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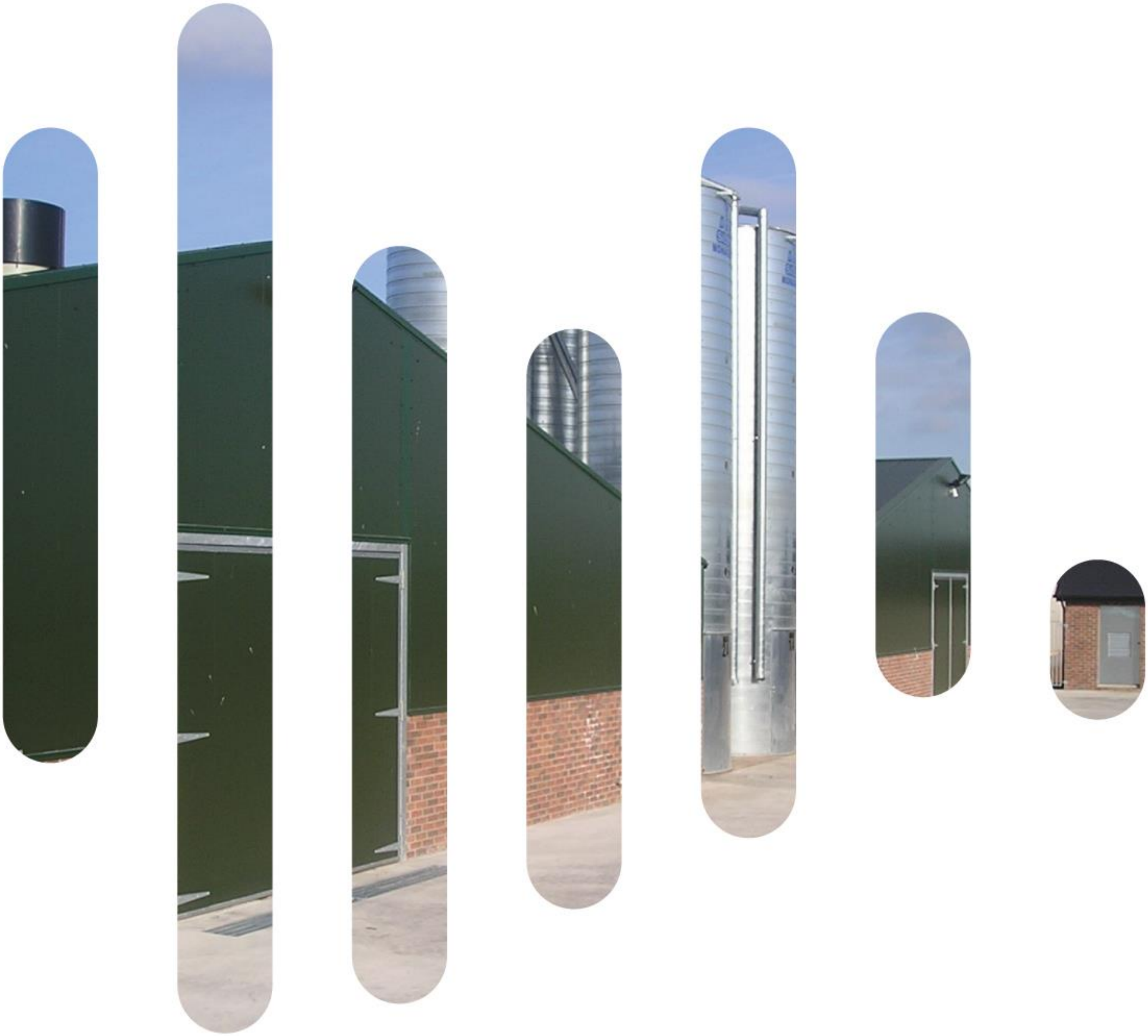

AMMONIA IMPACT ASSESSMENT
LONGFIELD POULTRY

Rp001 2022215 (Longfield Poultry, Co. Cavan)
30 September 2022

PROJECT:	AIR QUALITY IMPACT ASSESSMENT
PREPARED FOR:	LONGFIELD POULTRY C/O CLW ENVIRONMENTAL PLANNERS THE MEWS 23 FARNHAM STREET CAVAN
ATTENTION:	PARAIC FAY
REPORT NO.:	Rp 001 2022215

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Document Control

Status:	Rev:	Comments	Date:	Author:	Reviewer:
Final	1.0		30 September 2022	Christy Carr	Shane Carr

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1 INTRODUCTION

Irwin Carr Ltd have been commissioned to undertake ammonia dispersion modelling associated with the recent approval of an extension to an existing poultry farm at Lislea, Virginia, Co. Cavan.

The recent approval relates to the extension of 2no. mechanically ventilated poultry sheds with a total capacity of 22,000 broiler birds. A summary of each of these sheds is provided in Section 3.2 below.

The purpose of this report is to quantify the ammonia and nitrogen levels at the ecologically sensitive areas in the vicinity of the poultry farm. This assessment has taken account of the Report Requirements detailed in the EPA Guidance AG4[1].

The predicted impact can then be compared to an appropriate criterion and graphically illustrated in the form of 'contours of equal concentration' or isopleths which are superimposed on base maps.

[1] Air Dispersion Modelling from Industrial Installations Guidance Note (AG4), Environmental Protection Agency Office of Environmental Enforcement (OEE) December 2019

2 ASSESSMENT CRITERIA

The proposed target levels and method of assessment is described in this section.

2.1 Ammonia

There are limitations on emissions of ammonia from such installations for the protection of vegetation. They are referenced from *Cape, J.N.; van der Eerden, L.J.; Sheppard, L.J.; Leith, I.D.; Sutton, M.A.. 2009. Evidence for changing the critical level for ammonia. Environmental Pollution, 157 (3). 1033-1037.*

Where the limits are applied to general vegetation such as herbaceous species or forest trees the limit is set at 3 ± 1 µg/m³ of ammonia (ie. 2-4 µg/m³) as a long-term (several year) concentration.

For particularly sensitive plants such as lichens and bryophytes, the limit of 1 µg/m³ is applied to ammonia as a long-term (several year) concentration

Table 1 shows the target levels for the protection of vegetation.

Table 1: Ammonia limit values

Pollutant	Reason	Guideline Value	Measured as
Ammonia	Protection of Vegetation	1-3 µg/m³	Annual Mean

It should be noted that this assessment has only taken account of the dry deposition of ammonia, as it is not expected that wet deposition will have a significant effect in the vicinity of the site. This is supported by a Guidance Note published by Natural Resources Wales[2]:

- 'Wet deposition of ammonia is not significant compared to dry deposition close to the source. It is recommended that wet deposition of ammonia emitted at the poultry or pig farm is not considered in the assessment'.

While not applicable to sites under consideration by the EPA, this guidance note is supported by a number of other published reports, namely:

- SCAIL- Agriculture Update[3]: 'Wet deposition of ammonia has been ignored due to the dominance of local ammonia dry deposition'.
- UNECE[4]: This report details why wet deposition is not likely to have a contribution close to the source:

  "At short distances from the source the NH_3 plume has usually not reached the clouds and for that reason in-cloud scavenging of the NH_3 originating from the source will not occur".

  "Within 0.5 – 1km from a source the contribution of the source to wet deposition of NH_x is much less than the contribution to dry deposition. This is caused by the fact that the plume has not been mixed up at this distance and the NH_3 concentration at ground level is relatively high.

  Wet deposition is determined by the average concentration over the whole plume height and not by the much higher ground-level concentration. Due to its limited importance at the very local scale wet deposition is not taken into account in most local models: Danish OML-DEP (Olesen, 1995), the UK LADD (Dragosits et al., 2002), French FIDES (Loubet et al., 2001) and MODDAAS (Loubet et al., 2006)".

Given the information detailed above, and the fact that wet deposition has limited importance at a local level, it has not been included as part of this assessment.

[2] *Natural Resources Wales. Guidance Note- Modelling the concentration and deposition of ammonia emitted from intensive farming. Ref Number: GN036.*

[3] *SCAIL- Agriculture Update. Sniffer ER26: Final Report, March/ 2014. Page 18.*

[4] *UNECE Expert Workshop on Ammonia. Ammonia deposition near hot spots: Processes, models and monitoring methods. Background document for working group 3, Edinburgh 4-6 December 2006.*

2.2 Nitrogen Deposition

Critical load values for nutrient nitrogen deposition are provided by the United Nations Economic Commission for Europe (UNECE) as a range (e.g. 10-20 kg N/ha/yr for dry heaths). This table provides indicative values within the critical load range, by habitat type, for use in detailed impact assessments in Ireland.

Table 2: Critical Load Range for atmospheric Nitrogen

Habitat type (EUNIS code)	Critical load (CL) range (kgN/ha/yr)	Value to use at screening stage (kgN/ha/yr)	Recommended value to use at detailed assessment stage (kgN/ha/yr)
Marine habitats			
Mid-upper saltmarshes (A2.53)	20-30	20	20
Pioneer & low-mid saltmarshes (A2.54 and A2.55)	20-30	30	30
Coastal habitats			
Shifting coastal dunes (B1.3)	10 to 20	10	10
Coastal stable dune grasslands (grey dunes) (B1.4)	8 to 15	8	Acid dunes = 8 Calcareous dunes = 10
Coastal dune heaths (B1.5)	10 to 20	10	10
Moist to wet dune slacks (B1.8)	10 to 20	10	Low base availability = 10 High base availability = 15
Inland surface waters			
Softwater lakes (permanent oligotrophic waters) (C1.1)	3 to 10	Seek site specific advice	
Dune slack pools (permanent oligotrophic waters) (C1.16)	10 to 20	10	10
Permanent dystrophic lakes, ponds and pools (C1.4)	3 to 10	Seek site specific advice	
Mire, bog and fen habitats			
Raised & blanket bogs (D1)	5 to 10	5	Apply guidance
Valley mires, poor fens and transition mires (D2)	10 to 15	10	10
Rich fens (D4.1)	15 to 30	15	15
Montane rich fens (D4.2)	15 to 25	15	15
Grasslands and tall forb habitats			
Sub-atlantic semi-dry calcareous grassland (E1.26)	15 to 25	15	15
Non-Mediterranean dry acid and neutral closed grassland (E1.7)	10 to 15	10	10

Inland dune pioneer grasslands (E1.94) Inland dune siliceous grassland (E1.95)	8 to 15	8	Acid dunes = 8 Calcareous dunes = 10
Low and medium altitude hay meadows (E2.2)	20 to 30	20	20
Mountain hay meadows (E2.3)	10 to 20	10	10
Moist & wet oligotrophic grasslands:			
Molinia caerulea meadows (E3.51)	15 to 25	15	15
Heath (Juncus) meadows & humid (Nardus Stricta) swards (E3.52)	10 to 20	10	10
Moss & lichen dominated mountain summits (E4.2)	5 to 10	5	7
Alpine and subalpine acid grasslands (E4.3) Alpine and subalpine calcareous grasslands (E4.4)	5 to 10	5	5
Heathland, scrub & tundra			
Arctic, alpine and subalpine scrub habitats (F2)	5 to 15	5	5
Northern wet heaths (F4.11) Dry heaths (F4.2)	10 to 20	10	10
Forest habitats (general)			
Use if not one of specific forests in section below			
Broadleaved woodland (G1)	10 to 20	10	10
Coniferous woodland (G3)	5 to 15	5	10 (Use 5 if lichens/free-living algae important features of the site).
Forest habitats (specific)			
Fagus woodland (beech) (G1.6)	10 to 20	10	15
Acidophilous Quercus-dominated woodland (oak) (G1.8)	10 to 15	10	10
Meso- and eutrophic Quercus woodland (G1.A)	15 to 20	15	15
Pinus sylvestris woodland south of the taiga (G3.4)	5 to 15	5	12
Coniferous woodland (G3)	5 to 15	5	10 (Use 5 if lichens/free-living algae important features of the site).

3 AERMOD DISPERSION MODELLING DATA

The inputs for the dispersion modelling assessment are described in detail in this Section. The site layout, including the nearest residential properties, is shown in Appendix A.

3.1 AERMOD Dispersion Modelling Package Description

The AMS.EPA Regulatory Model (AERMOD) is the current US EPA regulatory model used to predict pollutant concentrations from a wide range of sources that are present at typical industrial facilities.

The model accepts hourly meteorological data to define the conditions for plume rise, transport, diffusion and deposition. It estimates the concentration or deposition value for each source and receptor combination for each hour of input meteorology and calculates user-selected short term averages. The model also takes into account the local terrain surrounding the facility. Since most air quality standards are stipulated as averages or percentiles, AERMOD allows further analysis of the results for comparison purposes.

Percentile analysis for emissions is calculated for the maximum averages using the AERMOD-percent post-processing utility. This utility calculates the maximum concentration of a pollutant from all receptors at a specific percentile, for a specific period. Employing the percentile facilitates the omission of unusual short-term meteorological events that may cause elevated pollutant concentrations and hence a more accurate representation of the likely average pollutant concentrations over an averaging period.

The following information was input into the model for the prediction of maximum ground level ambient ammonia concentrations from the poultry farm.

3.2 Input Parameters

The site layout map, existing building plans and elevations were used as a template for all sources, relevant structures and the boundary of the facility. The AERMOD package uses the steady state Gaussian plume equation for a continuous elevated point or line source.

Table 3 below gives general details of the poultry sheds. It should be noted that the dimensions provided take account of the entire length of each shed, not just the extension areas.

Table 3: Dimensions of Poultry Sheds

	Shed 1 (Extension)	Shed 2 (Extension)
Dimensions of House*	124m x 15m x 5.2m	124m x 15m x 5.2m
No. of birds per Shed	11,000	11,000
Emissions	Mechanically Ventilated	Mechanically Ventilated

**Dimensions included in the Table are for the respective extension areas of each shed.*

3.2.1 FREE RANGE AMMONIA EMISSION FACTOR

The birds on site are free-range, and it is acknowledged that there is the potential for an increase in ammonia emissions from free range units, as the birds have access to outdoor ranging areas and some of the birds' droppings will be deposited on these areas.

In order to estimate the total emissions from the site it was necessary to calculate the ammonia from the ranging areas:

Ranging Emission Factor = 0.24 x 0.7 x 0.35 x (17/14) = **0.0714kg.NH_3/bird/year**

Where:

0.24 = Amount of total Nitrogen (N) produced by a broiler per year (kg.N/yr) (RoI Figure)

0.7 = Proportion of N in the droppings that is Ammoniacal Nitrogen (NH_3-N)

0.35 = Proportion of NH_3-N in the droppings that is emitted to air

(17/14) = Conversion factor from NH_3-N to NH_3

The total ammonia from the site was then calculated based on the total number of birds on site:

Ammonia from Ranging Birds = 22,000 x 0.0714 x 0.05 = **78.5kg/yr**

Where:

22,000 = Total number of birds on site

0.0714 = Ranging Emission Factor

0.05 = Assumption that birds will only be ranging for approx. 5% of the year

It is understood that the birds will range on area of approx. 2.2 hectares of ground in the immediate vicinity of the sheds. It has been assumed in the AERMOD model that the ammonia produced is spread evenly over the area and is emitted year round (ensuring a worst case scenario), as calculated in Table 4 below.

Table 4: Emission Rates per m^2

Total Emissions (kg/Year)	Total NH_3 Emissions (g/s)	Total area (hectares)	Total area (m^2)	Emission Rate (g/s-m^2)
79	0.0025	2.20	22,000	**1.13 x10^{-7}**

A polygon area source was used to surround all the fields utilised for grazing in the AERMOD model, with the emission factor shown in the Table above (in g/s-m^2) used as the emission rate for the 2.2ha.

The grazing area is shown on the Figure in Appendix B.

3.2.2 EMISSIONS

The rate of production of an emission, such as ammonia, is best quantified as an emission rate.

To find the emissions from the house, it was necessary to calculate the concentration within the building. Table 5 below shows the ammonia level within each building on the site.

Table 5: Concentrations per Building

House No.	No. of Animals per house	Ammonia Emission Factor (kg/yr per animal)	Total Ammonia Emission Rate (kg/yr per house)	Total Ammonia Emission Rate (g/s per house)
1	11,000	0.08	880	0.028
2	11,000	0.08	880	0.028

For the purposes of the modelling process, the emission rate per house was divided by the number of extract fans to obtain the emission value for each source.

Table 6 below shows the emission rates coming out of emission point.

Table 6: Emission Rates for each stack

House No.	No of Fans (and type)	Ammonia per fan (g/s)
1	6x Ridge	0.0047
2	6x Ridge	0.0047

3.2.3 STACK EMISSIONS VELOCITY

The applicant and ventilation supplier have confirmed the type of fans that are utilised on the sheds.

Table 7 below shows the ventilation rates for the chosen fans.

Table 7: Ventilation Rates for fan

Fan Location	Stack Diameter (m)	Cross Sectional Area (m^2)	Exit Velocity (m/s)	Volume Flow (m^3/s)	Volume Flow (m^3/hr)
Ridge	0.63	0.312	5.216	1.625	5,850

**The maximum capacity of the ridge fans is 11,700m^3/hr, however they have been modelled at 50% capacity to ensure a conservative assessment.*

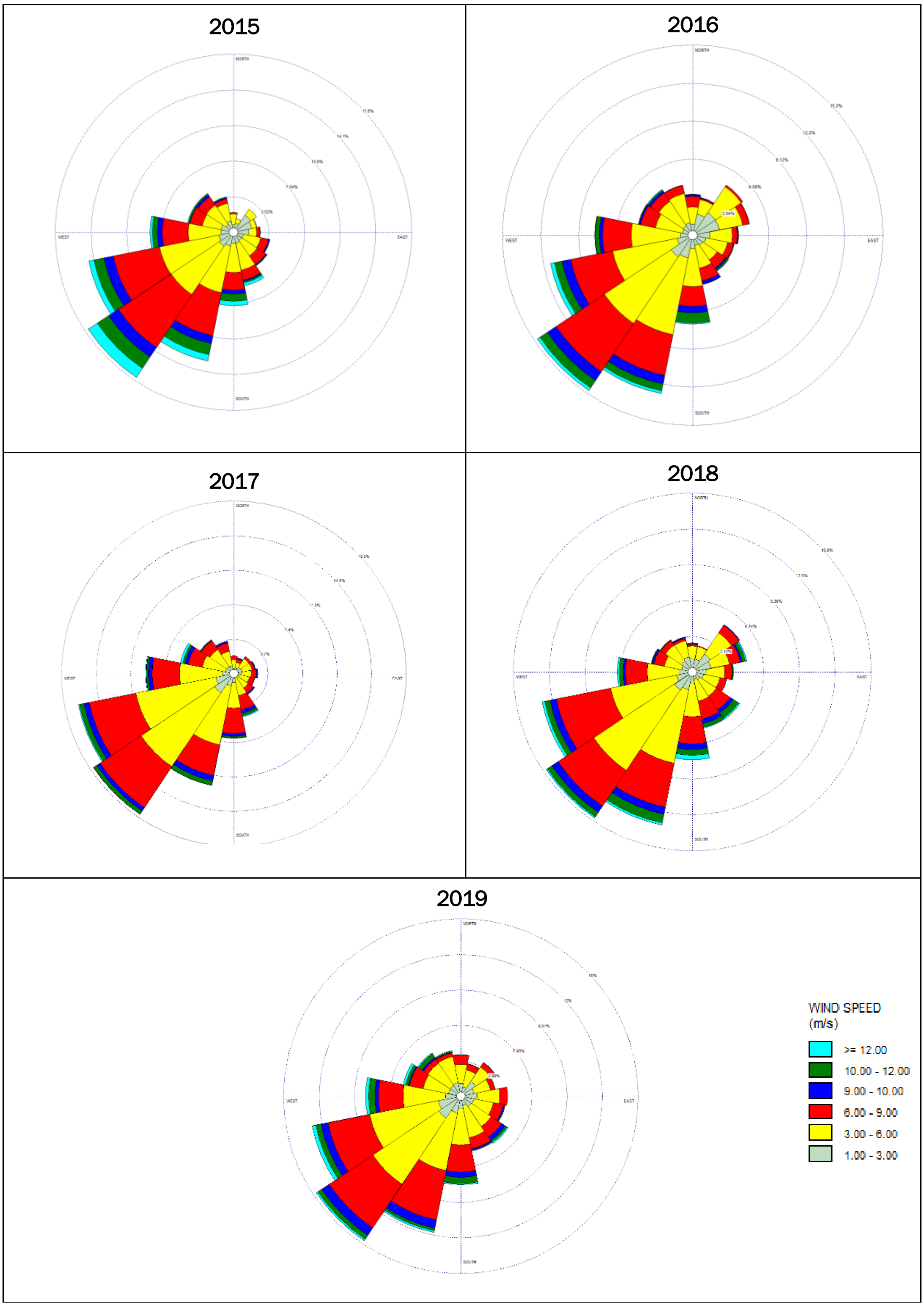
3.3 Meteorological Data

Five years of hourly sequential meteorological data (2015 – 2019) was used for the AERMOD dispersion modelling assessment.

The closest weather station to the site can be identified on Figure 6.1 of the EPA's AG4 Guidance Note as Ballyhaise, which has been selected as the most appropriate weather station for the installation.

This allowed for the determination of the predicted overall average impact of emissions from the facility. The windrose data for each individual year is presented in Figure 1 below.

Figure 1: Annual Windrose Data- Ballyhaise



3.4 Building Downwash

When one or more buildings in the vicinity of a point source interrupt wind flow, an area of turbulence known as a building wake is created. Pollutants emitted from a relatively low level can be caught in this turbulence, affecting their dispersion. This phenomenon is called building downwash. In order to conduct an analysis of downwash effects of the point sources created to mimic the release of odorous air from the poultry farm, the dimensions (including heights) of the poultry sheds and any other existing buildings on-site was obtained from drawings.

3.5 Digital Terrain Data

AERMOD contains a terrain data pre-processor called AERMAP. Receptor and source elevation data from AERMAP output is formatted for direct insertion into an AERMOD control file. The elevation data are used by AERMOD when calculating air pollutant concentrations.

Regulatory dispersion models applicable for simple to complex terrain situations require information about the surrounding terrain. With the assumption that terrain will affect air quality concentrations at individual receptors, AERMAP first determines the base elevation at each receptor and source. For complex terrain situations, AERMOD captures the essential physics of dispersion in complex terrain and therefore needs elevation data that convey the features of the surrounding terrain. In response to this need, AERMAP searches for the terrain height and location that has the greatest influence on dispersion for each individual receptor. This height is the referred to as the hill height scale. Both the base elevation and hill height scale data are produced by AERMAP as a file or files which can be directly inserted into an AERMOD input control file.

4 AMMONIA

The ammonia levels were assessed in areas of specific interest in relation to vegetation.

It is noted within Section 3.2.3 of the Environment, Heritage and Local Government Guidance document[5] that as part of the screening for an appropriate assessment, Natura 2000 sites within a distance of 15km from plans should be assessed, however for projects this distance could be much less than 15km.

As this application is considered a project (as defined by Section 5.3 of the Guidance document) and given the nature, size and location of the project, only sites within a 7.5km distance have been included. Furthermore, this detailed modelling is not considered to be screening and therefore the distance utilised in this report is less than that included in the Guidance.

All areas within approximately 7.5km of the site were searched on the EPA website for the four types of designated areas listed below:

- Special Areas of Conservation (SAC)

  These areas are given special protection under the European Union's Habitats Directive to protect some of the most seriously threatened habitats and species across Europe.

- Special Protection Areas (SPA)

  Areas designated under the European Commission on the conservation of wild birds (the Birds Directive). All EU member states are required to identify internationally important areas for breeding, over-wintering and migrating birds and designate them as SPA's.

- Natural Heritage Area (NHA)

  This is an area considered important for the habitats present or which holds species of plants and animals whose habitat needs protection.

- Proposed Natural Heritage Area (pNHAs)

  These proposed sites are of significance for wildlife and habitats. The pNHAs cover approximately 65,000ha and designation will proceed on a phased basis over the coming years.

There were three designated sites located within 7.5km of the poultry farm, which are detailed in Table 8 below. The closest location of each site to the facility were obtained from SCAIL.

Table 8: Designated areas in vicinity of the site

Location	Description	Designation	Approx. distance to Nearest shed (km)*	ING Grid Co-ordinates	
1	River Boyne and River Blackwater	SPA	3.1	263006	283424
2	River Boyne And River Blackwater	SAC	3.1	263015	283421
3	Killyconny Bog (Cloghbally)	SAC	4.9	267656	283338

**It should be noted that all distances detailed in the Table above are approximate and are provided for information purposes only. The grid co-ordinates provided were input into the model, and the source locations are provided in Appendix B. These distances have no bearing on the AERMOD model, and the only input from Table 8 is the actual grid co-ordinates.*

Ammonia modelling was carried out for the sites detailed above for each individual year, with the results at the nearest identified locations presented in Table 9 below.

All results are the Ammonia concentration in μg/m^3.

[5] *Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities. Environment, Heritage and Local Government. 10 December 2009.*

4.1 Results

The predicted impacts and results included in this Section take account of the inputs detailed in Section 3.2 above.

It should be noted that as part of the ammonia assessment, only the 2 most recently approved poultry sheds (extensions) on-site were considered.

Table 9: Annual Average Ammonia Concentrations from 2 Extension Areas & Ranging Birds

Location	2015	2016	2017	2018	2019	Average
1	0.006	0.009	0.004	0.007	0.005	**0.006**
2	0.006	0.008	0.003	0.007	0.005	**0.006**
3	0.004	0.004	0.004	0.004	0.003	**0.004**

All of the predicted Ground Level Concentrations of ammonia detailed in the Table above are significantly below the limit values as provided in Table 1 in relation to the protection of vegetation.

The background ammonia level is provided in the SCAIL website which is based on a 3-year average from 2017 - 2019. The grid references provided in Table 8 were searched, with the background ammonia level given in the Table below.

Table 10 below compares the highest annual average predicted levels at the designated areas where:

- The Process contribution (PC), the maximum modelled concentration of the substance due to process emissions alone.
- Predicted Environmental Concentration (PEC) – that is, the maximum modelled concentration (of ammonia) due to process emissions combined with estimated baseline concentrations.
- PC and PEC as a percentage of the objective or guideline.

For the assessment of annual mean concentrations the annual mean contribution of the process can be added to the annual mean estimate for background.

Table 10: Ammonia concentrations at designated ecologically sensitive locations (Worst Case).

	Location	Guideline (µg/m^{-3})	Background (µg/m^{-3})	Highest PC (µg/m^{-3})	PEC (µg/m^{-3})	PC/ Guideline level (%)	PEC/ Guideline level (%)
1	River Boyne and River Blackwater (SPA)	3	2.95	0.009	2.959	**0.30**	99
2	River Boyne And River Blackwater (SAC)	1	2.95	0.008	2.958	**0.80**	296
3	Killyconny Bog (Cloghbally)	1	2.91	0.004	2.914	**0.40**	291

The ammonia concentrations at the sites are dominated by the background concentrations, which are approximately 99 – 296% of the air quality guideline for ammonia.

It can be seen from the Table above that while the guideline level (critical level) of ammonia is exceeded at each Location, the PC from the sheds is <1% at each designated site, and as a result considered insignificant for the purposes of this assessment.

5 NITROGEN DEPOSITION

The Critical Load specifies the annual amount of ammonia that can be deposited for a given area per year. Below this level, sensitive habitat should not be affected.

The dry deposition flux (µg/m²/s of ammonia) was calculated using AQTAG06[6] where the predicted ground level of ammonia (in µg/m³) was multiplied by the relevant deposition velocity.

The dry deposition was then multiplied by the conversion factor provided in the guidance to convert to the levels of kgN/ha/yr. The conversion factors are provided in Table 8.1 and 8.2 of the AQTAG06 as presented in the Table 11 below.

Table 11: Conversion Factors

Pollutant	NH_3 Deposition Velocity (m/s)	Conversion Factor
NH_3 to N	0.02 (short vegetation)	260

Table 12 below converts the highest Process Contributions in Table 7 from µg/m⁻³ to kg.N/ha/yr, using the conversion factors detailed in Table 11 above.

Table 12: Conversion of Highest NH_3 Results (Worst Case)

Location	Pollutant	Highest PC (µg/m⁻³)	NH_3 Deposition Velocity (m/s)	Conversion Factor	Highest PC (kg.N/ha/yr)
1	NH_3 to N	0.009	0.02 (short vegetation)	260	0.05
2		0.008			0.04
3		0.004			0.02

Using similar methodology to the ammonia assessment in Section 4 above the PC and PEC can be seen in Table 13 below.

Table 13: Nitrogen concentration at designated ecologically sensitive locations

	Location	Guideline (kg N/ha/yr)	Background (kg N/ha/yr)	Highest PC (kg.N/ha/yr)	PEC (kg N/ha/yr)	PC/ Guideline level (%)	PEC/ Guideline level (%)
1	River Boyne and River Blackwater (SPA)	20	7.82	0.05	7.87	**0.23**	39
2	River Boyne And River Blackwater (SAC)	15	7.82	0.04	7.86	**0.28**	52
3	Killyconny Bog (Cloghbally)	5	7.76	0.02	7.78	**0.42**	156

It can be seen from Table 13 that the nitrogen concentrations at the sites are dominated by the background concentrations, which are approximately 39 – 156% of the guideline for each site.

The PC at all Locations is less than 1% and 0.3kg.N/ha/yr, and as a result would be considered deminimus for the purposes of the Nitrogen assessment.

[6] Technical Guidance on Detailed Modelling Approach for an Appropriate Assessment for Emissions to Air, AQTAG06

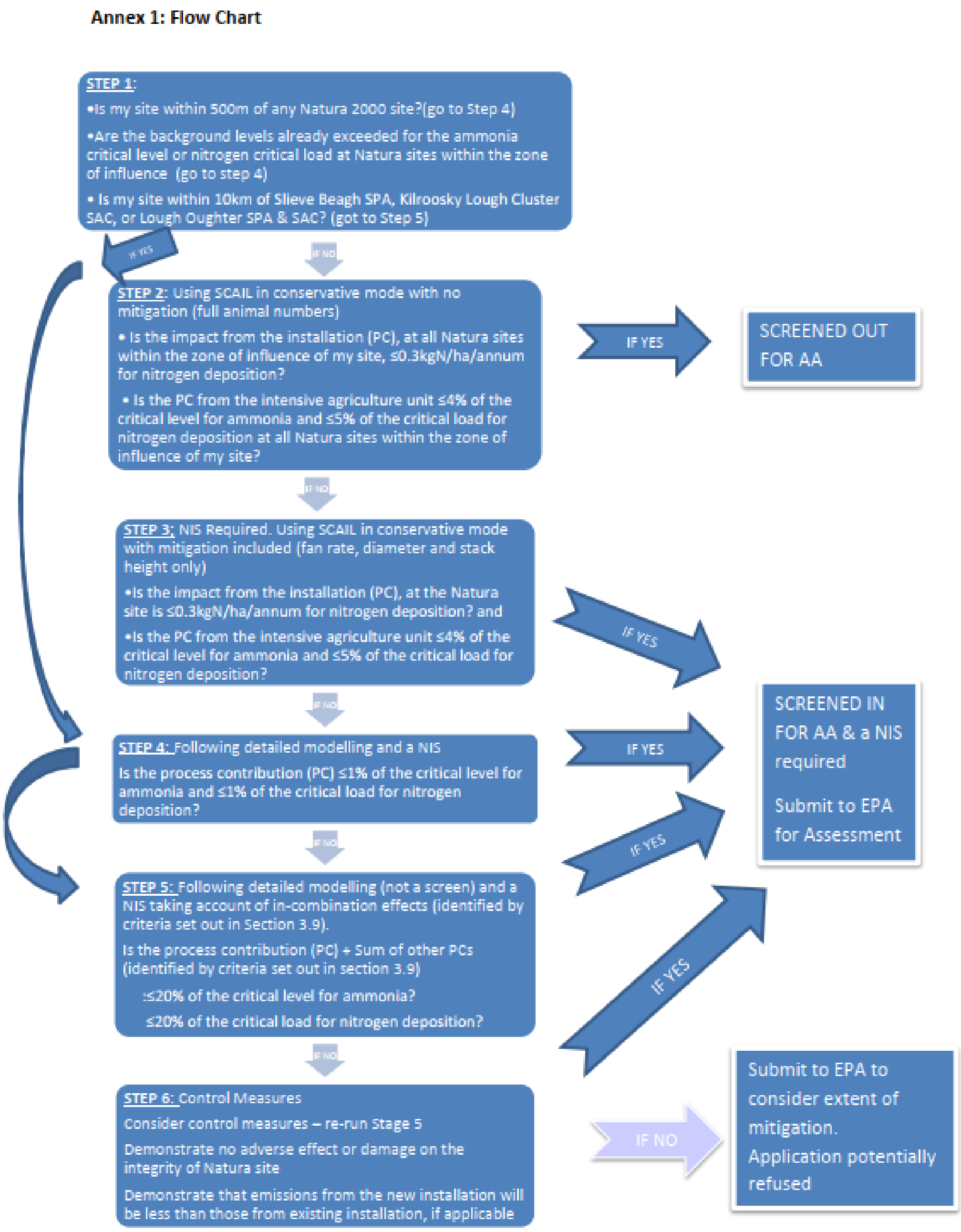
6 CUMULATIVE ASSESSMENT

Within the EPA Licence Application Guidance[7], specific information is provided in relation to the consideration of Cumulative Impact Assessments. Section 3.2 notes that,

> *'As a first step the applicant/licensee should confirm the background ammonia concentrations and nitrogen deposition levels at the sensitive receptor and indicate whether there is already an exceedance of the ammonia critical level or nitrogen critical load.*
>
> *Where background levels are already exceeded at sensitive receptors, detailed modelling of emissions, including in-combination effects, a Natura Impact Statement (NIS) and additional mitigation measures are likely to be required. This is dependent on the sensitivity of the habitat at the Natura impacted area'.*

Annex 1 of the document shows a flowchart for undertaking a cumulative impact assessment of a nearby industrial installation, which is shown below:

Figure 2: Flowchart for undertaking a Cumulative Assessment of a nearby Industrial Installation.



[7] Environmental Protection Agency. Licence Application Guidance. Assessment of the Impact of Ammonia and Nitrogen on Natura 2000 Sites from Intensive Agriculture Installations. Version 1.0, May 2021.

The following points detail whether or not a cumulative assessment is necessary as part of this assessment.

- It is noted that Step 1 of the flowchart states "Are the background levels already exceeded for the ammonia critical level or nitrogen critical load at Natura sites within the zone of influence? (Go to step 4).

It can be seen from Tables 10 and 13 above that the backgrounds are exceeded at the designated sites, and therefore the assessment continues to Step 4:

- 'Following detailed modelling and a NIS, is the process contribution (PC) ≤1% of the critical level for ammonia and ≤1% of the critical load for nitrogen deposition?

In line with Step 4, a detailed assessment has been undertaken, predicting the potential ammonia impact and Nitrogen deposition. The predicted impacts of both the ammonia and Nitrogen assessment shows that the PC of 1% is not exceeded at any of the designated sites

As the application does not have the potential to contribute a significant impact at any of the designated sites, no further assessment is required, in line with Step 4 of the flowchart shown in Figure 2 above.

7 CONCLUSIONS

An air quality impact assessment has been undertaken for the recent approval of an extension to an existing poultry farm at Lislea, Virginia, Co. Cavan.

Modelling has been undertaken to determine the impact of the maximum capacity of the extension areas of the sheds (22,000 birds).

The predicted results of the ammonia modelling process show that the limits for the protection of vegetation are not exceeded at the designated habitats within the vicinity of the poultry farm. Thus, any areas of ecological interest will not be adversely affected from the ammonia emissions for the operation of the farm.

Table 14 below details the maximum impact at the closest receptors for ammonia and nitrogen.

Table 14: Maximum predicted impact at closest sensitive receptors

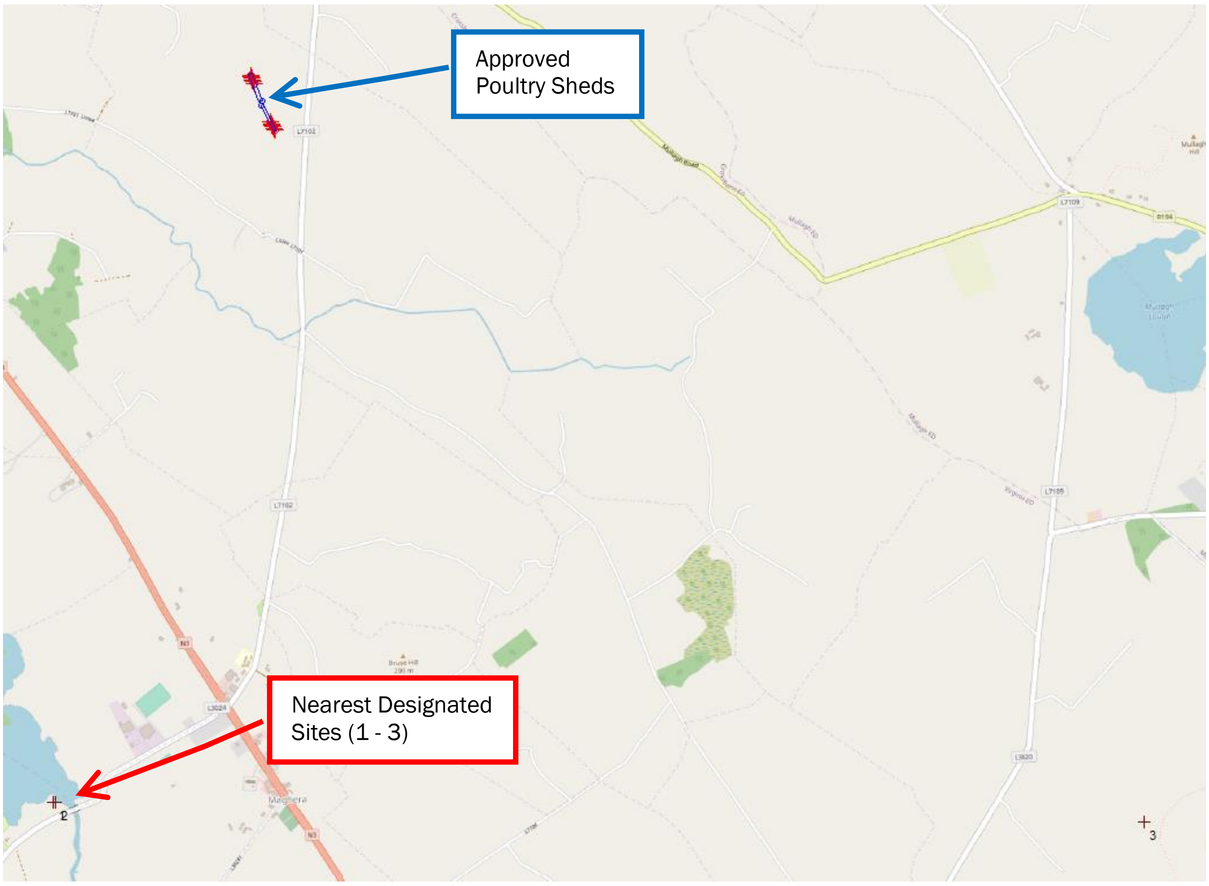
Location	Pollutant	Limit Type	Units	Limit Value	Baseline	Max Level	PEC	PC of limit (%)	PEC of Limit (%)
2	Ammonia	Annual Average	µg/m³	1	2.95	0.008	2.95	**0.8**	296
3	Nitrogen	Annual Average	kg.N/ha/yr	5	7.76	0.02	7.78	**0.42**	156

It can be seen from the Table above and as discussed in detail in this assessment, the predicted impact of each pollutant is within the appropriate limit/ threshold level.

Appendix C indicates the predicted dispersion of the ammonia plume for 2019 at the site.

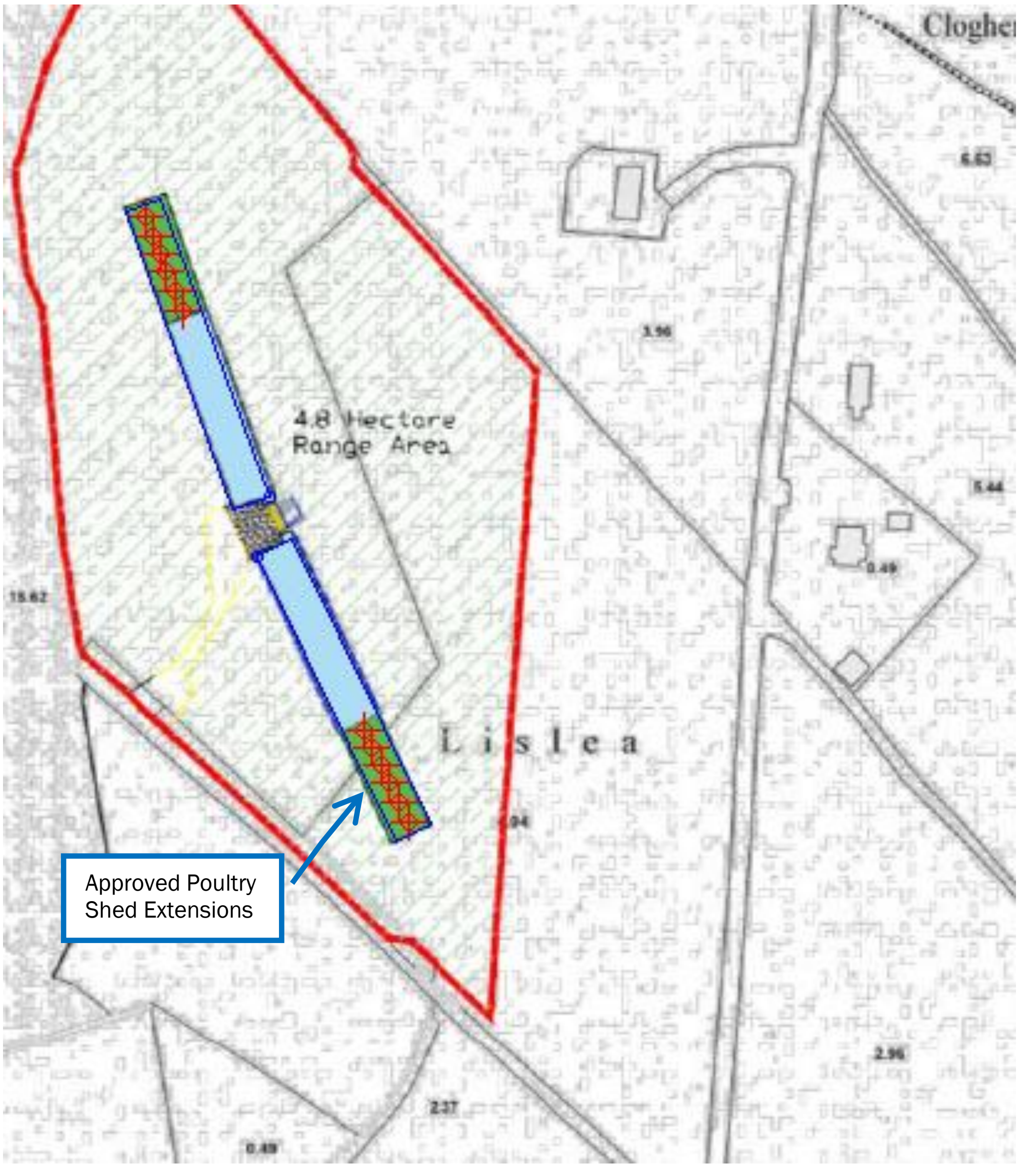
APPENDIX A SITE LAYOUT

Figure 3: Site Layout & Nearest Designated Sites.



**Exact co-ordinates of the closest designated sites were obtained from SCAIL and are detailed in Table 8 above.*

Figure 4: Approved Shed Layout.



APPENDIX B SOURCE AND RECEPTOR LOCATIONS

The information below details the AERMOD model inputs, specifically in relation to source locations, building inputs and grid receptor inputs.

Table 15: Building Location

Building Number	Irish Grid Co-ordinates (SW Corner)
1	263894 286416
2	263889 286392

Table 16: Source Locations

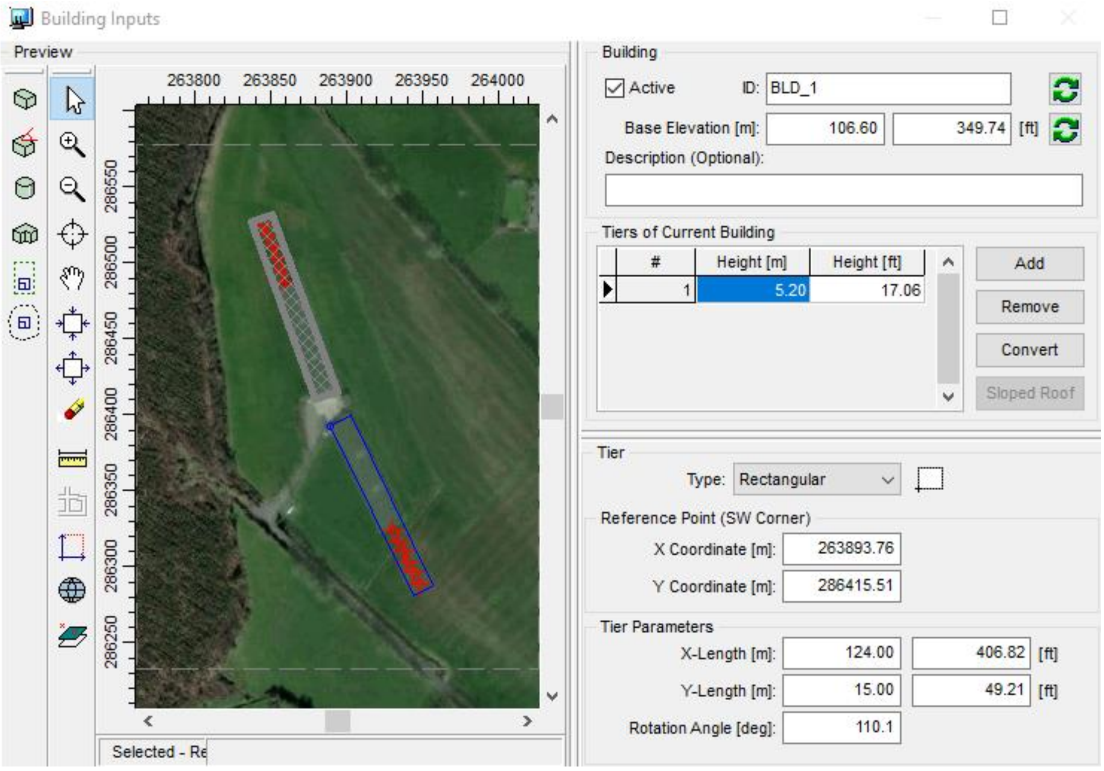
Building Number	Fan Type	Source	Approx. Irish Grid Co-ordinates (to the nearest 1m)	
1 (Extension)	Ridge	1	263860	286488
		2	263857	286496
		3	263854	286504
		4	263851	286511
		5	263848	286518
		6	263846	286525
2 (Extension)	Ridge	1	263948	286289
		2	263937	286310
		3	263934	286317
		4	263931	286324
		5	263944	286296
		6	263940	286303

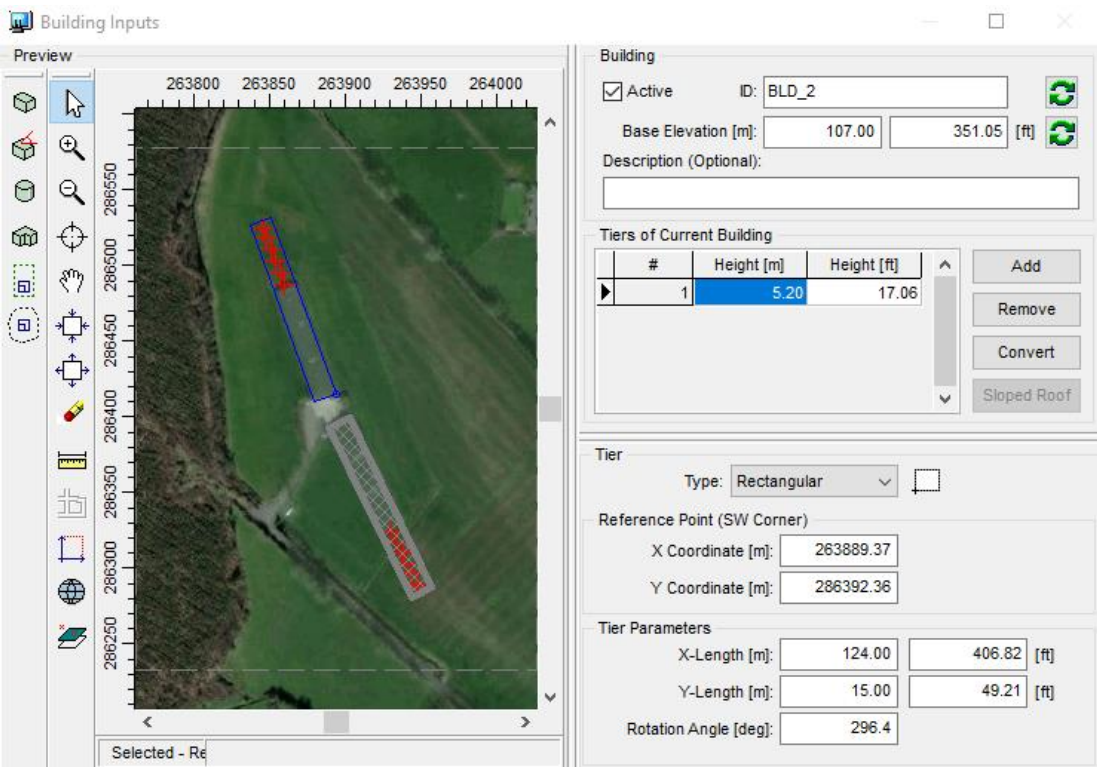
The 2.2ha of land around the sheds that is utilised by ranging birds is shown in the Figure below.

Figure 5: Area utilised by Ranging Birds

It should be noted that the building dimensions in the Figures below take account of the entire length of each shed- the original building as well as the approved extension area on each.

Figure 6: Building Inputs





It can be seen from the Figures above that the building locations input in the model reflect rotation angles of approximately 110 and 296 degrees respectively.

Figure 7: Details of Nested Grid Receptors

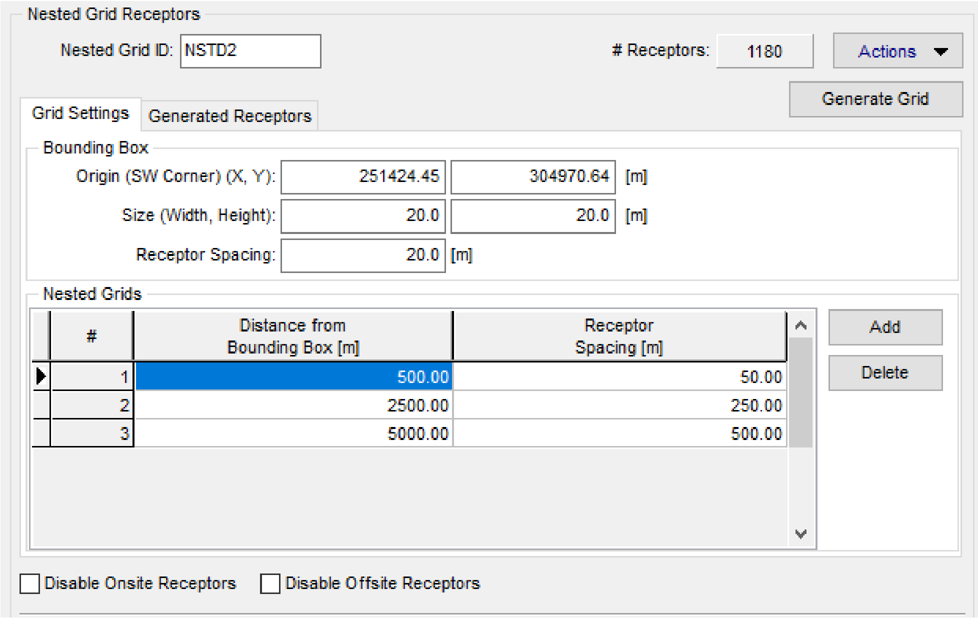
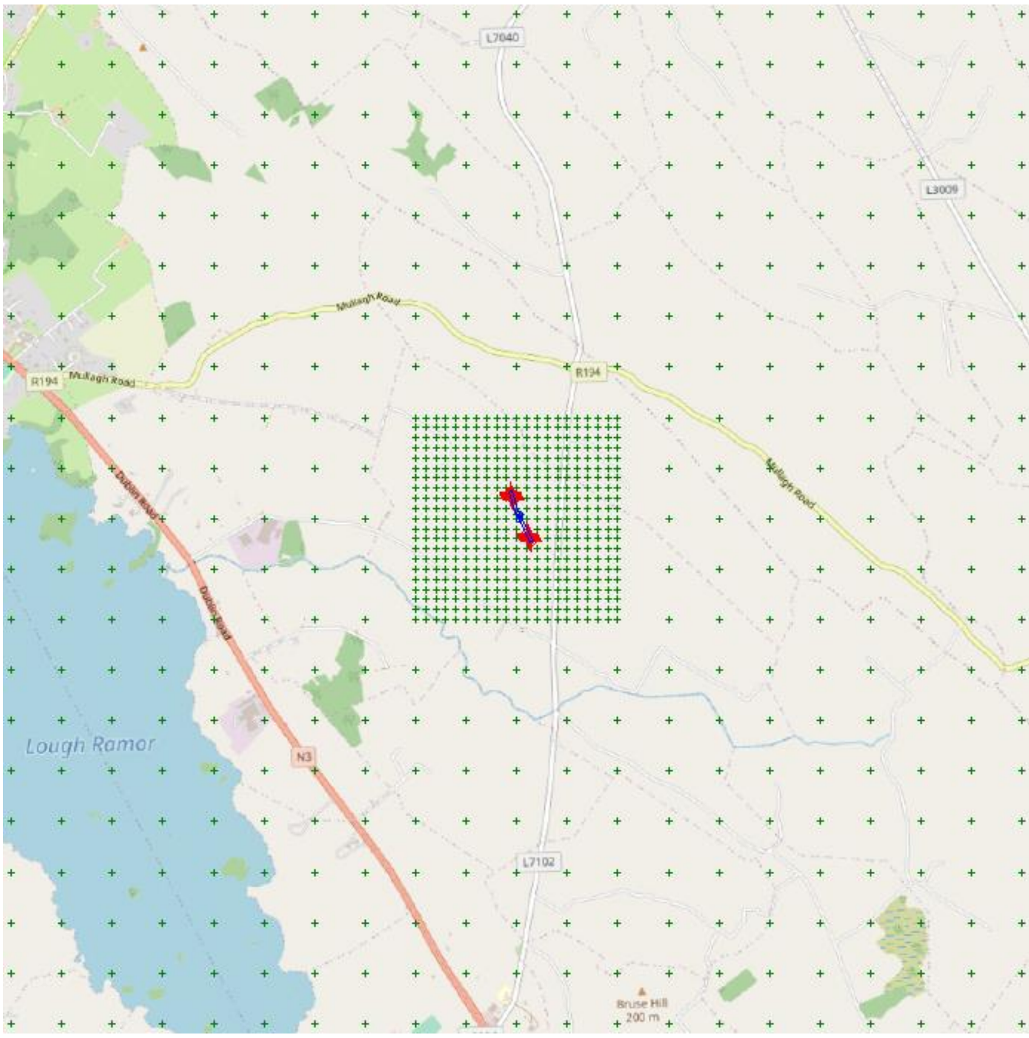


Figure 8: Graphical Representation of Nested Grid Receptors

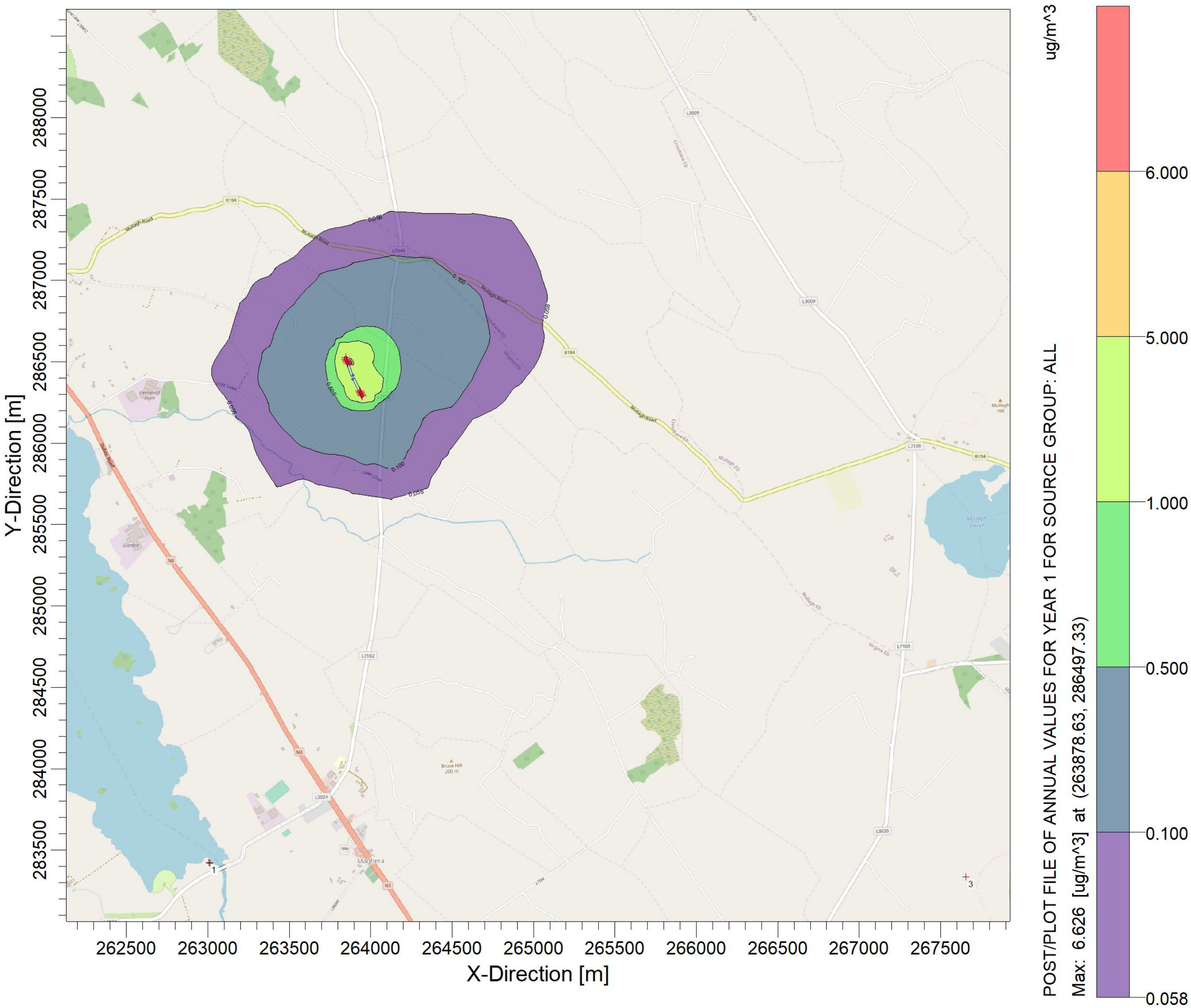


APPENDIX C MODELLING RESULTS

The ammonia plume below shows the annual average ammonia impact in the vicinity of the site. It should be noted that the outermost contour (0.058µg/m^3) corresponds to a nitrogen deposition of 0.3kg.N/ha/yr, which is considered deminimus for the purposes of a Nitrogen assessment.

PROJECT TITLE:

Longfield Poultry
Annual Average Ground Level Ammonia Concentration (ug/m3) (2019)



COMMENTS:

Site layout and closest sensitive locations. Outermost contour (0.058ug/m3) is equivalent to the deminimus Nitrogen level of 0.3kg/ha/yr

SOURCES:

15

RECEPTORS:

863

OUTPUT TYPE:

Concentration

MAX:

6.626 ug/m^3

MODELER:

Christy Carr

DATE:

30/09/2022

SCALE: 1:38,160

0 1 km

IRWIN CARR CONSULTANTS

PROJECT NO.:

2022215

AERMOD View - Lakes Environmental Software