Jaynic Property Group

Spring Grove Green Power, Withersfield

Review of Odour Assessment

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Consultants in air quality & odour assessment

Contents

Approved for Issue 

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1 Introduction

Michael Bull and Associates Ltd (MBAL) has been commissioned by the Jaynic Property Group to advise on odours issues concerned with a proposed development at Spring Grove Farm, Withersfield north of Haverhill. An application has been made for "*The construction and operation of an anaerobic digestion facility and ancillary infrastructure including digestate pipeline and satellite digestate lagoon*". This application is located around 200m from the Epicentre, a flexible high-quality workspace operated by Jaynic Property Group who are concerned about the potential odour impacts on this centre.

The planning application has been accompanied by an Environmental Statement and MBAL has been asked to review this document, in particular the odour assessment and to:

- Consider whether this assessment has used appropriate methods and reached the correct conclusions in accordance with established guidance and normal custom and practice;
- Assess whether there is a risk of unacceptable odour impacting on your operations from the proposals and the likely scale of impacts using qualitative methods; and;
- Prepare summary report detailing the outcome of the review and highlighting any matters of concern.

The author of this report is Dr Michael Bull who was the chair of group that produced the Institute of Air Quality Management (IAQM) guidance on the assessment of odours for planning. He is an air quality and odour consultant with over 36 years of experience, has published and spoken widely on air quality and odour matters and was a contributing author to the book, Designing with Smells, published by Routledge in 2017.

2 Odour Assessment – Background and Guidance

2.1 Guidance - Odours

Various guidance documents have been produced in relation to the assessment of odours, the most relevant in terms of planning is guidance from DEFRA and the Institute of Air Quality Management (IAQM). The Environment Agency also provide guidance in relation in relation to odours which is relevant for an Environmental Permit application, this also contains some useful background information and guidance on good practice for dispersion modelling.

2.1.1 DEFRA Guidance

The Department of Environment, Food and Rural Affairs (Defra) published the document Odour Guidance for Local Authorities in 2010[1]. This document was withdrawn in September 2017 and there is no indication that it will be replaced or updated. Some of the content of this guidance remains useful in providing background information on odours and for providing a framework for the assessment methodology which is discussed below.

The human nose is very sensitive to odour and can detect the presence of some chemicals at very low concentrations that would be difficult for instruments to measure. The environment is rarely "odour free", even in places that are perceived to be clean such as rural areas or by the sea. Our response to odours depends on four interlinked (sensory) characteristics:

- Hedonic tone: this is a judgement of the relative pleasantness or unpleasantness of an odour made by assessors in an odour panel;
- Quality/Characteristics: this is a qualitative attribute which is expressed in terms of "descriptors", e.g. "fruity", "almond", "fishy". This can be of use when establishing an odour source from complainants' descriptions;
- Concentration: is the "amount" of odour present in a sample of air. It can be expressed in terms of parts per million, parts per billion or in mg/m^3 of air for a single odorous compound. More usually a mixture of compounds is present, and the concentration of the mixture can be expressed in odour units per cubic metre (ou_E/m^3) (see definition below); and
- Intensity: is the magnitude (strength) of perception of an odour (from faint to strong). Intensity increases as concentration increases but the relationship is logarithmic. Increases or decreases in concentration of an odour do not always produce a corresponding proportional change in the odour strength as perceived by the human nose.

The most commonly used attribute is the concentration of odours; this is measured in European odour units (ou_E/m^3) using a device known as an olfactometer which presents a sample of odour at different dilutions to a trained panel. The panel is asked whether they are able to detect odour at various concentrations. Once only 50% of the panel can detect the odour it is considered to be at its "Detection Threshold". The odour concentration at the Detection Threshold is defined to be 1 ou_E/m^3. For instance, if an odour sample has been diluted in an olfactometer by a factor of 10,000 to reach the detection threshold, then the concentration of the original sample is 10,000 ou_E/m^3.

In the guidance, it is noted that 5 ou_E/m^3 would be considered to be a 'faint' odour whilst 10 ou_E/m^3 would be considered a 'distinct' odour. Generally, an average person would be able to recognise the source of an odour at about 3 ou_E/m^3, although this can depend on the relative offensiveness of the odour. Background odour levels can be some 5-60 ou_E/m^3 or more.

[1] Defra, Odour Guidance for Local Authorities, March 2010 (withdrawn September 2017).

The guidance considers that the following factors are the main factors to consider when assessing the acceptability of odours:

- Frequency of the odour;
- Intensity of the odour;
- Duration of exposure to the odour;
- Offensiveness of the odour; and
- Tolerance and expectation of the exposed subjects.

These are then placed within a framework known as the FIDOL factors as summarised in Table 1 to assist Environmental Health Practitioners determine if a statutory nuisance exists.

Factor	Factors determining Statutory Nuisance
FREQUENCY (How often an individual is exposed to odour)	Frequency (How often an individual is exposed to odour)
INTENSITY (The perceived strength of the odour, proportional to $\log_{10}$ concentration)	Level of odour
DURATION (The length of a particular odour event or episode. Duration of exposure to the odour)	Duration
OFFENSIVENESS (relative)/character (Offensiveness is a mixture of odour character and hedonic tone at a given odour concentration/intensity)	Type of odour
LOCATION (The type of land use and nature of human activities in the vicinity of an odour source. Tolerance and expectation of the receptor.)	The characteristics of the neighbourhood where the odour occurs The sensitivity of the complainant

Table 1 DEFRA Odour FIDOL Factors

Some other guidance refers to these as FIDOR factors (where the R relates to “receptors”).

The DEFRA guidance provides no further information how to interpret these factors but guidance from the Scottish Environmental Protection Agency[2] (‘SEPA’) does give more details as follows:

[2] SEPA, Odour Guidance, 2010

Frequency relates the number of events, which could be repeat events on the same day and can be defined from 1 - 5 as follows:

- 1 Rare, perhaps first recorded occurrence;
- 2 Infrequent, 2 or 3 events per year;
- 3 Occasional, 1 or 2 per month; or several short duration events in any one day;
- 4 Frequent, 1 or 2 per week; or routine short duration events over same period;
- 5 Very frequent, perhaps 3 or more events per week or numerous/repeated short duration events over same period.

Intensity categories may be defined from 1–5, as follows:

- 1 No detectable odour
- 2 Faint (need to inhale facing into wind)
- 3 Moderate (easily detected while breathing normally, possibly unpleasant character
- 4 Strong (bearable but distinctly unpleasant odour)
- 5 Very strong (very unpleasant odour, possibly causing nausea).

Duration categories may also be defined from 1- 4 as follows:

- 1 Transient, e.g. whiff (only detectable for brief intermittent spells)
- 2 Sporadic discrete <5 to 10 minutes or <50% of total assessment time if less than 30 minutes
- 3 Persistent greater than 50% of assessment time but not continuous, fairly localised
- 4 Continuous, present throughout assessment period.

Location categories may also be defined from 1–5 as follows:

- 1 On site or at boundary only
- 2 Short distance from boundary but not impacting any sensitive receptors (<25m)
- 3 At nearby sensitive receptors (<250m)
- 4 In wider locality out with immediate area of site (<500m)
- 5 Widespread, affecting large areas.

It is important to note that the guidance does not suggest that constant exposure to odours is required for an adverse impact, in fact relatively infrequent events can still give rise to odour problems. For instance, the guidance states that "Very Frequent" events are defined as "perhaps 3 or more events per week". The expectation is that most of the time, the environment could be odour free.

2.1.2 IAQM Guidance

The Institute of Air Quality Management (IAQM) produced guidance in 2014 and was updated in 2018[3] with the specific intention to provide advice for "assessing odour impacts for planning purposes". It provides details of various assessment techniques noting that each has its own strengths and weaknesses.

[3] Bull M, IAQM, Guidance on the assessment of odour for planning, 2018 update

The guidance states that dispersion modelling is a useful tool for assessments, particularly for assessing future odorous development. However, it also notes that dispersion modelling is not suitable for intermittent and fugitive sources and therefore the model results may not give a complete picture of the odour risk for a site. It suggests that, where possible, odour emissions rates are measured, and this will "*add certainty to the assessment*". Where library data is used the guidance states "Where "*standard" data are used, the source must be clearly noted and it should be demonstrated that the information is likely to be a reasonable representation of odour emission rates on the study site*".

The modelling will provide predicted concentrations (ou_E/m^3) as a 98th percentile of 1-hour means. The guidance recommends that in terms of comparing predicted concentrations with odour assessment criteria, practitioners should observe from the various scientific studies, case law and practical examples of the investigation of odour annoyance cases and then determine an appropriate criterion. This criterion could lie somewhere in the range of 1 to 10 ou_E/m^3 as a 98th percentile of hourly mean odour concentrations.

A framework is provided to assess the significance of predicted changes in odour concentrations and is shown in Table 2 below.

Table 2 IAQM Odour Effects Descriptors

Odour exposure level ou_E/m^3 (98^{th} percentile)	Receptor sensitivity		
	Low	Medium	High
>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
<0.5	Negligible	Negligible	Negligible

The guidance notes in Section 4.1 that, "*Even when the model is a good representation of the real situation and the assumptions and input data are reasonable, the uncertainty for predictions from dispersion modelling can be considerable*". The guidance therefore recommends a "multi-tool" assessment approach – i.e. an assessment approach that uses at least two methods to assess the odour impacts.

Dispersion modelling is one suitable tool and an example of a second suggested tool is the use of a Source, Pathway, Receptor (SPR) model. The SPR approach assesses the risk of an adverse odour impact by examining the source characteristics, how effectively the odours can travel from the source to a receptor (i.e. the Pathway) and examining the sensitivity of the receptor. For each of these factors, the guidance provides example risk factors to provide a consistent approach for the assessment. These risk factors are shown in Table 3.

Source Odour Potential	Pathway Effectiveness	Receptor
Source odour potential is allocated to one of three levels: small, medium or large. Factors affecting the source odour potential are: • The magnitude of the odour release • How inherently odorous the compounds are • The unpleasantness of the odour	Pathway effectiveness is allocated to one of three levels: highly effective, moderately effective and ineffective, Factors affecting the odour flux to the receptor are: • Distance from source to receptor • The frequency of winds from source to receptor • The effectiveness of any mitigation in reducing flux to the receptor • The effectiveness of dispersion/dilution in reducing the odour flux to the receptor • Topography and terrain	Use professional judgement based on the expectation of the users at the receptor location. However, the assessment usually considered residential receptors that are considered to be highly sensitive.

Table 3 IAQM SPR Assessment

An example matrix for assessing the outcome is also provided in the guidance and shown in Table 4 below.

		Source Odour Potential		
		Small	Medium	Large
Pathway effectiveness	Highly effective	Low risk	Medium risk	High risk
	Moderately effective	Negligible risk	Low risk	Medium risk
	Ineffective	Negligible risk	Negligible risk	Low risk

Table 4 IAQM Risk Assessment Framework

2.1.3 Environment Agency H4 Guidance

The Environment Agency H4 odour is the main source of the odour standards generally applied to assess the significance of dispersion modelling results. While the H4 document itself does not detail the justification for the proposed odour standards, these have been published elsewhere[4]. The odour benchmarks proposed were derived from studies that examined the relationship between the percentage of the population reported to be "annoyed" by odours from pig farming with predicted odour concentrations from odour modelling. The percentage of the population reported to be annoyed was derived from community surveys.

The H4 document provides the following odour benchmarks:

- 1.5 ou_E/m^3 for most offensive odours;
- 3 ou_E/m^3 for moderately offensive odours; and
- 6 ou_E/m^3 for less offensive odours.

The guidance states that exposures above these benchmark levels indicates the likelihood of unacceptable odour pollution. H4 provides some guidance on the classification of the offensiveness of odours as shown in Table 5. Odours from composting and anaerobic digestion are likely to be considered as moderately offensive.

Level of offensiveness	**Activities**
Most offensive	Processes involving decaying animal or fish remains Processes involving septic effluent or sludge biological landfill odours
Moderately offensive	Intensive livestock rearing Fat frying (food processing) Sugar beet processing Well aerated green waste composting
Less offensive	Brewery Confectionery Coffee roasting Bakery

Table 5 H4 Classification of Offensiveness

[4] Environment Agency, Assessment of Community Response to Odorous Emissions, R&D Technical Report p4-095/TR

3 The Proposed Development and the Epicentre

3.1 Proposed Development

3.1.1 Outline Process Description

The proposal is for the following elements:

Feeding system

- feedstock is delivered to the site from the surrounding farms consisting of sileage (46,500 tpa), straw (20,500 tpa), farmyard manure (10,000 tpa) and poultry litter (15,000 tpa);
- Feedstock would be unloaded in one of three silage clamps, a manure reception shed and a straw building as appropriate;
- Loading shovels are used to transfer feedstock into feed hoppers from the sileage clamps, chicken manure shed and straw bunker;
- Feedstock is macerated prior to feeding into the digester.
- Liquid manure would be transferred to liquid storage tanks from a tanker and then into the digester as required;

Digestion

- Digestion will take place in a series of tanks creating biogas;
- Biogas is held within the tanks under a membrane dome;
- Biogas is that passed into a gas cleaning unit before injection into the grid.

Storage and Digestate Separation

- Digestate would be transferred to screw presses and the dewater component stored in a storage bunker, the liquid digestate would be stored in lagoons with a floating HDPE cover;
- The solid digestate would be dried and exported off site for use on surrounding farmland.

Biogas Clean-up and Member Upgrading

- Biogas would be process in a clean-up plant to remove impurities. Hydrogen sulphide is mentioned as one impurity;

Electricity Generation

- There will be two CHP plants on the site, one fuelled by biogas, the other by natural gas;

Biogas Compression and Flaring

- Biogas would be compressed and cooled prior to injection into the national grid;
- Excess or reject gas would be flared in an emergency gas flare

The site location is shown in Figure 1. The process location diagram from the ES in shown in Figure 2, this a rather poor quality and the processes have been identified from other drawing submitted with the application.

There is little detail regarding the various buildings and processes, some elevations have been provided but no information regarding ventilation of the building or possible odour controls is detailed in the process description (Section 3). There is no information suggesting that rapid opening doors would be used on various buildings on the site. It would appear that the feed hopper is not covered and all loading takes place externally.

There is mention of a "protective sheet" to cover the sileage clamps but no further information is given and it is likely that this must be removed when material is added to or taken from the clamps.

Although the annual quantities of material are provided, no information is given on the frequency of loading of the digesters with feedstock so it is not possible to estimate the activity levels on site particularly in terms of the daily movements of feedstock into the site and within the site.

3.1.2 Potential Odour Sources

The anaerobic digestion process must be enclosed as it relies on biological degradation in the absence of oxygen. However, some of the feedstocks and products produced are highly odorous or have the potential to degrade into more odorous material.

Chicken litter is material removed at the end of the rearing cycle in poultry production. Chicken rearing is an odorous process and the odour emissions increase to a peak at the end of the rearing cycle. Removal of litter from the sheds at the end of the cycle is known to be a highly odorous activity with emission rates often estimated to be more than 10 times the average values over the rearing cycle[5]. The removal of litter often coincides with odour complaints from nearby sensitive receptors based on experience from other MBAL projects.

Liquid manure is another very odorous material, the actual source is not stated but could for example be cattle or pig manure. This material can degrade quickly and odour emissions be very high. Unloading of slurry into tanks can be odorous as air is displaced from the storage tanks and discharged to the atmosphere.

The handling of both chicken litter and liquid manure must be considered to have a high potential for odour emissions if not carefully controlled.

Sileage also is an odorous material, its odours may be considered to be less offensive but again MBAL has experience of situations where the handling of sileage has resulted in odour complaints.

It is not stated how long other feedstocks will be stored in the clamps. It is assumed that this is not intended to be a composting process but there is the potential for the material to start composting if kept in the clamps for sufficient time.

As can be seen from the process diagram, some of the materials handling must take place externally, the feed hoppers are separate from the feedstock storage areas and it is intended to move feedstock by loading shovels.

3.2 The Epicentre

The Epicentre is a high quality working space consisting of offices, circulation spaces, a café area and laboratory space. With the exception of the laboratory spaces, the building is naturally ventilated with opening windows and no air conditioning. There is also outdoor seating and amenity areas which are used in warmer weather.

[5] AS Modelling and Data Ltd, A Dispersion Modelling Study of the Impact of Odour from the Existing and Proposed Broiler Chicken Rearing Houses at Trevase Farm, near St. Owens Cross in Herefordshire, 20 August 2020

The laboratory spaces are air conditioned but use purge ventilation as an integral part of this operation. Purge ventilation relies on open windows and this activity could not take place if odorous air was present.

The operation of the building would be adversely affected if odours were present as the tenants expect a high quality working environment. As such, the Epicentre should be considered as a High Sensitivity receptor in the assessment.

4 Review

Chapter 7 of the ES provides a Summary of the air quality assessment undertaken for the development and this is based on a full report included as Appendix 7a. This review has therefore concentrated on the full report, this includes:

- A review of relevant local and national policy;
- A baseline assessment of existing air quality in the areas;
- A construction phase assessment;
- An operational phase assessment for odour, dust, bioaerosols, ammonia and combustion emissions;
- Recommendations for mitigation measures.

The scope of this assessment is to primarily examine the odours issues although information from other sections of the assessment has been examined where appropriate. Comments are made on each section below.

4.1 Policy and guidance

This section identifies the Environmental Protection Act 1990 as the main legislation covering nuisance. The Environmental Permitting regulations are also noted but without reference to odours. It would be normal for a permit to have a condition limiting odour emissions and likely to state that there should be no offensive odours beyond the site boundary.
National planning policy is discussed giving various extracts from the NPPF, one important part of the NPPF is not quoted, para 187 states:

"*Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established*".

This essentially states that existing businesses should not have to change their operations and be unaffected by proposed new development.

Section 2.4 notes the use of the IAQM guidance on the assessment of odours for planning.

4.2 Methodology

Section 3.3 of the methodology section details the approach used for the assessment of odours. The Source Pathway Receptor (SPR) approach has been used that is described in the IAQM guidance. This is a frequently applied tool for odour assessment that essentially considers the nature and magnitude of each odour source on site, whether there is an effective pathway for the odour released to travel from the source to a receptor and the sensitivity of the receptor.

A single assessment method has been used which is not recommended in the IAQM guidance, it states that there is a preference to combining a number of assessment methods because all methods "*have a degree of uncertainty associated with their estimates of impact*". it also notes that there are further reasons for the use of more than one assessment tool:

- *the partly subjective nature of odour and the wide differences that exist in population response; and*

- *the fact that there is no "silver bullet" assessment tool that on its own provides an unequivocal answer - results from each of the different techniques tend to give information only on some limited aspect of the odour impact or effect*.

The guidance concludes that "*Best practice is to use a multi-tool approach where practicable*".

4.3 Baseline Environment

The baseline section identifies the nearby human receptor locations in Table 4.1 and this includes The Epicentre which is classified as a Medium sensitivity receptor in the assessment, however, as noted in Section 3.2 the Epicentre is marketed as high quality working space and relies on natural ventilation and opening windows and includes outside seating and amenity space. The Epicentre is therefore more appropriately classified as a High sensitivity receptor.

Meteorological conditions are discussed in section 4.5 and the windrose from Andrewsfield provided. This is the most appropriate site available. The report states that "*during period of low wind speed, the dispersion of particles/odours is much less effective*" and then goes on to state that low winds are relatively frequent.

Low wind speeds are a very important consideration for assessment of low-level odour sources such as this proposal. The highest odour concentrations are found during low wind speed stable atmospheric conditions. The relatively high frequency of low wind speed conditions is therefore of concern.

Agriculture is identified as a potential existing local source of odour in the area.

4.4 Construction Phase Assessment

This section is not relevant to odours unless there was any odorous material being excavated.

4.5 Operational Phase Assessment

4.5.1 Process description

The operational phase assessment contains further details of the process that are not provided in Section 3 of the ES.

Section 6.1 states that the manure shed will be enclosed with an extraction and abatement system, but no details of the extraction and abatement system are provided. However, Table 6.1 contradicts this and states that this shed is passively ventilated.

The sileage clamps will be covered by "weighed down sheeting" which appears to be a poor-quality approach for covering.

Separated solids from the digester will be stored in an enclosed building with passive ventilation. It is stated that this will only be stored for short periods but could be a concern if this material was left in place for longer periods.

No details are provided of the arrangements for adding to and removing material from the buildings or clamps. As previously noted, some of these materials are likely to be highly odorous and will continue to degrade during storage producing more odours. The disturbance of stored materials by front end loaders will expose more odorous parts of the material and these odours would be released through opening doors and during transport and handling of the material.

4.5.2 Odour Assessment

Table 6.1 of the air quality assessment contains the assessed odour potential of the processes and activities on site. This is partly reproduced in Table 6 with comments from MBAL on the assessment outcome.

Table 6 Review of SPR assessment

Source	Assessed Odour Potential in ES	MBAL Comments
Feedstock import	Small	It is agreed that emissions may be transient in nature but during import there will be open doors and odour emissions to the atmosphere which are likely to significant as the material is handled and placed particularly for the chicken litter. The ES is contradictory regarding the ventilation and odour treatment of emissions from the building. No attempt has been made to quantify the activity required for importing material – i.e. the number of movements in and out of the storage areas per day and hence the likely frequency of potential odour events has not been estimated. Given the very high odour potential of chicken litter and some other feedstocks we would not agree that importing of this material would be a Small odour source.
Feedstock storage	Small	This section states that there is an extraction and abatement system fitted which contradicts the information for feedstock import. However, no details of the abatement system are provided nor the design principles that would be applied to reduce odours. It is therefore no possible to assess the likely scale of odour emissions from the manure shed. Odour emissions from other sources are likely to be Small during storage.

Source	Assessed Odour Potential in ES	MBAL Comments
Feedstock handling	Small	The assessment states that the majority of material handled will have a low odour potential and hence concludes that this is a Small odour potential source. However, the assessment has not considered the higher odour potential sources – particularly the manure shed and the sileage clamps. Both would have significant odour emissions during handling which would not be controlled by the abatement system (if that is fitted). These would not be considered to be Small odour sources. No attempt has been made to assess the frequency of this activity.
Leachate/liquor storage	Small	MBAL would agree with this assessment.
Anaerobic digestion	Negligible	MBAL would agree with this assessment as the process must be fully enclosed.
Liquid digestate	Medium	This has been identified as a medium odour potential source. This is on the basis of low microbial activity although anaerobic digesters operate at relatively high organic carbon levels (compared with raw sewage works) and are a single vessel process. Therefore, there will always be some organic material in the digestate. There is the potential for this material to become more odorous although it is covered. In normal operation MBAL would agree that this would be a medium scale source but there is the potential for higher levels of odour at times.
Liquid digestate export	Small	MBAL would generally agree with this assessment however, the emissions from tankers would be significant and this source should be quantified. In other assessments seen by MBAL, emissions from sludge tankers have been estimated to have odour concentrations as high as 100,000 ou_E/m^3 and similar levels may occur here.

Source	Assessed Odour Potential in ES	MBAL Comments
Production of solid digestate	Small	If solid digestate is only stored for a short period the assessed level of Small would be appropriate. However, if stored for longer periods there would be chance of higher odours emissions from this source.
Solid digestate storage and export	Small	If solid digestate is only stored for a short period the assessed level of Small would be appropriate. However, if stored for longer periods there would be chance of higher odours emissions from this source. However, the export will involve disturbing the material and odours would not be contained as doors will be open. The frequency of this activity has not been assessed, nor the scale of our emissions from disturbed material. The scale of odour emissions during handling are considered to be higher than Small.

In conclusion, there are some sources that are considered to have been underestimated in the table although the overall assessment is based on a Medium level of odour emissions. However, there are several intermittent odour sources that have not been individually assessed in terms of their scale of odour emissions or their frequency. This is a significant omission from the assessment and their impact has not been appropriately assessed. The main sources this applies to are:

- Import and handling of chicken litter and FYM;
- Handling after storage of material stored in clamps;
- Handling after storage of chicken litter and FYM;
- Placement of material into feed hoppers;
- Export of solid digestate.

Without an assessment of the frequency of each of these activities and the scale of this emissions it is not possible to fully assess their impact. However, it is reasonable to expect that these activities would be well in excess of the three times a week considered by the SEPA guidance as being Frequent and would have a Large Odour Potential. This has the potential to result in a significant impact at The Epicentre.

The pathway effectiveness has then been assessed and all receptors have been assessed as having an “ineffective” pathway. The rationale for this assessment is not completely explained. In the IAQM guidance, an example in given for a moderately effective pathway (Table 9 of the Guidance) as being:

- Distance – receptors Is local to the source;
- Where mitigation relies on dispersion/dilution.

The term "local" in the distance assessment is not defined although a highly effective pathway is "*well below and official set back distance*" and ineffective is "*exceeds any official set back distances*". There are no official set back distances in the UK although 400m was often applied for sewage works and for agricultural buildings.

The frequency of winds has been included but this is not the only factor that needs to be considered with the meteorological data. It is the combination of wind speed and direction and the stability of the atmosphere that is important. This can be assessed by using a dispersion model to calculate the 98th percentile of hourly – the parameter the Environment Agency guidance uses to determine the odour risk. The relative odour risk around the site can be assessed relatively simply by setting up a dispersion model with an area source and using the Andrewsfield meteorological data to predict the 98th percentile around the source. This provides a more appropriate assessment of the relative odour risk in each direction. This has been carried out using the ADMS dispersion model – note that this exercise is only to determine the relative risk in each direction, not the absolute odour concentrations as an arbitrary odour emission rate has been used. The results are shown in Figure 3. This shows (contrary to the wind rose) that the highest risk is to the north but that that odour risk at The Epicentre is similar to receptors placed to the north-east (i.e. downwind of the prevailing winds). This is because the 98th percentile is based on the highest 2% of predicted concentrations at any location and the average or normal conditions are not important in determining the potential for odour nuisance.

Given the distance to The Epicentre is 210m and that the ES states that dispersion and dilution would be low from this source, the most appropriate pathway effectiveness for The Epicentre would be Moderately Effective particularly as the site relies on natural ventilation and includes outdoor amenity space.

As a result, the predicted odour exposure at The Epicentre would be Low for medium source potential sources but High where there are Large odour sources such as the intermittent sources identified earlier.

4.6 Mitigation Measures

Section 7.2 identifies proposed mitigation measures as

- Sheeting of the silage clamps;
- Manure Shed to have extraction and abatement (not specified);
- Digestate lagoons to be covered;
- Separator building to be enclosed (passive ventilation);
- A site management system to ensure routine site cleaning measures are undertaken.

There is no discussion of an Odour Management Plan that would be required to effectively manage odours on site.

4.7 Consistency with Guidance and Good Practice

As already noted, the assessment is based on a single assessment method, namely the SPR approach. This SPR assessment carried out is limited and does not attempt to assess the frequency and nature of more intermittent odour sources to allow a proper assessment of their impact in a FIDOR context. By excluding some of these activities from the SPR analysis, there has been no assessment of the

potential impact of these sources on The Epicentre. As found above, when included, there is the potential for a higher level of odour impacts.

The use of a single assessment method is expressly not recommended in the IAQM guidance and further assessment would be useful to determine the scale of impacts. This could be based on detailed observations and operational history at similar facilities in the UK. Alternatively, some assessment of the likely scale of the odour sources could be made by examination of published odour emission rates for the various different sources and assessment of their effects using indicative dispersion modelling. This could then inform a FIDOR/FIDOL analysis based around the frequency of events, the likely scale and duration of odour emissions and the offensiveness of the odours (the latter has not been considered in the submitted assessment).

5 Conclusions

The odour assessment for the proposed anaerobic digester has been reviewed to determine whether the methods used comply with good practice and guidance and to assess whether there is a potential risk of unacceptable odour conditions at The Epicentre site. The Epicentre is a naturally ventilated building and includes outdoor seating and amenity space.

The proposed development includes the delivery, storage and handling of material that can be highly odorous including chicken litter and farmyard manure. While the actual process of anaerobic digestion is enclosed and hence has very low odour emissions, the storage and handling on site of this material will results in fugitive emissions of odour which have not been assessed. No information is provided regarding the frequency that stored material will be disturbed, how frequently it will be moved around site and how odours would be controlled during these activities.

The odour assessment has been based on a single assessment method, namely the SPR approach, this is a suitable method but is a qualitative approach largely based on professional judgement. In MBAL's view, some of the source odour potential and the pathway effectiveness to the Epicentre have been underestimated. The Epicentre is promoted as a high-quality working space and as such, should be considered to be a highly sensitive receptor. **Where there are large odour emissions, such as from handling of material such as chicken litter, there is the potential for a High level of impact from the proposal development upon the Epicentre.**

The use of a single assessment method is not in accord with the IAQM guidance which suggests that a multitool approach should be used. Other methods that could be applied include a detailed FIDOR/FIDOL assessment and indicative dispersion modelling based on published emission data for available sources.

Given the lack of such assessments and the potential for high odour emissions to occur from some activities, it is concluded that there is a risk of significant adverse odour impacts at the Epicentre.

Figures

Figure 1 Location of proposed development and Epicentre

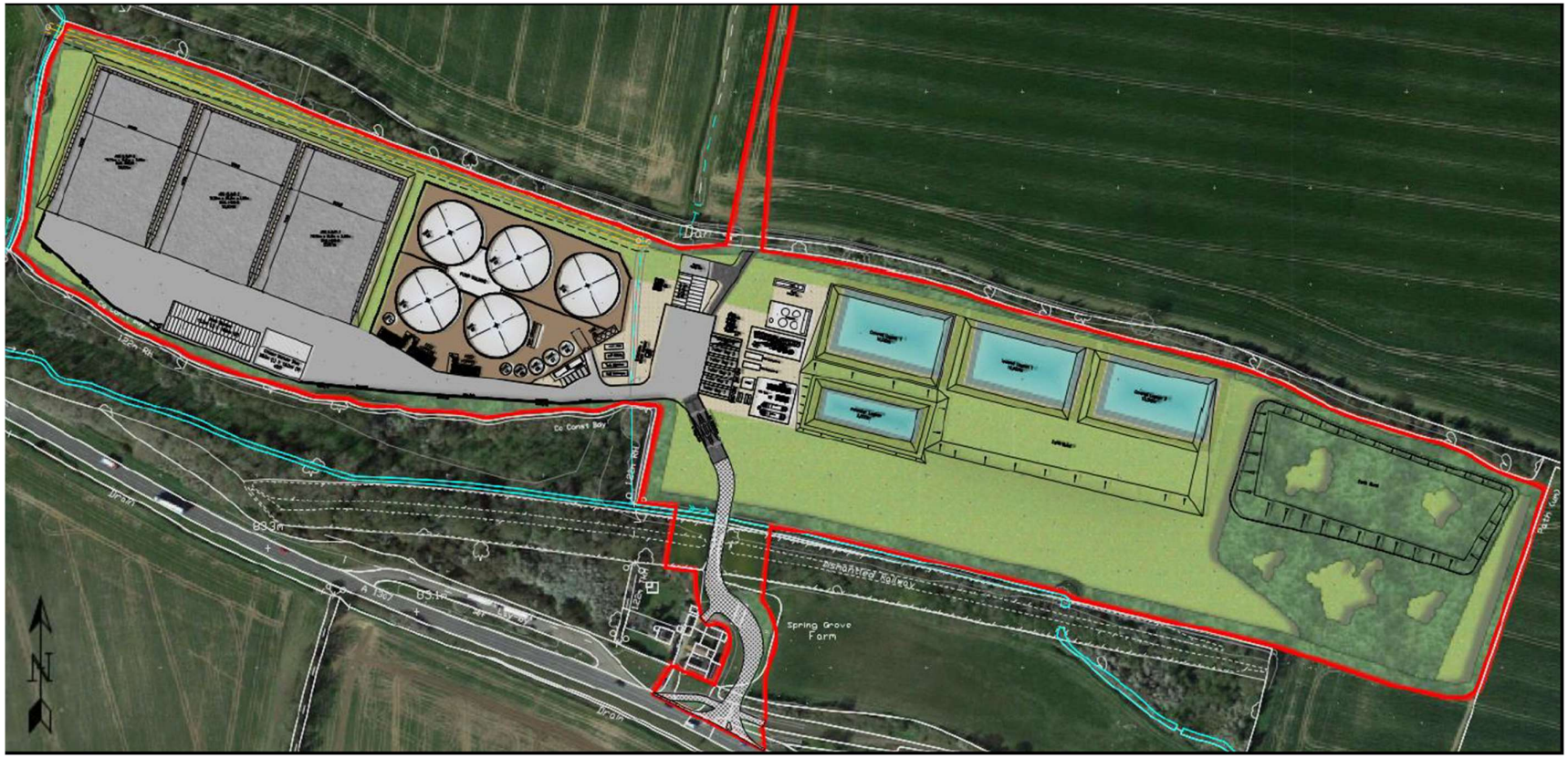

Figure 2 Process layout on site

Figure 3 Relative odour levels around proposed development