

REPORT

Land at Stanhill Road, Knuzden

Observational Odour Survey

Client: Mr. Clive Rawlinson and Mrs. Elaine Coar

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Executive Summary

Royal HaskoningDHV was commissioned by Hartley Planning and Development Associates. Ltd, on behalf of private landowners, to conduct an odour measurement survey at a potential development site in Knuzden, Lancashire.

The proposed site, located south of the B6234 Mount St James, covers an area of four hectares and is being considered for residential development. The current masterplan includes provision for 116 residential units ranging from detached dwellings to mews style properties.

An odour assessment was conducted to measure the potential impacts of a nearby Poultry Farm upon the proposed development. The assessment consisted of three observational odour 'sniff' surveys which adopted an assessment methodology accepted by Hyndburn Borough Council (HBC).

The assessment predicted that under normal operational conditions, a moderate odour exposure was observed within 50m downwind of the Poultry Farm site boundary. When downwind of the odour source, a moderate odour exposure was observed within 100m of the Poultry Farm site boundary during litter muck-out activities. Odour exposure classified as large were only witnessed on the south western corner of the development site adjacent to the doors of the most northerly poultry farm.

The assessment concludes that parts of the development site may be unsuitable for residential use with regard to odour. As a precautionary approach, this area was described as within 100m of the Poultry Farm site boundary. This stand-off distance also ensures that new residential receptors are not located any closer to the assessed odour source than existing residential properties.

1 Introduction

Royal HaskoningDHV was commissioned by Hartley Planning and Development Associates. Ltd, on behalf of private landowners, to conduct an odour measurement survey at a potential development site in Knuzden, Lancashire.

The proposed site, located south of the B6234 Mount St James, covers an area of four hectares and is being considered for residential development. The current masterplan includes provision for 116 residential units ranging from detached dwellings to mews style properties.

Pre-application advice from HBC was sought by Hartley Planning and Development Assocs. Ltd regarding the proposed development in December 2014. HBC raised concerns about the potential for odour impacts from the adjacent Knuzden Brook Poultry Farm. The Poultry Farm is operated by Patrick Lyons Poultry Limited and is regulated as a Part A process by the Environment Agency under permit number EPR/FP3130UF.

Odour is a human olfactory response to a mixture of chemical compounds in air. Odour is generally considered in terms of offensiveness to the human sense of smell which is, by nature, difficult to define. Odour response can be either physical or psychosocial; physical response can be affected by age, gender and lifestyle choices, whereas psychosocial response can be affected by past experience, current state of health, residential satisfaction or personality.

An odour dispersion modelling assessment was undertaken in December 2015¹ to investigate the impact of odour emissions from the Poultry Farm on the proposed development site and identify suitable areas for development. The assessment concluded that approximately 30% of the proposed development site would be exposed to odour concentrations in excess of that predicted at existing residential properties.

Upon advice from HBC site specific evidence of baseline odour conditions at the development site and local area was required. This report details of four observational odour surveys conducted in 2016 and 2017 across a range of operating conditions..

A location plan of the site is provided in **Appendix A**.

¹ Royal HaskoningDHV, Land at Stanhill Road, Knuzden, Odour Assessment, December 2015 ref IEMPB4198R001D01

2 Legislation and Guidance

2.1 Statutory Nuisance and Odour

The assessment of odour, in relation to statutory nuisance investigations, has its basis in the 1990 Environmental Protection Act, through the definition of 'Statutory Nuisance'. Section 79 (1) identifies that, among others, statutory nuisance constitutes:

"(d) any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance"

The Act and associated legislation provides the definition of statutory nuisance and sets out the responsibilities of all local authorities to seek out or investigate instances where a nuisance may be occurring.

The Environmental Protection Act does not specifically relate to the planning process and describes the process for assessing the impact of existing pollution upon established receptor locations.

2.2 The IPPC and Industrial Emissions Directives

The key legislative framework within the EU for the regulation of emissions from industry over the last decade was the 1996 Integrated Pollution Prevention and Control (IPPC) Directive, updated in 2008 (2008/1/EC). This required in essence the permitting of prescribed activities in accordance with the principle of Best Available Technology (BAT), and Article 2(11) of the IPPC Directive defines BAT as:

"The effective and advanced stage in development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing in principle the basis for emission limit values designed to prevent and, where that is not practicable, generally reduce emissions and the impact on the environment as a whole".

A review led to the European Commission proposing in 2007 a recast Directive on Industrial Emissions (IED), collating the seven existing directives into one. The IED was ratified in November 2010, and entered into force in January 2011 (as Directive 2010/75/EU).

2.3 Environmental Permitting (England and Wales) Regulations 2010

Although not directly relevant to this planning application, it is important to understand the appropriate regulatory regime for any odour emitting processes that requires consideration.

Emissions from a wide range of industrial activities are regulated mainly through a framework currently set out in the Environmental Permitting (England and Wales) Regulations (EPR) 2010². The 2010 EPR guidance provides a consolidated system of environmental permitting and replaces the main requirements of the Environmental Permitting (England and Wales) Regulations 2007, and associated amendments, which introduced a single 'environmental permitting' system in England and Wales.

The EPR guidance transposes the provisions of 18 European Directives regulating emissions to air, water and soil, waste management and management of specific substances, including odour.

² Statutory Instrument 2010 No.675 Environmental Protection England and Wales, The Environmental Permitting (England and Wales) Regulations 2010.

Some facilities (industrial installations) could harm the environment or human health unless they are controlled. The Environmental Permitting regime requires operators to obtain an environmental permit, and undergo regular inspection from the regulator. The aim of the regime is to:

- protect the environment and human health;
- deliver permitting and compliance effectively and efficiently in a way that provides increased clarity and minimises the administrative burden on both the regulator and the operators of facilities;
- encourage regulators to promote best practice in the operation of regulated facilities; and
- continue to fully implement European legislation.

In England most large industrial installations are regulated by the Environment Agency and are referred to as “Part A(1)” activities, although some are regulated by Local Authorities and are referred to as “Part A(2)” activities.

Smaller installations are subject to controls on emissions to air and are regulated by Local Authorities in England. These activities are often referred to as “Part B”.

Section 6.9 of EPR defines the criteria for inclusion of intensive farming activities within the EPR process. An intensive livestock facility requires an Environmental Permit under the Part A(1) regime where the following activities are undertaken:

- “(a) Rearing poultry or pigs intensively in an installation with more than:*
- (i) 40,000 places for poultry;*
 - (ii) 2,000 places for production pigs (over 30 kg); or*
 - (iii) 750 places for sows.”*

The management of odour emissions from sites regulated under EPR are defined in the Environment Agency’s H4 Odour Management guidance document³.

2.4 Odour Guidance

There are no specific regulations or guidance that define the level of odour which constitutes a statutory nuisance. As such odour assessments conducted in the UK use a range of assessment criteria based on available dose/response studies and case law.

The Institute of Air Quality Management (IAQM) released a guidance document in May 2014 entitled ‘Guidance on the Assessment of Odour for Planning’⁴. The document provides guidance aimed at development planning with regard to odour. Other existing odour assessment guidance, such as that produced by the Environment Agency, does not specifically provide a methodology for the assessment of odour within the planning process. The IAQM guidance details the elements that should be included in an odour assessment, which are as follows:

- Description of existing baseline odour conditions (including complaints history);
- Description of the location of receptors and their sensitivity to odour effects;
- Details of potential odour sources and the potential for generating odours;
- A description of control/mitigation measures in place;

³ Environment Agency 2010 H4 Odour Management, How to comply with your environmental permit.

⁴ Institute of Air Quality Management (2014) Guidance on the Assessment of Odour for Planning

- A prediction or observation of the likely odour impact and resulting effects at sensitive receptors, taking into account:
 - o The likely magnitude of odour emissions;
 - o The likely meteorological characteristics at the site;
 - o The dispersion and dilution afforded by the pathway to the receptors;
 - o The sensitivity of the receptors; and
 - o The potential cumulative odour impacts.
- Where odour effects are assessed as significant, details of further mitigation and control measures that could allow the proposal to proceed without significant loss of amenity;
- The residual odour impacts and their effects; and
- A conclusion on the significance of the residual effect.

The IAQM also provides information and a methodology for observational/qualitative surveys and assessments.

2.5 Environmental Permit Review

The Knuzden Brook Poultry farm is a Part A process and requires an Environmental Permit, approved by the Environment Agency (EA), to operate. The Permit⁵ was last revised in October 2014.

The Permit includes the standard rule permit condition for the management of odour emissions which is included within Sections 3.3. The specific odour impact management condition is as follows.

“3.3.1 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.”

This wording suggests that under the conditions of the Environmental Permit, the facility is not permitted to create an odour outside the boundary unless it can be demonstrated that all appropriate measures were used to minimise emissions.

The site is also required to maintain an Odour Management Plan (OMP) to minimise odour emissions and reduce any impacts. The OMP was submitted to and approved by the Environment Agency in 2011 and an update is required every four years. The OMP was obtained from the Environment Agency and reviewed as part of this study. The document details the specific management practices employed at the facility including how process and feedstock controls are used to minimise impacts. The document also stipulates the procedures for activities with a high potential for odour emission including during unexpected or non-routine events.

⁵ Permit reference number EPR/FP3130UF

3 Methodology

3.1 Consultation

Pre-application advice was sought in November 2015⁶ from the Environmental Health Officer (EHO) at HBC as part of the planning application process for the proposed development. Based on this consultation an odour screening assessment was conducted using atmospheric dispersion modelling techniques and literature based odour emission rates.

Subsequent consultation with HBC in February 2016⁷ requested that further site specific odour evidence was required to consider odour impacts in the vicinity of the Poultry Farm. The response stated:

"..... the odour assessment for the potential impact of this site, on the proposed residential development needs to capture evidence, of the actual, potential exposure. Therefore it needs to be able to capture evidence from activities at the chicken farm most likely to give rise to odours e.g. removal and disposal of soiled bedding and under environmental conditions likely to increase the probability of odour e.g. elevated temperatures, wind direction from the site towards the proposed development.

Should observational assessment be the most appropriate way to capture this evidence, then this method would be favoured by the council"

Through subsequent telephone correspondence with the HBC EHO in August 2016, a directed regime of site monitoring was developed to provide information on baseline odour conditions at the development site and existing local receptors. With co-operation of the Knuzden Brook Poultry Farm operator, the survey was undertaken to consider baseline odour conditions throughout the poultry growing cycle.

In addition the Environment Agency statutory consultee response (ref: NO/2017/109818/01-L01) identified that only one observational odour survey was undertaken during the muck out activities, potentially when odour generation is at its highest. It was therefore agreed that an additional survey, to be undertaken in 2017 under muck out conditions, would be provided

3.2 Observational Odour 'Sniff' Testing

Observational evidence was provided by conducting 'sniff' tests at directed periods during the poultry growing cycle. The sniff testing was undertaken in accordance with guidance provided by the IAQM in the document 'Guidance on the Assessment of Odour for Planning'⁴, which describes an odour intensity scale modified from that provided in the guidance document VDI 3940⁸. The IAQM odour intensity scale and associated descriptors are detailed in **Table 1**. The guidance also provides an odour pervasiveness matrix which is used to define the magnitude of odour exposure. As detailed in **Table 2** the assessment requires the calculation of average odour intensity and the proportion of time where a recognisable odour is present over the testing period.

The sniff testing was undertaken in accordance with the IAQM guidance. The method requires breathing in samples of air over a five minute period, and determining the odour intensity for each breath taken over that period. At the end of the five minute period, the odour unpleasantness is also noted if enough of the

⁶ Email sent by Royal HaskoningDHV to HBC on 20th November 2016 discussing proposed desk based dispersion modelling screening methodology

⁷ Email received from HBC on 17th February 2016 responding to proposed methodology for additional odour evidence

⁸ VDI 3940 – Measurement of Odour Impact by Field Inspection – Measurement of the Impact Frequency of Recognizable Odours. February 2006

breaths taken had sufficient odour intensity to determine the character. The percentage of time that the odour was recognisable at each location can also be determined to establish the pervasiveness of the odour. This requires dividing the number of times that the odour was of intensity level 4 or above by the number of breaths taken at each location.

HBC produced a guidance document detailing a sniff testing procedure which includes both the methodology presented in the IAQM guidance and references the Environment Agency H4 guidance³ and Defra Odour guidance⁹ documents.

Table 1: IAQM Odour Intensity Scale

Odour Strength	Intensity Level	Comments
No odour/not perceptible	0	No odour when compared to the clean site
Slight/very weak	1	There is probably some doubt as to whether the odour is actually present
Slight/weak	2	The odour is present but cannot be described using precise words or terms
Distinct	3	The odour character is barely recognisable
VDI 3940 states that the recognition threshold intensity is generally 3 - 10 times higher than the ODT, (i.e. 3 - 10 ou_E.m⁻³)		
Strong	4	The odour character is easily recognisable
Very strong	5	The odour is offensive. Exposure to this level would be considered undesirable
Extremely strong	6	The odour is offensive. An instinctive reaction would be to mitigate against further exposure

Table 2: IAQM Matrix to Assess the Odour Exposure at Time and Place of Sampling

Average Intensity (I_{mean})	Percentage Odour Time* During the Test ($T_{\geq 4}$)				
	≤10%	11-20%	21-30%	31-40%	≥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

Notes:

I_{Mean} intensity should be rounded to the nearest whole number.

The following overriding considerations affect the scoring of the odour annoyance impact:

if $I_{\text{mean}} = 0$, then the odour effect can for practical purposes be considered negligible; and

if $I_{\text{mean}} = 1$ but $T_{\geq 4} = 0\%$, then the odour effect can for practical purposes be considered negligible

*exceeding an odour intensity of 4

⁹ Defra (2010) Odour Guidance for Local Authorities

3.3 Monitoring Survey

The scheduling of the odour sniff tests was designed to correspond to key periods of the six week poultry growing cycle. Odour is expected to be at its greatest towards the end of the growing cycle due to the build-up of poultry litter, which is removed, in its entirety, after the poultry are removed from the site. Sniff testing was undertaken on 13th September, 27th October and 3rd November 2016. Duplicate surveys were undertaken concurrently by two surveyors on two of the three monitoring visits.

The poultry farm was operational during each of the surveys. The timing of the surveys corresponded with the following events:

- 13th September 2016 – Muck out of multiple sheds and high ambient temperature
- 27th October 2016 – Poultry approximately 30 days old (prior to flock thinning)
- 3rd November 2016 – Poultry approximately 40 days old (prior to full flock removal)
- 27th August 2017 – Muck out of multiple sheds in typical summer conditions.

The survey comprised sniff tests at nine predetermined locations and along a downwind transect of sampling locations at regular distances from the Poultry Farm. The locations of the fixed survey positions are detailed in **Table 3** and **Appendix A**.

The survey covered a range of meteorological conditions, including high and average temperatures, wet and dry periods and different wind speeds. The recorded meteorological conditions at each sampling point (wind speed, wind direction and temperature) are provided in **Appendix B**.

Table 3: Selected Receptor Locations

Site Reference	Description	Distance and Direction from odour Source	Current Public Exposure Y/N
R1	Eastern extent of development site	ENE – 280m	N
R2	Central area of development site	ENE – 160m	N
R3	Warcock Green Farm – to be retained as residential use in development plan	NE – 60m	Y
R4	SW corner of proposed development site	NE - 0m	N
R5	NE Corner of Poultry Farm Boundary	NE – 0m	N
R6	Central area of proposed development site adjacent to Knuzden St Oswald's School	NE – 150m	Y
R7	Intersection of Mount St James and Windsor Road	NEN – 175m	Y
R8	Residential Property adjacent to St Oswald Church	NW – 185m	Y
R9	Property on Haslingden Road – Opposite Poultry Farm Entrance	SW – 15m	Y
R10	Property on Haslingden Road	SE – 110m	Y
Transect (prefix T)	Transect starting at development site boundary at regular interval distances	-	N

4 Baseline Conditions

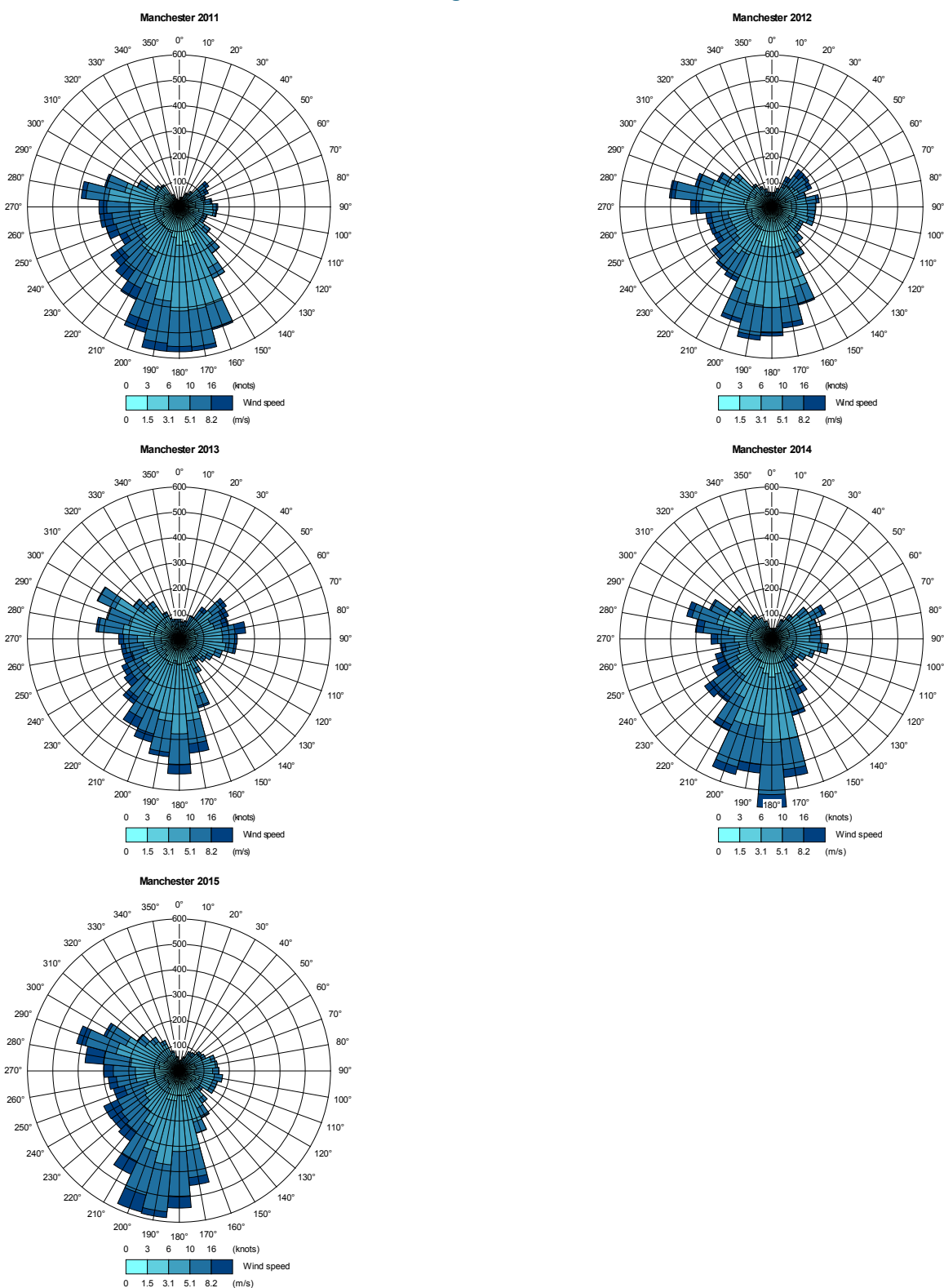
4.1 Meteorological Conditions

Meteorological data from the Manchester Airport recording station from 2009 - 2013 was analysed to determine trends in temperature, wind direction and wind speed. Manchester Airport is the nearest representative recording station to the proposed development that provides hourly synoptic meteorological data. The Manchester recording station is located approximately 40km south of the development site.

Wind roses for 2009 - 2013 meteorological data are detailed in **Figure 1**.

As detailed in **Figure 1**, the predominant wind direction is from the south, with regular winds also from south-west and westerly directions in all five years, a profile which is considered to be representative of conditions at the proposed development. As the site is located to the north and east of the poultry farm, there is potential for the prevailing wind to disperse odours across the proposed development site. The plots in Figure 1 depict cumulative hourly data for a full year, and therefore reflect long-term average conditions. Over the short term, wind can blow from any direction. Analysis of the above data was undertaken to determine the frequency of wind speeds blowing from each direction. The wind directions blowing towards the proposed development are from 180° to 270°. Wind directions blowing away from the site are therefore between 270° - 360° and 0° - 180°. The results of the analysis of the wind direction data are detailed in Table 3.

Figure 1: Wind Roses of Manchester Meteorological Data 2011 - 2015



4.2 Odour Complaint History

A freedom of information request was submitted to the Environment Agency requesting details on any odour complaints reported in the local area.

The information provided, in request number CL5239SR, is summarised below:

- Two odour complaints received outside regulator initiated investigation, occurred on:
 - o 15/11/2012 – an unspecified location described as ten minutes' walk from the Poultry Farm (within Knuzden Brook to the north of the Poultry Farm): and
 - o 19/11/2012 – unspecified location 1.5 miles from the Poultry Farm.
- Investigation on 15/11/2012 instigated odour diary and regulator odour visits:
 - o Odour reported on 21st, 28th, and 29th November 2012 and 6th, 14th, 25th, 26th and 28th January 2013.
 - o Investigator did not witness odour events however odour checks on 28th November, and 16th, 18th and 28th of January only identified, at worst, a faint odour at the site entrance. No detection of odour was observed in the wider area.
- Investigation into event on 19/11/2012 required no further action.

It is our understanding that no other odour complaints were received outside of this 10 week period. The odour investigation information received suggests that the event may have been caused by potential difficulties with the water supply which could have increased odour generated within the poultry litter. From this information, despite not knowing the cause of potential elevated emissions, it is likely that this event was a temporary issue which has not recurred.

Table 4: The Number of Hours that the Poultry Farm was Upwind and Downwind of the Proposed Development Site 2011-2015

Wind Direction	No. of Hours				
	2011	2012	2013	2014	2015
Towards site (180° - 270°)	3639 (41.5%)	3202 (36.5%)	3118 (35.6%)	3488 (39.8%)	3709 (42.3%)
Away from site (270° - 360° and 0° - 180°)	5060 (57.8%)	5435 (61.9%)	5502 (62.8%)	5231 (59.7%)	5012 (57.2%)
Calms / missing data	61 (0.7%)	147 (1.7%)	140 (1.6%)	41 (0.5%)	39 (0.4%)

As detailed in **Table 3**, winds blew away from the site for a greater number of hours in 2011 – 2015 than towards the site. As such, it is likely that winds will be blowing away from any part of the site for approximately 60% the year, which will reduce the likelihood of odours affecting future residents.

Analysis of the average daily temperature was undertaken using the Manchester meteorological data for 2011 – 2015 and the results are detailed in **Table 5**.

Table 5: Average Daily Temperature from the Manchester Recording Station for 2011-2015

Assessment Year	Temperature (°C)
2011	10.5
2012	9.5
2013	9.5
2014	7.8
2015	10.0

Table 5 provides an indication of average daily temperatures in the northwest for comparison to the recorded temperatures during the odour surveys.

4.3 Survey Weather Conditions

The weather conditions on the survey dates were as follows:

- 13th September 2016
 - o 22 - 24°C, clear and calm, no precipitation
 - o Southerly and north-easterly winds during the survey
- 27th October 2016
 - o 13 -14°C, cloudy, windy, no precipitation
 - o South westerly wind
- 3rd November 2016
 - o 13 -14°C, overcast, windy, no precipitation
 - o West and south-westerly winds during the survey
- 27th August 2017
 - o 15-16°C, overcast, windy, no precipitation
 - o Southerly winds during the survey

4.4 Odour Generation Potential

Warm temperatures play a part in odour generation potential. Conditions within a poultry rearing facility are regulated in order to provide the best conditions for growth. As the temperature within the poultry houses are regulated, in the region of 25 - 30°C, odour generation is likely to be independent of outside ambient temperatures. Poultry unit odour generation is likely to be more dependent on moisture content of the bedding litter. High moisture levels may result in unsanitary conditions and high bacteria growth, which can lead to elevated odour levels. In warmer drier conditions, odour generation is suppressed by lower moisture levels in the litter. Moisture level control in the bedding litter is a key part of odour management, this site is required to maintain a dry matter content of above 60%,

The way in which the internal temperature is regulated is by an automatically managed ventilation system which removes warm air from the poultry housing when an internal trigger temperature is reached. In periods of excessive heat, expected to be over 30°C ambient temperature, a set of additional wind tunnel fans is activated to introduce ambient air into the poultry unit to provide additional cooling. This mechanism may provide an enhanced pathway mechanism of the odorous air to the receptor. It must however be noted that the operation of ventilation systems will contribute to dilution and dispersion of odour in a more effective way compared to fugitive emissions.

5 Odour Survey Results

Guidance provided by the IAQM¹ details a methodology for undertaking sniff testing in the field, which captures the intermittent nature of odour. Details of the survey results are provided in **Appendix B** and include the odour intensity recorded at each monitoring point during the odour survey and any descriptors or site observations.

In accordance with the IAQM guidance the pervasiveness and extent of the odour was calculated. This calculation provides a measure of the amount of time that a 'recognisable' odour is present over the survey period. As defined in the guidance and detailed in **Section 3.2**, a recognisable odour is considered to have an intensity of greater than 4. The IAQM odour exposure matrix, presented as **Table 2** was then used to define the odour exposure at each sampling point.

Summary details of the odour survey results are detailed **Section 5.1 - 5.4**.

5.1 Odour Survey 13th September 2016

The odour survey on the 13th September 2016 represented conditions during poultry litter muck-out. The survey was conducted by two assessors.

The odour survey results indicated that:

- On the proposed development site (receptors R1-R6):
 - A **medium** odour exposure was observed at the closest survey location to the Poultry Farm, R4.
 - A **negligible** odour exposure was observed at all other fixed sampling locations.
- At existing receptors (receptors R7-R10):
 - A **medium** odour exposure was predicted at one existing receptor (R7).
- A **medium** impact was predicted at downwind distances up to 100m from the Poultry Farm

Table 6: Odour Survey – Fixed Receptor locations

Receptor Location	Wind Direction	Downwind of Poultry Farm (Y/N)	Mean Odour Intensity	% of Time Recognisable*	Odour Exposure
R1	ENE	N	0	0	Negligible
R2	ENE	N	0	0	Negligible
R3	ENE	N	0	0	Negligible
R4	ENE	N	3	60	Medium
R5	No Wind	-	0	0	Negligible
R6	S	Y	0	0	Negligible
R7	S	Y	2	23	Medium
R8	SW	N	0	0	Negligible
R9	No Wind	-	0	0	Negligible
R10	No Wind	-	0	0	Negligible

*Proportion of time where the odour intensity is 4 or above

Table 7: Odour Survey – Downwind Transect

Receptor Location	Distance from Poultry Farm	Mean Intensity	% of Time Recognisable*	Odour Exposure
TR1	125m	1	25	Small
TR2	100m	3	77	Medium
TR3	75m	2	37	Medium
TR4	50m	3	72	Medium
TR5	25m	3	62	Medium
TR6	0m	3	57	Medium

*Proportion of time where the odour intensity is 4 or above

5.2 Odour Survey 27th October 2016

The survey on 27th October 2016 was conducted when the poultry were approximately 30 days old. The survey was conducted by two assessors.

The odour survey results indicated that:

- On the proposed development site (receptors R1-R6):
 - A **medium** odour exposure was observed at the closest survey locations to the Poultry Farm, R3 and R4.
 - A **small** or **negligible** odour exposure was observed at all other fixed sampling locations.
- At existing receptors (receptors R7-R10):
 - A **negligible** odour exposure was observed at existing receptor locations
- A **medium** odour exposure was observed at downwind distances up to 50m from the Poultry Farm

Table 8: Odour Survey – Fixed Receptor locations

Receptor Location	Wind Direction	Downwind of Poultry Farm (Y/N)	Mean Odour Intensity	% of Time Recognisable*	Odour Exposure
R1	WSW	Y	0	0	Negligible
R2	WSW	Y	0	0	Negligible
R3	WSW	Y	3	30	Medium
R4	SW	Y	3	37	Medium
R5	SW	Y	2	5	Small
R6	SW	Y	1	0	Negligible
R7	W	N	0	0	Negligible
R8	W	N	0	0	Negligible
R9	W	N	0	0	Negligible
R10	W	N	0	0	Negligible

*Proportion of time where the odour intensity is 4 or above

Table 9: Odour Survey – Downwind Transect

Receptor Location	Distance from Poultry Farm	Mean Intensity	% of Time Recognisable*	Odour Exposure
TR1	200m	0	0	Negligible
TR2	135m	0	0	Negligible
TR3	100m	2	13	Small
TR4	50m	3	55	Medium
TR5	0m	3	35	Medium

*Proportion of time where the odour intensity is 4 or above

5.3 Odour Survey 3rd November 2016

The survey on 3rd November 2016 was conducted when the poultry were approximately 30 days old. The survey conducted at receptor and R9 was compromised by the presence of a bonfire on Haslingden Road. The survey was therefore stopped and the results were discounted. The survey was conducted by one assessor.

The odour survey results indicated that:

- On the proposed development site (receptors R1-R6):
 - A **large** odour exposure was observed at the closest survey location to the Poultry Farm, R4.
 - A **negligible** odour exposure was observed at all other fixed sampling locations.
- At existing receptors (receptors R7-R10):
 - A **negligible** odour exposure was observed at existing receptor locations
- A **medium** odour exposure was observed at downwind distances up to 25m from the Poultry Farm.

Table 10: Odour Survey – Fixed Receptor Locations

Receptor Location	Wind Direction	Downwind of Poultry Farm (Y/N)	Mean Odour Intensity	% of Time Recognisable*	Odour Exposure
R1	SW	Y	0	0	Negligible
R2	SW	Y	0	0	Negligible
R3	SW	Y	0	0	Negligible
R4	SW	Y	4	63	Large
R5	SW	Y	0	0	Negligible
R6	SW	Y	0	0	Negligible
R7	SW	Y	1	0	Negligible
R8	SW	N	0	3	Negligible
R9	SW	N	6	13	N/A
R10	SW	N	0	3	Negligible

*Proportion of time where the odour intensity is 4 or above

N/A – survey stopped after 1 minute as it was located adjacent to bonfire. Location was upwind of the poultry farm during the survey.

Table 11: Odour Survey – Downwind Transect

Receptor Location	Distance from Poultry Farm	Mean Intensity	% of Time Recognisable*	Odour Exposure
TR1	125m	2	0	Negligible
TR2	100m	2	3	Small
TR3	75m	2	10	Small
TR4	50m	2	30	Small
TR5	25m	3	57	Medium
TR6	0m	4	63	Large

*Proportion of time where the odour intensity is 4 or above

5.4 Odour Survey 27th August 2017

The odour survey on the 27th August 2017 represented conditions during poultry litter muck-out. The survey was conducted by two assessors.

The odour survey results indicated that:

- On the proposed development site (receptors R1-R6):
 - A **large** odour exposure was observed at the closest survey location to the Poultry Farm, R4.
 - A **negligible** odour exposure was observed at all other fixed sampling locations.
- At existing receptors (receptors R7-R10):
 - A **medium** odour exposure was predicted at one existing receptor (R9).
 - A **negligible** odour exposure was observed at all other fixed sampling locations.
- A **medium** impact was predicted at downwind distances up to 100m from the Poultry Farm

Table 12: Odour Survey – Fixed Receptor locations

Receptor Location	Wind Direction	Downwind of Poultry Farm (Y/N)	Mean Odour Intensity	% of Time Recognisable*	Odour Exposure
R1	S	N	0	0	Negligible
R2	S	N	0	0	Negligible
R3	S	Y	0	0	Negligible
R4	S	Y	4	82	Large
R5	S	Y	0	0	Negligible
R6	S	Y	0	0	Negligible
R7	S	Y	0	0	Negligible
R8	S	Y	0	0	Negligible
R9	S	N	3	38	Medium
R10	S	N	0	0	Negligible

*Proportion of time where the odour intensity is 4 or above

Table 13: Odour Survey – Downwind Transect

Receptor Location	Distance from Poultry Farm	Mean Intensity	% of Time Recognisable*	Odour Exposure
TR1	125m	1	13	Small
TR2	100m	3	30	Medium
TR3	75m	3	33	Medium
TR4	50m	2	30	Medium
TR5	25m	2	13	Small
TR6	0m	4	82	Large

*Proportion of time where the odour intensity is 4 or above

6 Results Discussion - Impact Significance

This assessment was undertaken to consider the presence of odorous activities in the vicinity of the proposed development site and determine their likely impact on future occupants of the development.

Observational odour 'sniff' surveys were undertaken to determine baseline odour conditions near to the Knuzden Brook Poultry Farm. When recognisable, i.e. described as an odour intensity of over 4, the assessors reported agricultural type characteristics which were generally not considered to be offensive or unpleasant.

The odour surveys indicated that:

- During normal operation, a **medium** odour exposure was observed at locations between 25 and 50m from the site boundary.
- During litter muck out, a **medium** odour exposure was observed within 100m of the site boundary.
- A **medium** odour exposure was observed at one residential receptor, R7 on the intersection of Windsor Road and Mount St James, during the muck out survey.

The additional odour survey conducted on the 27th August 2017 provided confirmation that during muck out, an odour exposure of **medium** or greater was only recorded within 100m of the site boundary shared with the Poultry Farm. On the basis of the odour survey results, it is considered that positions set back more than 50m from the development boundary shared with the Poultry Farm are unlikely to be exposed to more than a **medium** magnitude of odour exposure. Within distance bands of 50 - 100m from the shared boundary, a **medium** odour exposure could occur during muck out activities. The site operator conducts a litter muck-out at the end of each 6 week growing cycle which has a duration of a few hours per poultry unit.

These impacts would only occur when the development site is downwind of the odour sources. As shown in the meteorological data assessment, **Section 4**, areas of the development could be located downwind of the Poultry Farm for approximately 40% of the year. This figure represents the total time that any part of the development site is downwind of the odour source. Only those areas closest to the southwest corner of the development boundary would be downwind of the poultry farm for the full duration.

Although the development may introduce receptors nearer to the northern boundary of the Poultry Farm, existing receptors are located in closer proximity to the south of the site on Haslingden Road. The absence of an odour complaint history at existing receptor locations suggests that the facility does not currently cause an odour annoyance at existing residences. The most recent odour complaints were reported in winter 2012 by one complainant. The odour investigation conducted by the Environment Agency suggested that the event may have been caused by potential short term difficulties with the water supply resulting in increased odour generation from the poultry litter. The odour management practices have been revised and no subsequent odour complaints have been reported by members of the local community.

6.1 Comparison to Atmospheric Dispersion Model Odour Results

The sniff testing results show that the stand-off distances predicted in the December 2015 odour impact assessment¹ for the same development application may be overly cautious. The assessment predicted that approximately 30% of the proposed development area would be exposed to odour concentrations in excess of that predicted for existing residential receptors. This included all areas of the proposed development site west of the residential buildings that form Warcock Green Farm.

The observational odour surveys indicated that a **medium** odour exposure occurred within 50m of the site boundary during normal operation and 100m during infrequent litter muck out activities. These stand-off distances suggest a larger developable area compared to the odour dispersion model which used literature based emission rates and conservative upper end assessment assumptions.

7 Conclusions

This assessment provided observational odour evidence (four surveys) to quantify baseline odour conditions in the vicinity of the Knuzden Brook Poultry Farm. The assessment identified areas of **medium** odour exposure at downwind locations less than 50m, or 100m during the infrequent litter muck-out activities, from the shared site boundary of the development site and the Poultry Farm. These results indicate that previous odour dispersion modelling studies may have overstated the odour impact of the Poultry Farm.

As a precautionary approach, it is suggested that a 100m stand-off distance from the Poultry Farm site boundary should provide sufficient distance for dilution and dispersion of odours before reaching proposed residential receptors.

Appendix A: Selected Survey Locations



Key:

- Fixed Odour Survey Locations
- Site Boundary

Title

Odour Assessment
Odour Survey Locations

Project

PB4198 Land at Standhill Road, Knuzden

Client

C. Rawlinson / E. Coar

Date

11/11/2016

Scale

1:4360

Figure

Appendix A : Odour Survey Locations

Drawn by

ME

Checked by

CM

Number

V1



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Appendix B: Odour Survey Sample Results

