



# ODOUR MANAGEMENT PLAN

Fernbrook Bio Limited



*Helping clients prosper through compliance*

---

## SITE DETAILS

### **Fernbrook Bio Limited**

Rothwell Lodge AD Facility

Rothwell Lodge Farm

Rothwell Road

Kettering

Northamptonshire

NN16 8XF

---

## OPERATOR DETAILS

### **Fernbrook Bio Ltd**

Rothwell Road

Kettering

Northamptonshire

NN16 8XF

---

## PERMIT/APPLICATION REFERENCE

EPR/EP3894SC

## DOCUMENT REFERENCE

K114.1~09~013

---

## ISSUE DATE

16/06/2023



**Wiser Environment Ltd**, Suite 11 Manor Mews, Bridge Street, St Ives, PE27 5UW  
94 Xuan Thuy, Thao Dien Ward, District 2, Ho Chi Minh City, 713385  
+44 1480 462 232 | [www.wiserenvironment.co.uk](http://www.wiserenvironment.co.uk) | [info@wisergroup.co.uk](mailto:info@wisergroup.co.uk)

## DOCUMENT CONTROL

<b>DOCUMENT TITLE:</b>	Odour Management Plan
<b>REFERENCE:</b>	K114.1~09~013
<b>CLIENT:</b>	Fernbrook Bio Limited
<b>REPORTED BY:</b>	Wiser Environment Limited
<b>STATUS:</b>	Final
<b>ISSUE:</b>	6
<b>ISSUE DATE:</b>	16/06/2023
<b>AUTHOR:</b>	Wiser Environment Limited
<b>APPROVED BY:</b>	Fernbrook Bio Limited

## REVISION HISTORY

REFERENCE	DATE	ISSUE:	REVISION SUMMARY
K114.1~09~013	10/05/2018	1	FINAL
K114.1~09~013	29/03/2021	2	Amended to incorporate proposed installation of gas upgrading equipment.
K114.1~09~013	21/04/2021	3	Amended following installation of Thermal Oxidiser
K114.1~09~013	10/02/2022	4	Amended following change in carbon filter media and detailed odour analysis / modelling
K114.1~09~013	29/07/2022	5	Amended for application for substantial variation to the Environmental Permit
K114.1~09~013	13/06/2023	6	Amended following change in design of odour abatement systems

## QUALITY CONTROL

ACTION	DATE	NAME
Prepared	25/07/2022	Elliott Howard
Checked	27/07/2022	Josh Freeman

---

Approved	13/06/2023	Graeme Outridge
----------	------------	-----------------

## CONTENTS

<b>1. INTRODUCTION .....</b>	<b>8</b>
1.1. Scope .....	8
1.2. Aims.....	9
1.3. Review.....	9
<b>2. SENSITIVE RECEPTORS .....</b>	<b>10</b>
2.1. Prevailing Wind Direction .....	11
2.2. Estimated Odour Emissions .....	12
2.3. Designated Protected Sites.....	12
2.4. Human Receptors .....	12
<b>3. OPERATIONS .....</b>	<b>18</b>
3.1. Overview of Site Operations .....	18
3.2. Site History .....	19
3.3. Hours of Operation.....	19
<b>4. ODOUR MANAGEMENT.....</b>	<b>20</b>
4.1. Responsibility For Implementation of This Plan.....	20
4.2. Sources & Control of Odour .....	20
4.3. Pathways .....	22
4.4. Feedstock Inventory Control .....	22
4.5. Management of Odourous Materials .....	24
4.6. Process Control .....	26
<b>5. CONTAINMENT, COLLECTION &amp; ABATEMENT OF ODOUROUS AIR .....</b>	<b>28</b>
5.1. Routine Operation.....	28
5.2. Emergency Operation .....	29
5.3. Minimising Odourous Emissions Volumes.....	29
5.4. Sizing of Handling Systems .....	30
5.5. Reception Building .....	30
5.6. Operating Conditions of Containment / Abatement System.....	30
5.7. Monitoring of Containment / Abatement System .....	30
5.8. Contingency Measures .....	30
5.9. Odour Dispersion.....	31
<b>6. REPORTING &amp; COMPLAINTS RESPONSE .....</b>	<b>32</b>
6.1. Reporting of Complaints.....	32

**7. ODOUR MONITORING ..... 33**

    7.1. Olfactory ..... 33

    7.2. Meteorological ..... 33

    7.3. Dynamic..... 33

**8. ODOUR ACTION PLAN ..... 34**

**9. SITE & EQUIPMENT MAINTENANCE PLAN ..... 36**

    9.1. Abnormal Events / Emergencies ..... 36

**10. KEEPING RECORDS ..... 37**

**11. REVIEW THE MANAGEMENT PLAN..... 38**

**12. AVAILABILITY OF THE MANAGEMENT PLAN ..... 39**

**13. SUMMARY..... 40**

**TABLES**

TABLE	TITLE
Table 1	Vent Gases from Various Tanks and their Treatment
Table 2	Sensitive Receptors
Table 3	FIDOL Assessment Criteria
Table 4	FIDOL Assessment
Table 5	Feedstock Inventory Control
Table 6	Actions to be taken by the Operator

**DRAWINGS**

REFERENCE	TITLE
K114.1~20~006	Site Setting Plan (2km)
222-022-LG-ANSI-01-c	Proposed Site Layout Plan

## FIGURES

FIGURES	TITLE
Figure 1	Aerial Image of Site
Figure 2	Wind Rose Annual 5-year Average ( <a href="http://www.willyweather.co.uk">www.willyweather.co.uk</a> )

## APPENDICES

APPENDIX	TITLE
Appendix A	Schematic Process Overview
Appendix B	K114.1 SOP_Index_Fernbrook_v4
Appendix C	Combined Odour Abatement System Design
Appendix D	Exeon Hi-Flo™ Brochure (Reception Building)
Appendix E	Exeon Mid-Flo™ Brochure (Other process areas)
Appendix F	Odour Report Form (K114.1~19~001)
Appendix G	Odour Complaint Form (K114.1~19~002)

## 1. INTRODUCTION

This document is the Odour Management Plan (OMP) that accompanies the application for a Substantial Variation to the existing Bespoke Environmental Permit (EPR/EP3894SC) at Rothwell Lodge Anaerobic Digestion (AD) Facility, Rothwell Road, Kettering, Northamptonshire, NN16 8XF. The site is located at NGR SP 82389 80138.

The Odour Management Plan has been regularly updated to reflect improvements to odour abatement measures and enhanced process control over the last few years. This OMP identifies those waste codes and activities that have the potential to emit odour to the receptors within 1 km of the site and provides mitigation to prevent odour emissions occurring.

This latest revision is because of the changes implemented by the operator to comply with Best Available Techniques (BAT). Directly Associated Activities (DAAs) need to be amended to enable the installation of plant components to improve odour abatement. Proposed changes in infrastructure are required given the proposed increase in annual throughput from 49,000 to 100,000 tonnes.

The scope of the Application includes expansion of the reception building to include an additional feedstock line; replacement of the reception building odour abatement system with extraction and activated carbon filtration (Stack 2: 12 m); additional tanks (pasteurisation system, four buffers, two digesters and one end storage); new odour abatement system for all other tanks and process areas; gas upgrading for grid injection and propane gas storage; adding CO<sub>2</sub> recovery as an indirect activity; and modifications to ancillary equipment and pipework. There are no proposed changes to the permitted area or waste types to be accepted at the facility.

This Odour Management Plan (OMP) should be read in conjunction with the site's *Management Plan* (K114.1~09~006) and other supporting Management System documents.

### 1.1. Scope

The site is operated in accordance with policies, plans, procedures and practices outlined within the *Management Plan* (K114.1~09~006).

This Odour Management Plan assesses the operations at the site at the time of writing, is based upon observations made and a desk study. This assessment relies upon information provided by Fernbrook Bio Ltd, combined with industry best practice and the relevant Environment Agency guidance.

The Odour Management Plan has been produced in accordance with the Environment Agency's guidance:



- H4 Odour Management (April 2011) - [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/296737/geho0411btqm-e-e.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/296737/geho0411btqm-e-e.pdf);
- Control and monitor emissions for your Environmental Permit (Nov 2022 - <https://www.gov.uk/guidance/control-and-monitor-emissions-for-your-environmental-permit>); and
- BREF Document for Waste Treatment (August 2018).

### **1.2. Aims**

This document aims to identify the significant sources of odour generated from site both during routine and emergency operating conditions; assess the potential amenity impact on nearby sensitive receptors; and evaluate the effectiveness of appropriate measures to control and minimise odour generation.

### **1.3. Review**

The Odour Management Plan has been reviewed and updated following the request by the Environment Agency, and where further changes are identified to either current or future operations, or in response to unplanned event which has the potential for the uncontrolled release of significant odour, the document will be amended accordingly.

## 2. SENSITIVE RECEPTORS

The site is located at Rothwell Lodge Farm, Rothwell Road, Kettering, Northamptonshire, NN16 8XF, at NGR SP 82389 80138. Lying approximately 600 m south of Rothwell, 1.1 km northwest of Thorpe Malsor, 1.3 km northeast of Loddington, and 1.5 km northeast of Orton.

The site covers an area of 2.33 hectares. Access to the site is gained directly from the west bound A14.

This document is supported by the *Environmental Risk Assessment* (K114.1~11~001) and the *Management Plan* (K114.1~09~006). Figure 1. Shows an aerial image of the site.

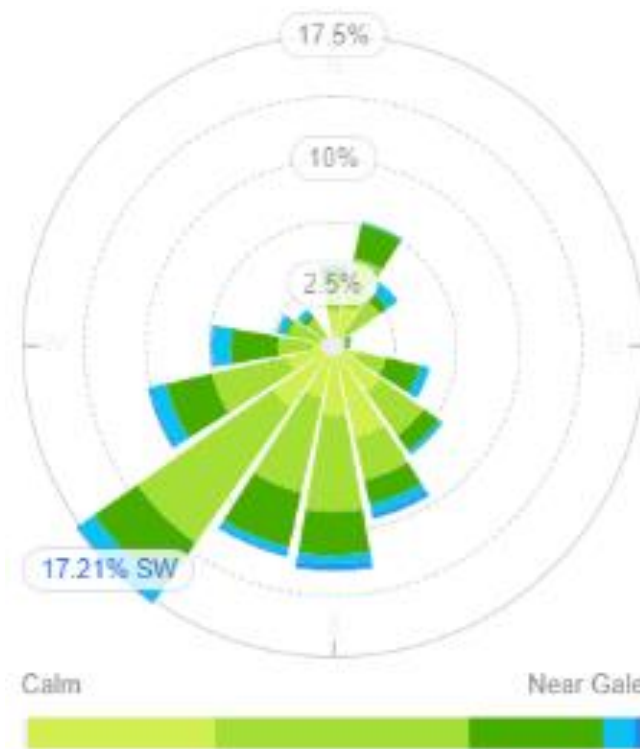


**Figure 1.** Aerial image of site

The closest observing station where wind statistic data is available is Thorpe Malsor. This is circa 1.4 km southeast of the site (based on observations from the last 5 years) Figure 2 presents the wind statistics on a wind rose as an annual average using data from the previous 5 years. The data indicates that sensitive receptors located towards the northeast of the site are potentially at greatest risk of windblown fugitive emissions (odour).

The closest receptors identified in each direction have been identified for assessment and are displayed in Table 2 below. Receptors are also displayed in K114.1~20~006 *Site Setting Plan* and *Sensitive Receptors Table*.

Receptors that are at a higher risk from odour have been identified in Table 2 Sensitive Receptors. The distance and direction of the receptors from the site and the prevailing wind direction (see Figure 2) have been considered for this assessment.



**Figure 2.** Wind rose annual 5-year average (www.willyweather.co.uk)

**2.1. Prevailing Wind Direction**

Historic data are based on daily observations taken between July 2018 and July 2022 at Rothwell.

The predominant wind direction was from the SW for approximately 17% of the reporting period.

**Table 1.** Vent Gases from Various Tanks and their Treatment

VENT GASES	TREATMENT PROCESS
Displaced air from the storage tank	Activated carbon filter
Displaced air from the digestate tanker loading	One carbon filter vessel containing a 50/50 blend of Filtracarb SA78 & Filtracarb EXR4
Displaced air from the pasteurisation	Directed to digesters and blended with biogas prior to desulphurisation and combustion in CHPs
Displaced air from the buffer tanks	Biofilter (pre-treatment) and activated carbon filter
Displaced air from the gas upgrading plant	Combination of 4 gas scrubbing columns and activated carbon and particulate filters.

**2.2. Estimated Odour Emissions**

The expanded reception building has a calculated volume of 9,000 m<sup>3</sup>. The estimated odour concentration emitted from Stack 2 is <1,000 ou<sub>E</sub>/m<sup>3</sup>.

**2.3. Designated Protected Sites**

There are no protected conservation sites within 2 km of the site.

**2.4. Human Receptors**

Identified human receptors are illustrated in the table below.

**Table 2.** Sensitive Receptors

ID	DESCRIPTION	DISTANCE	DIRECTION
-	Site Workers	On site	-
-	Site Visitors	On site	-
<b>INHABITANTS OF RESIDENTIAL PROPERTIES</b>			
1	Original Farmhouse at Rothwell Lodge	45 m	NE
2	New Farmhouse at Rothwell Lodge	96 m	ESE
3	Residents of Rothwell	546 m	NNW

ID	DESCRIPTION	DISTANCE	DIRECTION
4	Binders Lodge off Kettering Road	957 m	SSW
5	Residents of Glendon Hill Farm	1.03 km	NE
6	Residents of Thorpe Malsor	1.24 km	SE
7	Residents of Woodfield Farm	1.26 km	NE
8	Residents of Rothwell Grange Farm	1.42 km	E
9	Residents of Woodfield Farm	1.45 km	N
10	Residents of Loddington	1.51 km	SSW
11	Residential Properties at Woodfield Lodge	1.67 km	N
12	Residents of Bunkers Hill Farm	1.75 km	NE
13	Residents of Orton	1.76 km	WSW
14	Residents of Grange Farm	1.82 km	NNW
<b>SENSITIVE PUBLIC USE</b>			
1	Rothwell Cemetery	480 m	WNW
2	Holy Trinity Parish Church	1.13 km	NW
3	Rothwell Victoria Infant School & Rothwell Junior School	1.29 km	NNW
4	All Saints, Thorpe Malsor (Church)	1.33 km	SE
5	Woodland Hospital	1.35 km	E
6	Montsaye Academy	1.59 km	NW
7	Loddington CEVA Primary School	1.76 km	SSW
8	St. Leonard, Loddington (Church)	1.89 km	SSW
9	Rothwell Medical Centre	1.97 km	NW
<b>COMMERCIAL USE</b>			
1	Rothwell Service Station; Petrol Station & Outlets (McDonalds & Greggs)	65 m	N
2	Sewage Works south of the A14	725 m	ESE

ID	DESCRIPTION	DISTANCE	DIRECTION
3	Multiple Buildings on Market Hill & Bridge Street - Rothwell Town Centre	1.06 km	NNW
4	Rothwell Truck Stop (Service Station)	1.21 km	WNW
5	Midland Stone Centre (Aggregates Yard)	1.44 km	W
6	Unspecified Buildings & Yards off Main Street	1.69 km	SW
7	Styles Lodge Holiday Accommodation & Equestrian Centre	1.71 km	NNE
<b>PUBLIC RIGHTS OF WAY</b>			
-	Footpaths running between Rothwell Lodge Service Station & Rothwell	65 m	NE
-	Footpath running between Rothwell Lodge & Wyatts Plantation	125 m	E
-	Footpath running between Thorpe Malsor & Cransley Reservoir	1.38 km	SE
	Footpath running between Thorpe Malsor & Harrington Road	1.65 km	SE
	Footpath running between Loddington & Orton	1.83 km	SSW
	Footpaths running between Rothwell & Desborough	1.85 km	NNW
	Footpath running between Loddington & Great Cransley	1.88 km	SSW
<b>ROADS AND RAILWAYS</b>			
-	A14	12 m	N
-	B669	525 m	W
-	B576	1.51 km	NW
-	A6	1.71 km	WNW
<b>RECREATIONAL AREAS</b>			
1	Blythe Play Park	547 m	N
2	Rothwell Recreation Ground	551 m	NNW
3	Manor Park	1.05 km	NW
4	Park between Tennyson Road & Crown Lane	1.43 km	NW

ID	DESCRIPTION	DISTANCE	DIRECTION
5	Rothwell Town Cricket Club	1.68 km	NW
<b>AGRICULTURAL AND ALLOTMENTS</b>			
1	Rothwell Lodge Farm Yard	0 m	E
2	Parcels of Open Arable Farm Land south of the A14	0 m	S, W
3	Parcels of Open Arable Farm Land north of the A14	106 m	NE
4	Allotment Gardens off Meadow Road	965 m	WNW
5	Farm Yard at Thorpe Malsor	1.31 km	SE
6	Allotment Gardens off Rushton Road	1.52 km	N
7	Woodfield Lodge Farm Yard	1.59 km	N
<b>SURFACE WATER</b>			
-	Slade Brook	515 m	NNW
-	Thorpe Malsor Reservoir (and associated streams)	525 m	SSE
-	Pond adjacent to Wyatts Plantation	626 m	ESE
-	Pond in Manor Park	1.03 km	NW
-	Pond adjacent to A14/16 Junction	1.35 km	WNW
-	Darwen Lake	1.56 km	WSW
-	Pond in Thorpe Malsor	1.58 km	SE
-	Two ponds at Grange Farm	1.65 km	NNW
-	Cransley Reservoir (and associated streams)	1.73 km	S
<b>GROUNDWATER</b>			
-	Bedrock Aquifer: Secondary A Aquifer - moderate permeability	On site	-
	The Site is not in a Source Protection Zone (SPZ)		
<b>DESIGNATED SITES</b>			
1	Tailby Meadow - Local Nature Reserve	2.65 km	NNW

ID	DESCRIPTION	DISTANCE	DIRECTION
2	Birch Spinney & Mawsley Marsh - SSSI	3.22 km	SSW
3	River Ise & Meadows - SSSI	4.25 km	NE
4	Alder Wood & Meadow - SSSI	4.52 km	NNE
5	Pipewell Woods - SSSI	5.59 km	N
6	Stoke & Bowd Lane Woods - SSSI	6.13 km	NNW
7	Great Oakley Meadow - Local Nature Reserve	6.63 km	NNE
8	Badsaddle, Withmale Park & Bush Walk Woods - SSSI	7.09 km	SSE
9	Southfield Farm Marsh - SSSI	7.11 km	SE
10	Kings Wood - Local Nature Reserve	7.85 km	NNE
11	Geddington Chase - SSSI	8.91 km	NE
12	Pitsford Reservoir - SSSI	9.19 km	SSW
13	Hardwick Lodge Meadow - SSSI	9.55 km	SSE
<b>NON-DESIGNATED SITES</b>			
1	BAP - Deciduous Woodland & Improved Grassland at Wyatts Plantation & Pottedbeg	467 m	ESE
2	BAP - Deciduous Woodland at Woodfield Farm	1.31 km	NNW
3	BAP - Deciduous Woodland and Improved Grassland south of Thorpe Malsor	1.42 km	SE
4	BAP - Deciduous Woodland at Bunkers Hill Spinney	1.44 km	ENE
5	BAP - Deciduous Woodland at Glen Spinney	1.48 km	NE
6	BAP - Improved Grassland at Brocks Spinney	1.52 km	SSE
7	BAP - Deciduous Woodland at Loddington	1.54 km	SSW
8	BAP - Deciduous Woodland at Glendon Wood & Maunsells Spinney	1.81 km	ENE
9	BAP - Deciduous Woodland at Stiles Spinney	1.82 km	N
<b>ATMOSPHERE</b>			



ID	DESCRIPTION	DISTANCE	DIRECTION
-	The site is not in an Air Quality Management Area (AQMA)	-	-
<b>LISTED BUILDINGS &amp; PARKS</b>			
1	31 No. Grade II Listed Buildings in Rothwell	1.19 km	NW
2	12 No. Grade II Listed Buildings in Thorpe Malsor	1.31 km	SW
3	Grade II Listed Building - Three Chimneys	1.35 km	SSW
4	12 No. Grade II Listed Buildings in Loddington	1.61 km	SSW
5	Grade II Listed Building - The Orton Trust Workshop	1.85 km	WSW
6	Grade II Listed Building - Manor Farmhouse	1.93 km	WSW

## 3. OPERATIONS

### 3.1. Overview of Site Operations

The site is operated as a waste management facility in accordance with the Environmental Permitting (England and Wales) Regulations 2016 (as amended), The Animal By-Products (Enforcement) (England) Regulations 2013 and PAS110:2014. Undertaking the acceptance, handling, storage and treatment of source segregated bio wastes including liquid, sludge and solid wastes, combustion of the resultant biogas to produce electricity and the dispatch of PAS110 certified whole digestate biofertiliser in accordance with the site's Environmental Permit.

The permitted activity falls within Schedule 1: *Section 5.4 Part A(1) (b) (i) Recovery or mix of recovery and disposal of non-hazardous waste with a capacity exceeding 75 tonnes per day (or 100 tonnes per day if the only waste treatment activity is anaerobic digestion) involving biological treatment.* The site is therefore classed as an Installation and Best Available Techniques (BAT) is applicable.

A detailed breakdown of the process is included within the Management Plan (K114.1~09~006).

A schematic overview of the anaerobic digestion process is illustrated in Appendix A. The main process areas can be identified as:

- Waste reception & acceptance;
- Pre-digestion processing & storage;
- Feedstock storage;
- Digestion;
- Pasteurisation;
- Digestate storage;
- Odour abatement equipment; and
- Biogas upgrading, storage and combustion.

### **3.2. Site History**

The Rothwell Lodge AD Plant was originally designed and installed by WELTec BioPower, and has since been developed and further improved by Fernbrook Bio Ltd with engineering support from specialist contractors (from June 2016 onwards)

The facility provides anaerobic digestion of organic wastes from a variety of agricultural, commercial and industrial sources. The process involves the breakdown of organic material by bacteria in the absence of oxygen partially converting the degradable solid material into biogas (methane & carbon dioxide); this provides both a volume and mass reduction of the input materials. The biogas is combusted in a reciprocating engine to generate electricity which is sent to the National Grid. Heat is recovered from the combustion and used in the AD process to heat the digesters and to pasteurise the material after digestion.

The resultant nutrient rich 'whole' digestate is produced to be compliant with PAS 110 and the Quality Protocol for Anaerobic Digestate (ADQP) and is used as a replacement for artificial fertilisers.

### **3.3. Hours of Operation**

The site is open to accept waste from external sources during the following times:

- 07:00 to 17:00 Monday to Friday
- 07:00 to 13:00 Saturday

The site is closed on Sunday and Bank Holidays. The site processes waste 24 hours a day.

## 4. ODOUR MANAGEMENT

### 4.1. Responsibility For Implementation of This Plan

The responsibility for the implementation of the OMP is the Technically Competent Manager (TCM) and in their absence an appropriately designated person.

The effectiveness of the plan will be monitored daily and reviewed as required in the event it is shown not to be adequately limiting odour emissions experienced at the nearest odour sensitive receptors identified in the Site Setting Plan K114.1~20~006 and Table 2.

The Odour Management Plan forms part of the Company’s Integrated Management System (IMS) for the whole site. All staff are made aware, through toolbox talks and by training as required, of the Odour Management Plan and its requirements. The IMS is subject to an audit process and is continually reviewed and updated to ensure best practice is delivered.

### 4.2. Sources & Control of Odour

An assessment has been using the FIDOL methodology (**F**requency of detection; **I**ntensity as perceived; **D**uration of exposure; **O**ffensiveness; and **L**ocation (of receptors)), of the potential impact on sensitive receptors from odour sources identified from site operations.

Table 3 below presents the basic descriptors that have been used to categorise the frequency and duration of odour releases from each odour source.

**Table 3.** FIDOL Assessment Criteria

FREQUENCY		DURATION
<b>High</b>	More than 10 occurrences in 8 hours	More than 1 min
<b>Moderate</b>	Less than 10 occurrences in 8 hours	Up to 1 min
<b>Low</b>	Not every day	Seconds

The main odour sources for the site have been identified and are presented in Table 4 below.

**Table 4.** FIDOL Assessment

ODOUR SOURCE	ODOUR FREQUENCY	ODOUR INTENSITY	ODOUR OFFENSIVENESS	DURATION	RECEPTOR	OVERALL RISK RATING
Reception Building	MODERATE	LOW	LOW	MODERATE	Nearest residential receptors are approx. 50 m from any on-site odour sources.  Beyond these properties in Rothwell village are >400 m away.  Less sensitive receptors around the site in the form of industrial activities (For example the service station across the A14)	<b>MODERATE</b>
Whole Digestate Storage	LOW	LOW	LOW	MODERATE		<b>LOW</b>
Pressure Relief Valves	LOW	MODERATE	MODERATE	LOW		<b>LOW</b>
Buffer tanks	MODERATE	HIGH	HIGH	MODERATE		<b>HIGH</b>
Storage Tank	LOW	LOW	LOW	MODERATE		<b>LOW</b>
Digestate Offtake	LOW	LOW	LOW	HIGH		<b>MODERATE</b>
Gas Upgrading Plant	HIGH	LOW	LOW	HIGH		<b>MODERATE</b>
CHP Stack	HIGH	LOW	LOW	HIGH		<b>MODERATE</b>

Appropriate odour control measures have been installed where the potential for odour generation is greatest (i.e. reception building and digestate storage and separation). Further specific details of each of these odour abatement systems are provided in section 4.5.

Under routine operating conditions, there is no release of untreated odours to air.

Daily odour monitoring will be performed by suitably trained site staff in accordance with *SOP 021 – Site Checks*. An index of SOPs (K114.1 SOP\_Index\_Fernbrook v4) is presented in Appendix B. Any corrective/preventative actions will be documented in the Site Diary.

The SOPs are a fundamental part of the Management System and as operational documents, may be subject to review and amendment, whilst always considering and applying appropriate control sufficient to achieve the requirements of the Environmental Permit and the OMP.

#### **4.3. Pathways**

Pathway for odour to sensitive receptors is exclusively via air emission.

#### **4.4. Feedstock Inventory Control**

An analysis of primary feedstocks is illustrated in Table 5 below. Irregular wastes types are assessed for odour potential as part of the established waste acceptance procedures and provided with a risk ranking prior to any mitigation. It also provides the comments and controls used by site to control and reduce odorous emissions.

**Table 5.** Feedstock Inventory Control

PERMITTED TYPES AND QUANTITIES OF WASTES					
	WASTE CODE	WASTE CATEGORY	RISK LEVEL	COMMENTS & CONTROLS	RETAINED RISK LEVEL
<b>Food waste</b> (including kitchen and canteen waste)	02 02 03 20 01 08	Degradable	<b>HIGH</b>	<ul style="list-style-type: none"> <li>• Kerbside collections</li> <li>• 1-2 weeks old</li> <li>• Transfer station or other bulking facility</li> <li>• 2 - 3 weeks old</li> <li>• Prolonged storage especially during warmer weather, means waste is partially decomposed and hence more odourous upon delivery.</li> <li>• Multiple collections from producers</li> <li>• 1 – 2 weeks old</li> <li>• Mixing of wastes can promote decomposition and increase odour.</li> <li>• Single collections from producers</li> <li>• 24 - 48 hours</li> <li>• Certain waste types can be more odourous than others but typically direct transfer means odour potential is low.</li> <li>• Digestate from anaerobic treatment of animal and vegetable waste may provide additional challenges.</li> </ul>	<b>MEDIUM</b>
<b>Catering waste</b>	02 03 04	Degradable	<b>HIGH</b>		<b>LOW</b>
<b>Industrial wastes</b>	02 02 01 02 03 01 02 07 01 19 06 06	Degradable	<b>HIGH</b>		<b>LOW</b>

Table 5 shows all the wastes on the permitted list of waste that have the potential to cause odour, those not contained above have been screened out already. They have been risked ranked and mitigation provided.

#### 4.5. Management of Odourous Materials

Site operations are managed in such a way as to minimise the potential uncontrolled release of odour from the site in accordance with *SOP12 – Odour Control*.

##### 4.5.1. Waste Reception & Feedstock Storage

The primary mechanism for preventing the release of significant odour from within the reception building is the implementation of the site's waste acceptance procedures, the prompt processing of odourous feedstock materials and good housekeeping onsite. Under routine operating conditions the reception pits are emptied daily. Once processed, the liquid 'soup' is contained within sealed pipe work and tanks and therefore the potential risk of odour release is minimised.

The reception building is maintained at negative pressure and the odorous air is drawn through a particulate filter by two variable speed extraction fans, before being treated by the activated carbon filter bed system. An illustration of the combined odour abatement system is presented in Appendix C. See Appendix D for the *Exeon hi-flo™* system brochure.

Key System Parameters:

- Estimated odour source concentration: >20,000 ou<sub>E</sub>/m<sup>3</sup>
- Flow rate of equivalent to three air changes per hour (27,000 m<sup>3</sup>/h)
- Particulate filter (100 m<sup>2</sup> @ 0.3 µm)
- Size: 22.5 m<sup>3</sup> (containing approx. 11.25 tonnes of dry media)
- Residence time: minimum 3 seconds
- Dual layer filter bed (70% activated carbon; 30% copper impregnated)
- Combined 12 m exhaust stack, Stack 2 (new point source emission).

Maintenance checks are made daily by trained site staff to ensure all fans and ionised air systems are working effectively. Records are kept onsite. The site has a maintenance contract with Exeon to ensure that the system is working at optimum performance.

The release of odour caused by the entry and exit of vehicles is limited by the operation of fast-acting roller shutter doors which close automatically (in less than 20 seconds) once the vehicle has passed.

##### 4.5.2. Digestion Process

All digesters consist of sealed tanks, with a combined capacity of 15,400 m<sup>3</sup> and biogas storage above. Tanks are gas tight and under active gas extraction, so the risk of odour release is very low.



#### 4.5.3. Buffer Tanks & FOG tank

Due to the expected high concentrations of malodorous compounds and water soluble volatile organic compounds (VOCs), including sulphur compounds such as hydrogen sulphide within the buffer tanks, a pre-treatment biofilter has been installed. The contaminated air passes through a moist media bed, which acts as a host for a layer of biofilm. Microorganisms, fungi and bacteria inhabit the biofilm and degrade the odorous compounds, significantly reducing their level in the exhausted airstream. The biofilter is then allied to an activated carbon filter system for polishing.

The activated carbon filter system receives odourous gases directly from all other AD process areas (as well as pre-treated air from the biofilter).

Daily measurements are taken to ensure the abatement system is performing optimally. Records are kept onsite.

An illustration of the combined odour abatement system is presented in Appendix C. See Appendix E for the *Exeon mid-flo™* system brochure.

Key System Parameters (Biofilter):

- Estimated odour source concentration: >20,000 ou<sub>E</sub>/m<sup>3</sup>
- Flow rate of equivalent to three air changes per hour (1,000 m<sup>3</sup>/h)
- Size: 5.5 m<sup>3</sup>
- Residence time: approx. 40 seconds
- Filter bed: pumice stone

Key System Parameters (Activated Carbon filter):

- Particulate filter
- Flow rate of equivalent to three air changes per hour (5,040 m<sup>3</sup>/h)
- Size: containing approx. 2.5 tonnes of dry media
- Residence time: minimum 3 seconds
- Filter bed: activated carbon (4 mm pellets)

#### 4.5.4. Pasteurisation unit

As the digestate fills the pasteuriser tanks the air inside the tank is displaced. This air is directed to the digesters and blended with the biogas prior to desulphurisation and combustion in the CHPs.

#### **4.5.5. Biogas Storage**

Biogas produced is collected and stored directly above each of the digesters in a double-skinned membrane. Biogas pressure is monitored continuously and is actively extracted. Surplus biogas is combusted safely in the emergency flare to prevent the release of odourous compounds. Daily odour checks are carried out to ensure there is no leakage of biogas. Records of these inspections are kept onsite.

#### **4.5.6. Biogas CHPs**

Biogas is contained within sealed pipe work and is subjected to a desulphurisation process prior to combustion in one of two CHPs to produce heat and power. These removes >95% of the hydrogen sulphide from the biogas which, when combusted, would be converted to sulphur dioxide. The removal of sulphur dioxide also prolongs the lifetime of the CHPs.

#### **4.5.7. Biomethane Production**

Biogas is scrubbed in a series of vessels and filtered to remove impurities and increase the methane concentration to approx. 99% v/v. Biogas generated will be upgraded, scrubbed and exported directly as biomethane into the national grid. This includes the installation of additional plant which will allow the biogas generated to be upgraded and exported directly as biomethane into the national gas grid and an additional point source emission to air (Stack 1). In switching from a CHP plant to a biomethane injection plant (sometimes called "Gas to Grid" or "G2G"), the front end of the plant remains the same. At the back, the biogas, comprising carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>), is scrubbed (or cleaned) in a containerised unit to remove the impurities, leaving biomethane which is injected into the national gas grid and used a replacement for fossil fuel-derived natural gas.

#### **4.5.8. Digestate Storage**

After pasteurisation, the sterilised digestate is pumped to the end storage tank. As the tank is being filled the displaced air is directed to a carbon filter (as above). The storage tank has a sealed roof installed to prevent fugitive emissions to atmosphere.

The pasteurised digestate is stored in the storage tank ready to be dispatched as PAS110 biofertiliser. When the tanker arrives onsite it connects to a dedicated carbon filter (containing activated carbon) before filling up. This is to ensure that the air displaced from the tanker does not produce significant odour emissions.

### **4.6. Process Control**

Key operational parameters are monitored within each Digester to highlight potential process instability and maintain good biological health in accordance with *SOP006 – Digester*

*Monitoring.* In doing so, this reduces the likelihood of producing significant odours from the digestion process.

The control of the Critical Limits (temperature and feed amount) are set, monitored and recorded by the Supervisory Control and Data Acquisition (SCADA) system (*SOP010 – Process Control*). Digestate in the pasteuriser cannot be discharged to the Storage Tank until the Critical Limits have been achieved and manual verification of the dataset. To ensure that the temperature is achieved the Critical Limit for temperature is set to 71<sup>o</sup>C to achieve additional level of assurance.

Temperature probes are to be calibrated annually with calibrated replacements held as critical spares in accordance with *SOP011 – Process Inspection & Maintenance*.

## 5. CONTAINMENT, COLLECTION & ABATEMENT OF ODOUROUS AIR

### 5.1. Routine Operation

Only those wastes permitted by the site's Environmental Permit (Condition 2.3.2 and Schedule 3, Table S3.1) shall be accepted at the site. All material delivered to the site shall arrive in suitably covered vehicles.

Waste contracts are secured by using the services of food waste brokers to source suitable source-segregated biodegradable wastes in addition to those contracts which are sourced directly by Fernbrook Bio Ltd.

Weekly communication with waste brokers allows for the scheduling of pre-booked deliveries and prevents prolonged storage which may result in increased rates of decomposition.

Upon arrival, wastes are accepted in accordance with *SOP001 – Waste Reception and Acceptance*. Liquid wastes are subjected to further assessment prior to acceptance in accordance with the *Protocol for Accepting Liquid Waste* and *SOP020 – pH Determination of Liquid Loads* to ensure wastes are suitable for the AD process.

Operational staff are trained in the site's waste acceptance procedures, to ensure that all acceptance criteria (including reducing the risk of odour) are met and maintained.

Where waste is found to not comply with the waste acceptance criteria they shall be rejected, and either:

- a) Removed from the site; or
- b) Moved to the designated quarantine area pending removal.

Records of all waste transfers/rejection, feedstock analysis results and pH readings from liquid wastes, will be kept onsite.

Palletised waste is stored in a designated area within the reception building and manually depackaged prior to being discharged into the reception pit.

Bulk deliveries of loose waste are tipped directly into the reception pits.

Loose and depackaged waste is loaded into the hopper of the depackaging unit using a crane with a clam-shell bucket. Waste is removed from the rear of the reception pits first, to prevent prolonged storage and further decomposition which may lead to an increased risk of odour.

Liquid is pumped into the depackaging unit from the liquid tank in a controlled manner to ensure feedstock material is of the desired consistency to avoid blockage prior to being macerated and distributed to one or both buffer tanks.

Depackaged waste is blended with liquid waste returned from the liquid tank to achieve a homogenous 'soup' consisting of approx. 15% dry matter. 'Soup' is then pumped into one or more Buffer tanks where it is stored until required as feedstock for the Digester(s) in accordance with *SOP004 – Feedstock Storage*.

### **5.2. Emergency Operation**

If the site suffers a breakdown in waste handling equipment or feedstock processing machinery that is likely to result in significant downtime, the Site Manager or Duty Manager will divert incoming loads, where required, and feedstock levels will be managed to further reduce any potential environmental impact including the uncontrolled release of odour. This may also involve the removal of unprocessed feedstock material to a suitably permitted facility to reduce any overloading of the odour abatement system in the reception building.

If the site suffers a breakdown of the engine, to prevent the uncontrolled release of biogas from the pressure relief valves during such an event, an emergency flare is provided and would safely combust surplus biogas to prevent the release of odorous compounds. Records are kept of operational hours of the flare.

The Site Manager or Duty Manager will regularly review the situation and the frequency of perimeter odour checks will be increased until the AD facility returns to routine operating conditions. Records will be kept onsite.

### **5.3. Minimising Odourous Emissions Volumes**

Significant emissions of odourous compounds are minimised by the following actions by site operations:

- Daily site inspections and odour checks by trained site staff;
- Preventative maintenance by site team and equipment suppliers;
- Critical spares identified and stock maintained onsite; and
- Daily measurement of vent gases by trained site staff using specialist biogas analyser.

#### **5.4. Sizing of Handling Systems**

Air handling systems are designed and appropriately sized to ensure that a minimum residence time of 3 seconds is achieved and the potential release of odourous compounds is reduced to an acceptable level.

#### **5.5. Reception Building**

The reception building has a calculated volume of 9,000 m<sup>3</sup>. Nominal Flow rate = 29,000 m<sup>3</sup>/h.

#### **5.6. Operating Conditions of Containment / Abatement System**

The reception building is maintained at negative pressure and the odorous air is drawn through a particulate filter by two variable speed extraction fans, before being treated by the activated carbon filter bed system. An illustration of the combined odour abatement system is presented in Appendix C. See Appendix D for the *Exeon hi-flo™* system brochure.

#### **5.7. Monitoring of Containment / Abatement System**

The concentrations of hydrogen sulphide and ammonia are measured at least daily by trained site staff at strategic points in the gas line and at the outlet of each carbon filter installed onsite. The results are logged in the End of Shift Report.

Action levels are established for both odourous gases (hydrogen sulphide, 10 ppm and ammonia, 20 ppm), and where concentrations are exceeded on two consecutive days, the carbon vessel is replaced.

Daily site inspections assess the ambient air from areas of the plant where the potential for odour generation is greatest (i.e. reception building, pasteuriser, buffer tanks and digestate storage). Any corrective/preventative actions will be documented in the Site Diary.

#### **5.8. Contingency Measures**

Where daily olfactory monitoring indicates that malodours are detectable at the permit boundary, the TCM or Duty Manager will promptly investigate and locate the source of the odour. Where the detected odour is attributable to site activities, these will be stopped, where practicable. In response to this, mobile deodouriser(s) (at least one is kept on-hire always) will be deployed upwind of the point of release to facilitate odour amelioration.

The frequency of odour monitoring will be increased until the odour has dissipated. An investigation will be performed by the TCM or Duty Manager and any corrective/preventative actions will be documented in the Site Diary. Records will be kept onsite.

Daily measurements of hydrogen sulphide and ammonia emitted from the carbon filters are taken by trained site staff using a calibrated biogas analyser capable of reading concentrations of 1 ppm.

Where concentrations exceed the agreed action levels (hydrogen sulphide, 10 ppm and ammonia, 20 ppm) on two consecutive days, the carbon filter vessel is replaced with the onsite spare. The original vessel is collected by CPL and replaced upon return.

### **5.9. Odour Dispersion**

The prevailing wind is from the SW, and consequently the closest sensitive receptor is also potentially downwind from the site (Rothwell Lodge Farmhouse, < 50 m to the east). Extracted air from the reception hall will be vented from a new emission point (Stack 2, 12 m) in series from the carbon filters.

Odour emissions can be expected to disperse rapidly before they reach the site boundary and twice-daily olfactory monitoring both onsite and at the permit boundary, will reduce the risk of odour annoyance at the sensitive receptor to an acceptable level.

## 6. REPORTING & COMPLAINTS RESPONSE

### 6.1. Reporting of Complaints

The nominated person responsible for responding to complaints and implementing the complaint procedure is the TCM.

If complaints are received in relation to the activities covered by the Environmental Permit e.g. Odour, dust etc., these will be discussed with the TCM and, where necessary, action taken to deal with immediate consequences.

All complaints are dealt with in accordance with the *Complaints (CS01)* procedure. Any odour complaints received at the site will be recorded on the *Odour Complaint Form* (K114.1~19~002, Appendix G) and investigated by the TCM or Duty Manager in accordance with the approved Odour Management Plan and *SOP012 - Odour Control*. If a complaint is received either directly from a neighbouring resident or indirectly via a regulatory body. The name, address and contact details of the complainant will be sought:

- name;
- address;
- contact details;
- date(s) and time(s) to which the complaint relates; and
- nature of the complaint and any other details which may assist in the identification of the source, activity or circumstances which prompted the complaint.

The TCM will then investigate the complaint to determine the cause and implement any corrective and preventative actions. Timescales will be determined for follow-up of the corrective actions and determination of their effectiveness.

The findings of any investigation will be recorded on the *Odour Report Form* (K114.1~19~001, Appendix F) with all corrective/preventative actions logged in the Site Diary.

The timings and description of the complaint will be analysed in conjunction with the activities and meteorological conditions logged on site within 1 working day to identify the offending source or activity. The complainant may be asked to keep an ongoing log for correlation with the site operational log. Once the source or activity is identified suitable mitigation measures will be implemented without delay.

The complainant will be contacted to check that the mitigation has been effective.



## 7. ODOUR MONITORING

### 7.1. Olfactory

Routine olfactory monitoring is conducted at least twice daily by trained site staff both onsite and at the permit boundary. Records are kept onsite.

### 7.2. Meteorological

A weather station is provided onsite and is serviced/calibrated in accordance with the manufacturer's guidelines. Weather conditions are recorded prior to every odour inspection. A windsock is also installed on the site boundary to provide a quick reference for site staff to indicate wind direction.

### 7.3. Dynamic

Any odour complaints received at the site will be recorded on the Odour Complaint Form (K114.1~19~002, Appendix D)) and investigated by the TCM or Duty Manager in accordance with the approved Odour Management Plan and *SOP012 - Odour Control*. The findings of any investigation will be recorded on the Odour Report Form (K114.1~19~001, Appendix F) with all corrective/preventative actions logged in the Site Diary.

## 8. ODOUR ACTION PLAN

Following an internal technical review of site operations and odour abatement systems, the operator has commissioned a specialist contractor to assess the effectiveness of the odour abatement measures installed. This technical assessment has identified several recommendations that should be implemented to ensure that the emissions of odour are minimised to an acceptable level and the abatement systems remain effective. Recommendations are summarised in the table below.

**TABLE 6.** Actions to be taken by the Operator

ITEM	ACTIONS TO BE TAKEN	COMPLETION DATE
Management Plan (v18) & Odour Management Plan (v6)	<ul style="list-style-type: none"> <li>• Provide awareness training to all site staff.</li> </ul>	Complete
Terminodour system (Reception Building)	<ul style="list-style-type: none"> <li>• Replace defective ionisation tube units and clean all filters.</li> <li>• Ensure stock of critical spares is maintained.</li> <li>• Replace damaged ductwork diffusers and damaged square section of ductwork.</li> <li>• Establish service/maintenance contract with manufacturer.</li> <li>• CSO Technik to investigate potential improvements to odour abatement on other parts of the plant.</li> <li>• Alternative abatement technology reviewed and quotation sought.</li> </ul>	Complete  Complete  Complete  Complete  Complete  To be decommissioned.
Baseline odour monitoring onsite	<ul style="list-style-type: none"> <li>• Take odour samples from air outlets of pasteuriser, water scrubber, condenser, carbon filter.</li> <li>• Take ambient air samples from within pasteuriser room and outside reception building.</li> <li>• Repeat odour sampling once remedial actions have been implemented.</li> </ul>	Complete  Complete  Complete

ITEM	ACTIONS TO BE TAKEN	COMPLETION DATE
Review of carbon filter usage	<ul style="list-style-type: none"> <li>• Communications with CPL to review current usage of carbon media considering the result from sampling and analysis.</li> <li>• Further review of location and deployment of additional units.</li> </ul>	Carbon filter media upgraded to suit high humidity conditions.  Complete
Undertake trial of Thermal Oxidiser	<ul style="list-style-type: none"> <li>• Operational trial with pasteuriser discharge</li> <li>• Quantitative odour monitoring to establish efficacy.</li> <li>• Share Report findings with the EA.</li> </ul>	Odour analysis & BAT review submitted to EA for approval.  Not progressed.
Revise designs for odour abatement systems for reception building and all other areas	<ul style="list-style-type: none"> <li>• Submit BAT review to EA for approval</li> <li>• Submit Application to vary Environmental Permit to enable permanent use</li> </ul>	Application submitted.

## 9. SITE & EQUIPMENT MAINTENANCE PLAN

All site equipment will be maintained as per manufacturer's guidelines or at least annually and records kept, as a minimum.

### 9.1. Abnormal Events / Emergencies

Potential accidents and incidents have been identified and a detailed risk assessment accompanies the Accident Management Plan (K114.1~11~002) which includes the Incident Response Plan (K114.1~09~011).

Where residual risk remains, existing SOPs will be reviewed or updated, as required, to provide further controls to mitigate the risk to an acceptable level. An index of SOPs (K114.1 SOP\_Index\_Fernbrook v4) will be maintained and is presented in Appendix B.

Accident prevention and management will be reviewed on an annual basis along with the Management Plan or following any significant incident or accident.

## 10. KEEPING RECORDS

As a minimum, the following records must be kept ensuring compliance with the requirements of the Environmental Permit:

- A copy of the permit
- Risk assessments
- Competence and training records
- Duty of Care documentation and Environment Agency waste returns
- Other legally required documents
- Operational procedures
- Compliance records

Records must be retained for 6 years unless they relate to off-site environmental or health effects, or the condition of the land or groundwater when they shall be retained until permit surrender.

## 11. REVIEW THE MANAGEMENT PLAN

The Management Plan will be reviewed in its entirety at least annually or following any substantial change in site operations.

Other activities which may prompt review of the Management Plan are variations to the environmental permit, accident, complaint, breach or a change in the site setting or sensitive receptors.

Where the review results in required changes, this will be documented and maintained with the site records, for example, waste storage volumes, changes to abatement measures, new or altered equipment.

## **12. AVAILABILITY OF THE MANAGEMENT PLAN**

Where required all site operational staff will be trained in the contents of the Odour Management Plan to ensure compliance and consistent operation of the site.

A copy of the Odour Management Plan will be made available at the Company's main office for reference purposes and is available on request to interested parties.

### 13. SUMMARY

The Odour Management Plan seeks to ensure that by the adoption of industry best practice and appropriate measures, odour emissions are adequately controlled within the site and do not cause any significant impacts on amenity or the environment beyond the permit boundary.

Additional evidence has been provided to support and reinforce the argument that the proposed operator is fully committed to operating responsibly and in compliance with the Environmental Permit (if issued).

The Odour Management Plan will be reviewed at least annually, and in the event of any complaint regarding odour to ensure its provisions remain effective.





*Helping clients prosper through compliance*

Suite 11 Manor Mews, Bridge Street, St Ives, PE27 5UW  
01480 462 232 | [www.wiserenvironment.co.uk](http://www.wiserenvironment.co.uk) | [info@wisergroup.co.uk](mailto:info@wisergroup.co.uk)

