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Odour Management Plan

Brains Farm Anaerobic Digestion Plant

Japan Environmental Development and Investment UK Limited

CRM 0169 001 PE R 008 OTMP

'Experience and expertise working in union'

enzygo.com

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Odour Management Plan CRM 0169 001 PE R 008

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For:	Japan Environmental Development and Investment UK Limited
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Author:	Steph Charnaud, Director of Permitting
Reviewer:	Peter Cumberlidge, Senior Director

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Revision number	Revision authorised by	Date submitted to Environment Agency	Revision owner

1.0 Introduction

1.1 Overview

1.1.1 This Odour Management Plan (OMP) has been prepared as part of on-site Operational Documentation in support of the Anaerobic Digestion (AD) Plant at Land at Brains Farm, Moor Lane, Wincanton Somerset, BA9 9DP referred to as 'The Facility' throughout this document.

1.1.2 This Facility will be operated by Japan Environmental Development and Investment UK Limited (JEDI) ('The Operator') whose registered office is 95 Gresham Street, London, England, EC2V 7AB. The Company Number as registered on Companies House is 14330616.

1.1.3 This OMP is intended to be used as a standalone document for operational staff on a day to day basis. It outlines the main potential odour sources at the Facility, the mitigation measures in please to reduce the risk of odour nuisance and the monitoring and reporting methods employed. This OMP will form part of the Operator's Environmental Management System. The plan will be updated and reviewed in accordance with the requirements of the Facility's EMS.

1.2 Aims and Objectives of the OMP

1.2.1 This OMP has the following aims and objectives:

- identify all potential odours sources at the facility and any foreseeable situations which may compromise the operator's ability to prevent and/or minimise odour releases from the proposed activities;
- identify and employ appropriate methods, including monitoring and contingencies, to control and minimise odour pollution;
- identify and employ appropriate control measures and actions that the operator will take to minimise the impact in the event that odour incidents occur;
- prevent unacceptable odour pollution;
- reduce the risk of odour-releasing incidents or accidents by anticipating them and planning accordingly; and
- provide a working document for on-site staff.

This OMP outlines the methods by which the Operator will assess, reduce and prevent potentially odorous emissions from the Facility during normal and abnormal operations.

1.2.2 This OMP will consider sources, releases and impacts, and review these to identify cost-effective opportunities for odour management.

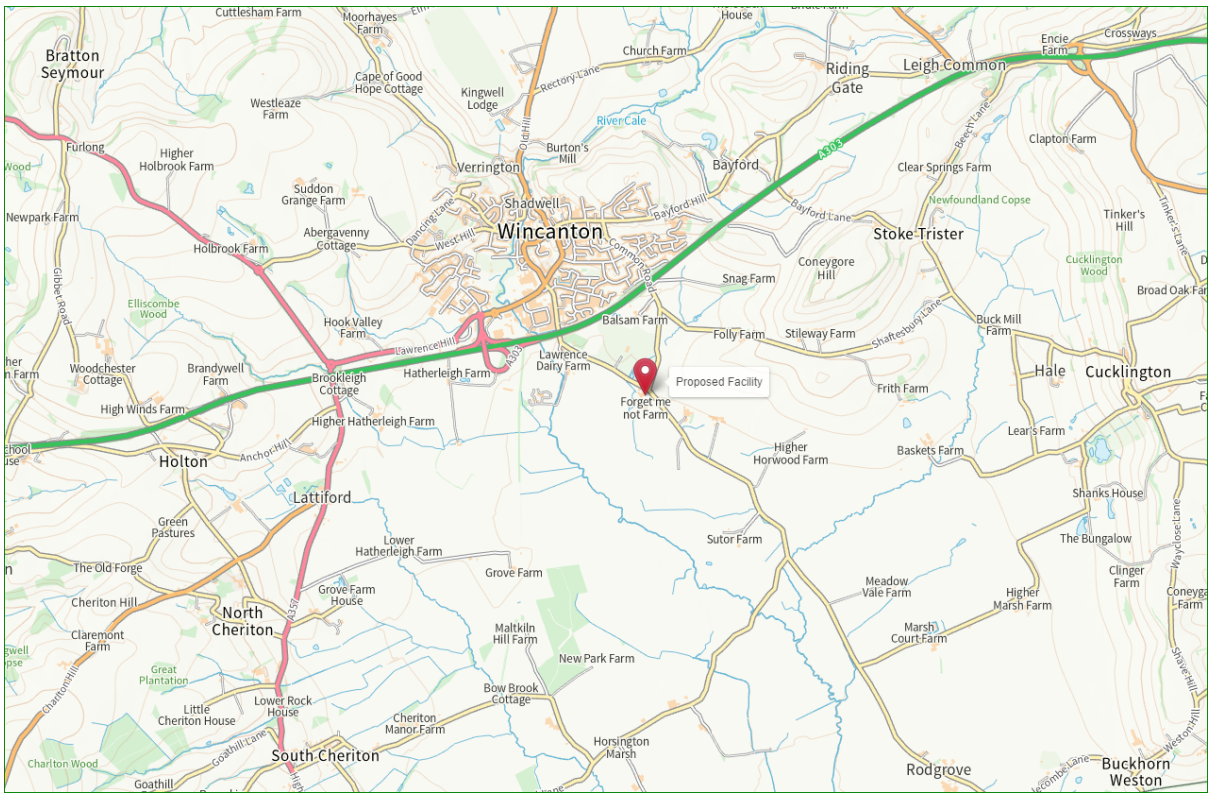
1.3 Site Location

1.3.1 The site is located at:

Brains Farm Anaerobic Digestion Plant,
Moor Lane,
Wincanton,
Somerset,
BA9 9RA

1.3.2 The National Grid Reference for the site is ST 71892 27406.

Figure 1.3.1: Site Location



1.3.3 The proposed Facility covers an area of approximately 2.8 hectares. The town of Wincanton is located approximately 537m to the northwest of the Facility.

1.3.4 The site currently comprises a combination of arable agricultural land, agricultural buildings, a residential property, concrete hardstanding and drainage ditches. The site is bound by Moor Lane to the north with a pond, recreational sports fields and tennis courts beyond. The site is also bound by Moor Lane to the East with agricultural fields beyond the road. The south and west of the site is bound by agricultural fields.

1.3.5 The nearest residential property to the proposed Facility, will be the residential properties at Forget Me Know Farm located adjacent to the southern site boundary.

1.3.6 The nearest surface water feature to the Facility is the drainage ditch which is currently runs through the centre of the site. It is proposed that this watercourse is rerouted as part of the development and will run adjacent to the Facility's southern and western boundaries. The nearest main river, River Cale, is situated approximately 390m west of the site.

1.4 Maintenance and Review of the OMP

1.4.1 The OMP will be reviewed by senior management every 4 years afterwards and immediately following any change, non-conformance or incident.

1.4.2 Any technical and managerial changes on site will also initiate a review of the OMP to ensure that the odour control techniques and abatement systems remain appropriate for the site.

1.4.3 The OMP will be stored electronically on the server which is accessible to all members of staff which duties associated with the OMP.

1.4.4 Training in the implementation of the OMP and associated monitoring will be provided by the Site Manager and/or Regional Operations Manager. Training will be carried out initially, with annual refreshers or in the event of a non-conformance or incident.

1.5 Relevant Guidance and Documentation

1.5.1 This OMP has been prepared with reference to the following key guidance:

- Control and monitor emissions for your environmental permit, Environment Agency, 24th November 2022;
- How to comply with your environmental permit, Additional guidance for H4 Odour Management, March 2011
- Biological waste treatment: Appropriate measure for permitted facilities, 2nd February 2024
- Environment Agency Monitoring Technical Guidance Notes (Various).

2.0 Sensitive Receptors

2.1 Introduction

2.1.1 Sensitive receptors are generally considered to represent places where people are likely to be for prolonged periods / where members of the public / off–site workers may be exposed to harmful releases arising from the proposed development. The term "sensitive receptor" would therefore apply to dwellings and associated gardens and many types of workplaces. Table 2.1.1 provides details on sensitive receptors within 2kms of the site.

2.2 Receptor List

2.2.1 The Facility is located in a predominately rural area, however there is a farm located in close proximity.

2.2.2 The key receptors that have the potential to be impacted by odour generated at the Facility are summarised in Table 2.2.1 below. The prevailing wind direction was taken into account, along with the distance from the Facility when scoring the sensitivity to odour.

Table 2.2.1: Sensitive Receptors

Receptor	Type of Receptor	Distance (m)	Direction	Sensitivity to odour (Low, Medium, High)
Forget Me Knot Farm	Residential and agricultural	0	S	High
Wincanton Sports Ground	Commercial/Recreational	190	NNE	High
Home Farm	Residential and agricultural	400	ESE	High
Laurence Dairy Farm	Residential/ Agricultural	400	NNW	Low
Somerset and Dorset Animal Rescue	Commercial	539	N	Medium
Balsam Farm	Residential	603	N	Medium
Chapper's Tailors	Commercial	631	N	Medium
Lower Horwood Farm	Residential and Agricultural	641	ESE	Medium
Explore Moto	Commercial	650	N	Medium
Matt's Respite Retreats	Commercial/residential	661	N	High
Nearest residence in Wincanton	Residential	673	NNE	Medium
Residence on Common Road	Residential	788	N	High
Bennetts Field Trading Estate	Commercial	800m	WNW	Medium
Residence on Snag Lane	Residential	857m	N	Medium

Receptor	Type of Receptor	Distance (m)	Direction	Sensitivity to odour (Low, Medium, High)
Honeyfield	Residential	912	ENE	Medium
Folly Farm	Residential	949	ENE	Medium
Wincanton primary school	Education	1.13kms	NNW	Low
Physicwell House	Residential	1.02kms	ENE	Medium
Higher Horwood Farm	Residential	1.21kms	SE	Medium
Snag Farm	Residential/Agricultural	1.22kms	NE	Medium
Travelodge	Commercial	1.25kms	NW	Low
Sutor Farm	Residential/agricultural	1.28kms	SSE	Medium
McDonalds	Commercial	1.28kms	NW	Low
The Tent Barn	Residential	1.29kms	ESE	Medium
KFC	Commercial	1.32kms	NW	Low
Great Hatherleigh Farm	Residential/Agricultural	1.36kms	W	Low
Moonrakers	Residential/Commercial	1.38kms	W	Low
Wagtail Pub	Commercial	1.40kms	NW	Low
The Chart House	Residential	1.44kms	ENE	Medium
GMT Timber Frames	Commercial	1.62kms	SSW	Low
The Bowlands	Residential	1.69kms	SW	low
Lime Tree Barn	Residential	1.90kms	W	Low
Higher Hatherleigh Farm	Residential/Agricultural	1.92kms	W	Low
Firth Farm House	Residential	1.97kms	E	Medium
Frith Farm	Residential	1.98kms	E	Medium

2.2.3 Figure 2.2.2 below shows the sensitive receptors on a map.

Figure 2.2.2: Sensitive Receptors

2.2.4 The prevailing winds at this site are from the south west and west south west (based on regular observations recorded at the 'Yeovilton Airport' monitoring station between September 2009 and January 2024 www.windfinder.com). Output for this station is provided below in Figures 1.5.1A and 1.5.1B

Figure 1.5.1A: Yeovilton Airport Wind Rose

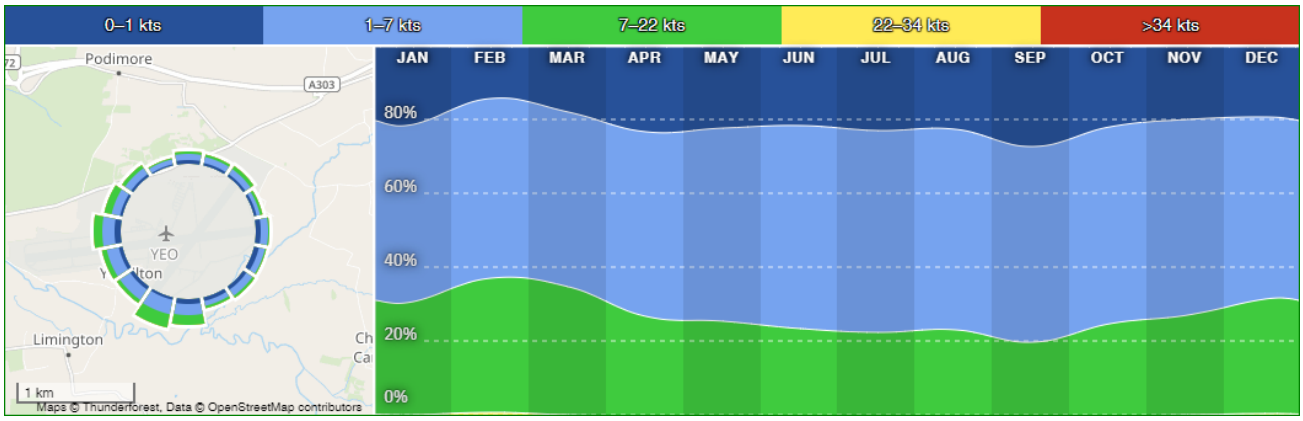
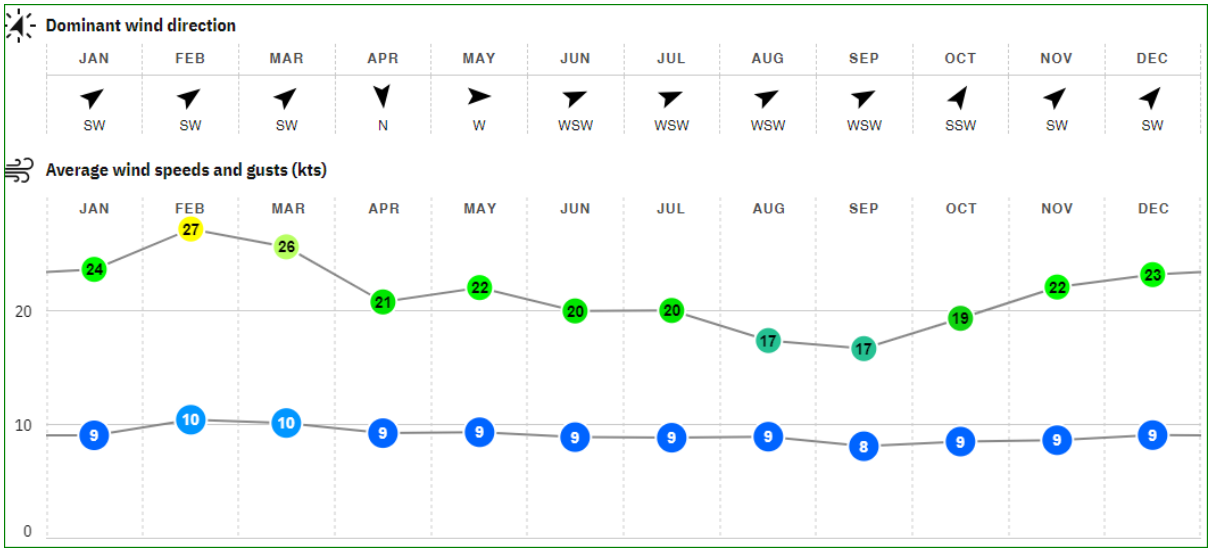


Figure 1.5.1B: Yeovilton Airport Monthly Wind Statistics



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2.3 Local Odour Sources

2.3.1 The Facility is located in a rural area with potentially odorous operations situated in relatively close proximity which are summarised in Table 2.3 below.

Table 2.3: Local Odour Sources

Odour Source	Type of Odour	Direction From Site	Approximate Distance to Site
Forget Me Knot	Agricultural	South	Adjacent

Odour Source	Type of Odour	Direction From Site	Approximate Distance to Site
Laurence Dairy Farm	Agricultural	NNW	400m
Sewage Treatment Works	Sewage	West	590m

3.0 Source of Odour and Site Processes

3.1 Overview of Site Operations

3.1.1 The Facility is permitted to processes up to 50,000 tonnes per annum of non-waste energy crops and wastes, specifically maize, grass and whole crop silage, straw, broiler and layer litter, pig and cattle manure mixed with straw, vegetable and fruit wastes to produce digestate and biogas which will be upgraded and injected into the medium pressure main gas main or utilised in the auxiliary biogas boiler. A 2.11MWTh natural gas fuelled CHP will deliver heat and power to the Facility.

3.1.2 Normal Feedstock deliveries will be received at the site during the following restricted operational hours:

- 07:00 to 19:00 hours Monday to Friday;
- 08:00 – 14:00 hours on Saturday;
- 08:00 to 14:00 hours Sunday and Bank Holidays feedstock deliveries are only received during harvest times.

3.1.3 The treatment of feedstock through the process and upgrading of biogas and injection into the grid will in general operate continuously 24 hours a day.

3.2 Odorous Materials Entering and Leaving the Facility

3.2.1 The Permitted operations allow the importation of the following potentially odorous wastes:

- Broiler and layer litter;
- Pig and cattle manure mixed with straw;
- Vegetable and fruit wastes.

3.2.2 These wastes are stored on hardstanding with sealed drainage and are covered, until input into the AD process. Storage times are minimised to reduce the risk of odour.

Figure 3.2.1: Storage Periods for Wastes entering the Facility

Description	Design Capacity	Length of Storage
Broiler/Layer Manure	200 tonnes	72 hours
Pig/cattle manure/straw	150 tonnes	72 hours
Vegetable and fruit waste	60 tonnes	48 hours

3.2.3 These waste materials will then be fed into the anaerobic digestion process, along with non-waste materials, which include, straw, maize, grass and whole crop silage and water.

3.2.4 The outputs of the process are biogas and digestate which are both potentially odorous.

Figure 3.2.2: Storage Periods for Process Outputs

Description	Design Capacity	Length of Storage
Digestate Storage Lagoon	4200m³	4 months
Solid Digestate	219 tonnes	72 hours
Biogas	7000m³	Continually being upgraded and sent to the medium pressure gas main

3.2.5 Without controls in place the processes at the Facility can generate offensive odours.

3.3 Site Operations

3.1.1 The Facility will comprise of the following elements:

- Maize, grass, whole crop silage and straw to be stored within dedicated clamps which meet SSAFO requirements;
- Cattle and pig manure and straw mix acceptance and storage, sheeted on a concrete pad, with sealed drainage;
- Broiler and layer litter acceptance and storage, sheeted on storage on a concrete pad, with sealed drainage;
- Vegetable and fruit waste acceptance and storage, sheeted on a concrete pad with sealed drainage;
- 2no feeder units;
- Crusher and screw conveyor;
- Anaerobic digestion of the feedstock in 1no. primary digester;
- Anaerobic digestion of the feedstock in 1no. secondary digester;
- Pasteurisation of the digestate;
- Separation of the solid and liquid fractions of the digestate via a screw press;
- Biogas collection, cleaning and compression;
- Biogas injection into the gas grid;
- Natural gas combustion in the CHP;
- Biogas combustion in the back up boiler;
- Emergency diesel generator;
- Surface water storage lagoon; and,
- Digestate storage in a covered lagoon or within a bunker.

3.4 Overview of Odorous Processes and Emissions

3.4.1 Understanding the nature and extent of the stock of odorous materials held on site is key to recognising and implementing appropriate control measures. Management of these materials primarily involves utilising appropriate material holding conditions through adequate containment designed to reduce the material's odour potential.

3.4.2 The Facility's emission points to air are describes in Table 3.4.2 below.

Table 3.4.2: Potentially Odorous Point Source Emissions to Air

Emissions Reference	Source	Environmental Media	Emissions
A1	CHP Unit	Air	NOX CO
A2	Biogas Boiler	Air	CO NOX SO_2 VOCs
A3	Emergency Flare	Air	CO NO_X VOCs
A4	Biogas Upgrading Stack	Air	VOCs
A5	Emergency Diesel Generator	Air	NOX SO_2 Particulates
Vents	One primary digester tank vent One secondary digester tank vent One separation tank vent Three pasteurizer tank vents Vent on recirculation tank Vent on preliminary liquid feed tank	Air	CO2, H2S, VOCs including methane, odour
Pressure Relief Valves	Biogas Entry Unit Biogas Upgrading Unit	Air	CO2, H2S, VOCs including methane, odour

3.4.3 The Facility's potentially odorous emissions from each stage of the process are described and assessed in Table 3.4.3 below.

3.4.4 The risk ratings applied to each source of odour are based on the following considerations, prior to control measures, such as abatement, being applied. Control measures are described in Section 4 of this OMP.

- Low risk – low odour potential or low offensive odour e.g., materials are stored in fully sealed vessels.
- Medium risk – medium odour potential or moderately offensive odour e.g., materials are stored in vented tanks and do not give rise to highly offensive odours.
- High risk – high odour potential or highly offensive odour e.g. odorous / volatile materials are stored in open tanks

Table 3.4.3: Risks from Odorous Processes and Materials

Odorous process and materials	Risk Rating
Feedstock Offloading	High
Storage of feedstock	Medium
Feed of feedstocks into the feeder units	High
Anaerobic digestion of feedstocks	Medium
Pasteurisation of feedstocks	Medium
Combustion of biogas in the boiler	High
Upgrading of biogas	High
Separation of digestate	High
Storage of solid digestate	High
Storage of liquid digestate	Medium
Transfer of digestate off site	High
Released of biogas from pressure relief valves	High
Odorous releases from vents, biogas and feedstocks	High
Drains and bunds	High

4.0 Control Measures and Process Monitoring

4.1 Source Material Control

4.1.1 Environment Agency Guidance and the European Union BREF Best Available Techniques Guidance Documents state that odour prevention, in the first instance by good housekeeping and good working practices, is the best and most effective means of mitigating odour. As such, the Operator will endeavour at all times to ensure that good working practices are being adopted and that wherever practicable Best Available Techniques (BAT) are implemented for the management of feedstocks on site.

4.1.2 The Facility has been designed in such a way as to control any potential odorous emissions that may be generated whilst ensuring that Best Available Techniques (BAT) where appropriate have been utilised, where appropriate. The Operator has considered both source materials and process related activities, such as emission releases, as part of its mitigation strategy for odour management. Further details on the considerations for these are provided below.

4.1.3 Control of incoming feedstock plays a key role in the management of odour. Feedstock transferred directly into incoming waste storage tanks for onward processing. Staff have been fully trained to identify any incoming wastes that are not permitted for treatment under the permit (against the EWC codes). Any non-permitted waste (whole or part loads, as appropriate) is rejected and an electronic record made.

4.1.4 If a particularly odorous permitted waste load is received, it will be inputted into the process as soon as reasonably practicable.

4.1.5 As part of the pre-acceptance checks with potential new feedstock suppliers, full details of the type of waste, the estimated annual quantities for delivery, the frequency of deliveries, the age of the material and any other aspects which may affect the nature of the material will be fully reviewed/assessed prior to a waste supply contract being entered into.

4.1.6 Contingency arrangements for diverting feedstock will be implemented if required if the facility is approaching full capacity in terms of processing and storage of waste. In the event of plant/essential equipment malfunction or breakdown and the plant cannot accept or process feedstock, arrangements will be implemented to manage and divert any waste deliveries until normal operations resume (e.g. keep at waste producers facility where possible or divert to another facility).

4.1.7 Alternative recovery or disposal routes will always follow the principles of the Waste Hierarchy System, and feedstock will be diverted to other facilities for treatment above any alternative disposal option.

4.2 Management Controls

4.2.1 The Facility will be managed using an Environmental Management System which will be written in accordance with the Environment Agency's Guidance, Develop a management system: environmental permits.

4.3 Odour Control Systems

4.3.1 This section describes the primary and secondary odour control measures that are in place at the Facility

Primary Odour Controls

4.3.2 The primary odour control measures related to the utilisation of enclosed systems and minimisation of storage durations of odorous materials.

4.3.3 Waste feedstocks are stored in sheeted piles. The sheeting is only removed to allow wastes to be added to or removed from the piles.

4.3.4 Effluent drainage from the storage of waste and non-waste feedstocks is stored within one of 3no enclosed 45 000l tanks. This effluent is directed to the preliminary tank for use within the process.

4.3.5 Once the solid feedstocks once fed into the hoppers the anaerobic digestion process takes place within enclosed tanks so there is little opportunity under normal conditions for odours to escape from these storage or process tanks. The movement of feedstocks from storage to the hoppers occurs outside of any building therefore has the potential to release odours.

4.3.6 The liquid digestate lagoon is fitted with a cover and also gas draw off facilities to ensure that any remaining gasses produced are captured and directed back to the facility to be either upgraded or utilised within the biogas boiler. In addition the retention times of the waste and non-waste feedstocks within the digesters are designed to ensure that minimal biogas will be generated from the digestate.

4.3.7 Regular cleaning of surfaces which have contact with potentially odours feedstocks and products is also carried out to further reduce the risk of odours from the Facility

Secondary Odour Controls

4.3.8 The stack arising from the biogas upgrading unit is fitted with active carbon filters which remove odorous compounds such as hydrogen sulphide and VOC's from stack emissions before release to the atmosphere.

4.3.9 Table 4.3.1 below describes the control measures in place for the potential odour sources at the Facility

Table 4.3.1: Odour Monitoring and Control Measures

Ref	Aspect	Ref.	Odour Source	Scenario	Odour Rating	Monitoring	Control
1	Incoming Vehicles	1.1	From raw feedstock within vehicle	Vehicle/trailer not closed, releasing odours as travels/static	Low	Checked at site reception	Driver informed; vehicle company informed
		1.2	Dirty Vehicle	Odorous feedstock on external parts	Low	Checked at site reception	Driver informed; vehicle company informed Vehicle washed and disinfected inside the building
2	Waste piles when uncovered to receive or remove waste	2.1	Fugitive emissions from uncovered waste pile	Uncovering waste piles to allow waste to be added or removed releasing trapped odours	High	Procedure undertaken by Site Manager	Minimise waste storage times, by utilizing FIFO approach and the amount of time the waste piles are uncovered for
3	Vehicle off-loading	3.1	Bulk solid feedstock being tipped	Tipping of feedstock releases trapped odours and exposes new odour surfaces. Feedstock may have warmed in transport.	High	Checked when tipped	If required, given priority for loading to processing system. Sheeting in place to reduce odour. Sheeting removed for the minimum period required for waste to be tipped.
4	Solid feedstock storage	4.1	Nominal amounts of solid feedstock are stored in stockpiles until they can be processed.	Odours from gas pockets and from surface of material	Medium	Checks undertaken to assess feedstock quality.	Solid waste feedstocks are covered when stored prior to unput into the process. Wastes are stored for short durations and fed into the process using the FIFO approach If required, feedstock is given priority for loading to processing system.
		4.2	Leachate/effluent drainage	Effluent draining from feedstock piles	Medium	Check made to ensure drainage system working OK Check made to identify any ponding liquids	Drainage system directs dirty water and leachate from the storage of solid wastes and non-wastes to 3no leachate/dirty water collection tanks. Clean water available to assist in cleaning
5	Rejected feedstock	5.1	Vehicle containing reject waste releases odour	Odours from surface of material	Medium	Operator odour checks	Wherever possible rejected waste is not stored on-site. Non-conforming waste is

Ref	Aspect	Ref.	Odour Source	Scenario	Odour Rating	Monitoring	Control
							rejected on arrival and vehicle is turned around. Waste reject form is completed to record event. If in the unlikely event rejected waste is not identified quickly enough for it to be reloaded onto the delivery vehicle it will be removed off site within 24 hours of receipt
6	Concrete Pad, and drainage	6.1	Base	Odour from film of liquor/ feedstock	Low	Check made to ensure drainage system working OK Surfaces cleaned regularly.	Enclosed tanks located below ground Clean water available
		6.2	Drains and Tanks	Odour from liquor surface	Medium	Check made to determine drain runs are open, tank levels OK and cleanliness acceptable	Drains cleaned on a regular basis. Effluent tanks checked for integrity
7	Feedstock Processing	7.1	Loading Shovel (bucket)	Odour release when feedstock is disturbed, tipped into feeder units	High	Supervisor/manager checks operator procedures acceptable	Operator training Adequate capacity equipment.
		7.2	Liquid waste collection tanks	Odour from liquor	High	High level alarms Operator visual checks	Procedures and training Planned preventative Maintenance Tanks are underground
8	Pasteurisation Units	8.1	Pressure relief on tank	Biogas release if over-pressure	High	SCADA System monitor/alarm	Reduce tank level, reduce pressure. Suction tanker option
		8.2	Condensate Water trap at tank	Biogas release if over-pressure	High	SCADA System monitor/alarm	Designed overflow to condensate drain. Pumped to process input.
		8.3	Condensate Water trap at tank	Foul water release/spillage	Medium	Operator visual check	Designed overflow to condensate drain. Pumped to process input.
		9.4	Maintenance, valve serviced	Odorous Biogas vented	High	Checked when serviced	Valves to isolate section

Ref	Aspect	Ref.	Odour Source	Scenario	Odour Rating	Monitoring	Control
							Mobile suction filtration system
		9.5	Pipelines cleared/serviced	Odorous Liquor released	High	Checked when serviced	Valves to isolate section Containment for liquid drain-down. Liquor suction tanker
9	Digester Tanks	9.1	Vents on tanks	Biogas release if over-pressure	Medium	SCADA System monitor/alarm	Reduce tank level, reduces pressure.
		9.2	Maintenance, valve serviced	Odorous Biogas vented	Medium	Checked when serviced	Valves to isolate section Mobile suction filtration system
		9.3	Pipelines cleared/serviced	Odorous Liquor released	High	Checked when serviced	Valves to isolate section Containment for liquid drain-down. Liquor suction tanker
		9.4	Tanks de-gritted	Odorous liquids and solids released	High	Odour checks carried out at the site boundary during de-gritting	De gritted should be undertaken when the prevailing wind direction is not in the direction of the nearest sensitive receptors wherever possible
10	Compound	10.1	Rainwater ponded in compound	Stagnant water becomes odorous	Low	Operator visual check	Designed pump outlet to process input system.
11	On-site lagoon	11.1	Emissions from lagoon surface	Odour vapours	High	Operator odour and visual checks, additional monitoring where required for example during periods of high winds.	Maintain a minimum of 30 days retention time in the primary digester and 35 days retention time in the secondary digester to ensure sufficient methane generation during the digestion process. Lagoon is fitted with a fixed cover.
12	CHP exhaust stack	12.1	Emissions from CHP exhaust	Burnt gases, within control limits	Low	SCADA System monitor/alarm Gas quality tests	Emissions tests 1/yr
		12.2		Burnt or unburnt gases, exceeding control limits	Medium		Safety Flaring
13	Emergency Flare	13.1	Emissions from Emergency Flare	Burnt gases, within control limits	Low	SCADA System monitor/alarm Gas quality tests	High temperature flare installed
		13.2		Burnt or unburnt gases, exceeding control limits	Medium		

Ref	Aspect	Ref.	Odour Source	Scenario	Odour Rating	Monitoring	Control
		13.3		Odour during abnormal operation	High		
14	Biogas Boiler	14.1	Emissions from biogas boiler	Burnt gases, within control limits	Low	SCADA system monitor/alarm Gas quality tests	Emissions tests1/yr
		14.2	Emissions from biogas boiler	Burnt or unburnt gases, exceeding control limits	Medium		Safety Flaring
15	Biogas storage domes	15	Pressure relief valve adjacent to domes	Biogas release if over-pressure Containment failure leading to a release of biogas.	High	SCADA System monitor/alarm	Safety flaring
16	Spillage of digestate during transfer to the vehicle from the digestate lagoon for removal off site	16	Odorous Liquor released/spilled	Digestate spilt onto the ground surrounding the digestate lagoon.	Medium	Operator/driver and site staff in attendance	Containment for liquid management. Spill kit, bunded area. Spills are directed to the effluent collection sump and redirected back into the process.
17	Storage of solid fraction of separated digestate in bunker	17	Solid Digestate Bunker	Odours released from temporary storage of separated digestate	Medium	Sniff testing	Storage of solid digestate is limited to 72 hours.
18	Failure of biogas upgrading or compression.	18	Biogas upgrading unit	Malfunction leading to a release of biogas	Medium	SCADA System /alarm	Biogas sent back through the upgrading process, biogas boiler or if necessary to the emergency flare.

5.0 Abnormal/Emergency Operations

5.1 General

5.1.1 Operators must consider what incidents or emergencies might adversely affect the control of odour pollution in order that they can plan and take appropriate steps to reduce the likelihood of the incident occurring; minimise any impacts if the incident were to occur; and recover control of the process as quickly as possible.

5.1.2 It is not necessary to consider events which are either very unlikely to occur or where odour would be a minor element of the overall environmental impact. For example, if there was to be a major environmental incident in the local area (such as snow/major flooding) which affected the general area and prevented staff from getting to work, then odours would be a relatively minor aspect of the overall disruption and environmental impact.

5.1.3 However, events that are uncommon but reasonably foreseeable which could affect the running of the site and cause odour problems should be addressed e.g. deliveries may be affected from time to time or staff (internal and external) may be unavailable for some reason e.g. illness.

5.2 Abnormal Meteorological Conditions

5.2.1 In the event that meteorological conditions prevent delivery or dispatch of vehicles, or staff arriving on site, emergency measures are in place, as detailed in Table 6.6.1, to ensure the site can be remotely managed until the plant can return to operation under normal conditions. The Site Manager and staff operatives undertake weather checks to ensure that any abnormal weather conditions can be foreseen as much as possible and contingency arrangements can be put in place prior to any problem occurring on site. In the event that the site has to be closed due to severe weather conditions deliveries are diverted to an alternative suitably authorised site for either recovery or disposal.

5.3 Breakdown of Process Equipment and Plant

5.3.1 In the event that there is a breakdown of equipment or plant during out-of-hours operations the standby and duty staff are alerted to the problem via email and SMS. Email notifications are also sent to standby duty staff to inform of any alarms raised on-site.

5.3.2 Critical spares will be kept on site so that any failed parts are quickly replaced and unnecessary delays in ordering parts can be avoided. When a spare part is used, the Site Manager is made aware and another replacement part ordered to ensure the stock of spare parts is replenished.

5.4 Staffing Issues

5.4.1 The facilities standby staff rota is actively managed, and in the event of staff illness, the next name is drawn down from the list, and the standby system continues. Equally during staff holidays the standby rota is updated to ensure there is adequate cover at all times.

5.4.2 All staff listed on the standby rota are provided with a list of emergency contact names and numbers.

5.5 Accidental Releases and Incidents

5.5.1 Under normal conditions the site has been designed to fully contain odour releases during the AD process itself, therefore the key potential hazards reside from abnormal events; primarily from accidents or incidents. This includes on site hazards from machinery failure, abatement

failure of the biogas upgrading unit, vehicle collisions, fires resulting from arson and vandalism, accidental explosion of biogas, and accidental fires.

5.5.2 The risk of explosion of biogas is considered to be an extremely unlikely event if the site is effectively managed. All tanks are located within secondary containment which has been sized to contain 110% volume of the total tank volume, to contain any material in the event that an explosion and/or rupture of the digester tanks occurs. Pressure relief valves are installed on the buffer tank and the two digester tanks plus the biogas storage dome to ensure the system operates at the design pressure (operation of valves is linked to SCADA system). Biogas contains approximately 60% methane and 40% carbon dioxide and is less volatile and explosive than propane or natural gas.

5.5.3 Other potential incidents include CHP unit power failure or an event which leads to total plant failure on site. In the event of power failure, the plant has been designed to provide a large gas storage capacity of approximately 7000m^3. In the rare event when the storage capacity is close to exceeding its limit will the pressure relief valves (mechanical) open to ensure there is no gas pressure built up within the gas system.

5.5.4 In the event of a power failure the emergency backup generator will be activated which will provide power to critical safety equipment including the flare and the roof blowers

5.6 Abnormal Conditions

5.6.1 In order to ensure adequate mitigation measures are in place to address all possible abnormal odour emission scenarios at the facility, the possible scenarios and response measures implemented are presented in Table 5.5.1 below.

5.6.2 Following the occurrence of any abnormal / emergency scenario on site a full post-event investigation will be conducted and if necessary modifications to the control measures, mitigation equipment, training and contingency actions will be implemented and the OMP updated accordingly.

5.6.3 Where an event is found to be due to deviation from operational procedures, in-place staff will be re-trained in the operational procedures as necessary.

Table 5.5.1: Abnormal/Emergency Operations

Scenario	Abnormal/Emergency Operations	Location	Likely effect on emissions inventory	Contingency/Control Measures
Severely odorous feedstock received	Abnormal	Reception building	Increase in emissions from feedstock reception and pre-treatment area while severely odorous feedstocks are being processed	If severely odorous feedstocks are received then these are processed into the digesters as a matter of priority. If severely odorous then feedstock is removed from site and further receipt of feedstock from that source may be suspended pending review if required.
Mechanical or electrical failure / preventing pre-treatment	Abnormal	Reception building	Potential increase in emissions of odour from feedstock storage on site	Instigate immediate investigation and remedial action as required. If backlogging of feedstock is considered to be a risk then the building doors are kept closed until feedstock can be processed or removed, if ongoing then a view to restrict the further acceptance of feedstock will be made, in accordance with the feedstock contingency arrangements described in above sections.
Failure of digestate transfer system for off-site transfers	Abnormal/emergency	Area surrounding digestate lagoon	Increase in emissions from the digestate lagoon area while spilt digestate is cleared up	Digestate transfer is stopped. Digestate spill is cleared to either one of the 3no 45 000l storage tanks or sucked up and transferred back into the digestate lagoon.
Restricted staff availability	Abnormal	All operational locations	Risk of increased impact from any area of site where normal operations affected	Staff will be trained to operate the loading shovels and other mobile plant; all other equipment will be automated. If required hired staff could be employed as necessary.
Plant breakdown	Abnormal	All operational locations	Risk of increased impact from an area of site where normal operations affected during and after breakdown	A supply of critical spares is maintained on site. The site employs skilled fitters to promptly undertake any repairs/replacement, and additional plant would be hired in where required. If spares or fitters are not available the relevant operations are suspended if necessary, to prevent significant odour emissions or offsite impact (such as suspend receipt of feedstock, suspend transfer of feedstock to digesters etc). Diesel back-up generator is available on site to provide power in the case of an emergency

Scenario	Abnormal/Emergency Operations	Location	Likely effect on emissions inventory	Contingency/Control Measures
Fire	Emergency	Within permitted area	Risk of increased impact from any area of the site affected by fire during and after fire	Fire risk procedures are adopted on site, including on-site water storage. If required following a fire, operations will cease until all plant and infrastructure is restored. Following a fire, all plant and equipment will be inspected and where required, repairs implemented as necessary. Further feedstock receipt, processing and in-feed will be reduced or suspended as necessary until operation is restored.
Flood	Emergency	All operational locations	Risk of increased impact from any area of site affected by flooding during and after flood	Site is located within flood zone 1, 2 and 3. However works are being undertaken to raise the ground level, divert the small drainage ditch and a flood compensation area is included within the development.. In the event that flooding should occur and feedstock has been submerged, there is a high likelihood of degradation and onset of anaerobic conditions early, so this will require immediate feed into the digester if possible or reprocessing in preparation of feeding into the process or removal off site.
Extreme meteorological conditions	Abnormal / Emergency	All operational locations	No change anticipated	When extreme meteorological conditions occur inhibiting the adequate dispersion of odours or increasing risk of unacceptable exposure at receptors, potential odour generating activities such as feedstock reception will be suspended.
Digestate storage failure	Emergency	Digestate storage lagoons	Increased emissions during any observed leachate / remediation activities	Instigate immediate investigation and remedial action as required, utilising specialist contractors where necessary. Co-ordinate off-site / remote storage of digestate to enable the plant to continue operation; if not possible consider reducing/ceasing operations until suitable storage arrangements can be found. Major maintenance and repair works to be carried out by the provider or recommended contractor.

Scenario	Abnormal/Emergency Operations	Location	Likely effect on emissions inventory	Contingency/Control Measures
Network entry facility failure	Emergency	Network entry facility	Increased emissions to air.	The biogas will be either diverted to the biogas boiler or if this is not possible then the emergency flare, with hours of use recorded. The biogas will continue to be diverted until the failure is addressed. Major maintenance and repair works to be carried out by technology provider or recommended contractor.

6.0 Records and Reporting

6.1 Complaints and Incident Review

6.1.1 Records of sniff testing undertaken are then filed and kept on site for inspection by the EA Officer as and when required.

6.1.2 Should odour be detected at the site boundary, it is noted in the site diary and the Site Manager informed so that appropriate steps, including considering temporarily ceasing activity, which is causing excessive odour, can be taken to mitigate the odour.

6.1.3 Routine odour monitoring is not reported to the Environment Agency unless required by the Environmental Permit.

6.1.4 Odour complaints received at the facility will be reported to the Environment Agency and followed up on with on-site investigation, which will also be reported to the Environment Agency via the appropriate Environmental Permit Notification System. Complaints will be managed as described in Section 7.

6.1.5 It is not proposed to undertake any grab sample monitoring unless continuous odours are identified at the facility or multiple complaints are received. At such time this OMP will be reviewed and the requirement for such monitoring carefully re-considered.

6.1.6 It is vital to record and act upon complaints received and communicate the outcome of the investigation to the complainant. It is equally vital to undertake a review following complaints or incidents if warranted to implement further control measures or change behavioural practices on site to prevent the event from occurring again. The Operator will undertake a formal review of onsite processes following any major incident and will routinely review any complaints received as and when they occur.

6.1.7 All records of events and actions taken will be retained as required by the Environmental Permit.

6.2 Notifying the Environment Agency

6.2.1 In the event that an accident or incident occurs the Operator will notify the Environment Agency as soon as practically possible, using the emergency 24hr phone line (0800 80 70 60). The Site Manager, TCM or duty Shift Manager for the facility will also notify the Regulatory Officer should any complaints be received directly to site and advise what remedial measures or actions have been taken to address the problem. Copies of any substantive complaints received will be made available to the Environment Agency for review.

6.2.2 The EA will also be notified in accordance with Environmental Permit conditions using the Notification form provided in the Permit Schedules.

6.3 OMP Review

6.3.1 The OMP will be reviewed by senior management following commissioning and every 4 years afterwards and immediately following any major incident / event.

6.3.2 Any technical and managerial changes on site will also initiate a review of the OMP to ensure that the odour control techniques and abatement systems remain appropriate for the site.

6.4 Cessation or Reduction of Operations

6.4.1 The Operator will prepare a site closure plan in line with Environment Agency Guidance to confirm how the site will be decommissioned to return it to a satisfactory state upon the cessation of activities.

6.4.2 The Site Closure Plan will be maintained on site and updated as circumstances change, for example, should there be any process changes or change of land use.

6.4.3 Records will be maintained of the location of facilities, as well as the services and sub-surface structures installed during the construction and operating phases of the facility.

6.4.4 De-commissioning will be in compliance with procedures outlined in the Site Closure Plan. During the de-commissioning process, operational records will be reviewed and assessed against the conceptual site model documented in the Permit application. If areas of deterioration during the operation of the site are identified these areas will be re-examined and the site will be returned to a satisfactory state as defined at the permit application stage.

6.4.5 Due consideration at this decommissioning phase will be given to ensuring any potential odour risks during dismantling or removal of plant / equipment from site.

7.0 Complaints Procedure

7.1 Engagement with Neighbours

7.1.1 In the event of odour issues, the Operator will ensure that their complaints procedure is followed and will engage with the public in an appropriate and timely fashion.

7.2 Responding to Complaints

7.2.1 A dedicated information / contact number is available for the public to use should they wish to register a direct complaint to the Operator. Details are supplied on front gate sign comprising telephone contact numbers. Following any complaints received, the Operator will endeavour (where possible) to contact the complainant to provide feedback on actions taken to both assess the event and convey any remedial actions taken.

7.2.2 Where complaints are received directly from the public the Operator will follow the sites Odour Complaints Procedure presented in Appendix B.

7.2.3 All Complaints are recorded on an Odour Complaint Form (Appendix C). A record of any complaints will be forwarded to the site's Environment Agency Officer. Information recorded includes the date, time, location/address of the complainant (where provided), time the odour was noted to be causing a nuisance and a description of the odour (from the complainant).

7.2.4 A trained member of staff will then attend the location of the odour complaint and undertake a walkover sniff test recording the results on an Odour Monitoring Form (Appendix D).

7.2.5 If odour is encountered, the source of it will be investigated by site management and the outcome of these investigations recorded.

7.2.6 Investigations will be carried out into the likely source and causes of the odour, including a review of the meteorological data. Where odour is identified, suitable remedial action will be implemented. The complainant and anyone else likely to have been affected by the odour will be informed of the action taken. All actions taken shall be recorded.

7.2.7 In such circumstances, an incident report will be completed and provided to the Environment Agency.

7.2.8 Where no odour is observed, a record of the monitoring round will be taken, the meteorological data will also be checked for prevailing conditions at the time the odour was observed and a report will be provided to the Environment Agency with suitable feedback provided to the complainant.

7.2.9 The appropriate Environmental Permit Notification Forms will be used to report any odour incidences/complaints to the Environment Agency.

Appendix A – Permitted Wastes

Brains Farm AD Plant - Waste Types	
Waste Codes	**Description**
02	**WASTES FROM AGRICULTURE, HORTICULTURE, AQUACULTURE, FORESTRY, HUNTING FISHING, FOOD PREPARATION AND PROCESSING**
02 01	**wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing**
02 01 06	animal faeces, urine and manure (including spoiled straw), effluent, collected separately and treated off-site
02 03	**wastes from fruit, vegetables, cereals, edible oils, cocoa, coffee, tea and tobacco prepara processing; conserve production; yeast and yeast extract production, molasses preparati fermentation**
02 03 04	materials unsuitable for consumption or processing (fruit and vegetable waste)

Appendix B – Complaints Procedure

Title: Odour Complaints Procedure
Issue Date: March 2024

1. Purpose

The purpose of this procedure is to provide details and define actions that employees of JEDI Limited are required to follow to ensure that best practice is employed on site, and that any odour complaints are appropriately managed. This procedure is for odour emissions only.

2. Scope

This procedure applies to odours arising from activities at Brains Farm Anaerobic Digestion Facility.

3. General

All odour complaints received at the site must be notified to the Site Manager / designated TCM for the site who will be responsible for notifying the Environment Agency.

4. Procedure

1. Any odour complaint received will be reported to the Site Manager.
2. If a complaint is received, the complaint report form will be completed, a copy will be kept in the site office and will be made available for inspection by the Environment Agency.
3. If details have been provided, the site manager will contact the complainant by telephone to discuss the nature of their complaint.
4. After details of the complaint have been compiled, the cause(s) will be investigated, with reference to:
    - The activities taking place on site at the time;
    - The timing of the complaint (whether weekday, weekend, daytime, evening) etc;
    - The weather conditions at the time.
5. The likely reasons for the complaint will be added to the form and the complainant will be contacted as appropriate;
6. Details of actions taken and updated plans will be forward to the Environment Agency;
7. Complete forms are kept on site and on the Company servers.

Appendix C – Odour Complaint Report Form

Odour Complaint Form JEDI Ltd		
Installation to which Complaint relates	**Date recorded**	**Reference number**
Name and address of caller (complainant)		
Telephone Numbers		
Date, time and duration of offending odour		
Odour description		
Any other comments from complainant		
Weather conditions		
Wind Direction and Strength		
Any other previous complaints relating to this odour	**Yes / No**	
Any other relevant information		
Potential odour sources that could give rise to the complaint		
Operating conditions at the time offending odour occurred		
Follow-Up		
Date and time caller contacted		
Action taken		
Amendment required to the odour management plan?	**Yes / No**	
Form Completed by:	**Signed:**	

Appendix D – Odour Monitoring Procedure and Survey Form

Odour Monitoring Procedure (Sniff Testing)

Purpose

Sniff testing is to be carried out daily.
Additional sniff tests must be carried out during periods of abnormal operation, including:

- Maintenance; and
- Malfunction of any plant or equipment which may increase odour levels.

Additional sniff tests should also be carried out during adverse meteorological conditions, for example warm weather or prevailing winds in the direction of particularly sensitive receptors.

Additional sniff tests must also be carried out when odour complaints are received.

Sniff Test Locations

Daily sniff tests must be carried out at the following locations:

- At the southern facility boundary closest to Forget Me Knot Farm;
- Along the north eastern boundary of the Facility;
- Drains;
- Feedstock storage area;
- Digester tanks;
- Digestate lagoon;
- Solid digestate storage bunker

Brains Farm Anaerobic Digestion Facility
Japan Environmental Development and Investment UK Limited

Odour Management Checks/Sniff Sheet

Date	Employee Name	Drains/Drainage	Feedstock Storage Area	Southern Boundary closest to Forget Me Knot Farm	North Eastern Site Boundary	Digester Tanks	Digestate Lagoon	Solid Digestate Storage Bunker

Appendix E – Odour Dispersion Modelling

enzygo
environmental consultants

Odour Impact Assessment

Brains Farm, Wincanton, Anaerobic Digestion Plant

Japan Environmental Development & Investment UK Limited

CRM.0169.001.OD.R.001

'Experience and expertise working in union'

enzygo.com

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Odour Assessment - CRM.0169.001.OD.R.001

Project:	Brains Farm, Wincanton, Anaerobic Digestion Plant
For:	Japan Environmental Development & Investment UK Limited
Status:	Final
Date:	March 2024
Author:	Josh Davies BSc (Hons) – Principal Air Quality Consultant
Reviewer:	Conal Kearney BEng (Hons) MSc MIAQM MIEnvSc – Director of Air Quality

Contents

Tables and Figures

Non-Technical Summary

i. Enzygo Limited was commissioned by Japan Environmental Development and Investment UK Limited to undertake odour dispersion modelling to support a permit application relating to an anaerobic digestion facility located at Brains Farm, Moor Lane, Wincanton.

ii. The operation of the plant has potential to cause odour impacts at sensitive locations due to onsite odour sources associated the storage and processing of feedstocks and digestate. Odour dispersion modelling was undertaken to consider impacts at existing sensitive receptor locations in the vicinity of the site.

iii. Odour emissions were defined based on the proposed plant operations and a review of literature and emission profiles used at similar facilities. Where necessary, robust assumptions were applied.

iv. Impacts at sensitive receptor locations in the vicinity of the site were quantified, with results compared with the appropriate odour benchmark level.

v. Predicted maximum odour concentrations were below the appropriate benchmark level at all sensitive receptors in the vicinity of the site for all modelling years. In addition, using the IAQM guidance significance criteria, impacts based on conservative modelling assumptions were slight at three receptor locations and negligible at all other receptors and overall impacts are considered as not significant.

vi. Based on the modelling results and conservative assumptions made, overall potential for odour impacts generated by the AD facility can be considered as not significant.

vii. Additionally, the facility will also control and prevent odour emissions in accordance with an Odour Management Plan. As such, the operation of the facility will not lead to an unacceptable impact on local amenity with regard to odour.

1.0 Introduction

1.1 Background

1.1.1 Enzygo Limited (Ltd) was commissioned by Japan Environmental Development & Investment (JEDI) UK Ltd to undertake detailed odour dispersion modelling to support a bespoke environmental permit application for a proposed anaerobic digestion (AD) plant at Brains Farm, Wincanton (the 'Facility').

1.1.2 The facility will process approximately 50,000 tonnes per annum (tpa) of feedstock materials comprising non-waste energy crops. Specifically this will comprise maize, grass and straw and manure, including broiler and layer litter, pig and cattle manure mixed with straw, alongside vegetable and fruit wastes. The Facility will produce digestate and biogas which will be upgraded and injected into the medium pressure gas mains or utilised in the auxiliary biogas boiler.

1.1.3 During the operation of the Facility there is potential for impacts to occur at existing sensitive receptors as a result of fugitive odour releases from the Facility. Odour dispersion modelling was therefore undertaken to consider impacts in the vicinity of the site.

1.2 Site Location and Context

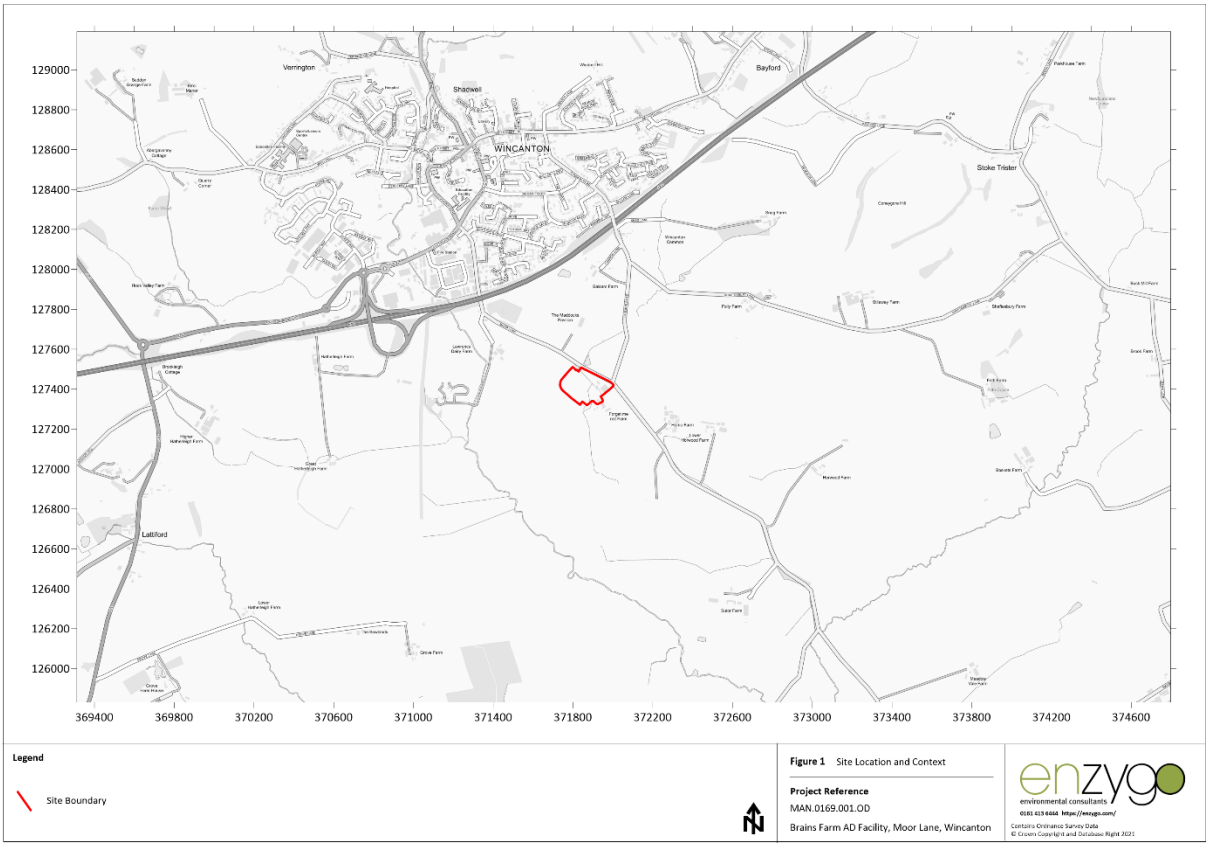
1.2.1 The Facility is located to the south of Wincanton on land at Land at Brains Farm, Moor Lane, Wincanton Somerset, BA9 9DP at the approximate National Grid Reference (NGR): 371860, 127420 situated approximately 550 m north west of the town of Wincanton.

1.2.2 The site currently comprises a combination of arable agricultural land, agricultural buildings, a residential property, concrete hardstanding, and drainage ditches. The site is bound by Moor Lane to the north with a pond, recreational sports fields, and tennis courts beyond. The site is also bound by Moor Lane to the East with agricultural fields beyond the road. The south and west of the site is bound by agricultural fields.

1.2.3 The site is surrounded by agricultural areas with sparsely distributed working farms and residential properties in the vicinity of the site. The nearest residential property is Forget me Not Farm situated adjacent to the south east boundary of the Facility.

1.2.4 Reference should be made to Figure 3 for a graphical representation of the site location.

Figure 1: Site Location



1.3 Facility Operations

1.3.1 The proposed Facility will operate an AD process fuelled by biomass feedstock in form of energy crops, farmyard manures (FYM) and vegetable and fruit wastes. The majority of the biogas produced by the AD process will be upgraded for injection into the gas grid.

1.3.2 The annual mass of waste types to be processed at the Facility are summarised in Table 1

Table 1: Proposed Feedstocks and Annual Throughputs

Feedstock	Annual Quantity in Tonnes
Maize	15,750
Grass	4,750
Whole Crop Silage	2,850
Broiler and Layer Manure	10,000
Straw Mixed Pig and Cattle Manure	7,500
Vegetable and Fruit Waste	2,750
Straw	4,500
Top Bales of Straw	1,900
Liquid Digestate	26,650
Solid Digestate	20,810

1.3.3 The AD process can briefly be described as follows:

Feedstock

1.3.4 The site will operate using biomass feedstock in the form of non-waste energy crops (maize, whole crop), grass, straw, FYM (poultry, pig, and cattle), and vegetable and fruit wastes. The

crops will be transported to site between May and October and ensiled within two silage clamps. FYM and vegetable/fruit waste is delivered on a daily basis throughout the year and will be sheeted and stored on a concrete pad adjacent to the silage clamps.

1.3.5 The silage, FYM, poultry litter, and vegetable/fruit waste feedstocks will be covered at all times, unless during loading and unloading, using protective sheeting. This will form an airtight layer to minimise emissions to preserve the feedstocks during storage. During loading in to the AD process the feedstocks will be exposed at one end, closest to the feeding hoppers, to allow access to the feedstock for transportation. Once material is loaded into the feeder hoppers the feedstock is re-covered.

Operation

1.3.6 All feedstock material will be fed into the primary digester, then secondary digester which are sealed and fitted with vents. The biogas produced (a mixture of methane (CH_4) and carbon dioxide (CO_2)) will be stored prior to upgrade for export to the grid or use in biogas boiler where it will be combusted to provide supplementary heat to the facility. A Combined Heat and Power (CHP) unit is also proposed, which will utilise natural gas as a fuel and provide heat and power to the process.

1.3.7 A flare and backup diesel generator are also proposed at the Facility for emergency venting of biogas during abnormal operation and as a backup heat supply when the CHP/biogas boiler are not operating.

Digestate

1.3.8 Digestate will undergo a pasteurisation process on site to remove pathogens to ensure the material suitable for application to land. Following this the digestate will be separated into “solid” and “liquid” fractions.

1.3.9 The solid fraction is stored underneath the separator before removal by tractor/trailer for use as a fertilizer via Heavy Good Vehicle (HGV)/tractor and trailer. The liquid fraction of the digestate is either stored within the onsite lagoon before being transported off-site via tanker for use as a fertiliser on local agricultural land or recirculated into the AD process.

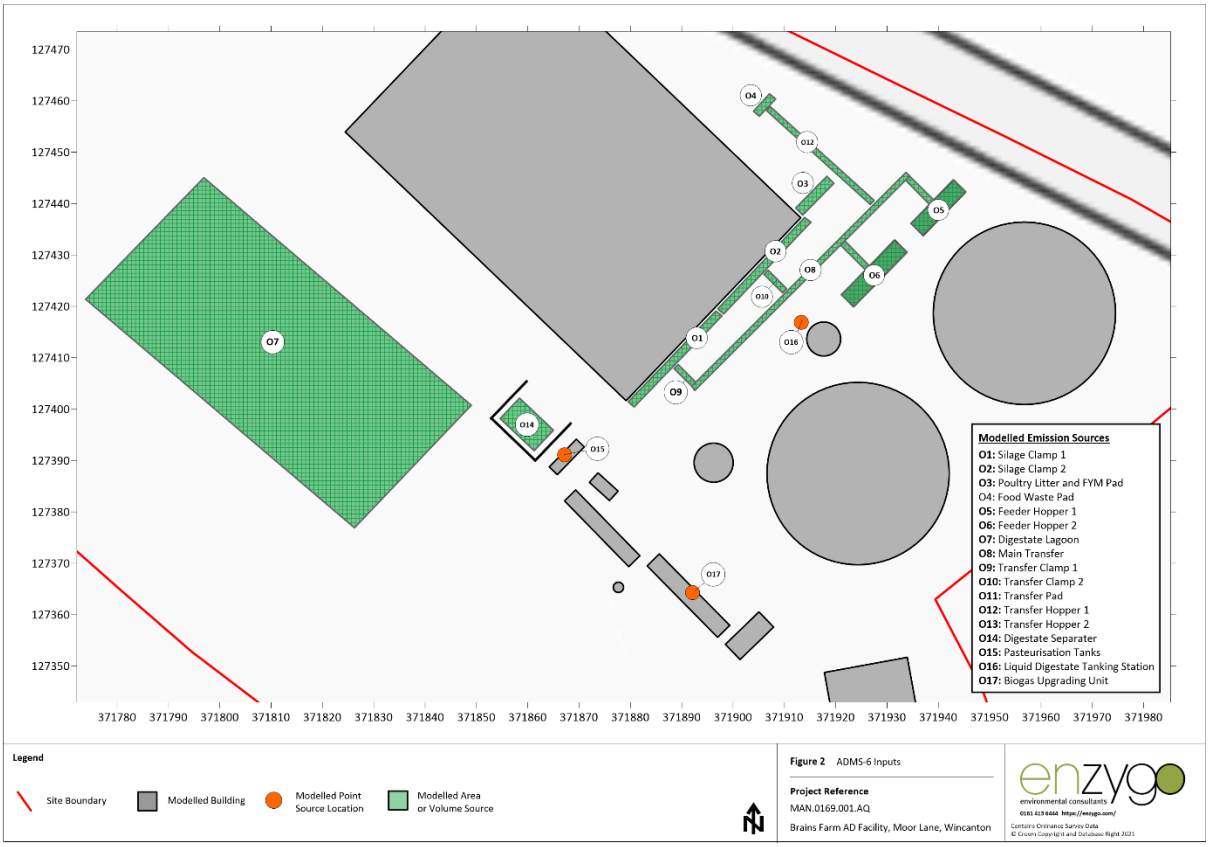
1.3.10 The biogas which is produced during the digestion process is either directed to the biogas upgrading unit or for combustion via the biogas boiler which generates electricity and heat to be used at the site. The biogas which is sent to the upgrading unit is treated to remove contaminants and tested for conformity before being injected into the grid.

1.3.11 The activities associated with the proposed plant are controlled under the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments. As such, the operator will be required to obtain an Environmental Permit from the Environment Agency (EA) as the appropriate regulator prior to operation.

1.3.12 The operation of the plant may result in odour 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. shows a site layout plan and identification of modelled odour sources.

1.3.13 Reference should be made to Figure 2 for a graphical representation of the modelled layout.

Figure 2: ADMS-6 Model Layout



2.0 Legislation Guidance and Policy

2.1 Guidance

2.1.1 The following legislation and guidance will be considered during the preparation of the odour dispersion modelling assessment:

- The Environmental Permitting (England and Wales) (Amendment) Regulations 2016;
- H4: Odour Management, Environment Agency (EA), 2011[1];
- Odour Guidance for Local Authorities (withdrawn), Department for Environment, Food and Rural Affairs (DEFRA), 2010[2]; and
- Guidance on the Assessment of Odour for Planning, IAQM, 2018[3].

2.2 Odour Benchmark Levels

Environment Agency: H4

2.2.1 The H4 guidance provides benchmark levels to assess relevant exposure to determine impacts from potential operations and practices regulated under the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments.

2.2.2 Modelled concentrations above the relevant benchmark levels detailed in Table 2 would therefore indicate unacceptable odour exposure. Benchmark levels are stated as the 98th percentile (%ile) of hourly mean concentrations in ou_E over a year. This means benchmarks should not be exceeded for more than 2% of the hours in a year or approximately 175 hours per year. This takes account of a reasonable amount of tolerance that can be expected by subjects to occasional odours. EA odour benchmark levels are summarised in Table 2.

Table 2: Odour Benchmark Levels

Relative Offensiveness of Odour	Benchmark Level as 98th%ile of 1-Hour Means (ou_E/m^3)
Most Offensive Odours: Processes involving decaying animal or fish Processes involving septic effluent or sludge Biological landfill odours	1.5
Moderately Offensive Odours: Intensive livestock rearing Fat frying (food processing) Sugar beet processing Well aerated green waste composting	3.0

[1] H4: Odour Management, Environment Agency (EA), 2011

[2] Odour Guidance for Local Authorities, DEFRA, 2010

[3] Guidance on the Assessment of Odour for Planning, IAQM, 2018 – Version 1.1.

Relative Offensiveness of Odour	Benchmark Level as 98th%ile of 1-Hour Means (ou_E/m^3)
Less Offensive Odours: Brewery Confectionery Coffee roasting Bakery	6.0

2.2.3 It was considered that odours from the proposed Facility would be comparable to those for "intensive livestock" and "well aerated green waste composting".

2.2.4 Odours generated by the facility are therefore classified as 'moderately offensive', in accordance with the EA assessment criteria shown in Table 2, and the benchmark level of 3 ou_E/m^3 is appropriate.

2.2.5 To provided context to the above benchmarks the EA guidance "Review of Odour Character & Thresholds[4]" states that the point of odour detection is 1 ou_E/m^3 based on laboratory testing of a panel of qualified assessors, with concentrations of 5 ou_E/m^3 and 10 ou_E/m^3 considered as faint and distinct odours, respectively. The guidance also states that It is important to recognise that published odour detection thresholds apply to population averages, not to individuals.

2.3 Institute of Air Quality Management Guidance

2.3.1 The IAQM guidance[3] specifically deals with assessing odour impacts for planning purposes, namely potential effects on amenity. The significance of impacts was also assessed through the interaction of the predicted 98th%ile of 1-hour mean odour concentrations and receptor sensitivity, as outlined below in Table 3.

Table 3: Odour Receptor Sensitivity

Sensitivity	Description
High	Surrounding land where: • Users can reasonably expect enjoyment of a high level of amenity; and • People would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land • Examples may include residential dwellings, hospitals, schools/education and tourist/cultural
Medium	Surrounding land where: • Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or • People would not reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land • Examples may include places of work, commercial/retail premises, and playing/recreation fields
Low	Surrounding land where: • The enjoyment of amenity would not reasonably be expected; or • There is transient exposure, where the people would reasonably be expected to present only for limited periods of time as part of the normal pattern of use of the land. • Examples may include industrial use, farms, footpaths, and roads

2.3.2 The receptor sensitivity detailed above is the combined with predicted 1-hour mean odour concentrations to determine the odour impact which enables a judgment of overall significance.

[4] Review of Odour Character and Thresholds, Science Report: SC030170/SR2, Environment Agency, March 2007

3.0 Dispersion Modelling Inputs

3.1 Scope

3.1.1 The operation of the facility will result in odour emissions during normal operations. These were assessed in accordance with the following stages:

- Identification of odour sources;
- Identification of odour emission rates;
- Dispersion modelling of odour emissions; and
- Comparison of modelling results with relevant criteria.

3.1.2 The following Sections outline the methodology and inputs used for the assessment.

3.2 Process Description and Potential Odour Sources

3.2.1 Potential odour sources were identified from the following processes. These included:

- Exposed grass, whole crop, maize, and straw within energy crop silage clamps;
- Exposed FYM, poultry litter and vegetable and fruit waste stored within the concrete pad adjacent to the energy crop silage clamps;
- Agitated feedstocks along transfer routes from the silage clamps and concrete pad to the feed hoppers;
- Agitated feedstock material within the feeder hopper;
- Solid digestate within the separator bunker;
- Storage of liquid digestate in the onsite lagoon;
- Air released during filling and emptying of the pasteurisation tanks; and
- Emission from road tankers at digestate filling points.

3.2.2 The AD process is sealed and therefore does not form a source of odour, or other emissions such as CH_4 or hydrogen sulphide (H_2S), under normal operation. Should releases of these species occur then this would indicate a fault with the plant and immediate remedial measures would be taken to eliminate the problem to avoid seriously affecting the AD process.

3.2.3 Delivery of FYM, poultry litter and fruit and vegetable waste will be delivered throughout the year on a continual basis. The majority of energy crop feedstocks will be delivered during July and October, coinciding with the harvest season.

3.2.4 Once delivered, energy crops will be quickly compacted, covered, and sealed within the two silage clamps. It is expected that maximum proposed storage on site is 4 to 6 months. Fruit and vegetable waste will be stored for a maximum of 48 hours on the concrete pad adjacent to the silage clamps where it will remain covered. A maximum of 72 hours of pig and cattle FYM mixed with straw and boiler and poultry litter (broiler and layer) is to be stored on the concrete pad at any one time. Both FYM and poultry litter will remain covered.

3.2.5 Feedstocks are transferred from respective clamp or pad by telehandler into the respective feeder hoppers for approximately 2 hours per day.

3.2.6 Following the AD process, the digestate will be pasteurised to stabilise it and remove pathogens. Following pasteurisation the solid and liquid digestate are separated, the solid fraction is stored within the separator bunker for a maximum of 72 hours. Portions of liquid fraction are either directed to the recirculation tank to return to the AD process or transported via piping to the onsite digestate lagoon.

3.2.7 The tanker collection points will be accessed a maximum of 7 times per month from February to September, inclusive. During tanker filling there is the potential for short term odour emissions from displaced air within the tanker.

3.2.8 The combined heating and power unit, auxiliary boiler, emergency flare and backup diesel generator will only emit products of combustion which do not typically have any significant odours. As such, they have not been considered as potential sources in the context of this assessment. Reference should be made to CRM.0163.002.AQ.R.001 for the assessment of associated on-site combustion pollutant emissions. The Biogas Upgrading Unit effectively captures CO_2 emissions and scrubs both H_2S and Particulate Matter (PM) emissions within the raw gas via adsorption methods, activated carbon and particulate filters. H_2S is considered as an odourous emission and was included as an odour emission source in the assessment.

3.2.9 The silage clamps, FYM manure, poultry litter, and vegetable and fruit wastes will be fully covered by an appropriate silage film to provide a robust impermeable oxygen barrier film to block the entry of oxygen into material. The feedstocks will be kept covered all times except when loading or unloading which would contain odour emissions. As such, insignificant emissions are expected from covered feedstocks, with odour releases modelled from the exposed areas during loading into the feeder hoppers.

3.3 Dispersion Modelling

3.3.1 Dispersion modelling was undertaken using ADMS 6 (v6.0.0.1), which is developed by Cambridge Environmental Research Consultants (CERC) Ltd and accepted by the EA. Reference should be made to Figure 2 for a graphical representation of the modelled odour sources.

3.4 Modelling Scenarios and Emissions

3.4.1 The scenarios considered in the modelling assessment are summarised in Table 4.

Table 4: Dispersion Modelling Scenarios

Pollutant	Modelled As	
	Short Term	Long Term
Odour	98th%ile 1-hour mean	n/a

3.4.2 Information for specific odour sources were based on a review of existing literature and odour monitoring data reported at similar facilities. Emission rates are summarised in Table 5.

Table 5: Odour Emission Rates

Source	Emission Rate	Unit	Reference
Maize	20.0	ou_E/m2/s	Odournet UK Ltd[1]
Silage Energy Crops	18.7	$ou_E/m^2/s$	REC Ltd[2]
Poultry Manure (Broiler)	77.0	$ou_E/m^2/s$	Sniffer[3]
Poultry Manure (Layer)	61.0	$ou_E/m^2/s$	Sniffer[3]
Pig Manure	20.0	$ou_E/m^2/s$	Sniffer[3]
Cattle manure	0.8	$ou_E/m^2/s$	Odournet UK Ltd[5]

Source	Emission Rate	Unit	Reference
Pig manure	1.35	$ou_E/m^2/s$	Odournet UK Ltd(5)
Vegetable and Fruit Waste	50.0	$ou_E/m^2/s$	Earthcare Technical Ltd(4)
Dewatered Digestate	10.0	$ou_E/m^2/s$	Odournet UK Ltd(5)
Dewatered Digestate	2.8	$ou_E/m^2/s$	Odournet UK Ltd(7)
Digestate Lagoon and Surface Rainwater Runoff Lagoon	1.0	$ou_E/m^2/s$	University of Liège and Universidad Politécnica de Valencia(7)
Liquid digestate tanker vehicle	10,000	ou_E/m^3	Odournet UK Ltd(7)

Notes:

(1) Odour Impact Assessment for a proposed Crop CHP Plant at Stoke Bardolph, Nottinghamshire, Odournet UK Ltd;

(2) Odour Impact Assessment for a proposed Crop AD Plant at Iretons Way, Chatteris, Cambridgeshire, REC Ltd;

(3) Sniffer ER26: Final Report March / 2014, SCAIL-Agriculture update;

(4); Air Quality and Odour Impact Assessment to Support a Planning Application for an AD facility at Copland Way, Copland Way, Ellough, Beccles, Earthcare Technical Ltd, February 2022

(5) Odour Impact Assessment for a proposed Anaerobic Digestion facility near Kenninghall, Norfolk, Odournet UK Ltd

(6) Multi-method Monitoring of Odor Emissions in Agricultural Biogas Facilities, Jacques Nicolas, Gilles Adam, Yolanda Ubeda, Anne-Claude Romain, University of Liège and Universidad Politécnica de Valencia

(7) Odour Impact Assessment for a proposed Anaerobic Digestion facility in Chatteris, Cambridgeshire, Odournet UK Ltd

3.4.3 As indicated in Table 5 the maximum odour emission rate relating to the energy crops would be derived from maize feedstocks. The energy crops are proposed to be c.53% maize, c.16% grass, c.21% straw and c.10% whole crop. All odour emissions from the silage clamp were assumed to be that from maize as a conservative approach.

3.4.4 FYM and litter feedstocks are proposed to be made up of c.57% poultry litter (broiler and layer) and c.43% pig/cattle manure in straw. As shown in Table 5 the odour emission rate for cattle and pig manure is much lower than that for poultry litter; with broiler litter more odourous than layer litter. To ensure a conservative assessment, all odour emissions from the concrete pad, transfer routes and relevant feeder hoppers were assumed to be that from boiler litter.

3.4.5 Pig and cattle manures are estimated to be mixed with straw which would result in a 50% reduction on odour emission rates as suggested by the Sniffer report(3). However, as the composition of straw within the manure is unknown no reduction has been applied. Furthermore, all FYM was modelled as broiler litter to ensure a conservative approach.

3.4.6 The digestate emissions from the pasteuriser tanks will be undergoing a drying process and therefore the higher of the values, 10 $ou_E/m^2/s$, was used for this assessment to represent the expelled air from these tanks. Following pasteurisation the digestated is separated into solid and liquid fractions. The solid fraction collects in a bunker underneath the separator which is regularly removed from the site by tractor/trailer. The digestate will be covered and enclosed, however, to assume a conservative approach, solid digestate was modelled as an uncovered enclosed source.

3.4.7 The digestate lagoon will receive liquid digestate from the AD proposed. The liquid digestate lagoon will be covered by impermeable floating cover which will reduce emissions considerably by avoiding exposure to meteorological conditions. A comparable emission rate of 0.5 $ou_E/m^2/s$ has been applied and considers a reduction of 50% associated with the proposed floating cover.

3.4.8 The emission rates shown in Table 5 were utilised with additional information provided for the Facility to define emissions within the dispersion model. These are summarised in Table 6.

Table 6: Emissions

Source	Modelled Height (m)	Odour Emission Rate	Unit	Characteristics
O1: Silage Clamp 1	3.5	20	ouE/m^2/s	c. 40m^2 of FYM exposed constantly within the clamp
O2: Silage Clamp 2	3.5	200.0*	ouE/m^2/s	c. 40m^2 of agitated FYM exposed constantly within the clamps
O3: Litter and FYM Pad	2.5	770.0*	$ou_E/m^2/s$	c. 17m^2 of agitated FYM exposed within the pad for 2 hours per day
O4: Vegetable and Fruit Waste Pad	2.5	500.0*	$ou_E/m^2/s$	c. 7m^2 of agitated vegetable and fruit waste exposed within the pad for 2 hours per day
O5: Feeder Hopper 1	4.3	770.0*	$ou_E/m^2/s$	c. 40m^2 of agitated FYM within the feeder for 2 hours per day
O6: Feeder Hopper 2	5.1	200.0*	$ou_E/m^2/s$	c. 50m^2 of agitated silage within the feeder for 2 hours per day
O7: Digestate Lagoon	0.0	1.0	$ou_E/m^2/s$	c.2,260m^3 of constantly exposed lagoon areas
O8: Main Transfer	2.0	770.0*	$ou_E/m^2/s$	1m wide main route from clamp/pad to feeders of agitated FYM, 2 hours per day.
O9: Transfer Clamp 1	2.0	200.0*	$ou_E/m^2/s$	1m wide route from Silage Clamp 1 to main transfer. Agitated silage for 2 hours per day.
O10: Transfer Clamp 2	2.0	200.0*	$ou_E/m^2/s$	1m wide route from Silage Clamp 2 to main transfer. Agitated silage for 2 hours per day.
O11: Transfer Pad	2.0	770.0*	$ou_E/m^2/s$	1m wide route from concrete pad to main transfer. Agitated FYM for 2 hours per day.
O12: Transfer Hopper 1	2.0	770.0*	$ou_E/m^2/s$	1m wide route from concrete pad to Feed Hopper 1. Agitated FYM, 2 hours per day.
O13: Transfer Hopper 2	2.0	200.0*	$ou_E/m^2/s$	1m wide route from Silage Clamps to Feed Hopper 2. Agitated silage, 2 hours per day.
O14: Digestate Separator	2.5	10	$ou_E/m^2/s$	c.50m^2 of solid digestate exposed constantly within the bunker
O15: Pasteurisation Tanks	5.0	10	$ou_E/m^2/s$	c. 0.33m^2 cross sectional area of the vent for the 15m^3 tank. With an air exchange of 1 hours. Flow rate of 0.004 m^3/s
O16: Liquid Digestate Station	0.5	83.33	ou_E/s	15m^3 tank air expelled over 1,800 seconds, flow rate of 0.008 m^3/s
O17: Biogas Upgrading Unit	6.0	151.39	ou_E/s	Stack Height: 6m Stack Diameter: 0.08m Volumetric flow rate: 0.151 m^3/s Velocity: 30.12 m/s

** Agitated or disturbed feedstocks represented by an increased emission rate of 10 times that of typical rates.*

3.4.9 The emission characteristics summarised within Table 6 include the following assumptions.

Exposed maize, grass, whole crop, and straw within silage clamps

3.4.10 The area of the silage clamps constantly uncovered represents an exposed face of the silage along its entire length and height. The uncovered clamp area will vary throughout operation depending on the levels and type of stored feedstock. As such, the assumption that both faces of the clamps will be exposed at all times would provide a conservative approach. The clamps are 25 m wide each and feedstocks are expected to be 7.5 m in height. It has been assumed the clamps are exposed during operations which occur for one hour twice a day. This was applied to sources O1 and O2.

FYM and Vegetable and Fruit Waste stored with the manure pad

3.4.11 The emissions for FYMs and poultry litter are given for pure and raw manures and based on 100% poultry manure to assume a robust emission profile, although 43% of the FYM feedstock is to comprise of pig and cattle manure mixed with straw.

3.4.12 JEDI UK Ltd confirmed that all feedstock stored on the pad are to be covered, with only the front face of the feedstocks exposed for twice a day for one hour during loading. It is understood the FYM storage holds a maximum of 72 hours of feedstock at any one time, with 48 hours of vegetable and fruit in the pad at any one time. The feedstocks will be fully covered and exposed and agitated for approximately 2 hours per day. This was applied to sources O3 and O4.

Exposed and agitated material within the feeder hoppers

3.4.13 The agitation of feedstock during loading into the feeder hoppers was represented by an increased emission of 10 times that of the standard rate. The feeding process of all feedstocks occurs 2 hours per day. This was applied to sources O5 – O6 with FYM and silage emission rates assigned to each of the respective feed hoppers.

Transfer from feedstock clamp/pad to feeder hoppers

3.4.14 The transfer route from the silage clamps (O10, O11, 013) to Feed Hopper 1 (O5) and FYM/vegetable and fruit waste pad (O12, O14) to Feed Hopper 2 (O6) was modelled as a 1.0 m wide area source, the maximum distance was used for the routes from the silage clamps and concrete pad to the feeder hoppers. The agitation of feedstock during transfer to the feeder hoppers was represented by an increased emission of 10 times that of the standard rate.

Emissions from solid digestate

3.4.15 Processed solid and dewatered digestate is separated and temporarily stored within a dedicated area which is enclosed and covered. The solid digestate will stay in situ for a maximum of 72 hours before transferred off site. Emission rates are conservative and based on an uncovered and open source which does not consider potential emissions reductions as a result of covering digestate.

Emissions from Digestate Lagoon

3.4.16 The digestate lagoon will be fitted with a floating cover which will reduce the fugitive emission rates; no reduction has been applied. However, the lagoon will consist of proportions of leachate runoff which will dilute the digestate and reduce the emission rate. To account for this the emission rate was reduced by 50%.

Emissions from Pasteurisation Tanks

3.4.17 The emissions from the pasteurisation tanks are based on an average displaced air flow of 15 m^3/hr from a full 15m^3 tank based on the proposed tank filling rate. The pasteurisation tanks emit via a dedicated vent with a diameter of 0.65 m and a flow of 0.004 m^3/s and a velocity of 0.013 m/s.

Emission from road tankers at digestate filling points

3.4.18 The liquid fraction of the digestate is stored in the digestate tank before being transported off-site by tankers to use as a fertiliser on local agricultural land. Tankers are assumed to have a 15 m^3 capacity and a filling time of 30 minutes has been used to calculate an air flow rate of 0.008 m^3/s and a velocity of 0.265 m/s.

Emission from Biogas Upgrading Unit

3.4.19 Emission concentrations stated in EA statutory guidance "SR2021 No 6: Anaerobic digestion facility, including use of the resultant biogas – installations"[5]. Modelled stack height of 6m, diameter 0.08 m, flow rate of 0.151 m^3/s and a velocity of 30.12 m/s emitting constantly during operations.

3.4.20 All odour emissions were at ambient velocity and temperature as a realistic assumption.

3.5 Time Varied Emissions

3.5.1 Emissions for the liquid digestate lagoon, digestate storage, biogas upgrade and pasteurisation tanks were assumed to be constant, with the plant in operation 24-hours per day, 365-days per year.

3.5.2 JEDI UK Ltd confirmed that the filling of the feeder hoppers, as well as the transfer of feedstock from the silage and FYM, poultry litter and vegetable and fruit waste pad would occur for approximately two hours per day. The silage clamps and feedstocks stored on the concrete pad will remain fully covered when not required for transfer to the feed hoppers and therefore exposed for two hours per day. A time-varied file was applied to represent these emissions.

3.5.3 JEDI UK Ltd confirmed that the collection of liquid digestate from the designated transfer point will occur for a maximum of 11 times per month. Therefore, a time-varied file was applied to represent 1 collection per a day as a robust assumption.

3.5.4 Modelling of all sources is therefore considered to provide conservative short-term pollutant concentration predictions which do not account for periods of reduced workload.

3.6 Assessment Extents

3.6.1 Ambient concentrations were modelled over a 10 km x 10 km area using a nested grid with variable resolutions and distances. The grid comprises the following spacing:

- 5m resolution - within 200 m of the Facility;
- 25 m resolution - within 400 m of the Facility;
- 50 m resolution - within 1,000 m of the Facility;

[5] https://www.gov.uk/government/publications/sr2021-no-6-anaerobic-digestion-facility-including-use-of-the-resultant-biogas-installations/sr2021-no-6-anaerobic-digestion-facility-including-use-of-the-resultant-biogas-installations

- 250 m resolution - within 2,000 m of the Facility; and
- 500 m resolution - within 5,000 m of the Facility.

Results were subsequently used to produce contour plots within the Surfer® visualisation software package.

Sensitive receptor locations in the vicinity of the Facility were identified following a desk top survey and assigned a relevant sensitivity based on the appropriate land use category and criteria detailed in Table 3.

3.6.2 Sensitive receptors are summarised in Table 7. Reference should be made to Figure 3 for a graphical representation of the receptor locations.

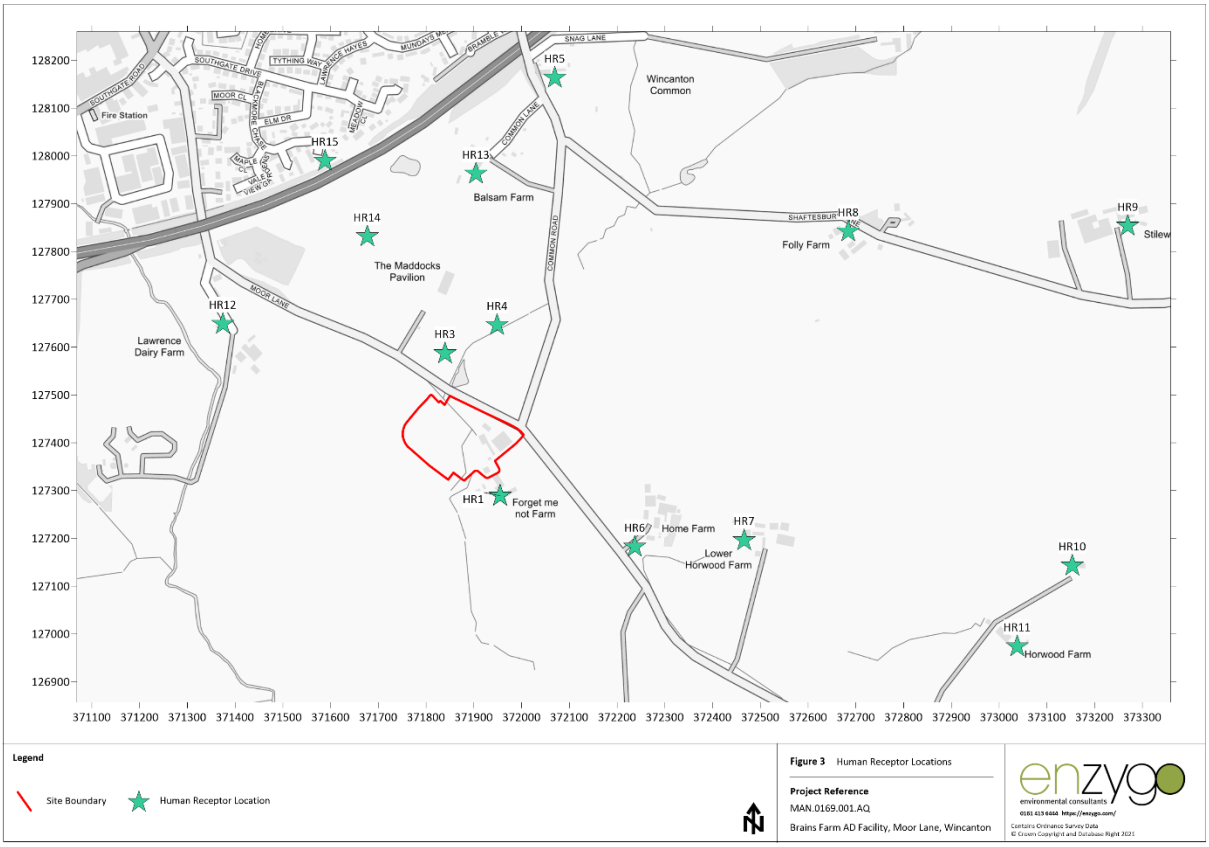
Table 7: Human Sensitive Receptors

Receptor		Use	NGR (m)		Distance from Facility (m)	Sensitivity
			X	Y		
HR1	Forget Me Not Farm	Residential	371955.0	127289.0	137	High
HR2	Wincanton Sports Ground	Recreational	371839.5	127587.0	137	Medium
HR3	Wincanton Sports Ground	Recreational	371948.9	127645.9	189	Medium
HR4	Vine House, Common Road	Residential	372069.5	128163.2	254	High
HR5	Home Farm	Residential	372237.1	127182.1	785	High
HR6	Lower Horwood Farm	Residential	372466.1	127196.0	421	High
HR7	Folly Farm	Residential	372684.1	127842.0	623	High
HR8	Stileaway Farm	Residential	373269.7	127853.3	919	High
HR9	Higher Horwood Farm	Residential	373153.4	127142.7	1,463	High
HR10	Higher Horwood Farm Cottage	Residential	373037.8	126974.0	1,302	High
HR11	Lawerence Dairy Farm	Residential	371374.1	127648.4	1,236	High
HR12	Balsam Farm	Residential	371904.4	127962.3	561	High
HR13	Allotments, Moor Lane	Residential	371676.7	127831.2	561	High
HR14	40 Blackmore Chase	Residential	371588.3	127989.5	474	High

3.6.3 It should be noted that surrounding land use is predominantly agricultural so silage and FYM odours would reasonably be expected. Many of the receptors in close vicinity to the Facility are working farms however receptors represent a group of properties and range of uses. HR1 represents an approved barn conversion to residential use within the curtilage of Forget Me Not Farm. The planning application 14/05207/PAMB was submitted in 2014 and approved at subject to conditions. The current status of the application and progression with construction is unknown and a receptor was included for completeness.

3.6.4 In all cases, receptors have been classified as the highest sensitivity in that group, such as a residential farmhouse within the curtilage of the farm.

Figure 3: Modelled Sensitive Receptor Locations



3.7 Terrain Data

3.7.1 Areas of complex terrain have potential to affect the dispersion of pollutants which vary dependent on the height and location of modelled emission sources. The ADMS-6 user guidance suggest that terrain height effect should only be included where gradient exceed 1:10.

3.7.2 Ordnance Survey Landform Panorama terrain data processed within the ADMS-6 model and covers the Facility and surrounding receptor locations.

3.8 Building Effects

3.8.1 Buildings can influence the dispersion of pollutant and may lead to increases to ground level concentrations. A review of adjacent buildings was therefore undertaken and subsequently included within the model and are summarised in Table 8.

3.8.2 Onsite building heights were provided by Burton Agnes Renewables. It should be noted that the effect of buildings on dispersion can only be modelled for points source. As such the modelled area/line sources do not take account of building effects.

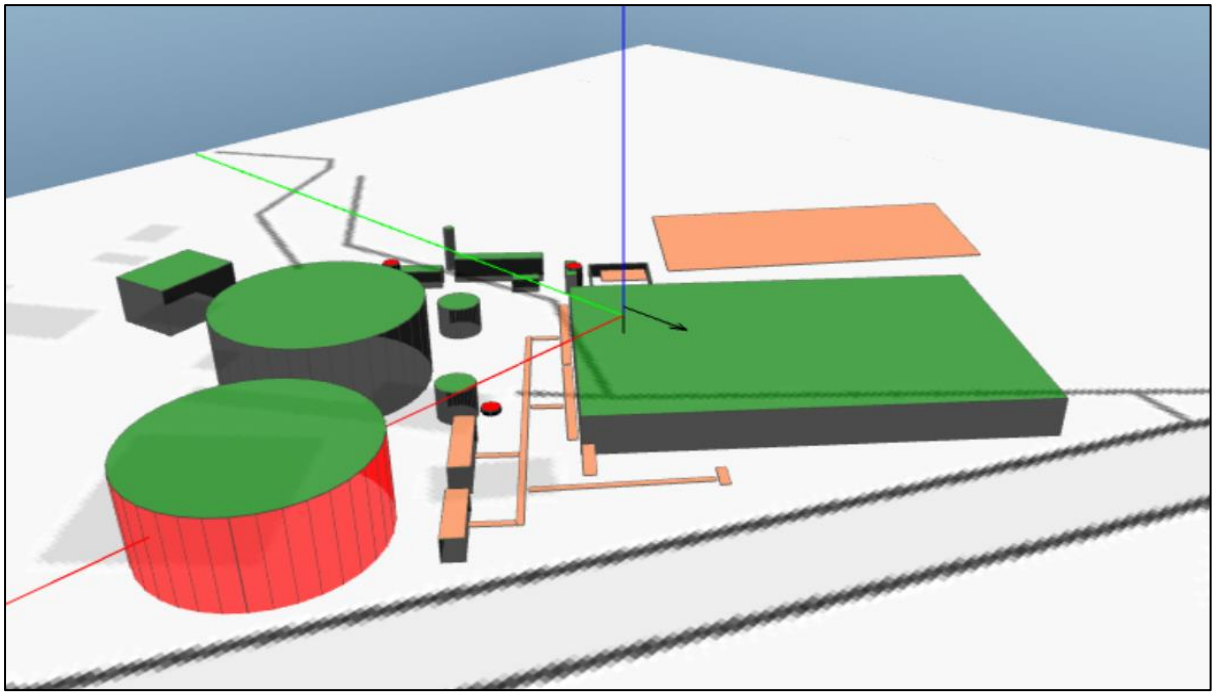
Table 8: Building Geometries

Building		NGR (m)		Height (m)	Length/ Diameter (m)	Width (m)	Angle (°)
		X	Y				
1	TNV Digester	371956.8	127418.7	16.0	35.5	Circular	N/A
2	Post Digester	371924.4	127387.5	16.0	35.5	Circular	N/A
3	Feed Hopper 1	371940.0	127439.2	4.2	11.9	3.3	224.4
4	Feed Hopper 2	371927.5	127426.4	5.0	3.4	14.9	134.4
5	Silage Clamps	371868.1	127443.8	7.5	75.7	49.2	130.3

Building		NGR (m)		Height (m)	Length/ Diameter (m)	Width (m)	Angle (°)
		X	Y				
6	Liquid Tanks 1	371917.7	127413.6	6.5	6.6	Circular	N/A
7	Liquid Tanks 2	371896.2	127389.6	6.5	7.6	Circular	N/A
8	Site Office	371927.0	127344.0	10.0	12.6	16.4	169.6
9	Grid Entry Units	371903.2	127355.9	3.5	9.1	4.1	226.0
10	Biogas Upgrader	371891.3	127363.7	4.0	3.3	19.5	225.4
11	CHP Unit	371874.5	127376.8	5.5	3.0	17.9	225.7
12	Boiler Unit	371874.8	127384.9	3.0	2.5	5.3	222.2
13	Pasteurisation Units	371867.6	127390.7	4.5	2.2	7.5	134.3
14	Flare	371877.7	127365.3	3.0	2.0	Circular	N/A
15	Digestate Bunker Wall	371856.3	127401.8	3.0	0.2	10.2	133.8
16	Digestate Bunker Wall	371864.9	127393.6	3.0	0.2	10.2	133.8
17	Digestate Bunker Wall	371857.2	127394.1	3.0	0.3	12.0	223.8

3.8.3 Reference should be made to Figure 2 for a graphical representation of the modelled building layout and ADMS-6 model inputs. A three-dimensional representation is provided below.

Figure 4: 3D Model Layout

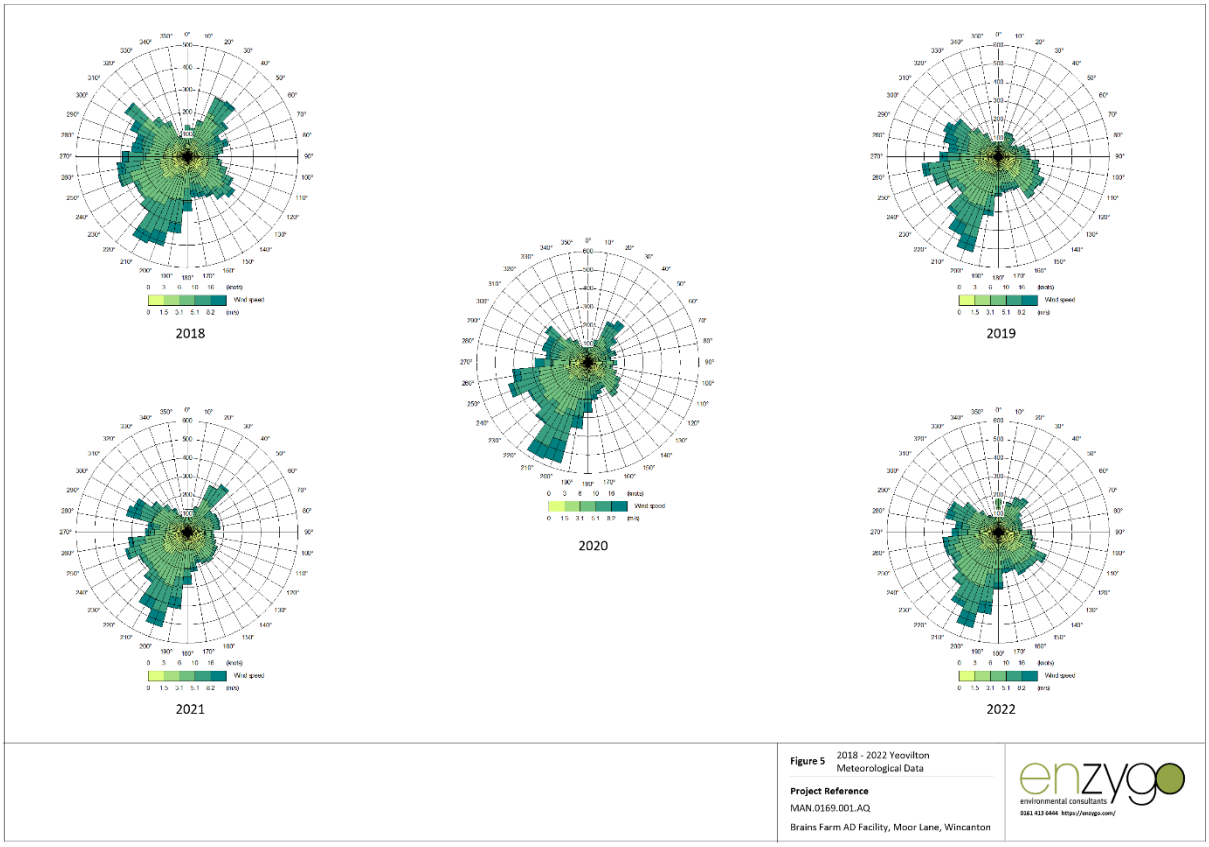


3.9 Meteorological Data

3.9.1 Hourly sequential data used in this assessment was obtain from Yeovilton meteorological station, located 17 km southwest of the Facility. Both sites are located within similar rural contexts and share comparable topographies. The choice of this parameter therefore provides a suitable representative of metrological conditions across the modelled domain.

3.9.2 Maximum emissions across the five years of meteorological data (2018 - 2022) were utilised to ensure a worse case assessment. Reference should be made to Figure 5 for the meteorological wind roses.

Figure 5: Meteorological Wind Roses



3.9.3 All meteorological data was provided by ADM Ltd.

3.10 Roughness Length

3.10.1 The specific roughness length (z_0) values specified with the ADMS-6 model are summarised in Table 9.

Table 9 Utilised Roughness Length

Location	Roughness length (m)	ADMS Description
Application Site and Meteorological Station	0.2	Agricultural (min)

3.11 Monin-Obukhov Length

3.11.1 The Monin-Obukhov length values are summarised in Table 10.

Table 10 Utilised Monin-Obukhov Lengths

Location	Monin-Obukhov length (m)	ADMS Description
Application Site and Meteorological Station	10	Small Towns <50,000

3.12 Surface Albedo and Priestley-Taylor Parameter

3.12.1 The surface albedo and Priestley-Taylor parameters used in the assessment were the model default values of 0.23 and 1 respectively.

3.13 Significance of Odour Impacts

3.13.1 Modelled 98th%ile of 1-hour mean odour concentrations were compared against the EA benchmark levels to determine the acceptability of the impacts.

3.13.2 To provide a further examination of significance, the impacts was also assessed through the interaction of the predicted 98th%ile of 1-hour mean odour concentrations and receptor sensitivity, as outlined in the IAQM guidance[3]. The relevant assessment matrix for "moderately offensive odours" as defined in Section 2.2 is summarised in Table 11.

Table 11 IAQM Odour Impact Descriptors

Odour Exposure Level as 98th%ile of 1-Hour Means (ou_E/m^3)	Receptor Sensitivity		
	Low	Medium	High
Greater than 10	Moderate	Substantial	Substantial
5 – 10	Slight	Moderate	Moderate
3 – 5	Negligible	Slight	Moderate
1.5 – 3	Negligible	Negligible	Slight
0.5 – 1.5	Negligible	Negligible	Negligible
Less than 0.5	Negligible	Negligible	Negligible

3.13.3 The IAQM guidance states that an assessment must reach a conclusion on the likely significance of the predicted impact. Where the overall effect is moderate or substantial, the effect is likely to be considered significant, whilst if the impact is slight or negligible, the impact is likely to be considered not significant.

3.14 Modelling Uncertainties

3.14.1 Uncertainty in dispersion modelling predictions can be associated with a variety of factors, including:

- Model uncertainty – due to model limitations;
- Data uncertainty – due to errors in input data, including emission estimates, operational procedures, land use characteristics and meteorology; and
- Variability – randomness of measurements used.

3.14.2 Whilst uncertainty in the model inputs and parameters cannot be fully reduced, the analysis of maximum emissions across the five years of meteorological data (2018 - 2022) provides sensitivity analysis which sufficiently accounts for variations in modelled predictions. Additionally, robust assumptions applied during the calculation of emission rates within the model also minimise potential uncertainties and underpredictions. As such, a sufficient degree of confidence can be placed in the results.

3.15 Dispersion Modelling Report Requirements

3.15.1 Table 12 provides the checklist of dispersion modelling report requirements.

Table 12 Dispersion Modelling Report Requirements

Item	Location within Report
Location map	Figure 1
List of odours modelled and relevant odour guidelines	Section 3.2, Section 2.2 and Table 2
Details of modelled scenarios	Section 3.4
Details of relevant ambient concentrations used	Not relevant to odour
Model description and justification	Section 3.3
Special model treatments used	Section 3.0
Table of emission parameters used	Table 5 and Table 6
Details of modelled domain and receptors	Section 3.6, Table 7 and Figure 3
Details of meteorological data used	Section 3.9
Details of terrain treatment	Section 3.7
Details of building treatment	Section 3.8, Table 8, and Figure 2

4.0 Assessment

4.1 Sensitive Receptor Results

4.1.1 Predicted odour concentrations at receptor locations are summarised in Table 13. Odour concentrations are presented as a 98th%ile of 1-hour mean values over the relevant assessment year. The maximum concentration over the 5 year meteorological dataset has been used to determine the overall assessment significance.

Table 13 Predicted Odour Concentrations

Receptor		Predicted 98th%ile 1-hour Mean Concentration (ou_E/m^3)					
		2018	2019	2020	2021	2022	5-Year Max Mean
HR1	Forget Me Not Farm	1.34	1.13	0.80	1.14	1.17	1.34
HR2	Wincanton Sports Ground	1.20	1.36	1.22	1.15	1.56	1.56
HR3	Wincanton Sports Ground	1.04	1.05	1.41	1.91	1.76	1.91
HR4	Vine House, Common Road	0.13	0.15	0.13	0.17	0.17	0.17
HR5	Home Farm	0.32	0.29	0.24	0.32	0.26	0.32
HR6	Lower Horwood Farm	0.17	0.18	0.16	0.17	0.17	0.18
HR7	Folly Farm	0.08	0.09	0.09	0.09	0.08	0.09
HR8	Stileaway Farm	0.03	0.03	0.04	0.03	0.03	0.04
HR9	Higher Horwood Farm	0.04	0.05	0.04	0.05	0.04	0.05
HR10	Higher Horwood Farm Cottage	0.05	0.05	0.04	0.05	0.05	0.05
HR11	Lawerence Dairy Farm	0.18	0.28	0.18	0.21	0.27	0.28
HR12	Balsam Farm	0.21	0.21	0.21	0.23	0.25	0.25
HR13	Allotments, Moor Lane	0.23	0.23	0.21	0.27	0.29	0.29
HR14	40 Blackmore Chase	0.12	0.12	0.12	0.13	0.16	0.16

4.1.2 As indicated in Table 13, predicted odour concentrations were below the appropriate odour benchmark of 3.0 ou_E/m^3 at all highly sensitive receptor locations for all modelling years.

4.2 IAQM Guidance Impact Significance

4.2.1 The significance of predicted odour impacts at the sensitive receptors based on 5-year maximum concentrations using IAQM guidance[3] is summarised in Table 14. Impacts are based on the criteria given in Table 11.

Table 14 Predicted Impact Significance at Receptors

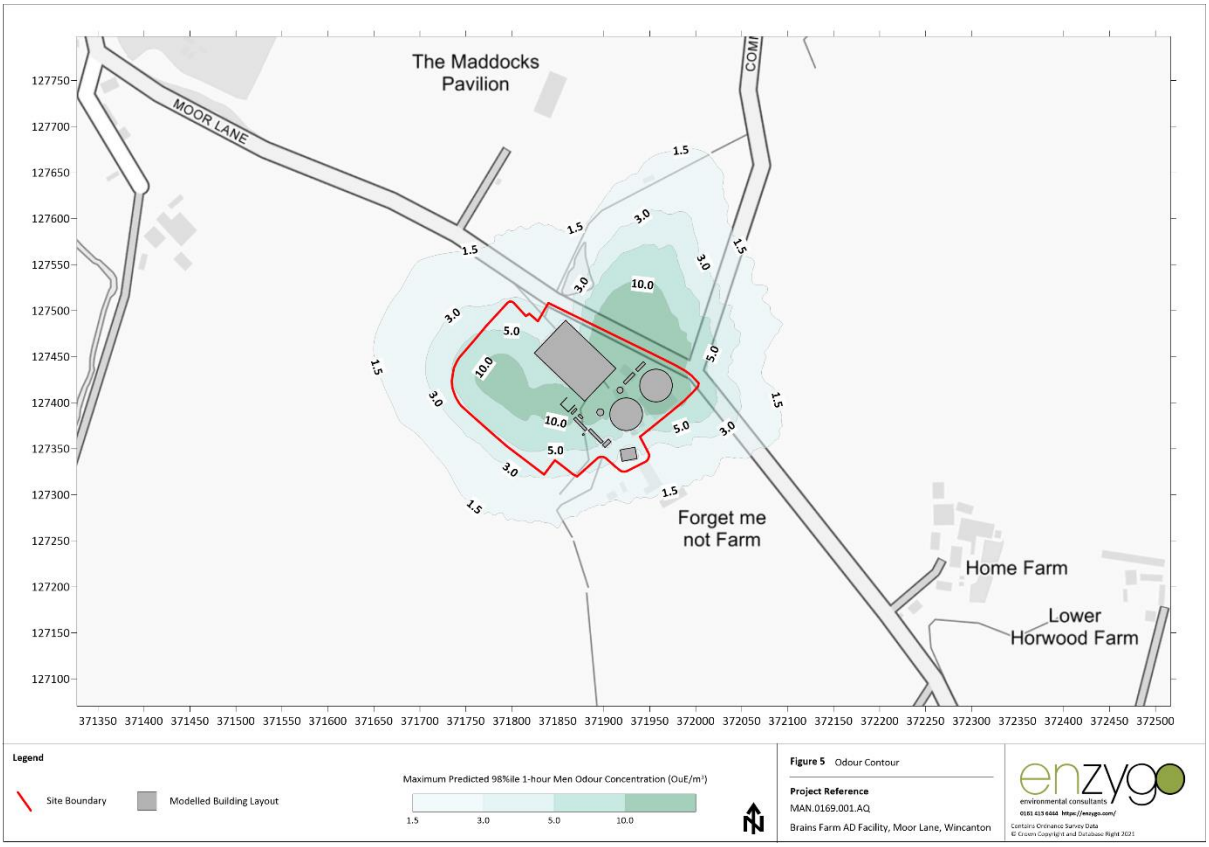
Receptor		Maximum Concentration (ou_E/m^3)	Odour Exposure Level (ou_E/m^3)	Receptor Sensitivity	Significance of Impact
HR1	Forget Me Not Farm	1.34	0.5 - 1.5	High	*Slight*
HR2	Wincanton Sports Ground	1.56	1.5 - 3	Medium	*Slight*
HR3	Wincanton Sports Ground	1.91	1.5 - 3	Medium	*Slight*
HR4	Vine House, Common Road	0.17	Less than 0.5	High	Negligible
HR5	Home Farm	0.32	Less than 0.5	High	Negligible
HR6	Lower Horwood Farm	0.18	Less than 0.5	High	Negligible
HR7	Folly Farm	0.09	Less than 0.5	High	Negligible

Receptor		Maximum Concentration (ou_E/m^3)	Odour Exposure Level (ou_E/m^3)	Receptor Sensitivity	Significance of Impact
HR8	Stileaway Farm	0.04	Less than 0.5	High	Negligible
HR9	Higher Horwood Farm	0.05	Less than 0.5	High	Negligible
HR10	Higher Horwood Farm Cottage	0.05	Less than 0.5	High	Negligible
HR11	Lawerence Dairy Farm	0.28	Less than 0.5	High	Negligible
HR12	Balsam Farm	0.25	Less than 0.5	High	Negligible
HR13	Allotments, Moor Lane	0.29	Less than 0.5	High	Negligible
HR14	40 Blackmore Chase	0.16	Less than 0.5	High	Negligible

4.2.2 As indicated in Table 14, the significance of odour impacts as a result of the Facility was predicted to be negligible at 11 sensitive receptor locations and slight at 3 sensitive receptor locations.

4.2.3 Based on the assessment results, the overall odour impact associated with the proposed activities are considered acceptable and not significant in accordance with the stated methodology and the IAQM impact descriptors listed in Table 10. Figure 5 presents the 5-year maximum a contour plot across the modelling domain.

Figure 6: Maximum 5-year Odour Concentrations



5.0 Conclusions

5.1.1 Enzygo Ltd was commissioned by JEDI UK Ltd to undertake detailed odour dispersion modelling to support a permit application relating to an AD plant at Brains Farm, Wincanton (the 'Facility').

5.1.2 During the operation of the Facility there is the potential for impacts at sensitive locations due to odour emissions from a number of sources at the plant. An Odour Assessment was therefore undertaken to consider effects in the vicinity of the site.

5.1.3 Potential odour emissions were defined based on information provided by JEDI UK Ltd on the facilities operation and a review of available literature and industry standard emission rates used at similar facilities. Where necessary conservative assumptions were made to give a robust assessment and increased confidence in the results.

5.1.4 A dispersion model using ADMS 6 and 5 years' meteorological data was produced to determine associated impacts. Impacts at sensitive receptor locations in the vicinity of the site were quantified, the maximum predicted results compared with the appropriate odour benchmark level.

5.1.5 Predicted odour concentrations were below the EA benchmark level of 3.0 ou_E/m^3 at all sensitive receptors in the vicinity of the site for all modelled years. In addition, using the IAQM guidance[3] impact criteria, maximum impacts were slight at one residential receptor location and two recreational receptor locations. All other locations were predicted to experience negligible impacts.

5.1.6 As such, given the robust assumptions made on odour emissions, the overall odour impacts generated by the Facility can be considered as acceptable and not significant.

5.1.7 The facility is therefore not considered to represent a constraint to environmental permitting permission with regard to odour.

6.0 Abbreviations

%ile	Percentile
AD	Anaerobic Digestion
ADM	Atmospheric Dispersion Modelling
ADMS	Atmospheric Dispersion Modelling Software
CERC	Cambridge Environmental Research Consultants
CH_4	Methane
CHP	Combined Heating and Power
CO_2	Carbon Dioxide
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EPUK	Environmental Protection UK
FYM	Farmyard Manure
H_2S	Hydrogen Sulphide
HGV	Heavy Good Vehicle
IAQM	Institute of Air Quality Management
JEDI	Japan Environmental Development & Investment
NGR	National Grid Reference
ou_E	European Odour Unit
PM	Particulate Matter
tpa	Tonnes Per Annum
z_0	Roughness Length

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