Bioaerosol Risk Assessment

Earlstrees Road, Corby

Client: Waste4Generation Ltd

Reference: 6430-1r1

Date: 14th April 2023

Report Issue

Report Title: Bioaerosol Risk Assessment - Earlstrees Road, Corby

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1.0 INTRODUCTION

1.1 Background

1.1.1 Redmore Environmental Ltd was commissioned by Waste4Generation Ltd to undertake a Bioaerosol Risk Assessment in support of an Environmental Permit Variation Application for the Anaerobic Digestion (AD) facility operated by the company on land off Earlstrees Road, Corby.

1.1.2 During the operation of the facility there is the potential for bioaerosol emissions and associated impacts at sensitive receptor locations in the vicinity of the site. A Risk Assessment has therefore been undertaken to identify potential emission sources and evaluate effects in the local area.

1.1.3 The purpose of this Bioaerosol Risk Assessment is to:

- Establish the likely sources of bioaerosols arising from existing and proposed operations at the site;
- Assess the potential for significant risk of impact at sensitive locations due to emissions from the identified sources; and,
- Identify any additional mitigation required to control potential effects.

1.2 Site Location and Context

1.2.1 The AD facility is located on land off Earlstrees Road, Corby, at National Grid Reference (NGR): 488750, 290780. Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 The plant is currently authorised to operate as a biological treatment facility under an Environmental Permit issued by the Environment Agency (EA) (Permit No: CB3902XP). Activities include the receipt of a range waste types followed by processing within an AD plant to generate biogas which is combusted within a Combined Heat and Power (CHP) unit. Two flares are also included at the plant for venting of biogas during abnormal operation.

1.2.3 An Environmental Permit Variation Application is currently being made to the EA in order to authorise a number of changes to operations. These include:

- Upgrade of the site to an installation and an increase in the capacity to 300m^3/day;
- An increase in the consented water discharge limit to 300m^3/day;
- The receipt, de-watering & blending of waste streams to produce high quality AD feedstocks, with up to 300m^3 of prepared material leaving site per day;
- Additional processing within the warehouse for Research and Development purposes plus continued processing and optimisation of complex wastes and fats, oils and greases (FOG);
- Further optimisation of the FOG process to provide an alternative and sustainable AD feedstock;
- Addition of a solids treatment bay to receive materials such as fruits;
- Onsite leachate and complex waste treatment as proof of concept that the process can achieve consented water discharge limits and by integrating existing processes with nano-bubble technology, operations can be made more cost effective and efficient;
- Introduction of a nano-bubble polishing system for ozone treatment and additional tertiary/quaternary treatment of effluent;
- Addition of a centralised Odour Control System (OCS); and,
- Addition of a number of European Waste Codes (EWC) to the Environmental Permit.

1.2.4 The operation of the plant may result in bioaerosol emissions from a number of activities. These have the potential to cause impacts at sensitive locations within the vicinity of the site and have therefore been assessed within this report.

2.0 BIOAEROSOL BACKGROUND

2.1 Bioaerosol Definition

2.1.1 Bioaerosol is a general term for microorganisms suspended in the air. These microorganisms include fungi and bacteria, as well as their components such as mycotoxins, endotoxins and glucans. Bioaerosols are generally less than 100µm in size and are not filtered out by hairs and specialised cells that line the nose. Due to their airborne nature and small size, many bioaerosols can penetrate the human respiratory system, resulting in inflammatory and allergic responses.

2.1.2 Although bioaerosols are ubiquitous, operations involving organic materials provide environments that are conducive to their growth. Bioaerosols are therefore likely to be associated with AD feedstocks and output materials, and in particular, organic material handling activities, which may release microorganisms into the air.

2.2 Health Risks from Bioaerosols

2.2.1 Exposure to bioaerosols has been associated with human health effects, symptoms can include inflammation of the respiratory system, coughs and fever. Inhalation of bioaerosols may also cause or exacerbate respiratory diseases[1]. They have been known to cause gastrointestinal illness, eye irritation and dermatitis.

2.2.2 Possible links have also been made between exposure to bioaerosols and organic dust toxic syndrome. This is an acute disease that causes symptoms resembling those of influenza, such as shivering, an increase in body temperature, dry cough and muscle and joint pains. Of particular relevance to waste management facilities are infections caused by Aspergillus fumigatus. Invasive aspergillosis is a particularly severe infection, which may be fatal and is primarily a concern with at risk and immuno-suppressed patients.

2.2.3 Although some data is available, one of the major knowledge gaps for bioaerosols is their associated dose-response relationships. It is not currently possible to state with any certainty that a given concentration will result in a particular health impact. This is due to

[1] Guidance on the evaluation of bioaerosol risk assessments for composting facilities, EA, undated.

the number of bioaerosols that are naturally present within the environment as well as the complexities associated with human responses to different microorganisms.

2.3 Bioaerosol Emissions from Waste Management Operations

2.3.1 Most scientific research on bioaerosol emissions from waste management operations focusses on open windrow and In-Vessel Composting (IVC) systems. Although it is recognised that there are fundamental differences between composting and food waste processing actives, there are similarities between the types of feedstocks, handling activities and infrastructure utilised. As such, a review of relevant research has been undertaken in order to inform the assessment. The findings are detailed in the following Section.

2.3.2 The EA document 'Health Effects of Composting - A Study of Three Compost Sites and Review of Past Data'[2] summarises the findings of emissions measurement work undertaken at three composting facilities, including two open air turned windrow sites and one IVC plant. The results from the work indicated a well-defined decline in concentrations of bioaerosols with increased distance from source. In most cases, measured concentrations were at or below background levels within 250m of the sources assessed.

2.3.3 The ADAS report 'Bioaerosol Monitoring and Dispersal from Composting Sites'[3] provides a summary of the findings from measurement work undertaken at three composting sites. Sampling for bioaerosols was undertaken downwind of a wide range of composting activities including shredding, turning, loading, unloading and screening. The results indicated that 91% of all micro-organisms sampled across all three sites were below 1,000cfu/m^3 at a downwind distance of 125m.

2.3.4 The Scotland and Northern Ireland Forum for Environmental Research (SNIFFER) report 'Measurement and Modelling of Emissions from Three Composting Sites'[4] provides a summary of the findings from monitoring work undertaken at three composting sites, which included two IVC facilities and one open windrow system. The findings indicated that there is the potential for seasonal variation in ambient concentrations of the mould

[2] Health Effects of Composting - A Study of Three Compost Sites and Review of Past Data, EA, 2001.

[3] Bioaerosol Monitoring and Dispersal from Composting Sites, ADAS, 2005.

[4] Measurement and Modelling of Emissions from Three Composting Sites, SNIFFER, 2007.

of Aspergillus fumigatus, with concentrations being the highest in the autumn. In most cases, levels of all bioaerosols assessed were at or below background equivalent concentrations within 250m of the sources assessed.

2.3.5 The Department for Environment Food and Rural Affairs (DEFRA) research report 'Bioaerosols and odour emissions from composting facilities'[5] focusses on the comparability of different sampling methodologies and the influence of spatial and temporal variation on ambient bioaerosol concentrations. Measurements were undertaken at four different composting facilities in England, which represent a range of system types. The results of the study corroborate existing research and suggest that concentrations of bioaerosols generally return to background levels within 250m of the source.

2.3.6 The findings of the review have been considered as appropriate throughout the assessment.

2.4 Legislative Control

2.4.1 Atmospheric emissions from industry are controlled in the UK through the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments. Activities at the site are included within the Regulations. As such, the facility is required to operate in accordance with an Environmental Permit issued by the EA.

2.5 Environment Agency Policy and Guidance

2.5.1 The EA Regulatory Position Statement (RPS) 'Bioaerosol monitoring at regulated facilities - use of M9: RPS 209'[6] outlines the conditions that apply to facilities in relation to bioaerosol emissions.

2.5.2 The RPS states that if a regulated facility is located within 250m of a sensitive receptor (a place where people live of work for more than 6-hours at a time), the operator must:

5 Bioaerosols and odour emissions from composting facilities, DEFRA, 2013.

6 Bioaerosol monitoring at regulated facilities - use of M9: RPS 209, EA, 2018.

- Monitor bioaerosols in accordance with EA guidance 'M9: environmental monitoring of bioaerosols at regulated facilities'[7]; and,
- Undertake a site specific Bioaerosol Risk Assessment.

2.5.3 The stated conditions are also specified in the EA document 'Biological waste treatment: appropriate measures for permitted facilities'[8] which represents the most up to date guidance published by the regulator on the standards that are relevant to biowaste sites, including criteria for emissions control. The requirements of the RPS and the stated EA guidance have been considered throughout the assessment.

2.6 Benchmark Levels

2.6.1 In the absence of dose-response data, the EA have 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'[9] specifies the following criteria for acceptable concentrations of Aspergillus fumigatus and total bacteria at sensitive receptor locations:

- Aspergillus fumigatus - 500cfu/m^3; and,
- Total bacteria - 1,000cfu/m^3.

2.6.2 The relevant benchmark levels have been considered as appropriate throughout the assessment.

7 M9: environmental monitoring of bioaerosols at regulated facilities, EA, 2017.

8 Biological waste treatment: appropriate measures for permitted facilities, EA, 2022.

9 Composting and potential health effects from bioaerosols: our interim guidance for permit applicants, EA, 2010.

3.0 PROBLEM DEFINITION

3.1 Introduction

3.1.1 The first stage of any risk assessment is to clearly set out the problem, including what will be addressed and what will not. This determines the scope, level of detail and focus. In particular, the temporal and spatial scales, contaminants to be assessed, persons at risk and the endpoint are identified. These factors are considered in the following Sections.

3.2 Conceptual Model

3.2.1 Potential hazards from bioaerosols are summarised in the conceptual model in Table 1.

Table 1 Conceptual Model

Criteria	Comment
Source	Feedstocks and output materials on the site as outlined in Section 3.3
Hazard	Potential adverse health impacts as outlined in Section 2.2
Transport Mechanism	Airborne
Medium of Exposure	Inhalation, ingestion, absorption, injection
Receptor	Human receptors at the proposed development site as outlined in Section 3.4

3.3 Sources

3.3.1 The operation of the facility may result in bioaerosol emissions from a number of activities. Potential odour sources associated with the site were identified from information provided by Waste4Generation Ltd. These are summarised in Table 2.

Table 2 Bioaerosol Sources

Source		Source Description	Emission Point	Emission Characteristics
1	Carbon Filter 2	Air displaced from the Animal By-Products (ABP)/ Main Break Tank (MBT) holding tanks is treated by a carbon filter prior to release to atmosphere	-	Treated air from the system is released to atmosphere via a dedicated vent on the top of the filter. This is anticipated to provide effective treatment of bioaerosols releases during normal operation. However, there may be the potential for diffuse emissions
2	Carbon Filter 3	Air displaced from the Dissolved Air Flotation (DAF) 1 break tank is treated by a carbon filter prior to release to atmosphere	-	Treated air from the system is released to atmosphere via a dedicated vent on the top of the filter. This is anticipated to provide effective treatment of bioaerosols releases during normal operation. However, there may be the potential for diffuse emissions
3	Carbon Filter 4	Air displaced from tanks RT1 and R1 is treated by a carbon filter prior to release to atmosphere	-	Treated air from the system is released to atmosphere via a dedicated vent on the top of the filter. This is anticipated to provide effective treatment of bioaerosols releases during normal operation. However, there may be the potential for diffuse emissions
4	Centralised OCS	Air displaced from all other existing/ proposed closed waste tanks at the site will be treated by a centralised OCS. This will utilise nano-bubble, ozone and chemical scrubbing technology to abate channelled emissions prior to discharge to atmosphere	6	Treated air from the system will be released to atmosphere via a dedicated vent at a height of 5m. This is anticipated to provide effective treatment of bioaerosols releases during normal operation. However, there may be the potential for fugitive emissions

Source		Source Description	Emission Point	Emission Characteristics
5	Inlet DAF Tank	Bioaerosols generated by effluent within the DAF tank	29	The surface of the DAF tank is covered by heavy duty plastic which is only removed for cleaning. This is anticipated to provide effective containment of bioaerosols releases during normal operation. However, there may be the potential for diffuse emissions from the cover
6	Effluent DAF Tank	Bioaerosols generated by effluent within the DAF tank	31	The surface of the DAF tank is covered by heavy duty plastic which is only removed for cleaning. This is anticipated to provide effective containment of bioaerosols releases during normal operation. However, there may be the potential for diffuse emissions from the cover

3.3.2 It should be noted that the actual AD process itself is sealed and therefore does not form a source of bioaerosols under normal operation. Should releases occur then this would indicate a fault with the plant and immediate remedial measures would be taken to eliminate the problem to avoid affecting the AD process, with associated financial consequences for the operator. Similarly, the CHP unit and flares only emit products of combustion which do not typically have any associated bioaerosols. As such, they have not been considered as potential sources in the context of this assessment.

3.3.3 The potential for bioaerosol emissions from the sources is considered further in the following Sections. Reference should be made to Figure 2 for visual representation of the source locations.

Carbon Filters

3.3.4 As detailed in Table 2, air displaced from tanks will be treated by three carbon filters prior to discharge to atmosphere via dedicated vents on top of the filter.

3.3.5 The carbon filters are likely to provide beneficial reductions in bioaerosol concentrations between inlet and vented air due to the impaction of microorganisms onto the carbon

media during operation. However, there may be the potential for the release of residual components which pass straight through the filters. As such, impacts associated with emissions from the sources have been considered further as part of the assessment.

Centralised OCS

3.3.6 Air displaced from all other existing/ proposed closed waste tanks at the site will be treated by a centralised OCS. This will utilise nano-bubble, ozone and chemical scrubbing technology to abate channelled emissions prior to discharge to atmosphere at height of 5m. This will likely ensure effective abatement of emissions due to the wet nature of the treatment process. However, there may be the potential for the release of residual bioaerosols. As such, impacts associated with emissions from the sources have been considered further as part of the assessment.

Inlet DAF Tank

3.3.7 The surface of the DAF tank is covered by heavy duty plastic which is only removed for cleaning. This is anticipated to provide effective containment of bioaerosols releases during normal operation. However, there may be the potential for diffuse emissions from the cover. As such, potential impacts associated with emissions have been considered further as part of the assessment.

Effluent DAF Tank

3.3.8 The surface of the Effluent DAF tank is covered by heavy duty plastic which is only removed for cleaning. This is anticipated to provide effective containment of bioaerosols releases during normal operation. However, there may be the potential for diffuse emissions from the cover. As such, potential impacts associated with emissions have been considered further as part of the assessment.

3.4 Receptors

3.4.1 EA guidance 'M9: environmental monitoring of bioaerosols at regulated facilities'[10] 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."

3.4.2 A desk-top study was undertaken in order to identify any sensitive receptor locations in the vicinity of the site that required specific consideration during the assessment. In accordance the requirements of the EA RPS[11], this focussed on locations within 250m of the facility boundary where people may be present for more than 6-hours at one time. The identified receptors are summarised in Table 3.

Table 3 Sensitive Receptors

Receptor		NGR (m)		Distance from Facility (m)	Direction from Facility
		X	Y		
R1	Commercial/ Industrial - Earlstrees Road	488827.1	290778.0	15	South-east
R2	Commercial/ Industrial - Earlstrees Road	488864.7	290806.1	35	East
R3	Commercial/ Industrial - Earlstrees Road	488890.2	290756.3	75	South-east
R4	Commercial/ Industrial - Earlstrees Road	488759.2	290827.8	15	North
R5	Commercial/ Industrial - Earlstrees Road	488831.9	290869.8	40	North-east

10 M9: environmental monitoring of bioaerosols at regulated facilities, EA, 2018.

11 Bioaerosol monitoring at regulated facilities - use of M9: RPS 209, EA, 2018.

Receptor		NGR (m)		Distance from Facility (m)	Direction from Facility
		X	Y		
R6	Commercial/ Industrial - Off Causeway Road	488645.4	290816.0	70	North-west
R7	Commercial/ Industrial - Off Causeway Road	488670.5	290755.2	40	West
R8	Commercial/ Industrial - Off Causeway Road	488728.2	290677.6	60	South
R9	Commercial/ Industrial - Earlstrees Road	488698.9	290886.1	100	North
R10	Commercial/ Industrial - Earlstrees Road	488758.9	290713.2	40	South

3.4.3 As shown in Table 3, the sensitive locations are located between approximately 15m and 100m from the site at their closest points. Reference should be made to Figure 3 for a visual representation of the identified receptors.

3.5 Prevailing Meteorological Conditions

3.5.1 The potential for bioaerosol emissions to impact at sensitive locations depends significantly on the meteorology, particularly wind direction, during release. In order to consider prevailing conditions at the site review of historical weather data was undertaken. Wittering observation station is located at NGR: 503490, 302412, which is approximately 19.5km north-east of the facility. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for an assessment of this nature.

3.5.2 Meteorological data was obtained from Wittering observation station over the period 1st January 2017 to 31st December 2021 (inclusive). The frequency of wind from the twelve sectors which best describe the directions which may cause impacts in the vicinity of the site is shown in Table 4. Reference should be made to Figure 4 for a wind rose of the meteorological data.

Table 4 Wind Frequency Data

Wind Direction (°)	Frequency of Wind (%)
345 - 15	5.05

Wind Direction (°)	Frequency of Wind (%)
15 - 45	7.54
45 - 75	5.96
75 - 105	2.50
105 - 135	3.66
135 - 165	5.38
165 - 195	8.61
195 - 225	14.05
225 - 255	16.22
255 - 285	12.19
285 - 315	8.16
315 - 345	5.54
Sub-Total	94.85
Calms	0.69
Missing/Incomplete	4.46

3.5.3 All meteorological data used in the assessment was provided by Atmospheric Dispersion Modelling Ltd, which is an established distributor of meteorological data within the UK.

3.5.4 As shown in Table 4, the prevailing wind direction at the AD plant is from the south-west. Winds from the north and east are relatively infrequent, which is indicative of conditions throughout the majority of the UK.

4.0 RISK ASSESSMENT METHODOLOGY

4.1 Overview

4.1.1 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'[12]. This included consideration of the following:

- Receptor - what is at risk? What do I wish to protect?
- Source - what is the agent or process with potential to cause harm?
- Harm - what are the harmful consequences if things go wrong?
- Pathway - how might the receptor come into contact with the source?
- Probability of exposure - how likely is this contact?
- Consequence - how severe will the consequences be if this occurs?
- Magnitude of risk - what is the overall magnitude of the risk? and,
- Justification for magnitude - on what did I base my judgement?

4.1.2 Based on the Bioaerosol Risk Assessment outcomes potential mitigation and control options were identified.

4.1.3 Further explanation for the key assessment areas is provided below.

4.2 Receptor

4.2.1 The first step was to consider how the activity could harm the environment. This involved identifying 'receptors' that may be affected and included people, property, and the natural and physical environment.

4.3 Probability of Exposure

4.3.1 The probability of exposure was defined based on the likelihood of exposure of the specific receptor to the identified sources. This depended on several factors, such as:

- Distance between source and receptor;

[12] Guidance on the evaluation of bioaerosol risk assessments for composting facilities, EA, undated.

- Dispersion potential of emission;
- Duration of emission; and,
- Frequency of emission.

4.3.2 Probability was categorised in accordance with the following criteria:

- High - exposure is probable, direct exposure likely with no/few barriers between source and receptor;
- Medium - exposure is fairly probable, barriers less controllable;
- Low - exposure unlikely, barriers exist to mitigate; or,
- Very low - exposure very unlikely, effective and multiple barriers.

4.4 Harm

4.4.1 The severity of harm from a risk depends on:

- How much a person or part of the environment is exposed; and,
- How sensitive a person or part of the environment is.

4.4.2 Some parts of the environment can be very sensitive. For example, serious health effects can occur if humans are exposed to certain chemicals for only short periods of time.

4.4.3 Harm can be described as follows:

- High - severe consequences, evidence that exposure may result in serious damage;
- Medium - significant consequences, evidence that exposure may result in damage that is not severe and is reversible;
- Low - minor consequences, damage not apparent, reversible adverse changes possible; and,
- Very low - negligible consequences, no evidence for adverse changes.

4.5 Magnitude of Risk

4.5.1 The level of risk is a combination of:

- How likely a problem is to occur; and,

- How serious the harm might be.

4.5.2 Risk is highest where both the likelihood of a problem is high and the potential harm is severe. Risk is lowest where a problem is unlikely to occur and the harm that might result is not serious.

4.5.3 Risk was defined based on the interaction between the probability of exposure and potential harm, as outlined in Table 5.

Table 5 Magnitude of Risk

Probability of Exposure	Potential Harm			
	Very Low	Low	Medium	High
High	Low	Medium	High	High
Medium	Low	Medium	Medium	High
Low	Low	Low	Medium	Medium
Very Low	Very Low	Low	Low	Medium

4.6 Further Requirements

4.6.1 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;
- 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.

4.6.2 Mitigation to reduce risk can also be applied to avoid the requirement for further assessment and/or monitoring.

5.0 RISK ASSESSMENT

5.1.1 The Bioaerosol Risk Assessment is shown in Table 6.

Table 6 Risk Assessment

Source		Probability of exposure	Harm	Magnitude of Risk	Control Measures	Residual Risk	Justification for Residual Risk
1	Carbon Filter 2	**Low** due to the prevailing meteorological conditions and the potential effectiveness of the abatement system in reducing bioaerosol concentrations	**Medium**	**Low**	The abatement system is likely to provide beneficial reductions in bioaerosol concentrations between inlet and vented air due to the impaction of microorganisms onto the carbon media during operation Treated air from the system is released to atmosphere via a dedicated vent on the top of the filter The carbon filter will be maintained in accordance with the supplier's instructions and relevant best practice guidance	**Very Low**	The prevailing meteorological conditions, as well as full implementation of the stated control measures, is considered to result in a **very low** risk of impact occurring

Source		Probability of exposure	Harm	Magnitude of Risk	Control Measures	Residual Risk	Justification for Residual Risk
2	Carbon Filter 3	**Low** due to the prevailing meteorological conditions and the potential effectiveness of the abatement system in reducing bioaerosol concentrations	**Medium**	**Low**	The abatement system is likely to provide beneficial reductions in bioaerosol concentrations between inlet and vented air due to the impaction of microorganisms onto the carbon media during operation Treated air from the system is released to atmosphere via a dedicated vent on the top of the filter The carbon filter will be maintained in accordance with the supplier's instructions and relevant best practice guidance	**Very Low**	The prevailing meteorological conditions, as well as full implementation of the stated control measures, is considered to result in a **very low** risk of impact occurring
3	Carbon Filter 4	**Low** due to the prevailing meteorological conditions and the potential effectiveness of the abatement system in reducing bioaerosol concentrations	**Medium**	**Low**	The abatement system is likely to provide beneficial reductions in bioaerosol concentrations between inlet and vented air due to the impaction of microorganisms onto the carbon media during operation Treated air from the system is released to atmosphere via a dedicated vent on the top of the filter The carbon filter will be maintained in accordance with the supplier's instructions and relevant best practice guidance	**Very Low**	The prevailing meteorological conditions, as well as full implementation of the stated control measures, is considered to result in a **very low** risk of impact occurring

Source		Probability of exposure	Harm	Magnitude of Risk	Control Measures	Residual Risk	Justification for Residual Risk
4	Centralised OCS	**Low** at all receptors due to the prevailing meteorological conditions and the potential effectiveness of the abatement system in reducing bioaerosol concentrations	**Medium**	**Low**	Air displaced from all other existing/ proposed closed waste tanks at the site will be treated by a centralised OCS. This is likely to contribute to abatement of bioaerosols, through utilising nano-bubble, ozone and chemical scrubbing technology Treated air will be discharged to atmosphere vertically via a dedicated stack at a height of 5m in order to promote effective dilution and dispersion of any residual emissions Regular inspection of the centralised OCS will be undertaken by site operatives in order to ensure that it is operating correctly and providing effective treatment of emissions	**Very Low**	Full implementation of the stated control measures is considered to result in a **very low** risk of impact occurring
5	Inlet DAF Tank	**Low** at all receptors due the prevailing meteorological conditions and the low release potential	**Medium**	**Low**	The surface of the DAF tank is covered by heavy duty plastic which is only removed for cleaning. This is anticipated to provide effective containment of bioaerosols releases during normal operation	**Very low**	The low release potential and implementation of the stated control measures is considered to result in a **very low** risk of impact occurring

Source		Probability of exposure	Harm	Magnitude of Risk	Control Measures	Residual Risk	Justification for Residual Risk
6	Effluent DAF Tank	**Low** at all receptors due the prevailing meteorological conditions and the low release potential	**Medium**	**Low**	The surface of the DAF tank is covered by heavy duty plastic which is only removed for cleaning. This is anticipated to provide effective containment of bioaerosols releases during normal operation	**Very low**	The low release potential and implementation of the stated control measures is considered to result in a **very low** risk of impact occurring

5.1.2 As shown in Table 6, the residual risk of impact as a result of emissions from all sources was determined as **low**. As such, it is concluded that no further control measures, other than those detailed in the assessment, are required in order to reduce the potential for impacts at sensitive locations in the vicinity of the site.

6.0 CONCLUSION

6.1.1 Redmore Environmental Ltd was commissioned by Waste4Generation Ltd to undertake an Bioaerosol Risk Assessment in support of an Environmental Permit Variation Application for the AD facility operated by the company on land off Earlstrees Road, Corby.

6.1.2 During the operation of the facility there is the potential for bioaerosol emissions and associated impacts at sensitive receptor locations in the vicinity of the site. A Risk Assessment was therefore undertaken to identify potential emission sources and evaluate effects in the local area.

6.1.3 The risk of significant bioaerosol impact at sensitive locations in the vicinity of the site was assessed using a source - pathway - receptor approach. This considered the nature of the potential emission, any barriers to dispersion and the severity of harm.

6.1.4 The results of the assessment indicated residual risk from all sources was determined as **low**. As such, it is concluded that no further control measures, other than those detailed in the assessment, are required in order to reduce the potential for impacts at sensitive locations in the vicinity of the site.

7.0 ABBREVIATIONS

AD	Anaerobic Digestion
ABP	Animal By-Products
CHP	Combined Heat and Power
DAF	Dissolved Air Flotation
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EWC	European Waste Codes
FOG	Fats, oils and greases
IVC	In-Vessel Composting
MBT	Main Break Tank
NGR	National Grid Reference
OCS	Odour Control System
RPS	Regulatory Position Statement
SNIFFER	Scotland and Northern Ireland Forum for Environmental Research

Figures

Legend

Site Boundary

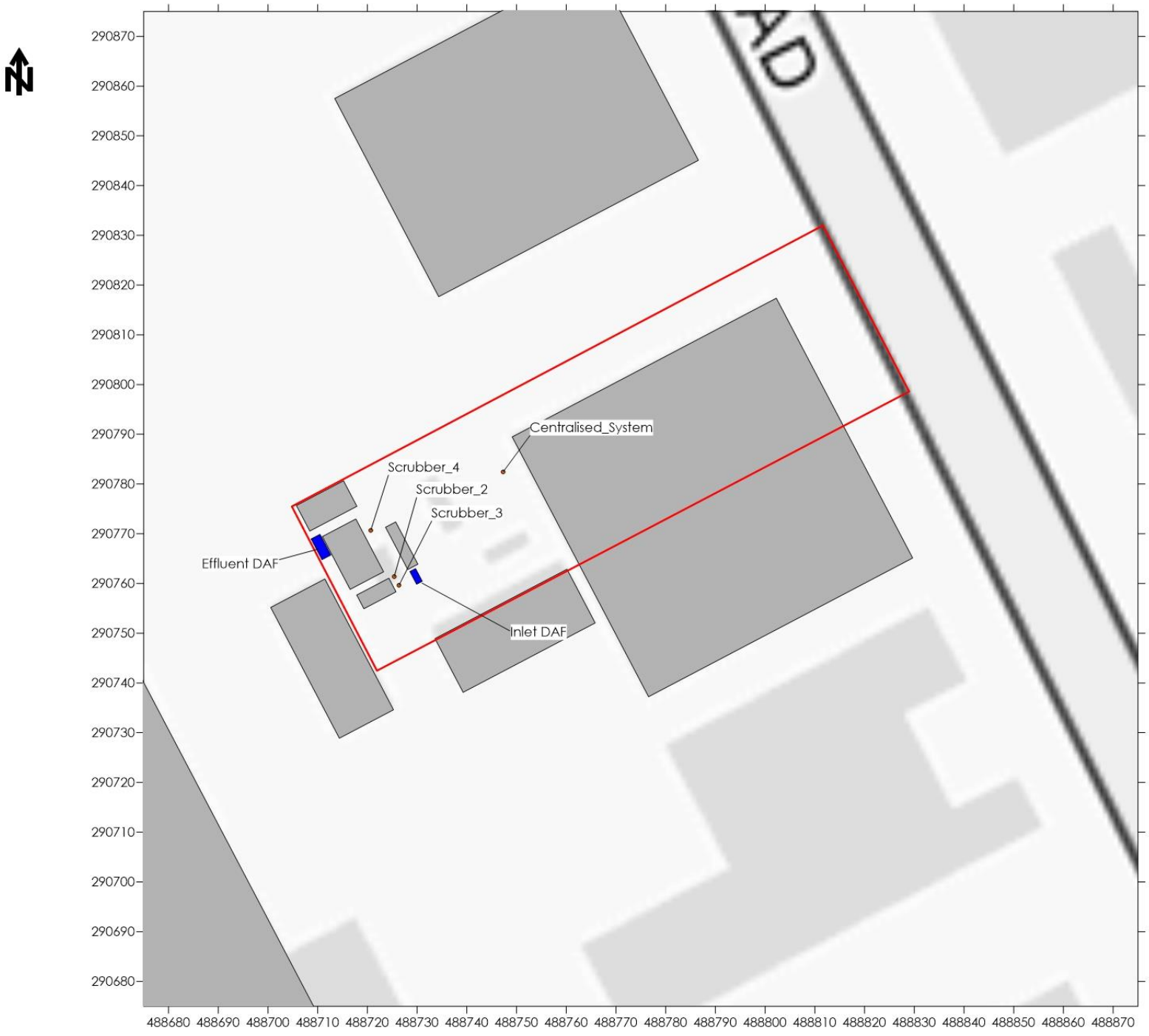
Title
Figure 1 - Site Location Plan

Project
Bioaerosol Risk Assessment
Earlstrees Road, Corby

Project Reference
6430-1

Client
Waste4Generation Ltd

Redmore environmental
www.red-env.co.uk | 0161 7060075



Legend

- Site Boundary
- Point Source
- Area Source
- Building

Title
Figure 2 - Bioaerosol Emission Source

Project
Bioaerosol Risk Assessment
Earlstrees Road, Corby

Project Reference
6430-1

Client
Waste4Generation Ltd

Redmore environmental
www.red-env.co.uk | 0161 7060075

Legend

Site Boundary

Sensitive Receptor

Title
Figure 3 - Sensitive Receptors

Project
Bioaerosol Risk Assessment
Earlstrees Road, Corby

Project Reference
6430-1

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Waste4Generation Ltd

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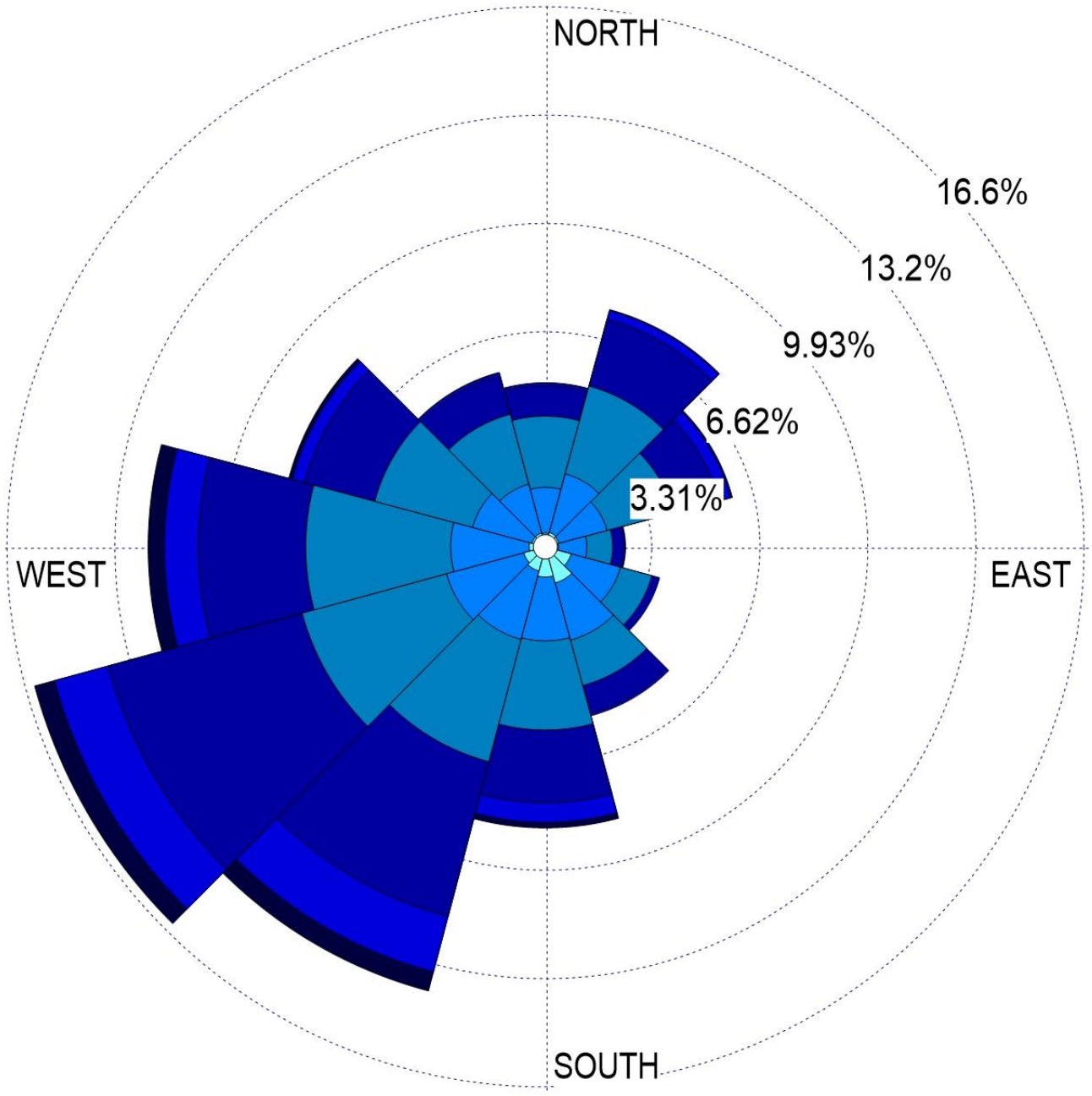

Legend

WIND SPEED (m/s)

- >= 11.10
- 8.80 - 11.10
- 5.70 - 8.80
- 3.60 - 5.70
- 2.10 - 3.60
- 0.50 - 2.10

Calms: 0.69%

Title
Figure 4 - Wind Rose of 2017 to 2021 Wittering Meteorological Station Data

Project
Bioaerosol Risk Assessment
Earlstrees Road, Corby

Project Reference
6430-1

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