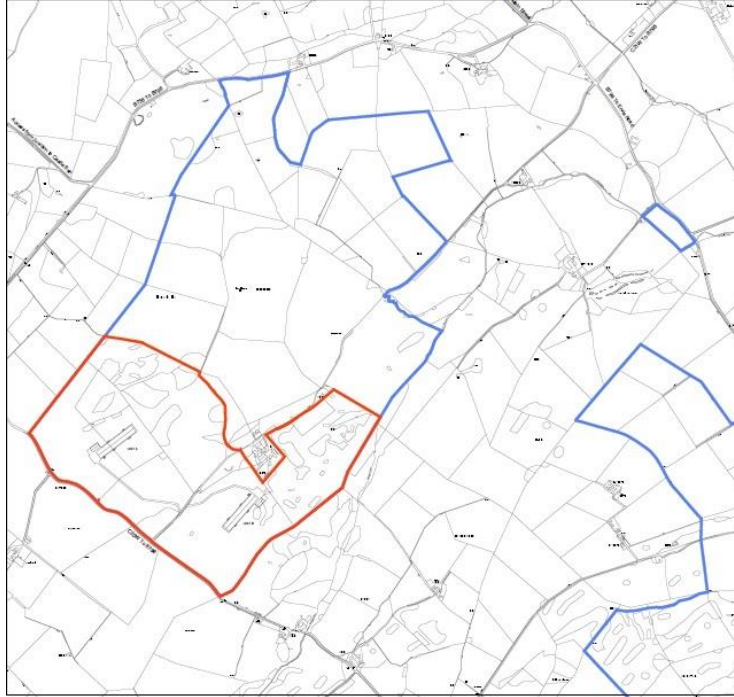


# Proposed Egg Production Plant, Mains of Dhuloch, Kirkcolm, Stranraer, NG9 0RF



## Odour Assessment

784-B0067657  
19<sup>th</sup> December 2024

### PRESENTED TO

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## EXECUTIVE SUMMARY

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The report presents the findings of an odour impact assessment in support of the planning application for a proposed egg production plant/farm at Mains of Dhuloch, Kirkcolm, Stranraer, DG9 0RF.

The objectives of the odour assessment are (1) to evaluate potential odour impact on the local area; (2) to determine whether the odour impacts from plant emissions meet the odour assessment criteria; and (3) to avoid causing potential adverse impacts on the amenity of sensitive receptors.

### Odour Impact Assessment Results

The odour impact assessment results indicate that the maximum odour concentration at the identified receptors does not exceed the odour assessment criteria. The odour effects on the sensitive receptors are considered to be 'negligible'. Therefore, the predicted odour emissions from the plant are considered acceptable.

In conclusion, the proposed development is not considered to be contrary to any of the national and local planning policies regarding the odour amenity.

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## ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
AERMOD	AERMOD is the state-of-the-science, steady-state Gaussian air dispersion model based on planetary boundary layer theory. AERMOD fully incorporates the PRIME building downwash algorithms, advanced depositional parameters, local terrain and urban heat island effects, and advanced meteorological turbulence calculations
DEFRA	Department for Environment Food & Rural Affairs
EPA	Environmental Protection Agency
EPUK	Environmental Protection UK
EU	European Union
LDP	Local Development Plan
PPG	Planning Policy Guidance
PPS	Planning Policy Statements
IAQM	Institute of Air Quality Management
IEMA	Institute of Environmental Management & Assessment
MAGIC	Multi-agency Geographic Information for the Countryside
NGR	United Kingdom National Grid Reference
NPPF	National Planning Policy Framework
OU <sub>E</sub>	Odour Unit. An odour unit is a measure of the concentration of a mixture of odorous compounds. It is determined by means of olfactometry. Odour unit values are determined by a standard method given in BSEN13725; 2003 on olfactometry. An odour unit as defined by the CEN standard is 1 OU <sub>E</sub> . 1 OU <sub>E</sub> /m <sup>3</sup> is the point of detection. Reference: H4 Odour Management, The Environment Agency, March 2011
OU <sub>E</sub> /m <sup>3</sup>	Odour Unit per cubic meter of gas/air
PC	Process Contribution
PEC	Predicted Environmental Concentration
SEPA	Scottish Environment Protection Agency
Tetra Tech	Tetra Tech Limited
USEPA	U.S. Environmental Protection Agency
UK	United Kingdom

## 1.0 INTRODUCTION

Tetra Tech have undertaken an odour impact assessment in support of the planning application for a proposed egg production farm/plant at Mains of Dhuloch, Kirkcolm, Stranraer, DG9 0RF.

The proposed application will comprise the development of an egg production farm, which is made up of two poultry sheds/houses and associated infrastructure.

The objectives of the odour assessment are (1) to evaluate potential odour impact on the local area; (2) to determine whether the odour impacts from plant emissions meet the odour assessment criteria; and (3) to avoid causing potential adverse impacts on the amenity of sensitive receptors.

### 1.1 SITE LOCATION

The central Grid Reference of the proposed egg production plant site is approximately 198400, 566210. The application site is bounded to the south and south-west by Bridge of Aldouran (Road), to the northwest by Mains of Dhuloch farm, and to the northwest and southeast by open farmland.

Reference should be made to **Figure 1-1** for a map of the application site and surrounding area.

**Figure 1-1.** Site Location and Surrounding Area



Google Imagery (2024)

## 1.2 PROPOSED EGG PRODUCTION FACILITY

The proposed egg production facility consists of 2 x poultry houses, Unit A and Unit B (158.9m x 30.6m each Unit), two manure storage areas and associated infrastructure.

The site layout plan is presented in **Figure 1-2**.

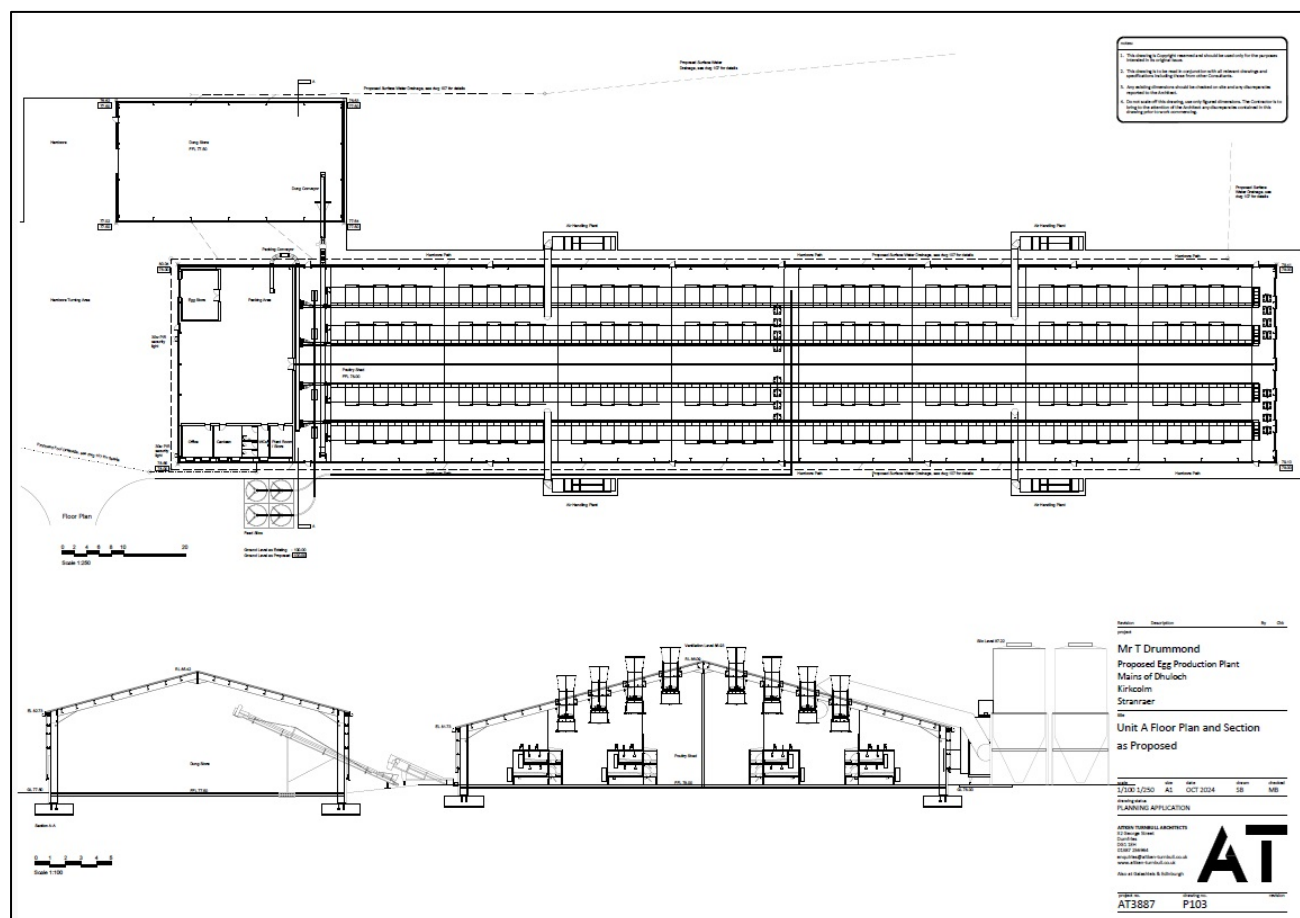
The Unit A Floor Plan and its Section are presented in **Figure 1-3**. The Unit B is designed to be same as the Unit A.

**Figure 1-2.** Site Layout Plan





**Figure 1-3. Unit A Floor Plan and Section**



## 1.3 SCOPE OF THE ASSESSMENT

The following assessment scopes have been undertaken as part of this assessment:

- Quantitative odour (odour modelling) assessment for the proposed new development poultry sheds/houses, two dung store buildings and potential odour emissions from free range birds;
- Odour modelling assessment has been undertaken based on the planned poultry house/shed ventilation rates and typical odour emission rates for poultry sheds operations;
- Identification of surrounding receptors;
- Undertaking dispersion modelling - the odour impacts of the plant emissions on the surrounding areas will be assessed using the third generation Breeze AERMOD dispersion model. AERMOD is a development from the ISC3 dispersion model and incorporates improved dispersion algorithms and pre-processors to integrate the impact of meteorology and topography within the modelling output; and
- Assessment of the significance of the effects - using the relevant SEPA guidance and “the impact descriptors for individual receptors” published on the latest guidance by EPUK and IAQM in May 2015.

## 2.0 POLICY AND LEGISLATIVE CONTEXT

### 2.1 DOCUMENTS CONSULTED

The following documents were consulted during the undertaking of this assessment:

#### Legislation and Best Practice Guidance

- Odour Guidance 2010, the Scottish Environment Protection Agency(SEPA), January 2010;
- Environmental Protection Act 1990, Part III, 14/06/2024. Environmental Protection Act 1990, Part III is up to date with all changes known to be in force on or before 17 September 2024;
- National Planning Policy Framework, Ministry for Housing, Communities and Local Government, Revised December 2023;
- Planning Practice Guidance: Air Quality, Ministry for Housing, Communities and Local Government, November 2019;
- Guidance on the assessment of odour for planning, IAQM, July 2018; and
- H4 Odour Management, How to comply with your environmental permit, March 2011.

#### Websites Consulted

- Google maps ([maps.google.co.uk](https://maps.google.co.uk));
- [emapsite.com](https://emapsite.com);
- MAGIC (<http://magic.defra.gov.uk/>);
- Planning Practice Guidance (<http://planningguidance.planningportal.gov.uk/>); and
- Dumfries & Galloway Council (<https://www.dumgal.gov.uk/>).

#### Site Specific Reference Documents

- Dumfries and Galloway Council's adopted the Local Development Plan 2 (LDP2) in September 2019.

### 2.2 PLANNING POLICY

#### **National Policy**

The National Planning Policy Framework (NPPF), revised July 2021, principally brings together and summarises the suite of Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) which previously guided planning policy making. The NPPF states that:

The National Planning Policy Framework (NPPF), revised December 2023, principally brings together and summarises the suite of Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) which previously guided planning policy making. The NPPF states that:

#### Paragraph 180

*Planning policies and decisions should contribute to and enhance the natural and local environment by:*

- a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);*

- b) *recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;*
- c) *maintaining the character of the undeveloped coast, while improving public access to it where appropriate;*
- d) *minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;*
- e) *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and*
- f) *remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.*

#### Paragraph 194

*“The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.”*

#### Scottish Statutory Nuisance

*“Local authorities rather than SEPA regulate statutory nuisance under Part III of EPA90. The definition of statutory nuisance in this act includes an odour arising from industrial or commercial premises which is prejudicial to health or a nuisance. The provisions require a local authority to investigate any complaints of statutory nuisance and also to inspect their area from time to time to identify any potential statutory nuisances which ought to be dealt with. If the activity is regulated under the PPC regulations, SEPA may deal with nuisance issues arising if the nuisance relates to the regulated emissions. In circumstances where SEPA is able to take action under the PPC regulations in respect of a matter constituting a statutory nuisance, the local authority needs the consent of the Secretary of State if it wishes to institute summary proceedings for statutory nuisance under Part III of the EPA. This is in order to prevent dual regulation.”*

#### Scottish Planning

*“Before any new or altered activity is undertaken there is normally a requirement for the operator to obtain relevant planning permissions under the Town and Country Planning Scotland Act 1997 which specifies controls over new or changed developments. The planning system has an important role in preventing or minimising odour impacts from new or changed developments by regulating the location and, to a certain extent, the specification of some design and control parameters of these activities.*

*SEPA is a consultee for most planning applications and is a statutory consultee for larger developments subject to the requirement to undertake environmental impact assessments. If SEPA is the regulator of an activity under environmental legislation, we will advise the local authority accordingly and highlight any potential issues associated with the activity including for example, its potential to give rise to odour.”*

## 2.3 LOCAL POLICY

In September 2019, Dumfries and Galloway Council adopted the Local Development Plan 2 (LDP2). The adopted Local Plan forms part of the statutory development plan for the Council. The LDP2 covers all of Dumfries and Galloway; it provides the planning framework and guides the future use and development of land in towns, villages and the rural area. It also indicates where development, including regeneration, should happen and where it should not.

The following policy is of relevance to this odour assessment:

### **Policy OP1: Development Considerations**

Development will be assessed against the following considerations where relevant to the scale, nature and location of the proposal:

#### a) General Amenity

Development proposals should be compatible with the character and amenity of the area and should not conflict with nearby land uses. The following issues which may result from the development will be a material consideration in the assessment of proposals:

- noise and vibration;
- odour and fumes;
- potential loss of privacy, sunlight and daylight on nearby properties;
- emissions including dust, smoke, soot, ash, dirt or grit or any other environmental pollution to water, air, or soil; and
- light pollution.

## 2.4 ODOUR ASSESSMENT METHODOLOGY

Following major regulations/guidance/guidelines have been used in the assessment:

- Odour guidance 2010, SEPA, January 2010;
- Scottish Guidance for intensive pig and poultry farmers (Pollution Prevention and control (Scotland) regulations 2012 (PPC), Intensive Livestock Installations, Standard Farming Installation rules (how to comply), Incorporating PPC Permit application guidance, April 2013);
- Guidance on the assessment of odour for planning, IAQM, July 2018; and
- H4 Odour Management, How to comply with your environmental permit, March 2011.

## 3.0 GENERAL FUNDAMENTALS OF ODOUR AND ODOUR ASSESSMENT CRITERIA

### 3.1 WHAT IS ODOUR

Odour is perceived by our brains in response to chemicals present in the air we breathe (Odour guidance 2010, SEPA, version 1, January 2010). Odour is one of the effects that those chemicals have on us. Humans have a sensitive sense of smell and can detect odour even when chemicals are present in very low concentrations.

The subject of odour is a highly complex one and the response of an individual to odour exposure is highly subjective: their reaction will depend on issues such as how strong it is, what it smells like, how often and when it occurs and in what context. The following characteristics can further complicate the assessment of odours:

- An odour can arise from a single substance or from a combination of substances.
- In combination with other substances, the characteristic odour of a single substance can be modified so as to be unrecognisable.
- Odour changes as the mixture becomes diluted. Individual components may fall below their odour threshold.
- Odours from a substance or mixture of substances can be pleasant when dilute but offensive when concentrated.
- Odours that are pleasant or acceptable to one person can be offensive and unacceptable to another person, as individuals can have different sensitivities to odour.
- Many assessment methods are subjective.

### 3.2 WHAT IS AN ODOUR UNIT

The definition of an Odour Unit has been defined in Scottish environment Protection Agency (SEPA) technical guidance note of IPPC SRG 6.02 (Farming), integrated Pollution Prevention and control (IPPC), Odour Management at intensive Livestock Installations. The technical guidance note state:

*“An odour unit is a measure of the concentration of a mixture of odorous compounds in a sample. It is determined by means of olfactometry.*

*The threshold of detection of an odour is the point at which it is just detectable, i.e. it produces a first sensation of odour in an average person. The concentration of a particular odour is considered in terms of the number of times that a sample of the odour has to be diluted before it becomes just detectable (it is at the detection threshold). This is determined by presenting a sample to an ‘odour panel’ made up of a number of trained observers in a laboratory setting. The sample is diluted a number of times and the threshold of detection is the concentration at which 50% of the panel of observers can first detect the odour (this point is equivalent to one odour unit). The concentration of the original sample is expressed in terms of the number of dilutions or in odour units.*

*Samples for olfactometry are usually collected directly from vents or above odour sources in large sample bags. In general, it is not possible to collect samples at the point where people live because the sample will be too dilute to allow it to be further diluted for testing.*

*In very general terms, based on the ‘intensity’ of the odour:*

- 1 odour unit is the threshold of detection (in the laboratory);
- 3 odour units is the point at which the smell is recognisable, i.e. it could be recognised as pig odour;
- 5 odour units is noticeable (faint); and
- 10 odour units is a distinct smell which can be intrusive.

*The amount of time that someone is exposed to the odour, its intensity and the type of odour will all play a part in producing a state of annoyance. In addition, the sensitivity of any particular individual to an odour, their memories of past exposures and the timing of exposure (for example at meal times or perhaps when feeling unwell) are also key factors.*

*The indicative exposure criterion applied to livestock at new installations is: 3 OU<sub>E</sub>/m<sup>3</sup> as a 98<sup>th</sup> percentile of a year of hourly means at location.*

*This means that an average concentration of 3 odour units (averaged over an hour) is to be met at a specified location for 98% of the time, as indicated by modelling.”*

### 3.3 ODOUR IMPACT AND EFFECTS

IEMA Guidelines for Environmental Impact Assessment (2004) recommend a clear progression from the characterisation of ‘impact’ to the assessment of the significance of the ‘effect’ taking into account the evaluation of the sensitivity and value of the receptors. The guidelines emphasise the need to clearly define at the outset how the two terms will be used and then to apply them in a consistent fashion. In this IAQM guidance, the following definitions are used:

- Impacts – these are changes to the environment attributable to the development proposal.
- Effects – these are the results of the changes on specific receptors.
- Receptors - are the users of the adjacent land, which may vary in their sensitivity to odour.

An increase in odour levels (the impact) would therefore cause a particular effect (e.g. loss of amenity) if the adjacent land use was residential, and perhaps a lesser effect if the adjacent land use was an industrial facility.

### 3.4 THE ODOUR SENSITIVITY OF THE RECEPTORS

Guidance on the assessment of odour for planning, IAQM, July 2018, recommends the receptor sensitivity to odours between high and low sensitivity, as shown in **Table 3-1**.



**Table 3-1.** Receptor sensitivity to odours (after Guidance on the assessment of odour for planning, IAQM, July 2018)

For the sensitivity of people to odour, the IAQM recommends that the Air Quality Practitioner uses professional judgement to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the following general principles:	
<b>High sensitivity receptor</b>	<p>Surrounding land where:</p> <ul style="list-style-type: none"> <li>• users can reasonably expect enjoyment of a high level of amenity; and</li> <li>• people would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.</li> </ul> <p>Examples may include residential dwellings, hospitals, schools/education and tourist/cultural.</p>
<b>Medium sensitivity receptor</b>	<p>Surrounding land where:</p> <ul style="list-style-type: none"> <li>• users would expect to enjoy a reasonable level of amenity, but wouldn't reasonably expect to enjoy the same level of amenity as in their home; or</li> <li>• people wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.</li> </ul> <p>Examples may include places of work, commercial/retail premises and playing/recreation fields.</p>
<b>Low sensitivity receptor</b>	<p>Surrounding land where:</p> <ul style="list-style-type: none"> <li>• the enjoyment of amenity would not reasonably be expected; or</li> <li>• there is transient exposure, where the people would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.</li> </ul> <p>Examples may include industrial use, farms, footpaths and roads.</p>

### 3.5 STANDARD FARMING INSTALLATION RULES

Scottish Guidance for intensive pig and poultry farmers ('Pollution Prevention and control (Scotland) regulations 2012 (PPC), Intensive Livestock Installations, Standard Farming Installation rules (how to comply), Incorporating PPC Permit application guidance', April 2013), details the roles and responsibilities regarding odour, as shown in **Table 3-2**.

**Table 3-2.** Scottish Standard Farming Installation Rules (after intensive pig and poultry farmers (Pollution Prevention and control (Scotland) regulations 2012)

<b>2.8</b>	<b>Odour</b>
2.8.1	All emissions to air from the permitted installation shall be free from offensive odour, as perceived by an authorised person, outside the site boundary.
2.8.2	<p>The operator shall:</p> <ol style="list-style-type: none"> <li>Implement and maintain an "Odour Management Plan" designed to meet the requirements of condition 2.8.1;</li> <li>Review the Odour Management Plan at least every 4 years or as soon as practicable after a complaint, (whichever is the earlier) and record whether changes to the plan should be made. Any appropriate changes identified should be implemented as soon as reasonably practicable.</li> </ol>

### 3.6 ODOUR ASSESSMENT CRITERIA

#### Odour Indicative Criteria of Significant Pollution

The Assessment of the significance of the odour effects has used the SEPA Odour Guidance 2010 and in accordance with the SEPA PPC technical Guidance Note 35.

SEPA Odour Guidance 2010 and Appendix 3 of Environment Agency Guidance H4 Odour Management (March 2011) provides a methodology for assessing the impacts of odour based on dispersion modelling.

The SEPA odour guidance provides details of the indicative criterion of significant pollution, which is dependent upon the relative offensiveness of the odour in **Table 3-3**.

**Table 3-3.** Industrial Activities and Indicative Criteria of Significant Pollution<sup>note1</sup>

Relative Offensiveness of Odour	Indicative Criterion of Significant Pollution
More offensive odours: Activities involving putrescible wastes Processes involving animal or fish remains Brickworks Creamery Fat & Grease Processing Waste water treatment Oil refining Livestock feed factory	1.5 OU <sub>E</sub> /m <sup>3</sup> (1.0 OU <sub>E</sub> /m <sup>3</sup> ) <sup>note3</sup>
Odours which do not obviously fall within a high or low category: Intensive livestock rearing Fat frying (food processing) Sugar beet processing	3.0 OU <sub>E</sub> /m <sup>3</sup> (2.5 OU <sub>E</sub> /m <sup>3</sup> ) <sup>note3</sup>
Less offensive odours (but not inoffensive): Chocolate manufacture Brewery Confectionary Fragrance and Flavourings Coffee Roasting Bakery	6.0 OU <sub>E</sub> /m <sup>3</sup> (5.5 OU <sub>E</sub> /m <sup>3</sup> ) <sup>note3</sup>
Note 1: Reference: EA H4 Guidance Appendix 6 Note 2: Odour Units (OUE) as 98th percentile of hourly averages Note 3: Local adjustment for hypersensitive populations (odour generated a high level of complaint) – Reference: EA H4 Guidance Appendix 6	

As detailed within the 2010 SEPA Odour Guidance, intensive livestock rearing falls in the group of ‘*Odour which do not obviously fall within a high or low category*’.

An indicative criterion of significant pollution of 3.0 OU<sub>E</sub>/m<sup>3</sup> has been used in the assessment.

#### Odour Effect Descriptors

The latest IAQM guidance states that the predictive, quantitative approach involves obtaining estimates of the odour source emission rate, use of the emissions in a dispersion model to predict 98th percentile concentration



at sensitive receptors and comparison of these with criteria that have evolved from research and survey work. At the present time, this remains an accepted technique and the IAQM supports this.

IAQM confirm that in the absence of comprehensive dose-response information the assessor should allow the derivation of exact C98 concentration metrics for different types of odour. IAQM is “...of the opinion that the practitioner should observe, from the various scientific studies, case law and practical examples of the investigation of odour annoyance cases, that in any specific case, an appropriate criterion could lie somewhere in the range of 1 to 10 ouE/m<sup>3</sup> as a 98th percentile of hourly mean odour concentrations.

*Taking into account the available scientific evidence and the collective experience of IAQM members involved in drafting this guidance, the odour concentration change descriptors together with impact descriptors are proposed by IAQM for an odour at the offensive end of the spectrum. These adopt the C98 as the appropriate frequency metric, encompasses the 1 to 10 ouE/m<sup>3</sup> concentration range referred to above and also considers the potential sensitivity of different receptors. It is also consistent in format and concept with other guidance in the air quality field.*

*For odours that are less unpleasant, the level of odour exposure required to elicit the same effect may be somewhat higher, requiring professional judgement to be applied. For example, odours from sewage treatment works plant operating normally, i.e. non-septic conditions, would not be expected to be at the ‘most offensive’ end of the spectrum (see **Table 3-4** below) and can be considered on par with ‘moderately offensive’ odours such as intensive livestock rearing. **Table 3-5** below shows the impact descriptors proposed for a ‘moderately offensive’ odour.”*

**Table 3-4.** Proposed Odour Effect Descriptors for Impacts Predicted by Modelling – ‘Most Offensive’ Odours

Odour Exposure Level C <sub>98</sub> , ouE/m <sup>3</sup>	Receptor Sensitivity		
	Low	Medium	High
≥10	Moderate	Substantial	Substantial
5-10	Moderate	Moderate	Substantial
3-5	Slight	Moderate	Moderate
1.5-3	Negligible	Slight	Moderate
0.5-1.5	Negligible	Negligible	Slight
<0.5	Negligible	Negligible	Negligible

It should be noted that the Table applies equally to cases where there are increases and decreases in odour exposure as a result of this development, in which case the appropriate terms “adverse” or “beneficial” should be added to the descriptors.

**Table 3-5.** Proposed Odour Effect Descriptors for Impacts Predicted by Modelling – ‘Moderately Offensive’

Odour Exposure Level $C_{98, \text{ou}_E} / \text{m}^3$	Receptor Sensitivity		
	Low	Medium	High
$\geq 10$	Moderate	Substantial	Substantial
5-10	Slight	Moderate	Moderate
3-5	Negligible	Slight	Moderate
1.5-3	Negligible	Negligible	Slight
0.5-1.5	Negligible	Negligible	Negligible
$< 0.5$	Negligible	Negligible	Negligible

It should be noted that the Table applies equally to cases where there are increases and decreases in odour exposure as a result of this development, in which case the appropriate terms “adverse” or “beneficial” should be added to the descriptors.

## 4.0 ODOUR ASSESSMENT METHODOLOGY

### 4.1 POTENTIAL SOURCES OF ODOUR

The following sources of odour have been identified for the proposed plant:

- Poultry Shed (Birds House) Unit A;
- Poultry Shed (Birds House) Unit B;
- Dung Store (Manure storage area) associated with the Poultry Shed Unit A;
- Dung Store (Manure storage area) associated with the Poultry Shed Unit B;
- Odour Emissions from free range birds associated with the Poultry Shed Unit A; and
- Odour Emissions from free range birds associated with the Poultry Shed Unit B.

### 4.2 VENTILATION SYSTEM FOR THE BIRD SHEDS

The ventilation system for each bird shed consists of:

- A heat recovery unit which contains two wall fans – 1 fan blowing in to the shed and 1 fan exhausting air out. The two fans are operating under same pressure and each fan has a capacity of 30,000 m<sup>3</sup>/hour. The heat recovery unit will be installed on the ground level next to the bird house.
- 4 roof fans which exhaust air out of the house. Each roof fan has a capacity of 36,700 m<sup>3</sup>/hour pulling air out of the house/shed. These will be high velocity chimneys with an air speed of 15m/s.

### 4.3 ODOUR EMISSION RATES

Odour emission rates have been derived from the “*Technical Guidance Note, IPPC SRG6.02 (Farming), Integrated Pollution Prevention and Control, Odour Management at Intensive Livestock Installations, July 2003*”. Odour emission factors for poultry of “*Low emission system, with conveyor belt litter removal and forced drying*” range from 0.2 to 0.76 OU<sub>E</sub>/s/bird (Geometric mean: 0.35; Min: 0.20; and Max: 0.76 OU<sub>E</sub>/s/bird). The maximum odour emission factors of 0.76 OU<sub>E</sub>/s/bird has been used to produce a worst-case assessment.

Following the Scottish Environment Protection Agency (SEPA) recommendations, it is assumed that 90% of birds are kept in house and 10% of birds are free range.

Using the total number of birds for 16,000 and the odour emission factors of 0.76 OU<sub>E</sub>/s/bird, a total odour emission in OU<sub>E</sub>/s can be calculated for each poultry shed. The total odour emissions are then split into two portions: 90% of odour emits out of the shed through the ventilation fan stacks and 10% of odour emissions from the free-range birds.

The odour emissions from the free-range birds are assessed using an area of 30m x 30m with an odour emission rate of 1.35 OU<sub>E</sub>/m<sup>2</sup>/s.

In addition, odour emissions from the dung store have been included in the assessment to produce a worst-case assessment. The odour emission factors of 61 OU<sub>E</sub>/m<sup>2</sup>/s for dung store (manure storage area) are taken from the Sniffer ER26: Final Report, March 2014, SCAIL - Agriculture Update. The dung store has 150 to 200 tonnes storage capacity and has a surface area of 544 m<sup>2</sup>. The Sniffer ER26 states that decreases from the

raw emission rates can be made for covers of differing degrees to technology, for example, using engineering cover to achieve 90% reduction. As buildings are used to control the odour for dung store, therefore a 90% reduction factor has been used in the assessment, which is equivalent to an odour emission area of 55 m<sup>2</sup> with an odour emission factors of 61 OU<sub>E</sub>/m<sup>2</sup>/s.

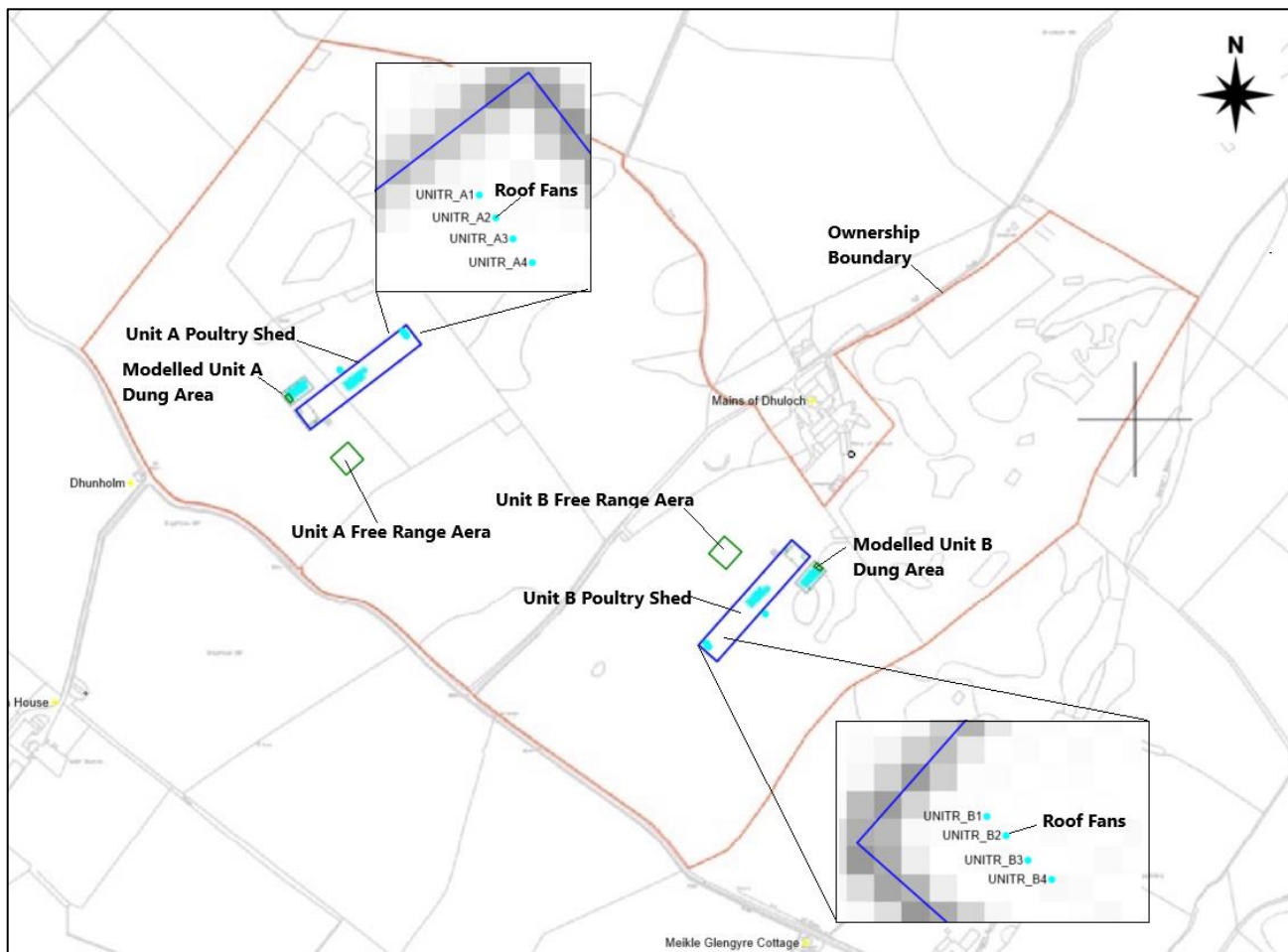
The details of the odour emission source and odour modelling parameters are presented in **Table 4-1**.

**Table 4-1. Odour Emission Rates**

Parameter	Emission Rate	Unit
Bird Numbers per Poultry Shed	16,000	Birds per Unit
Odour Emission Factor	0.76	OU <sub>E</sub> /s/birds
Total Odour Emission Rate per Poultry Shed	12,160	OU <sub>E</sub> /s
Odour Emission per Poultry Shed through Ventilation Fans/Stacks – 90%	10,944	OU <sub>E</sub> /s
Odour Emission from Free-Range Birds – 10%	1,216	OU <sub>E</sub> /s
<b>Ventilation Fans</b>		
No. of Roof Fans per Poultry Shed	4	2 fans are operating continuously and 2 fan are on and off. 4 fans have been assumed to be operating continuously to produce a worst-case assessment
Roof Fan Air Volume per Fan	36,700	m <sup>3</sup> /hr
Roof Fan Stack Velocity	15	m/s
Roof Fan Air Temperature	15	°C
Roof Fan Stack Diameter	0.93	m
Roof fan odour emission rate	2,272	OU <sub>E</sub> /s (per fan)
Heat Recovery Fan Air Volume per Fan	30,000	m <sup>3</sup> /hr
No. of Heat Recovery Fans per Poultry Shed	1	-
Heat Recovery Fan Outlet Velocity	12.27	m/s
Heat Recovery Fan Air Temperature	15	°C
Heat Recovery Fan Outlet Diameter	0.93	m
Heat Recovery fan odour emission rate	1,857	OU <sub>E</sub> /s (per fan)
<b>Free-Range Odour Emissions</b>		
Free-Range Odour Emission Assessed as an Area Source in Modelling. No. of Area per Poultry Shed	1	-
Odour Area Source Size	30m x 30m = 900	m <sup>2</sup>
Odour Emission Rate	1.35	OU <sub>E</sub> / m <sup>2</sup> /s
<b>Dung Store Odour Emissions</b>		
Dung Store Odour Emission Assessed as an Area Source in Modelling. No. of Area per Poultry Shed	1	-
Dung Store – Equivalent Odour Emission Area Size	55.0	m <sup>2</sup>
Dung Store Odour Emission Rate	61.0	OU <sub>E</sub> / m <sup>2</sup> /s

The modelled odour emission sources are shown in **Figure 4-1**.

**Figure 4-1. Modelled Odour Emission Sources**



## 4.4 RECEPTORS

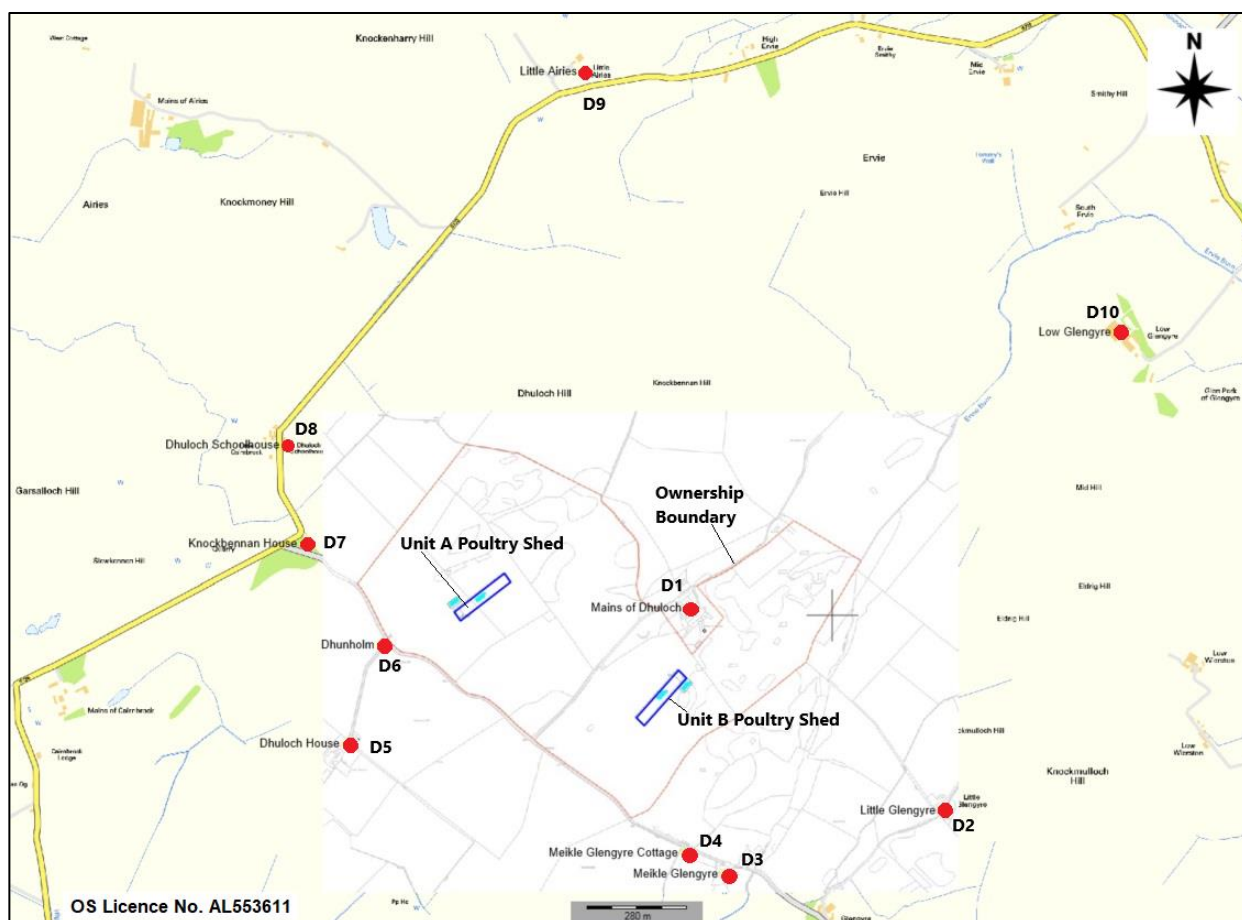
### 4.4.1 Discrete Receptors

The residential receptors surrounding the Proposed Development boundary have been incorporated into the modelling. The selected residential receptors are presented in **Table 4-2** and shown in **Figure 4-2**.

**Table 4-2. Modelled Sensitive Receptors**

Discrete Sensitive Receptor		UK NGR (m)		Bearing from site	Approx. distance from the nearest site boundary (m)
		X	Y		
D1	Mains of Dhuloch	199019	566177	Surrounded by the boundary	20
D2	Little Glengyre	199733	565606	E	550
D3	Meikle Glengyre	199122	565428	S	300
D4	Meikle Glengyre Cottage	199011	565488	S	150
D5	Dhuloch House	198056	565794	S	300
D6	Dhunholm	198152	566072	S	20
D7	Knockbennan House	197938	566358	W	190
D8	Dhuloch Schoolhouse	197885	566634	W	400
D9	Little Airies	198723	567685	N	1,080
D10	Mains of Dhuloch	200228	566951	NE	950

**Figure 4-2. Modelled Sensitive Receptor Locations**



### 4.4.2 Cartesian Grid Receptors

A Cartesian receptor grid has been used in the model in order to produce the concentration contour lines. The Cartesian receptor grid consists of receptors identified by their x (east-west) and y (north-south) coordinates.

The grid was constructed with grid spacing (x, y) of 50 m x 50 m over an area covering 3000 m by 2500 m with south-west corner UK NGR (m) of 197326, 565031.

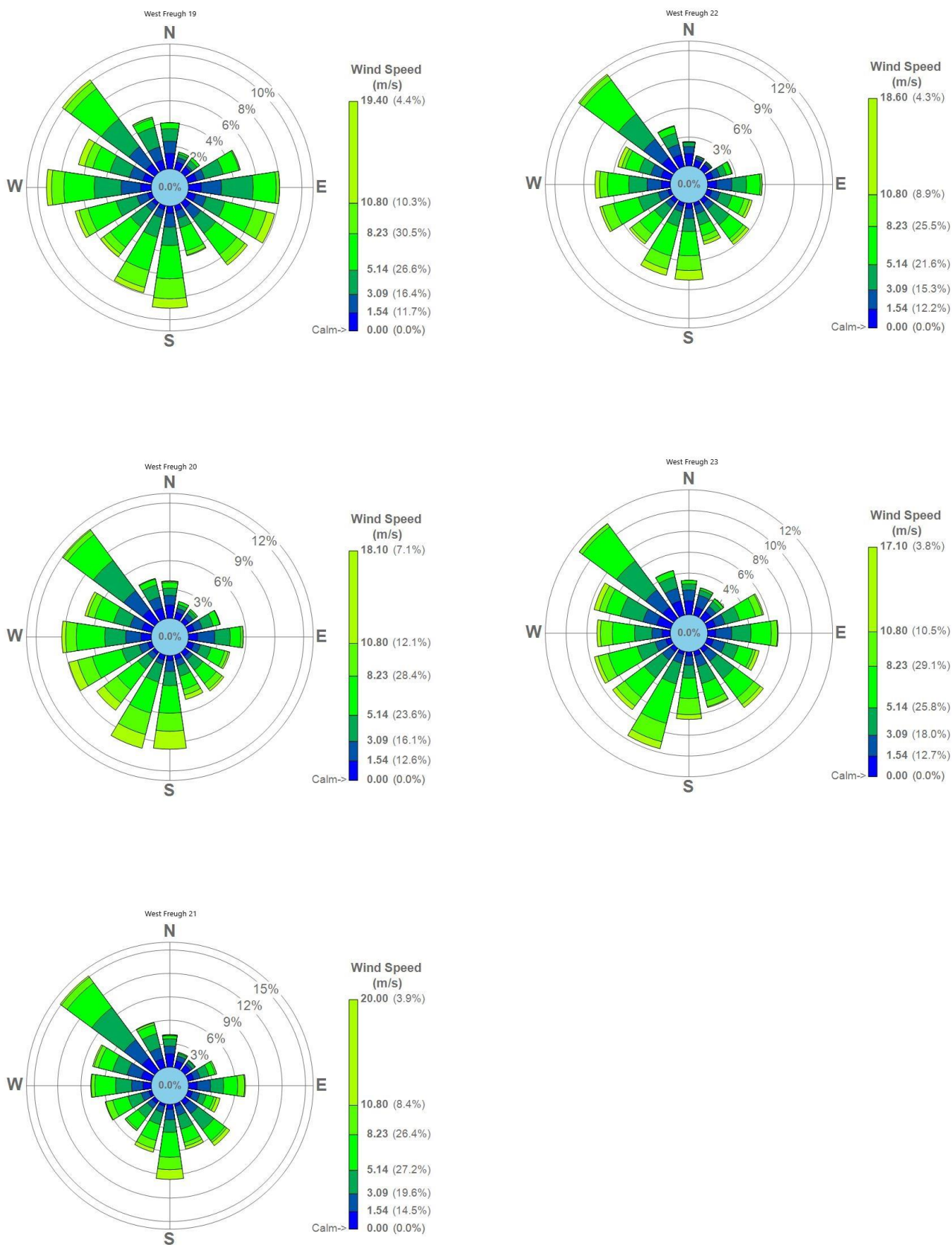
## 4.5 METEOROLOGICAL DATA

The 5-year meteorological data, which were used in the assessment, are derived from West Freugh weather station (34 km to the site) weather station, which is considered representative of conditions within the vicinity of the site. West Freugh has complete data from 2019 to 2023.

Reference should be made to **Figure 4-3** for an illustration of the prevalent wind conditions at the West Freugh weather station.



Figure 4-3. Meteorological Station Windrose





## 4.6 SURFACE CHARACTERISTICS

The land uses surrounding the site are described mainly as open fields/rural area . A conservative surface roughness value of 0.3 m for the agricultural area (max) has been used as it is considered that they are representative of the characteristics of the area surrounding the site.

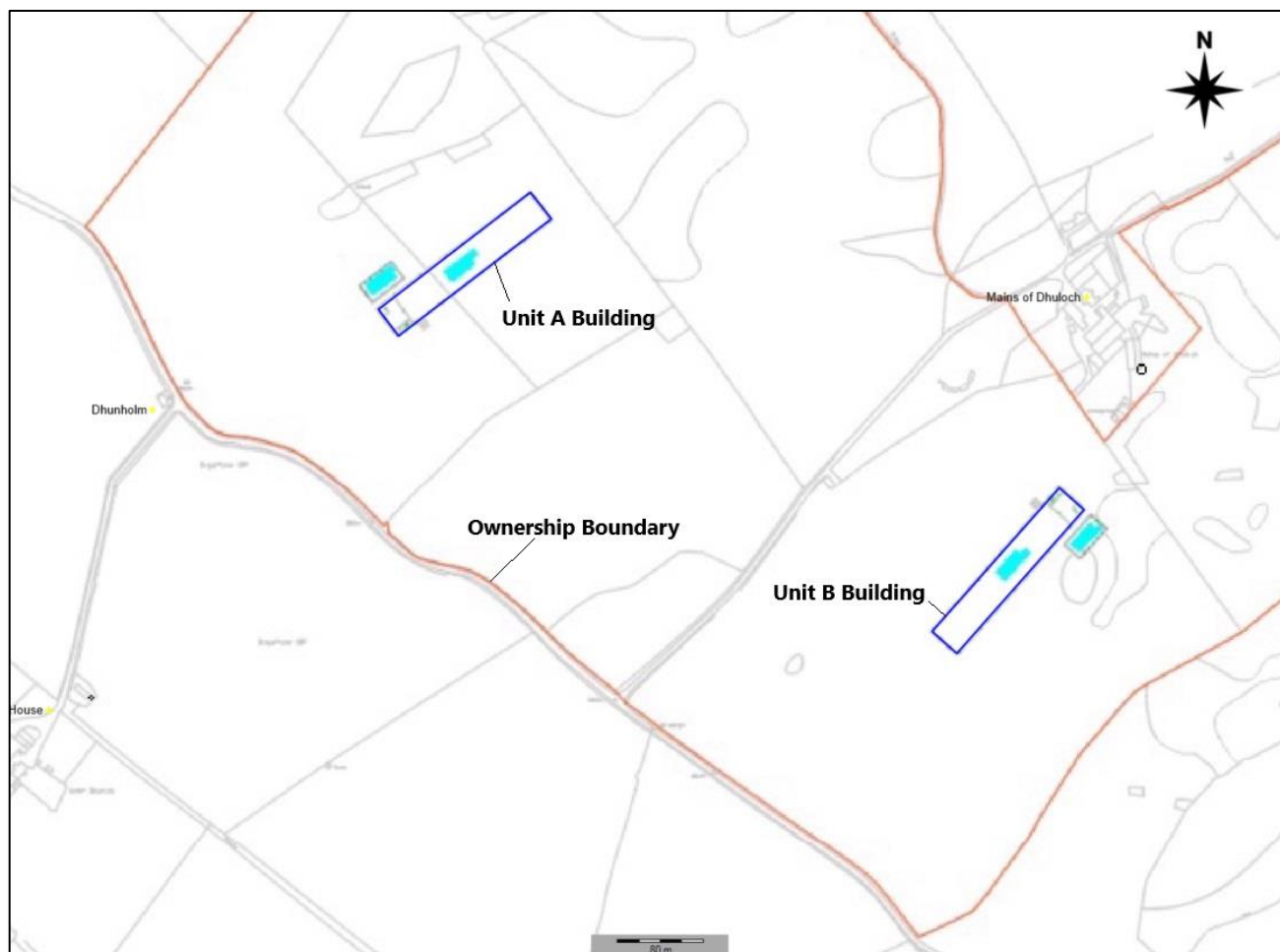
## 4.7 BUILDINGS IN THE MODELLING ASSESSMENT

Buildings nearby or immediately adjacent to the stack could potentially cause building downwash effects on emission sources and have therefore been modelled. The locations and dimensions of the buildings used in the model are given in **Table 4-3** and illustrated in **Figure 4-4**.

**Table 4-3.** Locations and Heights of Building Used in the Model

	Name	UK NGR (m)		Modelled Building Height (m)
		X	Y	
1	Unit A Poultry Shed Building	198362	566166	5.9
2	Unit B Poultry Shed Building	198875	565867	5.9

**Figure 4-4.** Buildings in the Model



## 4.8 TREATMENT OF TERRAIN

Two digital terrain files in the UK Ordnance Survey (OS) Landranger format (.NTF), which cover larger surrounding area of the proposed development, have been used in the assessment.

## 4.9 MODELLING UNCERTAINTY

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

- Model uncertainty - due to model limitations;
- Data uncertainty - including emissions estimates, background estimates and meteorology; and
- Variability - randomness of measurements used.

However, potential uncertainties in model results have been minimised as far as practicable and worst-case inputs considered in order to provide a robust assessment. This included the following:

- Choice of model - AERMOD is a commonly used atmospheric dispersion model and results have been verified through a number of studies to ensure predictions are as accurate as possible.
- Considering the site-specific topographic effects (due to being at the base of a quarry), it is believed that AERMOD is the most suitable model for this assessment. This is because that (1) there is no other suitable model available and (2) AERMOD has advanced building downwash and plume rise capabilities for dealing with the complex terrain and the structures/buildings near the emission sources.
- Facility operating parameters - Operational parameters were provided for the facility.
- Background concentrations - Background pollutant concentrations were obtained from a number of recognised sources in order to consider baseline levels in the vicinity of the site, as detailed within the main report text.
- Variability - All model inputs are as accurate as possible and worst-case conditions have been considered where necessary in order to ensure a robust assessment of potential pollutant concentrations.

## 5.0 ODOUR MODELLING RESULTS

The predicted ground level short-term odour concentrations were assessed using 2019 to 2023 met data. All predicted odour concentrations at identified receptors for five-year data have been compared to the relevant environmental assessment criteria in **Table 5-1**. The results are presented at the 98<sup>th</sup>ile of hourly averages (SEPA Odour Guidance 2010).

**Table 5-1.** The 98<sup>th</sup>ile Short-Term (Hourly) Concentrations of Odour at Each Receptor

		Predicted 98 <sup>th</sup> ile Short-Term (Hourly) PEC OU <sub>E</sub> /m <sup>3</sup> <sup>a</sup>				
Receptors		2019	2020	2021	2022	2023
D1	Mains of Dhuloch	0.84	0.83	0.76	0.74	0.82
D2	Little Glengyre	0.25	0.30	0.43	0.23	0.32
D3	Meikle Glengyre	0.57	0.66	0.69	0.65	0.63
D4	Meikle Glengyre Cottage	0.60	0.68	0.74	0.67	0.65
D5	Dhuloch House	0.37	0.36	0.44	0.30	0.43
D6	Dhunholm	1.02	0.86	1.04	0.78	1.17
D7	Knockbennan House	0.37	0.34	0.36	0.34	0.32
D8	Dhuloch Schoolhouse	0.22	0.16	0.23	0.15	0.18
D9	Little Airies	0.06	0.05	0.05	0.04	0.06
D10	Mains of Dhuloch	0.07	0.06	0.07	0.07	0.07
Odour Assessment Criteria		3.0 OU <sub>E</sub> /m <sup>3</sup>				

Note:

(a) There is no background for odour and hence the PC = PEC.

From the meteorological dataset the year resulting in maximum short-term odour PC concentration was identified as 2023 met data.

The predicted odour concentrations at each identified receptor using 2023 met data have been compared to the relevant environmental assessment criteria in **Table 5-2**.

**Table 5-2.** The 98<sup>th</sup>ile Short-Term (Hourly) Concentrations of Odour at Each Receptor

Receptors		X	Y	Predicted Hourly PEC OU <sub>E</sub> /m <sup>3</sup> – 2021 Met Data <sup>a</sup>	Odour Effect
D1	Mains of Dhuloch	199019	566177	0.82	Negligible
D2	Little Glengyre	199733	565606	0.32	Negligible
D3	Meikle Glengyre	199122	565428	0.63	Negligible
D4	Meikle Glengyre Cottage	199011	565488	0.65	Negligible
D5	Dhuloch House	198056	565794	0.43	Negligible
D6	Dhunholm	198152	566072	1.17	Negligible
D7	Knockbennan House	197938	566358	0.32	Negligible
D8	Dhuloch Schoolhouse	197885	566634	0.18	Negligible
D9	Little Airies	198723	567685	0.06	Negligible
D1	Mains of Dhuloch	200228	566951	0.07	Negligible

Notes:

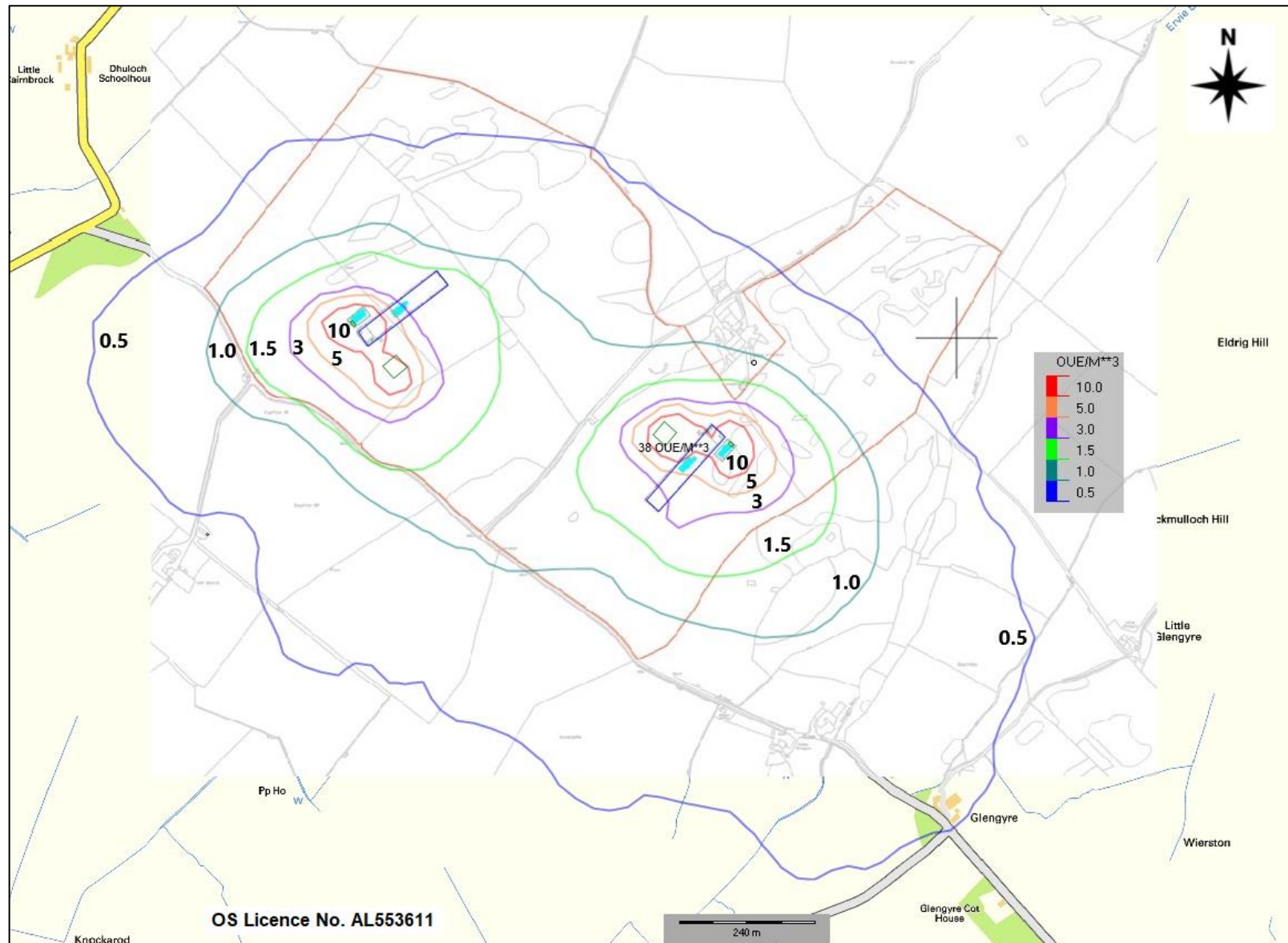
(a) There is no background for odour and hence the PC = PEC.

The results indicate that the maximum odour concentration at the identified receptors using 2023 meteorological data is 1.17 OU<sub>E</sub>/m<sup>3</sup> at Dhunholm (D6) receptors, which does not exceed the 3.0 OU<sub>E</sub>/m<sup>3</sup> assessment criteria/level. The predicted maximum predicted odour concentrations is 39% of the assessment criteria.

The odour effect on all sensitive receptors is considered to be 'negligible'. Therefore, the predicted short-term odour emissions from the proposed plant are considered acceptable.

The contour plots of the predicted odour concentrations for all receptors, including discrete and grid receptors using 2023 met data are presented in **Figure 5-1**. The contour plots show that the predicted maximum concentrations occur adjacent to the emission sources, for example, the poultry sheds and dung stores, with a predicted decrease in concentration with the increased distance from the emission sources.

Figure 5-1. The 98<sup>th</sup>ile Short-Term (Hourly) PC of Odour



## 6.0 SUMMARY AND CONCLUSION

Tetra Tech have undertaken an odour impact assessment in support of the planning application for a proposed egg production farm/plant at Mains of Dhuloch, Kirkcolm, Stranraer, DG9 0RF.

The objectives of the odour assessment are (1) to evaluate potential odour impact on the local area; (2) to determine whether the odour impacts from plant emissions meet the odour assessment criteria; and (3) to avoid causing potential adverse impacts on the amenity of sensitive receptors.

The detailed modelling results have been presented in terms of the emitted odour PC and PEC. AERMOD modelling was undertaken for the most representative meteorological dataset and the worst-case, highest predicted short-term PECs were compared to the appropriate odour assessment criteria.

### Odour Impact Assessment Results

The predicted odour concentrations using 5 year's meteorology data have been presented separately.

The odour impact assessment results indicate that the maximum odour concentration (from the worst year meteorological data modelled) at the identified receptor is  $1.17 \text{ OU}_E/\text{m}^3$ , which does not exceed the  $3.0 \text{ OU}_E/\text{m}^3$  assessment criteria at the 98<sup>th</sup> percentile. The odour effect on all sensitive receptors is considered to be 'negligible'. Therefore, the predicted short-term odour emissions from the proposed plant are considered acceptable.

In conclusion, the proposed egg production plant development is not considered to be contrary to any of the national and local planning policies regarding the odour amenity.