



Site Specific Bioaerosol Risk Assessment

EPR/BP3590VJ/V003

Advetec Holdings Ltd on behalf of Max Recycle UK Ltd

Hawthorne House,
Blackthorn Way,
Sedgeleth Industrial Estate,
Fencehouses,
Tyne and Wear
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1.0 Introduction

Advetec Holdings Ltd has instructed SLR Consulting Limited (SLR) on behalf of Max Recycle UK Ltd (Max Recycle) to prepare a Site Specific Bioaerosol Risk Assessment (SSBRA) to assess potential impacts associated with the operation of an aerobic digestion unit at the Max Recycle waste transfer station located at Blackthorn Way, Sedgelych Industrial Estate, Fencehouses, Tyne and Wear, DH4 6JW.

The objective of the SSBRA is to

- Establish the likely sources of bioaerosols arising from proposed operations at the site;
- Identify the proposed mitigation and control measures to minimise potential offsite risks;
- Assess the potential for significant risk of impact to human health at sensitive receptors located in the vicinity of the plant as a result of bioaerosol emissions from the process; and,
- Identify any additional mitigation required to control potential effects.



2.0 Relevant Guidance and Standards

2.1 EA Guidance for the Treatment of Biological Waste

The Environment Agency has issued sector specific guidance in relation to the treatment of biological waste¹.

Section 11.4 of this guidance sets out the requirements for control of emissions of bioaerosols, which are:

1. You must take measures to minimise the release of bioaerosols from your process.
2. You must document potential bioaerosol emission sources and identify measures to minimise their release. Measures include, for example:
 - processing waste promptly and monitoring it according to defined processing conditions;
 - taking corrective measures to address unfavourable conditions;
 - using slow-speed shredders in sensitive locations with misting devices fitted or carrying out these activities in covered areas;
 - taking into account meteorological conditions when managing activities;
 - avoiding activities such as turning and shredding in unfavourable meteorological conditions;
 - stopping activities when the wind is blowing in the direction of sensitive receptors;
 - dampening haul roads and processing areas and stopping activities when the wind is blowing in the direction of sensitive receptors;
 - using static aeration and covering piles where possible and practicable.
3. If your facility is within 250 metres of a sensitive receptor, you must:
 - write and implement a site specific bioaerosol risk assessment;
 - monitor bioaerosols to make sure that the control methods you have stated are effective.
4. You must implement the control measures identified in your risk assessment. You must also consider the exposure of staff and visitors and take measures to avoid or reduce prolonged exposure to bioaerosols.

The Environment Agency (EA) has also issued Regulatory Position Statement 209² which sets out the requirements for monitoring of bioaerosols at regulated facilities.

Given that the aerobic digestion plant is not yet in place and operational, it is not possible to undertake monitoring at this time to provide a quantitative assessment of potential risks and impacts, and the EA has therefore requested that a qualitative site specific bioaerosols risk assessment (SSBRA) is prepared.

¹ Biological waste treatment: appropriate measures for permitted facilities – Environment Agency -Issued 02 February 2024 - <https://www.gov.uk/guidance/biological-waste-treatment-appropriate-measures-for-permitted-facilities>

² Bioaerosol monitoring at regulated facilities: RPS 209 – Environment Agency – 18 July 2023 - <https://www.gov.uk/government/publications/bioaerosol-monitoring-at-regulated-facilities-use-of-m9-rps-209/bioaerosol-monitoring-at-regulated-facilities-use-of-m9-rps-209>



2.2 Benchmark Data / Definition of Acceptable Bioaerosol Levels

The EA has adopted a precautionary risk-based approach in determining guidance levels for bioaerosols. The EA position statement 'Composting and potential health effects from bioaerosols: our interim guidance for permit applicants'³ specifies the following criteria for acceptable concentrations of bioaerosols which are derived from values for an 8-hour working day:

Table 1: Acceptable Levels for Bioaerosols

Bioaerosol Species	Level (cfu/m ³)
Gram-negative bacteria	300
Aspergillus fumigatus	500
Total Bacteria	1,000

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



3.0 Assessment Methodology

3.1 Overview of Risk Assessment Approach

The Bioaerosol Risk Assessment has been undertaken in accordance with the general principles of EA document 'Guidance on the evaluation of bioaerosol risk assessments for composting facilities' which refers to guidelines produced by the Department for Environmental, Farming and Rural Affairs (DEFRA) and the EA 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.

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.



Table 2: Tier 2 Assessment – Overall Risk Matrix

		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

Based on the outcomes of the risk assessment the EA document provides guidance on further requirements for different risks.

These can be summarised as follows:

- High risks - additional assessment and active management will be required;
- Medium risks - likely to require further assessment and may require either active management or monitoring; and,
- Low and very low risk - will only require periodic review.

Mitigation to reduce risk can also be applied to avoid the requirement for further assessment and/or 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 Site Data

4.1 Site Location

The aerobic digester will be situated on the Site of the Max Recycle waste transfer station which is located at Blackthorn Way, Sedgeleth Industrial Estate, Fencehouses, Tyne and Wear, DH4 6JW, centred on National Grid Reference (NGR) NZ 32119 50674.

The village of Houghton Le Spring is located 2.3km Southeast and the City of Sunderland lies 10km to the Northeast.

To the south and east, the Site is immediately bounded by buildings as part of Sedgeleth Industrial Estate. To the north and west lies park land. Immediately to the east lies industrial and commercial and residential properties.

The site layout and location is shown on Drawings 001 and 002, dated April 2024.

A summary of the immediate surrounding land use is provided in Table 3.

Table 3: Surrounding Land Use

Direction	Description
North	Moors Burn and open ground (Elba Park)
East	Industrial / commercial premises include a timber engineering facility and residential properties.
South	Commercial/industrial properties with residential properties beyond.
West	Open ground (Elba Park)

4.2 Identification of Potentially Sensitive Receptors

Human health and welfare is the focus for SSBRA's.

EA Guidance note M9 'environmental monitoring of bioaerosols at regulated facilities' 4 defines a sensitive receptor as follows:

"Nearest sensitive receptor means the nearest place to the permitted activities where people are likely to be for prolonged periods. This term would therefore apply to dwellings (including any associated gardens) and to many types of workplaces. We would not normally regard a place where people are likely to be present for less than 6 hours at one time as being a sensitive receptor. The term does not apply to those controlling the permitted facility, their staff when they are at work or to visitors to the facility, as their health is covered by Health and Safety at Work legislation, but would apply to dwellings occupied by the family of those controlling the facility."

Hence for the purposes for this SSBRA, a sensitive receptor is defined as meaning locations within a 250m range of the aerobic digester where people will be present on a frequent basis or for prolonged periods. The selected receptor types for this assessment are defined below.

⁴ M9 environmental monitoring of bioaerosols at regulated facilities, Environment Agency, 8th February 2017 - <https://www.gov.uk/government/publications/m9-environmental-monitoring-of-bioaerosols-at-regulated-facilities>



Commercial and Industrial Receptors

There are a number of commercial properties within 500m of the site’s environmental permit boundary. The closest of these is Fencehouse Timber Engineering located adjacent to the southeast of the site.

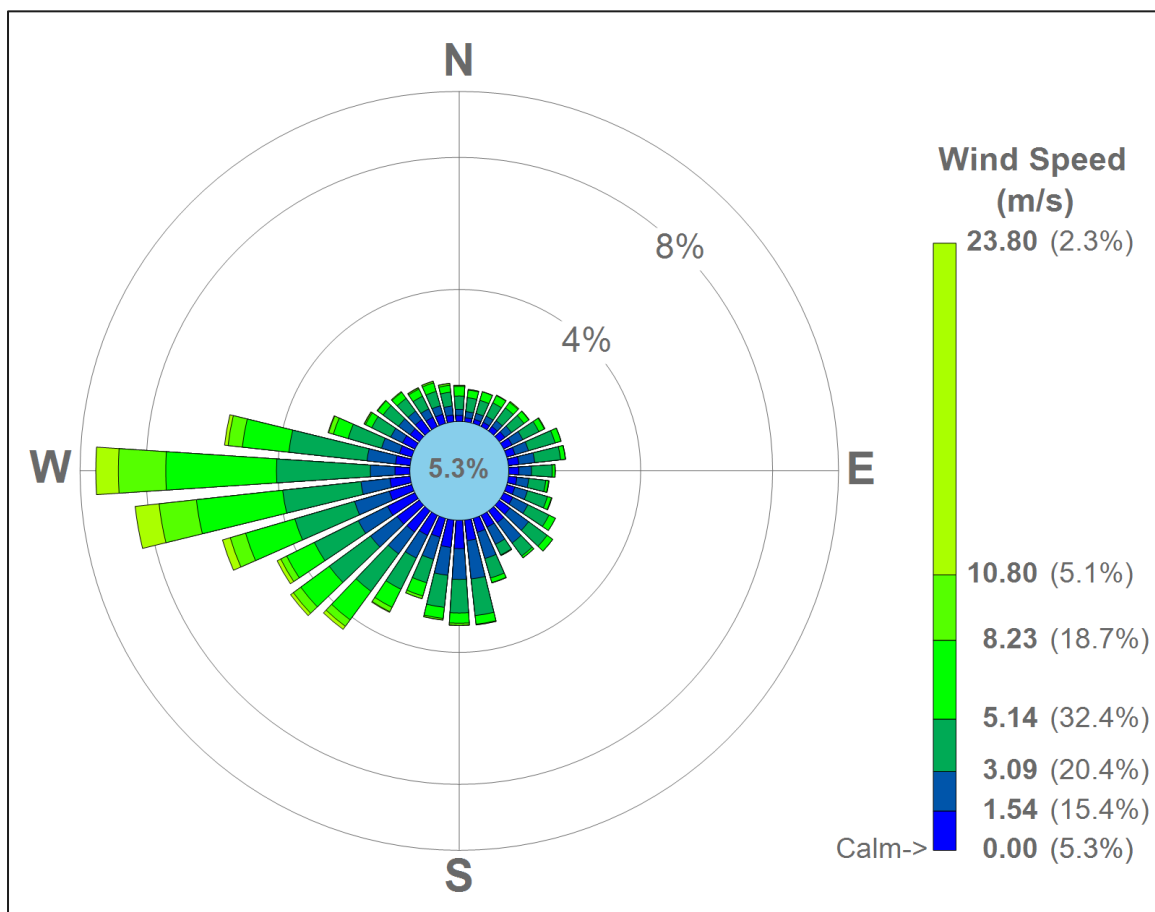
Residential Receptors

Areas of residential properties surround the site to the north, east and west of the Site. The nearest residential properties to the location of the proposed aerobic digester are adjacent to the east of the site.

4.3 Meteorology

The wind direction and frequency should be considered when looking at the impact of emissions on receptors. Figure 1 shows the wind patterns between 2014-2017 as identified at Newcastle meteorological station located approximately 24.3km to the north of the Site. The predominant wind direction is from the west and southwest, with winds from the east and north relatively infrequent.

Figure 1: Wind Rose from Newcastle Meteorological Station (2014-2017)



4.4 Site Activities

The site is proposing to install an Advetec XO22 aerobic digestion unit at the site, with a capacity to process up to 10 tonnes of residual municipal type waste per day.



Waste awaiting processing will be stored within Max Recycle's waste transfer station building in accordance with their currently permitted arrangements on Site.

The waste will be loaded within the existing waste transfer station building into a bulk loading system which feeds a shredder. The shredder which is also located internally will shred waste into 50mm² particle size. The shredded waste is then augered into the digester, where bacteria and bio-stimulants are automatically dosed into the waste to promote aerobic digestion. The digester will be located externally to the building.

There will be two point source emissions to air from the aerobic digester.

Aerobic digestion takes place in a sealed vessel, meaning the potential for fugitive emissions to escape is considered very low.

The entire aerobic digestion process takes approximately 72 hours to complete, after completion the post-process floc exits the unit via an enclosed auger which conveys to a 40 yd³ Roll-on Roll-off (RORO) compactor with a maximum capacity of up to 8 tonnes. Waste is stored within the compactor before being collected and transferred off-Site.

It is considered unlikely that the aerobic digester will emit significant levels of bioaerosols due to the small scale of the machine.



5.0 Site Specific Risk Assessment

5.1 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.

5.1.1 Sources of Bioaerosol Emissions

The only potential sources of bioaerosol emission would be from the vents from the aerobic digestion unit.

There are not considered to be any other potential sources of bioaerosol emissions from the plant.

Ambient monitoring of bioaerosols undertaken at a similar, but smaller, plant using identical process technology and abatement systems at Advotec’s Cribbs Causeway Shopping Centre installation found bio-aerosols to be below levels of detection or at very low values in all samples⁵ and similar performance is expected from the plant proposed for the site.

The maximum levels reported for the Cribbs Causeway site are shown in Table 4 which clearly show that the emissions of bioaerosols are well below the acceptable level.

Table 4: Predicted Emission Levels for Bioaerosols

Bioaerosol Species	Acceptable Level (cfu/m ³)	Maximum Level Recorded at Cribbs Causeway (recorded at the outlet from the carbon filter) (cfu/m ³)
Gram-negative bacteria	300	Not assessed / Not present
Aspergillus fumigatus	500	<8
Total Bacteria	1,000	48

On the assumption that the proposed aerobic treatment plant for the site can be expected to achieve similar levels of performance to that monitored at the Cribbs Causeway site, it would be reasonable to anticipate that the emissions of bioaerosols from the proposed plant will be at acceptable levels at point of discharge, and hence would not pose any significant risk to the identified nearby sensitive receptors.

5.1.2 Receptors

The tier 1 risk screening has identified the following nearby receptors:

Commercial and Industrial Receptors

There are a number of commercial properties within 250m of the site’s environmental permit boundary. The closest of these is Fencehouse Timber Engineering located adjacent to the southeast of the site.

⁵ Ambient Bioaerosols Monitoring - Cribbs Causeway - SLR Report 416.11977.00001 – October 2021



Residential Receptors

Areas of residential properties surround the site to the north, east and west of the Site. The nearest residential properties are located adjacent to the east of the location of the proposed aerobic digester.

5.1.3 Conclusion of Tier 1 Risk Screening

The initial screening assessment has identified that there are potential sources of bioaerosols at the site, and that there are sensitive receptors within 250m of the emission points.

However, the level of bioaerosol emissions are anticipated to be sufficiently low to not pose any significant risk to human health at the defined nearest receptors.

5.2 Tier 2 – Generic Risk Assessment

Table 5 presents the results of the Tier 2 risk assessment.



Table 5: Tier 2 Risk Assessment

What do you do that can harm and what could be harmed			Managing the Risk	Assessing the Risk		
Hazard / Source	Receptor	Pathway	Risk Management	Probability of Exposure	Consequences	What is the Overall Risk
What has the potential to cause harm?	What is at risk/What do I wish to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk? Who is responsible for what?	How likely is the contact?	What is the harm that can be caused?	What is the risk that still remains? The balance of probability and consequence
Bioaerosols released during aerobic digestion.	Residential receptors 90m to the southeast of the digester Commercial properties within 250m of the site	Air	<p>It is considered unlikely that the aerobic digesters will emit significant levels of bioaerosols due to the small scale of the activity involving treatment of up to 10 tonnes of waste per day.</p> <p>Ambient monitoring of bioaerosols undertaken at a similar, but smaller, plant using identical process technology and abatement systems at Advetec's at Cribbs Causeway Shopping Centre installation found bio-aerosols to be below levels of detection or very low in all samples and similar performance is expected from the plant proposed for the site.</p> <p>The digestion process is undertaken within a sealed vessel.</p> <p>Operational procedures will be in place to ensure that the digester is maintained in good working order.</p> <p>Once operational confirmatory monitoring of bioaerosol emissions will be undertaken as required by RPS 209.</p>	<p>Low</p> <p>Exposure is unlikely:</p> <p>Predicted emission levels are very low and controlled to mitigate against exposure.</p> <p>Based on the emission levels predicted there will be no emission of bioaerosols at concentrations that could potentially cause harm to human health, so this could potentially be rated Very Low.</p>	<p>Low</p> <p>Consequences are minor:</p> <p>Based on the emission levels predicted there will be no offsite human health impacts, and so this could potentially be rated Very Low.</p> <p>However, giving consideration to the uncertainty linked to the reliance on monitoring data from the Cribbs causeway site the rating has been increased to low so as to provide a conservative assessment of potential risk.</p>	<p>Low</p> <p>The risk is suitably low and will only require periodic review.</p>



6.0 Conclusion

The risk assessment concludes that the risk of potential human health impacts associated with bioaerosol emissions from the plant is low and hence is acceptable without additional abatement or controls.





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