

# Odour Impact Assessment Update



## Potential Mixed Use Development on Land at Great Birchwood, Warton

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## Quality Assurance

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### Version History

VERSION	DATE	AMENDMENTS
Draft 1	27/02/2017	Initial Report
Revised	03/03/2017	2 <sup>nd</sup> Draft
Final Report	13/04/2017	Final

## Executive Summary

ADAS was commissioned by Britmax Developments Ltd to carry out a qualitative Odour Impact Assessment to assess the possible odour constraints that may be caused by an existing quail rearing unit at Brook Bridge Farm on proposals for a mixed leisure, care and residential development scheme on land at Great Birchwood, Warton. The proposals include a proposal for a care home in the south east of the site.

The quail rearing enterprise at Brook Bridge Farm is permitted by the Environment Agency for the operator to keep up to 190,000 quail in two buildings, and the buildings are situated to the south and east of the proposed development land.

Some odour release is inevitable at various stages during the quail rearing cycle, but the impacts of off-site odours can be minimised by following best practice measures as set out in the Code of Good Agricultural Practice for Farmers, Growers and Land Managers (Defra, 2009). Furthermore, in the case of permitted installations, such as that operated by Game Fayre at this site, odour emissions should also be minimised by following an Environment Agency approved Odour Management Plan, to meet the requirements of the Environmental Permit which includes a specific condition requiring the operators to use “appropriate measures” to minimise odour emissions.

Odour emissions associated with the rearing of birds in poultry sheds have the potential to cause impacts on any future occupants should planning consent for the proposed development be granted. An Odour Impact Assessment was therefore commissioned to assist in determining the suitability of the proposed site for residential elements of the proposed development with respect to potential adverse odour impacts from activities at the quail rearing installation and to establish if there should be any constraints on the proximity of potential residential development. The Odour Impact Assessment was undertaken by ADAS based on a methodology set out in Appendix 1 of the Institute of Air Quality Management (IAQM) document ‘Guidelines on the assessment of odour for planning’ (2014).

Additional odour sniff test surveys have also been undertaken based on guidelines for monitoring of ambient odours set out in Appendix 2 of the Institute of Air Quality Management (IAQM) document ‘Guidelines on the assessment of odour for planning’ (2014). Findings - Qualitative Odour Assessment

### Findings – Initial Qualitative Odour Assessment

The IAQM assessment provided the following findings:

- An assessment based on “Small” Source Potential combining “Negligible Risk” with “High” potential receptor sensitivity leads to an overall assessment of **Negligible Effect**.
- An assessment based on “Medium Source Potential” combining “Low Risk” with “High” potential receptor sensitivity leads to an overall assessment of **Slight Adverse Effect**.

These findings suggest that the presence of the quail rearing farm would not prevent future residents of the proposed development enjoying a reasonably good standard of amenity, although there may be times when there are some odour impacts at the end of each quail “crop” when emissions will increase.

These findings also do not suggest that there would be any reason why potential new residents would cause any interference with the operation of the quail rearing farm, which in any case will have the benefits of “appropriate measures” controls of odour emissions under the environmental permit.

## Findings – Site Odour Surveys

The initial qualitative assessment was based on the assumption that quail production will have similar odour emissions per square metre of building floor area to those generated in conventional chicken rearing, on the basis that the stocking rates for quail, in terms of bird weight per square metre of floor area are likely to be appreciably lower than this employed for broiler chickens. However, there are some uncertainties given the very limited empirical or scientific evidence on the emissions of odours from quail.

On this basis ADAS has also subsequently undertaken three on-site odour surveys to evaluate the actual odour impact of the quail rearing buildings on the potential development site to help assess if appropriate minimum separation distances can be established if necessary. The results of the on-site odour surveys are provided in this updated report.

The results of this further work demonstrated that **substantial adverse** odour impacts are likely to occur within 5m of the operational boundary of the quail farm, while up to 10m from the boundary **moderate adverse** impacts are likely, given the high sensitivity of the future receptors.

The furthest point where odours could be faintly detected on all three site visits was between 20m to the north of the poultry farm, that is on the proposed development site, and also 120m, but that was to the west of the poultry buildings on Lytham Road. Therefore it can be reasoned that given the potential for "high" sensitivity of future receptors to the north of the poultry farm, **slight adverse** odour impacts could occur at these separation distances. The IAQM guidance sets out that the overall odour effect is likely to be significant if it is greater than **slight adverse**, but for slight adverse, as in this case, the impact may be deemed acceptable or tolerable.

In light of this evidence, it is suggested that the more sensitive residential elements of the proposed development should be subject to a minimum separation distance, between the quail farm and the proposed care home and residential developments, of at least 25m from the site boundary of the quail farm.

Some areas of the proposed development which are only subject to intermittent occupation, such as car parking areas, will be less to the effects of odours. Providing that suitable minimum separation distances are established there are no reasons why the proposed development and quail farm cannot co-exist, and physical features such as a dense landscaping or vegetation barrier north of the quail farm, and the proposed residential care home will help mitigate odour impacts over the remainder of the site.

## Environmental Permit Requirements

The quail farming installation has the benefit of an Environmental Permit with a specific condition relating to off-site odour impacts which states "*Emissions from the activities shall be free from odour at levels likely to cause pollution outside the site, as perceived by an authorised officer of the Environment Agency, unless the operator has used appropriate measures, including, but not limited to, those specified in any approved odour management plan, to prevent or where that is not practicable to minimise the odour*".

During the first of three odour surveys carried out on 24<sup>th</sup> January odours were dominated by the smoke from an oil drum "rubbish" fire on the quail farm holding. This may well be only an infrequent and short-term activity, and it is in any case unlikely that this activity is permitted under the terms of the site's Environment Agency permit. Such activities are not consistent with the permit requirements to use appropriate measures to minimise emissions, and indicative of there being potential to reduce odour impacts by use of an approved Odour Management Plan.

Odour impacts should be minimised through a robust Odour Management Plan (OMP) that should be prepared in accordance with the Environment Agency's (EA) Odour Guidance and other published guidance relating to OMPs.

It is noted that the National Planning Policy Framework is clear in stating that the planning system should operate on the basis that the relevant pollution control regimes will be properly applied and enforced. Therefore, in respect of potential odour impacts it should be assumed that the Environmental Permit will operate effectively in controlling odour emissions and their off-site impact.

## 1 Introduction

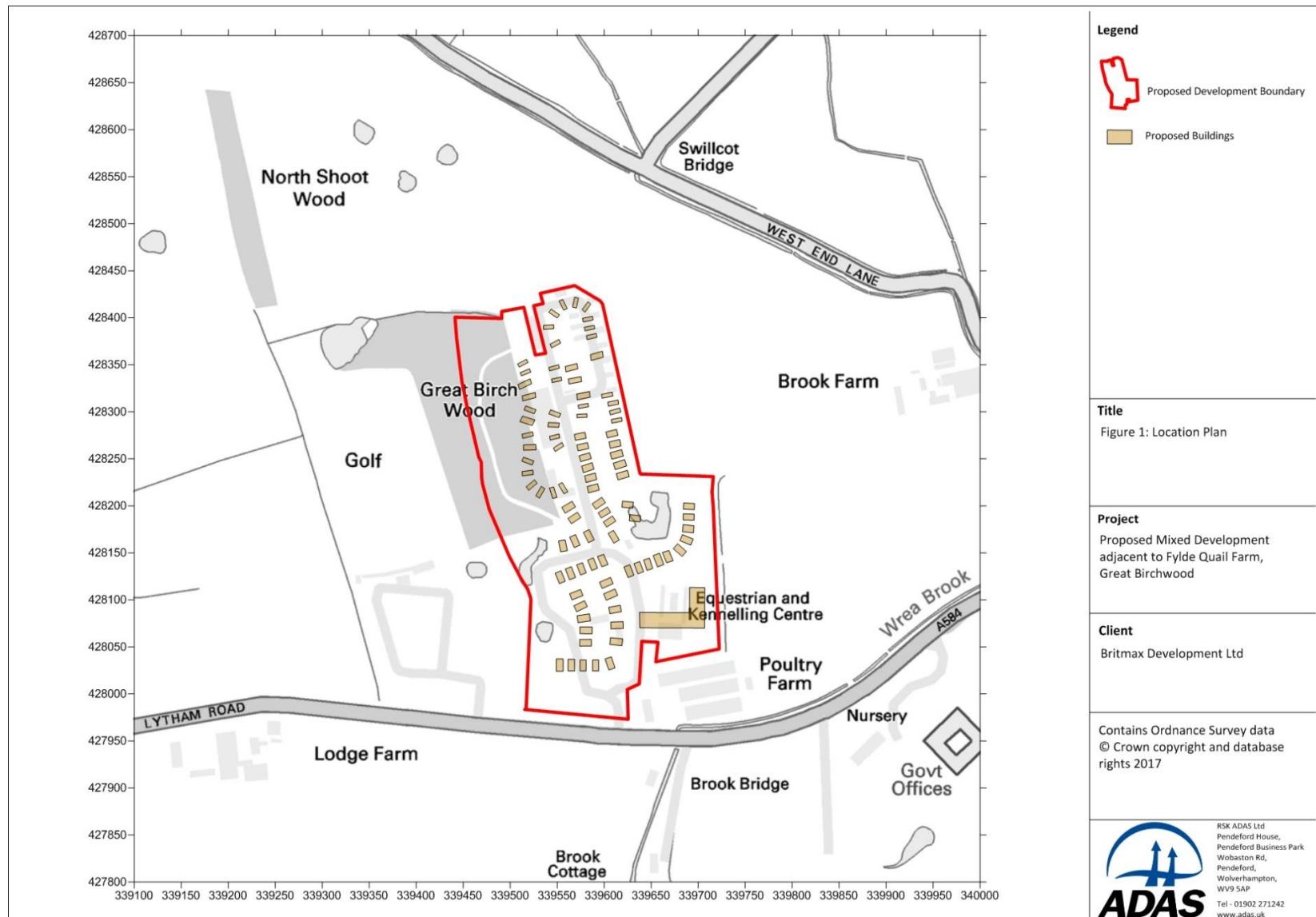
ADAS was commissioned by Britmax Developments Ltd to carry out an Odour Impact Assessment to assess the possible odour constraints that may be caused by an existing quail rearing unit at Brook Bridge Farm on proposals for a mixed leisure, care and residential development scheme on land at Great Birchwood, Warton. The proposals include a proposal for a care home in the south east of the site and it is understood that this area of the site, to the north of the quail farm has recently been used as a stables and a riding centre.

The quail rearing enterprise at Brook Bridge Farm is permitted by the Environment Agency for the operator to keep up to 190,000 quail in two buildings and the buildings are situated to the south and east of the proposed development. Figure 1 shows the proposed site layout of the development site and its proximity in relation to the quail rearing facility.

Odour emissions associated with the rearing of birds in poultry sheds have the potential to cause impacts on any future occupants should planning consent for the proposed development be granted. An Odour Impact Assessment was therefore commissioned to assist in determining the suitability of the proposed site for mixed use with respect to potential adverse odour impacts from activities at the quail rearing installation, and to establish if there should be any constraints on the proximity of potential residential elements of the development.

An initial Odour Impact Assessment was undertaken by ADAS based on a methodology set out in Appendix 1 of the Institute of Air Quality Management (IAQM) document 'Guidelines on the assessment of odour for planning' (2014).

The Odour Impact Assessment has now been supplemented with on-site odour surveys to evaluate the actual odour impact of the quail rearing facility on the potential development site to help determine minimum separation distances, where necessary. The results of this further work are presented in this updated report.



## 2 Legislation, Policy & Regulation

### Odour Definition

DEFRA guidance defines odour as:

*"An odour is the organoleptic attribute perceptible by the olfactory organ on sniffing certain volatile substances. It is a property of odorous substances that make them perceptible to our sense of smell. The term odour refers to the stimuli from a chemical compound that is volatilised in air. Odour is our perception of that sensation and we interpret what the odour means. Odours may be perceived as pleasant or unpleasant. The main concern with odour is its ability to cause a response in individuals that is considered to be objectionable or offensive.*

*Odours have the potential to trigger strong reactions for good reason. Pleasant odours can provide enjoyment and prompt responses such as those associated with appetite. Equally, unpleasant odours can be useful indicators to protect us from harm such as the ingestion of rotten food. These protective mechanisms are learnt throughout our lives. Whilst there is often agreement about what constitutes pleasant and unpleasant odours, there is a wide variation between individuals as to what is deemed unacceptable and what affects our quality of life."*

### Odour Impacts

The magnitude of odour impact depends on a number of factors and the potential for adverse impacts varies due to the subjective nature of odour perception. The FIDOR acronym is a useful reminder of the factors that can be used to help determine the degree of odour pollution:

- **Frequency** of detection - frequent odour incidents are more likely to result in adverse impacts;
- **Intensity** as perceived - intense odour incidents are more likely to result in adverse impacts;
- **Duration** of exposure - prolonged exposure is more likely to result in adverse impacts;
- **Offensiveness** - more offensive odours have a higher risk of resulting in adverse impacts; and,
- **Receptor sensitivity** - sensitive areas are more likely to have a lower odour tolerance.

It is important to note that even infrequent emissions of odours may cause loss of amenity if odours are perceived to be particularly intense or offensive.

The FIDOR factors can be further considered to provide the following issues in regards to the potential for an odour emission to cause adverse impacts:

- The rate of emission of the compound(s);
- The duration and frequency of emissions;
- The time of the day that this emission occurs;
- The prevailing meteorology (wind direction, wind speeds etc.);
- The sensitivity of receptors to the emission i.e. whether the odorous compound is more likely to cause annoyance, such as the sick or elderly, who may be more sensitive;
- The odour detection capacity of individuals to the various compound(s) in odours; and,
- The individual perception of the odour (i.e. whether the odour is regarded as unpleasant). This is quite subjective, and may vary significantly from individual to individual. For example, some individuals may consider some odours as pleasant, such as petrol, paint and creosote, whilst others find them less tolerable.

## National Planning Policy

The National Planning Policy Framework (NPPF)<sup>1</sup> was published on 27<sup>th</sup> March 2012 and sets out the Government's core policies and principles with respect to land use planning, including air quality. The document includes the following considerations which are relevant to this assessment:

*"The planning system should contribute to and enhance the natural and local environment by:*

*[...]*

*Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability"*

The implications of the NPPF have been considered during the production of this report.

## Institute of Air Quality Management Guidance

The IAQM published the 'Guidance on the Assessment of Odour for Planning'<sup>2</sup> document on 20<sup>th</sup> May 2014. This guidance specifically deals with assessing odour impacts for planning purposes, namely potential effects on amenity. The assessment methodology outlined in Appendix 2 of that guidance has been utilised in this report.

## Environmental Permit & Odour Management

The environmental impact of the poultry rearing enterprise at Brook Bridge Farm is regulated under an environmental permit (Permit Reference: EPR/QP3934FG) issued by the Environment Agency.

The introductory note of the Permit sets out the activities at the facility, which are summarised below:

*Fayre Game Limited operate Brook Bridge Poultry Farm to rear quail in Preston, Lancashire NGR SD 396 279 with 190,000 places designed for rearing quail mainly for meat production. Birds are brought in from a hatchery and are reared from day old to six weeks in houses 1 and 3 only. The average cycle length is 6 weeks.*

*There is residential housing to the North East of the facility within 400m of the installation. An equestrian and kennelling centre is located adjacent to Brook Bridge Poultry Unit and Local Government Offices are located to the South East of the facility. There are 3 poultry houses, 2 of which are used for the rearing quail, the other, house 2, is used for the storage of litter following clean out of houses 1 and 3. All houses are ventilated by side vents in all houses. All operate a cross flow ventilation system. Food is delivered to the installation once a week and is stored in galvanised steel bins. Birds which die during the production cycle are removed from houses each day and taken to Catforth, where they are collected by a recognised fallen stock scheme operator.*

*At the end of the growing period, all birds are removed from houses 1 and 3 and the litter is put into large skips and stored in house 2 and stored there for approximately 10 days. It is then removed off site by an agricultural waste contractor. The empty houses are then washed and disinfected ready for the next crop. The wash water is channelled via a dirty water drains within the buildings to underground holding tanks. Any dirty water from the yard is directed to a drain at the top of the site which is diverted to an underground holding tank. Yard drainage during normal operating procedures also runs to soakaway. Roof water from the poultry houses leads to soak away.*

<sup>1</sup> National Planning Policy Framework, Department for Communities and Local Government, 2012.

<sup>2</sup> Guidance on the Assessment of Odour for Planning, IAQM, 2014.

It is noted that by current standards the Brook Bridge Farm comprises of two relatively modestly sized poultry buildings.

The scale of the enterprise is relatively limited in comparison with typical size modern intensive poultry rearing units, despite the large number of quails permitted to be kept at the site because quail are much smaller birds than broiler chickens. The size of the buildings which are estimated to be approximately 1,120 m<sup>2</sup> and 920m<sup>2</sup> in floor area is such that they are estimated to have an equivalent “capacity” of less than the 40,000 bird trigger which would require permitting if the buildings were used for chickens rather than quail.

The Environmental Permit variation contains a specific condition at 3.3.1 concerning the control of off-site odour impacts:

*Emissions from the activities shall be free from odour at levels likely to cause pollution outside the site, as perceived by an authorised officer of the Environment Agency, unless the operator has used appropriate measures, including, but not limited to, those specified in any approved odour management plan, to prevent or where that is not practicable to minimise the odour.*

#### **Odour Management Plan (OMP)**

The Brook Bridge Farm will be required to have an “approved” Odour Management Plan (OMP) in place, prepared in accordance with the Environment Agency’s (EA) Odour Guidance and other published guidance relating to OMPs if there are any concerns about off-site odour impacts as set out above. The EA guidance requires OMPs to be developed with three key objectives in mind:

1. To carry out all appropriate methods to minimise emissions of odorous substances and subsequent exposure/ impact;
2. To prevent exposure of people outside the site to levels of odour which would result in annoyance; and
3. To minimise the risk of any unplanned odour releases or accidents that might result in annoyance off site.

These requirements are relevant to existing land users around the permit in the same way as they would be the occupiers of any new developments in the area.

### 3 Qualitative Odour Assessment

#### Methodology

In 2014 the Institute of Air Quality Management (IAQM) published a document “Guidance on the assessment of odour for planning” which provides recommendations on how odour should be considered in the preparation and determination of planning applications. It gives guidance on the application of various techniques for odour assessment. Appendix 1 of the guidance provides a recommended framework for qualitative odour assessment, this framework has been adopted here. The IAQM method for qualitative assessment essentially comprises four stages:

##### **Stage 1 - Characterise the Source Odour Potential**

The IAQM guidance refers to three categories of source odour potential; Large, Medium and Small. The judgement over the source odour potential is based on three key factors; the magnitude of the odour release (taking into account control measures), how inherently odorous the compounds or materials being assessed are, and the unpleasantness (or offensiveness) of the odour. Definitions are provided for each category in Table 1 within the IAQM guidance. This table, which is reproduced below (as IAQM Table 1), sets out how the “scale” of odour sources can be assessed.

In this case the existing poultry unit is very small by current day standards. The total floor area of the two buildings used to house quail is likely to be just below the level which would require the farm to be permitted as an intensive livestock installation under the Environmental Permitting Regulations 2010 (as amended) if it were used to house conventional broiler chickens. It is effectively only the large number of relatively small birds (quails) in this case which brings the farm within the permitting regime, but the requirements of the permitting system do impose more rigorous controls on environmental impacts than would otherwise be the case as explained above in relation to permit condition 3.3.1.

Odours from poultry farming are classified as moderately offensive within the Environment Agency’s 2011 H4 Odour guidance. The source potential could therefore be most appropriately classified as “Small” because of the small size of the poultry rearing enterprise, or at worst “Medium” by virtue of the offensiveness rating of poultry odours, although this is precautionary as poultry odours are categorised as of “medium offensiveness” by the Environment Agency in their H4 Odours guidance.

**IAQM Table 1 Source Odour Potential**

<b>Source Odour Potential</b>	<b>Suggested Definition</b>
<b>Large</b>	<p>Magnitude – Larger Permitted processes of odorous nature or large STWs; materials usage hundreds of thousands of tonnes or m<sup>3</sup> per year; area sources of thousands of m<sup>2</sup>.</p> <p>The compounds involved are very odorous (e.g. mercaptans), having very low Odour Detection Thresholds (ODTs) where known.</p> <p>Unpleasantness – processes classed as “Most offensive” in H4; or (where known) compounds/odours having unpleasant (-2) to very unpleasant (-4) hedonic score.</p> <p>Mitigation/control – open air operation with no containment, reliance solely on good management techniques and best practice.</p>
<b>Medium</b>	<p>Magnitude – smaller Permitted processes or small Sewage Treatment Works (STWs); materials usage thousands of tonnes/m<sup>3</sup> per year; area sources of hundreds of m<sup>2</sup>.</p> <p>The compounds involved are moderately odorous.</p> <p>Unpleasantness – processes classed in H4 as “Moderately offensive”; or (where known) odours having neutral (0) to unpleasant (-2) hedonic score.</p> <p>Mitigation/control – some mitigation measures in place, but significant residual odour remains.</p>
<b>Small</b>	<p>Magnitude – falls below Part B threshold; materials usage hundreds of tonnes/m<sup>3</sup> per year; area sources of tens m<sup>2</sup>. The compounds involved are only mildly odorous, having relatively high ODTs where known.</p> <p>Unpleasantness – processes classed as “Less offensive” in H4; or (where known) compounds/odours having neutral (0) to very pleasant (+4) hedonic score.</p> <p>Mitigation/control – effective, tangible mitigation measures in place (e.g. BAT, BPM) leading to little or no residual odour.</p>

## Stage 2 - Assess Effectiveness of Transport Mechanism to a Receptor

This stage aims to assess the means by which odours released from the source may affect sensitive receptors; in this case occupants of the proposed development. The effectiveness of transport of odours (or the pathway) takes into account five main factors; distance from source to receptor, the frequency of winds blowing from the source towards the receptor, the effectiveness of any mitigation or controls, the effectiveness of dispersion and dilution (a tall stack for example), and topography and terrain in the local areas.

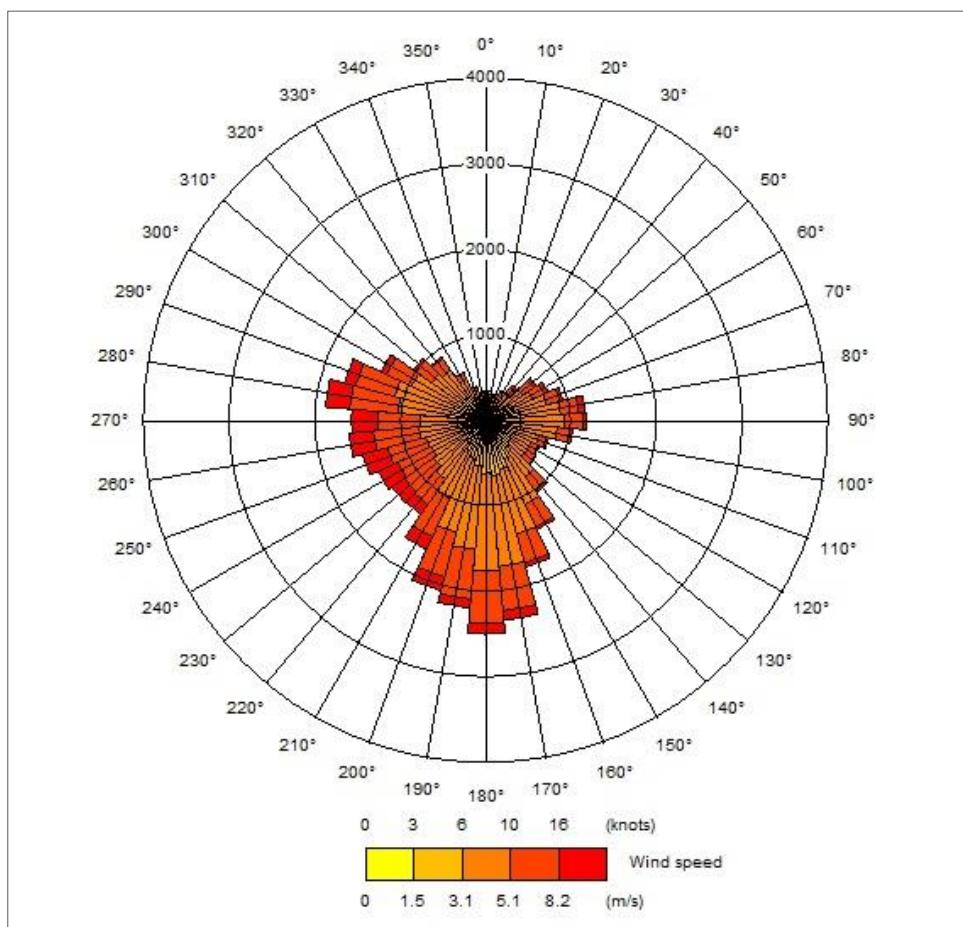
Suggested definitions of pathway effectiveness are provided in the guidance and are summarised in the IAQM Table 2 below.

**IAQM Table 2 Assessment of Effectiveness of Odour Transport**

Pathway Effectiveness	Suggested Definition
<b>Highly Effective</b>	<p>Distance – receptor is adjacent to the source/site; distance well below any official set-back distances.</p> <p>Direction – high frequency (%) of winds from source to receptor (or, qualitatively, receptors downwind of source with respect to prevailing wind). Effectiveness of dispersion/dilution - open processes with low-level releases, e.g. lagoons, uncovered effluent treatment plant, landfilling of putrescible wastes.</p>
<b>Moderately Effective</b>	<p>Distance – receptor is local to the source.</p> <p>Where mitigation relies on dispersion/dilution – releases are elevated, but compromised by building effects.</p>
<b>Ineffective</b>	<p>Distance – receptor is remote from the source; distance exceeds any official set-back distances.</p> <p>Direction – low frequency (%) of winds from source to receptor (or, qualitatively, receptors upwind of source with respect to prevailing wind). Where mitigation relies on dispersion/ dilution – releases are from high level (e.g. stacks, or roof vents &gt; 3m above ridge height) and are not compromised by surrounding buildings.</p>

An analysis of local wind direction frequencies is summarised in Figure 1 below. This based on the nearest Met Office recording station at Warton, but because Warton has a high proportion of missing data (>50%) the data used to draw up this wind rose includes data from Manchester Airport.

**Figure 1. Wind Rose Derived from Data from Warton (2011 - 2015)**



This analysis shows a high frequency of southerly winds (29.9%) which could carry odours from the quail farm towards the potential development and the separation distance, which is estimated to be approximately 50m, can be classed as local, so that overall the pathway can be said to be moderately effective.

### Stage 3 - Predict Risk of Odour Exposure

At this stage the source odour potential and pathway effectiveness are brought together to predict the risk of odour exposure at the receptor being considered. The guidance recommends that this is done by a matrix approach, as set out in Table 3.

**IAQM Table 3 Risk of Odour Exposure**

Pathway Effectiveness	Source Odour Potential		
	Low	Medium	High
Highly Effective	Low Risk	Medium Risk	High Risk
Moderately Effective	Negligible Risk	Low Risk	Medium Risk
Ineffective	Negligible Risk	Negligible Risk	Low Risk

In this case the combination of “Moderately Effective” pathway effectiveness and “Low” source potential provides an assessment of Negligible Risk. Alternatively more conservatively, with a “Medium” source potential, Table 3 provides an assessment of Low Risk.

#### Stage 4 - Assess Impact at Receptor based on Predicted Level of Risk

Finally the method involves using the prediction of risk to assess the likely impact on the potential receptors based on the level of risk, with the assessment matrix set out below in Table 5. Differing levels of receptor sensitivity are defined by the guidance but as this assessment is mainly concerned with future occupants of the proposed care home residential development, which corresponds to high sensitivity, full definitions are not repeated here.

An assessment based on “Small” Source Potential combining “Negligible Risk” with “High” potential receptor sensitivity leads to an overall assessment of **Negligible Effect**.

An assessment based on “Medium Source Potential” combining “Low Risk” with “High” potential receptor sensitivity leads to an overall assessment of **Slight Adverse Effect**.

**IAQM Table 5 Odour Effect Levels**

Risk of Odour Exposure	Receptor Sensitivity		
	Low	Medium	High
High	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
Medium	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
Low	Negligible Effect	Negligible Effect	Slight Adverse Effect
Negligible	Negligible Effect	Negligible Effect	Negligible Effect

## 4 On-site Odour Surveys

### Methodology

On-site odour surveys were undertaken in line with guidelines for monitoring of ambient odours set out in Appendix 2 of the Institute of Air Quality Management (IAQM) document 'Guidelines on the assessment of odour for planning' (2014). These observations provide supportive evidence to the risk assessment presented in the previous sections of this report to help determine whether any minimum separation distances should be set on the potential development site.

At each monitoring location observations were made at 10 second intervals over a monitoring period of 5 minutes. For each observation interval an assessment of odour intensity and offensiveness was carried out and where possible a description of the character of any odours detected was recorded.

Odour intensity was assessed using the intensity scale ranges set out in the IAQM guidance, where it is attributed to the Association for German Engineers standard VDI 3940, 'Determination of Odourants in Ambient Air' (1993), as described at Section A2.1 in Appendix 2 of the IAQM guidance. The IAQM scale ranges are summarised in Table 6 below.

Where odours were rated at an intensity level of 3 or above (i.e. 'distinct'), an assessment of offensiveness was made based on descriptors set out in the IAQM odour guidance. Offensiveness was rated as either unpleasant, neutral or pleasant.

The average odour intensity for the observation period was also calculated for each monitoring location and the maximum intensity observed at each location was also noted.

**IAQM Table 6 Odour Intensity Scale taken from VDI 3940:1993**

Odour Strength	Intensity Level	Comments
No Odour/ not perceptible	0	No odour when compared to clean site
Slight/very weak	1	There is probably some doubt as to whether odour is present
Slight/weak	2	The odour is present but cannot be described using precise words
Distinct	3	The odour character is barely recognisable
Strong	4	The odour character is easily recognisable
Very Strong	5	The odour is offensive. Exposure is considered undesirable
Extremely Strong	6	The odour is offensive. An instinctive reactive is to mitigate exposure

For each sampling location the pervasiveness/extent of odours was assessed. This was calculated as the percentage of time that odours were recognisable (i.e. the number of observation intervals with an average intensity score of 4 or greater) divided by the total number of observation intervals (i.e. 30) per observation period. The IAQM guidance sets out that calculation of pervasiveness/extent should only consider odours which are rated at VDI intensity of 4 (strong – easily recognisable) or above and is summarised in Table 7 below.

**IAQM Table 7 Matrix to Assess Odour Exposure (Neutral and Unpleasant Odours)**

Average Intensity ( $I_{mean}$ )	Percentage odour Time ( $t \geq 4$ during the test)				
	$\leq 10\%$	11 to 20%	21 to 30%	31 to 40%	$\geq 41\%$
6	Large	Very Large	Very Large	Very Large	Very Large
5	Medium	Large	Large	Very Large	Very Large
4	Small	Medium	Medium	Large	Large
3	Small	Medium	Medium	Medium	Medium
2	Small	Small	Medium	Medium	Medium
1	Small	Small	Small	N/A	N/A

This systematic approach allows the collected information to be interpreted using a logical methodology set out by the IAQM to gauge how odour will affect surrounding land-users. Residential receptors would reasonably expect enjoyment of a high level of amenity and would be expected to be present at their properties continuously or at least regularly for extended periods of time. For these purposes residential receptors are classed as "high" sensitivity receptor areas (HSRA) as defined in Table 2 of the IAQM guidance. Industrial/workplace receptors are classed as medium sensitivity and public rights of way where people may only be passing by are classed as low sensitivity receptors.

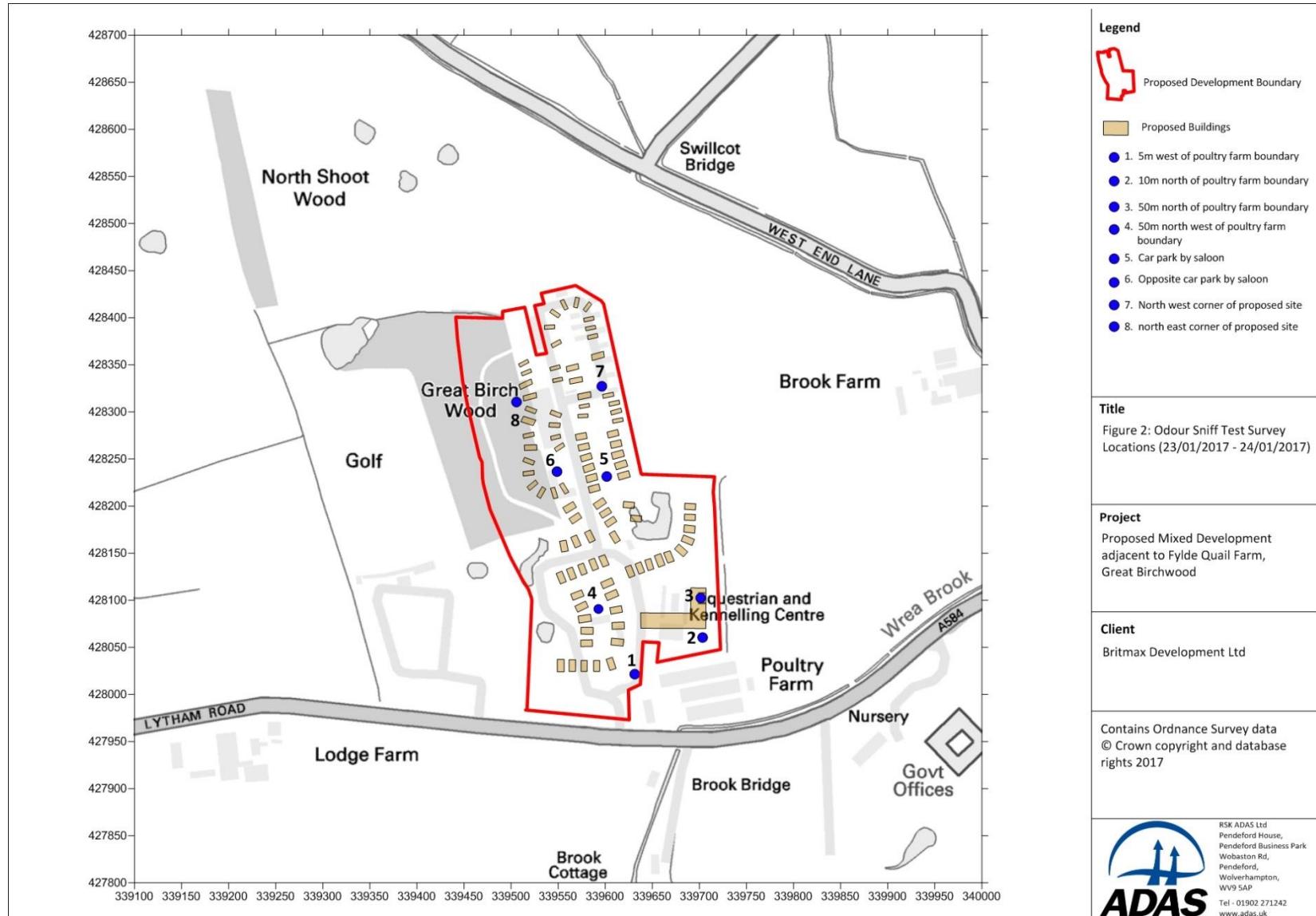
Bringing together the results of sniff test odour exposures and receptor sensitivity a judgment can be made on the overall odour effect as set out in Table 8 below.

**IAQM Table 8 Matrix to Assess the Overall Odour Effect at Individual Receptors**

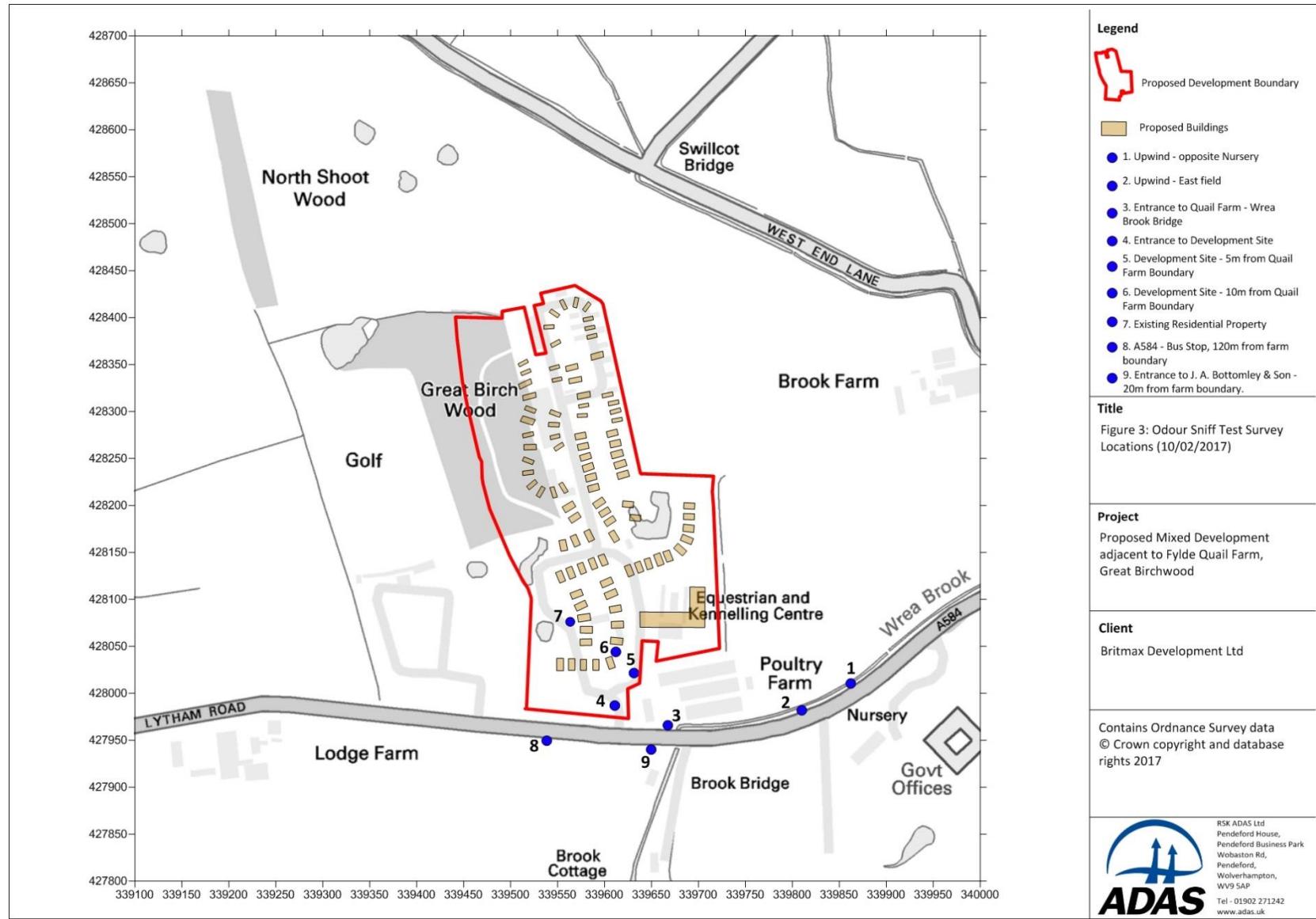
Risk of Odour Exposure	Receptor Sensitivity		
	Low	Medium	High
High	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
Medium	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
Low	Negligible Effect	Negligible Effect	Slight Adverse Effect
Negligible	Negligible Effect	Negligible Effect	Negligible Effect

Odour surveys were carried out by assessors of known sensitivity, as established at the Silsoe Odours laboratory in Bedfordshire using the criterion set out in European standard BSEN13725 for the determination of odour strength by olfactometry.

Up to nine specified points within the potential development site were chosen for undertaking odour surveys, ranging from 5m to 50m from the operational boundary of the quail farm. Three circuits of odour surveys were undertaken on three dates; 23<sup>rd</sup> and 24<sup>th</sup> January and 10<sup>th</sup> February 2017. The locations of "sniffing" assessment points are shown in Figures 2 and 3 below and their positions were determined based on the wind directions on the assessments dates.



## Potential Mixed Use Development on Land at Great Birchwood, Warton



## Survey Results

Results of the odour sniff test surveys for all three circuits for each visit are summarised in Tables 9 to 17.

Odour intensity scores are interpreted with respect to calculated odour pervasiveness/extent. This equates to 0% in all cases where average intensity scores are 3 and less, and in these cases all observations correspond to '**small**' or '**negligible**' odour exposure as set out in the IAQM guidance. In all cases when odour intensity is scored at an average of 2 or 3 the overall assessment is of "**slight adverse**" odour effect with respect to the high sensitivity receptor points (i.e. residential receptors), according to the definitions set out in the IAQM guidance.

Where the intensity scores of 4 are recorded the percentage of time with scores  $\geq 4$  (i.e. pervasiveness) are used to assess the odour exposure, which would give odour exposures of medium, large or very large, depending on the percentage of time that odour intensities are  $\geq 4$ . In cases where the odour intensity is scored at an average of 0 or 1 and the calculated pervasiveness is 0%, i.e. no observations of intensity  $\geq 4$ , then the overall assessment is assumed to be of "**negligible**" odour effect.

**Table 9:** Great Birchwood Odour Survey Results, 23<sup>rd</sup> January 2017, Circuit 1

Time of Survey	Point No.	Odour Description	Average intensity	Max. Intensity	% of ≥4	Odour Exposure	Location sensitivity (high, low medium)	Impact	Wind Dir. (Blowing from)	Average Wind speed estimate m/s
09:05-09:10	1	Very strong to extremely strong manure odours at 5m from Quail Farm boundary	6	6	100	Very Large	High	Substantial Adverse	SSE	2.7
09:13-09:18	2	Overall faint manure odour, but on 9 occasions was distinct to very strong	2	5	20	Small	High	Slight Adverse	SSE	2.7
09:20-09:25	3	Faint or distinct manure odour briefly detected, otherwise no or little odour.	0	3	0	Negligible	High	Negligible	SSE	2.7
09:28-09:33	4	Faint manure odour briefly detected, otherwise little or no odour.	0	2	0	Negligible	High	Negligible	SSE	2.7
09:38-09:43	5	No odour	0	0	0	Negligible	High	Negligible	SSE	2.7
09:45-09:50	6	No odour	0	0	0	Negligible	High	Negligible	SSE	2.7
09:52-09:57	7	No odour	0	0	0	Negligible	High	Negligible	SSE	2.7
09:59-10:04	8	No odour	0	0	0	Negligible	High	Negligible	SSE	2.7

**Table 10:** Great Birchwood Odour Survey Results, 23<sup>rd</sup> January 2017, Circuit 2

Time of Survey	Point No.	Odour Description	Average intensity	Max. Intensity	% of ≥4	Odour Exposure	Location sensitivity (high. Low medium)	Impact	Wind Dir. (Blowing from)	Average Wind speed estimate m/s
10:15-10:20	1	Very strong to extremely strong manure odours at 5m from Quail Farm boundary	6	6	100	Very Large	High	Substantial Adverse	SSE	2.7
10:23-10:28	2	Smoke odour from oil drum bonfire dominating	2	6	23	Medium	High	Moderate Adverse	SSE	2.7
10:30-10:35	3	Smoke odour from oil drum bonfire dominating, at times distinct or strong.	3	5	10	Medium	High	Moderate Adverse	SSE	2.7
10:38-10:43	4	Smoke odour from oil drum bonfire dominating, at times distinct.	2	3	0	Small	High	Slight Adverse	SSE	2.7
10:47-10:52	5	Smoke odour from oil drum bonfire dominating, at times distinct or strong.	3	4	13	Medium	High	Moderate Adverse	SSE	2.7
10:54-10:59	6	Smoke odour from oil drum bonfire dominating, at times distinct or strong.	2	4	3	Small	High	Slight Adverse	SSE	2.7
11:02-11:07	7	Smoke odour from oil drum bonfire dominating, at times distinct.	1	3	0	Small	High	Slight Adverse	SSE	2.7
11:09-11:14	8	Smoke odour from oil drum bonfire dominating, at times distinct.	1	3	0	Small	High	Slight Adverse	SSE	2.7

**Table 11:** Great Birchwood Odour Survey Results, 23<sup>rd</sup> January 2017, Circuit 3

Time of Survey	Point No.	Odour Description	Average intensity	Max. Intensity	% of ≥4	Odour Exposure	Location sensitivity (high, low medium)	Impact	Wind Dir. (Blowing from)	Average Wind speed estimate m/s
11:30-11:35	1	Strong to very strong manure odour at 5m from Quail Farm boundary	4	5	100	Large	High	Substantial Adverse	SSE	2.7
11:38-11:43	2	Overall faint manure odour, but on 7 occasions was distinct.	2	3	0	Small	High	Slight Adverse	SSE	2.7
11:45-11:50	3	Faint manure odour briefly detected, otherwise little odour present.	1	2	0	Negligible	High	Negligible	SSE	2.7
11:53-11:58	4	Faint manure odour briefly detected, otherwise little or no odour.	0	2	0	Negligible	High	Negligible	SSE	2.7
12:03-12:08	5	No odour	0	0	0	Negligible	High	Negligible	SSE	2.7
12:10-12:15	6	No odour	0	0	0	Negligible	High	Negligible	SSE	2.7
12:18-12:23	7	No odour	0	0	0	Negligible	High	Negligible	SSE	2.7
12:26-12:31	8	No odour	0	0	0	Negligible	High	Negligible	SSE	2.7

**Table 12:** Great Birchwood Odour Survey Results, 24<sup>th</sup> January 2017, Circuit 1

Time of Survey	Point No.	Odour Description	Average intensity	Max. Intensity	% of ≥4	Odour Exposure	Location sensitivity (high, Low medium)	Impact	Wind Dir. (Blowing from)	Average Wind speed estimate m/s
09:08-09:13	1	Very strong to extremely strong manure odours at 5m from Quail Farm boundary	5	6	100	Very Large	High	Substantial Adverse	SSE	2.7
09:16-09:21	2	Smoke odour from oil drum bonfire dominating very strong or extremely strong	5	6	73	Very large	High	Substantial Adverse	SSE	2.7
09:23-09:28	3	Smoke odour from oil drum bonfire dominating, at times distinct, strong or very strong.	3	5	30	Medium	High	Moderate Adverse	SSE	2.7
09:31-09:36	4	Smoke odour from oil drum bonfire dominating, at times distinct.	2	3	0	Small	High	Slight Adverse	SSE	2.7
09:41-09:46	5	Smoke odour from oil drum bonfire dominating, at times distinct or strong.	2	4	3	Small	High	Slight Adverse	SSE	2.7
09:48-09:53	6	Smoke odour from oil drum bonfire dominating, at times distinct or strong.	2	4	7	Small	High	Slight Adverse	SSE	2.7
09:56-10:01	7	Smoke odour from oil drum bonfire dominating, at times distinct.	1	3	0	Small	High	Slight Adverse	SSE	2.7
10:03-10:08	8	Smoke odour from oil drum bonfire dominating, at times distinct.	2	3	0	Small	High	Slight Adverse	SSE	2.7

**Table 13:** Great Birchwood Odour Survey Results, 24<sup>th</sup> January 2017, Circuit 2

Time of Survey	Point No.	Odour Description	Average intensity	Max. Intensity	% of ≥4	Odour Exposure	Location sensitivity (high. Low medium)	Impact	Wind Dir. (Blowing from)	Average Wind speed estimate m/s
10:24-10:29	1	Very strong or extremely strong manure odour at 5m from Quail Farm boundary	6	6	100	Very Large	High	Substantial Adverse	SSE	2.7
10:32-10:37	2	Distinct and at times strong manure odour.	3	4	30	Medium	High	Moderate Adverse	SSE	2.7
10:39-10:44	3	Faint and on one occasion distinct manure odour briefly detected, otherwise little odour.	1	3	0	Small	High	Slight Adverse	SSE	2.7
10:47-10:52	4	Faint and on one occasion distinct manure odour briefly detected, otherwise little odour.	1	3	0	Small	High	Slight Adverse	SSE	2.7
10:56-11:01	5	No odour	0	0	0	Negligible	High	Negligible	SSE	2.7
11:03-11:08	6	No odour	0	0	0	Negligible	High	Negligible	SSE	2.7
11:10-11:15	7	No odour	0	0	0	Negligible	High	Negligible	SSE	2.7
11:17-11:22	8	No odour	0	0	0	Negligible	High	Negligible	SSE	2.7

**Table 14:** Great Birchwood Odour Survey Results, 24<sup>th</sup> January 2017, Circuit 3

Time of Survey	Point No.	Odour Description	Average intensity	Max. Intensity	% of ≥4	Odour Exposure	Location sensitivity (high. Low medium)	Impact	Wind Dir. (Blowing from)	Average Wind speed estimate m/s
11:35-11:40	1	Very strong or extremely strong manure odour at 5m from Quail Farm boundary	5	6	100	Large	High	Substantial Adverse	SSE	2.7
11:43-11:48	2	Distinct and at times strong manure odour.	3	4	13	Medium	High	Moderate Adverse	SSE	2.7
11:50-11:55	3	Faint and on one occasion distinct manure odour briefly detected, otherwise little odour.	1	3	0	Small	High	Slight Adverse	SSE	2.7
11:58-12:03	4	Faint and on one occasion distinct manure odour briefly detected, otherwise little odour.	1	3	0	Small	High	Slight Adverse	SSE	2.7
12:07-12:12	5	No odour	0	0	0	Negligible	High	Negligible	SSE	2.7
12:14-12:19	6	No odour	0	0	0	Negligible	High	Negligible	SSE	2.7
12:23-12:28	7	No odour	0	0	0	Negligible	High	Negligible	SSE	2.7
12:30-12:35	8	No odour	0	0	0	Negligible	High	Negligible	SSE	2.7

**Table 15:** Great Birchwood Odour Survey Results, 10<sup>th</sup> February 2017, Circuit 1

Time of Survey	Point No.	Odour Description	Average intensity	Max. Intensity	% of ≥4	Odour Exposure	Location sensitivity (high. Low medium)	Impact	Wind Dir. (Blowing from)	Wind speed m/s
10:50 – 10:55	1	No odour detected upwind of source	0	1	0	Negligible	Low	Negligible	NE	1.5
10:57 – 11:02	2	No odour detected upwind of source	0	1	0	Negligible	Low	Negligible	NE	1.1
11:04 – 11:09	3	Distinct manure odour detected at the entrance to Fylde Quail Farm	3	3	0	Small	High	Slight Adverse	NE	1.4
11:11 – 11:16	4	Faint and on two occasions distinct manure odour detected at the entrance to Great Birchwood C.P (i.e. development site)	2	3	0	Small	High	Slight Adverse	ENE	2.1
11:17 – 11:22	5	Mostly faint manure odour detected 5m from the boundary of the Farm within the proposed development site and on occasion's distinct odours.	2	3	0	Small	High	Slight Adverse	ENE	1.5
11:25 – 11:30	6	Faint manure odour detected at seven intervals, otherwise no recognisable odour detected at 10m from the boundary with the farm.	1	2	0	Negligible	High	Negligible	ENE	2.3
11:30 – 11:35	7	No recognisable odour detected at existing properties 75m west of the farm boundary.	1	1	0	Negligible	High	Negligible	ENE	2.4
11:35 – 11:40	8	Faint manure odour detected on fourteen intervals at the bus stop on A5184 just west of the entrance to the proposed development site and approximately 120m from the Quail Farm.	1	2	0	Negligible	High	Negligible	ENE	2.3
11:42 – 11:47	9	Generally faint manure odour detected at the entrance to J. A. Bottomley & Son approximately 20m opposite the Quail Farm and at one interval distinct odour detected.	2	3	0	Small	High	Slight Adverse	ENE	2.4

**Table 16:** Great Birchwood Odour Survey Results, 10<sup>th</sup> February 2017, Circuit 2

Time of Survey	Point No.	Odour Description	Average intensity	Max. Intensity	% of ≥4	Odour Exposure	Location sensitivity (high, Low medium)	Impact	Wind Dir. (Blowing from)	Wind speed m/s
12:07 – 12:12	1	No odour detected upwind of source	0	1	0	Negligible	Low	Negligible	ENE	1.7
12:13 – 12:18	2	No odour detected upwind of source	0	1	0	Negligible	Low	Negligible	ENE	2.1
12:20 – 12:25	3	Distinct manure odour detected at the entrance to Fylde Quail Farm	3	3	0	Small	High	Slight Adverse	ENE	2.3
12:27 – 12:32	4	Faint and on two occasions distinct manure odour detected at the entrance to Great Birchwood C.P (i.e. development site)	2	3	0	Small	High	Slight Adverse	ENE	2.0
12:33 – 12:38	5	Distinct manure odour detected 5m from the boundary of the Farm within the proposed development site.	3	3	0	Small	High	Slight Adverse	ENE	1.9
12:40 – 12:45	6	Faint manure odour detected at six intervals, otherwise no recognisable odour detected at 10m from the boundary with the farm.	1	2	0	Negligible	High	Negligible	ENE	2.3
12:47 – 12:52	7	No recognisable odour detected at existing properties 75m west of the farm boundary.	1	1	0	Negligible	High	Negligible	E	2.1
12:55 – 13:00	8	Faint manure odour detected at sixteen intervals at the bus stop on A5184 just west of the entrance to the proposed development site and 120m from the Quail Farm.	2	2	0	Small	High	Slight Adverse	ENE	1.8
13:02 – 13:07	9	Generally faint manure odour detected at the entrance to J. A. Bottomley & Son approximately 20m opposite the Quail Farm and at two intervals distinct odour detected.	2	3	0	Small	High	Slight Adverse	E	1.7

**Table 17:** Great Birchwood Odour Survey Results, 10<sup>th</sup> February 2017, Circuit 3

Time of Survey	Point No.	Odour Description	Average intensity	Max. Intensity	% of ≥4	Odour Exposure	Location sensitivity (high, Low medium)	Impact	Wind Dir. (Blowing from)	Wind speed m/s
13:11 – 13:16	1	No odour detected upwind of source	0	1	0	Negligible	Low	Negligible	E	1.6
13:18 – 13:23	2	No odour detected upwind of source	0	1	0	Negligible	Low	Negligible	ENE	1.8
13:24 – 13:29	3	Distinct manure odour detected at the entrance to Fylde Quail Farm	3	3	0	Small	High	Slight Adverse	ENE	2.2
13:31 – 13:36	4	Faint and on two occasions distinct manure odour detected at the entrance to Great Birchwood C.P (i.e. development site)	2	3	0	Small	High	Slight Adverse	NE	2.0
13:37 – 13:42	5	Distinct manure odour detected 5m from the boundary of the Farm within the proposed development site.	3	3	0	Small	High	Slight Adverse	ENE	1.9
13:43 – 13:48	6	Faint manure odour detected at three intervals, otherwise no recognisable odour detected at 10m from the boundary with the farm.	1	2	0	Negligible	High	Negligible	ENE	1.4
13:50 – 13:55	7	No recognisable odour detected at existing properties 75m west of the farm boundary.	0	1	0	Negligible	High	Negligible	ENE	1.4
13:58 – 14:03	8	Faint manure odour detected at fifteen intervals at the bus stop on A5184 just west of the entrance to the proposed development site and 120m from the Quail Farm.	2	2	0	Small	High	Slight Adverse	ENE	1.3
14:05 – 14:10	9	Generally faint manure odour detected at the entrance to J. A. Bottomley & Son approximately 20m opposite the Quail Farm and at one interval distinct odour detected.	2	3	0	Small	High	Slight Adverse	ENE	1.7

## Commentary on Results

### Odour Surveys 1 and 2 (23/01/2017 and 24/01/2017)

During all three circuits on both 23<sup>rd</sup> and 24<sup>th</sup> January 2017, very strong or extremely strong (5 and 6) manure odour intensities were detected within 5m of the Quail rearing unit boundary, marked as observation point 1 in Figure 2. Overall this equates to a large or very large odour exposure and therefore a “**substantial adverse**” odour impact using the IAQM methodology for a high sensitivity receptor location.

At observation point 2, which is approximately 10m north of the farm boundary, distinct (3) manure odours were detected during the first and third circuits on 23<sup>rd</sup> January. During the second visit on 24<sup>th</sup> January, distinct or strong (3 and 4) manure odour intensities were recorded during the second and third circuits. This equates to a medium odour exposure and therefore a “**moderate adverse**” odour impact using the IAQM methodology for a high sensitivity receptor location.

The furthest point where manure odours could be detected on 23<sup>rd</sup> and 24<sup>th</sup> January was at a separation distance from the farm boundary of 50m, which corresponds to observation points 3 and 4 as marked in Figure 2. The observed odours could be said to be of a “**slight adverse**” odour impact using the IAQM methodology at 50m separation distance for a high sensitivity receptor.

During the first survey on 24<sup>th</sup> January odours were dominated by the smoke from an oil drum “rubbish” fire on the quail farm holding. This may well be only an infrequent and short-term activity, and it is in any case unlikely that this activity is permitted under the terms of the site’s Environment Agency permit. Such activities are not consistent with the permit requirements to use appropriate measures to minimise emissions, and indicative of there being potential to reduce odour impacts by use of an approved Odour Management Plan.

### Odour Survey 3 (10/02/2017)

A third visit of odour surveys was undertaken on 10<sup>th</sup> February, where the forecast was for south easterly winds. However, on the day use of an on-site weather station demonstrated variable winds ranging from a north easterly to easterly direction, therefore odours from the Quail rearing unit were not blowing directly across the proposed development site. Representative points were therefore chosen downwind to correspond with equivalent separation distances to the development site.

During all three circuits distinct (3) manure odour intensities were detected within 5m of the Quail rearing unit boundary, marked as observation point 5 in Figure 3. Overall this equates to a small odour exposure and therefore a “**slight adverse**” odour impact using the IAQM methodology for a high sensitivity receptor location. Distinct (3) manure odours were also detected at the entrance to the Quail rearing unit, marked as observation point 3 in Figure 3.

Faint manure odours (intensity scores of 2) were detected at equivalent separation distances of 10m, 20m and even up 120m from the poultry buildings which corresponds to observation points 4, 6, 8 and 9 in Figure 3. These odour levels equate to a “**slight adverse**” odour impact using the IAQM methodology for a high sensitivity receptor location at up to 120m separation distance.

At the time of this third visit, no cleaning out activities of the quail housing were taking place and doors to the housing were closed.

## 5 Discussion and Conclusions

The findings of the initial desktop IAQM assessment suggested that the presence of the quail rearing farm would not prevent future residents of the proposed development enjoying a reasonably good standard of amenity.

Conversely the findings suggested that there would be no reason why potential new residents would cause any interference with the operation of the quail rearing farm, which in any case would have the benefits of “appropriate measures” controls of odour emissions under the environmental permit.

This assessment was based on the assumption that quail production will have similar odour emissions per square metre of building floor area as conventional chicken rearing, and this believed to be a reasonable assumption as the stocking rates for quail, in terms of bird weight per square metre of floor area are likely to be appreciably lower than this employed for broiler chickens. However, there are some uncertainties given the very limited empirical or scientific evidence on the emissions of odours from quail.

On this basis ADAS was instructed to undertake additional on-site odour surveys to evaluate the actual odour impact of the quail rearing buildings on the potential development site so that appropriate minimum separation distances can be established where necessary.

The results of this further work demonstrated that **substantial adverse** odour impacts are likely to occur within 5m of the operational boundary of the quail farm, and up to 10m from the quail farm boundary **moderate adverse** impacts are likely, given the high sensitivity of the future receptors.

The furthest point where odours could be faintly detected on all three site visits was between 20m to the north of the poultry farm that is on the proposed development site and also out to 120m to the west of the poultry buildings on Lytham Road. Therefore it can be reasoned that given the potential for “high” sensitivity of future receptors to the north of the poultry farm, **slight adverse** odour impacts could occur at these separation distances. The IAQM guidance sets out that the overall odour effect is likely to be significant if it is greater than **slight adverse**, but for slight adverse, as in this case, the impact may be deemed acceptable or tolerable.

In light of this evidence, it is suggested that the more sensitive residential elements of the proposed development should be subject to a minimum separation distance, between the quail farm and the proposed care home and residential developments, of at least 25m from the site boundary of the quail farm.

Some areas of the proposed development which are only subject to intermittent occupation, such as car parking areas, will be less to the effects of odours. Providing that suitable minimum separation distances are established there are no reasons why the proposed development and quail farm cannot co-exist, and physical features such as a dense landscaping or vegetation barrier north of the quail farm, and the proposed residential care home will help mitigate odour impacts over the remainder of the site.

### **Environmental Permit**

The quail farming installation has the benefit of an Environmental Permit with a specific condition relating to off-site odour impacts which states "*Emissions from the activities shall be free from odour at levels likely to cause pollution outside the site, as perceived by an authorised officer of the Environment Agency, unless the operator has used appropriate measures, including, but not limited to, those specified in any approved odour management plan, to prevent or where that is not practicable to minimise the odour*".

During the first of three odours surveys carried out on 23<sup>rd</sup> January, odours were dominated by the smoke from an oil drum "rubbish" fire on the quail farm holding. This should be no more than an infrequent and short-term activity, and it is in any case very unlikely that this activity is permitted under the terms of the site's Environment Agency permit. Such activities are not consistent with the permit requirements to use appropriate measures to minimise emissions, and indicative of there being potential to reduce odour impacts by use of an approved Odour Management Plan.

Odour emissions from cleaning out activities at the poultry buildings can be expected to be minimised by a range of steps, such as minimising ventilation during cleaning out, minimising disturbance of spent litter during handling of the spent litter as it is removed from the buildings, and prompt washing out of buildings after the manure is removed. Such steps can be expected to be set out in an Environment Agency approved and regulated Odour Management Plan. As odour impacts are not just restricted to cleaning out activities, when odour impacts would usually be expected to be higher, it can be reasoned that the implementation of an Odour Management Plan is in any case an appropriate control of odour emissions throughout the rearing cycle. Odour impacts can be assumed to be minimised through the use of a robust Odour Management Plan (OMP) that has been prepared in accordance with the Environment Agency's (EA) Odour Guidance and other published guidance relating to OMPs.

It is noted that the National Planning Policy Framework is clear in stating that the planning system should operate on the basis that the relevant pollution control regimes will be properly applied and enforced. Therefore, in respect of potential odour impacts it should be assumed that the Environmental Permit will operate effectively in controlling odour emissions and their off-site impact.