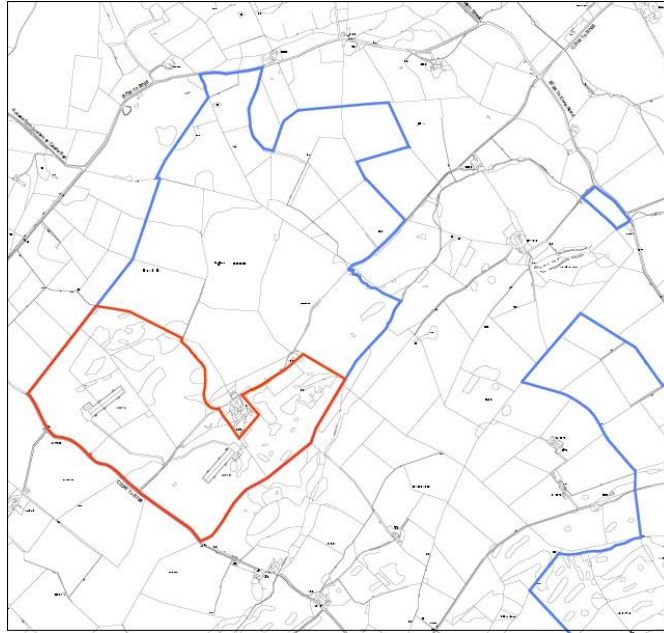


# Proposed Egg Production Plant, Mains of Dhuloch, Kirkcolm, Stranraer, DG9 0RF



## Ammonia Impact Assessment on Designated Habitats Using SCAIL-Agriculture

784-B067657  
19<sup>th</sup> December 2024

### PRESENTED TO

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## EXECUTIVE SUMMARY

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This report presents the findings of a SCAIL ammonia impact assessment undertaken to evaluate potential air quality effects on sensitive ecological designations (protected areas) like SSSIs and SACs in support of a PPC permit application for a proposed egg production plant at Mains of Dhuloch, Kirkcolm, Stranraer, DG9 0RF.

### SCAIL Input Discussions and Consultations with SEPA

Consultations and discussions with SEPA have been undertaken by means of Microsoft Teams meetings and email exchanges. Two Teams meetings have been held on 2<sup>nd</sup> August 2024 and 2<sup>nd</sup> September 2024 and attendances included SEPA, the proposed egg production plant developers and Tetra Tech. Following SCAIL input information have been reviewed and approved by SEPA during the discussions in the meeting and follow-up email exchanges:

- (1) Number of emission sources, including two bird sheds and two manure storage areas;
- (2) Ammonia emission rates for each source;
- (3) The calculated total ammonia rates;
- (4) SCAIL output interpretations;
- (5) On the subject of accumulative ammonia impact assessment, SEPA has confirmed that “*regarding the discussion on background concentrations the nearest PPC site would be Glenhead of Aldouran which is approximately 2.5km away from Mains of Dhuloch. This site will already be accounted for in the background as it was in operation before Jan 2022*”. Therefore, accumulative impact assessment is not required for this development.

### SCAIL Screening Assessment Scenarios

Two SCAIL screening assessment scenarios have been considered:

- (1) Scenario 1 – considering using the belt dry techniques to reduce ammonia emissions within the bird sheds/houses; and
- (2) Scenario 2 – Without using the belt dry methodology to reduce ammonia emissions within the bird sheds/houses.

### SCAIL Screening Assessment Results

The ammonia impact on the protected areas has been screened out for both assessment Scenarios and no more detailed modelling or site-specific investigation is required. There is non-exceedance of the PM<sub>10</sub> impact limit for both assessment Scenarios. The PM<sub>10</sub> impact on the surrounding receptor location is determined to be ‘insignificant’ in terms of the protection of human health.

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## ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
AQMA	Air Quality Management Area
AQO	Air Quality Objectives
AQS	Air Quality Standards
CEH	Centre for Ecology and Hydrology
CIEEM	Chartered Institute of Ecology and Environmental Management
CL/CLevel	Critical Level
CLe	Relevant Critical Levels
Clo/CLoad	Critical Loads
CLRTAP	Convention on Long-range Transboundary Air Pollution
DEFRA	Department for Environment Food & Rural Affairs
EA	Environment Agency
EAL	Environmental Assessment Limits
EC	European Commission
EPUK	Environmental Protection UK
EU	European Union
EUWA	European Union (Withdrawal) Act 2018
EPAQS	Expert Panel on Air Quality Standards
Ha	Hectare
IAQM	Institute of Air Quality Management
LA	Local Authority
LAQM	Local Air Quality Management
NGR	United Kingdom National Grid Reference
NO	Nitric Oxide
NO <sub>2</sub>	Nitrogen Dioxide
PC	Process Contribution
PEC	Predicted Environment Concentration
PM <sub>10</sub>	Particulate matter with an aerodynamic diameter of less than 10 µm
PM <sub>2.5</sub>	Particulate matter with an aerodynamic diameter of less than 2.5 µm
PPC	Pollution Prevention and Control
NH <sub>3</sub>	Ammonia
SAC	Special Areas of Conservation
SCAIL	Simple Calculation of Atmospheric Limits
SEPA	Scottish Environment Protection Agency
SPA	Special Protection Area
SSSI	Sites of Special Scientific Interest
TG	Technical Guidance
WHO	World Health Organization
UK	The United Kingdom

## 1.0 INTRODUCTION

This report presents the findings of a SCAIL ammonia impact assessment undertaken to evaluate potential air quality effects on sensitive ecological designations (protected areas) like SSSIs and SACs in support of a PPC permit application for a proposed egg production plant at Mains of Dhuloch, Kirkcolm, Stranraer, DG9 0RF.

The proposed egg production facility consists of 2 x poultry houses (158.9m x 30.6m each) and associated infrastructure.

### 1.1 PRE-APPLICATION CONSULTATION WITH SEPA

As the proposed development falls into PPC the applicant, a pro-application consultation has been undertaken with the Scottish Environment Protection Agency (SEPA).

SEPA has responded with following comments:

*“Regarding ammonia, we (SEPA) are required Under the Habitats Regulations (Conservation (Natural Habitats, &c.) Regulations 1994) and the Nature Conservation (Scotland) Act 2004 to ensure that there will be no adverse impact on any relevant designations from ammonia concentration, acid deposition and nutrient nitrogen deposition. Information on air emissions risk assessments is available on our website here. For the initial screening SEPA use SCAIL agriculture (this can also screen for PM<sub>10</sub>). If screening fails and detailed modelling is required, we (SEPA) recommend providing a methodology for SEPA comment in advance. ...”*

### 1.2 SCAIL-AGRICULTURE TOOL

A Simple Calculation of Atmospheric Limits (SCAIL) Assessment is a web-based tool used to screen potential air quality effects on sensitive ecological designations like SSSIs and SACs as a result of ammonia emissions from agricultural activities. These can include poultry housing, litter or farm-yard manure storage and slurry lagoons.

Emissions of ammonia (NH<sub>3</sub>) and their subsequent deposition to sensitive sites impose a major environmental burden both nationally and internationally (Bobbink et al., 1998, The effects of air-borne nitrogen pollutants on species diversity in natural and semi-natural European vegetation, J. Ecol., 86, 717-738). At a local scale the deposition of these pollutants can result in eutrophication of sensitive ecosystems and the acidification of soil. As part of the Habitats Directive, environmental regulators have a duty to consider the potential impacts of emissions from regulated industrial installations on designated European Sites. The SCAIL-Agriculture model was first developed by the Centre for Ecology and Hydrology (CEH) for the Environment Agency (EA). The model was subsequently modified for the Scottish Executive to provide a screening model that could help the Scottish Environmental Protection Agency (SEPA) assess permit applications (v2.0) (Theobald et al., 2009, A simple model for screening the local impacts of atmospheric ammonia. Science of the Total Environment Volume: 407 Issue: 23 Pages: 6024-6033). The model is used by environmental regulators throughout the UK to assess the impacts of agricultural installations on designated habitats including Habitats Directive sites and designated sites under National Legislation (SSSIs /ASSIs/NNRs). The objective is to screen environmental

permit applications from farm units and to assess impacts from agricultural developments applying for planning permission to determine if there is the possibility of adverse impacts. Should such impacts be found then this would indicate that more detailed dispersion and deposition modelling is required.

SCAIL-Agriculture produces an estimate of the ammonia concentrations at a certain distance downwind of the source, using a 'deposition velocity' specific to the habitat of interest. The model also estimates the potential for critical load exceedance at the nearest edge of the habitat, taking into account the background deposition at that location and the critical load of the habitat. To do this, the model uses both UK Critical Load/Level maps and habitat information held within the Air Pollution Information System (<https://www.apis.ac.uk/>).

### 1.3 SCAIL INPUT DISCUSSIONS AND MEETINGS WITH SEPA

Microsoft Teams meetings have been held with SEPA, the proposed egg production plant developers and Tetra Tech. Two Teams meetings took place on 2<sup>nd</sup> August 2024 and 2<sup>nd</sup> September 2024. Following SCAIL input information have been approved by SEPA:

- (1) Number of emission sources, including two bird sheds and two manure storage areas;
- (2) Ammonia emission rates for each source;
- (3) The number of identified protected areas;
- (4) The calculated total ammonia rates;
- (5) SCAIL output interpretations;
- (6) Accumulative ammonia impact assessment topic. SEPA has confirmed that: *"regarding the discussion on background concentrations the nearest PPC site would be Glenhead of Aldouran which is approximately 2.5km away from Mains of Dhuloch. This site will already be accounted for in the background as it was in operation before Jan 2022"*. Therefore, accumulative impact assessment is not required for this development.

### 1.4 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.

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

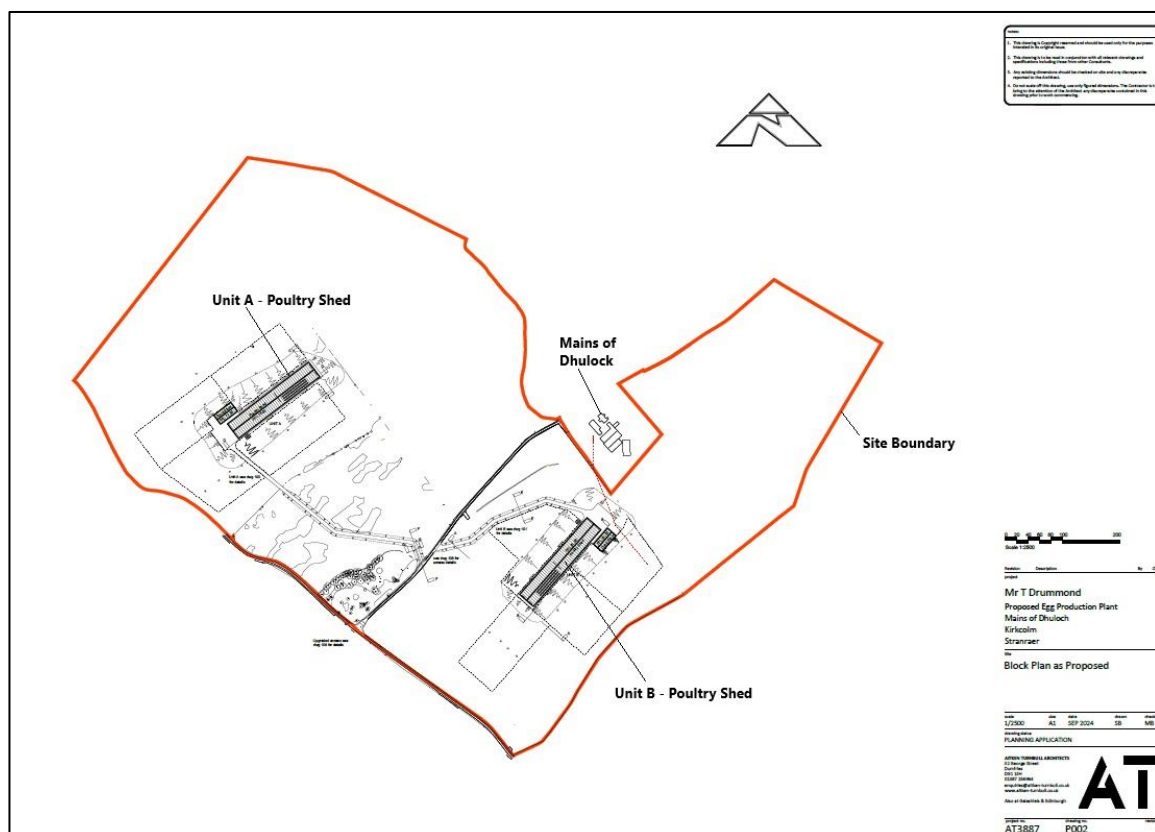


Figure 1-1. Satellite Image of Site and Surrounding Area



Google Imagery (2024)

Figure 1-2. Site Layout Plan



## 1.5 CONTEXT

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The primary ammonia emission sources associated with the proposed development site are from two bird houses and two manure storage areas.

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

- SCAIL input data discussions and consultations with SEPA;
- Identification of the Emission Sources;
- Identification of protected areas;
- Identification of sensitive receptors for PM<sub>10</sub> impact assessment;
- Identification of the Assessment Scenarios; and
- SCAIL result discussions and conclusions.

The results of the assessment are detailed in the following sections of this report.

## 1.6 REPORT STRUCTURE

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Following this introductory section, the remainder of this report is structured as follows:

- Section 2.0: Policy and Legislative Context
- Section 3.0: Baseline Conditions
- Section 4: SCAIL-Agriculture Input
- Section 5.0: SCAIL-Agriculture Results
- Section 6.0: Conclusions

## 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

- The Conservation (Natural Habitats, &C.) Regulations 1994, 30<sup>th</sup> October 1994;
- The Nature Conservation (Scotland) Act 2004, 11<sup>th</sup> June 2004;
- Air Emissions Risk Assessment for Environmental Permits, SEPA, May 2024;
- Guidance on Considering air pollution impacts in development management casework, Scottish Natural Heritage;
- The Air Quality Standards Regulations (Amendments), 2019;
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Defra, 2007;
- The Air Quality Strategy for England, Defra, 2023;
- The Environment Act 1995;
- The Environment Act 2021;
- 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;
- Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, 2017;
- A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Version 1.1), IAQM, May 2020;
- Ecological Assessment of Air Quality Impacts, CIEEM, Version 2, October 2023; and
- Local Air Quality Management Technical Guidance LAQM.TG(22), Defra, 2022.

#### Websites Consulted

- SEPA (<https://www.sepa.org.uk/>);
- SCAIL (SCAIL - Simple Calculation of Atmospheric Impact Limits (<https://www.scail.ceh.ac.uk/>));
- Google maps ([maps.google.co.uk](https://maps.google.co.uk/));
- The UK National Air Quality Archive ([www.airquality.co.uk](http://www.airquality.co.uk/));
- Multi-Agency Geographic Information for the Countryside (<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

- 2021 Air Quality Annual Progress Report (APR) for Dumfries and Galloway Council.

## 2.2 AIR QUALITY LEGISLATIVE FRAMEWORK

### European Legislation

European air quality legislation is consolidated under Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidates previous legislation which was designed to deal with specific pollutants in a consistent manner and provides new air quality objectives for fine particulates. The consolidated Directives include:

- **Directive 1999/30/EC** – the First Air Quality ‘Daughter’ Directive – sets ambient air limit values for NO<sub>2</sub> and oxides of nitrogen, sulphur dioxide, lead and PM<sub>10</sub>;
- **Directive 2000/69/EC** – the Second Air Quality ‘Daughter’ Directive – sets ambient air limit values for benzene and carbon monoxide; and,
- **Directive 2002/3/EC** – the Third Air Quality ‘Daughter’ Directive – seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

The fourth daughter Directive was not included within the consolidation and is described as:

- **Directive 2004/107/EC** – sets health-based limits on polycyclic aromatic hydrocarbons, cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable.

The European Commission (EC) Directive Limits, outlined above, have been transposed in the UK through the Air Quality Standards Regulations. In the UK responsibility for meeting ambient air quality limit values is devolved to the national administrations in England, Scotland, Wales and Northern Ireland.

The European Union (Withdrawal) Act 2018 (EUWA) provides a new framework for the continuity of 'retained EU law' in the UK. EU Directives no longer have to be implemented by the UK except to any extent agreed or decided by the UK unilaterally.

EUWA retains the domestic effect of EU Directives to the extent already implemented in UK law, by preserving the relevant domestic implementing legislation enacted in UK law before 'Implementation Period' completion day. Though the EU Directives are not retained, following the UK's departure from the EU, the EUWA converts the current framework of Air Quality targets, however the role that the EU instructions were party to are lost.

### UK and Scottish Legislation

The Air Quality Standards Regulations (Amendments 2016) seek to simplify air quality regulation and provide a new transposition of the Air Quality Framework Directive, First, Second and Third Daughter Directives and also transpose the Fourth Daughter Directive within the UK. The Air Quality Limit Values are transposed into the updated Regulations as Air Quality Standards, with attainment dates in line with the European Directives. SI 2010 No. 1001, Part 7 Regulation 31 extends powers, under Section 85(5) of the Environment Act (1995), for the Secretary of State to give directions to Local Authorities (LAs) for the implementation of these Directives.

The UK Air Quality Strategy is the method for implementation of the air quality limit values in England, Scotland, Wales and Northern Ireland and provides a framework for improving air quality and protecting human health from the effects of pollution.

For each nominated pollutant, the Air Quality Strategy sets clear, measurable, outdoor air quality standards and target dates by which these must be achieved; the combined standard and target date is referred to as the Air Quality Objective (AQO) for that pollutant. Adopted national standards are based on the recommendations of the Expert Panel on Air Quality Standards (EPAQS) and have been translated into a set of Statutory Objectives within the Air Quality (England) Regulations (2000) SI 928, and subsequent amendments. The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 amends the AQO for PM<sub>2.5</sub> outlined within the Air Quality Standards Regulations (2010 & 2016 Amendments).

The AQOs for pollutants included within the Air Quality Strategy and assessed as part of the scope of this report are presented in **Table 2-1**.

**Table 2-1.** Air Quality Standards, Objectives, Limits and Target Values

Pollutant	Applies	Objective	Concentration Measured as <sup>10</sup>	Date to be achieved and maintained thereafter
PM <sub>10</sub>	Scotland Only	50 µg/m <sup>3</sup> (not to be exceeded more than 7 times a year)	24-hour Mean	31 <sup>st</sup> December 2010
	Scotland Only	18 µg/m <sup>3</sup>	Annual Mean	31 <sup>st</sup> December 2010

### Ammonia Impact on Protected Areas

Guidance on 'Considering air pollution impacts in development management casework', Scottish Natural Heritage, April 2017, details dealing with planning casework involving air pollution issues. The guidance is helpful to developers with proposals requiring the assessment of air pollution impacts on protected areas.

The guidance details the methods for screening out ammonia impacts on protected areas. The distance from the development for a poultry unit is 10 km.

The site-relevant critical levels and critical loads have been set as below:

*"The screening process is the application of Site Relevant Critical Levels (CLE) and Critical Loads (CLO) to the qualifying features of the protected areas that are sensitive to air pollutants. CLE are the atmospheric concentration thresholds, and CLO the deposition rate thresholds, of a pollutant below which a habitat is unlikely to suffer any damage (see Box 1). CLE and CLO are referred to collectively below as CL."*

The site relevant critical levels and loads are provided in Box 1 within the guidance.

**Box 1 Site Relevant Critical Levels and Loads**

A **Critical Level** is the minimum concentration of a pollutant in the atmosphere ( $\mu\text{g}/\text{m}^3$ ) at which habitats may be affected. Critical levels are used to screen for direct impacts of ammonia gas (annual mean of  $1 \mu\text{g}/\text{m}^3$  for habitats containing lichens and bryophytes or  $3 \mu\text{g}/\text{m}^3$  for less sensitive higher plants). They also apply to nitrogen oxides ( $30 \mu\text{g}/\text{m}^3$ ) and sulphur dioxide ( $30 \mu\text{g}/\text{m}^3$  or  $20 \mu\text{g}/\text{m}^3$  for lichens), though in practice these thresholds are rarely breached.

A **Critical Load** is the minimum rate of deposition of a pollutant at which a habitat may be affected ( $\text{kg}/\text{ha}/\text{yr}$ ). Critical Loads are key to screening the impacts of nitrogen and acid deposition, and vary depending on the sensitivity of the habitat affected.

It is important to note that exceedance of Critical Levels or Loads doesn't necessarily mean that a habitat will be affected, but just that below these thresholds we can be confident that there won't be any effect.

**Ammonia Screening Criteria**

The guidance states that:

*"If the PEC of a pollutant does not exceed the CL for a feature, then the additional pollution predicted to arise from the development is unlikely to have an impact on the feature and it can be screened out of any further assessment. For many protected areas in Scotland and the rest of the UK, existing levels of pollutants to which they are exposed are close to or exceeding CL. In such circumstances, a new development may only make a small additional contribution to the overall exposure, and the screening stage allows for this. Where  $PC < 1T$  CL the contribution from the development is de minimis and can be screened out of any further assessment. Note that the PC estimates from the commonly used SCAIL-Agriculture screening tool are conservative, and the alternative de minimis screening threshold of  $PC < 4\%$  is normally applied."*



### SCAIL-Agriculture Screening Tool

SCAIL-Agriculture is the most commonly used screening tool for the short-range impacts of air emissions from intensive livestock unit, as detailed in Box 3 within the guidance.

#### **Box 3 SCAIL (Simple Calculation of Atmospheric Impact Limits)**

<http://www.scail.ceh.ac.uk>

SCAIL is a set of on-line screening tools used to consider the short range impact of air emissions. SCAIL-Agriculture is a tool for screening impacts from agricultural sources, including intensive livestock units. SCAIL-Combustion is the equivalent for screening combustion plants. The models were developed for SEPA and partners by CEH, and are maintained on CEH's web server. The tools are available to anyone for simple modelling of ammonia emissions close to protected areas.

The tools require details of the proposal. SCAIL-Agriculture requires details such as location, numbers of animals, type of housing and management of manure. SCAIL-Combustion requires details such as location, stack dimension and gas temperatures, velocities and emission rates. The models then calculate the increases in ammonia concentration and the rate of nitrogen and acid deposition on a specified protected area (Combustion), or on protected areas within a specified search radius (Agriculture), and compares these with the Site Relevant Critical Level/Loads for each sensitive habitat type within the protected areas.

The website includes a comprehensive user guide and an online tutorial that walks you through the data entry and results pages. The default results are for the closest point of the protected area to the proposed development, but specific grid references can be entered to examine particular feature locations within the protected area.

## 3.0 BASELINE CONDITIONS

### 3.1 AIR QUALITY REVIEW – PM<sub>10</sub> BACKGROUND

This section provides a review of the existing air quality in the vicinity of the application site in order to provide a benchmark against which to assess potential air quality impacts of the proposed development. Baseline air quality in the vicinity of the application site has been defined from several sources, as described in the following sections.

#### Local Air Quality Management (LAQM)

The proposed development site falls within the jurisdiction of Dumfries and Galloway Council.

The air quality in Dumfries & Galloway is generally very good and currently there are no designated Air Quality Management Areas (AQMAs).

The latest LAQM Annual Progress Report 2021 states: *“As a result of the 2018 monitoring no further PM<sub>10</sub> monitoring has carried out by Dumfries and Galloway Council in 2019 as further monitoring is not warranted.”*

#### Background Pollutant Mapping for PM<sub>10</sub>

Background concentrations were referenced from the UK National Air Quality Information Archive database based on the National Grid Co-ordinates of 1 x 1 km grid squares nearest to the site. Defra issued revised 2018 based background maps for PM<sub>10</sub>.

The updated mapped background concentrations adjacent to the site are summarised in **Table 3-1** below.

**Table 3-1.** Predicted Background Concentrations for 2023

Grid Reference (m)		2023 Predicted Background Concentration (µg/m <sup>3</sup> )
X	Y	PM <sub>10</sub>
198500	566500	7.07

**Table 3-1** indicates that there were no background exceedances of the relevant AQOs within the vicinity of the proposed development site during 2023.

### 3.2 PRETECTED AREA RECEPTORS – FOR SCAIL SCREENING

SCAIL-Agriculture Screening Tool has identified 4 protected areas within 10 km of the proposed development, as presented in **Table 3-2**.

**Table 3-2.** The Protected Areas and The Ecological Receptors

Site Code	Site Name	Habitat Type	X	Y
1401	Salt Pans Bay	SSSI	196949	561596
407	Corsewall Point to Milleur Point	SSSI	198015	572184
UK9003351	Glen App and Galloway Moors	SPA	206714	568758
8162	Glen App and Galloway Moors	SSSI	206714	568758



### 3.3 SENSITIVE RECEPTORS – SCAIL SCREENING FOR PM<sub>10</sub>

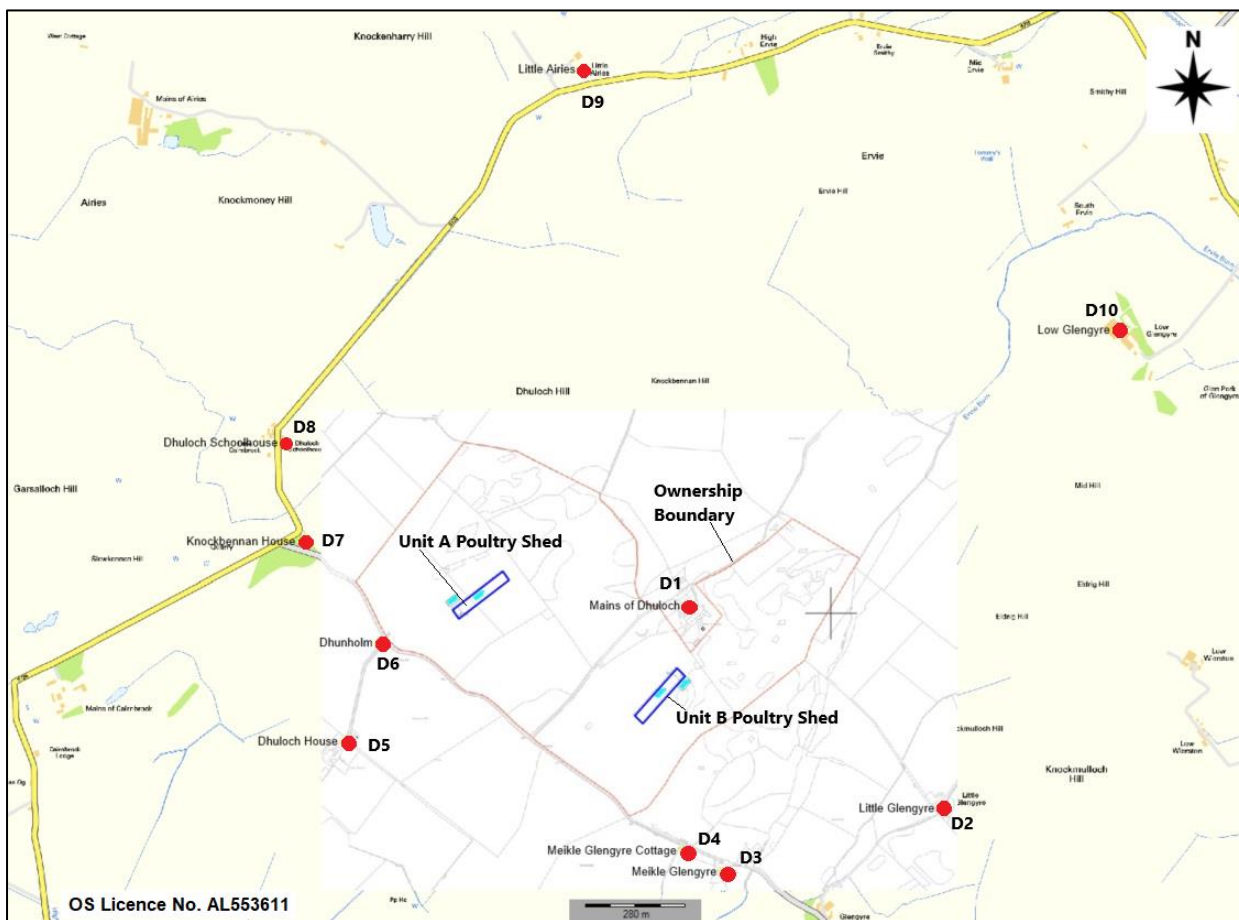
Receptors that are considered as part of the air quality assessment are primarily those existing receptors that are adjacent to the proposed development.

The existing receptor locations are summarised in **Table 3-3** and the spatial locations of all of the receptors are illustrated in **Figure 3-1**.

**Table 3-3.** Modelled Sensitive Receptor Locations

Existing Sensitive Receptor		Type	X	Y
D1	Mains of Dhuloch	Residential	199037	566132
D2	Little Glengyre	Residential	199733	565606
D3	Meikle Glengyre	Residential	199122	565428
D4	Meikle Glengyre Cottage	Residential	199011	565488
D5	Dhuloch House	Residential	198056	565794
D6	Dhunholm	Residential	198152	566072
D7	Knockbennan House	Residential	197938	566358
D8	Dhuloch Schoolhouse	Residential	197885	566634
D9	Little Airies	Residential	198723	567685
D10	Low Glengyre	Residential	200228	566951

**Figure 3-1.** Sensitive Receptors Location – For PM<sub>10</sub> Assessment



## 4.0 SCAIL- AGRICULTURE INPUT

### 4.1 EMISSION SOURCES FOR SCAIL

The ammonia SCAIL screening assessment considers 4 emission sources:

- (1) Bird House No.1;
- (2) Bird House No.2;
- (3) Manure storage area associated with Bird House No. 1; and
- (4) Manure storage area associated with Bird House No. 2.

### 4.2 SCAIL SCREENING ASSESSMENT SCENARIOS

Two SCAIL screening assessment scenarios have been considered:

- (1) Scenario 1 – considering using the belt dry techniques to reduce ammonia emissions; and
- (2) Scenario 2 – Without using the belt dry methodology to reduce ammonia emissions.

### 4.3 SCAIL SCREENING ASSESSMENT INPUT

The details of the ammonia emission rate calculations for two bird houses are presented in **Table 4-1**.

**Table 4-1.** Birds House Ammonia Emission Rate Calculations.

Parameter	Emission Rate: Scenario 1 Using the Belt Dry Techniques	Emission Rate: Scenario 2 Without Using the Belt Dry Techniques	Unit
Total birds per house	64,000	64,000	Birds
90% Birds in house	57600	57600	Birds
10% Birds Free Range	6400	6400	Birds
Ammonia Emission Factor for Birds in House	0.08	0.08	kg NH <sub>3</sub> /animal place/year
Ammonia Emission Factor for Birds as Free Range	0.22	0.22	kg NH <sub>3</sub> /animal place/year
NH <sub>3</sub> Mass Emission from Birds in house	4608	1843 (after applying for 60% reduction)	kg NH <sub>3</sub> /year
NH <sub>3</sub> Mass Emission from Birds Free Range	1408	1408	kg NH <sub>3</sub> /year
Total NH <sub>3</sub> Mass Emissions – 2 Bird Houses	6016	3251	kg NH <sub>3</sub> /year

The details of the SCAIL input data/parameters for Scenario 1 are presented in **Figure 4-1** to **Figure 4-4**, using the SCAIL tool screenshots.

Figure 4-1. House No. 1 SCAIL Input – Scenario 1

[LOAD INPUT DATA](#)

### Project Details

Project Notes [?](#) Mains of Dhuloch - 2 new FR sheds 128 000 All HH receptors, user defined. No reductions, Manure stores

Project Run Mode [?](#) ☐ Hybrid Met ☒ Conservative Met ☐ Realistic Met

### Location Details

Select Country [?](#) Scotland

### Installation Details

Installation [?](#) 1

Installation Name [?](#) Mains of Dhuloch

Installation Location [?](#) 198925,566034 ☐ Landranger ☒ x,y

[CHOOSE/VERIFY LOCATION](#) [?](#)

### Source Details

Source [?](#) 1

Source [?](#) ☐ Pig ☐ Poultry ☐ Cattle ☒ User defined emissions

New or Existing Source [?](#) New

Source Name [?](#) Bird House 1

Source Location [?](#) Provides a link to GoogleMaps to check the location.

198925,566034

☐ Landranger ☒ x,y

[VERIFY LOCATION](#) [?](#)

Source Type [?](#) Housing

Housing Floor Area [?](#)  m<sup>2</sup>

---

NH<sub>3</sub> emission (kg) [?](#) 6016

(comment)

PM<sub>10</sub> emission (kg) [?](#) 2112

(comment)

Odour emission (kOu) [?](#) 857393

(comment)

---

Naturally Vented ☐

Building Height 7.1 m

Fan Location [?](#) Roof

No. of Fans (optional) [?](#) 5

Fan Diameter [?](#) 0.92 m

Fan Flowrate [?](#) 10.19 m<sup>3</sup>/s

Total emissions [?](#)

Pollutant	Source Emissions	Running total of all emission sources	Units
NH <sub>3</sub>	6016	12084	(kg)
PM <sub>10</sub>	2112	4224	(kg)
Odour	857393	856066265	(kOu)

[GET EMISSIONS VALUES](#) [?](#)

Figure 4-2. House No. 2 SCAIL Input – Scenario 1

**Project Details**

Project Notes ⓘ

Project Run Mode ⓘ ☐ Hybrid Met ☒ Conservative Met ☐ Realistic Met

**Location Details**

Select Country ⓘ

**Installation Details**

Installation ⓘ

Installation Name ⓘ

Installation Location ⓘ  ☐ Landranger ☒ x,y

**Source Details**

Source ⓘ

Source ⓘ ☐ Pig ☐ Poultry ☐ Cattle ☒ User defined emissions

New or Existing Source ⓘ

Source Name ⓘ

Source Location ⓘ Provides a link to GoogleMaps to check the location.  
 ☐ Landranger ☒ x,y

Source Type ⓘ

Housing Floor Area ⓘ  m<sup>2</sup>

NH<sub>3</sub> emission (kg) ⓘ   
(comment)

PM<sub>10</sub> emission (kg) ⓘ   
(comment)

Odour emission (kOu) ⓘ   
(comment)

Naturally Vented ☐

Building Height  m

Fan Location ⓘ

No. of Fans (optional) ⓘ

Fan Diameter ⓘ  m

Fan Flowrate ⓘ  m<sup>3</sup>/s

Total emissions ⓘ

Pollutant	Source Emissions	Running total of all emission sources	Units
NH <sub>3</sub>	6016	12984	(kg)
PM <sub>10</sub>	2112	4224	(kg)
Odour	85730472	856066265	(kOu)

Figure 4-3. Manure Storage Area for Birds House No.1 SCAIL Input – Scenario 1

[LOAD INPUT DATA](#)

---

### Project Details

Project Notes [?](#) Mains of Dhuloch - 2 new FR sheds 128 000 All HH receptors, user defined. No reductions, Manure stores

Project Run Mode [?](#) ☐ Hybrid Met ☒ Conservative Met ☐ Realistic Met

---

### Location Details

Select Country [?](#) Scotland

---

### Installation Details

Installation [?](#) 1

Installation Name [?](#) Mains of Dhuloch

Installation Location [?](#) 198925,566034 ☐ Landranger ☒ x,y [CHOOSE/VERIFY LOCATION](#)

---

### Source Details

Source [?](#) 3

Source [?](#) ☐ Pig ☒ Poultry ☐ Cattle ☐ User defined emissions

New or Existing Source [?](#) New

Source Name [?](#) Manure Store House 1

Source Location [?](#) Provides a link to GoogleMaps to check the location.  
198940,566034 ☐ Landranger ☒ x,y [VERIFY LOCATION](#)

Source Type [?](#) Litter / Manure storage

Type [?](#) Manure - belts

NH<sub>3</sub> emission (kg) [?](#) 476  
 (comment)

PM<sub>10</sub> emission (kg) [?](#) 0  
 (comment)

Odour emission (kDu) [?](#) 384739200  
 (comment)

Tonnes Fresh Manure (t) [?](#) 200

Area of Storage (m2) [?](#) 615

---

### Total emissions [?](#)

Pollutant	Source Emissions	Running total of all emission sources	Units
NH <sub>3</sub> :	476	12984	(kg)
PM <sub>10</sub> :	0	4224	(kg)
Odour:	384739200	856066265	(kDu)

[GET EMISSIONS VALUES](#)

Figure 4-4. Manure Storage Area for Birds House No.2 SCAIL Input – Scenario 1

[LOAD INPUT DATA](#)

### Project Details

Project Notes [?](#) Mains of Dhuloch - 2 new FR sheds 128 000 All HH receptors, user defined. No reductions, Manure stores

Project Run Mode [?](#) ☐ Hybrid Met ☒ Conservative Met ☐ Realistic Met

### Location Details

Select Country [?](#) Scotland

### Installation Details

Installation [?](#) 1

Installation Name [?](#) Mains of Dhuloch

Installation Location [?](#) 198925,566034 ☐ Landranger ☒ x,y  
[CHOOSE/VERIFY LOCATION](#) [?](#)

### Source Details

Source [?](#) 4

Source [?](#) ☐ Pig ☒ Poultry ☐ Cattle ☐ User defined emissions

New or Existing Source [?](#) New

Source Name [?](#) Manure store house 2

Source Location [?](#) Provides a link to GoogleMaps to check the location.  
198435,566173 ☐ Landranger ☒ x,y  
[VERIFY LOCATION](#) [?](#)

Source Type [?](#) Litter / Manure storage

Type [?](#) Manure - belts

NH<sub>3</sub> emission (kg) [?](#) 476  
 (comment)

PM<sub>10</sub> emission (kg) [?](#) 0  
 (comment)

Odour emission (kOu) [?](#) 384739200  
 (comment)

Tonnes Fresh Manure (t) [?](#) 200

Area of Storage (m2) [?](#) 615

### Total emissions [?](#)

Pollutant	Source Emissions	Running total of all emission sources	Units
NH <sub>3</sub> :	476	12984	(kg)
PM <sub>10</sub> :	0	4224	(kg)
Odour:	384739200	856066265	(kOu)

[GET EMISSIONS VALUES](#) [?](#)

The details of the SCAIL input data/parameters for Scenario 2 are presented in **Figure 4-5** to **Figure 4-8**, using the SCAIL tool screenshots.

**Figure 4-5.** House No. 1 SCAIL Input – Scenario 2

[LOAD INPUT DATA](#)

### Project Details

Project Notes [?](#) Mains of Dhuloch - 2 new FR sheds 128 000 All HH receptors, user defined. 60% reduction for belt dry, manure stores

Project Run Mode [?](#) ☐ Hybrid Met ☒ Conservative Met ☐ Realistic Met

### Location Details

Select Country [?](#) Scotland ▼

### Installation Details

Installation [?](#) 1 ▼

Installation Name [?](#) Mains of Dhuloch

Installation Location [?](#) 198925,566034 ☐ Landranger ☒ x,y  
[CHOOSE/VERIFY LOCATION](#) [?](#)

### Source Details

Source [?](#) 1 ▼ ✖

Source [?](#) ☐ Pig ☐ Poultry ☐ Cattle ☒ User defined emissions

New or Existing Source [?](#) New ▼

Source Name [?](#) Bird House 1

Source Location [?](#) Provides a link to GoogleMaps to check the location.  
198925,566034 ☐ Landranger ☒ x,y  
[VERIFY LOCATION](#) [?](#)

Source Type [?](#) Housing ▼

Housing Floor Area [?](#)  m<sup>2</sup>

NH<sub>3</sub> emission (kg) [?](#) 3200

(comment)

PM<sub>10</sub> emission (kg) [?](#) 2112

(comment)

Odour emission (kOu) [?](#) 857393

(comment)

Naturally Vented ☐

Building Height 7.1 m

Fan Location [?](#) Roof ▼

No. of Fans (optional) [?](#) 5

Fan Diameter [?](#) 0.92 m

Fan Flowrate [?](#) 10.19 m<sup>3</sup>/s

Total emissions [?](#)

Pollutant	Source Emissions	Running total of all emission sources	Units
NH <sub>3</sub> :	3200	7352	(kg)
PM <sub>10</sub> :	2112	4224	(kg)
Odour:	857393	85666265	(kOu)

[GET EMISSIONS VALUES](#) [?](#)

Figure 4-6. House No. 2 SCAIL Input – Scenario 2

[LOAD INPUT DATA](#)

### Project Details

Project Notes [?](#) Mains of Dhuloch - 2 new FR sheds 128 000 All HH receptors, user defined. 60% reduction for belt dry, manure stores

Project Run Mode [?](#) ☐ Hybrid Met ☒ Conservative Met ☐ Realistic Met

### Location Details

Select Country [?](#) Scotland

### Installation Details

Installation [?](#) 1

Installation Name [?](#) Mains of Dhuloch

Installation Location [?](#) 198925,566034 ☐ Landranger ☒ x,y [CHOOSE/VERIFY LOCATION](#) [?](#)

### Source Details

Source [?](#) 2

Source [?](#) ☐ Pig ☐ Poultry ☐ Cattle ☒ User defined emissions

New or Existing Source [?](#) New

Source Name [?](#) Bird House 2

Source Location [?](#) Provides a link to GoogleMaps to check the location.

198463,566211 ☐ Landranger ☒ x,y [VERIFY LOCATION](#) [?](#)

Source Type [?](#) Housing

Housing Floor Area [?](#)  m<sup>2</sup>

NH<sub>3</sub> emission (kg) [?](#) 3200

(comment)

PM<sub>10</sub> emission (kg) [?](#) 2112

(comment)

Odour emission (kOu) [?](#) 85730472

(comment)

Naturally Vented ☐

Building Height 7.1 m

Fan Location [?](#) Roof

No. of Fans (optional) [?](#) 5

Fan Diameter [?](#) 0.92 m

Fan Flowrate [?](#) 10.19 m<sup>3</sup>/s

Total emissions [?](#)

Pollutant	Source Emissions	Running total of all emission sources	Units
NH <sub>3</sub> :	3200	7352	(kg)
PM <sub>10</sub> :	2112	4224	(kg)
Odour:	85730472	85606265	(kOu)

[GET EMISSIONS VALUES](#) [?](#)



Figure 4-7. Manure Storage Area for Birds House No.1 SCAIL Input – Scenario 2

[LOAD INPUT DATA](#)

### Project Details

Project Notes [?](#) Mains of Dhuloch - 2 new FR sheds 128 000 All HH receptors, user defined. 60% reduction for belt dry, manure stores

Project Run Mode [?](#) ☐ Hybrid Met ☒ Conservative Met ☐ Realistic Met

### Location Details

Select Country [?](#) Scotland

### Installation Details

Installation [?](#) 1

Installation Name [?](#) Mains of Dhuloch

Installation Location [?](#) 198925,566034 ☐ Landranger ☒ x,y  
[CHOOSE/VERIFY LOCATION](#) [?](#)

### Source Details

Source [?](#) 3

Source [?](#) ☐ Pig ☒ Poultry ☐ Cattle ☐ User defined emissions

New or Existing Source [?](#) New

Source Name [?](#) Manure Store 1

Source Location [?](#) Provides a link to GoogleMaps to check the location.  
198940,566034 ☐ Landranger ☒ x,y  
[VERIFY LOCATION](#) [?](#)

Source Type [?](#) Litter / Manure storage

Type [?](#) Manure - belts

NH<sub>3</sub> emission (kg) [?](#) 476  
(comment)

PM<sub>10</sub> emission (kg) [?](#) 0  
(comment)

Odour emission (kDu) [?](#) 384739200  
(comment)

Tonnes Fresh Manure (t) [?](#) 200

Area of Storage (m<sup>2</sup>) [?](#) 615

Total emissions [?](#)

Pollutant	Source Emissions	Running total of all emission sources	Units
NH <sub>3</sub> :	476	7352	(kg)
PM <sub>10</sub> :	0	4224	(kg)
Odour:	384739200	856066265	(kDu)

[GET EMISSIONS VALUES](#) [?](#)

Figure 4-8. Manure Storage Area for Birds House No.2 SCAIL Input – Scenario 2

[LOAD INPUT DATA](#)

### Project Details

Project Notes [?](#) Mains of Dhuloch - 2 new FR sheds 128 000 All HH receptors, user defined. 60% reduction for belt dry, manure stores

Project Run Mode [?](#) ☐ Hybrid Met ☒ Conservative Met ☐ Realistic Met

### Location Details

Select Country [?](#) Scotland

### Installation Details

Installation [?](#) 1

Installation Name [?](#) Mains of Dhuloch

Installation Location [?](#) 198925,566034 ☐ Landranger ☒ x,y  
[CHOOSE/VERIFY LOCATION](#) [?](#)

### Source Details

Source [?](#) 4

Source [?](#) ☐ Pig ☒ Poultry ☐ Cattle ☐ User defined emissions

New or Existing Source [?](#) New

Source Name [?](#) Manure store 2

Source Location [?](#) Provides a link to GoogleMaps to check the location.  
198435,566173 ☐ Landranger ☒ x,y  
[VERIFY LOCATION](#) [?](#)

Source Type [?](#) Litter / Manure storage

Type [?](#) Manure - belts

NH<sub>3</sub> emission (kg) [?](#) 476  
 (comment)

PM<sub>10</sub> emission (kg) [?](#) 0  
 (comment)

Odour emission (kOu) [?](#) 384739200  
 (comment)

Tonnes Fresh Manure (t) [?](#) 200

Area of Storage (m2) [?](#) 615

### Total emissions [?](#)

Pollutant	Source Emissions	Running total of all emission sources	Units
NH <sub>3</sub> :	476	7352	(kg)
PM <sub>10</sub> :	0	4224	(kg)
Odour:	384739200	856066265	(kOu)

[GET EMISSIONS VALUES](#) [?](#)

## 5.0 SCAIL- AGRICULTURE RESULTS

### 5.1 AMMONIA SCAIL SCREENING RESULTS – SCENARIO 1 – USING BELT DRY TECHNOLOGY

The ammonia SCAIL screening results are presented in **Table 5-1**.

The ammonia SCAIL screening results for Scenario 1 are summarised as below:

- (1) The process contributions (PCs) of  $\text{NH}_3$  at the four protected areas range from 0.012 to 0.024  $\mu\text{g}/\text{m}^3$ , which range from 0.405% to 0.794% of the 'NH<sub>3</sub> PC to CLevel'. As the '% of NH<sub>3</sub> PCs to CLevel' are all below 1%, the ammonia impact on those protected areas has been screened out and no more detailed modelling or site-specific investigation is required;
- (2) The predicted environmental concentrations (PECs) of  $\text{NH}_3$  at the four protected areas range from 0.77 to 1.22  $\mu\text{g}/\text{m}^3$ . The '% of NH<sub>3</sub> PECs to CLevel' are range from 25.74% to 40.79%. Therefore, there is non-exceedance of the habitat's impact limit; and
- (3) The predicted 'PC ACID\_DEP (kEqH+/ha/yr)' of  $\text{NH}_3$  at the four protected areas range from 0.004 to 0.009 kEqH+/ha/yr. The '% of Adep PEC to CLoad' are 96.45%. There is non-exceedance of the habitat's impact limit. Therefore, no more detailed modelling or site-specific investigation is required.

Table 5-1. Ammonia SCAIL Results – Scenario 1

Receptors	Name	PC NH <sub>3</sub> (ug m-3)	NH <sub>3</sub> Background (ug m-3)	NH <sub>3</sub> PEC (ug m-3)	NH <sub>3</sub> EAL (ug m-3)	% of NH <sub>3</sub> PC to CLevel	% of NH <sub>3</sub> PEC to CLevel
11	Salt Pans Bay	0.024	1.2	1.22	1-3	0.794	40.794
12	Corsewall Point to Milleur Point	0.017	0.97	0.99	1-3	0.581	32.914
13	Glen App and Galloway Moors	0.012	0.76	0.77	1-3	0.405	25.738
14	Glen App and Galloway Moors	0.012	0.76	0.77	1-3	0.405	25.738
Receptors	PC NDEP (kg/ha/yr)	NDEP Background (kg/ha/yr)	NDEP TOTAL (kg/ha/yr)	NDEP CLOAD (kg/ha/yr)	NITROGEN_HABITAT	% of Ndep PC to CLoad	% of Ndep PEC to CLoad
11	0.12	11.82	11.94	0	Maritime cliff		
12	0.09	10.11	10.2	0	No sensitive habitat or species at this site		
13	0.06	11.59	11.65	5	Circus cyaneus	1.2	233
14	0.06	11.59	11.65	5	Hen harrier (Circus cyaneus) breeding	1.2	233
Receptors	PC ACID_DEP (kEqH+/ha/yr)	ACID_DEP Background (kEqH+/ha/yr)	ACID_DEP TOTAL (kEqH+/ha/yr)	ACID_DEP CLOAD (kEqH+/ha/yr)	ACID_HABITAT	% of Adep PC to CLoad	% of Adep PEC to CLoad
11	0.009	0	0.009	0	No sensitive habitat or species at this site		
12	0.006	0.8	0.806	0	No sensitive habitat or species at this site		
13	0.004	0.921	0.925	0.959	Circus cyaneus	0.417	96.455
14	0.004	0.921	0.925	0.959	Hen harrier (Circus cyaneus) breeding	0.417	96.455

## 5.2 PM<sub>10</sub> SCAIL RESULTS – SCENARIO 1 – USING BELT DRY TECHNOLOGY

The PM<sub>10</sub> SCAIL results for Scenario 1 are presented in **Table 5-2** and summarised as below:

- (1) The percentage change in the process concentrations relative to the long-term AQS at all receptor locations, with respect to PM<sub>10</sub> exposure, are determined to range from 0.04 to 0.77 µg/m<sup>3</sup>. The 'PM<sub>10</sub> %PC of EAL' range from 0.22% to 4.28% of the long-term AQS; and
- (2) The predicted long-term PEC of PM<sub>10</sub> range from 6.11 to 6.90 µg/m<sup>3</sup>. The 'PM<sub>10</sub> %PEC of EAL' range from 33.94% to 38.33% of the long-term AQS. There is non-exceedance of the PM<sub>10</sub> impact limit. The PM<sub>10</sub> impact on the surrounding receptor location is determined to be 'insignificant' for the protection of human health.

**Table 5-2.** PM<sub>10</sub> SCAIL Results – Scenario 1

Receptors	Name	PC PM <sub>10</sub> (ug m-3)	PM <sub>10</sub> Background (ug m-3)	PM <sub>10</sub> PEC (ug m-3)	PM <sub>10</sub> EAL (ug m-3)	PM <sub>10</sub> %PC of EAL	PM <sub>10</sub> %PEC of EAL
1	Mains of Dhuloch	0.77	6.13	6.90	18	4.28	38.33
2	Little Glengyre	0.09	6.26	6.35	18	0.50	35.28
3	Meikle Glengyre	0.14	6.26	6.40	18	0.78	35.56
4	Meikle Glengyre Cottage	0.17	6.26	6.43	18	0.94	35.72
5	Dhuloch House	0.09	6.07	6.16	18	0.50	34.22
6	Dhunholm	0.11	6.05	6.16	18	0.61	34.22
7	Knockbennan House	0.07	6.05	6.12	18	0.39	34.00
8	Dhuloch Schoolhouse	0.06	6.05	6.11	18	0.33	33.94
9	Little Airies	0.04	6.12	6.16	18	0.22	34.22
10	Low Glengyre	0.04	6.62	6.66	18	0.22	37.00

### 5.3 AMMONIA SCAIL RESULTS – SCENARIO 2 – WITHOUT USING BELT DRY TECHNOLOGY

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The ammonia SCAIL screening results are presented in **Table 5-3**.

The ammonia SCAIL screening results for Scenario 2 (without using the belt drying techniques to reduce the ammonia emissions in the bird houses) are summarised as below:

- (1) The process contributions (PCs) of  $\text{NH}_3$  at the four protected areas range from 0.021 to 0.040  $\mu\text{g}/\text{m}^3$ , which range from 0.694% to 1.338% of the 'NH<sub>3</sub> PC to CLevel'. As the '% of NH<sub>3</sub> PCs to CLevel' are all below 4%, the ammonia impact on the protected areas has been screened out and no more detailed modelling or site-specific investigation is required;
- (2) The predicted environmental concentrations (PECs) of  $\text{NH}_3$  at the four protected areas range from 0.78 to 1.24  $\mu\text{g}/\text{m}^3$ . The '% of NH<sub>3</sub> PECs to CLevel' are range from 26.03% to 41.34%. Therefore, there is non-exceedance of the habitat's impact limit; and
- (3) The predicted 'PC ACID\_DEP (kEqH<sup>+</sup>/ha/yr)' of  $\text{NH}_3$  at the four protected areas range from 0.008 to 0.015 kEqH<sup>+</sup>/ha/yr. The '% of Adep PEC to CLoad' are 96.87%. There is non-exceedance of the habitat's impact limit. Therefore, no more detailed modelling or site-specific investigation is required.

Table 5-3. Ammonia SCAIL Results – Scenario 2

Receptors	Name	PC NH <sub>3</sub> (ug m-3)	NH <sub>3</sub> Background (ug m-3)	NH <sub>3</sub> PEC (ug m-3)	NH <sub>3</sub> EAL (ug m-3)	% of NH <sub>3</sub> PC to CLevel	% of NH <sub>3</sub> PEC to CLevel
11	Salt Pans Bay	0.040	1.20	1.24	1-3	1.338	41.34
12	Corsewall Point to Milleur Point	0.030	0.97	1.00	1-3	0.985	33.32
13	Glen App and Galloway Moors	0.021	0.76	0.78	1-3	0.694	26.03
14	Glen App and Galloway Moors	0.021	0.76	0.78	1-3	0.694	26.03
Receptors	PC NDEP (kg/ha/yr)	NDEP Background (kg/ha/yr)	NDEP TOTAL (kg/ha/yr)	NDEP CLOAD (kg/ha/yr)	NITROGEN_HABITAT	% of Ndep PC to CLoad	% of Ndep PEC to CLoad
11	0.21	11.82	12.03	0	Maritime cliff		
12	0.15	10.11	10.26	0	No sensitive habitat or species at this site		
13	0.11	11.59	11.7	5	Circus cyaneus	2.2	234
14	0.11	11.59	11.7	5	Hen harrier (Circus cyaneus) breeding	2.2	234
Receptors	PC ACID_DEP (kEqH+/ha/yr)	ACID_DEP Background (kEqH+/ha/yr)	ACID_DEP TOTAL (kEqH+/ha/yr)	ACID_DEP CLOAD (kEqH+/ha/yr)	ACID_HABITAT	% of Adep PC to CLoad	% of Adep PEC to CLoad
11	0.015	0	0.015	0	No sensitive habitat or species at this site		
12	0.011	0.8	0.811	0	No sensitive habitat or species at this site		
13	0.008	0.921	0.929	0.959	Circus cyaneus	0.83	96.87
14	0.008	0.921	0.929	0.959	Hen harrier (Circus cyaneus) breeding	0.83	96.87

## 5.4 PM<sub>10</sub> SCAIL RESULTS – SCENARIO 2 – WITHOUT USING BELT DRY TECHNOLOGY

The PM<sub>10</sub> SCAIL screening results for Scenario 2 (without using the belt drying techniques to reduce the ammonia emissions in the bird houses) are presented in **Table 5-4** and summarised as below:

- (1) The percentage change in the process concentrations relative to the long-term AQS at all receptor locations, with respect to PM<sub>10</sub> exposure, are determined to range from 0.19 to 3.73 µg/m<sup>3</sup>. The 'PM<sub>10</sub> %PC of EAL' range from 0.38% to 7.46% of the long-term AQS; and
- (2) The predicted long-term PEC of PM<sub>10</sub> range from 12.43 to 15.99 µg/m<sup>3</sup>. The 'PM<sub>10</sub> %PEC of EAL' range from 24.78% to 31.98% of the long-term AQS. There is non-exceedance of the PM<sub>10</sub> impact limit. The PM<sub>10</sub> impact on the surrounding receptor location is determined to be 'insignificant' for the protection of human health.

**Table 5-4.** PM<sub>10</sub> SCAIL Results – Scenario 2

Receptors	Name	PC PM <sub>10</sub> (ug m-3)	PM <sub>10</sub> Background (ug m-3)	PM <sub>10</sub> PEC (ug m-3)	PM <sub>10</sub> EAL (ug m-3)	PM <sub>10</sub> %PC of EAL	PM <sub>10</sub> %PEC of EAL
1	Mains of Dhuloch	3.73	12.26	15.99	50	7.46	31.98
2	Little Glengyre	0.42	12.52	12.94	50	0.84	25.88
3	Meikle Glengyre	0.70	12.52	13.22	50	1.40	26.44
4	Meikle Glengyre Cottage	0.83	12.52	13.35	50	1.66	26.70
5	Dhuloch House	0.43	12.14	12.57	50	0.86	25.14
6	Dhunholm	0.54	12.10	12.64	50	1.08	25.28
7	Knockbennan House	0.35	12.10	12.45	50	0.70	24.90
8	Dhuloch Schoolhouse	0.29	12.10	12.39	50	0.58	24.78
9	Little Airies	0.19	12.24	12.43	50	0.38	24.86
10	Low Glengyre	0.20	13.24	13.44	50	0.40	26.88



## 6.0 CONCLUSIONS

Tetra Tech have undertaken an ammonia impact assessment using SCAIL-Agriculture Tool to evaluate potential air quality effects on sensitive ecological designations like SSSIs and SACs in support of a PPC permit application for a proposed egg production plant at Mains of Dhuloch, Kirkcolm, Stranraer, DG9 0RF.

### SCAIL Input Discussions and Consultations with SEPA

Consultations and discussions with SEPA have been undertaken by means of Microsoft Teams meetings and email exchanges. Two Teams meetings have been held on 2<sup>nd</sup> August 2024 and 2<sup>nd</sup> September 2024 and attendances included SEPA, the proposed egg production plant developers and Tetra Tech. The following SCAIL input information have been reviewed and approved by SEPA during the discussions in the meeting and follow-up email exchanges:

- (1) Number of emission sources, including two bird sheds and two manure storage areas;
- (2) Ammonia emission rates for each source;
- (3) The calculated total ammonia rates;
- (4) SCAIL output interpretations;
- (5) On the subject of accumulative ammonia impact assessment, SEPA has confirmed that “*regarding the discussion on background concentrations the nearest PPC site would be Glenhead of Aldouran which is approximately 2.5km away from Mains of Dhuloch. This site will already be accounted for in the background as it was in operation before Jan 2022*”. Therefore, accumulative impact assessment is not required for this development.

### SCAIL Screening Assessment Scenarios

Two SCAIL screening assessment scenarios have been considered:

- (1) Scenario 1 – considering using the belt dry techniques to reduce ammonia emissions; and
- (2) Scenario 2 – Without using the belt dry methodology to reduce ammonia emissions.

### SCAIL Screening Assessment Results

#### Scenario 1 Results - Ammonia

The process contributions (PCs) of NH<sub>3</sub> at the protected areas are all below 1% of the ‘NH<sub>3</sub> PC to CLevel’, the ammonia impact on the protected areas has been screened out and no more detailed modelling or site-specific investigation is required.

The predicted environmental concentrations (PECs) of NH<sub>3</sub> at the protected areas below the ‘NH<sub>3</sub> PECs to CLevel’ and there is non-exceedance of the habitat's impact limit.

The predicted PC acid deposition of NH<sub>3</sub> at the protected areas are below 0.5% of the ‘CLoad’ and the predicted PEC acid deposition of NH<sub>3</sub> are less than the ‘CLoad’. There is non-exceedance of the habitat's impact limit and no more detailed modelling, or site-specific investigation is required.

### Scenario 1 Results – PM<sub>10</sub>

The percentage changes in the process concentrations relative to the long-term AQS at all receptor locations, with respect to PM<sub>10</sub> exposure, are below 1% of AQS. The predicted long-term PECs of PM<sub>10</sub> are less than the long-term AQSs and there is non-exceedance of the PM<sub>10</sub> air quality standard. The PM<sub>10</sub> impact on the surrounding receptor location is determined to be 'insignificant' for the protection of human health.

### Scenario 2 Results - Ammonia

The process contributions (PCs) of NH<sub>3</sub> at the protected areas are all below 4% of the 'NH<sub>3</sub> PC to CLevel', the ammonia impact on the protected areas has been screened out and no more detailed modelling or site-specific investigation is required.

The predicted environmental concentrations (PECs) of NH<sub>3</sub> at the protected areas below the 'NH<sub>3</sub> PECs to CLevel' and there is non-exceedance of the habitat's impact limit.

The predicted PC acid deposition of NH<sub>3</sub> at the protected areas are below 2% of the 'CLoad' and the predicted PEC acid deposition of NH<sub>3</sub> are less than the 'CLoad'. There is non-exceedance of the habitat's impact limit and no more detailed modelling, or site-specific investigation is required.

### Scenario 2 Results – PM<sub>10</sub>

The percentage changes in the process concentrations relative to the long-term AQS at all receptor locations, with respect to PM<sub>10</sub> exposure, are below 8% of AQS. The predicted long-term PECs of PM<sub>10</sub> are less than the long-term AQSs. There is non-exceedance of the PM<sub>10</sub> air quality standard. The PM<sub>10</sub> impact on the surrounding receptor location is determined to be 'insignificant' for the protection of human health.

In summary, the ammonia impact on the protected areas has been screened out for both assessment Scenarios and no more detailed modelling or site-specific investigation is required. There is non-exceedance of the PM<sub>10</sub> impact limit for both assessment scenarios. The PM<sub>10</sub> impact on the surrounding receptor location is determined to be 'insignificant' in terms of the protection of human health.