the site is achieved via the B4239 which is located approximately 775m to the north of the site.

The National Grid Reference for the centre of the site is ST 23010 77658 and the site location is illustrated on Drawing 001.

4.2 Site Surroundings and Potentially Sensitive Receptors

The surrounding land-use and receptors are illustrated on Drawings 003 and 004, and are identified in Table 3 **Error! Reference source not found.** below.

Table 3 - Surrounding Land Uses

Boundary	Description
North	Open land and the Lamby Way Eastern Extension Landfill lie immediately to the north of the site. Beyond these lie Rhosog Fach Reen (a surface water drain) and a number of residential and commercial /industrial properties.
East	Open land, the Cardiff Coastal Footpath and the Severn Estuary are situated to the east of the site.
South	To the south of the site lies a public footpath and the Severn Estuary.
West	The Severn Estuary lies almost immediately to the west of the site. Beyond this lies Lamby Way Eastern Extension Landfill and Rhymney River.

The immediate surrounding land use is described in further detail below:

Residential Properties

The closest residential property to the proposed site boundary is Mardy House located approximately 270m north. Other residential properties include Mardy Farm approximately 375m north east and Seabank Farm located 455m north of the proposed site boundary.

Industrial and Commercial Premises

The proposed site is within an area identified by NRW as an authorised landfill; Lamby Way Eastern Extension landfill extends to the north-west for approximately 1.17km. GMH Vehicle Recyclers Limited and Mardy Farm Caravan Storage are located approximately 205m and 430m north of the proposed site boundary, respectively.

Major Roads and Transport Links

There are no major roads or transport links located within 500m of the site's proposed boundary. The closest major road is B4239 from which access to the site is gained. The B2439 is located approximately 775m to the north of the site.

Table 4 and Drawing 003 show the locations of receptors that are considered to be potentially sensitive to bioaerosols.

Table 4 - Potentially Sensitive Receptors

Receptor Name	Receptor Type	Direction from Site	Approximate Distance from site boundary (at nearest point)
Potentially sensitive receptors within 250m of the Environmental Permit Boundary as shown on Drawing 003 Sources, Pathways and Receptors			
Lamby Way Eastern Extension Landfill	Industrial/Commercial	North / North West	Adjacent
GMH Vehicle Recyclers Ltd	Industrial	North	205m

4.3 Climate – Wind Direction and Rainfall

Prevailing wind directions are considered in assessing the likelihood and management of fugitive emission risks. Wind speed and direction data have been obtained for five years for Cardiff. A wind rose of speed and direction is presented in **Error! Reference source not found..** It shows the prevailing wind to be from the west. As a result, the potential impact of fugitive emissions is likely to be greater to the east of the site.

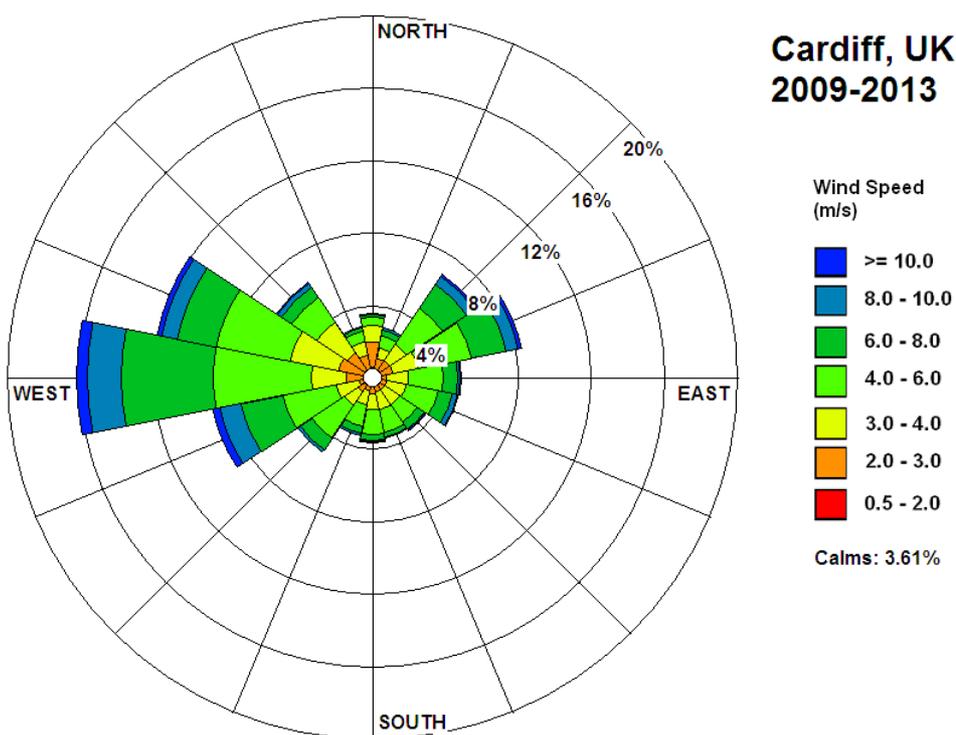


Figure 1 - Wind Rose for Cardiff 2009 - 2013

4.4 Summary of Operations

The purpose of the OWC Facility is to store and treat waste for recovery to produce a PAS 100 certified compost product.

The site will treat up to 38,000 tonnes per annum of green waste by open-windrow composting. The input to the site will vary seasonally; however, the maximum throughput will be approximately 1,167 tonnes over 7 days (approximately 167 tonnes per day). Wastes are received from three different sources, including;

- kerbside green waste collections;
- green waste from household waste recycling centres; and
- commercial users delivering green waste to the site.

Treatment will consist only of manual sorting, separation, screening, shredding and composting in open-windrows into different components for recovery.

The OWC Facility will operate throughout the year in accordance with the operating hours specified in the relevant planning permission.

At any one time, maximum storage of waste at the site will be 8,500 tonnes. Of this storage, an 850 tonne at any one time limit will apply to the storage of waste prior to the formation of a windrow. A 7,650 tonne at any one time limit will apply to wastes undergoing biological treatment i.e composting and maturation.

In addition, the facility has the capacity to store up to 2,300 tonnes of compost product.

5.0 RISK ASSESSMENT

5.1 Sources of Bioaerosol Emissions

Windrow composting will be undertaken in the open-air and as such will potentially result in the release and dispersal of bioaerosols. Composting activities such as shredding, turning and screening which disturb the materials will lead to the intermittent emission of bioaerosols. Studies show that turning of the waste materials has the greatest potential for bioaerosol release.

There are a number of other factors that influence the source potential, including:

- Compost moisture content – dry compost will have a higher potential for bioaerosol emissions;
- Source material – food waste will have a higher potential for bioaerosol emissions than green waste;
- Processing equipment – slow speed shredders and dedicated compost turners may generate less emissions; and
- Topography and site layout – designing the site so windrows are parallel to the wind direction will reduce bioaerosol emissions.

5.2 Tier 1 – Risk Screening

Tier 1 risk screening purely identifies the existence of potential hazards and receptors. No account is taken of the existence or non-existence of pathways or mitigation measures and the probability of consequences is assumed to be absolute.

The tier 1 risk screening has identified that Lamby Way Eastern Extension Landfill and GMH Vehicle Recyclers Ltd are within 250m of storage, process and handling areas and have the potential for their employees to be located within this range on a frequent basis or for prolonged periods of time.

5.3 Tier 2 – Generic Risk Assessment

The following risk tables are compiled using the assessment methodology described in Section 3.0 and based on the information on site characteristics provided in Section 4.0.

Table 5 – Tier 2 Generic Risk Assessment

Sources, Pathways and Receptors			Risk Assessment				Mitigation and Residual Risk	
Source	Pathway	Receptor	Probability	Consequence	Overall Risk	Justification	Mitigation measures	Residual Risk
What has the potential to cause harm?	How can the hazard get to the receptor?	What is at risk, what do I wish to protect?	How likely is contact?	What is the harm that can be caused?	What is the overall magnitude of risk?	On what did I base my judgement?	What measures can I take to reduce the overall risk?	What is the risk that still remains?
Waste reception, handling and processing including shredding, screening, composting and product storage	Transport in the air then inhalation	Occupiers and workforce at GMH Vehicle Recyclers Ltd	Very Low	Medium	Low	<p>Receptor is situated approx 205m north of the site.</p> <p>The site is located away from the prevailing wind direction. The wind rose in Figure 1 indicates that northerly winds will be experienced less than 4% of the time.</p>	<p>Where possible, limit undertaking activities likely to lead to the release of bioaerosols during unfavourable meteorological conditions i.e wind direction towards sensitive receptors.</p> <p>Compost moisture content will be maintained between 40% (w/w) and 60% (w/w) during composting.</p> <p>Only source segregated green wastes will be accepted at the</p>	Low

Sources, Pathways and Receptors			Risk Assessment				Mitigation and Residual Risk	
							facility. No food wastes will be accepted. Incoming materials shall be inspected and offloaded as soon as possible and non-conforming materials shall be quarantined and removed off-site.	
Waste reception, handling and processing including shredding, screening, composting and product storage	Transport in the air then inhalation	Occupiers and workforce at Lamby Way Eastern Extension Landfill	Very Low	Medium	Low	The landfill is located adjacent to the north of the site however it is restored up to a distance of 250m from the site boundary. It is not anticipated that human receptors will be located within this range on a frequent basis or for prolonged periods of time.	Where possible, limit undertaking activities likely to lead to the release of bioaerosols during unfavourable meteorological conditions i.e wind direction towards sensitive receptors. Compost moisture content will be maintained between 40% (w/w) and 60% (w/w) during composting.	Low

Sources, Pathways and Receptors			Risk Assessment				Mitigation and Residual Risk	
							<p>Only source segregated green wastes will be accepted at the facility. No food wastes will be accepted.</p> <p>Incoming materials shall be inspected and offloaded as soon as possible and non-conforming materials shall be quarantined and removed off-site.</p>	

6.0 CONCLUSIONS

The bioaerosol risk assessment for the Lamby Way Composting Facility has indicated a low risk of impact.

Mitigation measures are proposed in the event of unfavourable conditions for example wind direction which may have the potential to lead to higher levels of bioaerosols experienced at sensitive receptor locations. These are as identified below.

Therefore, no further assessment is considered to be required.

6.1 Risk Management Measures

The following mitigation measures are proposed to further limit the potential for release of bioaerosols as a result of operations on site;

- Meteorological forecasts will be monitored and used to plan the undertaking of activities at the site;
- Where possible, activities likely to lead to the release of bioaerosols during unfavourable meteorological conditions, for example wind direction and high wind speeds and humidity, will be limited. These include shredding, turning and screening;
- Compost moisture content will be maintained between 40% (w/w) and 60% (w/w) during composting;
- Hedgerows border the site along its southern and western edges. The hedgerows will reduce wind speeds and increase wind turbulence. Gabian baskets border the site's northern edge.
- Incoming materials shall be inspected and offloaded as soon as possible and non-conforming materials shall be quarantined and removed off-site;
- Daily visual inspections shall be undertaken at all areas of the site to check for conditions potentially affecting bioaerosol release and fugitive emission releases. Records of the findings shall be recorded in a site log book;
- Operational areas and site surfaces shall be maintained in a clean condition; and
- Processes shall take place in designated and controlled areas of the site.

7.0 CLOSURE

This report has been prepared by SLR Consulting Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of Kelda Organic Energy (Cardiff) Limited; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

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