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Air Quality at Designated Ecological Sites: Crymlyn Parc, Skewen

Client: Hale Group

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1. Introduction

1.1. Air Pollution Services ([APS](#)), part of Kalaco Group Ltd, has been commissioned by Hale Group (the 'Client') to assess the air quality impacts on designated ecological sites associated with the proposed development at Crymlyn Parc, Skewen (herein the 'Proposed Development') in the administrative area of Neath Port Talbot Council.

1.2. An air quality assessment was prepared for the Proposed Development in October 2024 (document ref: APS_P1248A_A1-1). During the pre-application process for the Proposed Development, Natural Resources Wales ([NRW](#)) has stated the following:

"We note the submitted Air Quality Assessment however this does not include impacts on nearby environmental receptors. Given the close proximity of the proposed development to Crymlyn Bog SAC, we would require an air quality report and modelling which rules out any impact upon the sensitive habitats present on site.

Therefore, we have concerns that harm from the proposed development on the SAC and SSSI cannot be ruled out."

1.3. This document sets out the air quality impacts from the Proposed Development on designated ecological sites in the local area. Consideration is given to ambient concentrations of relevant pollutants along with the potential for deposition onto sensitive habitats.

2. Methodology

Modelling of Road Traffic Emissions

2.1. A dispersion modelling study was carried out in October 2024 to predict contributions of road traffic emissions and assess the impacts of the Proposed Development's operational traffic on the areas of human health exposure, details of which are set out in 'Air Quality Assessment: Crymlyn Parc, Skewen' (document ref: APS_P1248A_A1-1).

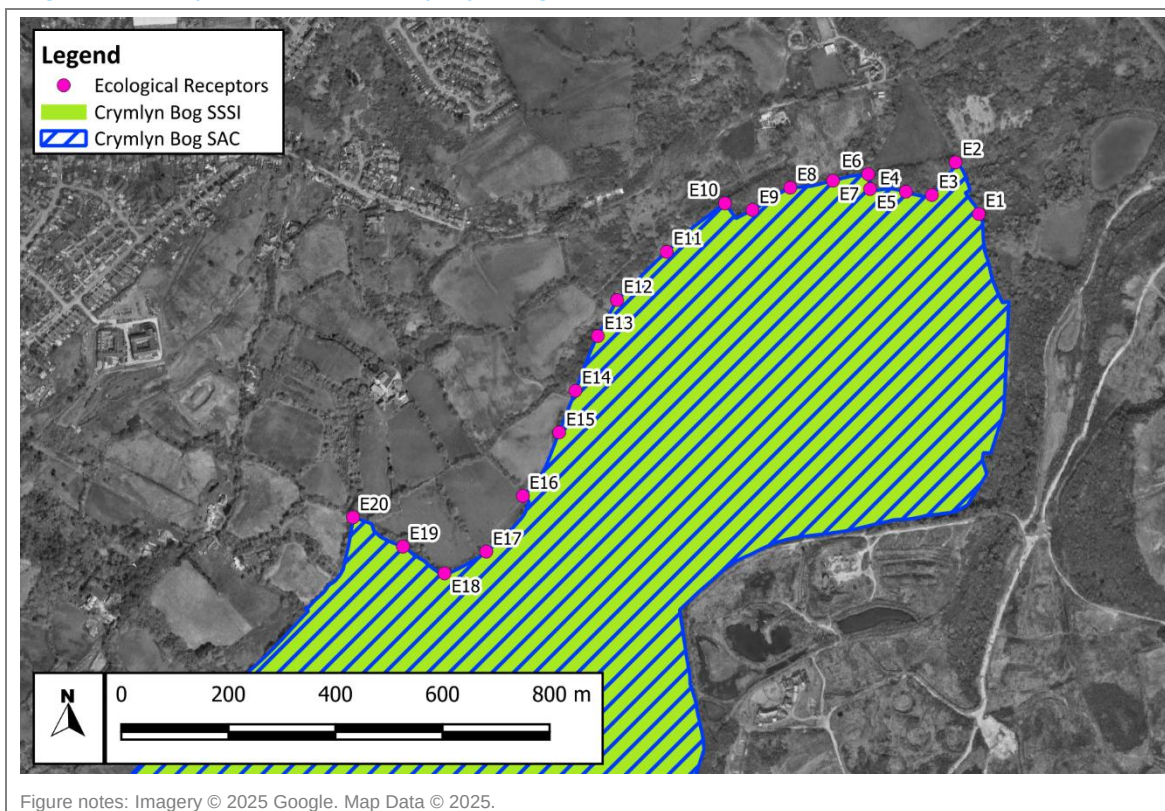
2.2. Further modelling has been undertaken, following the same approach, to predict concentrations of nitrogen dioxide ([NO_x](#)) and ammonia ([NH₃](#)), as well as nutrient nitrogen deposition and acid deposition fluxed, for a range of relevant ecological exposure locations to allow comparison with air quality assessment levels. The concentrations have been predicted for the year of 2026, the earliest likely operational year of the Proposed Development.

Modelled Ecological Receptors

2.3. Concentrations and deposition fluxes due to pollutant emissions have been predicted at 20 ecological receptors which have been identified at the worst-case locations of exposure within Crymlyn Bog Special Area of Conservation ([SAC](#))/ Site of Special Scientific Interest ([SSSI](#)) relevant to the Proposed Development (i.e. nearest to the road where there is the potential for changes in traffic flows). The locations of the ecological receptors are shown in Figure 1.



Figure 1: Receptor Locations in Crymlyn Bog SAC / SSSI



Road Traffic Modelling

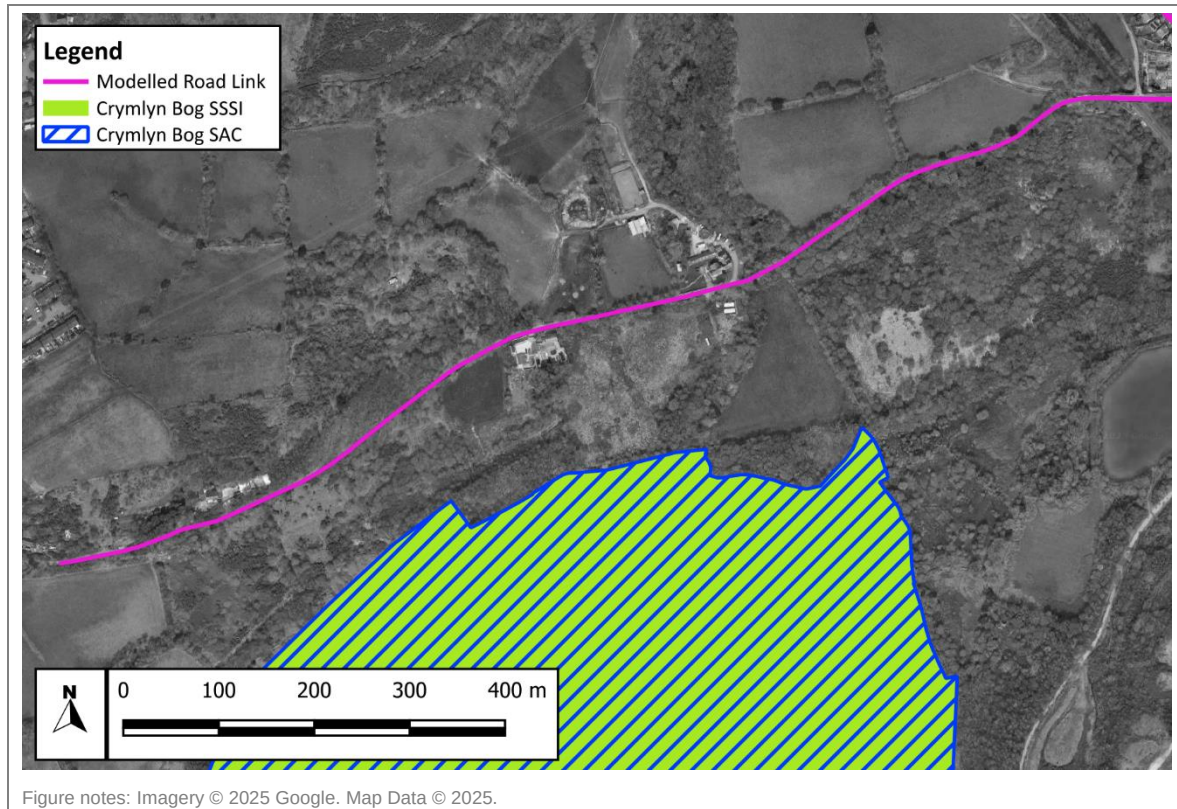
- 2.4. As stated in document '*Dispersion Modelling Study: Crymlyn Parc, Skewen*' (document ref: APS_P1248A_E1-1), concentrations have been predicted using the ADMS-Roads atmospheric dispersion model (v 5.0.0.1) with the latest vehicle emission factors available from Defra's Emissions Factor Toolkit ([EFT](#)) (v12.1). In addition to the EFT, vehicle emissions of NH₃ have been calculated using the Calculator for Road Emissions of Ammonia ([CREAM](#)) tool, published by Air Quality Consultants.
- 2.5. The model requires a range of input parameters, discussed in '*Dispersion Modelling Study: Crymlyn Parc, Skewen*' (document ref: APS_P1248A_E1-1), alongside a model performance verification which was utilised for this assessment. A brief overview of the key uncertainties associated with the model can also be found in the document.

Modelled Roads

- 2.6. In addition to the roads previously modelled, shown in '*Dispersion Modelling Study: Crymlyn Parc, Skewen*' (document ref: APS_P1248A_E1-1), the link for Crymlyn Road was extended to cover the entirety of the road near to the Crymlyn Bog SAC/SSSI. The extended road link is shown in Figure 2.
- 2.7. The width of the road has been aligned with data from a range of mapping sources, such as Ordnance Survey and Google maps.



Figure 2: Modelled Road Links



Traffic Data

- 2.8. Traffic data has been obtained from Acstro, the transport consultants for the project. Detailed information on the traffic data can be found in ‘*Dispersion Modelling Study: Crymlyn Parc, Skewen*’ (document ref: APS_P1248A_E1-1). For the extended road link, shown in Figure 2, the flows for modelled road ‘Crymlyn Road (towards Carmel Road)’ were used.
- 2.9. Furthermore, Acstro has stated the following in regard to the consideration of cumulative traffic in future years:
- “We used growth factors obtained from the DfT’s Temproware software package rather than cumulative traffic from explicit developments. Temproware provides growth factors from the National Trip End Model (NTEM) dataset with local adjustments made that account for the cumulative impacts of housing and employment allocations within the current Local Development Plan.”*
- 2.10. Therefore, it can be assumed that the traffic data used in the modelling exercise considered future increases of the road traffic as a result of cumulative schemes in the local area.

Guidance Documents

A guide to the assessment of air quality impacts on designated nature conservation sites

- 2.11. The Institute of Air Quality Management (IAQM) has produced guidance (2020) to assist in the assessment of the air quality impacts of the Proposed Development on designated nature conservation sites. The guidance considers air quality assessments in support of Habitats



Regulations Assessments ([HRA](#)) but also considers the approach for assessing the air quality impact on ecology at national or local designated nature conservation sites.

Chartered Institute of Ecology and Environmental Management's Air Quality Advice Note

- 2.12. The Chartered Institute of Ecology and Environmental Management ([CIEEM](#)) produced guidance (2021) on the ecological effects of changes in pollutant concentrations and deposition rates at ecological sites. The guidance provides a consistent approach to understand ecological effects caused by air pollution.

Joint Nature Conservation Committee's Decision-Making Thresholds

- 2.13. The Joint Nature Conservation Committee ([JNCC](#)) have published guidance (2021) which provides decision-making criteria to inform the assessment of air quality impacts on designated conservation sites. The criteria are intended to be applied to individual sources to identify those for which a decision can be taken without the need for further assessment effort. At present, however, none of the national conservation bodies have adopted this approach.

Air Pollution Information System Guidance

- 2.14. The Air Pollution Information System ([APIS](#)) provides guidance (2025) on using and applying the critical load function.

Approach Overview

- 2.15. The following section details the methodology of the assessment. The process consists of:
1. Predicting process contributions ([PCs](#))
 2. Evaluating the potential for significant impacts, using relevant guidance.
 3. Where necessary defining baseline conditions and considering predict environmental concentrations ([PECs](#)). Note, the phrase PEC is used to refer to deposition as well as concentrations.
 4. Determining which pollutants require a determination of likely significant effects to be carried out by an ecologist.

Criteria for this Assessment

- 2.16. There are two types of assessment criteria:
- Critical Levels ([CLes](#)), which are concentrations of pollutants (e.g. in micrograms per cubic metre, $\mu\text{g}/\text{m}^3$) in the atmosphere below which direct adverse effects on receptors, such as plants, ecosystems or materials, are not expected to occur according to present knowledge; and,
 - Critical Loads ([CLos](#)), which define rates of acid or nitrogen ([N](#)) deposition (e.g. in kiloequivalents per hectare per year, $\text{keq}/\text{ha}/\text{yr}$) below which significant harmful effects are not expected to occur in sensitive habitats
- 2.17. CLes for annual mean NO_x and sulphur dioxide ([SO₂](#)), and winter SO_2 , have been set in the Air Quality Standards Regulations 2010 (HM Government, 2010). CLes for NH_3 , 24-hour NO_x and the CLos have been set by the United Nations Economic Commission for Europe ([UNECE](#)) under the Convention on Long-Range Transboundary Air Pollution ([CLRTAP](#)).



- 2.18. NRW published instructions (2012) regarding detailed assessment of the impact of air emissions from new or expanding integrated pollution prevention and control (IPPC) regulated industry for impacts on nature conservation. This document explains that where the long-term total concentration, known as PEC, is greater than 70% of the assessment level a detailed assessment is required, which ensures that the process will not:
- *“Result in an ‘adverse effect’ on the integrity of a European site [now referred to as a national network site]”;*
 - *“be an operation likely to damage (OLD)[sic] a SSSI”;*
 - *“result in significant pollution of a NNR, LNR, LWS or ancient woodland.”*
- 2.19. Where the PEC is below 70% of the assessment level, the NRW consider there to be a low risk for significant effects at a designated nature site.
- 2.20. The CIEEM provides guidance (2021) on defining the ‘Likely significant effect’ – use of 1% and 4% long-term thresholds and 10% short-term threshold. NRW has an agreed a four-stage process to assess the potential impact of industrial processes on European sites [now referred to as a national network site]. The 4% long-term threshold is related to farming and not relevant to the Proposed Development. With respect to industrial facilities, the IAQM guidance (2019) mirrors this guidance which states:
- “Where the maximum, worst-case concentration within the emission footprint in any part of the European site(s) [now referred to as a national network site] is less than 1% of the relevant long-term benchmark (CLE and/or CLO) and less than 10% of the relevant short-term benchmark (if available), AQTAG considers that the emission is not likely to have a significant effect alone, irrespective of the background levels.”*
- 2.21. The NRW guidance goes on to state:
- “Where the predicted long-term contribution from the industrial process is greater than 1% of the relevant long-term benchmark, consideration also needs to be given to the predicted environmental contribution (PEC). Where the PEC (process contribution + background) is less than 70% of the relevant long-term benchmark then a conclusion of no likely significant effect can be reached, even if the process contribution is greater than 1%”.*
- 2.22. Within this assessment, when screening the PC for national network sites and national sites where the long-term PCs are below 1% of the assessment level (CLE or CLO) the impacts from the Proposed Development in isolation are considered to be not significant. Where short-term impacts are considered, if the PC is less than 10% of the assessment level then the impacts are also considered to be not significant. Where impacts are above these levels, an ecological assessment undertaken by an Ecologist may be required to determine whether the impacts are likely to result in a significant effect on the habitat or not.

Deposition

- 2.23. Deposition occurs when material is lost from the air onto the surface of the ground for vegetation/foliage, thus reducing the airborne concentration of the pollutant. Wet deposition occurs when there is precipitation (rain, sleet, snow, etc.) and pollution is deposited with the precipitation.



- 2.24. Habitats are sensitive to deposition of air pollution as it can result in eutrophication (i.e make the soil too nutrient rich) and acidification (i.e too acidic). CLoS are dependent on the habitat that potentially may be impacted.
- 2.25. The CLoS used to assess the impacts of deposited pollution which result in eutrophication and acidification are expressed in terms of kilograms of deposited nitrogen per hectare per year (kg N/ha/yr) and kilo-equivalents H^+ ions deposited per hectare per year (keq/ha/yr) respectively.

Nutrient Deposition

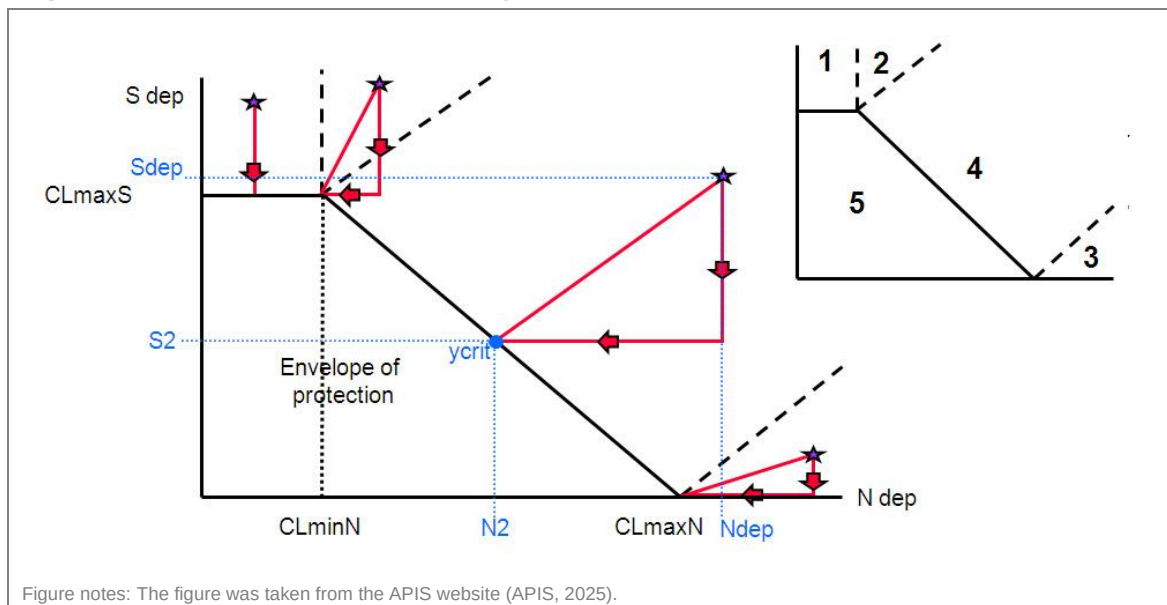
- 2.26. The NRW states:
- "It is considered that wet deposition of SO_2 , NO_2 and NH_3 is not significant within a short range".*
- 2.27. Eutrophication CLoS are given as a range. Generally, the lower end of the range should be used for a conservative assessment.
- 2.28. The screening criteria for eutrophication is 1% of the relevant CLo. Initially assumed to be the most stringent CLo from any habitat at the site. Where the contribution exceeds 1% the potential for significant effects cannot be discounted without an expert assessment. However, the PEC will be presented, and where the PEC is below the CLo the effect is likely to be insignificant.

Acid Deposition

- 2.29. The CLoS for acidification are more complicated, in that both N and sulphur (S) deposition fluxes must be considered at the same time. A CLo function has been developed that considers:
- $CL_{max}S$ – the maximum CLo of S above which the deposition of S alone would be considered to lead an exceedance;
 - $CL_{min}N$ - a measure of ability of a system to “consume” deposited N (e.g. via immobilisation and uptake of the deposited N); and
 - $CL_{max}N$ – the maximum CLo of acidifying N, above which the deposition of N alone would be considered to lead to an exceedance.
- 2.30. These three quantities define the CLo function as shown in Figure 3.



Figure 3: Critical Load Function for Acidity



- 2.31. While N and S dominate acid deposition in the UK, other compounds also contribute to acid deposition, e.g., Hydrogen Chloride and Hydrogen Fluoride. The contributions from all relevant compounds have been included in this assessment.
- 2.32. The CLo in relation to acidification are expressed in terms of kilo-equivalents H^+ ions deposited per hectare per year (keq/ha/yr) respectively. The unit of 'equivalents' (eq) is used, rather than a unit of mass, for the purpose of addressing acidification from multiple species. The unit eq (keq $\equiv$ 1,000 eq) refers to the molar equivalent of potential acidity resulting from e.g. sulphur, oxidised and reduced N, as well as base cations. Essentially, it is a measure of how acidifying a particular chemical species can be.
- 2.33. Combinations of N and S deposition 'above' the CLo function exceed the CLo. The CLo function is divided into areas as shown in Figure 3. To achieve compliance with the CLo, in some areas of the diagram either N or S or both could potentially be reduced, whilst in others, it may be necessary to reduce just N or only S.
- 2.34. The CLRTAP mapping manual (CLRTAP, 2004) provides methods for calculating exceedance of the function based on deposition of N and S and a given CLo function as the sum of the N and S deposition reduction required to reach the CLo function by the 'shortest path'.
- 2.35. As an initial screening step, the PC as %CL function is calculated as the maximum from:
 - the PC Acid N deposition/ CLminN; and
 - the PC Acid S deposition/ CLmaxS.
- 2.36. Where the initial screening is not achieved the next stages of screening are considered.
- 2.37. The potential impacts of additional N and/or S deposition from a source are partly determined by the PEC, because only if the PEC of N deposition is greater than CLminN will the additional N deposition from the source contribute to acidity. Consequently, if PEC is less than CLminN only the acidifying effects of S from the process need to be considered. The following define the PEC dependent criterion for calculating the PC as percentage contribution of the CLo function.



2.38. Where the PEC related to Acid N Deposition is less than the CLminN:

$$PC \text{ as } \% CL \text{ function} = (PC \text{ S deposition} / CL_{maxS}) * 100$$

2.39. Where the PEC is greater than CLminN (the majority of cases), the combined inputs of S (and other non-N acid compounds) and N need to be considered. In such cases, the total acidity input should be calculated as a proportion of the CLmaxN.

2.40. Where the PEC Acid N Deposition is greater than CLminN:

$$PC \text{ as } \% CL \text{ function} = ((PC \text{ of S+N deposition}) / CL_{maxN}) * 100$$

2.41. Additionally, where the PEC exceeds the CLo function in region 4 of Figure 3, the relevant CLo is defined at the point of the function which is the shortest distance from the PEC (Ycrit in Figure 3). Ycrit defines the relevant N and S CLos, against which the Acid N deposition PC and the Acid S deposition PC can be screened.

2.42. The APIS online critical load function tool (2025) has been published to carry out this process automatically, and this has been used in this assessment.

Relevant exposure

2.43. Relevant receptors for the NOx annual mean CLe, 24-hour mean proxy CLe and annual mean CLoS are:

- The National Network Sites¹:
 - Special Protected Areas (SPAs);
 - SAC; and
 - Ramsar.
- National Sites:
 - SSSIs;
 - Areas of Special Scientific Interest (ASSSIs); and
 - National Nature Reserves (NNRs).

2.44. Locally Designated Ecological Sites e.g. Local Nature Reserves (LNRs), Local Wildlife Sites (LWSs) and Ancient Woodlands (AWs), Sites of Importance for Nature Conservation (SINCs), are also considered potentially sensitive receptors, however, they are less sensitive to changes and less weight is attributed to these sites in the regulatory regime.

2.45. The IAQM guidance (2020) explains that:

“Under the Directive, assessment of compliance with the critical levels is strictly only required at locations more than 20 km from towns with more than 250,000 inhabitants or more than 5 km from other built-up areas, industrial installations or motorways. In practice, however, assessment against

¹ Based on the changes to the Habitats Regulations 2017 (Defra, 2021), formally known as ‘European sites’ in the habitats regulation.

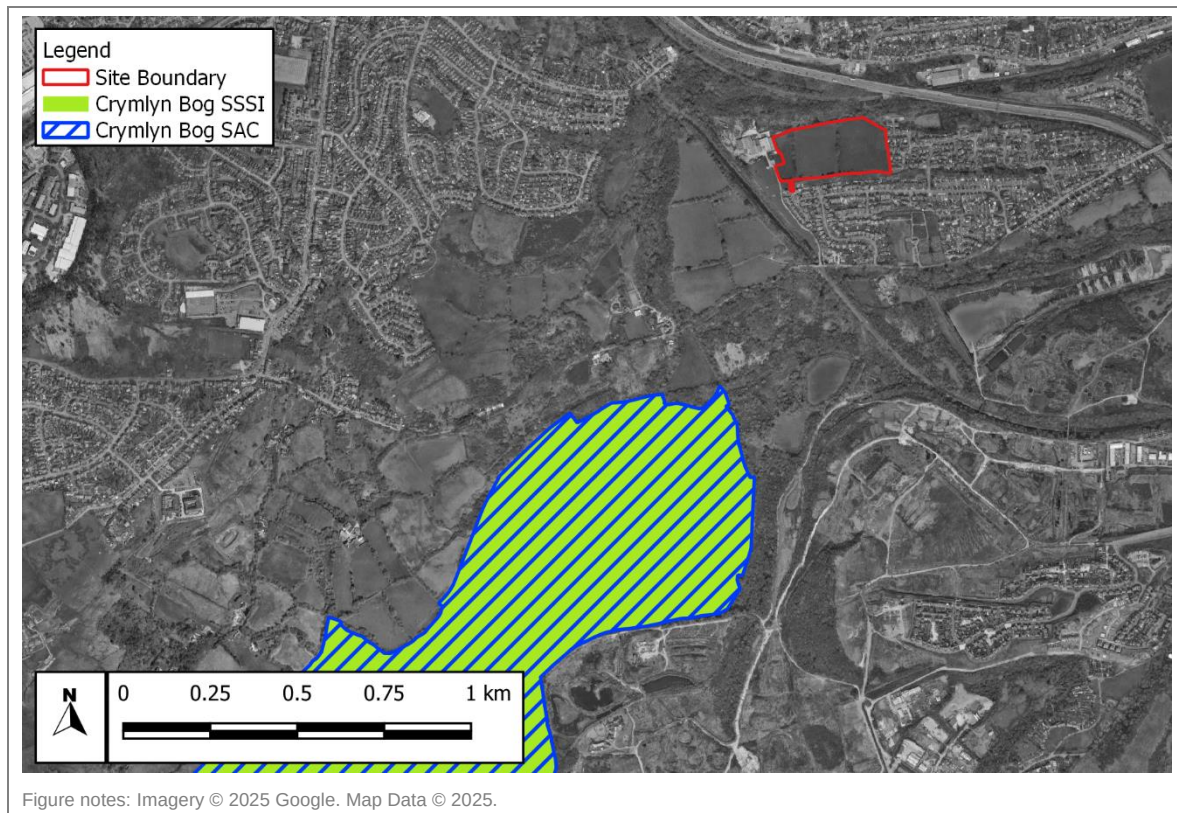


critical levels for vegetation is frequently undertaken to inform planning and permitting processes across the country, regardless of this definition.”

3. Location Context

- 3.1. The NRW expects an assessment for the road traffic generated by the Proposed Development in relation to the impacts at Crymlyn Bog SAC/SSSI. The location of the Proposed Development and Crymlyn Bog SAC/SSSI is shown in Figure 4.

Figure 4: Designated Ecological Sites

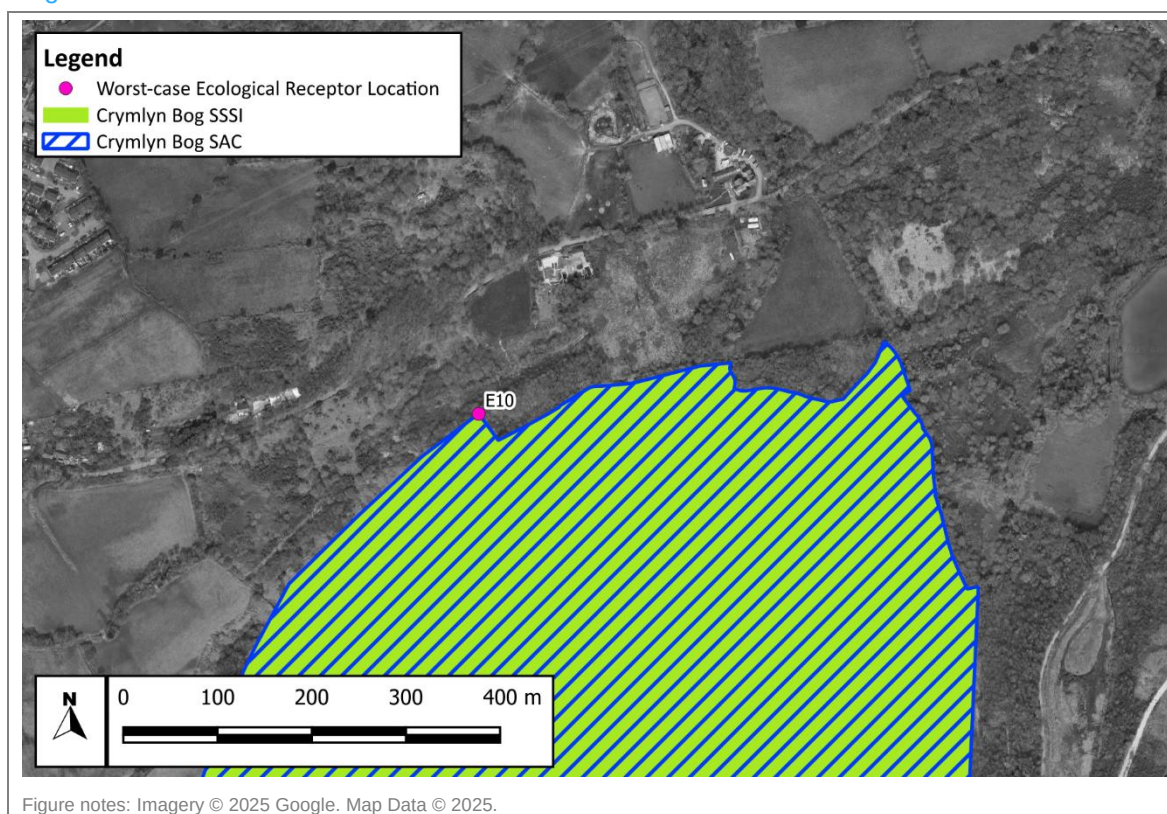


Assessment Locations

- 3.2. Figure 5 shows the worst-case assessment location. The ecological receptor is located approximately 110 m south of Crymlyn Road, the road used in the assessment of the impacts on the ecological sites. Note, additional locations were modelled but this is the worst-case impact location used for assessment.



Figure 5: Assessment Location



4. Annual Mean Critical Levels

Assessment Criteria

- 4.1. The CLes for Wales for the pollutants relevant to this assessment are detailed in Table 1. The impacts of SO₂ and Ozone have not been assessed within this assessment, as these pollutants are not anticipated to be produced by the Proposed Development.

Table 1: Annual Mean Critical Levels at Ecological Sites

Pollutant	Time Period	Source of Assessment Level ^a	Concentration, and the number of exceedances allowed per year (Percentile if applies)	Date Assessment Level to be Achieved From and Maintained After
Nitrogen Oxides (NO _x) expressed as NO ₂	Annual Mean	AQO / LV / CL _e ^b	30 µg/m ³	31 st December 2000 / 19 th July 2001
Ammonia (NH ₃)	Annual Mean	EA EAL	1 µg/m ³ where lichens or bryophytes (including mosses, landworts and hornworts) are present 3 µg/m ³ where they are not present	-



Table 1: Annual Mean Critical Levels at Ecological Sites

Table notes:
a. CLeS are provided from the Air Quality Standards Regulations and NRW EALs from the Environmental Agency Air emissions risk assessment.
b.CLeS are: "concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge". (JNCC, 2021)

PC Screening

- 4.2. From the NRW guidance, it can be inferred that any change in concentration smaller than 1% of the annual mean CLe (0.3 ug/m³) will be insignificant at nationally designated sites, regardless of existing air quality conditions. For locally designated sites, the NRW consider that up to 100% additional PC is unlikely to be considered significant.
- 4.3. The maximum annual mean NO_x and NH₃ PCs at relevant ecological receptor locations are shown in Table 2. The annual mean NO_x and NH₃ PC at Crymlyn Bog SAC/ SSSI are below the 1% screening threshold. Therefore, they can be discounted as insignificant and further consideration of PEC is not necessary.

Table 2: Maximum CLeS PC at Relevant Ecological Receptor Locations

Pollutant	CLe	Maximum PC (ug/m³)	% of CLe	Screened out without further consideration	Comments
Receptor E1 (Designated Site 1)					
NOx (expressed as NO ₂)	30	<0.01	0.03	Yes	Below the 1% of the NRW screening threshold
NH ₃	1	<0.01	0.06	Yes	Below the 1% of the NRW screening threshold
	3		0.02	Yes	Below the 1% of the NRW screening threshold
Table notes: -					

5. Short-term Critical Level

Assessment Criteria

- 5.1. The short-term mean CLe for Wales for the pollutants relevant to this assessment are detailed in Table 3.

Table 3: Critical Levels at Ecological Sites

Pollutant	Time Period	Source of Assessment Level ^a	Concentration, and the number of exceedences allowed per year (Percentile if applies)	Date Assessment Level to be Achieved From and Maintained After
NO _x (expressed as NO ₂)	24-hour Mean	Proxy CLe ^b	75 / 200 µg/m ³ ^c	-



Table notes:

- a. CLEs are provided from the Air Quality Standards Regulations and NRW EALs from the Environmental Agency Air emissions risk assessment.
- b. CLEs are: "concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge". (JNCC, 2021)
- c. The IAQM guidance (IAQM, 2019) explains that a CLE for short-term NO_x has been defined by the World Health Organization and is dependent on the O₃ and SO₂ concentrations. The WHO, explain that: "Experimental evidence exists that the CLE [critical level] decreases from around 200 µg/m³ to 75 µg/m³ when in combination with O₃ or SO₂ at or above their critical levels. In the knowledge that short-term episodes of elevated NO_x concentrations are generally combined with elevated concentrations of O₃ or SO₂, 75 µg/m³ is proposed for the 24 h mean". Based on this, where O₃ and SO₂ are not elevated above their critical levels, a value of 200 µg/m³ is recommended for assessments.

- 5.2. The NRW guidance states, with regards to 'Screening for protected conservation areas' for daily mean NO_x concentration, the assessment level is:

"75 micrograms per cubic metre, 200 micrograms per cubic meter[sic] but only for detailed assessments where the ozone is below the AOT40 critical level and sulphur dioxide is below the lower critical level of 10 micrograms per cubic metre".

PC Screening

- 5.3. The short-term CLEs of 75 µg/m³ and 200 µg/m³ have been used in the assessment.
- 5.4. In both instances, the short-term impacts of the Proposed Development upon Crymlyn Bog SAC/SSSI can be discounted as insignificant; further consideration is not required. As shown in Table 4, the maximum short-term NO_x PC at Crymlyn Bog SAC/SSSI is below the 10% screening threshold.

Table 4: Maximum Short-term CLEs PC at Relevant Ecological Receptor Locations

Pollutant	CLE	Maximum PC (µg/m ³)	% of CLE	Screened out without further consideration	Comments
NO _x (24-hour mean)	75	<0.01	0.01	Yes	Below the 10% of the NRW screening threshold
	200		0.004		

Table notes: -

6. Annual Mean Nitrogen Nutrient Deposition Fluxes

Assessment Criteria

- 6.1. The nutrient nitrogen CLEs were obtained from the APIS website (2025). The information was obtained for sensitive ecological sites relevant to the assessment, i.e. Crymlyn Bog. Consideration has been given to both SAC and SSSI designations of Crymlyn Bog.
- 6.2. The nutrient nitrogen CLEs for Crymlyn Bog SAC and Crymlyn Bog SSSI are presented in in Table 5 and Table 6, respectively.

Table 5: Nitrogen Critical Loads for Crymlyn Bog SAC ^{a b}

Feature Code	Feature Name	NVC types	Is the Feature sensitive to N?	Nitrogen Critical Load Class	EUNIS code	Critical Load for N (kg N/ha/yr)	
						Minimum	Maximum
H7140	Transition mires and quaking bogs	M5; M8; S27; M9	Yes	Valley mires, poor fens and transition mires	Q2	5	15



Table 5: Nitrogen Critical Loads for Crymlyn Bog SAC ^{a b}

Feature Code	Feature Name	NVC types	Is the Feature sensitive to N?	Nitrogen Critical Load Class	EUNIS code	Critical Load for N (kg N/ha/yr)	
						Minimum	Maximum
H7210	Calcareous fens with <i>Cladium amriscus</i> and species of the <i>Caricion davallianae</i>	S2	Yes	Rich fens	Q41-Q44	15	25
H91E0	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)	W7	No	Designated feature/ feature habitat not sensitive to eutrophication	n/a	n/a	n/a

Table notes:
a. Data taken directly from the APIS website, accessed on 24th January 2024.
b. n/a used where information not presented on the APIS website.

Table 6: Nitrogen Critical Loads for Crymlyn Bog SSSI ^{a b}

Feature Code	Feature Name	NVC types	Is the Feature sensitive to N?	Nitrogen Critical Load Class	EUNIS code	Critical Load for N (kg N/ha/yr)	
						Minimum	Maximum
SSSI3422	Fen-topogenous mires in valleys, basins and flood plains- (<i>Carex echinata</i> - <i>Sphagnum recurvum</i> / <i>auriculatum</i> mire)	M6	Yes	Valley mires, poor fens and transition mires	Q2	5	15
SSSI2350	Fen-topogenous mires in valleys, basins and flood plains – (<i>Carex rostrata</i> - <i>Calliergon cuspidatum</i> mire)	M9	Yes	Valley mires, poor fens and transition mires	Q2	5	15
SSSI2341	Fen-topogenous mires in valleys, basins and flood plains – (<i>Carex rostrata</i> - <i>Sphagnum recurvum</i> mire)	M4	Yes	Valley mires, poor fens and transition mires	Q2	5	15
SSSI2342	Fen-topogenous mires in valleys, basins and flood plains – (<i>Carex rostrata</i> - <i>Spahnum squarrosum</i> mire)	M5	Yes	Valley mires, poor fens and transition mires	Q2	5	15
SSSI2331	Fen-topogenous mires in valleys, basins and flood plains – (<i>Hypericum elodes</i> - <i>Potamogeton</i>)	M29	Yes	Valley mires, poor fens and transition mires	Q2	5	15



Table 6: Nitrogen Critical Loads for Crymlyn Bog SSSI ^{a b}

Feature Code	Feature Name	NVC types	Is the Feature sensitive to N?	Nitrogen Critical Load Class	EUNIS code	Critical Load for N (kg N/ha/yr)	
						Minimum	Maximum
	polygonifolius soakway)						
SSSI2299	Fen-topogenous mires in valleys, basins and flood plains – (Narthecium ossifragum-Sphagnum papillosum valley mire)	M21	Yes	Valley mires, poor fens and transition mires	Q2	5	15
SSSI2462	Fen-topogenous mires in valleys, basins and flood plains – (Potentilla palustris-Carex rostrata fen)	S27	Yes	Valley mires, poor fens and transition mires	Q2	5	15
SSSI2288	Fen-topogenous mires in valleys, basins and flood plains – (Scripus cespitosus-Eriophorum vaginatum blanket mire)	M17a; M3; M2a; M17; M1; M18; M2b	Yes	Raised and blanket bogs	Q1	5	10
SSSI2638	Semi-natural woodland (Salix cinerea-Betula pubescens-Phragmites australis woodland)	W2	Yes	Moist and wet dune slacks	N1H	5	15
SSSI2649	Semi-natural woodland (Alnus glutinosa-Carex paniculata woodland)	W5	Yes	Broadleaved deciduous woodland	T1	10	15
Table notes: a. Data taken directly from the APIS website, accessed on 24 th January 2024. b. n/a used where information not presented on the APIS website.							

PC Screening

- 6.3. Where the long-term PC is less than 1% of the CLo for national network site and nationally designated sites or 100% of the CLo for locally designated sites, impacts can be screened out as insignificant.
- 6.4. In this assessment, the deposition includes nitrogen contributions from NO₂ based on deposition velocity for forests, which provides the worst-case deposition velocity. With regards to nutrient CLos set out in Table 5 and Table 6, the lower value in the range has been used as the initial screening assessment level.



- 6.5. The maximum PC for deposition at each designated ecological site is shown in Table 7.
- 6.6. The maximum deposition fluxes are below the screening criteria and the impacts upon the ecological sites can be discounted as insignificant. The impacts of the annual mean PCs do not require further consideration.

Table 7: Maximum Annual Mean Deposition PCs

Location	CLo (Kg N/ha/yr) ^a	PC (Kg N/ha/yr) ^b	PC as % of CLo	Screening Criteria (%)	Screened out?
Receptor E10 (Crymlyn Bog SAC/ SSSI) ^c	5	<0.01	0.12	1	Yes
Table notes: a. The lower value in the CLo range has been used. b. The maximum PC has been based on the worst-case deposition velocity (i.e. for forests) c. The location of the receptor is shown in Figure 5.					

7. Annual Mean Acidity Deposition Fluxes

Assessment Criteria

- 7.1. The APIS online critical load function tool (2025) was used to extract the relevant CLo for sensitive ecological sites relevant to the assessment, i.e. Crymlyn Bog. Consideration has been given to both SAC and SSSI designation of Crymlyn Bog.

Screening

- 7.2. The maximum contribution from the operation of the Proposed Development to the N related acidic deposition at the identified sensitive habitats are shown in Table 8.

Table 8: Maximum Annual Mean Acidity Deposition PCs

Receptor	PC (Keq/ha/yr) ^a	
	N Contributions	Non N Contributions
E10 (Located within Crymlyn Bog SAC/ SSSI) ^b	0.0004	0
Table notes: a. The maximum PC has been based on the worst-case deposition velocity (i.e. for forests) b. The location of the receptor is shown in Figure 5.		

- 7.3. These maximum PCs have been entered into the APIS online critical load function tool. The tool extracts the relevant information for the initial screening and appropriate assessment (if needed). The tool presents the background (also known as baseline) based on deposition associated with land use 'forest' which is the maximum level. The percentage of the relevant critical load function assessment level is also presented in the tool.
- 7.4. The locations entered into the APIS tool are the locations of receptor E10 in Crymlyn Bog SAC/ SSSI (see Figure 5). This is required for the tool to extract the relevant information. The features listed in the tool are:
- SAC Ecological Designation:
 - Transition mires and quaking bogs (Feature), Bogs (Acidity Class);
 - SSSI Ecological Designation:



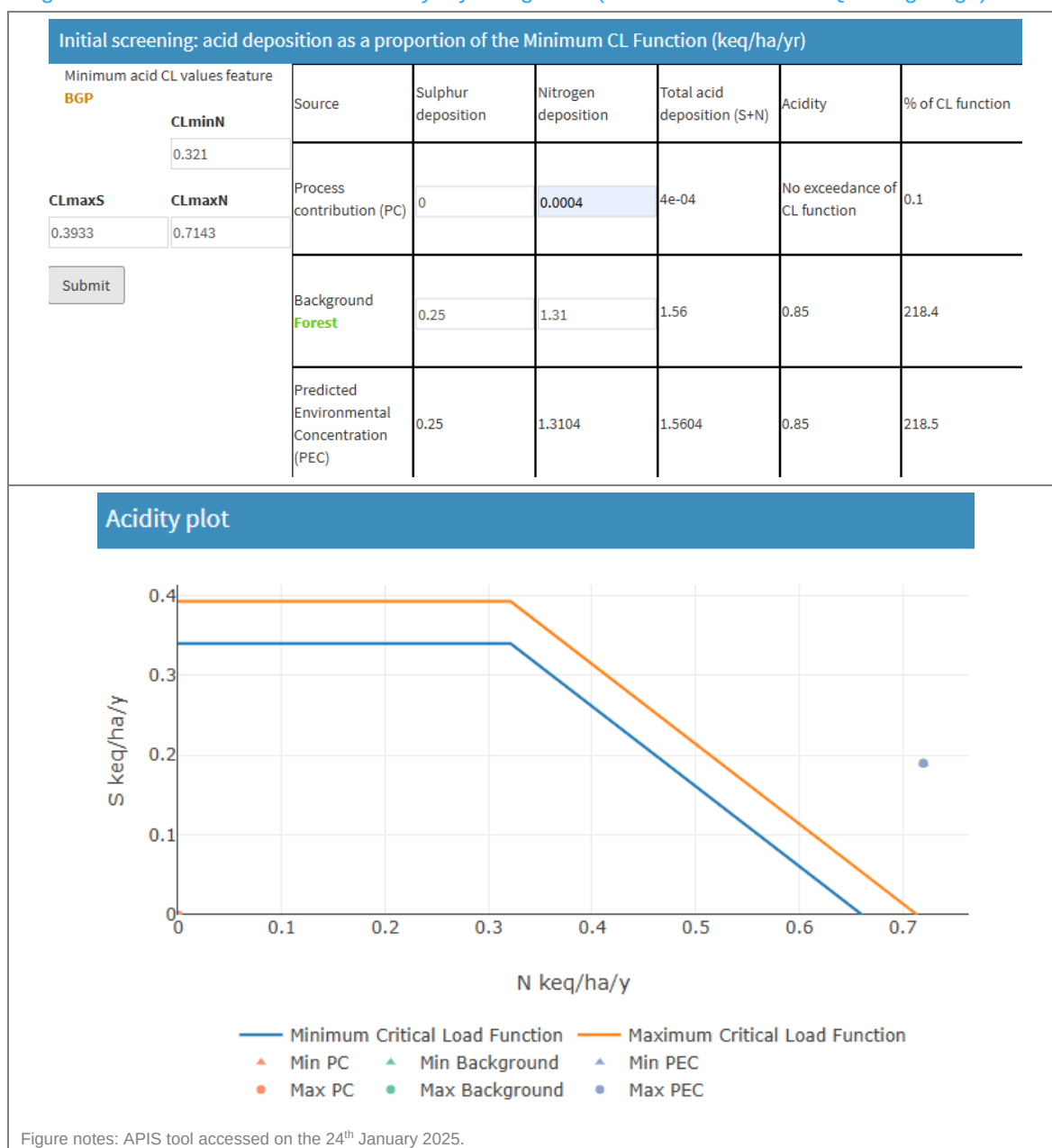
- Fen-topogenous mires in valleys, basins and flood plains-(*Carex echinata-Sphagnum recurvum/auriculatum mire*) (Feature), Bogs (Acidity Class);
- Fen-topogenous mires in valleys, basins and flood plains-(*Carex rostrata-Calliergon cuspidatum mire*) (Feature), Bogs (Acidity Class);
- Fen-topogenous mires in valleys, basins and flood plains-(*Carex rostrata-Sphagnum recurvum mire*) (Feature), Bogs (Acidity Class);
- Fen-topogenous mires in valleys, basins and flood plains-(*Carex rostrata-Sphagnum squarrosum mire*) (Feature), Bogs (Acidity Class);
- Fen -topogenous mires in valleys, basins and flood plains- (*Hypericum elodes-Potamogeton polygonifolius soakway*) (Feature), Bogs (Acidity Class);
- Fen -topogenous mires in valleys, basins and flood plains-(*Narthecium ossifragum-Sphagnum papillosum valley mire*) (Feature), Bogs (Acidity Class);
- Fen -topogenous mires in valleys, basins and flood plains-(*Potentilla palustris-Carex rostrata fen*) (Feature), Bogs (Acidity Class);
- Fen -topogenous mires in valleys, basins and flood plains- (*Scirpus cespitosus-Eriophorum vaginatum blanket mire*) (Feature), Bogs (Acidity Class);
- Semi-natural woodland (*Alnus glutinosa-Carex paniculata woodland*) (Feature), Unmanaged Broadleaved/ Coniferous Woodland (Acidity Class);
- *Eriophorum gracile* (Feature), No critical load assigned (Acidity Class);
- *Asilus crabroniformis* (Feature), No critical load assigned (Acidity Class); and
- Peatland invertebrate assemblage (Feature), No critical load assigned (Acidity Class).

7.5. Figure 6 and Figure 7 show the APIS critical load function tool completed with the maximum PC entered for Crymlyn Bog SAC and Crymlyn SSSI, respectively, in relation to the most sensitive features. Due to the high backgrounds, which exceed the critical load function without the Proposed Development, any addition of more than 1% has the potential to be significant and requires an ecologist to determine whether the integrity of the site is significantly affected or not. The maximum PCs at Crymlyn Bog SAC and Crymlyn Bog SSSI do not exceed the critical load function by more than 1%; thus, further consideration is not required and the potential for adverse impacts to the site are judged to be negligible.



Crymlyn Bog SAC Critical Load Functions

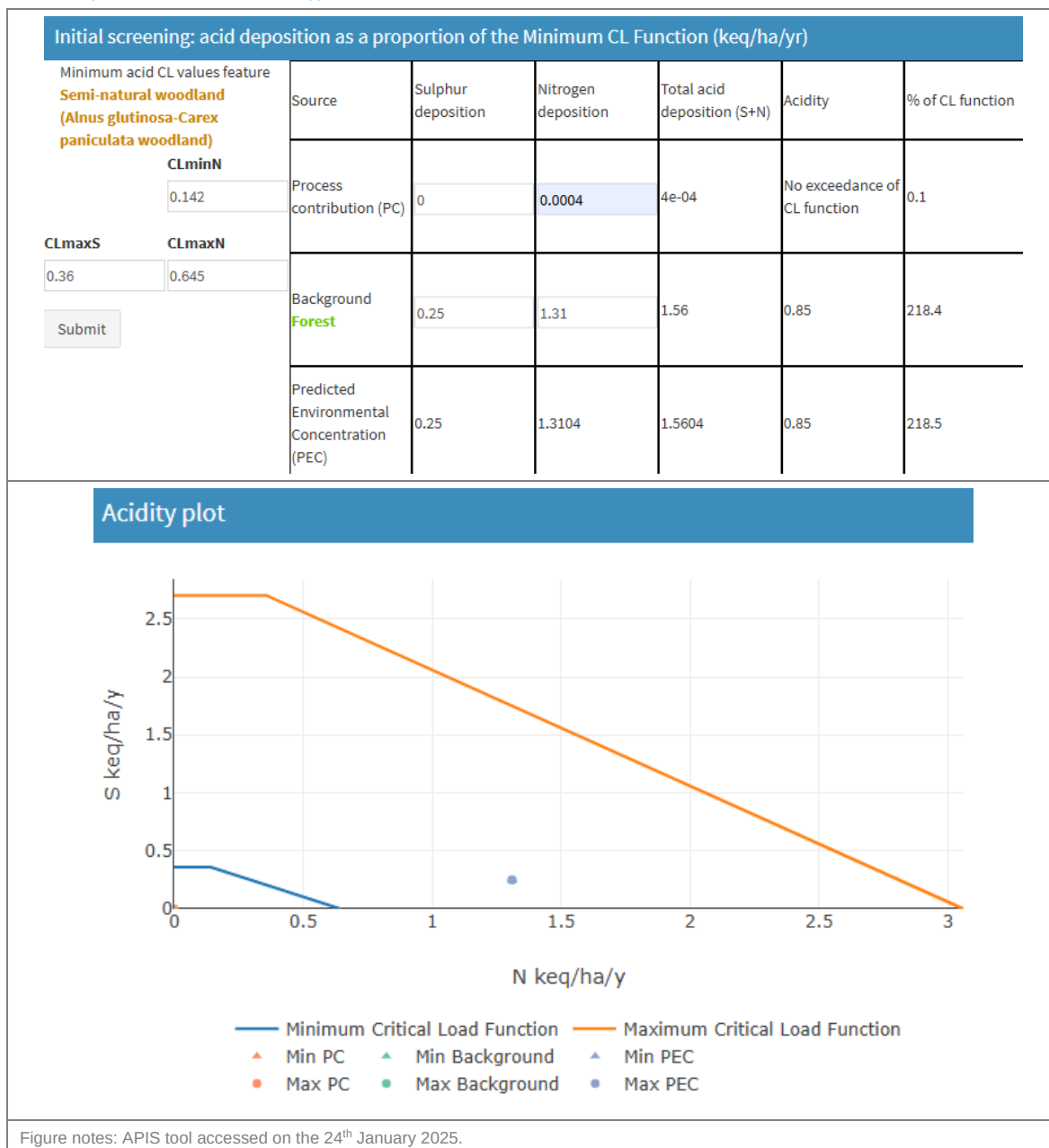
Figure 6: Critical Load Function for Crymlyn Bog SAC (Transition Mires and Quaking Bogs)





Crymlyn Bog SSSI Critical Load Functions

Figure 7: Critical Load Function for Crymlyn Bog SSSI (Semi-natural Woodland (*Alnus glutinosa*-*Carex paniculata* woodland))



8. Significance of Operational Air Quality Effects on Designated Ecological Sites

Summary

- 8.1. A summary of the impacts in relation to CLe of sensitive ecological exposure is set out in Table 9.



Table 9: Critical Level Impacts at Sensitive Ecological Sites

Pollutant	Long-term mean	Short-term mean
NO _x	Not significant impact at Crymlyn Bog SAC and Crymlyn Bog SSSI based on the maximum annual mean PC being less than 1% of CLe (30 µg/m ³).	Not significant impact on Crymlyn Bog SAC and Crymlyn Bog SSSI based on short-term PC being less than 10% of CLe (75/ 200 µg/m ³).
NH ₃	Not significant impact at Crymlyn Bog SAC and Crymlyn Bog SSSI based on the maximum annual mean PC being less than 1% of CLe (30 µg/m ³).	n/a
Table notes: -		

- 8.2. A summary of the impacts in relation to CLo at locations of sensitive ecological exposure are set out in Table 10.

Table 10: Critical Load Impacts at Sensitive Ecological Sites

Pollutant	Long-term mean
Nitrogen nutrient deposition (kg/ha/yr)	Crymlyn Bog SAC and Crymlyn Bog SSSI are considered to be sensitive to nitrogen nutrient deposition. The Proposed Development's contribution is less than 1% of the CLo, thus the Proposed Development will not have a significant impact on the nitrogen nutrient deposition.
Total acid deposition (keq/ha/yr)	Crymlyn Bog SAC and Crymlyn Bog SSSI are considered to be sensitive to total acid deposition; The Proposed Development's contribution is less than 1% of the CLo, thus the Proposed Development will not have a significant impact on the total acid deposition.
Table notes: -	

Significance

- 8.3. The air quality impacts associated the operation of the Proposed Development have been assessed in relation to the CLe and CLo set out to protect sensitive ecological habitats.
- 8.4. The air quality impacts from the Proposed Development in relation to the CLe at sensitive ecological habitats have been discounted as 'not significant'.
- 8.5. The air quality impacts from the Proposed Development in relation to nutrient nitrogen deposition and acidity deposition CLo at sensitive ecological habitats are considered likely to be 'not significant'.
- 8.6. The air quality potential for significant impacts from the Proposed Development in relation to acidity deposition CLo at sensitive ecological habitats can be discounted as 'not significant'.

9. Glossary

APIS	Air Pollution Information System
APS	Air Pollution Services
AQO	Air Quality Objective
ASSI	Areas of Special Scientific Interest
AW	Ancient Woodlands
CIEEM	Chartered Institute of Ecology and Environmental Management



CLes	Critical Levels
CJos	Critical Loads
CLRTAP	Convention of Long-Range Transboundary Air Pollution
CREAM	Calculator for Road Emissions of Ammonia
EAL	Environmental Assessment Level
EFT	Emissions Factor Toolkit
HRA	Habitats Regulation Assessment
IAQM	Institute of Air Quality Management
IPPC	Integrated Pollution Prevention and Control
JNCC	Joint Nature Conservation Committee
LNR	Local Nature Reserve
LWS	Local Wildlife Site
N	Nitrogen
NH₃	Ammonia
NNR	National Nature Reserve
NO₂	Nitrogen Dioxide
NO_x	Nitrogen Oxides
NRW	Natural Resources Wales
PC	Process Contribution
PEC	Predicted Environmental Concentration
S	Sulphur
SAC	Special Area of Conservation
SINC	Sites of Importance for Nature Conservation
SO₂	Sulphur Dioxide
SPA	Special Protected Area
SSSI	Special Site of Scientific Interest
UNECE	United Nations Economic Commission for Europe

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