

POULTRY UNIT, LLWYNGWILYM

## AMMONIA EMISSIONS: IMPACT ASSESSMENT

July 2020

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## 1.0 INTRODUCTION

Isopleth Ltd has been commissioned by Berrys, on behalf of H & E Powell to carry out a detailed assessment of ammonia impacts associated with a proposed poultry unit on land near Llwyngwilym, Rhayader LD6 5NS. Site layout and location plans are shown in Appendix A of this report.

### 1.1 Background

The potential ammonia impacts on local ecological sites associated with the development of a new poultry (broiler) building at Llwyngwilym has been assessed.

The site lies within the administrative area of Powys County Council (planning) and Natural Resources Wales are responsible for regulating the site under an Environmental Permit.

One new building housing 55,000 broiler birds is proposed, adjacent to an identical building which has recently been granted planning permission. The new facility would therefore consist of 2 new broiler houses housing approximately 110,000 birds in total. It is understood that these new houses would include an acid scrubbing system such as the IPT VentMax 1200 Acid Scrubbers for ammonia (and odour) control scrubbers to ensure that emissions to air are mitigated. In the event that an alternative scrubbing system is chosen the performance would be equivalent to (or better than) that of the IPT VentMax system.

### 1.2 Previous Applications / Assessments

The site benefits from planning permission for a single 55,000 broiler house which was approved on 30<sup>th</sup> June 2020 (Application 18/0463/FUL):

*'Full: Erection of a broiler unit, creation of access and all associated works.  
Llwyngwilym Farm, Rhayader, Powys LD6 5NS.'*

Natural Resources Wales and the ecology department of Powys Council were consulted in relation to Application 18/0463/FUL and provided responses at that time. Any specific responses which are relevant to the current application are referenced, as appropriate.

### 1.3 Approach

An assessment of ammonia impacts against critical levels and critical loads for nutrient nitrogen has been completed:

- Critical levels are a quantitative estimate of exposure to one or more airborne pollutants in gaseous form, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge.
- Critical loads are a quantitative estimate of exposure to deposition of one or more pollutants, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge.

The type, source and significance of potential impacts have been identified and detailed modelling undertaken in line with NRW Guidance:

- NRW (December 2018) Assessing the impact of ammonia and nitrogen on designated sites from new and expanding intensive livestock units. Technical guidance for determining environmental permit applications or responding to planning application consultations. Reference number: **GN020**
- NRW (March 2017) Assessment of ammonia and nitrogen impacts from livestock units when applying for an Environmental Permit or Planning Permission. Reference number: **OGN 41**
- NRW Modelling the concentration and deposition of ammonia emitted from intensive farming Reference number: **GN036** (version 1.0, December 2019)

GN 020, GN036, OGN 41 and *Intensive farming risk assessment for your environmental permit* only requires that the ammonia and nutrient nitrogen critical load calculations are undertaken. There is no requirement for the calculation of acidification as the calculation of the ammonia and nutrient N forms the more stringent test. This approach is consistent with that for application 18/0463/FUL.

#### 1.4 Scope

This report is aimed at comparing the predictions of the ammonia modelling with limit values described by Natural Resources Wales and Powys County Council. Interpretation of the results and the screening thresholds to be used by the Natural Resources Wales, for example in relation to screening distances and impact thresholds are relevant for both planning and Permitting. This assessment is therefore aimed at meeting the requirements of NRW and therefore also the requirements of Powys Council and represents an update to the detailed modelling submitted in support of the Permit Application.

#### 1.5 Ecological Receptors

Ecological site searches 2km (local sites and AW) and 5km (SSSI and European sites) are included as Appendix B to this report. These confirmed that the following sites are of interest and these are consistent with those assessed in support of application 18/0463/FUL.

- Upper Nantserth Pasture SSSI
- Coed y Cefn SSSI
- Marcheini Uplands, Gilfach Farm & Gamallt SSSI
- Rhos Rhyd-y-Ceir SSSI
- Cwm Gwynllyn SSSI
- River Wye (Upper Wye) SSSI
- Cerrig-Gwalch SSSI
- Carn Gafallt and Elenydd SSSI

- Caeau Wern SSSI;
- New House Meadow SSSI;
- Cae Coed Gleision SSSI;
- Cae Cwm-bach SSSI
- Black Brook Pastures SSSI;
- Elenydd-Mallaen SPA;
- River Wye SAC; and
- Elan Valley Woodlands SAC.

In addition to these sites of European and National interest, there are a number of ancient woodlands withing 2km of the proposed site location. The locations of these sites are shown in Appendix B (MAGIC maps).



## 2.0 APPROACH

### 2.1 General Approach

NRW guidance GN 020 and OGN 41 has been followed for this assessment in relation to sites of European and National interest (i.e. 'Natura 2000' sites). Predicted ground level concentrations of ammonia, nutrient nitrogen and acid deposition are compared with relevant air quality standards and guidelines for the protection of sensitive habitats. For local sites and ancient woodland, Guidance *Intensive farming risk assessment for your environmental permit* (May 2018) is used. This approach is consistent with that for application 18/0463/FUL.

### 2.2 Critical Levels

Critical levels for the protection of vegetation and ecosystems are specified within relevant European air quality directives and corresponding UK air quality regulations.

**Table 3-1**  
**Ammonia Critical Level**

Concentration ( $\mu\text{g}/\text{m}^3$ )	Habitat and Averaging Period
1	Annual mean. Sensitive lichen communities & bryophytes and ecosystems where lichens & bryophytes are an important part of the ecosystem's integrity
3	For all higher plants (all other ecosystems)

The critical levels used in this assessment are based on data from APIS and NRW open data on access, flood, habitats, hydrology, landscapes, marine, designated land, water quality, and woodlands<sup>1</sup> (i.e. NRW opendata sensitivity maps). This approach differs from that used for application 18/0463/FUL, which used a 'blanket' critical level of  $1.0 \mu\text{g}/\text{m}^3$  for all ancient woodland sites. The opendata sensitivity maps provide additional information to confirm which of the ancient woodland sites are ammonia sensitive (and therefore the critical level of  $1.0 \mu\text{g}/\text{m}^3$  is appropriate) and which are not, where a critical level of  $3.0 \mu\text{g}/\text{m}^3$  has been applied.

### 2.3 Critical Loads

Critical loads are set for the deposition of various substances to sensitive ecosystems. Predicted contributions to nitrogen deposition have been calculated and compared with the relevant critical load range for the habitat types associated with each designated site as derived from the UK Air Pollution Information System (APIS) website<sup>2</sup>. The contribution to critical loads for Nitrogen deposition are recorded as  $\text{KgN}/\text{ha}/\text{yr}$ .

<sup>1</sup> [NRW Open Access Map](https://nrw.maps.arcgis.com/) available at <https://nrw.maps.arcgis.com/>

<sup>2</sup> [www.apis.ac.uk](http://www.apis.ac.uk)

Deposition rates were calculated using dispersion modelling results processed by following empirical methods recommended by the Environment Agency in AQTAG and summarised below.

Firstly, calculate dry deposition flux using the following equation:

$$\text{Dry deposition flux } (\mu\text{g}/\text{m}^2/\text{s}) = \text{ground level concentration } (\mu\text{g}/\text{m}^3) \times \text{deposition velocity } (\text{m}/\text{s})$$

The applied deposition velocity for ammonia is 0.020 for grassland and 0.030 for woodland. This may be adapted based on the overall concentration of ammonia as a process contribution however this value is appropriate for concentrations below 10  $\mu\text{g}/\text{m}^3$ , as stated in NRW *Modelling the concentration and deposition of ammonia emitted from intensive farming* Reference number: GN036 (version 1.0, December 2019):

**Table 1. Recommended ammonia dry deposition velocity at different long term average concentration to be used in an impact assessment.**

NH3 conc (farm contribution + background – the PEC) ( $\mu\text{g}/\text{m}^3$ )	<10	10 – 20	20 – 30	30 – 80	>80
Deposition velocity (m/s)	0.02 or 0.03*	0.015	0.01	0.005	0.003

\*0.02 m/s for short vegetation and 0.03 m/s for tall vegetation

An applied deposition velocity for ammonia of 0.005m/s for water bodies has been accepted by the NRW for other poultry schemes although for application 18/0463/FUL it was confirmed by consultees that there is no applicable critical load for sites where the designated features are aquatic – in the case the Upper Wye SSSI.

The units are then converted from  $\mu\text{g}/\text{m}^2/\text{s}$  to units of kg/ha/year by multiplying the dry deposition flux by a standard conversion factor for ammonia of 259.7.

As nutrient nitrogen depositions forms a more stringent test than acid deposition, as accepted for application 18/0463/FUL.

Wet deposition occurs via the incorporation of the pollutant into water droplets which are then removed in rain or snow and is not considered significant over short distances compared with dry deposition and therefore for the purposes of this assessment, wet deposition has not been considered. This is consistent with application 18/0463/FUL.

## 2.4 Significance: Interpretation of Results

OGN 41 presents thresholds for livestock developments in relation to European sites (RAMSAR, SPA and SAC) and SSSIs:

- threshold of insignificance (% of the designated site Critical Level or Load): **1%**;



- upper threshold % of the designated site Critical Level or Load: **8%**.

In the case of Local sites such as Sites of Special Interest to Nature Conservation (SINC) and Ancient Woodlands, Natural Resources Wales apply a limit for PC of up to 100% of Critical Level or Critical Load, i.e. the upper and lower thresholds are the same (100%).

#### *2.4.1 Threshold of Insignificance*

Where process contributions, considered in isolation, are up to 1% of the designated site Critical Level or Load, then it should be determined that there is no significant environmental effect/no likely significant effect/damage to scientific interest (see section 2.5, below). This was confirmed by Powys Council (22 May 2020) in relation to application 18/0463/FUL:

*'The results of the modelling demonstrate that the use of the ammonia scrubbing units would reduce the predicted process contributions from the proposed development to below the current lower threshold for Statutory designated sites - 1% of the precautionary Critical Levels.'*

#### *2.4.2 In-Combination Range*

Where process contributions, considered in isolation, are between 1% and 8% of the designated site Critical Level or Load, an in-combination assessment is required. Should the in-combination process contributions be between 1% and 8% of the designated site Critical Level or Load then it should be determined that the application would cause no significant environmental effect/likely significant effect/damage to scientific interest.

Within the range between the lower and upper thresholds, whether or not the impact is deemed acceptable is at the discretion of Natural Resources Wales.

#### *2.4.3 Upper Threshold*

For units that are assessed as exceeding the 8% threshold either alone, or in combination, the applicant will be required to submit a plan as part of their permit application detailing how the ammonia emissions and nitrogen deposition will be reduced.

### **2.5 Consistency with other Applications**

The approach taken in this report is consistent with other recent schemes such as the first broiler unit at Llwyngwylm Farm (application ref: 18/0463/FUL). The initial building also proposed the use of IPT VentMax 1200 Acid Scrubbers (or equivalent) for ammonia mitigation. The Powys Council ecologist for the scheme reviewed the NRW consultation response and commented as follows for that scheme:

*'The results of the modelling demonstrate that the use of the ammonia scrubbing units would reduce the predicted process contributions from the proposed development to below the current lower threshold for Statutory designated sites - 1% of the precautionary Critical Levels. It is therefore considered that the potential impacts of the proposed development to statutory designated sites as a result of installation of the proposed air scrubber unit would be within the levels considered to*

*be acceptable by recognised current guidelines. NRW have reviewed the information provided within the Report with regards to statutory designated sites, in their response dated 20<sup>th</sup> February 2020 NRW have confirmed that in light of the proposed Ammonia Scrubber technology which has been identified to be installed in the proposed development the predicted process contributions would be reduced to below the thresholds applied to determine potential impacts to statutory protected sites under which the application has been considered and are therefore would be considered to be acceptable. NRW have advised that the LPA should considered inclusion of an appropriately worded planning condition to secure implementation and maintenance of the ammonia air scrubbers.’ – 22nd May 2020*

On this basis it can be seen that both Powys Council and NRW have accepted the use of IPT VentMax 1200 Acid Scrubbers for mitigation of ammonia from broiler units and that the ‘the current lower threshold for Statutory designated sites’ should be taken as 1% of the precautionary Critical Levels. Where the potential impacts are below 1% the application would be considered to be acceptable in air quality (ammonia) terms and this is consistent with Guidance OGN 41 as described above.

The selection of a scrubber will be a commercial decision taken at the tendering stage prior to construction of the units. There are several suppliers of scrubbing technology for poultry buildings including IPT, DraperVENT, JF McKenna and Big Dutchman. This report assumes that, in the event that an alternative scrubbing system is chosen for the final design, the performance would be equivalent to (or better than) that of the IPT VentMax system in relation to ammonia scrubbing performance.

## 3.0 SITE SETTING AND OPERATIONS

### 3.1 Location

The site lies approximately 1.5km North East of the centre of Rhayader and 3.4km south west of Harmon. The predominant land use is grassland and grazing. The site itself is located within a grassland field located off the B4518 highway at approximate site grid reference OS GR 297720, 269460. The location is shown in Appendix A.

### 3.2 Description of Development

The proposal seeks Planning Permission for the operation of a further 55,000 broiler bird poultry rearing unit with associated infrastructure on the site which already benefits from planning permission for a single poultry building.

Ventilation in the new house will be drawn through IPT VentMax 1200 gable end air scrubbing systems (or equivalent) reducing ammonia release by an average of 90% (the data sheet for the units indicates an achievable average value of 92%) when compared with standard emission rates for broiler birds.

The farm will be operated in accordance with best practice and BAT standards in EPR 6.09.

- A computer automatically will control ventilation and heating so that heat is not wasted by being drawn out of the building.
- Litter will be kept loose and friable. The quality will be regularly inspected to ensure it does not become excessively wet or dry.
- Temperature in the sheds will meet the health and welfare needs for the age and number of the birds. Hot water heaters will be spaced regularly within the sheds to prevent cold spots and extremes of temperature. The fans are fitted with back draft shutters to prevent drafts and unnecessary heat loss.
- Birds will be fed a minimum of three diets during their cycle, with gradually reducing levels of protein and phosphorous as bird age increases. Feed will be delivered from a UKASTA accredited feed mill and blown into bulk feed bins situated adjacent to the houses, from the feed bins the feed will be piped into the houses and distributed to the birds via a pan feeding system.
- Fallen stock will be recorded daily and securely stored in vermin proof containers awaiting regular collection by a licenced renderer.

Ammonia emissions within the buildings will be reduced through a diet based on 'ideal' protein feed and maintaining good litter conditions.

### 3.3 Stocking

This ammonia assessment is based on the proposed building holding an average of 55,000 birds in a single shed of 115.8 metres long by 24.4 metres wide with a roof pitch of 15°, internal eaves height of 2.5 metres. This is identical to the recently approved building.

The proposed poultry unit will produce standard birds, based on a 35-38 day growing cycle, with an empty period at the end of each cycle for cleanout and preparation of the buildings for the incoming flock. The unit will operate with approximately 7.5 flocks per annum.

During the growing cycle temperature is controlled within the buildings. The buildings are pre-warmed to a temperature of approximately 33°C on day 1 of the cycle typically reducing to approximately 22°C at clear-out of the crop (for more detail refer to Table 3-4).

### 3.4 Dispersion Modelling Inputs

Detailed dispersion modelling has been completed in line with *Guidance on modelling the concentration and deposition of ammonia emitted from intensive farming. Air Quality Modelling and Assessment Unit v3*. The BREEZE AERMOD model has been used.

#### 3.4.1 Buildings

The movement of air over and around buildings and other structures generates areas of flow re-circulation that can lead to increased ground level concentrations of pollutants close to the source. Where the stack height is less than 2.5 times the height of any nearby building (within 5 stack heights), downwash effects and entrainment can be significant.

The site details have been provided by the applicant and the specifications for the new buildings are consistent with those for planning application 18/0463/FUL. The detailed dispersion model was constructed on this basis and includes the recently approved building as this has the potential to influence dispersion.

**Table 3-1**  
**Building Details**

Building	Width (m)	Length (m)	Basal Height (mAoD)	Angle (°)	No. of stacks
Proposed building	24.4	115.8	315	57.2	0
Extant Building	24.4	115.8	315	57.2	0
Proposed Building scrubber	24.4	4	315	57.2	3
Extant Building scrubber	24.4	4	315	57.2	3

The heights of the buildings have been taken as 5.2m for the buildings and 4.5m for the scrubbing units for purposes of downwash.

### 3.4.2 Meteorology

In accordance with current guidance, 5 years of meteorological data has been used (2015 – 2019). The closest meteorological data sites to the scheme are:

- Trawsgoed WMO Identifier 3503 (62m AoD)
- Shobdon Airfield WMO Identifier 3520 (99m AoD); and
- Sennybridge NO2 WMO Identifier 3507 (307m AoD).

The closest of these data sets with similar characteristics to the application site (such as altitude) is Sennybridge NO2. This site lies approximately 40km from the proposed development site.

Meteorological data for Sennybridge NO2 was obtained in .met format and converted to .sfc and .pfl formats for use in AERMOD using AERMET Pro according to US EPA methodology<sup>3</sup>. Surface roughness length is based upon land use characteristics 1km from the point source. The determination of Bowen ratio and albedo is defined by a 10km by 10km region around the site. In this case the site is characterised by forest, cultivated land and grassland. A site roughness of 0.225m has been used for the modelling, which is consistent with the roughness length used for planning application ref 18/0463/FUL.

### 3.4.3 Topography

Elevated terrain reduces the distance between the plume centre line and the ground level, thereby increasing ground level concentrations. Elevated terrain can also increase turbulence and, hence, plume mixing with the effect of increasing concentrations near to a source and reducing concentrations further away. The site is set on ground at approximately 315m AOD and the height of the surrounding land is highly variable. Information relating to the topography of the area surrounding the site has been used to assess the impact of terrain features on the dispersion of emissions from the site. Topographical data has been obtained in digital (.ntf) format and incorporated into the assessment.

### 3.4.4 Source Parameters

Modelling inputs for the proposed broiler building are shown in Appendix C. The emission parameters are as shown in Table 3-2 below and they are identical for all stacks detailed in Appendix C.

**Table 3-2**  
**Stack Details**

Building	Stack height (m)	Stack diameter (m)	Velocity (m/s)
Proposed Building scrubber	5.5	1.5	6.22

<sup>3</sup> US Environmental Protection Agency (2008). AERMOD Implementation Guide, AERMOD Implementation Group.

The temperature of all emissions has been taken as 22°C for all hours of the year which represents 'worst case' in terms of thermal buoyancy from the stacks. The velocity and stack diameter results in a flow per stack of 11 m<sup>3</sup>/s, which represents 118710 m<sup>3</sup>/h for the 3 stacks modelled (the maximum throughput of the unit is 120000m<sup>3</sup>/h).

#### 3.4.5 Emission Rate

The process contribution is calculated as a result of the emissions from the proposed buildings. The emission rates for each building are shown below.

**Table 3-3**  
**Emission Rate**

Building	No. of Birds	Emission (kg/yr)	% abatement	Emission (g/s) per stack
Shed 1 scrubbers	55000	1870	90%	0.00197658
Shed 2 scrubbers	55000	1870	90%	0.00197658

The emission rate used above is calculated from the standard emission factors for broilers of 0.034kg/bird/year with 90% abatement applied. The same stack input details have been used for the approved building for purposes of the in-combination assessment included with Section 6.

#### 3.4.6 Maximum Scrubber Treatment Capacity

The maximum treatment capacity of the units means that under extreme circumstances (i.e. when the ventilation exceeds the maximum design capacity of the scrubbers) a proportion of the air will be vented out of ridge vents to atmosphere. This is similar to the relationship between ridge and gable end fans for a standard (i.e. unscrubbed) poultry building.

Details of the IPT Ventmax system assumed for purposes of this assessment are included as Appendix D to this report. The IPT system has a maximum ventilation capacity of 120,000m<sup>3</sup>/hr (33.33m<sup>3</sup>/s).

The air quality assessment provided in support of application ref: 18/0463/FUL stated the following in relation to the flow of air from the building:

*'The ventilation rates used in the calculations are based on industry practices and standard bird growth factors. Minimum ventilation rates are as those of an operational poultry house and maximum ventilation rates are based on Defra guidelines. Target internal temperature is 33 Celsius at the beginning of the crop and is decreased to 22 Celsius by day 34 of the crop. If the external temperature is 7 Celsius, or more, lower than the target temperature, minimum ventilation only is assumed for the calculation. Above this, ventilation rates are increased in proportion to the difference between ambient temperature and target internal temperature. A maximum transitional ventilation rate (35% of the maximum possible ventilation rate) is reached when the ambient temperature is equal to the target temperature. A high ventilation rate (70% maximum possible ventilation rate) is reached when the*

*temperature is 4 degrees above target and if external temperature is above 33 Celsius the maximum ventilation rate is assumed.'*

On this basis, the following ideal dry bulb temperature values are of relevance and are taken from the optimal values detailed in the Aviagen guide for Ross broilers. Note that these are based on a suggested relative humidity value of 50% RH.

**Table 3-4**  
**Optimal House Temperatures (Aviagen)**

Age	Suggested indoor temperature	minimum ventilation	transitional ventilation	maximum ventilation
1	33.2	26.2	33.0	33.0
3	31.2	24.2	31.2	33.0
6	29.9	22.9	29.9	33.0
9	28.6	21.6	28.6	32.6
12	27.8	20.8	27.8	31.8
15	26.8	19.8	26.8	30.8
18	25.5	18.5	25.5	29.5
21	24.7	17.7	24.7	28.7
24	23.5	16.5	23.5	27.5
27+	22.7	15.7	22.7	26.7

Based on 50% RH, the optimal temperatures in the Aviagen guide the bird number and husbandry strategy proposed (55,000 birds average, 36 day cycle with thinning at day 30) and the ventilation strategy accepted for application ref: 18/0463/FUL, the key ambient temperatures would be as follows and these values are also shaded in table 3-4, above:

- Irrespective of bird age, the unit would be operated at minimum ventilation up to an ambient temperature of 15.7°C;
- The maximum transitional ventilation (33% of overall maximum) would not be exceeded until the ambient temperature of 22.7°C. At maximum transitional ventilation the capacity of the IPT Ventmax system would not be exceeded until Day 25 of the crop, when the ambient temperature would have to be greater than 23.5°C;
- For the largest birds (>27 days), maximum ventilation capacity would be required when the ambient temperature of reaches 26.7°C. At maximum ventilation the capacity of the IPT Ventmax system would not be exceeded until Day 19 of the crop, when the ambient temperature would have to be greater than 29.5°C;

Analysis of 5 years (2015-2019) meteorological data recorded at Sennybridge that temperatures very rarely exceed 22.7°C and have not exceeded 29.2°C over the 5 year data set.



**Table 3-5**  
**Sennybridge Meteorological Summary (2015-19)**

Minimum Temp °C	Maximum Temp °C	Number of Hours	% of year	% of year cumulative	Average hours per year
	<15.7	38542	90.4%	90.4%	7708
15.7	22.7	3786	8.9%	99.3%	757
22.7	23.5	79	0.2%	99.5%	16
23.5	26.7	200	0.5%	100.0%	40
26.7	29.5	18	0.0%	100.0%	4
<b>TOTAL</b>		<b>42625</b>	<b>100%</b>		<b>8525</b>

It can be seen that, at this location (and particularly this altitude, which is the same for Sennybridge as it is for Llwyngwilym) the facility would be operating at the minimum ventilation for over 90% of the year. The temperature at which the maximum transitional ventilation would be reached for the bird older than 27 days would only be exceeded for fewer than 60 hours (or 0.7%) of the average year. This would need to coincide with one of the 72 days (assuming 8 crops) or 20% of the year when the bird of that age are being housed. There are only 18 hours in the 5 year data set (<4 hours per year) when the ambient temperature is above the 26.7°C required before the crop is at maximum ventilation for the largest birds.

For the above reasons it is considered appropriate to model the emissions from the scrubber unit stacks with no ammonia emitted from the roof vents as the chances of this occurring are very small and therefore the total mass emission of ammonia from the roof vents over any one year will be insignificant when compared with the emissions from the scrubber. The 90% average abatement factor for scrubbing systems such as the IPT and equivalent units is consistent with that for other applications approved by NRW when considering potential annual average ammonia impacts on ecological sites.

### 3.5 Ecological Receptors

As discussed in section 1.5 above, the relevant sites are:

- Upper Nantserth Pasture SSSI;
- Coed y Cefn SSSI;
- Marcheini Uplands, Gilfach Farm & Gamallt SSSI;
- Rhos Rhyd-y-Ceir SSSI;
- Cwm Gwynllyn SSSI;
- River Wye (Upper Wye) SSSI;
- Cerrig-Gwalch SSSI;
- Carn Gafallt and Elenydd SSSI;



- Caeau Wern SSSI;
- New House Meadow SSSI;
- Cae Coed Gleision SSSI
- Cae Cwm-bach SSSI;
- Black Brook Pastures SSSI;
- Elenydd-Mallaen SPA;
- River Wye / Afon Gwy (Wales) SAC; and
- Coetiroedd Cwm Elan / Elan Valley Woodlands SAC.

The MAGIC Ecological site search is included within Appendix B.

### *3.5.1 Upper Nantserth Pasture SSSI*

The SSSI citation for this site describes the Upper Nantserth Pasture as follows:

*'This site comprises a single sloping field of mainly boggy land on either side of a small tributary of the Nant Serth. The pasture is of special interest because it supports a good range of mire and grassland plant communities within a small area. It has a high species diversity which includes locally and nationally uncommon plants.'*

APIS data shows that the neutral grassland (Mountain hay meadows) has a nutrient nitrogen critical load range of 10-20 Kg N/ha/year. However, on 5<sup>th</sup> Nov 2019 Natural Resources Wales (North) DPAS responded in relation to Application 18/0463/FUL to confirm the following requirement:

*'Requirement 2 - amend the detailed modelling report on the deposition of ammonia to assess the Upper Nantserth Pastures SSSI on a Critical Load of 8kgN/ha/yr.'*

A nutrient nitrogen critical load of **8 Kg N/ha/year** has therefore been used in this assessment. A lower critical level of **1 µg/m<sup>3</sup>** applies to this site.

### *3.5.2 Coed y Cefn SSSI*

The CCfW citation states that this site is a sessile oakwood comprising oak trees, probably of secondary growth, and occasional birch. The APIS data for semi natural (Acidophilous Quercus-dominated) woodland is **10-15 kg N/ha/yr**. As lichens are present a lower critical level of **1 µg/m<sup>3</sup>** applies.

### *3.5.3 Marcheini Uplands, Gilfach Farm & Gamallt SSSI*

The SSSI citation for this site indicates that the area is of importance because of its representation of blanket mire, heather moorland, western gorse heathlands, lichen-rich rock outcrops and the occurrence of rare species. A nutrient nitrogen critical load range of **5-10 Kg N/ha/year** is relevant for raised and blanket bogs and as lichens are present a lower critical level of **1 µg/m<sup>3</sup>** applies.

### 3.5.4 Rhos Rhyd-y-Ceir SSSI

The citation for this site describes it as a 'botanically rich damp-wet heathy pasture' (known as 'rhos'). The damp pasture which comprises most of the site is dominated by purple moor-grass *Molinia caerulea*, sharp-flowered rush *Juncus acutiflorus* and soft-rush *J. effusus*.

There is no nutrient nitrogen critical load range for EUNIS habitat class 'Moist or wet eutrophic and mesotrophic grassland', however a nutrient nitrogen critical load range for Upland heathland (Wet Heath) of **10-20 kg N/ha/yr** may be used in this case. According to the NRW opendata sensitivity map a critical level for higher plants of **3 µg/m<sup>3</sup>** applies at this site.

### 3.5.5 Cwm Gwynllyn SSSI

According to CCfW this SSSI contains Coed Wennallt (freely drained, grazed sessile acidic oakwood). Gwynllyn is a small oligotrophic lake, is surrounded by an open water transition mire, parts of which are describes as 'floristically rich'. Other areas have been colonised by willow and alder and 'support a rich epiphytic lichen flora'.

A nutrient nitrogen critical load range of **5-10 Kg N/ha/year** has been applied to this diverse site and as lichens are present a lower critical level of **1 µg/m<sup>3</sup>** applies.

### 3.5.6 Cerrig-Gwalch SSSI

The citation for this site states:

*'This is a fine example of a mixed deciduous woodland developed on an east-facing steep cliff comprised of rocks of Silurian (Tarannon and Llandovery) age. The tree layer is scrubby, with birch, oak and rowan well represented. Ash is locally present.'*

The APIS data for semi natural (Acidophilous Quercus-dominated) woodland is **10-15 kg N/ha/yr**. As lichens are likely to be present a lower critical level of **1 µg/m<sup>3</sup>** applies and this is consistent with the NRW opendata sensitivity mapping information.

### 3.5.7 Carn Gafallt and Elenydd SSSI

The citation for this upland site describes that it contains a diverse range of habitats. These include semi-natural broadleaved woodland (including sessile oakwood), above which is situated one of the largest expanses of heather moorland in Brecknock. The SSSI is also rich bryophyte flora and it is noted that the mature trees support a variety of epiphytic lower plants. The SSSI also includes areas of Heather moorland and blanket mire and bog communities.

A nutrient nitrogen critical load range of **5-10 Kg N/ha/year** has been applied to this diverse site and as lichens are present a lower critical level of **1 µg/m<sup>3</sup>** applies.

### 3.5.8 Caeau Wern SSSI

The Caeau Wern SSSI is an area of herb-rich, traditionally managed hay meadow. APIS data shows that the neutral grassland (Mountain hay meadows) has a nutrient nitrogen critical load range of **10-20 Kg N/ha/year**. A critical level of **3 µg/m<sup>3</sup>** applies at this site, according to NRW opendata sensitivity mapping information.

### *3.5.9 New House Meadow SSSI*

This herb-rich grassland comprises a single field adjacent to a roadside. APIS data shows that the neutral grassland (Mountain hay meadows) has a nutrient nitrogen critical load range of **10-20 Kg N/ha/year**. A critical level of **3 µg/m<sup>3</sup>** applies at this site, according to NRW opendata sensitivity mapping information.

### *3.5.10 Cae Coed-Gleision SSSI*

The Cae Coed-Gleision SSSI is a traditionally managed hay meadow. APIS data shows that the neutral grassland (Mountain hay meadows) has a nutrient nitrogen critical load range of **10-20 Kg N/ha/year**. A lower critical level of **3 µg/m<sup>3</sup>** applies at this site, according to NRW opendata sensitivity mapping information.

### *3.5.11 Cae Cwm-bach SSSI*

The SSSI citation describes that this site consists of a single meadow normally grazed by sheep in the spring and then put up for hay and cut in late July or August. It is an example of a seminatural neutral grassland, in particular 'the mid-wales hay meadows'. APIS data shows that the neutral grassland (Mountain hay meadows) has a nutrient nitrogen critical load range of **10-20 Kg N/ha/year**. A lower critical level of **3 µg/m<sup>3</sup>** applies at this site, according to NRW opendata sensitivity mapping information.

### *3.5.12 Black Brook Pastures SSSI*

Black Brook Pastures is of special interest for its species-rich acid/neutral grassland, mixed grassland and flood-plain fen vegetation. APIS data shows that the neutral grassland (Mountain hay meadows) has a nutrient nitrogen critical load range of **10-20 Kg N/ha/year**. A lower critical level of **3 µg/m<sup>3</sup>** applies.

### *3.5.13 Elenydd-Mallaen SPA*

This SPA consists of a mix of woodland and heathland which the Red Kite and Merlin use as a habitat:

- Red kite: Broadleaved deciduous woodland **10 – 20 Kg N/ha/year**
- Merlin: Northern wet heath: Calluna-dominated wet heath (upland moorland) **10 – 20 Kg N/ha/year**

APIS indicates that the SPA includes areas where epiphytes and bryophytes may be present and therefore a lower critical level of **1 µg/m<sup>3</sup>** applies.

### *3.5.14 River Wye / Afon Gwy (Wales) SAC*

The JNCC describes the River Wye SAC as consisting of the following within the designated area of 2147.64 ha:

- Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins) (9.5%)
- Salt marshes, Salt pastures, Salt steppes (1.5%)

- Inland water bodies (Standing water, Running water) (52.5%)
- Bogs, Marshes, Water fringed vegetation, Fens (3.1%)
- Heath, Scrub, Maquis and Garrigue, Phygrana (1%)
- Dry grassland, Steppes (5.3%)
- Humid grassland, Mesophile grassland (2.4%)
- Improved grassland (10.4%)
- Broad-leaved deciduous woodland (12.3%)
- Inland rocks, Scree, Sands, Permanent Snow and ice (0.2%)
- Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites) (1.8%)

The Annex I habitat that is a primary reason for selection of this site is:

*'3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation'*

An Annex I habitat present as a qualifying feature, but not a primary reason for selection of this site is:

*'7140 Transition mires and quaking bogs'*

The River Wye (Tributaries) / Afon Gwy (Isafonydd) is the 47.9 ha section of the Wye that sits within Powys and The River Wye (Upper Wye) Covers 552.8 Ha within Powys And Ceredigion.

The Delegated Report for Application 18/0463/FUL described that:

*'We have read the email dated 11<sup>th</sup> of October 2019 from the Powys County Ecologist, Rachel Probert regarding this proposal, found on the planning portal for this application.*

*For clarification, we do not require the River Wye SAC/River Wye (Upper Wye) SSSI to be considered in the in-combination assessment because the designated features in this area are aquatic.'*

A lower critical level of **1 µg/m<sup>3</sup>** applies to this site, according to NRW opendata sensitivity mapping information.

### ***3.5.15 Coetiroedd Cwm Elan / Elan Valley Woodlands SAC***

The Elan Valley Woodlands SAC has been designated on the basis of:

- Tilio-Acerion forests of slopes, scree and ravines;
- European dry heaths; and
- Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles.

This Acidophilous Quercus-dominated woodland has a nutrient nitrogen critical load range of **10-15 Kg N/ha/year** and as APIS indicates that the SAC includes areas where epiphytes and bryophytes may be present a lower critical level of **1 µg/m³ applies**.

### 3.5.16 Ancient Woodland

There are a number of AW sites within 2km of the proposed poultry building.

Although there is no site specific information for these sites, the critical load for deciduous woodland is 10 - 20 Kg N/ha/year. Within this range, the lower critical load is therefore 10 Kg N/ha/year with the upper threshold being 20 Kg N/ha/year. The use of **10 Kg N/ha/year** is consistent with the approach accepted for Application 18/0463/FUL.

As described in section 2.2 of this report, the critical levels used in this assessment are based on data from NRW opendata sensitivity maps. This approach differs from that used for application 18/0463/FUL, which used a 'blanket' critical level of 1.0 µg/m³ for all ancient woodland sites. The opendata sensitivity maps provide additional information to confirm which of the ancient woodland sites are ammonia sensitive (and therefore the critical level of **1.0 µg/m³** is appropriate) and which are not, where a critical level of **3.0 µg/m³** has been applied.

### 3.5.17 Model Input

Modelling was carried out with discrete receptors representing the ecological sites of biological interest. A drawing showing the 63 receptor points is included as Appendix E.

**Table 3-6  
Receptor Points**

ID	Site	OS Xm	OS Ym	Elevation (m)
D1	Ancient Woodland	298505.0	269468.0	304.7
D2	Ancient Woodland	297944.0	269088.0	286.4
D3	Ancient Woodland	297398.0	269408.0	320.8
D4	Ancient Woodland	297112.0	269361.0	302.5
D5	Ancient Woodland	297078.0	269728.0	258.9
D6	Ancient Woodland	298771.0	269323.0	278.9
D7	Ancient Woodland	297552.0	269063.0	290.0
D8	Ancient Woodland	297355.0	268948.0	274.0
D9	Ancient Woodland	298439.0	268734.0	220.0
D10	Ancient Woodland	296737.0	269647.0	239.9
D11	Ancient Woodland	296865.0	269250.0	271.5
D12	Ancient Woodland	297070.0	268811.0	251.0
D13	Ancient Woodland	296502.0	269178.0	227.9
D14	Ancient Woodland	296711.0	268747.0	221.9
D15	Ancient Woodland	296183.0	269204.0	223.1
D16	Ancient Woodland	296490.0	268747.0	224.4

ID	Site	OS Xm	OS Ym	Elevation (m)
D17	Ancient Woodland	296763.0	268334.0	211.1
D18	Ancient Woodland	298230.0	268176.0	225.6
D19	AW (NH3 Sensitive)	298040.7	267444.7	236.1
D20	AW (NH3 sensitive)	298909.3	267921.9	272.7
D21	Ancient Woodland	299571.0	269886.0	269.9
D22	Ancient Woodland	299392.0	270494.0	308.7
D23	Ancient Woodland	299891.0	269803.0	275.4
D24	Ancient Woodland	296283.0	268536.0	248.9
D25	Upper Nantserth Pasture SSSI	297641.0	270176.0	278.3
D26	Caeau Wern SSSI	300667.0	269793.0	285.2
D27	Caeau Wern SSSI	300875.0	269586.0	265.2
D28	New House Meadow SSSI	296805.0	267613.0	203.2
D29	Coed Y Cefn SSSI	295575.0	268140.0	286.0
D30	Coed Y Cefn SSSI	295642.0	267687.0	292.4
D31	Marcheini Uplands, Gilfach Farm & Gamallt SSSI	297055.0	271782.0	339.2
D32	Cae Coed Gleison SSSI	298237.0	272499.0	278.6
D33	Marcheini Uplands, Gilfach Farm & Gamallt SSSI	297534.0	272580.0	304.9
D34	Rhos Rhyd-y-ceir SSSI	298501.0	264598.0	225.0
D35	Cwm Gwynllyn SSSI	295041.0	268660.0	229.3
D36	Cae Cwm-Bach SSSI	295270.0	269998.0	231.1
D37	River Wye SAC/River Wye (Upper Wye) SSSI	296642.0	268690.0	204.5
D38		296847.0	268242.0	205.7
D39		296448.0	269071.0	205.6
D40		297436.0	267727.0	197.3
D41		297305.0	266804.0	192.5
D42		295620.0	266858.0	187.9
D43		296641.0	265671.0	182.1
D44		297344.0	265012.0	179.7
D45		294453.0	270833.0	217.1
D46		295210.0	271482.0	221.7
D47		294170.0	272478.0	235.5
D48	Elan Valley Woodlands SAC/Cwm Gwynllyn SSSI	295794.0	268895.0	300.9
D49	Elenydd - Mallaen SPA/Marcheini Uplands, Gilfach Farm & Gamallt SSSI	296427.0	270969.0	397.4
D50		295650.0	270425.0	374.5
D51		296821.0	272761.0	352.3
D52		296678.0	274038.0	464.5
D53		294752.0	272926.0	386.1
D54		295358.0	273675.0	379.4
D55		295204.0	269064.0	310.1
D56		294466.0	268899.0	248.7

ID	Site	OS Xm	OS Ym	Elevation (m)
D57		293388.0	269746.0	393.6
D58	Elenydd - Mallaen SPA / Elenydd SSSI	294158.0	268062.0	274.6
D59		294180.0	266929.0	323.8
D60	Elenydd - Mallaen SPA / Cerrig-Gwalch SSSI	293696.0	270296.0	437.4
D61	Elenydd - Mallaen SPA / Carn Gafallt SSSI	296700.0	265520.0	197.4
D62	Elenydd - Mallaen SPA / Elan Valley Woodlands / Carn Gafallt SSSI	295809.0	265322.0	317.7
D63	Black Brook Pastures	301673.0	267367.6	219.8

### 3.6 Baseline Concentration / Deposition

The existing baseline values for each of the designated site types (i.e. roughness class) are as follows, based on the centre of the proposed development site.

**Table 3-7**  
**Baseline Conditions**

Site	NH <sub>3</sub> concentration (µg/m <sup>3</sup> )	Nutrient N (kg/ha/yr)
Grassland	0.93	16.1
Woodland	0.93	24.36

The existing concentration of ammonia all the development site is below the upper critical level limit of 3 µg/m<sup>3</sup> and also (just) below the limit for sites designated for epiphytes and bryophytes of 1 µg/m<sup>3</sup>. Where impacts are above 1% of their respective limit, consideration of the existing background (and any in-combination effects) will be required.



## 4.0 IMPACTS: PROCESS CONTRIBUTION

The results of the ammonia modelling for the proposed sheds is presented below.

### 4.1 Results: Critical Levels

The maximum dispersion modelling results for each site are shown in the tables below.

**Table 4-1**  
**Results: Critical Levels ( $\mu\text{g}/\text{m}^3$ )**

ID	Site	Result	Critical Level	% of C.L.
D1	Ancient Woodland	0.0045	3	0.15%
D2	Ancient Woodland	0.0045	3	0.15%
D3	Ancient Woodland	0.0098	3	0.33%
D4	Ancient Woodland	0.0032	3	0.11%
D5	Ancient Woodland	0.0017	3	0.06%
D6	Ancient Woodland	0.0029	3	0.10%
D7	Ancient Woodland	0.0083	3	0.28%
D8	Ancient Woodland	0.0050	3	0.17%
D9	Ancient Woodland	0.0025	3	0.08%
D10	Ancient Woodland	0.0012	3	0.04%
D11	Ancient Woodland	0.0020	3	0.07%
D12	Ancient Woodland	0.0031	3	0.10%
D13	Ancient Woodland	0.0013	3	0.04%
D14	Ancient Woodland	0.0020	3	0.07%
D15	Ancient Woodland	0.0010	3	0.03%
D16	Ancient Woodland	0.0016	3	0.05%
D17	Ancient Woodland	0.0021	3	0.07%
D18	Ancient Woodland	0.0018	3	0.06%
D19	AW (NH3 Sensitive)	0.0016	1	0.16%
D20	AW (NH3 sensitive)	0.0016	1	0.16%
D21	Ancient Woodland	0.0018	3	0.06%
D22	Ancient Woodland	0.0023	3	0.08%
D23	Ancient Woodland	0.0015	3	0.05%
D24	Ancient Woodland	0.0014	3	0.05%
D25	Upper Nantserth Pasture SSSI	0.0053	1	0.53%
D26	Caeau Wern SSSI	0.0011	3	0.04%
D27	Caeau Wern SSSI	0.0010	3	0.03%
D28	New House Meadow SSSI	0.0018	3	0.06%
D29	Coed Y Cefn SSSI	0.0010	1	0.10%
D30	Coed Y Cefn SSSI	0.0010	1	0.10%
D31	Marcheini Uplands, Gilfach Farm & Gamallt SSSI	0.0015	1	0.15%



ID	Site	Result	Critical Level	% of C.L.
D32	Cae Coed Gleison SSSI	0.0016	3	0.05%
D33	Marcheini Uplands, Gilfach Farm & Gamallt SSSI	0.0016	1	0.16%
D34	Rhos Rhyd-y-ceir SSSI	0.0006	3	0.02%
D35	Cwm Gwynllyn SSSI	0.0006	1	0.06%
D36	Cae Cwm-Bach SSSI	0.0005	3	0.02%
D37		0.0018	1	0.18%
D38		0.0022	1	0.22%
D39		0.0013	1	0.13%
D40		0.0023	1	0.23%
D41		0.0015	1	0.15%
D42	River Wye SAC/River Wye (Upper Wye) SSSI	0.0009	1	0.09%
D43		0.0010	1	0.10%
D44		0.0009	1	0.09%
D45		0.0003	1	0.03%
D46		0.0005	1	0.05%
D47		0.0003	1	0.03%
D48	Elan Valley Woodlands SAC/Cwm Gwynllyn SSSI	0.0010	1	0.10%
D49		0.0002	1	0.02%
D50		0.0003	1	0.03%
D51		0.0010	1	0.10%
D52	Elenydd - Mallaen SPA/Marcheini Uplands,	0.0001	1	0.01%
D53	Gilfach Farm & Gamallt SSSI	0.0001	1	0.01%
D54		0.0002	1	0.02%
D55		0.0007	1	0.07%
D56		0.0005	1	0.05%
D57		0.0001	1	0.01%
D58	Elenydd - Mallaen SPA / Elenydd SSSI	0.0005	1	0.05%
D59		0.0006	1	0.06%
D60	Elenydd - Mallaen SPA / Cerrig-Gwalch SSSI	0.0001	1	0.01%
D61	Elenydd - Mallaen SPA / Carn Gafallt SSSI	0.0010	1	0.10%
D62	Elenydd - Mallaen SPA / Elan Valley Woodlands / Carn Gafallt SSSI	0.0010	1	0.10%
D63	Black Brook Pastures	0.0006	3	0.02%

Impacts at sites where the critical level applies are predicted to be (well) below 1% of the critical level at all of the sites identified. The impact is therefore insignificant at these sites, either alone or in combination with other ammonia sources.

## 4.2 Results: N Nitrogen Critical Load

The nutrient nitrogen critical load result at each ecological site is shown in table 4-2.

**Table 4-2**  
**Results: N Deposition (kgN/ha/yr)**

ID	Site	Result	Critical Load	% of C.L.
D1	Ancient Woodland	0.035	10	0.35%
D2	Ancient Woodland	0.035	10	0.35%
D3	Ancient Woodland	0.077	10	0.77%
D4	Ancient Woodland	0.025	10	0.25%
D5	Ancient Woodland	0.013	10	0.13%
D6	Ancient Woodland	0.022	10	0.22%
D7	Ancient Woodland	0.065	10	0.65%
D8	Ancient Woodland	0.039	10	0.39%
D9	Ancient Woodland	0.019	10	0.19%
D10	Ancient Woodland	0.009	10	0.09%
D11	Ancient Woodland	0.016	10	0.16%
D12	Ancient Woodland	0.024	10	0.24%
D13	Ancient Woodland	0.010	10	0.10%
D14	Ancient Woodland	0.015	10	0.15%
D15	Ancient Woodland	0.008	10	0.08%
D16	Ancient Woodland	0.012	10	0.12%
D17	Ancient Woodland	0.016	10	0.16%
D18	Ancient Woodland	0.014	10	0.14%
D19	AW (NH3 Sensitive)	0.012	10	0.12%
D20	AW (NH3 sensitive)	0.012	10	0.12%
D21	Ancient Woodland	0.014	10	0.14%
D22	Ancient Woodland	0.018	10	0.18%
D23	Ancient Woodland	0.012	10	0.12%
D24	Ancient Woodland	0.011	10	0.11%
D25	Upper Nantserth Pasture SSSI	0.027	8	0.34%
D26	Caeau Wern SSSI	0.005	10	0.05%
D27	Caeau Wern SSSI	0.005	10	0.05%
D28	New House Meadow SSSI	0.009	10	0.09%
D29	Coed Y Cefn SSSI	0.008	10	0.08%
D30	Coed Y Cefn SSSI	0.008	10	0.08%
D31	Marcheini Uplands, Gilfach Farm & Gamallt SSSI	0.008	5	0.16%
D32	Cae Coed Gleison SSSI	0.008	10	0.08%
D33	Marcheini Uplands, Gilfach Farm & Gamallt SSSI	0.008	5	0.16%
D34	Rhos Rhyd-y-ceir SSSI	0.003	10	0.03%
D35	Cwm Gwynllyn SSSI	0.005	5	0.10%

ID	Site	Result	Critical Load	% of C.L.
D36	Cae Cwm-Bach SSSI	0.002	10	0.02%
D37		0.010	10	0.10%
D38		0.011	10	0.11%
D39		0.007	10	0.07%
D40		0.012	10	0.12%
D41		0.008	10	0.08%
D42		0.005	10	0.05%
D43	River Wye SAC/River Wye (Upper Wye) SSSI	0.005	10	0.05%
D44		0.005	10	0.05%
D45		0.002	10	0.02%
D46		0.002	10	0.02%
D47		0.002	10	0.02%
D48		0.008	10	0.08%
D49	Elan Valley Woodlands SAC/Cwm Gwynllyn SSSI	0.001	5	0.02%
D50		0.002	5	0.03%
D51		0.005	5	0.10%
D52		0.001	5	0.01%
D53		0.001	5	0.01%
D54		0.001	5	0.02%
D55		0.004	5	0.08%
D56	Elenydd - Mallaen SPA/Marcheini Uplands, Gilfach Farm & Gamallt SSSI	0.004	10	0.04%
D57		0.000	10	0.00%
D58		0.003	10	0.03%
D59		0.003	10	0.03%
D60		<0.001	10	<0.01%
D61		0.007	5	0.15%
D62		0.007	5	0.15%
D63	Black Brook Pastures	0.003	10	0.03%

Impacts at sites where the nutrient nitrogen critical load applies are predicted to be below 1% of the critical load at all of the sites identified.

### 4.3 In-Combination Effects

NRW and Powys Council guidance requires an assessment of in-combination effects where the Process Contribution is >1% from the scheme at a designated site of European or National interest. In this case, the impacts at all sites are below 1% and therefore no further in-combination assessment is therefore required in this case.

## 5.0 CONCLUSIONS

Isopleth Ltd has been commissioned by Berrys, on behalf of H & E Powell to carry out a detailed assessment of ammonia impacts associated with a proposed poultry unit on land near Llwyngwilym, Rhayader LD6 5NS. Site layout and location plans are shown in Appendix A of this report.

The type, source and significance of potential impacts have been identified and detailed modelling undertaken in line with guidance issued by Natural Resources Wales.

Predicted ground level concentrations of ammonia and nutrient nitrogen are compared with relevant air quality standards and guidelines for the protection of sensitive habitats.

The assessment shows that impacts at all designated ecological sites will be below 1% of the relevant critical level and nutrient nitrogen critical load and are therefore below the thresholds NRW apply in their assessment of potential impact on protected sites. The impacts of ammonia from the proposed development site are therefore predicted to be acceptable either alone or in-combination with other schemes according to Powys and NRW assessment criteria. As such, provided that the mitigation measures are installed then the development is unlikely to adversely impact protected sites.

As such it is considered that, subject to the mitigation measures being installed, the proposed development would comply with the requirements of Powys LDP policy DM2 and TAN5.

### **Notice:**

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## APPENDIX A





## APPENDIX B







## APPENDIX C

**Table C-1**  
**Source Locations**

Stack ID	Reference	Location (OS Xm)	Location (OS Ym)	Basal Height (mAoD)
B1S1	New Building, Scrubber 1	297748.2	269508.1	315
B2S2	New Building, Scrubber 2	297752.5	269501.2	315
B2S3	New Building, Scrubber 3	297757.3	269493.9	315



## APPENDIX D





## APPENDIX E

