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POULTRY UNITS AT GROES-Y-GARREG, BERRIEW, POWYS.

DRAFT AMMONIA EMISSIONS: IMPACT ASSESSMENT

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1.0 INTRODUCTION

Isopleth Ltd has been commissioned by Berrys, on behalf of R.M & C.A Bright, to carry out a detailed assessment of ammonia impacts associated with a poultry operation at Groes-Y-Garreg, Berriew, Welshpool, Powys SY21 8AU. The farm lies within the administrative area of Powys Council.

New poultry rearing (broiler) sheds are proposed on land adjacent to the farm. When complete, it is planned that the site capacity will increase to a maximum of 100,000 birds in 2 buildings.

An assessment of ammonia impacts against critical levels and critical loads (for nutrient nitrogen and acid deposition) has therefore 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***

Also:

> *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***

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.

2.0 SITE SETTING AND OPERATIONS

2.1 Description

The application site is located to the North of Red Lane, between the B4285 to the East and the B4390 to the West. Located at OS GR 317135, 302735, the site setting can be seen in Appendix A, which are drawings submitted with the planning application and have been reproduced courtesy of Berrys.

The closest residences to the poultry facility are those associated with Groes-Y-Garreg Farm (i.e. the applicant, family and tenants). Groes-Y-Garreg Farm is shown, alongside assessed receptors which are not associated with the farm, in Drawing AQ1 (Appendix A).

The site is not currently developed and the applicant is now seeking to construct 2 houses for a total maximum capacity of 100,000 birds across the 2 sheds. The broilers will be brought in as day old chicks at a 50-50 mix of males and females. The 36 day growth period (with thinning at day 30) will lead to birds being around 2.0kg in weight by clearout.

The new buildings will each measure approximately 98m by 24.5m with a height to the eaves of 2.638 metres, 4.818 metres to the ridge (average 3.728m) and the top of the fans approximately 0.8m above the ridge. The elevations for the proposed sheds are shown in Figure 2-1, below.

Figure 2-1
Elevations

For the comfort and productivity of the birds the temperature within the houses must be regulated. The new houses would be ventilated by uncapped high speed ridge mounted fans, with exhaust via a single chimney per ridge fan. Gable end fans are available for use in the warmest weather as there is sufficient fan capacity (including back-up systems) to ensure that the comfort of the birds is maintained even in the event that the outside ambient temperature rises above 30ºC.

The facility will be of modern design, utilising the current best practice control measures for minimisation of ammonia impact. This includes optimisation of diet for the growing birds and the use of nipple drinkers to reduce litter moisture content, for example. High litter moisture content, low oxygen levels, small particle size, high temperatures and low pH encourage anaerobic bacterial activity and the generation of ammonia and the facility will be operated in a manner which discourages such activity.

2.2 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:

- Mongtomery Canal SAC and SSSI;
- Caeau Glyn SSSI;
- Coed Byrwydd SSSI;
- Glyn Wood LWS;
- Numerous ancient woodland sites, such as:
    - The Ffridd AW;
    - The Groestyn AW;
    - Glyn Cil AW;
    - Cil Wood AW;
    - Arthurs Wood AW;
    - Cocked Hat Wood AW;
    - Wyle Cop Wood AW;
    - Castle Fluke Wood AW;
    - Gilfach Wood AW; and
    - Pant-Y-Fridd Hill AW.

The JNCC describes the Mongtomery Canal SAC as consisting of:

- Inland water bodies (Standing water, Running water) (73.6%);
- Heath, Scrub, Maquis and Garrigue, Phygrana (2.4%);
- Dry grassland, Steppes (21.6%); and
- Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites) (2.4%).

There are no 'annex I' habitats within this SAC / SSSI, however there is one Annex II species that is a primary reason for selection of this site, which is Floating water-plantain *Luronium natans:*

> *'This is the largest and the most extensive population of floating water-plantain Luronium natans in Britain and is a highly significant lowland population. In favourable management conditions the species can be dominant over kilometre lengths of canal, carpeting the shallow bed and flowering and setting seed in abundance. This is a semi-natural population, having colonised from drift material or seed but needing periodic human disturbance for continued growth; in this respect*

the canal is a substitute for the species' former slow-moving, mesotrophic river niche, which has been largely destroyed in lowland Britain.'

Luronium natans occurs as two forms: in shallow water with floating oval leaves, and in deep water with submerged rosettes of narrow leaves. As such, any species on the canal banks are not key to the Mongtomery Canal SAC and SSSI designation.

The Caeau Glyn SSSI consists of bracken, grassland and woodland. The land is farmed in accordance with the requirements of the SSSI designation with the young calves and has previously it has been grazed with sheep. It is not regarded as being highly sensitive to ammonia impacts. Coed Byrwydd SSSI consists of semi-natural woodland.

The location of the ecological sites assessed in this report are shown in drawing AQ1 (Appendix A).

3.0 APPROACH

3.1 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.

3.2 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 (µg/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)

3.3 Critical Loads

Critical loads are set for the deposition of various substances to sensitive ecosystems. The AQTAG procedure defines the dispersion modelling approach in terms of receptor location and arrays, use of topographical and terrain data, the calculation of deposition fluxes, how these should be considered alongside the background conditions and relevant critical levels and loads.

Predicted contributions to acid deposition and 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[1]. The contribution to critical loads for Nitrogen deposition are recorded as KgN/ha/yr. Deposition rates are converted to units of acid equivalents (k_{eq}/ha/year), which is a measure of how acidifying the chemical species can be, by dividing the dry deposition flux (kg/ha/year) by standard conversion factors.

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

[1] www.apis.ac.uk

Firstly, calculate dry deposition flux using the following equation:

Dry deposition flux (µg/m^2/s) = ground level concentration (µg/m^3) x deposition velocity (m/s)

The applied deposition velocity for ammonia is 0.020 m/s for grassland and 0.030 m/s 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 µg/m^3. For sites such as water bodies, this deposition velocity may be reduced still further, with a value of 0.005 m/s having been applied (and accepted) for previous planning applications within Powys. The units are then converted from µg/m^2/s to units of kg/ha/year by multiplying the dry deposition flux by a standard conversion factor for ammonia of 259.7.

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.

3.4 Limits and Significance

Natural Resources Wales guidance GN 020 (v1.0, Oct 2017) takes you through the steps needed to carry out the assessment on the following designated sites:

- European sites
    - Special Areas of Conservation (SAC);
    - Special Protection Areas (SPA); and
    - Ramsar Sites (as a matter of government policy).
- Sites of Special Scientific Interest (SSSI)

The guidance is to be used in conjunction with OGN41 Assessment of ammonia and nitrogen from livestock units. The guidance does not replace existing guidance for assessing the impact of emissions on local nature reserves (LNRs), local wildlife sites (LWSs) and ancient woodland (AW). The limits to be applied are therefore is follows in relation to both ammonia and N deposition:

1. Where process contribution is below 1% the impact is insignificant;
2. Where process contribution is between 1% and 8% the background must also be considered:
    a. Where the background is not exceeding the critical level / load and if the PEC does not cause an exceedance of the ammonia critical level or nitrogen critical load then further assessment is not required.
    b. Where the background and / or background is exceeding the critical level / load, and / or the PEC does cause an exceedance of the ammonia critical level or nitrogen critical load then further mitigation is likely to be required.

GN 020, OGN 41 and Intensive farming risk assessment for your environmental permit only requires that the nutrient nitrogen critical load calculations are undertaken. There is no requirement for the calculation of acidification.

For local nature reserves (LNRs), local wildlife sites (LWSs) and ancient woodland (AW), if the PC meets both of the following criteria they're insignificant and there is no requirement for further assessment:

- the short-term PC is less than 100% of the short-term environmental standard; and
- the long-term PC is less than 100% of the long-term environmental standard.

There is no requirement to calculate PEC for local nature sites.

4.0 ASSESSMENT

4.1 Step 1: Distance Screen

GN 020, OGN 41 and *Intensive farming risk assessment for your environmental permit* requires that conservation sites need only be considered where they fall within set distances of the activity:

- Special Protection Areas (SPAs), Special Areas of Conservation (SACs), Ramsar sites or Sites of Special Scientific Interest (SSSIs) within 5 km of the installation; and
- National Nature Reserves (NNRs), Local Nature Reserves (LNRs), local wildlife sites and ancient woodland within 2km of the location of the installation.

As noted in section 2.2, there are ecological receptors within these Tier 1 screening distances.

4.2 Step 2: Simple Screening Threshold

In this case, detailed modelling ('step 3') has been undertaken rather than simple screening. As such, there is no 'Step 2' assessment in this case.

4.3 Step 3

Powys Council has not yet been approached to identify other agricultural installations which, in their view, could potentially act in combination with the proposed development, such as:

1. Applications for planning or permitting that are submitted but not yet determined;
2. Developments that have planning permission and/or permits but are not yet (fully) operating;
3. Developments that started operating after the most recent update of background levels.

Indications from Powys Council are that pre-application discussions would be required where such information would be provided.

Modelling has been completed in line with the requirements of *Guidance on modelling the concentration and deposition of ammonia emitted from intensive farming. Air Quality Modelling and Assessment Unit, 22 November 2010, v3*. The BREEZE AERMOD model has been used.

Modelling was carried out with discrete receptors representing the ecological sites of biological interest. For larger sites (or linear sites perpendicular to the proposed development), multiple discrete receptor locations have been used. The receptor locations are shown on drawing AQ1 and also Table 4-1 below.

Table 4-1
Ecological Receptor Locations

Receptor	Site	OS Coordinate Xm	OS Coordinate Ym	Height (m AoD)
Montgomery Canal SAC / SSSI				
D1	Mongomery Canal SAC 1	318831	300579	88.5
D2	Mongomery Canal SAC 2	319435	301579	86.6
D3	Mongomery Canal SAC 3	319673	302071	87.9
D4	Mongomery Canal SAC 4	320197	302785	84.9
D5	Mongomery Canal SAC 5	320657	303706	83.7
Caeau Glyn SSSI				
D6	Caeau Glyn SSSI 1	317836	302809	152.5
D7	Caeau Glyn SSSI 2	317959	302907	143.9
D8	Caeau Glyn SSSI 3	317963	303043	163.2
D9	Caeau Glyn SSSI 4	317899	303134	158.2
Coed Byrwydd SSSI				
D10	Coed Byrwydd SSSI 1	315942	303975	239.9
D11	Coed Byrwydd SSSI 2	316090	304032	231.7
D12	Coed Byrwydd SSSI 3	316138	304051	226.9
D13	Coed Byrwydd SSSI 4	316246	304085	225.1
D14	Coed Byrwydd SSSI 5	316305	304085	229.0
D15	Coed Byrwydd SSSI 6	316365	304179	227.5
D16	Coed Byrwydd SSSI 7	316417	304287	203.7
D17	Coed Byrwydd SSSI 8	316499	304334	194.5
Glyn Wood LWS				
D18	Glyn Wood LWS 1	318134.7	303152.7	146.7
D19	Glyn Wood LWS 2	318112.4	303085.9	139.2
D20	Glyn Wood LWS 3	318093.2	303018.1	136.5
D21	Glyn Wood LWS 4	318083.1	302964.5	132.6
D22	Glyn Wood LWS 5	318108.4	302899.7	130.2
D23	Glyn Wood LWS 6	318144.8	302820.8	128.6
D24	Glyn Wood LWS 7	318147.9	302726.7	125.7
D25	Glyn Wood LWS 8	318139.8	302638.6	126.4
D26	Glyn Wood LWS 9	318151.9	302543.5	127.3
D27	Glyn Wood LWS 10	318156	302431.2	126.7
D28	Glyn Wood LWS 11	318186.3	302340.1	120.6
D29	Glyn Wood LWS 12	318271.3	302272.4	119.0
D29	Glyn Wood LWS 12	318271.3	302272.4	119.0
Ancient Woodlands				
D30	The Ffridd AW1	317123.2	303215.6	197.9
D31	The Ffridd AW2	317238.8	303190.8	190.6

Receptor	Site	OS Coordinate Xm	OS Coordinate Ym	Height (m AoD)
D32	The Ffridd AW3	317348.9	303182.5	180.9
D33	The Groestyn AW	317644.9	303167.4	170.0
D34	Glyn Cil AW	317936.7	302691.1	176.9
D35	Cil Wood AW	317559.5	301756.5	163.4
D36	Arthurs Wood AW	317362.7	301662.9	171.3
D37	Cocked Hat Wood AW	317094.3	301536.3	147.1
D38	Wyle Cop Wood AW1	316918.1	301801.9	188.8
D39	Wyle Cop Wood AW2	316736.4	301890	183.4
D40	Castle Fluke Wood AW	316616.6	302030.4	148.6
D41	Gilfach Wood AW1	316337.2	302155.7	159.3
D42	Gilfach Wood AW2	316302.8	302319.5	195.9
D43	Gilfach Wood AW3	316136.2	302341.5	187.0
D44	Pant-Y-Fridd Hill AW1	315953.2	302684.3	245.4
D45	Pant-Y-Fridd Hill AW2	315739.8	302894.9	282.8
D46	Pant-Y-Fridd Hill AW3	315697.1	303101.3	277.0

There are no APIS critical load values or Natural England citations for local sites (e.g. LWS) or ancient woodland. Therefore robust nutrient nitrogen and acid critical load results are presented for the SAC / SSSI only. This must be confirmed by Powys Council and Natural Resources Wales, if required.

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 Groes-Y-Garreg Farm site details have been provided by the applicant and a detailed dispersion model constructed on this basis.

4.3.1 Model inputs

A single scenario has been modelled. This represents the proposed broiler facility with 100,000 birds housed in 4 buildings.

Modelling inputs for the Groes-Y-Garreg Farm site are shown appendix C.

The presence of elevated terrain can significantly affect ground level concentrations of pollutants emitted from sources in a number of ways. 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 located at approximately 201m AOD. 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. Buildings have been incorporated into the dispersion model as detailed in the modelling files at a height of 3.728m (the average of eaves to ridge). This compares with the 4.53m stack heights modelled and gable fans for the which have been modelled as area sources (with no vertical velocity).

The emissions of ammonia from the poultry buildings have been calculated using the Environment Agency / NRW ammonia emission factors. These are indicative only and may not reflect actual emissions where housing methods exceed minimum requirements and ammonia emissions are therefore lower than those which may be found at a 'standard' facility. Indirect heating is used for the new broiler houses (ground source heat pumps) and a >35% reduction has been applied to ammonia emissions from the site.

The ammonia emitted from the farm with the standard EA factor of 0.034 kg NH_3/animal place/year (reduced to 0.0221 kg NH_3/animal place/year due to the ground source heat pumps) are as shown in Table 4-2. Each of the buildings has been assumed to house 50000 birds (i.e. even distribution at the maximum capacity) which is a worst case assumption as mortality throughout the crop will mean that fewer birds are in the final crop. The gable-end fans would be used rarely, if at all. However, for purposes of this assessment, 25% of the ammonia is assumed to be emitted from these fans in order to represent a worst-case approach for this modelling which relies on annual average impacts.

Table 4-2
Emission Rates (g/s)

Receptor	Emission
House 1 (proposed)	0.001877 g/s per fan 0.00876 g/m2/s (gable)
House 2 (proposed)	0.001877 g/s per fan 0.00876 g/m2/s (gable)

The (standard) emission parameters per stack are as shown in Table 4-3 below for all stacks modelled.

Table 4-4
Emission Parameters

Stack height (m)	Temp (°C)	Velocity (m/s)	Stack Diameter (m)
4.53	25	3.0	0.8

The gable end fans have been modelled as area sources the width of the house (and 3m deep) at a release height of 2m above ground level.

4.3.2 Local Wind Speed and Direction Data

The most important meteorological parameters governing the atmospheric dispersion of pollutants are wind direction, wind speed and atmospheric stability.

For meteorological data to be suitable for dispersion modelling purposes a number of meteorological parameters need to be measured on a continuous basis. There are only a limited number of sites where the required meteorological measurements are made. In the UK, all of these sites are quality controlled by the Met Office.

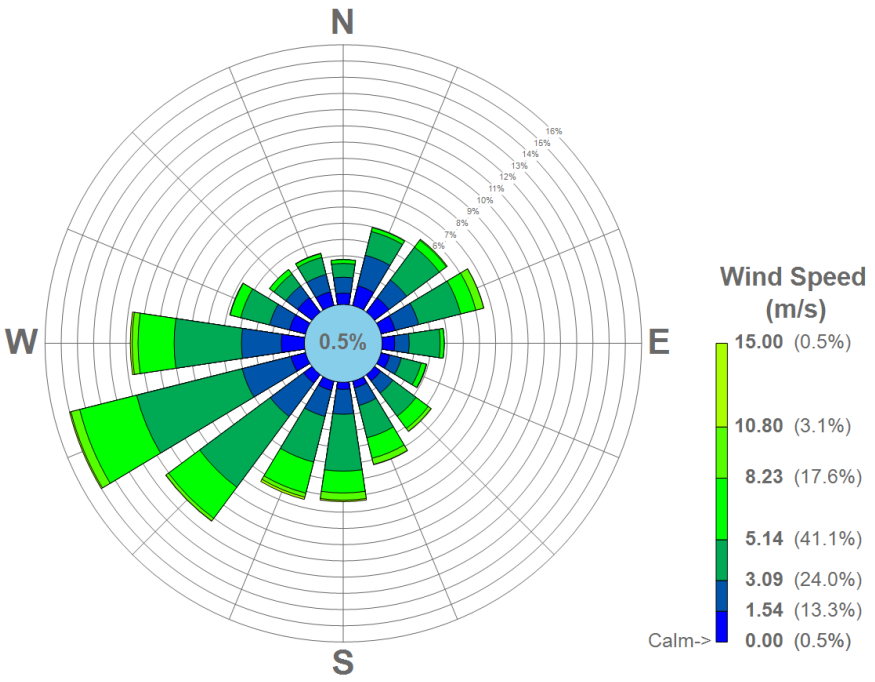
The closest Met Office sites to Groes-Y-Garreg, Berriew are:

- Shawbury (43km from Scout Road, 75.9m AoD); and
- Shobdon (49 km from Groes-Y-Garreg, 99m AoD);.

Both of these sites are exposed airfields and over 40km from Groes-Y-Garreg. Following consultation with the meteorological data provider, it was concluded that neither of these sites are ideal for the Groes-Y-Garreg area with the site lying at over 200m AoD. Under these circumstances, the impact may be modelled using a 5 year Global Forecasting System (GFS) resolution Numerical Weather Prediction (NWP) meteorological data set. The GFS is a spectral model and data are archived at a horizontal resolution of 0.5 degrees (approximately 50 km over the UK). The GFS resolution adequately captures major topographical features and the broad-scale characteristics of the weather over the UK. Smaller scale topological features may be included in the dispersion modelling by using the flow field module of ADMS (FLOWSTAR). This NWP meteorological data is accepted for use in dispersion modelling assessments in the UK and provides the advantage of a more site-focussed data set than would be the case for data collected by the Met Office in the UK.

A windrose providing the frequency of wind speed and direction for 5 years of NWP data is presented in Figure 5-1, below.

Figure 5-1
NWP Data: Windrose (5 years)



4.3.3 Results: Critical Levels

The dispersion modelling results are shown in the tables below. The applicable level at all ancient woodland sites and the Glyn Wood LWS is subject to site specific consultation advice, hence both results are presented.

Table 4-6
Results: Critical Levels

Site	NH_3 Concentration (µg/m³)	% of Critical Level 3 µg/m³	% of Critical Level 1 µg/m³
Mongomery Canal SAC	0.043	1.4%	---
Caeau Glyn SSSI	0.331	11.0%	---
Coed Byrwydd SSSI	0.037	1.2%	3.7%
Glyn Wood LWS	0.208	6.9%	20.8%
The Ffridd AW	0.297	9.9%	29.7%
The Groestyn AW	0.264	8.8%	26.4%
Glyn Cil AW	0.280	9.3%	28.0%
Cil Wood AW	0.072	2.4%	7.2%
Arthurs Wood AW	0.068	2.3%	6.8%
Cocked Hat Wood AW	0.037	1.2%	3.7%
Wyle Cop Wood AW	0.109	3.6%	10.9%
Castle Fluke Wood AW	0.107	3.6%	10.7%
Gilfach Wood AW	0.107	3.6%	10.7%
Pant-Y-Fridd Hill AW	0.010	0.3%	1.0%

The results are as follows:

- The highest PC impact at the Mongomery Canal SAC is between 1 and 8%;
- The highest PC impact at the Caeau Glyn SSSI is greater than 8%;
- The highest PC impact at the Coed Byrwydd SSSI is between 1 and 8%;
- The highest PC impacts at the local sites and ancient woodland are below 100% and are therefore insignificant in all cases.

APIS indicates that the ammonia background concentration at the Mongomery Canal SAC and the two SSSI is 1.7µg/m³. The PEC at the Mongomery Canal SAC and Caeau Glyn SSSI is therefore below the critical level at these sites and no further assessment is required.

From the information available from NRW / APIS it is not clear whether the Coed Byrwydd SSSI has been designated as a result of epiphytes / bryophytes and therefore whether the 1µg/m³ or 3µg/m³ is most appropriate in this case.

4.3.4 Results: N Nitrogen Critical Load

The dispersion modelling results against nutrient nitrogen critical loads are shown in the tables below. The ecological sites are represented with multiple discrete points in some cases (refer to Table 4-1) and the maximum result for each site has been presented.

Table 4-7
Results: N Deposition

Site	Conc (µg/m^3)	dep velocity (m/s)	N Dep kg/ha/yr
Mongomery Canal SAC	0.043	0.005	0.06
Caeau Glyn SSSI	0.331	0.020	1.72
Coed Byrwydd SSSI	0.037	0.030	0.29
Glyn Wood LWS	0.208	0.030	1.62
The Ffridd AW	0.297	0.030	2.32
The Groestyn AW	0.264	0.030	2.06
Glyn Cil AW	0.280	0.030	2.18
Cil Wood AW	0.072	0.030	0.56
Arthurs Wood AW	0.068	0.030	0.53
Cocked Hat Wood AW	0.037	0.030	0.29
Wyle Cop Wood AW	0.109	0.030	0.85
Castle Fluke Wood AW	0.107	0.030	0.83
Gilfach Wood AW	0.107	0.030	0.84
Pant-Y-Fridd Hill AW	0.010	0.030	0.08

The relevant critical loads are:

- Broadleaved deciduous woodland: 10 - 20 Kg N/ha/year;
- Fagus woodland: 10 - 20 Kg N/ha/year;
- Acidophilous Quercus-dominated woodland: 10 - 15 Kg N/ha/year;
- Meso- and eutrophic Quercus woodland: 15 - 20 Kg N/ha/year;
- Low and medium altitude hay meadows: 20 - 30 Kg N/ha/year; and
- Mountain hay meadows: 10 - 20 Kg N/ha/year.

The applicable nutrient nitrogen critical load at all ancient woodland sites is subject to site specific consultation advice.

Table 4-7
Results: N Deposition

Site	N Dep kg/ha/yr	Lower Critical Load	% of C.L.	Upper Critical Load	% of C.L.
Mongomery Canal SAC	0.06	3.0	1.9%	10.0	0.6%
Caeau Glyn SSSI	1.72	10.0	17.2%	20.0	8.6%
Coed Byrwydd SSSI	0.29	10.0	2.9%	20.0	1.4%
Glyn Wood LWS	1.62	10.0	16.2%	20.0	8.1%
The Ffridd AW	2.32	10.0	23.2%	20.0	11.6%
The Groestyn AW	2.06	10.0	20.6%	20.0	10.3%
Glyn Cil AW	2.18	10.0	21.8%	20.0	10.9%
Cil Wood AW	0.56	10.0	5.6%	20.0	2.8%
Arthurs Wood AW	0.53	10.0	5.3%	20.0	2.6%
Cocked Hat Wood AW	0.29	10.0	2.9%	20.0	1.4%
Wyle Cop Wood AW	0.85	10.0	8.5%	20.0	4.2%
Castle Fluke Wood AW	0.83	10.0	8.3%	20.0	4.2%
Gilfach Wood AW	0.84	10.0	8.4%	20.0	4.2%
Pant-Y-Fridd Hill AW	0.08	10.0	0.8%	20.0	0.4%

The results are as follows:

- The highest PC impact at the Mongomery Canal SAC is between 1 and 8%;
- The highest PC impact at the Caeau Glyn SSSI is above 8%;
- The highest PC impact at the Coed Byrwydd SSSI is between 1% and 8%;
- The highest PC impacts at the local sites and ancient woodland are below 100% and are therefore insignificant in all cases.

APIS indicates that the ammonia background N deposition at the site (OS GR 317125, 302730) is:

- Woodland: 28.28 Kg N/ha/year; and
- Grassland: 17.08 Kg N/ha/year.

The background N deposition at all sites (irrespective of the impacts from the proposed development) is therefore above the lower N critical load at these sites.

4.4 Summary

No further assessment is required in relation to ammonia impacts against critical levels.

APIS indicates that the ammonia background N deposition at the site (OS GR 317125, 302730) is above the lower N critical load at these sites. Therefore, although the N deposition process contributions are well below the limit, the high background (in common with the majority of

the UK) means that further mitigation may be required. As a site which is currently managed / grazed the Caeau Glyn SSSI is considered unlikely to be highly sensitive to N deposition.

5.0 SENSITIVITY TEST

The site is over 40km from any Met Office recording stations with data quality (and completeness) suitable for dispersion modelling. As such, GFS (NWP) data has been used in this assessment for Groes-y-Garreg as it is considered to be more suitable in this individual case. Notwithstanding this, a meteorological data set sensitivity assessment has been completed which compares the results of the modelling (GFS) with those for an identical model using data from Shobdon airfield for the same 5 years of 2014 – 2018.

Table 5-1
Results: Sensitivity Test

Site	GFS Data: NH_3 Concentration ($\mu g/m^3$)	Shobdon Data: NH_3 Concentration ($\mu g/m^3$)	Difference
Mongomery Canal SAC	0.043	0.075	+0.032
Caeau Glyn SSSI	0.331	0.404	+0.073
Coed Byrwydd SSSI	0.037	0.049	+0.012
Glyn Wood LWS	0.208	0.265	+0.057
The Ffridd AW	0.297	0.332	+0.035
The Groestyn AW	0.264	0.238	-0.026
Glyn Cil AW	0.280	0.366	+0.086
Cil Wood AW	0.072	0.107	+0.035
Arthurs Wood AW	0.068	0.087	+0.019
Cocked Hat Wood AW	0.037	0.079	+0.042
Wyle Cop Wood AW	0.109	0.150	+0.041
Castle Fluke Wood AW	0.107	0.175	+0.068
Gilfach Wood AW	0.107	0.276	+0.169
Pant-Y-Fridd Hill AW	0.010	0.018	+0.008

It remains the Isopleth view that, although the use of Met Office recorded data is normally preferred when a suitable data set is available, the use of GFS data is more appropriate in this case given the distance (>40km) from any site for which good quality data has been recorded in a format required for detailed dispersion modelling. The results of this meteorological data sensitivity test indicate that the selection of data set for purposes of the annual average ammonia modelling does not make a material difference to the conclusions of the assessment for any of the identified ecological sites.

6.0 CONCLUSIONS

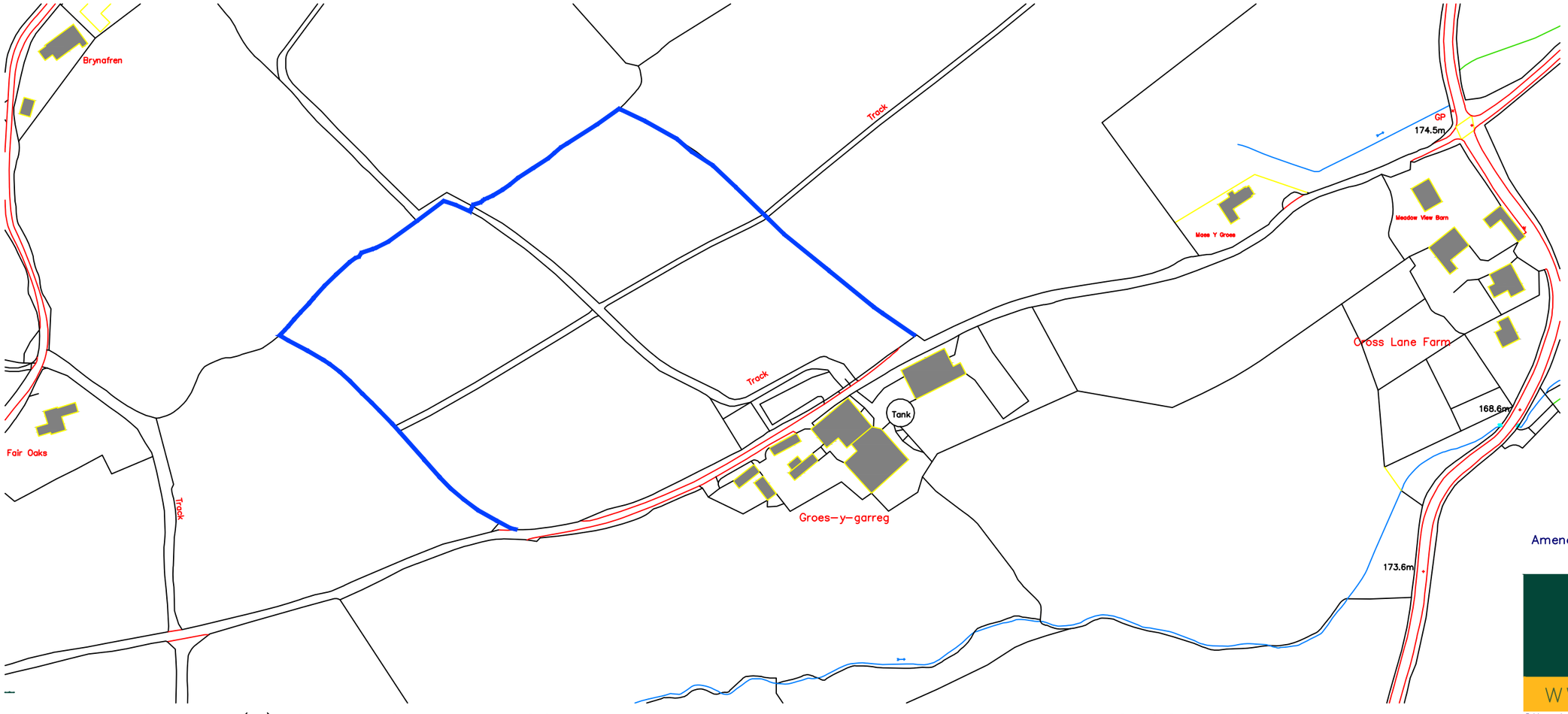
The potential ammonia impacts of the proposed Farm on local ecological sites has been assessed. The applicant is seeking to construct 2 houses for a total maximum capacity of 100,000 birds across the 2 sheds. The farm will use indirect heating which has been demonstrated to reduce ammonia emissions.

An assessment of ammonia impacts against critical levels and critical loads (for nutrient nitrogen) has been completed in accordance with Powys and NRW Guidance. 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 indicates that:

- No further assessment is required in relation to ammonia impacts against critical levels;
- The existing nutrient nitrogen deposition is above the limit at all sites; and
- Although the N deposition process contributions are well below the limit, the high background (in common with the majority of the UK) means that further mitigation may be required.

APPENDIX A



1:2500 @ A3

0 25 50 100 200

Amendments:

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Client:
R.M & C.A Bright

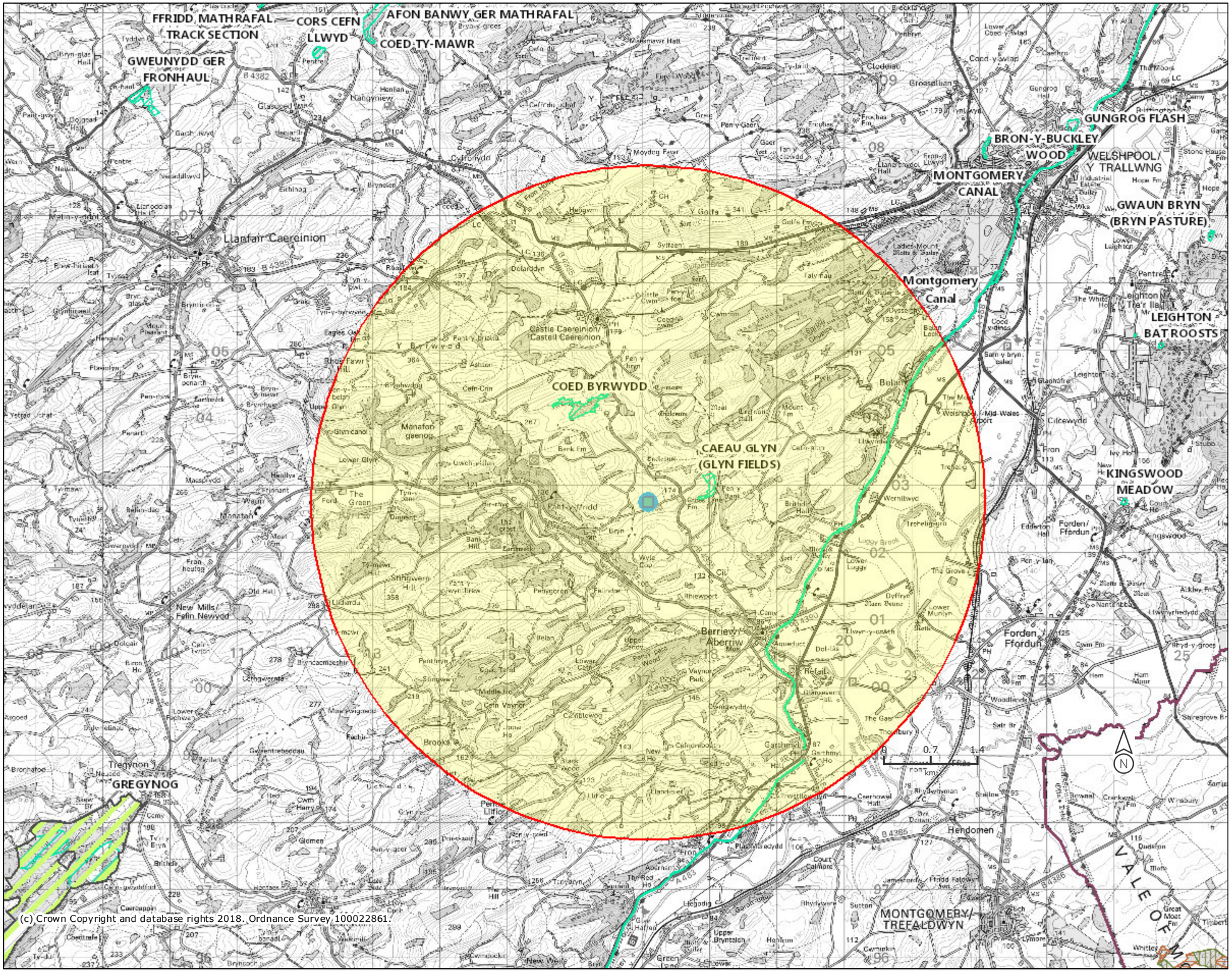
Project:
Proposed Poultry Units at Groes-y-Garreg, Berriew

Drawing:
Location Plan

Drawing:	Rev.	Scale	Paper	Drawn By: PH
SA 31747 01		1:2500	A3	Date: 07.02.2019

APPENDIX B

Magic Map



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Legend

- Local Nature Reserves (England)
- National Nature Reserves (England)
- National Nature Reserves (Wales)
- Ramsar Sites (England)
- Proposed Ramsar Sites (England)
- Ramsar Sites (Wales)

Sites of Special Scientific Interest Units (England)

- Favourable Condition
- Unfavourable Recovering
- Unfavourable no change
- Unfavourable Declining
- Part Destroyed
- Destroyed
- Not Assessed
- Sites of Special Scientific Interest (Wales)
- Special Areas of Conservation (England)
- Possible Special Areas of Conservation (England)
- Special Areas of Conservation (Wales)
- Special Protection Areas (England)
- Potential Special Protection Areas (England)
- Special Protection Areas (Wales)
- Biosphere Reserves (England)
- Biosphere Reserves (Wales)

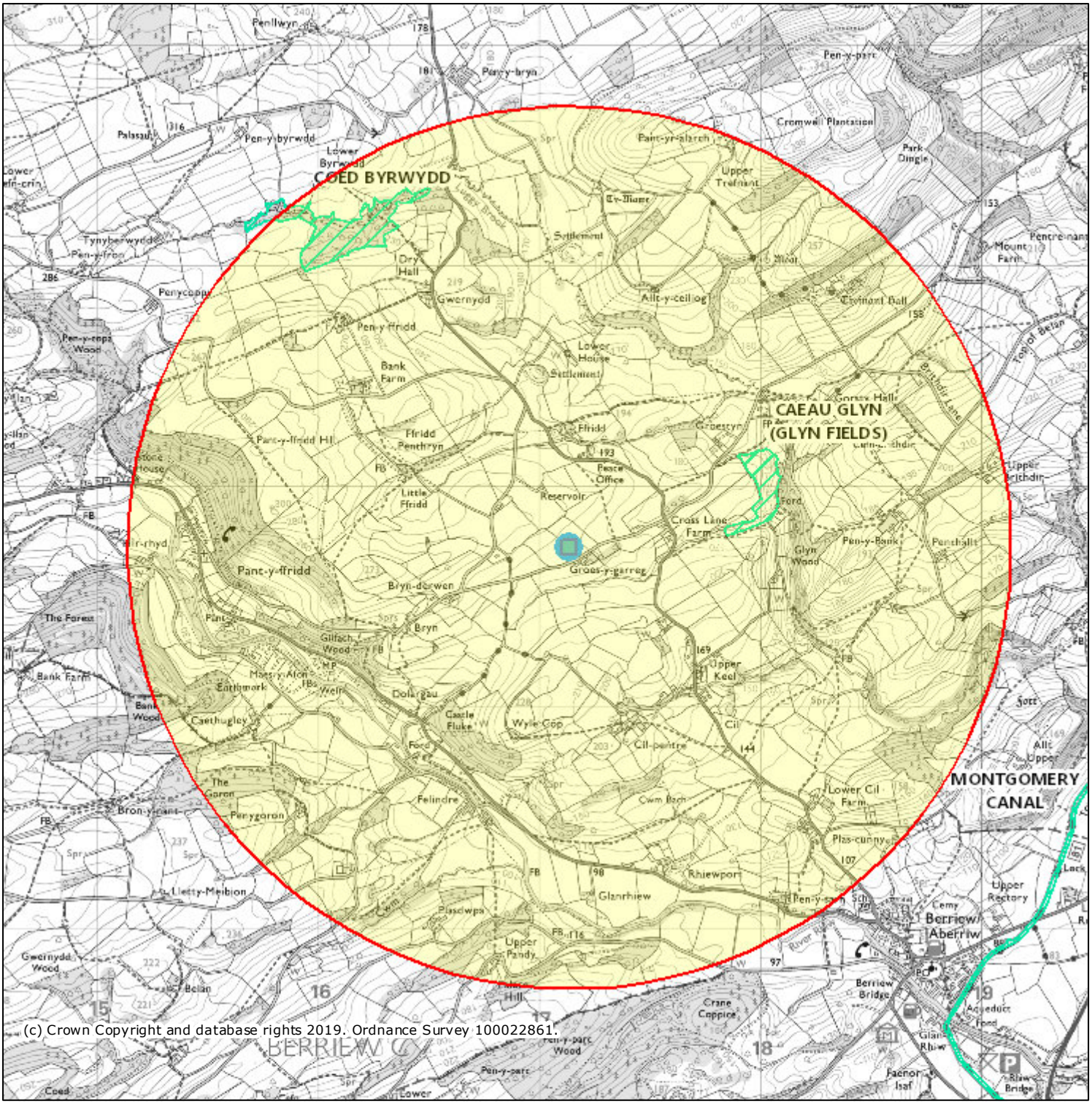
Ancient Woodland (England)

- Ancient and Semi-Natural Woodland
- Ancient Replanted Woodland

Projection = OSGB36
xmin = 303700
ymin = 297200
xmax = 329500
ymax = 308800

0 1 2 km

Magic Map



Legend

Sites of Special Scientific Interest (Wales)

0 0.75 1.5
km

Projection = OSGB36

xmin = 311400

ymin = 299900

xmax = 322600

ymax = 305500

Isopleth Data Search - Local sites within 2km of three sites
Site SJ1708502750 - Near Pant-y-ffridd

SJ1708502750

Glyn Wood Local Wildlife Site

- Sites of Interest to Nature Conservation (SINCs) and Local Wildlife Sites (LWS)
- 2km Buffer
- Sites

Glyn Wood Local Wildlife Site

Reason: Meets Powys wildlife site criteria for broadleaved woodland

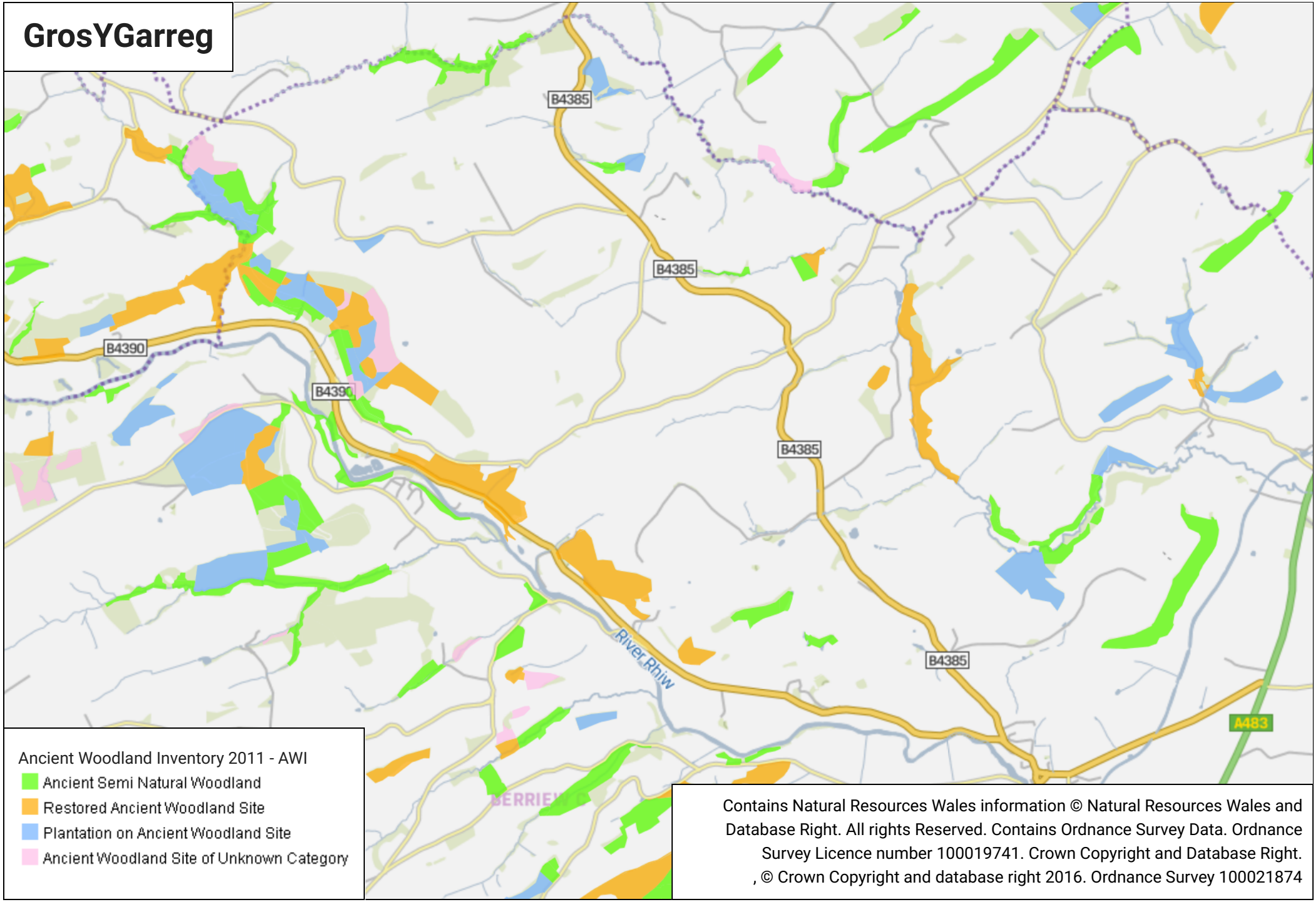
Habitats: Broadleaved woodland

Area: 9.7 Ha

Status: Adopted

BIODIVERSITY INFORMATION SERVICE
FOR POWYS AND BRECON BEACONS NATIONAL PARK
GWASANAETH GWYBODAETH FIOAMRYWIAETH
POWYS A PHARC CENEDLAETHOL BANNAU BRYCHEINIOG

GrosYGarreg



APPENDIX C

Table C-1
House 1: Stack Locations

Stack ID	OS GR Xm	OS GR Ym
Building 1 vent 1	317101.0	302711.9
Building 1 vent 2	317105.0	302717.4
Building 1 vent 3	317111.7	302717.7
Building 1 vent 4	317115.6	302723.3
Building 1 vent 5	317122.4	302723.7
Building 1 vent 6	317126.3	302729.2
Building 1 vent 7	317133.1	302729.5
Building 1 vent 8	317137.0	302735.0
Building 1 vent 9	317143.8	302735.4
Building 1 vent 10	317147.8	302741.0
Building 1 vent 11	317154.5	302741.3
Building 1 vent 12	317158.4	302746.8
Building 1 vent 13	317165.2	302747.2
Building 1 vent 14	317169.1	302752.7

Table C-2
House 2: Stack Locations

Stack ID	OS GR Xm	OS GR Ym
Building 2 vent 1	317116.7	302683.5
Building 2 vent 2	317120.7	302689.0
Building 2 vent 3	317127.4	302689.3
Building 2 vent 4	317131.3	302694.9
Building 2 vent 5	317138.1	302695.3
Building 2 vent 6	317142.0	302700.8
Building 2 vent 7	317148.8	302701.1
Building 2 vent 8	317152.7	302706.6
Building 2 vent 9	317159.5	302707.0
Building 2 vent 10	317163.5	302712.6
Building 2 vent 11	317170.2	302712.9
Building 2 vent 12	317174.1	302718.4
Building 2 vent 13	317180.9	302718.8
Building 2 vent 14	317184.8	302724.3

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