Fferm Wynt
Garn Fach
Wind Farm

Garn Fach Wind Farm
Environmental Statement

Supplementary Environmental Information
March 2023

Accelerating to a net zero future where clean energy powers our lives.

Proud to be investing in Wales and working in partnership with local communities.

PREFACE

Following receipt of the letter dated 12 July 2022, sent on behalf of the appointed Inspector, H W Jones BA BTP MRTPI, this Supplementary Environmental Information (SEI) has been prepared to provide further information under Regulation 15(2), as requested in Annex B of the aforementioned letter. This SEI should be read in conjunction with the Environmental Statement (ES) submitted to the Welsh Ministers for the proposed Garn Fach Wind Farm (Case ref DNS/3244499) and is submitted on behalf of the Applicant, EDF Renewables Ltd.

A number of Appendices from the Garn Fach Wind Farm Environmental Statement 2022 have been updated as a result of comments from Statutory Consultees. These are listed below and should be considered to supersede the originally submitted version:

- Appendix 5-1 Outline Construction and Environmental Management Plan
- Appendix 8-8 Report to Inform the HRA
- Appendix 8-9 Outline Habitat Management Plan
- Appendix 9-1 Ornithological Report
- Appendix 10-2 Outline Peat Management Plan
- Appendix 10-8 Carbon Balance Assessment

For ease of reference, where there is additional or updated information has been added to the above listed Appendices, this is shown in blue text, with the exception of Appendix 8-8 and Appendix 9-1 which need to be read as full documents.

These documents, along with the SEI, are available for viewing via the project website – https://www.edf-re.uk/our-sites/garn-fach. Hard copies are also available to view at Newtown Library and Llanidloes Library for the duration of the consultation period.

This SEI has been prepared by Dulas Ltd, with support by the following specialist environmental assessors:

Organisation	Environmental Planning Topic
BSG Ecology, 17 Southward Lane, Langland, Swansea, SA3 4QE	Ornithology advisor
Eastpoint Geo, 35-o, Scottow Enterprise Park, Lamas Road, Badersfield, Norwich NR10 5FB	Peat Advisor
Environment Systems, Science Park, Cefn Llan, Aberystwyth SY23 3AH	Ecology and Ornithology
Wallingford Hydro Solutions, Castle Court, 6 Cathedral Road, Cardiff, CF11 9LJ	Hydrology, Hydrogeology and Geology Assessment; Peat Assessment

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4. SITE SELECTION AND PROJECT EVOLUTION

4.1 Introduction

4.1.1 Chapter 4 of the original ES described the process by which the Garn Fach Wind Farm site ('the Site') was identified and selected for wind energy development. The Chapter further explained the evolution of the wind farm design and layout that led to the final application layout.

4.2 Guidance

4.2.1 At the time of designing the layout, as advised during Scoping, NRWs Guidance Note 'CCW Guidance Note - Assessing the impact of wind farm developments on peatlands in Wales' (14th January 2010) was considered, which establishes these three key principles when considering windfarms with peatland areas:

- that peat should be avoided where possible,
- that impacts on peat will require detailed assessment as part of an EIA, including assessment of the whole peatland resources within the application site, and
- that compensation for loss or degradation of peat should demonstrate equivalence by taking the form of peat restoration elsewhere within the development site, or as close to it as possible.

4.3 Site Design

4.3.1 As ecology and peat data for the site available from the original Llaithddu Scheme, the initial layouts were able to consider impacts on ecology and peat from an early stage in the design process.

4.3.2 An area of the site at Waun Ddubarthog was identified early on as being an area of better ecology, and is the only part of the site on the Unified Peat Map of Wales (2019). As such, no infrastructure was located within this area from the outset.

4.3.3 Further to the information outlined in Section 4.7 of the ES, an updated Table 4.1 has been provided to include more details on layout changes as a result of peat surveys.

4.3.4 In addition to the table below, the access track was amended in the northern part of the site. The original track ran between T5 and T7 (with reference to final submission numbering) which would have been located across an area of peat.

4.3.5 An alternative track routing between ES turbine 1 and the track to T6 was considered, but again ruled out as this would have crossed an area of deeper peat.

Table 4.1: Site Design Iterations – Wind Turbines

Turbine	Amendment
T4	Removed in order to widen the spacing between the turbines and allow T6 to be located in order to move it further from the bridleway.
T7	Relocated to increase distance from properties. This also resulted in the removal of the access track across Blue Lins Brook which would have been a large water crossing across the incised valley and an area of deeper peat.
T8	Relocated slightly following the Phase 2 Peat Survey
T13	Removed due to topography, marshy ground/wetter habitat and proximity to archaeological features – following the removal of this turbine, those further south were relocated in order to even out spacing between then turbine from a landscape and visual perspective.
T14	Removed due to wind resource issues, deep peat in this area and the possible hydrological link to the CwmDerw SSSI
T21	Removed.
T22	Removed.

4.3.6 Further to paragraph 4.7.11, rerouting of the track between T10 and T11 removed track from several areas of deeper peat.

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5. PROJECT DESCRIPTION

5.1 Introduction

5.1.1 Chapter 5 of the original ES described the project and outlined the site design activities associated with the construction, operation and decommissioning of the Garn Fach Wind Farm ('the proposed Development'). This Section of the SEI provides several updates to information within the original ES chapter, as a response to comments from statutory consultees.

5.1.2 Update to 5.4.14 of the original ES. Following advice from NRW, floating tracks would be utilized on ground where the peat depth if over 0.5m. Further information is provided in Section 10 of this document and Appendix XX Outline Peat Management Plan.

Comment

5.1.3 *Section 5.4.71 p 34 of the Environmental Statement Volume 1 anticipates that "Bare peat areas will be allowed to re-vegetate naturally".. In our experience, much more active management is likely to be required to ensure the successful re-establishment of vegetation - with the aim of re-establishing peat-forming vegetation and suitable supporting hydrological conditions for this imperative.*

Response

5.1.4 As stated in paragraph 5.4.70, vegetated turf is the most suitable reinstatement, and this will be used wherever possible. Please refer to Appendix 10-2 Peat Management Plan, Paragraph 10.1.52, where it describes the handling of excavated peat and temporary storage.

5.1.5 Should any bare peat occur, this will be stabilised by adding heather and grasses which will halt the loss of peat by erosion. For any blanket bog to begin actively creating new peat, more intervention will be needed. A donor site will be identified from nearby, where sources of suitable sphagnum and cotton grasses can be harvested, only up to 10% of any donor site's plants would be harvested, so they can quickly regrow and replace the donated clumps. For the restoration to work, particular plants need to be planted in different areas, for example, cotton grass needs to be on a flat, wet area. Even at low densities of one plant per square metre, in the right place, will cover the peat surface in a few years. The exact planting regime will be adopted in to the Habitat Management Plan proper.

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8. ECOLOGY

8.1 Other Comments

Comment 1

8.1.1 *We note the following references to legislation are missing from Table 8.2 on 'Legislation':*

- The Invasive Alien Species (Enforcement and Permitting) Order 2019.

- The Environment Act 2021.

The following is missing from the 'Policies' section: - Document C(2021) 7301 Commission notice Guidance document on the strict protection of animal species of Community interest under the Habitats Directive

Response

8.1.2 The highlighted information is listed below:

Table 8.1 : Update of Table 8.2 of Chapter of ES on Policy and Legislation

Policy/Legislation	Description	Relevance and How requirements will be Met
The Invasive Alien Species (Enforcement and Permitting) Order 2019	The Invasive Alien Species (Enforcement and Permitting) Order 2019 are regulations to prevent and minimise the impact of the introduction and spread of non-native animals and plants. It lists 66 species which are of special concern. 14 of these species are found in Wales. The regulations apply to live specimens and anything they can reproduce from, such as seeds, spores and fragments of plants. The regulations make it an offence to carry out any of the following activities with listed species, except where a licence, permit or exemption is in place: import, keep, breed, transport (except transporting for eradication) place on the market, exchange, allow to grow, cultivate or permit to reproduce, release into the environment.	This legislation is relevant in carrying out all development activities on site. It is important for protecting both terrestrial and freshwater habitats, and associated species within the Zone of Influence. The requirements will be met through the application of all provisions provided in the Environmental Statement particularly Appendix 5-1: Outline Construction Environmental Management Plan (OCEMP), and Appendix 10-7 Outline Drainage and Surface Water Management Plan. A final detailed CEMP will include all these measures and provide further details where necessary.
The Environment Act 2021	The Environment Act operates as the UK's new framework of environmental protection. Given that the UK has left the EU, new laws that relate to nature protection, water quality, clean air, as well as additional environmental protections that originally came from Brussels, needed to be established. The Environment Act allows the UK to enshrine some environmental protection into law. It offers new powers to set new binding targets, including for air quality, water, biodiversity, and waste reduction. The legislation completed its passage through parliament on 13 October	This legislation is relevant in carrying out all development activities on site. It is important for protecting both terrestrial and freshwater habitats, and associated species within the Zone of Influence. The requirements will be met through the applications of all provisions provided in the Environmental Statement particularly Appendix 5-1: Outline Construction Environmental Management Plan (OCEMP), and Appendix 10-7 Outline

Policy/Legislation	Description	Relevance and How requirements will be Met
	2021 and received Royal Assent on 9 November 2021.	Drainage and Surface Water Management Plan. A final detailed CEMP will include all these measures and provide further details where necessary.
Document C(2021) 7301 Commission notice Guidance document on the strict protection of animal species of Community interest under the Habitats Directive	This is a guidance that aims to provide an understanding of the provisions for species protection and of the specific terms used on the strict protection of animal species of Community interest under the Habitats Directive. It focuses on the obligations arising from Articles 12 and 16 of the Habitats Directive which establish a system of strict protection for the animal species listed in Annex IV(a) to the Directive, while allowing for a derogation from these provisions under defined conditions. The document is destined for national, regional and local authorities, conservation bodies and other organisations responsible for, or involved in, implementation of the Habitats Directive, and stakeholders. It aims to assist them in devising effective and pragmatic ways of applying the provisions, while fully	The ES, and other Ecology supporting documents have considered the species concerned. For example, as can be seen in the updated HRA, and the SEI response to fish species which consider the protection of Atlantic salmon and Freshwater pearl mussel outside European sites.

Policy/Legislation	Description	Relevance and How requirements will be Met
	respecting the legal framework.	

Comment 2

8.1.3 *Section 8.4.46 regarding 'Significance Criteria' needs a reference to Favourable Conservation Status (FCS).*

Response

8.1.4 The requested information is outlined below:

The significance of an effect is largely a product of the interaction between the value of the ecological receptor and the magnitude of the effect on it, moderated by professional judgement, to determine whether the integrity of the receptor will be affected. An ecologically significant effect can be defined as an effect (adverse or beneficial) on the integrity of a defined site or ecosystem and/ or the conservation status of habitats or species within a given geographical area. For protected sites, the effect is considered on the Favourable Conservation Status (FCS) for a European Protected Site's qualifying habitats and species across their natural range in the UK. In general, the conservation status of the qualifying feature will be taken as favourable when the following parameters are maintained or restored:

- The extent and distribution of the habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which the habitats of qualifying species rely;
- The populations of the qualifying species; and
- The distribution of the qualifying species within the site.

8.1.5 Within the ES assessment a significant effect therefore means that the predicted effects are considered likely to affect the integrity of a receptor and the parameters contributing to achieving the FCS of the qualifying habitats and species. It is noted where significant effects have been considered, it has not by default lead to the conclusion that the FCS (if present) will not be maintained. The Habitat Regulations Assessment (HRA) document has considered the significant effects in the first stage of the HRA. Then where likely significant effects (LSE) could

not be ruled out, the second stage of the HRA Appropriate Assessment, considered the mitigation measures to be implemented and whether after its implementation, residual effects will remain that can compromise the favourable conservation status of each qualifying feature has been considered.

Comment 3

8.1.6 *5.1 Significance and Favourable Conservation Status: We advise that EIA considers significance (both alone and in combination) and where applicable conservation status. In respect of conservation status, we advise consideration to be given to current conservation status (CCS), and demonstration of no likely detriment to maintenance of favourable conservation status (FCS) during construction operation and decommissioning phases of the scheme. Reference to CCS and FCS in accordance with EC Guidance1 is advocated.*

Response

8.1.7 The EC Guidance document (EC, 2021)[1] explains that "the state and condition of the local population of a species in a certain geographical area might well be different from the overall conservation status of populations in the biogeographic region in the Member State (or even the natural range). Therefore, the conservation status at all levels should be known and properly assessed before deciding whether to issue a derogation".

8.1.8 Although the terminology of "current conservation status" has not been used in the ES, the information provided to describe the "conservation status" has been based on diligently seeking up to date baseline information from desk studies, conferring with local ecological experts and a suite of ecological surveys on the conservation status of species at the relevant unit of assessment within the site's zone of influence wherever possible.

Comment 4

8.1.9 *Section 8.7 on 'Mitigation' has a missing component: Requirement for Ecological Compliance Audit. We advise that any future consent includes the imposition of a condition that requires the submission and implementation of an approved ecological compliance audit (ECA) scheme to the satisfaction of the LPA. The purpose of the Ecological Compliance Audit is to evidence compliant implementation of all ecological avoidance, mitigation and compensation works, either proposed or subject to the provisions of reserved matters conditions. For each identified ecological feature the Audit shall identify Key Performance Indicators (KPI's) that are to be used for the purposes of assessing and evidence compliance of all identified ecological actions.*

Response

8.1.10 Section 2.9. Ecological Compliance Audit of Appendix 8-10: Great Crested Newt - Species Conservation Plan addresses the ecological audit requirements for great crested newt mitigation measures. A similar Ecological Compliance Audit Scheme will be developed and implemented for all mitigation measures proposed in all the ES chapters, appendices, and final CEMP. The audit scheme will also include any additional mitigation measures proposed in this response letter.

Comment 5

8.1.11 *However, the text does not appear to have regard to the prevention of incidental injury or killing of European Protected Species under Article 15 of the Habitats Directive/Reg 53 of the Conservation of Habitats and Species Regulations 2017 (as amended).*

8.1.12 The ES has concluded that the impact of the proposed development will not affect the conservation status of any bat species within its natural range as a result of any incidental killing as referred to in regulation 53.

8.1.13 Furthermore, the mitigation and monitoring strategy for bats put forward within the ES (see paras 8.7.28-8.7.36) outlines a programme of mitigation, including monitoring, which ensures that effects on all bat species as a result of any incidental killing will not be significant (see conclusion at para 8.8.12). Accordingly the purpose set out in Regulation 53(2) is achieved.

[1] European Commission (2021). Guidance document on the strict protection of animal species of Community interest under the Habitats Directive. C(2021) 7301 final.

8.2 Great Crested Newts

Comment 1

8.2.1 *Section 8.4.19 of the GCN survey identifies 6 ponds on site. Pond 4 is over 1.3km from the application site, and access was not possible for Pond 6. An eDNA and Habitat Suitability Index (HaSI) was undertaken on these on 10/05/2019.*

Section 8.4.23 'GCN Abundance Surveys' states surveys of ponds 3 and 5 were undertaken between April and June 2020. eDNA surveys in 2019 returned positive GCN DNA in Pond 3.

Section 8.5.96 states eDNA surveys undertaken on Pond 3 in 2019 returned a positive outcome for GCN DNA.

The conservation status of the great crested newt in its natural range is not considered by English Nature (2001) to be Favourable. While no Regional (Welsh)-level data is available, it can be considered reflective as Wales is assessed as marginal and unsuitable in habitat suitability (ARG UK, 2010).

Given the distance from the population's stronghold in the Pond 3 cluster to other ponds within the landscape, the population is likely to be an important constituent of a fragmented meta-population. Therefore, within this context the species is considered important at the County level.

No reference to more update CCS (Current Conservation Status) assessments in Wales - Contents (naturalresources.wales) or the recent Amphibians and Reptiles Red data book.

However, we consider the survey and assessment to be appropriate and proportionate. We therefore concur with the stated conclusions in section 8.5.101.

Response

8.2.2 The CCS assessments by Haysom *et al*, 2018[2] identifies the ponds on Development Site as located in areas identified as having ponds predicted to be suitable for GCN which lie outside the present known range but within counties where the species is native. The CCS assessments states that the current conservation status of GCN is considered to be unfavourable at national and county spatial scales. At a site-based level, current conservation status is described as variable and as critically dependant on targeted management and control of adverse factors. The species is vulnerable to ongoing and likely future threats and pressures such as land-use change, climate change and hydroseral succession.

8.2.3 Similarly, as advised, reference was made to the Amphibians and Reptiles Red Data Book by Foster *et al*, 2021[3]. This describes the CCC of GCN in Wales as Least Concern (LC) as per the Great Britain level assessment. The number of Welsh populations (thousands) exceeds the threshold for reduction rates in the Threatened categories, and there is unlikely to be a significant deterioration in the short term. The Extent of Occurrence and Area of Occupancy values appear to just exceed the threshold values for Vulnerable status. Hence currently we assign the species as Least Concern. The same caveat relating to the risk posed by possible introduction of disease applies in Wales.

8.2.4 Therefore, taking into account the updated GCN CCC status information, it is considered that the conclusions in section 8.5.101 of the ES are still appropriate and that the species is considered important at the County level.

Comment 2

8.2.5 *Section 8.6.147 states impacts to GCN from the operation of the turbines include collision/mortality from vehicular traffic, specifically within 500m of the Pond 3 cluster where there is a medium-sized population present. Suitable habitat connects the Pond 3 cluster with Pond 6 along the Custogion Brook; the existing watercourse crossing point will be redesigned / reinforced to allow heavy construction vehicles to cross. Vehicular traffic will increase in frequency, and the existing access track will increase in width. The ES considers the significance of effect to have potential to be Slight adverse, and not significant. We have no information/evidence to refute or rebut this assessment or its conclusions. We therefore accept this conclusion.*

[2] K Haysom, D Driver, M Cartwright, J Wilkinson and J Foster. 2018. Great Crested Newt in Wales, with specific references to its long-term prospects and within its stronghold in North-East Wales. NRW Science Report Series. Report No: 259. pp 113, Natural Resources Wales, Bangor.

[3] Foster, J., Driver, D., Ward, R. & Wilkinson, J. (2021). IUCN Red List assessment of amphibians and reptiles at Great Britain and country scale. Report to Natural England. ARC report. ARC, Bournemouth.

Section 8.7.50 covers matters of monitoring for GCN species. This section states 'Part of any licence to derogate from relevant legislation must include a plan for monitoring.'. We advise the monitoring should include:

• Methodology: The Wales Great Crested Newt Monitoring Scheme shall be used with surveys being carried out on an [annual] basis;

• Duration: Not less than 25 years; www.naturalresourceswales.gov.uk

• Surveys shall include abundance counts and habitat quality assessments using Habitat Suitability Index (HSI) scores;

• Identification of individuals/bodies being responsible for monitoring and reporting survey results.

• Each water body shall be individually numbered on site.

Response

8.2.6 The above advice which will be applied to the GCN monitoring scheme. This will be presented in any method statement to be prepared and submitted to NRW as part of any GCN derogation licence application.

Comment 3

8.2.7 *Section 3.2.4 of Appendix 8-9: Outline Habitat Management Plan is regarding GCN surveillance work. We welcome the inclusion of the site in the Wales GCN monitoring scheme. In terms of methodology, we advise annual 2-3 abundance counts using torching techniques and the use of the Habitat Suitability Index scores.*

We advise further detail is provided in Section 2.2.2 of Appendix 8-10 'Great Crested Newt Conservation Plan' into what habitat management prescriptions are proposed for GCN aquatic and terrestrial habitats.

Response

8.2.8 The following information on terrestrial and aquatic habitat management prescriptions summarise the relevant information detailed in Appendix 8-9: Outline Habitat Management Plan and Appendix 8-10: Great Crested Newt - Species Conservation Plan of the ES. Figures 17a.V2 (Terrestrial and aquatic habitat management prescriptions for GCN (Southern Parcel)) and 17b (Terrestrial and aquatic habitat management prescriptions for GCN (Middle Parcel, Ponds 3 and 6)) provide an outline of the location of the prescriptions listed below.

Terrestrial Habitat Management Prescriptions

8.2.9 Terrestrial habitat management prescriptions listed below are proposed in various locations within the proposed development area. These are particularly concentrated in the southern parcel that has been designated as a Compensation Area where No development or construction activity will occur.

Creation of amphibian hibernacula (section 2.2.1 Appendix 8-9 and sections 2.2.2, 2.2.3 Appendix 8-10)

8.2.10 Two hibernacula will be created within the southern parcel in locations shown in Figure 18a.V2.

8.2.11 An additional two more hibernacula will be constructed within the currently-fenced area surrounding the Pond 3 cluster (section 2.4.2 Appendix 8-9).

8.2.12 Other hibernacula will be integrated with the green superhighway corridor (section 2.3.2 Appendix 8-9)

8.2.13 These will be made from logs, stones, inert rubble, soil and turf. These are proposed to be entirely stock-fenced to prevent interference from livestock. Construction will follow instructions and suggestions laid out in the section entitled 'Special Newt Conservation Measures' (Langton, Beckett & Foster, 2001). Locations proposed are provided 17a and 17b.

1. Reducing grazing density

8.2.14 Fencing will be erected around two areas within the Southern parcel where grazing density will be managed as shown in as shown in Figure 17a.R2. The bridleway cutting through one of the fenced off areas will remain accessible through the provisions of suitable gates at either sides of the area.

8.2.15 Fencing around the pond 3 cluster will be upgraded to manage grazing density by sheep (section 2.4.2 Appendix 8-9). The fence will be maintained as part of the enhancement measures to be secured through the proposed development. This will ensure that the ecological benefits are extended for the lifetime of the wind farm project.

2. Installation of amphibian culverts (section 2.4.1 Appendix 8-9, sections 2.5.1 and 2.6 Appendix 8-10)

8.2.16 Three amphibian culverts will be installed adjacent to one another beneath the access track to the east of the east Pond 3 cluster. These will include permanent amphibian walls to guide the amphibians into and away from the culverts.

8.2.17 Where the corridor intersects with the proposed development infrastructure, the design considerations will include fauna access features such as culverts to allow continued fauna movement.

3. Peat trench bunding (supplementary information)

8.2.18 Prescription measures for the peatland habitat will also be of benefit to GCN. Peat trench bunding proposals for the northern parcel will aim to enhance peatland habitats by increasing wetness and promoting the regeneration of lesser plant communities which will provide suitable good quality terrestrial habitat for GCN. This is described in further detail in the Technical Appendix 8.9: Outline Habitat Management Plan.

Aquatic Habitat Management Prescriptions

4. Creation of a pond (section 2.2.3 Appendix 8-9 and sections 2.2.2, 2.3.4 Appendix 8-10)

8.2.19 Two new ponds suitable for great crested newts will be created in accordance with the section entitled 'Construction of Breeding Ponds' within the Great Crested Newt Conservation Handbook (Langton, Beckett & Foster, 2001) as shown in Figure 17a.V2. A stock fence will surround the pond to prevent poaching and other destruction by grazing stock. The pond margins will be sown with appropriate marginal floral species, and the pond encouraged to support aquatic plants. A full recommended plant species list will be provided in the HMP proper.

5. Creation of scrapes (section 2.2.3 Appendix 8-9 and section 2.2.2 Appendix 8-10)

8.2.20 A series of shallow scrapes / ephemeral pools will be created as shown in Figure 17a.V2. Naturally wet areas were identified on site for the citing of the scrapes to encourage water to remain in areas where it occurs naturally.

Delivery of Terrestrial and Aquatic Habitat Management Prescriptions

8.2.21 Delivery information on the prescriptions listed above are presented in Table 2-2 within section 2.1 Appendix 8-10. To ensure the success of implementation of the management prescriptions, it is recommended that a section 106 agreement (or similar) is dawn to insider the management of the southern parcel over the life time of the development.

Monitoring and Reporting of the Prescriptions Delivery (section 2.5.5 Appendix 8-10)

8.2.22 The integrity and condition of the habitats and features will be appraised each year. A log detailing all inspections made and any actions taken will be kept by the person conducting the monitoring, which will be passed to the licensee / developer. It is the licensee / developer's responsibility to action any remedial works.

8.3 Fish

Comment 1

8.3.1 *Habitat Regulations Assessment*

We have concerns that a significant effect from the proposed development on the following protected sites cannot be ruled out:

- *Elenydd-Mallaen Special Protection Area (SPA)*
- *River Wye Special Area of Conservation (SAC)*

The proposal is located approximately 7km southwest of the SPA and is hydrologically connected by a network of small streams and land drains, which form tributaries of the River Wye SAC. This river is also designated as the River Ithon Site of Special Scientific Interest (SSSI). The SPA is also classified as the Elenydd SSSI.

We advise the missing information or points, or clarification outlined in this letter must be submitted to carry out a Habitat Regulation Assessment (HRA) under regulation 63 of the Conservation of Habitats and Species Regulations 2017 prior to the determination of the planning application. The HRA should demonstrate that there will be no adverse effect on protected site integrity. Should you conclude that the proposed development is likely to have a significant effect on the European site, we look forward to being consulted on your appropriate

assessment under Regulation 63 of the Conservation of Habitats and Species Regulations 2017. We consider provided the nature interests of the European sites are protected, the interests of the SSSIs should also be safeguarded.

Response

8.3.2 Appendix 8-8 of the ES Report to Inform HRA for two European Sites (Version 4) has provided information to inform a Habitat Regulation Assessment (HRA) under regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended). The information in the ES relates to both screening Stage 1 Likely Significant Effect (LSE) test and Stage 2 Appropriate Assessment (AA) for both the *Elenydd-Mallaen Special Protection Area (SPA) and River Wye Special Area of Conservation (SAC)* Version 4 of Appendix 8-8 incorporates the information provided in this response letter for both European Protected Sites.

8.3.3 Where relevant to the fish species comments, the missing information or clarification points in this response letter have been presented below within the framework to inform the HRA.

Comment 2 – Fish Species

8.3.4 *We note Table 8.15 recognises the importance of the watercourses on the development Site as tributaries leading to the River Ithon SSSI and River Wye SAC.*

While we accept that given implementation of full Pollution Prevention Measures under the CEMP that limited impact would be expected on fish species. However, we would insist on reviewing a final detailed CEMP, which should take account of Severe weather events for all construction stage mitigation.

Response

8.3.5 We welcome the comments regarding Appendix 5.1: Outline Construction Environmental Management Plan (CEMP), and taking account of severe weather events. The Outline CEMP refers to Appendix 10-7 of the ES: Garn Fach Wind Farm Outline Drainage and Surface Water Management Plan which addresses in detail mitigation measures to be employed to manage surface water run off including accounting for severe weather events. We draw your attention to the drawings titled Outline Surface Water Management Strategy 1-5 (Drawing numbers HS1759-T02-0001- HS1759-T02-0005) that provide detailed information on types and locations of the mitigation measures. Section 6 of Appendix 10-7 provides a summary of such measures. The summary of the measures, conclusions and recommendations are listed below:

- Good surface water management during construction is essential to ensuring that sediment does not pollute downstream watercourses;
- Vegetation cover would be retained for as long as possible and track construction phased to minimise the potential for soil stripping;
- Temporary drainage pathways would be established to direct surface water away from at risk areas and towards the SuDS and surface water drainage network via sediment controls;
- The aim of the drainage scheme would be to ensure that water from surrounding land is excluded from the area of development and where this is not possible the volumes draining onto the Site are significantly reduced;
- Further guidance provided in this document on construction activities, vehicle access/maintenance, felling and spillage control would also be followed to further ensure pollution control;
- For the proposed road, it is recommended that v-shaped ditches (ditches possibly combined with bunds) be placed on the upslope side of the construction area. These will convey surface water from upslope to piped crossings beneath the construction areas;
- Downslope of the construction area, a buffer strip would run along the entire length of the excavated construction area. Where there is enough space available it is recommended that the minimum buffer strip width be set at 5m. Vegetation would not be disturbed within this filter strip to enable treatment of any direct run-off from earthworks;
- If following detailed design, the road has a curved camber, this means runoff will fall to both sides so drainage channels in the form of v-shaped ditches will be required on both sides;
- Silt fencing is recommended as a primary treatment method within the earthworks. These will act to break up any preferential flow paths and divert and filter runoff. These would be set at regular intervals where necessary;

- It is recognised that some areas on Site are more vulnerable than others and these may require additional surface water protection measures, including implementing a number of measures in series to ensure adequate treatment;
- It is envisioned that during the operational phase the general SuDS approach adopted during construction will continue to be used. However, several features such as silt fences will be removed given the reduced pollution hazard during the operational phase;
- Storage volumes will be provided on Site during construction and operation to treat and control runoff. For the northern and central Site areas, when considering the 100-Year event the provisional storage requirements are 380.4 m3 and 433.1 m3 per hectare, respectively;

8.3.6 A final detailed Construction Environmental Management Plan (CEMP) is to be produced by the appointed contractor. The final CEMP will include detailed design, implementation and management of the mitigation for all stages of the construction stage including consideration of worse case scenarios such as severe weather conditions. The document will incorporate all the measures detailed in Appendix 5.1: Outline Construction Environmental Management Plan (CEMP) and Appendix 10-7 of the ES: Garn Fach Wind Farm Outline Drainage and Surface Water Management Plan. The final detailed CEMP will be presented to NRW for review from NRW prior to the commencement of works.

Comment 3 – Fish Species

8.3.7 *We note Chapter 8, 8.5.117 P153 and CEMP 5.11.18 p 5-22 there is still limited detail around consideration of fish species Annexe II species SAC features. The ES excludes consideration of Freshwater Pearl Mussel. Further detail on this feature must be provided.*

Response

8.3.8 ES Chapter 8, 8.5.117 P153 states that "*any impacts from siltation or accidental/reckless discharge or spillage of other polluting substances into the watercourses on site have the potential to impact the two designated sites and therefore Atlantic salmon and Brown trout in the wider catchment, the importance of the Site to the species is considered to be at the County level*".

8.3.9 Appendix 5 CEMP section 5.11.18 p 5-22 states that "*Physical impacts to Atlantic salmon and Brown trout, such as accidental or reckless mortality or injury is considered to be unlikely, as there will be limited breaching of the water courses for the purposes of The Development, and no specific mitigation is recommended as a result*".

Consideration of Annexe II fish species SAC features, Brown trout and freshwater pearl mussel (FWPM)

8.3.10 NRW noted that there is limited detail around consideration of fish Annexe II species SAC features in Chapter 8, 8.5.117 P153 and CEMP 5.11.18 p 5-22. More detailed assessment of the Annex II species was presented in Appendix 8-8 of the ES Report to Inform HRA for two European Sites. Relevant mitigation measures for fish are also listed in Appendix 5-1: Outline Construction Environmental Management Plan (CEMP), and Appendix 10-7: Outline Drainage and Surface Water Management Plan. The sections below outline relevant information from the above listed appendices and provide further supplementary information to address NRW's comments. Where relevant, the information is presented in a format to inform a Habitat Regulation Assessment (HRA).

Brown trout (Section 1.2 Appendix 8-8)

8.3.11 Brown trout, not an SAC feature, is a species of principal importance under the Environment (Wales) Act 2016 is also likely to be present. Consideration for the SAC feature Atlantic salmon in the ES is likely to be sympathetic for the other features present in the river including non-SAC features such as brown trout.

River Wye SAC qualifying interest features and conservation objectives of the SAC (Section 4 of Appendix 8-8, and Supplementary Information)

8.3.12 The River Ithon SSSI/River Wye SAC is located 1.9km to the east of the Site and 2.1km to the east of the nearest proposed turbine; the footprints of the SSSI and SAC are identical, up to where the River Ithon joins the River Wye. As the River Wye SAC is large and will experience varying conditions relative to its location, various reaches have been designated as SSSIs, also corresponding to Management Units within the SAC Core Management Plan. At a distance of 1.9km from the Site, the SAC occupies the same boundary as the River Ithon SSSI, which corresponds to Management Unit 7 (Figure 1). The Llaithddu brook on Site corresponds to management unit 7s.

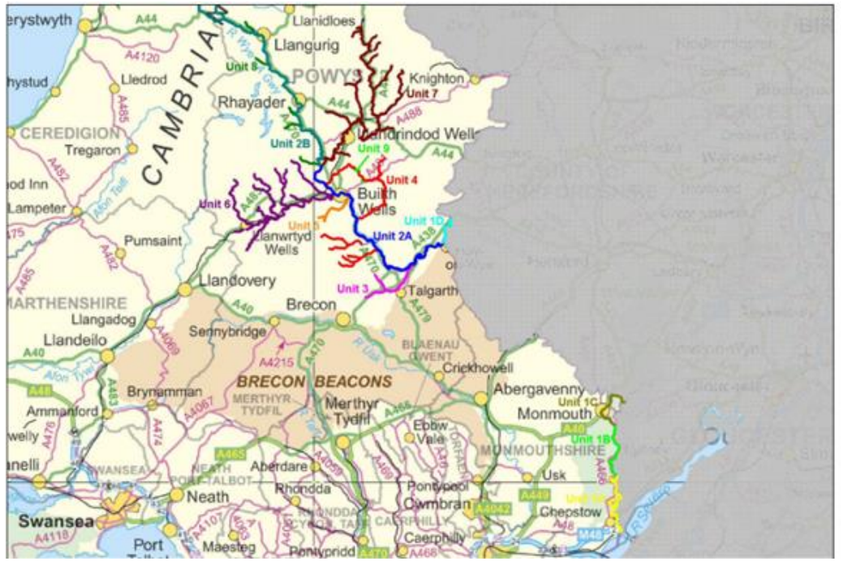

Figure 8.1: Management units of the rive Wye SAC (NRW, 2008[4])

8.3.13 The Core Management Plan for the river Wye SAC (NRW, 2022)[5] identifies within each Management Unit, specific SAC features as being 'Key' or 'Other'. Key species or habitats are the main drivers of management and the focus of monitoring effort. Other features are of importance in a unit, but are not the main drivers. They will benefit from management for the Key features, and may be classed as Sympathetic on association with the Key features. It is noted that if features are Key Species or Key Habitats, they are bolded in the list below. The fish species Annexe II species SAC features relevant to Management Unit 7 are:

- Feature 2: River lamprey (Other/Sympathetic); Status: unfavourable: unclassified
- Feature 3: Brook lamprey (Other/Sympathetic); Status: unfavourable: unclassified
- Feature 6: Atlantic salmon (Key Species/KS); Status: unfavourable: unclassified
- Feature 7: Bullhead (Other/Sympathetic); Status: unfavourable: unclassified
- Feature 10: White-clawed crayfish* (Other/Sympathetic). Status: unfavourable: unclassified

*White-clawed crayfish has been recorded in Management Unit 7 in Howey Brook, however its restoration to this sub-catchment is not a current management objective and is therefore scoped out and not considered further. Twaite shad, allis shad and sea lamprey are not known to occur within Management Unit 7, but habitats in the lower reaches may possibly be suitable. However, the other aforementioned species are widely distributed throughout the catchment. Conservation objectives and performance indicators, where relevant, are provided below.

The Wye Watercourse

8.3.14 The ecological status of the watercourse is a major determinant of favourable conservation status for all features. The required conservation objectives for the watercourse are defined in the Core Management Plan (NRW, 2022). These are:

- The capacity of the habitats in the SAC to support each feature at near natural population levels, as determined by predominantly unmodified ecological and hydromorphological processes and characteristics, should be maintained as far as possible, or restored where necessary;
- The ecological status of the water environment should be sufficient to maintain a stable or increasing population of each feature. This will include elements of water quantity and quality, physical habitat and community composition and structure;
- Flow regime, water quality and physical habitat should be maintained in, or restored as far as possible to, a near-natural state, in order to support the coherence of ecosystem structure and function across the whole area of the SAC;
- All known breeding, spawning and nursery sites of species features should be maintained as suitable habitat as far as possible, except where natural processes cause them to change.
- Flows, water quality, substrate quality and quantity at fish spawning sites and nursery areas will not be depleted by abstraction, discharges, engineering or gravel extraction activities or other impacts to the extent that these sites are damaged or destroyed;

[4] NRW (2008). Core Management Plan Including Conservation Objectives for Afon Gwy / River Wye SAC. Version 1 (Dated February 2008). Accessed 21/12/2022.
[5] NRW (2022). Core Management Plan Including Conservation Objectives for Afon Gwy / River Wye SAC. Version 3 (Dated September 2022). Accessed 21/12/2022.

- The river planform and profile should be predominantly unmodified. Physical modifications having an adverse effect on the integrity of the SAC, including, but not limited to, revetments on active alluvial river banks using stone, concrete or waste materials, unsustainable extraction of gravel, addition or release of excessive quantities of fine sediment, will be avoided;
- River habitat SSSI features should be in favourable condition. Where the SAC habitat is not underpinned by a river habitat SSSI feature, the target is to maintain the characteristic physical features of the river channel, banks and riparian zone;
- Artificial factors impacting on the capability of each species feature to occupy the full extent of its natural range should be modified where necessary to allow passage, eg. weirs, bridge sills, acoustic barriers;
- Natural factors such as waterfalls, which may limit, wholly or partially, the natural range of a species feature or dispersal between naturally isolated populations, should not be modified.
- Flows during the normal migration periods of each migratory fish species feature will not be depleted by abstraction to the extent that passage upstream to spawning sites is hindered.
- Flow objectives will be agreed by NRW as necessary. It is anticipated that these limits will concur with the standards used by the Review of Consents process;
- Water quality targets follow those in the revised Common Standards Monitoring Guidance for Rivers (JNCC 2016);
- Potential sources of pollution not addressed in the Review of Consents, such as contaminated land, will be considered in assessing plans and projects; and
- Levels of suspended solids will be agreed by NRW for each Water Framework Directive water body in the Wye SAC as necessary.

Atlantic salmon conservation objectives and performance indicators

8.3.15 The Core Management Plan covering the River Wye SAC (NRW, 2022) sets out the conservation objectives and performance indicators for Atlantic salmon which are presented in section 4.1.3 Appendix 8-8 of the ES.

Impact pathways and effects

8.3.16 Impact pathways are routes by which a change in activity as a result of the proposed Development can lead to an effect upon the SAC site. Due to the scale and nature of the proposed Development it is considered that river Wye SAC could be affected by the proposed works being undertaken. This is due to the fact that the proposed Development is located within potential influencing distance of the Site and could therefore affect their qualifying features (either alone or in combination with other plans or projects) and is not directly connected with or necessary to the management of them.

Effects upon qualifying features (as well as Brown trout and FWPM) from adverse water quality (Supplementary Information)

8.3.17 The following effects relate to the construction and decommissioning phases:

1. Toxic contamination (Introduction of synthetic compounds, introduction of non-synthetic compounds). Water quality could be adversely affected during construction through the following mechanisms:
    - Potentially contaminating construction materials (i.e., fuel, oils, concrete constituents, soils, etc) are mobilised, washing chemical pollutants into surface waters and affecting river habitats.
    - Construction activities cause the mobilisation of soils and silt, which are washed into the river.
2. Non-toxic contamination (Changes in nutrient loading, changes in thermal regime, changes in turbidity (light penetration)).
3. Physical damage (creation of new water crossing points/reinforcement/redesign of existing water course crossing points, changes in suspended sediment, changes in water flow rate, abrasion/physical disturbance of habitats).
    - Damage to small localised areas of stream beds for the culverting works would not have significant impacts on fish populations, and direct mortality is not likely. However works in important, sensitive good spawning area could have significant negative local impacts on fish populations.

- Soil compaction can lead to the creation of preferential flow paths and drainage can increase run-off rates. This has the effect that flood peaks increase in energy/erosive power and occur more rapidly, resulting in increased river bank erosion and slumping, leading to river widening and increased sediment load and scour of river habitat.
- Depleted water flows can result in exposure (emersion) of some life cycle stages of fish and their habitat, impede migration, and altering spawning/nursery substrate. It can also lead to increased sedimentation and increased macrophyte and macroalgal colonisation of river habitat.

4. Biological disturbance (Introduction of microbial pathogens, introduction of introduced non-native species (INNS), selective extraction of species).

8.3.18 Appendix 8.8 (HRA) and Appendix 8-7 (drainage management plan) of the ES has identified adverse water quality as one of the main impacts due to poor construction management and pollution prevention measures. The impact pathway from the pollution sources to the sensitive ecological receptors is surface water runoff and ground water contamination which can lead to effects 1-3 listed above.

8.3.19 Introduction of pathogens and Invasive Non-Native Species (INNS) can potentially take place through the use of contaminated machinery and equipment within and adjacent to water courses, or through the transport of pathogens and INNS through surface water runoff.

8.3.20 The possible effects may occur during construction and decommissioning phases of the development. During the operation phase, once constructed, the potential for an increase in runoff into the water courses is envisaged on account of the increased area of man-made surfaces on the Site. It is not expected that soil will remain exposed during operation, as borrow pits will be reinstated following completion of construction of the proposed Development. The nature of vehicular access to the Development is expected to largely return to the existing levels, where current farming practices will continue after completion of the Development.

8.3.21 A compliance assessment report from NRW (2021)[6] against Phosphorus Targets indicated that all water courses on the Site are within their recommended levels of phosphorus concentrations. Water courses will not be breached during the course of the operation of the turbines. Isolated or unlikely/rare events such as heavy rainfall and flash flooding, repair of water course crossing points and landslip into the water courses may cause siltation of/introduce other pollutants into the watercourse, which would previously not have occurred if the Development had not been permitted. Such events are unpredictable and are likely to be contained to discrete areas on Site.

8.3.22 The possible effects for Atlantic salmon (and trout) are outlined in Table 1 following the stage 1 Habitat Regulations Assessment Likely Significant Adverse Effects (LSE) methodology. The purpose of the test is to decide whether 'full' Appropriate Assessment is required. The LSE test will determine if the proposed development, either alone or in combination with other relevant projects and plans, likely to result in a significant [adverse] effect upon the river Wye SAC. If it can be demonstrated that significant effects are unlikely, no further assessment is required.

[6] Natural Resources Wales (2021) Compliance Assessment of Welsh River SACs against Phosphorus Targets. Report no. 489. Natural Resources Wales.

Table 8.2: River Wye SAC – Test of Likely Significance Summary

Impacts/ Hazard	Interest Feature	Possible Effect	Magnitude in the absence of mitigation	Design of the scheme which reduces impacts on Interest Features[7]	Conclusion
Toxic contamination	S1106. Salmo salar; Atlantic salmon Status: unfavourable: unclassified	lower survival rate of eggs and embryos lower spawning success Morphological changes in the gills lower Oxygen levels in the water and a decrease in visual ability reducing ability of individual adult fish to see one another and/or compete for prey or mating resources Successful migration of the young salmon to the ocean in the parr/smolt stage may also be negatively impacted by pollution	Minor spatial and Medium-term temporal in magnitude, and of a Moderate adverse effect	N/A	Likely significant effect
Non-toxic contamination	S1106. Salmo salar; Atlantic salmon Status: unfavourable: unclassified	lower survival rate of eggs and embryos lower spawning success Morphological changes in the gills lower oxygen levels in the water and a decrease in visual ability reducing ability of individual adult fish to see one another and/or compete for prey or mating resources Successful migration of the young salmon to the ocean in the parr/smolt stage may also be negatively impacted by pollution	Minor spatial and Medium-term temporal in magnitude, and of a Moderate adverse effect	N/A	Likely significant effect

[7] In light of the CJEU ruling (People over Wind and Sweetman v Coillte Teoranta (C-323/17))

Impacts/ Hazard	Interest Feature	Possible Effect	Magnitude in the absence of mitigation	Design of the scheme which reduces impacts on Interest Features7	Conclusion
Physical damage/loss/disturbance	S1106. Salmo salar; Atlantic salmon Status: unfavourable: unclassified	Removal/substratum loss and smothering Blocking of migration routes Destruction of foraging and spawning grounds	Minor spatial and Medium-term temporal in magnitude, and of a Moderate adverse effect	Tracks have been designed to minimise the number of watercourse crossings and use existing tracks located along the access route where possible, the creation of four new crossings and adoption of another four existing crossings would be required.	Likely significant effect
Biological disturbance	S1106. Salmo salar; Atlantic salmon Status: unfavourable: unclassified	Introduction of pathogens and invasive non-native species	Minor spatial and Long-term temporal in magnitude, and of a Moderate-High adverse effect	N/A	Likely significant effect

This assessment considers the Project will result in likely significant effects to the Atlantic salmon SAC feature. Considering the ruling in Court of Justice of European Union case c-323/17 'People over Wind', avoidance measures cannot be considered at the Screening stage of HRA. F**urther HRA "Appropriate Assessment" (Stage 2) will therefore be required** to assess whether potential adverse effects arising from the Project on the integrity of the SAC, both alone and in combination with other developments, can be mitigated as outlined in Table 2 below.

Table 8.3: Appropriate Assessment – River Wye SAC

Interest Feature	Mitigation Measures Required (Construction Phase Decommissioning Phase)
S1106. Salmo salar; Atlantic salmon **Status: unfavourable: unclassified**	**Toxic and non-contamination, Physical loss, Physical damage** Mitigation measures have been outlined in Appendix 5-1: Outline Construction Environmental Management Plan (CEMP), and Appendix 10-7 Outline Drainage and Surface Water Management Plan. A final detailed **CEMP** will include all these measures and provide further details where necessary. New and upgraded culverts will be designed to retain the conditions that existed prior to that installation. This means that the cross-sectional area will not be restricted by the culvert, the slope should will not change, and the roughness coefficients will remain the same. The streams where new and upgraded culverting for are proposed are small and shallow. Where practicable, any culverting works will be carried out between early May and late October and damage to or destabilisation of banks, will be avoided to avoid impacts on spawning fish or developing eggs and fry. If it is necessary to carry out culverting work during sensitive months (November to April) then fish habitat assessment surveys will be carried out to determine habitat suitability for key live stages of fish. Surveys will be carried out as described in fish habitat survey section below; If the habitat surveys conclude the crossing locations as important spawning areas, then further consultation with NRW will be undertaken as part of this process and prior to works commencing. Options to consider then would be restricting works to avoid the sensitive months, or reviewing locations of crossings and this can be secured through relevant planning or consenting conditions. **Biological disturbance** Biosecurity risk assessment and compliance actions will be implemented as outlined in section 2.8 of Appendix 8-10 Great Crested Newt Conservation Plan. This is also relevant to fish species mitigation and will be incorporated into the final detailed CEMP. We welcome the inclusion of Condition 4, which advises that no development, including site clearance, shall commence until a Biosecurity Risk Assessment, and Method Statement that considers invasive non-native species and specific diseases (e.g. Chytrid) has been submitted to and approved in writing by the Consenting Authority. A water quality monitoring programme will be developed following consultation with statutory consultees to allow any potential pollution incidents to be detected and rectified promptly.
In combination test: Are there any in combination effects with other plans and projects considering Additional Mitigation Measures	Section 5.1.4 of Appendix 8-8 Report to Inform HRA for two European Sites of the ES, cumulative impacts for the River Wye SAC outlines three operational wind farms present within 5km of the SAC: Penrhyddlan-Llidiartywaun (P&L) – which will become the repowered Llandinam project; Garreg Lyd Hill; and Bryn Titl. The assessment considered the in combination effects to be Low spatial and Short-term temporal in magnitude, with mitigated effects being assessed to be slight adverse and not significant.
Conclusion of the Appropriate Assessment: Integrity Test	There will be no adverse effect on the integrity of the SAC as a result of the project either alone or in-combination with other plans or projects following the implementation of mitigation measures to be secured through relevant planning conditions.

Freshwater pearl mussel Margaritifera margaritifera (Supplementary Information)

8.3.23 FWPM is not listed as a qualifying feature of the river Wye SAC. However, a large population of FWPM is known to occur in specific reaches of the river Wye within Management Unit 6A (River Irfon confluence of the Cledan to confluence of River Wye).

8.3.24 Unit 6A is located approximately 24 km to the south of the Site. Custogion Brook within the proposed development Site drains into Llaithddu Brook which is a tributary of the River Ithon SSSI/River Wye SAC and is within the SAC management unit 7S.

8.3.25 Within Management Unit 6A, the long-term viability of the mussel is uncertain due to the apparent lack of juvenile recruitment. Poor river habitat quality (e.g. water quality, riparian and instream habitat (including the interstitial substrate quality) and host fish populations) remains the serious limiting factor in juvenile recruitment. Any underlying causes of their decline including water quality issues must also be addressed but are not currently fully understood (NRW, 2018).

8.3.26 Nationally, FWPM is a rare species whose conservation is giving rise to concern, and its increasing rarity in mainland Europe gives extra significance to UK populations (JNCC, 2022). Its current conservation status nationally including Wales is unfavourable Bad (UK Government, 2019) [8].

8.3.27 FWPM is protected under the Wildlife and Countryside Act 1981 (as amended) of Great Britain. It is listed on Annexes II and V of the EC Habitats Directive (Council Directive 92/43/EEC) and Appendix III of the of the Bern Convention. It is also on the short list of globally threatened/declining species, from the 1995 Steering Group Report, the Scottish Biodiversity List of species of principal importance for biodiversity conservation, and the UKBAP as a priority species.

8.3.28 The FWPM mussel requires cool, well-oxygenated soft water free of pollution or turbidity. It is found in clean rivers which flow over non-calcareous rock with waters that have little calcium and are generally low in nutrients.

8.3.29 The substrate of the river bed is also of great importance, and determines in which areas within a river the pearl mussels can survive. Clean gravel and sand are essential to a healthy population. Within this substrate, oxygen can move freely to the juvenile mussels, which are still buried. If this substrate becomes clogged with silt, oxygen can no longer reach juveniles and they die. If un-naturally large quantities of silt accumulate on the riverbed, or the bed becomes coated in filamentous algae, no juveniles will survive and adults can become stressed, clam their shells shut, and begin to waste away and die. In some rivers, mussels are associated with shaded areas of river, but in very clean waters, they are found in high numbers in open, unshaded areas (Moorkens, 1999)[9].

8.3.30 The mussel spends its larval, or glochidial, stage attached to the gills of salmonid fishes. The larvae attach themselves during mid to late summer and drop off the following spring to settle in the riverbed gravel where they grow to adulthood.

8.3.31 Population declines have been caused by factors such as pearl-fishing, pollution, acidification, organic enrichment, siltation, river engineering, and declining salmonid stocks. Any factors that interfere with its ecological requirements constitutes a threat. In the absence of mitigation, threats associated to the activities planned on Site are nutrient enrichment, pollution incidents, river bank erosion, salmonid stocks, river modification including clearing of vegetation from riverbanks and removal of trees, water abstraction and introduction of exotic species (Moorkens, 1999).

8.3.32 In the absence of mitigation, the current unfavourable condition of the FWPM populations and their habitat, can be adversely affected by the development by prolonging the poor condition of the habitat, or result in further deterioration of the habitat. This can be due to toxic and non-toxic contamination, physical damage and biological disturbance as described above for the Atlantic salmon.

[8] UK Government (2019). Fourth Report by the United Kingdom under Article 17, on the implementation of the Directive from January 2013 to December 2018 Conservation status assessment for the species: S1029 - Freshwater pearl mussel (*Margaritifera margaritifera*).

[9] E. A. Moorkens (1999) Conservation Management of the Freshwater Pearl Mussel Margaritifera margaritifera. Part 1: Biology of the species and its present situation in Ireland. Irish Wildlife Manuals, No. 8.

8.3.33 As well as providing hydrological function, the importance of fringing wetlands as a food source to the FWPM is increasingly being recognised. Water flowing through and over such wetlands accumulates detritus that has been shown to play an essential role in sustainable juvenile growth and survival. Restoration of a near-natural hydrological regime is necessary to the achievement of the conservation objective for most FWPM populations.

8.3.34 It is considered that the hazards and mitigation measures listed above for the SAC feature Atlantic salmon are likely to be similar for the FWPM due to similar habitat requirements and due to the direct association during the larval stage. Therefore, with the implementation of the proposed mitigation measures, no significant effect is predicted on the local population of FWPM.

Comment 4 – Fish Species

8.3.35 *NRW advise that full account needs to be taken of survey and mitigation requirements for fish species if in-channel works are proposed potentially to include electro-fishing and respect embargo periods. Both HRA and Water Framework Directive (WFD) impact conclusions will be incomplete in the absence of sufficient measures to protect fish species/SSSI and SAC features.*

Response

8.3.36 No targeted survey was undertaken for the presence of Atlantic salmon / Brown trout within the water courses present on the Site. Presence of Atlantic salmon / Brown trout and FWPM has been assumed, and mitigation measures have been put in place to mitigate impacts as previously discussed. The adoption of this approach was not raised by the main consultees in the scoping direction consultation nor the PAC consultation.

8.3.37 The proposals include the creation of four new crossings and the adoption of another four existing crossings. At these locations a pre-construction fish habitat assessment survey will be carried out to determine habitat suitability for key live stages of fish, and whether these works can be carried out during sensitive months November to April if required.

8.3.38 Fish habitat assessment survey methods will follow guidance by Hendry & Cragg-Hine (1997)[10]. Detailed surveys will cover approximately 50 m upstream and 100 m downstream of proposed crossing points. Areas of functional habitat types will be identified, classified and mapped around each crossing. Where suitable spawning areas for salmonid fish will be identified and the location recorded using GPS. The area and quality of available spawning habitat will be recorded. Representative photographs will be taken at each crossing location.

8.3.39 All surveys will comply with the biosecurity measures outlined in section 2.8 of Appendix 8-10 Great Crested Newt Conservation Plan.

[10] Hendry, K. & Cragg-Hine, D. (1997). Restoration of Riverine Salmon Habitats; A Guidance Manual. Fisheries Technical Manual 4, R & D: Technical Report W144, Environment Agency, Bristol.

8.4 Peat

Comment 1

8.4.1 ***3. clarification must be provided on what extent do the non-extant peatland vegetation categories include peat***

4. The correction of the figure stated for the quantity of blanket bog there is in Wales

5. Clarification is required on what 'direct loss' means in the context of section 8.6.37

Characterisation of deep peat as ">1m" (section 8.7.5, p180, Environmental Statement Volume 1), in the context of attempts to site infrastructure away from such areas, is of concern. The published National Action Programme (Natural Resources Wales / The National Peatland Action Programme) has a focus on peat soils are defined by the Soil Survey of England & Wales (1980) as:

- *more than 40 cm of organic (O horizon) material within the upper 80cm, excluding fresh litter (L) and living moss; or*
- *more than 30 cm of organic (O horizon) material resting directly on the bedrock (R or Cr) or extremely stony material.*

Thus defined, all such peat soils should be regarded as sensitive receptors to be avoided in infrastructure siting and their associated impacts.

Response

8.4.2 Please refer to the updated Technical Appendix 10-2 Outline Peat Management Plan (OPMP), where clarification on siting of infrastructure is made. Where it has been unavoidable to traverse peaty soils, the updated OPMP and updated Technical Appendix 1-5 Outline Construction Environmental Management Plan (OCEMP) address how the peat resource will be managed. The OPMP now considers any peat deposits of greater than 0.3m to be deep peat and the excavation volumes have been calculated based on this assumption.

Comment 2

8.4.3 *Section 8.5.34 (p. 146 of the Environmental Statement Volume 1) interprets the M25 component of wet modified bog as grassland rather than mire, despite the fact the published NVC volume quite specifically places it as a mire community. M25 is very widespread on deep peat in Wales and for a wide range of causal reasons and is a core part of wet modified bog sensu Phase 1. On a related point, section 8.6.43 goes onto state that "M25 habitat develops on more aerated peats" and that therefore "drainage is less likely to have an effect as it favours the spread of purple moor-grass". There are many contexts in Wales where Molinia dominated M25 occurs on saturated peat in semi or perhaps fully ombrogenous contexts. Eriophorum vaginatum can be a component of this vegetation and drainage could plausibly reduce its frequency, so we do not concur that M25 is necessarily less susceptible to drainage impacts.*

Response

8.4.4 All areas of M25 that are affected by the development are considered within the wet modified bog class and therefore their impact is considered as a peatland impact. There is one area of M25 that is considered to be within an area of marshy grassland, but this is not within the infrastructure envelope, and therefore this classification does not affect the assessment of peatland impact.

Comment 3

8.4.5 *In terms of design considerations, we are unsure why the stated focus is on "Avoidance of deeper peatland (>1m), blanket bog, wet modified bog and potentially high GWDTEs, for the location of turbines and other infrastructure as far as practicable." (section 8.5.122 page 154 Environmental Statement Volume 1). The focus should be on all peat areas, as defined above (from the National Peatland Action Programme) and associated areas of shallower peat of functional significance to the wider peat body.*

Response

8.4.6 Please refer to the updated Technical Appendix 10-2 Peat Management Plan, where clarification on siting of infrastructure is made. The proposed wind farm layout was designed to minimise the quantity of peat to be excavated during the construction phase of the project. Where practical, the final footprint of the layout has been designed to avoid the following:

- Areas of deeper peat (>30cm)
- Areas with steep gradients and
- Natural drainage within the peat.

Comment 4

8.4.7 *Table 8.16 (Environmental Statement Volume 1 page 166) considers the predicted loss of habitats. We advise clarification must be provided on what extent do the non-extant peatland vegetation categories include peat (i.e. improved grassland etc).*

Response

8.4.8 We welcome the comment made above in relation to predicted loss of habitats, and that clarification must be provided on what extent do the non-extant peatland vegetation categories include peat (i.e. improved grassland etc).

8.4.9 Peatlands in Wales occur across a wide range of geographic locations, these areas are subject to a wide range of land-use and management. Within the Garn Fach Site, there are a range of habitats that are found.

8.4.10 Within this response we have calculated the loss of all habitats with relation to the Development, please see Table below showing the estimated loss of habitat (temporary and permanent, including potential habitat change). This has included non-extant peatland vegetation. Using the NVC habitat map and overlaying the peat depth within GIS, a value was used as shown below which was derived from the Peatland code v1.2 (2022), NatureScot condition categories (2017) and the Unified Peat Map of Wales (NRW Lle):

Peat depth (cm)	Value
0-30	1
30-50	2
50-100	3
100-150	4
150+	5

8.4.11 Please see the additional Figure 19: Non-Extant Peatland Vegetation submitted with this response.

8.4.12 The main finding was that in the north of the site where there is a mosaic of bog habitat and acid grassland, the presence of NVC U6 *Juncus squarrosus – Festuca ovina* grassland is present as shown on the NVC map. This is a grassland that is characteristic of moist peats and peaty mineral soils, almost always base-poor and infertile, distributed over gentle slopes and plateaux at higher altitudes (400m to 800m) in the cool and wet north and west of Britain (Rodwell *et al*., 1992; Cooper, 1997).

8.4.13 U6 is often a secondary vegetation type, strongly encouraged by particular kinds of grazing and burning treatments in damper upland pastures and on the drying fringes of blanket mires. The spread of *J. squarrosus* in upland pastures tends to be encouraged where uncontrolled heavy and selective grazing has been applied over rather ill-drained ground (Rodwell *et al*., 1992; Cooper, 1997). A number of relatively substantial areas of U6 are present within the northern area of the Site, these are often transitional areas difficult to separate from adjoining communities due to species overlap, or are present in mosaics with other acid grassland communities.

8.4.14 Areas of U6 were seen to be transitional with the M20 mire. The largest patches of U6 are found to the north of Waun Ddubarthog. Areas of NVC U6 in the Site are dominated by *Juncus squarrosus* but not overly so, and as a result also contain varying abundances of associate species including; *Festuca ovina, Anthoxanthum odoratum, Nardus stricta, Molinia caerulea, Potentilla erecta, Galium saxatile, Vaccinium myrtillus, Deschampsia flexuosa* and occasionally *Eriophorum vaginatum* in areas transitional with M20 mire. Typical acid grassland mosses are also abundant, along with occasional patches of Sphagna.

8.4.15 The amount of peat extracted is addressed within the updated OPMP.

Comment 5

8.4.16 *The characterisation of hydrological impacts on areas of peatland habitat bordering infrastructure as "indirect "section 8.6.33 page 169 is questioned. In the context to which this applies, these impacts wouldn't happen in the absence of windfarm development of operation and thus must be regarded as potential direct effects.*

Response

8.4.17 Following the application with the Planning and Environment Decisions Wales (PEDW), and consultation with Natural Resource Wales, the parameters on the likely effects to habitats were discussed and the understanding of the potential wider impacts of the placement of infrastructure on habitats was defined.

8.4.18 In addition to the footprint area of each infrastructure component, potential impact zones up slope and downslope (10 m and 30 m respectively) were applied beyond the edge of the development's footprint where the infrastructure crossed all habitats.

8.4.19 There is a high degree of uncertainty regarding the level of change within potential impact zones; whereby a change in habitat characteristics could occur due to changes in hydrology, in many instances it is considered the long-term changes could be undetectable, the approach taken is a worst-case scenario with assumptions made on the impact zones, and NRW advising on parameters.

8.4.20 This response sets out the revised parameters on the likely effects to habitats, in particular peatland habitats, through the construction and the operation of the proposed wind farm.

8.4.21 This response will:

- set out the revised parameters following consultation with PEDW and NRW; and
- provide an updated assessment of the likely significant effects under the revised parameters.

8.4.22 The following assessment would ensure that, if required, appropriate additional mitigation proposed in the EcIA would be identified, and subsequently implemented.

Revised Approach

8.4.23 Following consultation with NRW, a revised approach on the likely effects resulting from the construction and operation of the wind farm has been undertaken. The revised approach outlined in this section was agreed with NRW at a meeting in August 2022.

8.4.24 The habitat loss areas have been calculated based on the footprint of individual components as described in the ES and include:

Direct habitat loss – the permanent footprint of any component of the built infrastructure for the development which would not be restored following construction. This includes, tracks, turbine bases and hard-standings and substation.

Temporary habitat loss – any infrastructure component that would be restored following construction for example turbine laydown areas, construction compounds and borrow pits. This area also includes a 4m buffer surrounding infrastructure to allow machinery to work out with the permanent footprint of any infrastructure component. Such areas will be restored following construction as will be detailed in the Construction Environmental Management Plan.

Potential Habitat Change – A 30m buffer down slope and 10m buffer upslope has been applied to each component of the permanent footprint where hydrologically dependant habitats are present to account for the potential alterations to habitats through changes to hydrological flows to these. Non extant peatland vegetation has also been included in the calculations.

8.4.25 The following section details the predicted effects to habitats using the revised parameters as detailed above. The table below shows the estimated loss of habitat (temporary and permanent, including potential habitat change). The rows highlighted yellow are those associated with hydrologically dependant habitats.

Table 8.4: Estimated loss of habitat (temporary and permanent, including potential habitat change)

NVC	Direct Habitat Loss (ha)	Temporary Habitat Loss including 4m buffer (ha)	Potential Habitat Change (30m upslope/ 10m downslope) (ha)	Total Area Potentially Affected (ha)
H21	0.014	0	0.036	0.05
H8	0.135	0	0.455	0.59
M15d	0	0	0.001	0.001
M20	0.868	0.084	3.353	4.305
M23	0.245	0.027	0.683	0.955
M23a	0.181	0.029	0.459	0.669
M23b	1.211	0.477	2.468	4.156
M25	0.568	0.187	1.615	2.37

NVC	Direct Habitat Loss (ha)	Temporary Habitat Loss including 4m buffer (ha)	Potential Habitat Change (30m upslope/ 10m downslope) (ha)	Total Area Potentially Affected (ha)
M25b	0	0	0.068	0.068
M3	0.046	0	0.127	0.173
M6c	0.221	0.007	0.377	0.605
MG10	0.699	0.169	0.81	1.678
MG6	9.265	2.421	16.778	28.405
U4	0.176	0.039	0.222	0.437
U4 H8a	0.074	0	0.26	0.334
U4b	0.742	1.17	2.027	3.939
U4e	0.289	0.171	0.757	1.217
U5 U6	0.134	0.103	0.892	1.129
U6	0.982	0.289	2.51	3.781
U6b	0.232	0.171	0.428	0.831
CP	0.97	0	1.805	2.774
AE	0.077	0	0.102	0.179
BP	0.008	0	0.029	0.029
NBWAS	0.01	0.126	0	0.126
Total	**17.15**	**5.47**	**36.26**	**58.80**

8.4.26 Using the revised parameters to assess effects to habitats, there would be an overall increase in potential effects from the Proposed Development of 36.26 ha, this increase in effects is primarily associated with the possible effects of drainage on habitats. When only hydrologically dependant habitats highlighted in yellow in the table above (M15d, M20, M23, M23a, M23b, M25, M25b, M3, M6c, MG10 and U6) are taken into consideration the overall amount of potential habitat change is 13.79ha, with 5.163ha of that attributed to wet modified bog habitats (M20, M25 and M3).

8.4.27 As stated within the ES, there may be potential habitat change because of the zone of drainage around infrastructure (assumed to extend out to 10m upslope and 30m downslope from infrastructure as per above; but this is unlikely given the discussion below).

8.4.28 If, in the unlikely, worse-case scenario, drainage effects are fully realised out to 10/30m in all wet modified bog areas then predicted losses increase for wet modified bog to 5.163ha for permanent infrastructure. This is a total of 8.8% of the Site for wet modified bog. This is still considered to represent a low spatial effect magnitude (see criteria within Ecology Chapter: Table 8 3) on a common habitat type within the Site as well as in the wider local area.

8.4.29 The distance of the impacts of drainage on a peatland is highly variable and depends on various factors such as the type of peatland and its characteristics and properties of the peat; the type, size distribution and frequency of drainage features; and whether the drainage affects the acrotelm, penetrates the catotelm, or both. Consequently, drainage impacts can be restricted to just a few metres around the feature or extend out to tens of metres, or further (e.g. see review within Landry & Rochefort, 2012). The hydraulic conductivity of the peatland is one of the key variables which affect the extent of drainage. In general, less decomposed more fibric peatlands (which tend to be found commonly in fen type habitats) generally have a higher

hydraulic conductivity and drainage impacts can extend to around 50 m, whilst in more decomposed (less fibrous) peat drainage impacts may only extend to 2 m or so. Blanket bog habitats commonly are associated with more highly decomposed peats (Nayak et al., 2008).

8.4.30 In summary, using the revised parameters detailed in this response to assess the predicted effects of the Proposed Development to habitats, key findings are:

- An increased effect to habitats within the Site of 36.26 ha, 20.72ha of these total effects are to wetland habitats;

8.4.31 With the adoption of good practice and environmental management techniques, and an appropriate and considered drainage design, it is considered unlikely that potential drainage impacts of this scale (i.e. out to 10 m upslope and 30m downslope of infrastructure) on an already modified habitat would occur or would have such an impact on the habitat as to result in large-scale vegetation shifts to a lower conservation value habitat type (such as acid grassland for example).

8.4.32 With the adoption of Prescription 1.3 under Section 2.14 within the OHMP, the potential to restore an area of 31.6ha of degraded bog habitat through the encouragement of growth from peat forming species through re-wetting via trench bunding will deliver net positive effects.

Comment 6

8.4.33 *Section 8.6.36 (p.169 Environmental Statement Volume 1) states there is 90,050 ha of blanket bog in Wales. This figure is incorrect, with 52,200 ha being the figure reported by NRW for the last Article 17 reporting round (see Wales information for H7130 - Blanket bogs as part of the Fourth Report by the United Kingdom under Article 17 of the EU Habitats Directive (jncc.gov.uk)). We advise this figure must be amended.*

Response

8.4.34 The figure 90,050 ha used in this paragraph was derived from the unified peat base map for Wales which was developed in a project for the Welsh Government (Evans et al., 2014). The map is based on combination of peat areas recorded 1:50,000 BGS superficial geology dataset, and a range of survey data held by Natural Resources Wales (NRW), comprising the Lowland Peat Survey, peat-associated habitat categories recorded in the Phase I survey, and soil surveys undertaken by the former Forestry Commission Wales.

8.4.35 The map gives a total peat area of 90,050ha, however it is noted that the figure of 53,200ha as reported by NRW for the last article 17, has taken this information into consideration and the figure is now amended (N.B. the figure 52,200ha as recommended within the PEDW response is incorrect).

Comment 7

8.4.36 *In terms of the subsequent assessment of importance in this paragraph, assessment using the habitat area on-site as a proportion of the national total is only part of the picture. For example, the vulnerability of blanket bog to climate change and the ease with which modified states might be restored to less modified is not uniform across Wales and the area in question is predicted to become particularly vulnerable in terms of restoration viability (Bell, 2020), a reflection of its occurrence close to a key biogeographical limit for this habitat in the UK (Article 17 report for 2019, H7130).*

Response

8.4.37 When considering the option of doing nothing, the area in question may continue to be vulnerable in terms of long term decline of vulnerable habitats. The mitigation and enhancement measures proposed which include active restoration of degraded habitats can potentially provide resilience to climate change variables in the areas they are applied.

Comment 8

8.4.38 *Section 8.6.37 (p.169 Environmental Statement Volume 1) estimates the direct loss of wet modified bog to be 1.06 ha. This figure is obtained also from Table 8.18 by adding together the areas of the NVC communities included under wet modified bog. However, this Table quantifies indirect habitat loss as "As direct loss". We advise clarification is required on what 'direct loss' means in the context of this section.*

Response

8.4.39 The use of direct loss in this context refers to the direct loss of habitat due to permanent infrastructure and land take from earthworks. The revised approach set out above, gives clarification of the terms used and the approach used to calculate direct habitat loss, temporary habitat loss and potential habitat change.

Comment 9

8.4.40 *Figure 8.16 of the main ES cannot strictly be regarded as a National Vegetation Classification map; in at least some cases it adds no additional detail compared to the Phase 1 map (ES Figure 8.2). In the case of the area just the east of T14 the Phase 1 maps a polygon here as E1.6.1 whereas the NVC map labels it simply as "Bogs". In this specific case then the Phase 1 map actually provides a higher resolution of information than the NVC map.*

Response

8.4.41 Please refer to the updated Figure 8.16 National Vegetation Classification Habitat Map with Infrastructure Layout that is included within this response that addresses the above comments.

Comment 10

8.4.42 *Appendix 8-2 Desk Study and Extended Phase 1 Habitat, page 8-5, page 5 (file name 2022-02-28 ES Doc Ref 4.03.8a Chapter 8 Appendices Redacted). Vegetation/habitat survey. Section reading "The NVC botanical survey also resulted in a number of habitats that correlate with various Annex I habitat types, although none were deemed of a high enough quality to be considered having Annex I status". The distinction drawn here appears rather dubious: some of the later descriptions of blanket bog habitat and communities would certainly be regarded as examples of the Annex 1 blanket bog habitat H7130.*

Response

8.4.43 A revised section wording would be *"The NVC botanical survey also resulted in a number of habitats that correlate with various Annex I habitat types. If assessed against relevant criteria, blanket bog habitat may qualify as Annex 1 habitat but its conservation status would likely be unfavourable for this site"*.

Comment 11

8.4.44 *Appendix 8-9 Outline Habitat Management Plan page 8-133, page 127 (file name 2022-02-28 ES Doc Ref 4.03.8a Chapter 8 Appendices Redacted) Under the stated objectives of the plan in terms of achievement of Biodiversity Net Gain (BNG) (page 8-134) across the site it is surprising to see "Protection of valuable habitats during construction" listed and not also the protection of degraded habitats and their ongoing protection (of both) post construction. Re-assurance should be sought that both requirements will be met.*

Response

8.4.45 To clarify it is the applicant's aim to protect degraded habitats, both during and post construction. During the development phase of the 17 Turbine Proposed Development, the Applicant has minimised any potential ecological impacts; firstly, by designing the wind farm to avoid or limit ecological impacts wherever practicable (see Chapter 4: Site Selection and Design Evolution), and secondly, by undertaking to employ industry best environmental-practice during wind farm construction and operation (see Chapter 8: Ecology; Chapter 10: Hydrology, Hydrogeology, Geology and Peat; and Appendix 5.1: Outline Construction Environmental Management Plan).

Comment 12

8.4.46 *Section 2.1.2 states "Excellent examples of blanket bog can be considered as Annex I habitats; none of the habitat present on site was considered to be of Annex I quality.". This statement represents a potential misinterpretation of the definition of H7130 which can certainly include areas of poor-quality blanket bog habitat. This undermines faith in the veracity of subsequent interpretations of habitat quality and importance and the importance of avoiding/minimising impacts.*

Response

8.4.47 We welcome and accept that the statement within Section 2.1.2 is a misinterpretation of Annex I habitats and the habitat present on site. The wet modified bog represented on site, the majority of which is NVC M20, is a degraded habitat with a lack of sphagnum mosses, however it does have the capability of regeneration. This can be achieved in locations where the hydrology is repaired and where, with appropriate rehabilitation management, there is a reasonable expectation of re-establishing vegetation with peat-forming capability within 30 years, the lifetime of the proposed development. Please refer to the updated Appendix 8-9 Outline Habitat Management Plan.

Comment 13

8.4.48 *Section 2.1.3. The prescriptions in support of Aim 1 "enhancement of blanket bog, wet modified bog and flush habitats" appear rather incomplete, with no mention of drain blocking methodologies nor how much of this might be required: note also that low contour bunding*

could also play a significant role in rewetting blanket mire in the absence of obvious drains. For prescription 1.2, fencing alone may not be sufficient to realise an appropriate grazing regime.

Response

8.4.49 Please refer to the updated Appendix 8-9 Outline Habitat Management Plan and updated Appendix 10-2 Outline Peat Management Plan for details on contour bunding and drain blocking.

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9. ORNITHOLOGY

9.1 Introduction

9.1.1 The purpose of this chapter is to directly address the comments and concerns raised by Natural Resources Wales (NRW), in response to the previously submitted Chapter 9 Ornithology of the written Environmental Statement (ES) regarding the proposed Garn Fach wind farm.

9.1.2 This document builds on the information presented in Chapter 9 Ornithology of the ES by addressing the NRW comments regarding the impact of the Garn Fach windfarm project on the Elenydd - Mallaen Special Protection Area (SPA), and other protected or vulnerable bird species within the windfarm project boundary. It accompanies a shadow Habitat Regulations Assessment (HRA) (Appendix 8.8), updated March 2023.

9.2 Impact of Development on Features of the Elenydd-Mallaen Special Protection Area (SPA)

Comment 1

9.2.1 *The ES needs to clearly present a section on Special Protection Area (SPA) Connectivity/functional linkage and screen each feature of the Elenydd-Mallaen SPA to each of the three SPA connectivity tests.*

Response

9.2.2 The Elenydd-Mallaen SPA boundary is located 6.7 km to the southwest of the proposed wind farm boundary, here after referred to “the site”, and 8.6km to the nearest turbine.

9.2.3 The Elenydd-Mallaen SPA was classified due to supporting nationally important breeding populations of three species:

- *Falco columbarius* (Merlin);
- *Falco peregrinus* (Peregrine); and
- *Milvus milvus* (Kite/ Red Kite).

9.2.4 This chapter provides further information to assess whether there is likely to be connectivity / functional linkage between the Site and whether the internationally important populations of birds the SPA supports are likely to be impacted by the proposed development.

9.2.5 Each of the three SPA feature species were screened against the following connectivity tests, provided by NRW:

- Test 1: “Is there evidence to suggest that breeding adults of all three classified features from the Elenydd-Mallaen SPA forage within the proposed development area?”;
- Test 2: “Is the maintenance of conservation objectives for all classified features of the Elenydd-Mallaen SPA dependent on recruitment from within the proposed development area. If so, would this loss of immigration represent an adverse impact to the favourable condition of the qualifying feature of the Elenydd-Mallaen SPA”; and
- Test 3: “Are there temporal differences, between breeding and non-breeding periods, in the percentage values of flight time at collision risk height and the predicted number of collisions per year within the proposed development area? If so, would the predicted number of collisions per temporal period (breeding and non-breeding) represent a likely significant effect to the qualifying interests of the Elenydd-Mallaen SPA?”.

9.2.6 The approach to addressing the connectivity test has considered the results of survey completed at the Site in combination with available information on the typical ranging distances of breeding and wintering birds for which the SPA was classified. The quality of habitat on Site for these species has also been considered in drawing a conclusion on functional linkage / connectivity. This has been broken down into three discrete stages below:

Test 1: Is there evidence to suggest that breeding adults of all three classified features from the Elenydd-Mallaen SPA forage within the proposed development area?

Consideration 1 - The survey data has been considered to determine if there is evidence of regular use of the Site by the three species for which the SPA was classified.

Usage Levels – Headline finding.

9.2.7 *The survey results show very low levels of use of the Site by merlin and peregrine, with both species being encountered slightly more commonly outside of the breeding season.*

9.2.8 *Red kite occurs commonly year-round, being slightly more regularly encountered outside of the breeding season. Field observations suggest there are several territories close to the Site (outside the SPA) that are likely to account for much of the observed field observations during the breeding season.*

Evidence to support headline finding

- All three SPA feature species were observed on site during Vantage Point (VP) surveys carried out over two years totalling 576 hours of survey over four VP locations. Three merlin, 11 peregrine and 853 kite observations were recorded over the survey period. Within the breeding season over two years between April and September 2017 – 2019), VP surveys were carried out over 285 hours of survey. The VP surveys during the breeding season recorded no instances of merlin, four instances of peregrine and 398 instances of kite.
- In addition to VP surveys, walkover breeding bird surveys (April to September 2018 and 2019) were carried out to complement the findings of the VP surveys and build a more holistic landscape picture of how birds use the Site. The breeding bird surveys recorded no instances of merlin and peregrine, and 29 instances of red kite.
- Outside of the breeding season, VP over wintering bird surveys were carried out over 288 hours of survey. Three instances of merlin, seven instances of peregrine and 455 instances of kite were recorded. In addition to VP surveys, walkover winter bird surveys were carried out where one merlin, two peregrine and 17 instances of red kite were observed.
- The total flight time recorded over all occurrences for each species, was 00:02:00 (hours :minutes :seconds) for merlin, 00:27:00 for peregrine and 36:33:10 for kite. Table 9-1 shows flight activity from all three SPA features over the Site and at Collision Risk Height (CRH).

Table 9.1: Flight activity from all three SPA features over the Site and at CRH

Species	Survey period	Number of birds observed	Time observed at collision risk height	Time observed in flight	Percentage of flight time at collision risk height (%)
Red kite	**Total**	853	31:22:10	36:33:10	85.82
	Breeding season	398	13:12:45	16:03:15	82.30
	Outside of breeding season	455	18:09:25	20:29:55	88.58
Kestrel	**Total**	125	2:51:15	6:17:30	45.36
	Breeding season	28	1:31:00	1:55:15	78.96
	Outside of breeding season	97	1:20:15	4:22:15	30.60
Peregrine	**Total**	11	0:25:00	0:27:00	92.59
	Breeding season	4	0:02:45	0:03:45	73.33
	Outside of breeding season	7	0:22:15	0:23:15	95.70

Consideration 2 - Does the Site lie within the typical breeding range for each of the feature species from the SPA.

Usage Levels – Headline finding.

9.2.9 *The review of published data shows that the Site does not represent an area of normal breeding range extent for foraging merlin and peregrine. This is supported by the survey results based on the low number of occurrences and low number of flight minutes recorded during VP surveys. When the recommended home range zone of influence (ZOI) distance was considered for red kite (including the 2km breeding buffer zone referenced in the Core Management Plan (CCW,*

2008)[11]), the Site boundary and nearest turbine lie outside the maximum ranging distance of breeding red kites within the SPA.

Evidence to support headline finding.

- The Scottish Natural Heritage publication "Assessing Connectivity with Special Protection Areas (SPA)" (SNH, 2016) was used to gather information on the ranging behaviour of the three species and derive a zone of influence (ZOI). The ZOI reflects the foraging range from the nest site during the breeding season. An additional 2km has been included in our evaluation for red kites only, to account for the 2km SPA buffer outlined within the Core Management Plan. The guidance document recommends that in most cases the core range should be used when determining whether there is connectivity between the proposal and the qualifying interests. Maximum ranges provided indicate that birds can / will travel further (potentially when an exceptional food resource is available).
- Due to the lack of available data on the exact locations of nesting sites within the SPA buffer, bird sub populations are considered at risk if the ZOI distance from the edge of the 2km SPA breeding buffer, overlaps with a turbine location. In reality nests are unlikely to be located at the nearest point to the Site.
- The distance between the Elenydd-Mallaen SPA and the Site, and published ranging distances of all three SPA feature species are outlined within Table 9-2 below.
- The data shows that the proposed wind farm lies outside the maximum ranging distance of all feature SPA birds.

Table 9.2: Home range distances of different feature species (SNH, 2016[12])

	Merlin ZOI	Peregrine ZOI	Kite ZOI	Minimum distance between Elenydd-Mallaen SPA boundary and the site	Minimum distance between Elenydd-Mallaen SPA boundary and the nearest turbine
Distance (Km)	Within 5km (Likely wider ranging in the winter)	2km	Core range of 4km, with maximum range of up to 6km	6.7 km	8.6km

<u>Consideration 3 - Evaluation of habitat quality; available breeding and foraging habitat for each feature species within and around the Site.</u>

Headline Finding

9.2.10 *Part of the Site support typical peregrine prey species including flocks of starling Sturnus vulgaris with a mean flock size of 23 (breeding season) and 87 birds (outside the breeding season), and golden plover Pluvialis apricaria with a mean flock size of 98 birds. No peregrine were observed hunting these species during any survey, therefore, there is no evidence that peregrine regularly use the Site as a hunting resource.*

9.2.11 *Although there are potentially suitable habitats for merlin to forage within the Site, there were few birds recorded, suggesting it is not regularly used. The data review and bird survey results show that the habitats within the SPA and the surrounding area of the Site are of higher quality for merlin than those within the Site boundary.*

[11] Countryside Council for Wales, 2008, Elennydd Mallaen Core Management Plan

[12] Ibid.

9.2.12 *Red kite is a generalist feeder. The Site represents typical but an unexceptional resource to kites. Compared to the SPA and the surrounding area, the Site provides fewer quality habitats than those found in the SPA and surrounding land.*

Evidence to support headline finding.

- A desk study was undertaken to estimate the habitat suitability in the surrounding area using online aerial photography and available Phase 1 data from Welsh Government data dating 1979-1991[13].
- The habitats were evaluated within a 5km buffer. Studies have shown that to support sustainable merlin populations in Wales, the proportion of suitable foraging habitat within 5km of the territories (nest sites) must be 59%. Additionally, 5km covers the mean breeding range for red kite and breeding range for peregrine.
- The habitat assessment considers the habitat suitability both within and outside the Site, within this 5km buffer area.
- Initial findings suggested 1.97 km^2 of suitable breeding habitat and 1.47km^2 of optimal foraging habitat for merlin, and 107.16 km^2 suitable foraging habitat and 0.019 km^2 potentially suitable breeding habitat for peregrine (peregrine falcons require a well-protected and relatively flat ledge on a steep cliff for a nesting site, alternatively some buildings and quarries can also provide a suitable ledges) (Table 2). This translates to 29.4% suitable habitat for merlin, which is considerably less than the 59% minimum suitable foraging habitat.
- However, outside the Site boundary, suitable breeding and foraging habitat is more abundant. The bird observations during the VP surveys suggest the Site is not highly used by peregrine and merlin.
- A targeted habitat suitability desk study was not undertaken for kites, due to the generalist habitat use of this species, and the abundance nationally of open agricultural and upland habitats favoured by this species. However, while assessing the habitat suitability for merlin and peregrine, it was concluded there is 151.55km^2 of suitable foraging habitat and 31.72 km^2 of suitable breeding habitat within 5km of the Site boundary.

[13] lle.gov.wales, 1991, Terrestrial Phase 1 Habitat Survey, accessed 20/02/2023.

Table 9.3: Description of suitable foraging and breeding habitat suitability for the three Elenydd-Mallaen SPA feature species.

Feature species	Description of Habitat on Site
Merlin	Habitat within the Site is suitable for this species, in particular the western section, where a mosaic of upland habitats including acid grassland and dry heath provides good foraging potential with adjacent wooded gullies, forestry plantation edge and valleys is present and provides good breeding potential. Prey species such as skylark, starling and meadow pipit are present on Site.
Peregrine	Habitat within the Site is suitable for foraging. A mosaic of extensive open habitat consisting of upland habitats (such as upland acid grassland and upland dry heath with adjacent wooded gullies and valleys) is present. Typical prey species were recorded on site, including woodpigeon, stock dove, small corvids, thrushes, starling and golden plover. The peregrine surveys carried out on Site identified no suitable cliff and rock outcrop with breeding potential.
Red Kite	Habitat within the Site can be described as suitable foraging habitat, with a mosaic of extensive open habitat consisting of upland habitats such as upland acid grassland and upland dry heath, open agricultural pasture with adjacent wooded gullies and valleys. There is also suitable available prey species noted (anecdotally) on site by Environment Systems, for example rabbit, hare, small mammals and open ground that can support foraging invertebrates, carrion and other prey items. Regular instances of dead sheep, lambs and associated afterbirth were recorded with high stocking rates of sheep across the majority of the Site. This access to carrion, as well as resulting short turf from this intensive land use, which makes the soil accessible for kites feeding on invertebrates, further increases the Site suitability for this species. Therefore, there is available and suitable breeding and feeding habitat within the Site (Batten et al, 2010.[14])

Test 2: Is the Elenydd-Mallaen SPA population dependent on recruitment from within the proposed development area.

9.2.13 Recruitment of juveniles of the three feature species, into the Elenydd-Mallaen SPA breeding populations has the potential to contribute to maintaining the favourable conservation status of the Elenydd-Mallaen SPA breeding populations, by replacing breeding adults lost by natural mortality, or by directly increasing the breeding population. In this section we address the need to understand whether the species breed on or close to the Site, and whether this is likely to make a significant contribution to maintaining populations within the SPA.

Consideration 1: Assessing whether each of the three feature species breeds within the site.

Headline Finding

9.2.14 *Neither peregrine nor merlin have been recorded breeding on or close to the Site. The extent of foraging habitat available to them on site does not suggest breeding is likely in the future. It is therefore considered that the Elenydd-Mallaen SPA merlin and peregrine population is not dependent on recruitment from within the Site.*

9.2.15 *Three red kite nests were recorded on and within 2km of the Site over the course of the two survey seasons.*

9.2.16 *Surrounding the SPA, 39 pairs and 35 nests were found within approximately 360km^2 Welsh Kite Trusts East Powys study plot in 2019, 37 nests in the Shropshire study area in 2019 (study area size not reported), and 113 occupied sites were found in the Brecon study plot in 2015. The Brecon and East Powys plots, are within the referenced range of juvenile red kite to the SPA.*

9.2.17 *Based on the data gathered, it is considered unlikely that the SPA breeding population is reliant on the contribution of juveniles from the Site and immediate surrounding land to achieve the conservation objectives listed in the Core Management Plan[8]. However, there is a small possibility that the young from birds on Site could subsequently breed within the Elenydd-Mallaen SPA, population. However, it is considered that this is an unlikely occurrence or for it to have an impact on maintaining the favourable conservation status of the red kite population at the SPA at 15 pairs.*

Evidence to support headline finding.

- Three red kite nests were recorded during the two years of survey. (Please refer to Paragraph 9.7.14 of Chapter 9 within the ES). Two were located in 2018, and one in 2019. Assuming typical productivity of the nests, these three sites make a limited contribution to the population of red kites at a regional level.
- The Welsh Kite Trust have undertaken population monitoring of kites annually, and have published reports based on three sites since 2015. Across all study sites and years (Powys, Shropshire and Brecon) recorded productivity stood at 0.9 chicks per nesting pair (Smith, 2020), indicating that the birds within the site will produce 2.7 young per year. Annual productivity of the 34 pairs recorded within the Elenydd-Mallaen SPA can be expected to be around 30.4 young.

Consideration 2: Assessing the dispersal of red kites.

Headline finding

9.2.18 *Juvenile kites will be able to disperse between the Site and the Elenydd-Mallaen SPA*

Evidence to support headline finding.

- Cross (2005)[14] has recorded that within Wales, dispersal distances between place of hatching and first breeding, is 11km for males and 13.7km for females. The Site is 6.7km at its closest point from the SPA, with the nearest turbine 8.6km from the SPA. Juvenile kites fledged on Site could therefore form part of the breeding population of the SPA in future years.

Consideration 3: Assessing if the predicted juvenile mortality due to the wind farm will have an impact on achieving a stable population within the SPA

9.2.19 To achieve a stable population, mortality within the breeding populations must be equal to recruitment. Mortality is well documented for red kites. A recruitment figure larger than the mortality figure will support a growing population, providing other variables such as space, nesting Site availability, prey availability etc are also available.

[14] Cross. T. et. al, 2005, The Red Kites of Wales, page: 41, Subbuteo.

9.2.20 Collision Risk Modelling was undertaken to work out any additional mortality from the turbines which could affect recruitment into the SPA population. A worst-case scenario was established, where it was assumed that all the birds represented in the collision risk analysis were from the red kite population from the Site.

9.2.21 It is noted, that in relation to the SPA the figures suggest that the population of red kite is self-sustaining through productivity of pairs within it and within immediately adjacent areas and therefore the kites on Site have a negligible impact on the SPA kite population.

Headline finding

9.2.22 The SPA population of red kite is increasing, with only a 5% annual mortality rate in adult birds (Newton *et al*. 2000). The juvenile population from Garn Fach are not necessary to maintain this population.

9.2.23 Modelling using the Population Viability Analysis (PVA) tool has indicated that if all juvenile birds from the Site's population contributed to Elenydd-Mallaen SPA breeding population, the impact would be around a 22% potential population increase over the lifetime of the wind farm project. The spatial potential positive magnitude would be **Highly positive** if the results are considered in isolation.

9.2.24 Evidence from the Welsh Kite Trusts area report, and advice from Tony Cross (personal communication), the potentially large local population adjacent to the SPA population is likely to have a larger role in maintaining / increasing the red kite population size in the SPA, than the small and more distant population from the Site. For these reasons, the spatial magnitude of impact (Table 9.4, Chapter 9 Ornithology of the Garn Fach windfarm, written statement) for the birds on the Site is **Low,** and the impact of the Site's population on the internationally important population of red kite in the Elenydd-Mallaen SPA is likely to be **negligible**.

9.2.25 Overall, given the size of the red kite population in the hinterland areas of the SPA, that the small population from the Garn Fach site and surrounding area will have a minimal contribution to the breeding birds of the SPA.

9.2.26 CRM with a worst case scenario for the Site, demonstrated the population growth in the SPA would not be significantly reduced by the turbines. A worst-case scenario is assumed, where all birds represented by the CRM are juveniles, and only one juvenile from the Site is available to enter the SPA population every ~6 years. That even with collision risk, there is still a slight positive increase in the population of the SPA from the birds from the Site.

Evidence to support headline finding

- The published population for red kite in the SPA in the Natura 2000 Data Form is estimated at 34 breeding pairs.
- The mortality has been calculated as a 5% probability. Based on 34 breeding pairs only 5.2 will die every year.
- Modelling of annual mortality was carried out using the Collision Risk Model (CRM) otherwise known as the Band model (Band *et al*., 2007; SNH, 2007)[15] which has been adopted across the industry for the purposes of assessment.
- Figure 9:1 shows the CRM output which highlights the difference in scale between the productivity of the Site and SPA (with and without the expected proposed windfarm mortality), and the expected annual background mortality within the Elenydd-Mallaen SPA. Adult mortality of breeding kite is referenced at 0.5 per individual bird (Newton et al, 1987[16]).

[15] Band, W., Madders, M. & Whitfield, D.P. (2007) Developing field and analytical methods to assess avian collision risk at wind farms. In: de Lucas, M., Janss, G.F.E. & Ferrer, M. (Eds.) Birds and Wind Farms: Risk Assessment and Mitigation, pp 259-275. Quercus, Madrid.

[16] Newton, I., Davis, P.E. and Davis, J.E., 1989. Age of first breeding, dispersal and survival of Red Kites Milvus milvus in Wales. Ibis, 131(1), pp.16-21

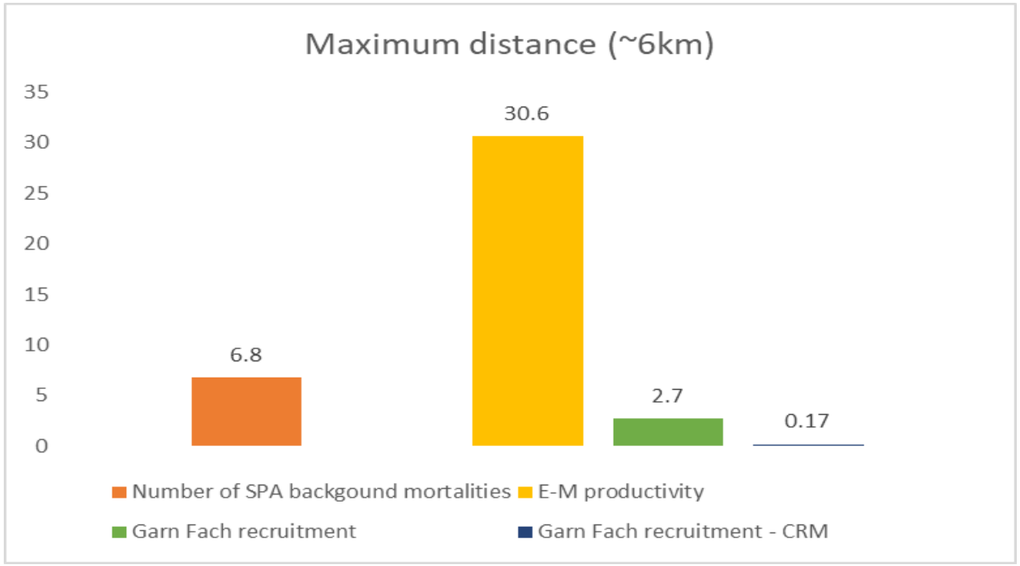


Figure 9.1: Productivity compared to the productivity of the Garn Fach site and Elenydd - Mallaen SPA populations. E-M = Elenydd-Mallaen SPA, CRM = Collision risk modelling

- In the absence of data on where the birds will make their territories, the true proportional impact cannot be predicted and therefore a worst case was assumed, and the CRM was composed entirely of the Sites juveniles. However, it is likely that juveniles will disperse in any direction and not necessarily to the SPA. Areas around the fringes of the SPA, the valleys / generally lower-lying more agriculturally improved ground with ribbon woodlands is better habitat for breeding and foraging than some of the upland moorland habitat within the site.
- A PVA analysis using Natural England's online tool (Searle et al, 2022) was undertaken to assess the impact of the loss of the Site's juveniles, as well as juveniles from other sub populations that could potentially contribute to the breeding population within the SPA. This analysis included population data from two metapopulations, the Site's breeding population and the SPA breeding population. Table 9:4 below shows the results of the analysis.

Table 9.4: PVA results for the SPA population.

	Population (pairs) size after 30 years with Garn Fach juvenile immigration	Baseline without Garn Fach juvenile immigration (pairs) population size after 30 years	% Change from baseline	% Population change over 30 years	% Baseline population change over 30 years
Elenydd - Mallaen without windfarm	1515.5	839.5	44.6	2261.7	1205.5
Elenydd - Mallaen with windfarm	864.5	839.5	2. 9	1244.5	1205.5

- Other known breeding subpopulations, even if within the range of red kite, were left out of the analysis. This is because the exact locations of territories are not published, and therefore there could be no certainty on the impact these populations have on the success and growth of the population within the SPA. Although they stand as good examples of the general abundance of the species in the areas around the Site and the SPA.
- The PVA analysis was undertaken in order to predict the population change of the Elenydd-Mallaen population over 30 years, the lifespan of the proposed turbines. Predicted population trend is displayed in Figure 9-2 below.

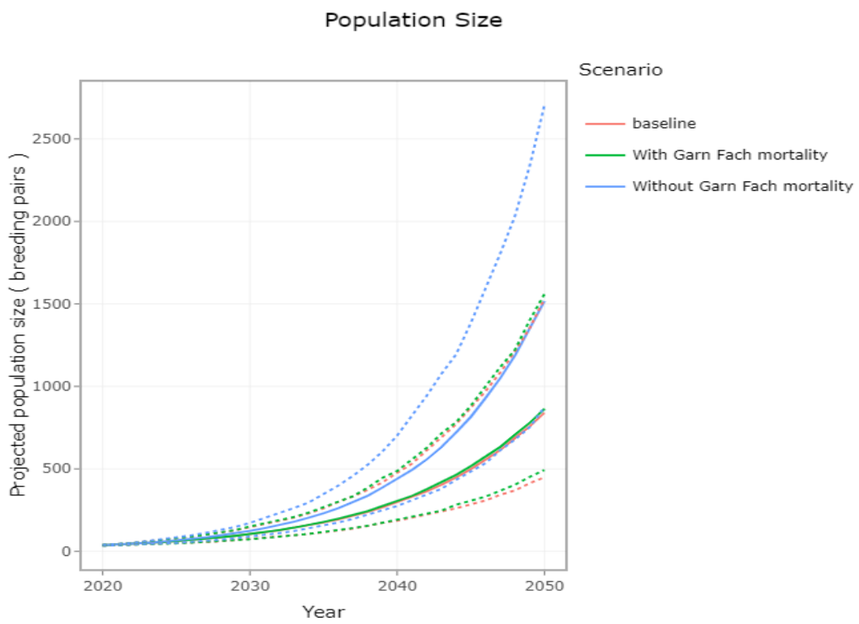


Figure 9.2: Elenydd - Mallaen SPA Population trend with and without the impact of the addition of the Garn Fach site juvenile population. The blue line represents the SPA population growth with the addition of all juveniles from the Garn Fach site. The green line represents the SPA population increase with the addition of juveniles from the Garn Fach population minus the annual CRM for this species.

- As SPA adults during the breeding season are unlikely to be impacted by turbines due to the distance of the SPA boundary to the nearest turbine (8.6km), impact on adult survival were imputed as 0, and the impact (in this case positive impact) on productivity with the inclusion of Site's birds was set at 0.17 (Site's juveniles minus the annual CRM) and 2.7 (Site's recruitment in the absence of the Garn Fach windfarm). The baseline prediction in the absence of the Site's contribution to productivity, proposes a population increase within the SPA to 839.5 individual breeding pairs in 30 years, representing a 1,205% population increase.
- With the inclusion of additional juveniles from the Site's population in the absence of turbine related mortality, the number increases to 1,515.5 individual breeding pairs over 30 years. This represents a 45% difference from expected baseline. This represents a 2,262% population increase in 30 years.
- With the inclusion of additional juveniles from the Site's population in the presence of turbine related mortality, the number is increased to 864.5 individual breeding pairs over 30 years. This represents a 3% difference from the expected baseline. Representing a 1,244.5% population increase in 30 years. While the population is unlikely to reach these numbers, this demonstrates that the population is still likely to increase exponentially.[17]
- The main limitation of this model is that it is unknown what proportion, if any of the Site's chicks typically enter the SPA breeding population, nor how regularly they enter the population. Therefore, the assumptions of the model, in that all juveniles from the Site's population enter the SPA population, is considered to be an unlikely scenario. Especially, considering the abundant fertile lowland habitats outside of the Elenydd Mallaen SPA boundary is more suitable for red kite than the upland environment of the SPA. Therefore, there is likely to be more than sufficient population of red kite surrounding the SPA to support the red kite population. (Personal communication, Tony Cross, 18/02/2022).
- There is an exponentially increasing population of red kite across Wales, as is apparent in the results of the study areas of the Welsh Kite Trust. This suggests that there is a large population surrounding the SPA that could contribute significantly more to the SPA through recruitment, than the relatively small number provided by the Site.
- For example, the Welsh Kite Trusts east Powys study area supports 35 pairs producing 21 chicks in a 360km^2 area, and the Brecon study plot contributes 86 juveniles within 6, 10km study plots (Smith. L, 2015[18]), (Smith. L, 2020[19]). This could be indicative of the true scale of the proportional contribution to the integrity of Elenydd-Mallaen SPA population, by the Site's population. The methodology Smith. L, 2015[20]), (Smith. L, 2020[21]) involved finding birds on publicly accessible roads within the study areas to survey for nests, and access suitable publicly accessible Vantage Point locations. Therefore, the final estimates are likely to be an underestimate.

[17] Searle K et al, A Population Viability Analysis Modelling Tool for Seabird Species (NECR274), http://publications.naturalengland.org.uk/publication/4926995073073152, accessed 15/10/2022
[18] Smith, L. 2015, Brecon Area red kite breeding report 2015, The Red Kite Trust
[19] Smith, L. 2020, Red Kites in East Powys 2019, The Red Kite Trust.
[20] Smith, L. 2015, Brecon Area red kite breeding report 2015, The Red Kite Trust
[21] Smith, L. 2020, Red Kites in East Powys 2019, The Red Kite Trust.

Test 3: Are there temporal differences in collision risk and would any difference represent a likely significant effect to the feature species. Consideration was given to collision risk inside and outside the breeding season

Consideration 1: Assessing how each of the three feature species are using the Site's air space.

Headline finding

9.2.27 *Merlin has not been recorded at collision risk height and is scoped out from this test.*

9.2.28 *Peregrine use of the airspace was irregular. It was not possible to reach statistically reliable conclusions on total usage and usage in and out of breeding season with the small data set of 14 observations over a total of 576 hours of survey.*

9.2.29 *When considering red kites, the likely large population of red kite adjacent to the Site, and the distance between the Site and the SPA boundaries results in it being unlikely that the SPA population will be impacted differently within or outside of the breeding season. Red kites showed a slightly higher level (14.32%) of use of the Site's air space outside of the breeding season than within. This level does not represent a large difference in Site use by this species.*

Evidence to support headline finding.

- Merlin has been scoped out at this stage, due to no flight being recorded within the Collision Risk Zone (CRZ) for the entire survey period regardless of separating the data temporally. The expected CRM for this species is 0 bird collisions per year.
- Peregrine have been observed flying within the CRZ. Four observations were made during the breeding season and seven were made outside of the breeding season. Within the breeding season, peregrine was observed at collision risk height for 2 minutes and 45 seconds, while outside of the breeding season the species was observed at collision risk height for 22 minutes and 15 seconds. This suggests the airspace on the Site is used more outside of the breeding season. However, the data is skewed by two observations of five minutes and eight minutes duration respectively, with the other observations below two and a half minutes which is similar to the observations during the breeding bird season. It is difficult to reach statistically reliable conclusions with a small data set of 14 observations over a total of 576 hours of survey. However, it does appear there is more activity recorded during the winter season.
- Many raptor species utilise their territories differently at different times of the year; for example, by making altitudinal movements or migrating short distances in order to access wintering grounds or winter roosts. Typically, they also range more widely in the landscape, and move in response to inclement weather conditions and increased prey availability at lower altitudes and along the coasts.
- Red kites are known to utilise upland habitats such as those found within the Site differently at different times of the year. For example, kites can utilise woodland for large communal roosts during the winter months. Understanding this change in site usage is important to understand the extent and scale of impact.

  A desk study found the nearest recorded red kite winter roost to the SPA is located near the Hafod[22] Ceredigion, approximately 10km away, with none identified within the SPA (Countryside Council for Wales, 2008).
- Red kites are known to utilise upland habitats such as those found within the Site differently at different times of the year. For example, red kites can utilise woodland for large communal roosts during the winter months. Understanding this change in the Site usage is important to understand the extent and scale of impact.
- A desk study found the nearest recorded red kite winter roost to the SPA is located near the Hafod[23] Ceredigion, approximately 10km away, with none identified within the SPA (Countryside Council for Wales, 2008). No roosting during the winter was observed on and around the Site.

[22] Countryside Council for Wales, 2008, Elennydd Mallaen Core Management Plan
[23] Countryside Council for Wales, 2008, Elennydd Mallaen Core Management Plan

- Red kite have been recorded on Site within and outside of the breeding season as shown Figures 9-3 and 9-4 below. There were 398 encounters during the breeding season, and 455 encounters outside of the breeding season during VP surveys. This suggests a higher level of use of the Site's air space outside of the breeding season. Survey effort was almost equal throughout the two temporal periods, with 288 survey hours outside the breeding bird season, and 285 survey hours within the breeding bird season. A spike in occurrences and time in flight was observed in February and early spring, as well as in October. These could be indicative of courtship behaviour starting in February, and an increase in post fledging juveniles in October.
- Red kites move from the exposed uplands to lower more sheltered areas (Davies et al, 1973; Cross, T, 2005), especially during inclement weather conditions (Cross, T, 2005). The Site's habitats are elevated compared to the surrounding area, and comparable to the SPA. The highest peak in the SPA is Drygan Fawr at 645 meters, with the majority of the Site lying between 300-600 meters altitude. The Site is comparable with an altitude of between 320-560 meters.
- Outside of the breeding season, over two years and with equal survey effort, an increase of 14.32% in kite occurrences were recorded. This variation between breeding and outside breeding season is considered to be small.

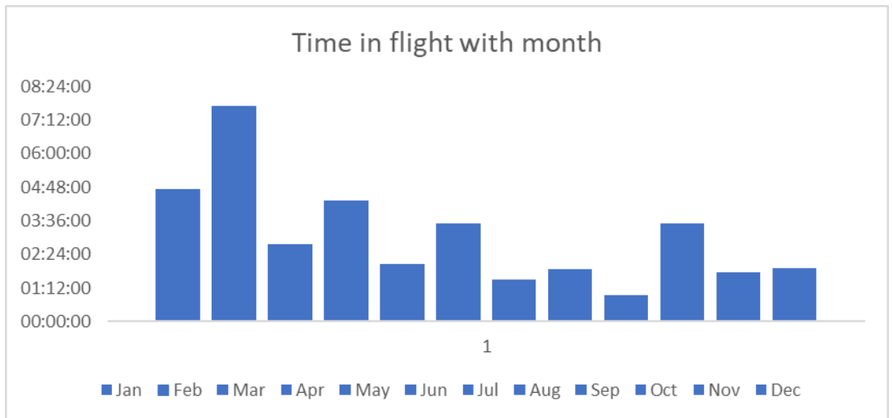


Figure 9.3: Total time in flight of all kite observations per month of the year

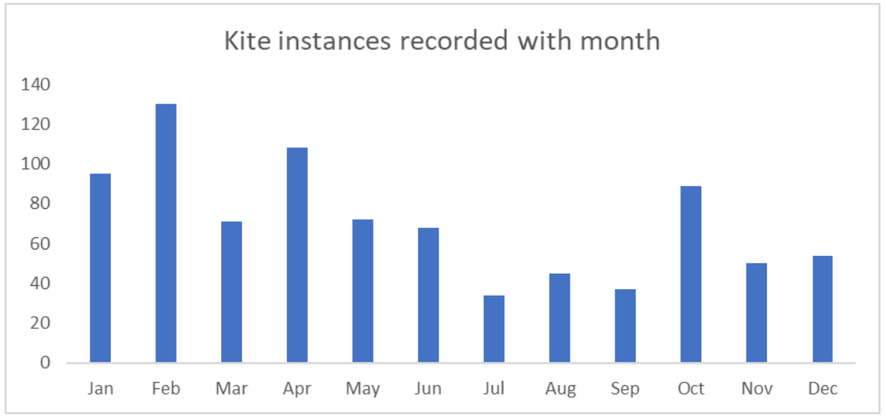


Figure 9.4: Total number of occurrences of all kite

Consideration 2: How does the observed difference in kite activity outside the breeding season affect the predicted collision risk rate during that time

Headline Finding

9.2.30 *The increase in kite activity on Site observed outside of the breeding season was translated by the Collision Risk Model (CRM), to an expected annual collision rate of 1.26 individuals per year during the breeding season, and 1.82 birds outside of the breeding season. It is considered that the increase of activity was not likely due to the winter movement of breeding kites from other locations. The Site is at a similar altitude to the SPA with comparable upland conditions, whereas kites typically move to lower altitudes during the winter if at all. The increase in activity could be due but could be due to the increase in fledged juvenile birds from within or outside of the Site or more likely an increase in the use of the Site's airspace by the same birds on Site as opposed to an increased number of birds.*

Evidence to Support Headline Finding

- It is expected there will be an increase in the number of flying birds within a population in the period after the breeding season, after juveniles fledge. Therefore, the increased activity observed on the Site, could be as a result of the increase in the number of post fledging juveniles.
- It is therefore most likely that the increase in red kite activity observed outside of the breeding season during VP surveys, is due to an increase in flying behaviour of juvenile birds, and not due to an increase in individual adult birds, as the site is elevated compared to much of the surrounding landscape.

- When inputted to a CRM, this is translated to an expected annual collision rate of 1.26 individuals per year during the breeding season, and 1.82 birds outside of the breeding season with an avoidance rate of 99% assumed.
- The increase of activity is not likely due to the winter movement of breeding kites from the SPA, as the Site is at a similar altitude to the SPA with comparable upland conditions, whereas red kites typically move to lower altitudes during the winter if at all (Cross, 2005). The distance between the Elenydd-Mallaen SPA and the Site is also greater than the summer and winter range of adult red kite in Wales. However, the increase could be due to the increase in fledged juvenile birds form the Elenydd-Mallaen SPA, the Site or any population within 13km of the Site, or more likely an increase in the use of the Site's airspace by birds on site as opposed to an increased number of birds.
- Therefore, risk to the relevant protected feature of adult breeding kite remains **low**. In conclusion, following the three tests of connectivity the following spatial magnitude of impact can be concluded for each of the three feature species.

Results of the three tests:

- Merlin adult breeding population: **Negligible**, screened out in test 1 and 2;
- Peregrine adult breeding population: **Negligible**, screened out in test 1 and 2;
- Red Kite adult breeding population: **Negligible.**

9.3 Additional Comments

Comment 2

9.3.1 *Table 9.3 page 201. This table provides a definition of the nature conservation value for bird species at the proposed development. Birds that are Red-listed in Birds of Conservation Concern (BoCC) Wales are categorised as having a medium nature conservation value and Amber-listed species are categorised as having a low nature conservation value. There is a contradiction here, on the basis that Red and Amber-listed species of BoCC Wales informs the outcomes of Section 7. NRW recommend Section 7 and Red and Amber-listed BoCC have equal weighting of high nature conservation value.*

Response

9.3.2 The recommended alterations have been undertaken as shown Table 9-5.

Table 9.5: Definition of nature conservation value for bird interest at the Site

Nature Value	Definition
Very high	Qualifying species of an internationally designated site (i.e. Elenydd-Mallaen SPA or Ramsar) or nationally designated site (i.e. SSSI) Species present in internationally important numbers (>1% of UK population).
High	Species that contribute to the integrity of theElenydd-Mallaen SPA or Site of Special Scientific Interest (SSSI) but which are not cited as species for which the site is designated (Elenydd-Mallaen) or notified (SSSIs). Ecologically sensitive species such as rare birds (<300 breeding pairs in the UK). Species present in nationally important numbers (>1% Welsh population). Species listed on Annex I of the EC Birds Directive or breeding species listed on Schedule 1 of the Wildlife and Countryside Act. Regularly occurring relevant migratory species, which are either rare or vulnerable, or warrant special consideration (i.e. Schedule 1 of the Wildlife and Countryside Act and Section 7 of the Environment Act) on account of the proximity of migration routes, breeding, wintering and staging areas in relation to the Development. All Red or Amber species listed in the Birds of Conservation Concern (BoCC) Wales that informs Conservation measures in the Vicinity of the Study Area, and the outcomes of Section 7.

Nature Value	Definition
Medium	Species present in regionally (i.e. mid-Wales) important numbers (>1% regional population). Species occurring within SPAs and SSSIs but not crucial to the integrity of the site. Species of Principal Importance as defined in Section 7 of the Environment Act. Regularly occurring relevant migratory species, which are either rare or vulnerable, or warrant special consideration (i.e. BoCC Wales 3 Red List) on account of the proximity of migration routes, breeding, wintering and staging areas in relation to the Development.
Low	Regularly occurring relevant migratory species, which are either rare or vulnerable, or warrant special consideration on account of the proximity of migration routes, breeding, wintering and staging areas in relation to the Development. Any other species of local conservation interest such as those listed in the LBAP or PNRAP.

Comment 3

9.3.3 *Para 9.3.5 page 202. The supporting text refers to two tables that provide a guideline to assessing the magnitude of temporal and Spatial change. Only 9.4 is referenced in the text, clarity is required to confirm the other table referred to is Table 9.5.*

Response

9.3.4 To clarify, there was an error with the referencing in the software used to produce the report, paragraph 9.3.5 page 202 of the Environmental Statement should read: "Effects are judged in terms of magnitude over the area and timeframe in which they occur, with five levels of spatial and temporal effects as detailed in Table 9.4 and Table 9:5. These two tables provide a guideline to the assessment, but professional judgement will be relied upon in each effect on ornithological receptors on the Site".

Comment 4

9.3.5 *Para 9.3.6 page 202. States "The expected significance of the effect is determined through assessment and expert judgement…" NRW requires clarity on the determination of the significance of effect using the categories in table 9.6. For example, who provided the expert judgement, what was the assessment framework and what was the supporting evidence and the strength of the evidence base. It is important to determine the level of subjectivity in this approach and whether the method is repeatable with comparable findings.*

Response

9.3.6 Members of staff involved in the assessment process were as follows:

- Laura Cottrell, MCIEEM, Principal Ecologist at Environment Systems with over 15 years of professional experience in the ecology sector as of 2023.
- Grace Dooley, ACIEEM, Head of Ecology at Environment Systems with 8 years professional experience in the ecology sector as of 2023.
- Adam Murphy, Ornithologist at Environment Systems with approximately 5 years' professional experience in the ecology sector as of 2021.
- During this amendment process post planning application, the following additional members of staff have been involved in addressing NRW comments and recommendations.
- Thomas Faulkner, QCIEEM, Assistant Ecologist with 3 years professional experience within the ecology sector as of 2023.
- Dunia Hatuqa MCIEEM, Principal Ecologist with over 15 years professional experience within the ecology sector.
- Dr Katie Medcalf CEnv, MCIEEM, MBSSS, MBES, Environmental Director with over 25 years' experience in delivering successful projects in environmental policy, agri-environment, ecology, GIS and remote sensing.

9.3.7 The significance of effect was determined by using expert judgement of experienced ecologists with their combined 25 years learned experience within the ecology and ornithology sector

(listed above). Ecologists reached a conclusion by considering conservation status, sensitivity (i.e. each bird species' relative sensitivity to a particular effect) alongside spatial magnitude of impact set out in Table 9.6 within chapter 9 Ornithology of the written Environmental Statement which is shown in Table 9.6 below.

9.3.8 Determining significance of effects provides a route to assess these impacts together, using informed professional judgement.

Table 9.6: Criteria for assessing Spatial magnitude of impact

Spatial Magnitued	Definition
Very High	Complete or near complete loss of population/productivity due to either mortality, displacement or disturbance. (>80% of population lost)
High	Very large reduction in the status of the population/productivity due to mortality, displacement or disturbance. (21-80% of population lost)
Medium	Partial reduction in the status of the population/productivity due to mortality, displacement or disturbance. (6-20% of population lost)
Low	Small but noticeable reduction in the status of the population/productivity due to mortality, displacement or disturbance. (1-5% of population lost)
Negligible	Very small reduction in the status of the population/productivity due to mortality, displacement or disturbance. This is barely noticeable and equivalent to a no change scenario. (<1% of population lost)

Comment 5

9.3.9 *Para 9.4.8 page 204. The second bullet states "Red kite Milvus milvus, 0.5% of the GB population". This is incorrect. At the time of classification, the Elenydd-Mallaen SPA represented 9.3% of the UK population (Stroud et al., 2001). In addition, there is no reference to the third classified feature of the Elenydd-Mallaen SPA – Peregrine, site total 15 pairs representing 1.3% of the UK population (Stroud et al., 2001).*

Response

9.3.10 The following estimates of the SPA representation of the whole British population for each species, has been modified to reflect the comment from NRW.

Table 9.7: Percentage of the wider British population present at each site.

Feature species	SPA representation of the GB population %	Garn Fach representation of the GB population %
Merlin	0.5	0
Peregrine [24]	1.3	0
Kite	9.3	0.14 (BTO, 2023)

9.3.11 The Natura 2000 Data Form for the SPA does not currently include peregrine as a qualifying feature. It is understood that peregrine was initially a listed interest feature on the Data Form, but was removed in response to the conclusion of one of the periodic SPA Reviews that the number of individuals present did not meet the qualifying threshold. Clearly NRW do not recognise the deletion of peregrine from the interest features of the Elenydd-Mallaen SPA Data Form.

Comment 6

9.3.12 *Para 9.6.13 page 209. States "The observations in 2018 were more than 500m away from the site boundary…" NRW requires clarity that all observations of curlew were within/out with a distance of 800m of a given proposed location of a turbine.*

Response

9.3.13 Curlew were heard calling on seven occasions, three times in April 2018, twice in May 2018 once both in May 2019 and June 2019 during the targeted Curlew surveys following the Brown and Shepherd surveys (see Figure 9.5 in the ES Ornithology Chapter). Each of these records were geographically distinct.

[24] There was some uncertainty as to NRW's stance on the status of peregrine as a feature species. The species is included within the core management plan, however the JNCC Natura 2000 data form for the SPA recommends the removal of this species as a feature. We have erred on the side of caution and included the species as it appears, NRW remains to include it.

9.3.14 The observations in 2018 were all more than 800m away from the site boundary.

9.3.15 There were two incidences of calling curlew in 2019 on opposite sides of the site ([redacted] in 2019. In isolation, these two sightings do not confirm breeding on the site.

9.3.16 During targeted Brown and Shepherd surveys on the 28th of May, behaviour was observed indicative of breeding, which when added to the incidental observations recorded in the Breeding Bird Surveys (BBS) makes the area a likely territory[25].

9.3.17 These observations are further supported by observations made during surveys for other taxa.

9.3.18 The records were each between April 21st and 30th of May 2018, which is the typical egg laying season (BTO Birdfacts) All potential curlew territories were recorded more than 800m away from the nearest turbine.

Comment 7

9.3.19 *Para 9.6.18 page 209. States "Red kite were routinely observed …" there is no reference to the actual number of observations of red kite within the proposed development area that were recorded separately from Vantage Point Surveys.*

Response

9.3.20 Over the course of the whole survey period, kite were routinely observed in all corners of the site boundary, on 97 separate occasions; frequently two birds were recorded together.

Comment 8

9.3.21 *Table 9.10, page 210. NRW requires additional data on i) number of observations, mean number of birds per observation and mean % of observed flight at collision risk height. NRW require the data is separated and presented as breeding and non-breeding periods, this will determine whether the total number of winter observations and bird flight time at collision risk height is disproportionally different to breeding season observations.*

Response

Table 9.8: Table showing number of observations, mean number of birds per observation and mean % of observed flights at collision risk height.

Species	Temporal season	Actual number of observations	Mean No birds	Mean % flight in CRZ
Golden Plover	Breeding season	0	0	0%
	Outside breeding season	2164	98.36363636	64.73%
Goshawk	Breeding season	4	1	83.33%
	Outside breeding season	6	1	81.17%
Great Black Backed Gull	Breeding season	23	1.277777778	57.41%
	Outside breeding season	27	1.421052632	58.08%
Hen Harrier	Breeding season	4	1	0%
	Outside breeding season	9	1	7.27%
Herring Gull	Breeding season	11	2.75	69.44%
	Outside breeding season	3	1	0%
Kestrel	Breeding season	28	1	78.92%
	Outside breeding season	97	1.103448276	26.81%

[25] BTO birdfact, last accessed: 12/02/2023, https://www.bto.org/understanding-birds/birdfacts/curlew

Species	Temporal season	Actual number of observations	Mean No birds	Mean % flight in CRZ
Lesser black backed gull	Breeding season	47	4.7	96.76%
	Outside breeding season	0	0%	0%
Peregrine	Breeding season	4	1	42.31%
	Outside breeding season	7	1	73.47%
Red kite	Breeding season	398	1.18452381	82.72%
	Outside breeding season	455	1.277456647	87.65%
Starling	Breeding season	161	23	8.18%
	Outside breeding season	11070	87.85714286	2.83%
Merlin	Breeding season	0	0%	0%
	Outside breeding season	3	1	0%
Curlew	Breeding season	0	0%	0%
	Outside breeding season	0	0%	0%

Comment 9

9.3.22 Para 9.6.27 page 210. NRW advise that recommended avoidance rates for red kite, hen harrier and kestrel are presented and that the recommended default avoidance rate for all other species is 98% (see NatureScot (formerly SNH) guidance, 2018).

Response

9.3.23 Table 9.10 within Chapter 9 Ornithology of the ES shows the 11 species which were subject for potential collision impacts from the operational phase of the development.

9.3.24 Table 9.11 shows the results of the CRM with avoidance rates applied to each species (avoidance rates taken from Scottish Natural Heritage (2016[26])). Kestrel avoidance rate is recommended to be set at 95%, kite at 99% and all other species at 98% including hen harrier.

Comment 10

9.3.25 *Table 9.11 page 211. This table presents the predictive outputs of Collision Risk Modelling (CRM), here the predicted number of collisions over 30 years is the predicted number of collisions per year multiplied by 30 years. NRW note there are inherent biases in this approach as it assumes the number of observations recorded at collision height remains constant over time. This approach only provides an indicative number of predicted collisions over 30 years and would represent an underestimate in species that are exponentially increasing e.g. red kite.*

Response

9.3.26 An additional table (Table 9.9) and assessment have been included below, representing the CRM extrapolated on-site population increases and decreases where appropriate. These were undertaken using published and referenced data[27][28][29], either local data or national data, on the most current population trends to predict the potential change in population size of all species of concern on site.

[26] Scottish Natural Heritage, 2016 Assessing Connectivity with Special Protection Areas (SPAs)
[27] BTO birdfact, last accessed: 12/02/2023, https://www.bto.org/understanding-birds/birdfact

[28] The State of The UK's Birds report, 2020
[29] Boyes. S, Montgomeryshire County Bird Report 2021, 2021, Montgomeryshire Birds

Table 9.9: CRM and predicted % population change in 30 years, and predicted CRM by the 30th year.

Species	CRM	Predicted % population change in 30 years	Predicted CRM by the 30th year
Golden Plover	53.75461106	-62	0
Goshawk	0.022001781	192	0.03
Great Black Backed Gull	0.211044151	11.28	2.08
Hen Harrier	0.014070374	-127.27	0.00
Herring Gull	0.071102059	-109.03	0.01
Kestrel	1.133647195	-43.64	0
Lesser Black backed Gull	0.195799814	-42.04	0
Peregrine	0.147060315	55.00	0.41
Red Kite	2.53	376.00	3.34
Starling	4.25729304	-33.19	0
Merlin	0.00	0.00	0
Sparrowhawk	0.029767115	-30.00	0
Snipe	0.032315473	-9	0.11
Curlew	0	-73[30]	0

Comment 11

9.3.27 *Table 9.12 page 213. This table suggests the total number of kestrels recorded was 115 with a total time recorded at collision height of 02:43:15, whereas Table 9.10 page 201 suggest 125 birds were recorded with a total time recorded at collision height of 02:51:15. NRW seek clarity on the actual number of recorded birds observed by Vantage Points. NRW advise, the data is brigaded and presented into two temporal categories breeding and nonbreeding.*

Response

Kestrel

9.3.28 To clarify, there were 125 observations of kestrel during the VP surveys (refer to Table 9.10 within Chapter 9 Ornithology of the ES). Most activity was observed during the winter period (October to March), with a limited number of flights during the breeding season (April – July) and an increase in the number of flight observations during late summer (August and September).

9.3.29 The true real world numbers of individual Kestrel on site cannot be provided with any certainty, however the large numbers of occurrences are of single hovering birds.

Table 9.10: Summary of kestrel recorded flights.

Time of year	Number of flights observed	Time observed at collision risk height	Time observed in flight
Breeding	28	1:31:00	1:55:15
Outside breeding	97	1:20:15	4:22:15

9.3.30 When the VP data is separated temporally, there is less Kestrel activity on site during the breeding season (28), with 97 flights recorded outside of the breeding season. Territorial activity was recorded on the Site, though no nest sites were identified. However, due to abundant suitable foraging and breeding habitats on site it is likely that there are breeding pairs adjacent to the Site whose productivity could have contributed to the larger number of flights observed outside of the breeding season, as well as the potential for birds from the surrounding areas moving to the site from elsewhere during the winter.

[30] Bowgen C, 2023, Wintering Curlew, distribution and habitat preference, Welsh Ringers Conference, 18/02/2023, Royal Welsh Showground Builth Wells.

Comment 12

9.3.31 *Para 9.6.70 page 214. NRW advise using the contemporary population estimates of Woodward et al. (2020). Here, this study suggests a GB red kite breeding population of 4,370 pairs. NRW further advise using Harris et al. (2022) for UK red kite long-term trend change that shows a 1,935% increase between 1995-2020 and in Wales 376% increase over the same 25-year period.*

Response

9.3.32 The findings of Harris et al., (2022) have been adopted, which describes, a long-term trend of 1,935% increase and a long-term Welsh trend of 376% increase between 1995-2020.

Comment 13

9.3.33 *Para 9.7.8 page 218. States "The curlew breeding habitat will not be lost because of the development, nor is disturbance likely to be sufficient enough to cause territories to be abandoned, due to their distance from the site boundary. All territories were recorded outside of the site boundary and at distance of at least 700m." The study of Pearce Higgins et al (2009) suggests there is a ~50% probability of occurrence of breeding curlew up to 800m from a turbine and contradicts para 9.7.8.*

Response

9.3.34 We have assessed the single known recorded territory adjacent to the Site boundary against the conclusions of Pearce-Higgins et al (2009). When the distance of the nearest turbine is measured to the estimated location of the Curlew territory, the distance exceeds 800m[31] (the minimum recommended distance to avoid exclusion of this species by disturbance). Therefore, it is considered that the impact on this species on site is likely to remain **low**.

9.3.35 Should a pre-construction survey identify this territory being closer to the proposed array than previously, there is some ability to micro site the location by a further 50m away from the nest (which is likely to be in the same general location as the species is site loyal and likely to return to the same site annually (BTO, 2023)) for each turbine can be utilised to avoid disturbance of breeding curlew. However, given current population trends and the lack of evidence of successful breeding in either year of survey the long term persistence of the species locally seems unlikely.

Comment 14

9.3.36 *Para 9.7.35 page 220. This paragraph seems to disregard the findings of Pearce-Higgins et al. (2009) and adopt the findings of Whitfield et al. (2010). NRW has several concerns with the strength of evidence within Whitfield et al. (2010), these are presented below. The Whitfield et al. (2010) study illustrates the variation that exists in the response of curlews to wind farms between sites, emphasising the importance of collecting data from multiple sites to estimate mean effects. This is the approach taken by Pearce-Higgins et al. (2012), based upon data from 15 sites where curlew was recorded. Whitfield et al. (2010) appears to regard their somewhat qualitative assessment from five sites with the same weight as the much more quantitative, peer-reviewed assessments of Pearce-Higgins et al. (2009, 2012). NRW would argue that one good quality, peer-reviewed multi-site and multi-species study published in a high-quality journal should be regarded with greater weight than a number of unpublished, un-reviewed studies based on fewer data and with less rigorous analysis.*

Response

9.3.37 We have assessed the single known recorded territory on the Garn Fach site against the conclusions of Pearce Higgins *et al*., (2012). We found the distance of the nearest turbine to the estimated location of the curlew territory exceeds 800m. Therefore, when we adopted the findings of Pearce Higgins et al (2009) the survey results even when parameters of 800m for breeding Curlew were used, the spatial magnitude of impacts remains **low**.

Comment 15

9.3.38 *Para 9.7.35 page 220. States "No curlew territories were identified within 500m of the proposed development turbines". NRW advocate the assessment of breeding curlew territories should be within 800m of a proposed turbine location and the magnitude of effect should reflect this assessment.*

Response

9.3.39 To clarify, no curlew territories were identified within 500m of the proposed Development turbines, all territorial behaviour noted was more than 800m away from the nearest turbine location.

[31] Pearce-Higgins, J.W., Stephen, L., Douse, A. and Langston, R.H.W. (2012). Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. Journal of Applied Ecology, 49: 386-394.

Comment 16

9.3.40 *Para 9.7.42 page 221. States "It is therefore concluded that displacement of peregrine during the operation of the wind farm is likely to be minor and not significant." This should be with reference to kestrel and therefore should be reworded to - It is therefore concluded that displacement of kestrel during the operation of the wind farm is likely to be minor and not significant."*

Response

9.3.41 To clarify 'It is therefore concluded that displacement of kestrel during the operation of the wind farm is likely to be minor and not significant.'

Comment 17

9.3.42 *Para 9.7.56 page 222. Presents information on the number of red kite flights (N = 554 flights) and predicted modelled outputs of the rate of red kite collision per year (N = 2.53). To address our Test 3 of SPA connectivity (see our comments to para 9.3.9 page 203) NRW require the predicted number of red kite collisions over the winter period to be presented together with supporting text.*

Response

9.3.43 It was concluded that the CRM was 1.26 during the breeding season and 1.82 outside of the breeding season. Therefore, there is a greater predicted risk to birds outside of the breeding season.

9.3.44 Modelling a population viability analysis has indicated that if all juvenile birds from the Site's population contributed to Elenydd-Mallaen SPA breeding population, the impact would be around a 22% potential population increase over the lifetime of the wind farm project. The spatial potential positive magnitude would be Highly positive if the Population Viability Analysis (PVA) results are considered in isolation.

9.3.45 The spatial magnitude of impact could be described as **high** if the PVA results were considered in isolation. However, considering the comparatively small contribution of the site's population relative to the SPA productivity, as well as the likely larger contribution of local juveniles from areas outside of the Elenydd-Mallaen SPA, the spatial magnitude of impact is considered to be **low.**

Comment 18

9.3.46 *Paras 9.81 – 9.8.12 pages 223-224. NRW require a full consideration of our proposed tests of SPA connectivity for all classified features of the Elenydd-Mallaen SPA and based on these findings a revised framework of mitigation, where required.*

Response

9.3.47 We welcome the advice to refer to more updated screening each feature of the Elenydd-Mallaen SPA the three connectivity tests.

9.3.48 The findings of the proposed tests have not changed the outcome of the report. There is no additional direct risk to the breeding population. As mentioned in Paragraph ??, following the three tests of connectivity the following Spatial magnitude of impact can be concluded for each of the three feature species.

- Merlin adult breeding population : **Negligible**, screened out in test 1 and 2
- Peregrine adult breeding population: **Negligible**, screened out in test 1 and 2
- Red Kite adult breeding population: **Negligible**,

9.3.49 We conclude there is no need for a revised framework of mitigation.

Comment 19

9.3.50 *Para 9.8.18 page 225. NRW will require a revised spatial magnitude of impacts based on flight height data and CRM for both temporal periods of breeding and non-breeding.*

Response

9.3.51 The following Table 9.11 and text are a response to the above comment:

Table 9.11: Spatial magnitude of impacts for breeding and non breeding periods

Species	Survey period	Number of birds observed	Time observed at collision risk height	Time observed in flight	Percentage of flight time at collision risk height (%)
Golden plover	**Total**	2164	148:05:30	210:46:00	70.26
	Breeding season	0	0:00:00	0:00:00	0
	Outside of breeding season	2164	148:05:30	210:46:00	70.26
Goshawk	**Total**	10	0:08:15	0:10:15	80.49
	Breeding season	4	0:02:00	0:02:15	88.89
	Outside of breeding season	6	0:06:15	0:08:00	78.13
Great black-backed gull	**Total**	50	1:02:45	1:43:45	60.48
	Breeding season	23	0:21:45	0:36:30	59.59
	Outside of breeding season	27	0:41:00	1:07:15	60.97
Hen harrier	**Total**	13	0:06:45	0:31:15	21.60
	Breeding season	4	0:05:15	0:10:15	51.22
	Outside of breeding season	9	0:01:30	0:21:00	7.14
Herring gull	**Total**	14	0:23:45	0:29:00	81.90
	Breeding season	11	0:18:45	0:24:00	78.13
	Outside of breeding season	3	0:05:00	0:05:00	100.00
Kestrel	**Total**	125	2:51:15	6:17:30	45.36
	Breeding season	28	1:31:00	1:55:15	78.96
	Outside of breeding season	97	1:20:15	4:22:15	30.60
Lesser black-backed gull	**Total**	47	0:58:15	1:01:15	95.10
	Breeding season	47	0:58:15	1:01:15	95.10
	Outside of breeding season	0	0:00:00	0:00:00	0
Merlin	**Total**	3	0:00:00	0:02:00	0
	Breeding season	0	0:00:00	0:00:00	0
	Outside of breeding season	3	0:00:00	0:02:00	0
Peregrine	**Total**	11	0:25:00	0:27:00	92.59
	Breeding season	4	0:02:45	0:03:45	73.33
	Outside of breeding season	7	0:22:15	0:23:15	95.70

Species	Survey period	Number of birds observed	Time observed at collision risk height	Time observed in flight	Percentage of flight time at collision risk height (%)
Snipe	**Total**	14	0:08:15	0:09:30	86.84
	Breeding season	0	0:00:00	0:00:00	0
	Outside of breeding season	14	0:08:15	0:09:30	86.84
Red kite	**Total**	853	31:22:10	36:33:10	85.82
	Breeding season	398	13:12:45	16:03:15	82.30
	Outside of breeding season	455	18:09:25	20:29:55	88.58
Starling	**Total**	11231	16:48:30	534:37:30	3.14
	Breeding season	161	0:13:45	1:43:30	13.29
	Outside of breeding season	11070	16:34:45	532:54:00	3.11
Curlew	**Total**	0	00:00:00	00:00:00	0
	Breeding season	0	00:00:00	00:00:00	0
	Outside of breeding season	0	00:00:00	00:00:00	0

Red Kite

9.3.52 Data collated by Dürr (2020) indicate there have been 798 collisions of kites with wind turbines recorded in Europe to date (latest update 07 January 2022). Of these, 695 have been in Germany, 1 in Denmark, 34 in Spain, 41 in France, 5 in Great Britain and 12 in Sweden, 5 in Belgium, 1 in Austria, 1 in Norway and 3 in Luxemburg. Other sources suggest that at least 6 collisions of red kites have now occurred in Great Britain (Duffy & Urquhart, 2014), with three at the Braes of Doune Wind Farm (Stirlingshire), one at Fairburn Wind farm in Ross-shire, one at Llandinam Wind farm (Powys) and a collision near a feeding station at Bwlch Nant-yr-Arian (Aberystwyth, Ceredigion)[32].

9.3.53 A total of 857 red kite flights were recorded through the turbine locations at collision risk height during the survey work. Modelling has resulted in a predicted rate of collision of 2.53 kites per year (based on 99 % avoidance). Collision rates outside the breeding season are slightly higher (1.81) than during the breeding season (1.26).

9.3.54 Following current population trends, assuming no change takes place over the next 30 years, the CRM calculation predicts 3.34 mortalities per year by the 30th years of operation. This is a significant increase following national trends for this species which is displaying exponential increases (Red Kite Trust, 2022)[33] .

9.3.55 This conclusion was taken from the PVA model run for this species, as this is expected to give more accurate site-specific results and for consistency. It is predicted that this increase will be proportional with the population rise on Site and in the adjacent subpopulations and therefore, the proportional impact on the population should not change. The carrying capacity of the area is not known for this species. And therefore population limits cannot be applied to the model.

9.3.56 The increase of activity in winter is not likely due to the winter movement of breeding red kites from other locations as the Site is at a similar altitude to the Elenydd-Mallaen SPA, where red kites typically move to lower altitudes during the winter if at all. The distance between the Elenydd-Mallaen SPA and the Site is also greater than the summer and winter range of adult red kites in Wales. The increase could be due to the increase in the number of fledged juvenile birds form the Elenydd-Mallaen SPA, the Site or any other population within 13km of the project area. The increase in activity is more likely due an increased use of the Site's airspace by the same birds on site, as opposed to an increased number of birds.

[32] Reference to a kite mortality near Swansea was erroneous, there were no windfarms in this location at the time of the report. The correct locations are included in this report

[33] Red Kite Trust, 2022. How many kites are there in Wales. https://www.rklt.co.uk/ Accessed 20.02.23.

9.3.57 Should the predicted collisions affect young (first winter / sub adult) birds the effect on the population is likely to be imperceptible, as rates of overwinter survival for first year birds are likely to be low. If adult / birds of breeding age were killed, this would potentially open up an opportunity for the recruitment of sub adults into the local population to replace them (which is likely given the expanding regional population).

9.3.58 Adverse effects on red kite arising as a result of collision are considered to be **moderate** and therefore significant at the **Local level.**

9.3.59 The spatial magnitude of impacts, the timeframes of impacts, and significance of effects therefore are expected to follow those published previously within Chapter 9 Ornithology of the ES.

Kestrel

9.3.60 Of a total of 598 officially documented collisions in Europe, none are from the UK. Though it is not clear if this is due to gaps in the data, and lack of surveys being undertaken (but highly possible this could be the cause). Large proportions of the total collisions across Europe were reported from Germany (148 collisions), 28 from Austria, 7 from Belgium, 160 from France, 14 from the Netherlands, 39 from Portugal, 2 from Poland and Spain (273 collisions). The UK has recorded 2 mortalities from wind farm collision (Dürr, 2020[34]). 36 of the collisions in Spain have been recorded at the Park Pesur, Andalucia, and are likely to involve migrating birds.

9.3.61 Kestrel typically spends time looking downwards for habitats in which to forage or roost or for prey. This is likely to make them susceptible to collision. It is possible, given the manner in which kestrel forage, that this is also a reason why relatively large numbers of collision victims have been recorded of that species in Europe.

9.3.62 A total of 125 flights were recorded on the Site over two years of survey. Modelling of the survey data has resulted in a predicted rate of collision of 0.99 kestrel per year or 18.19 kestrel over a 30-year period (based on 95 % avoidance).

9.3.63 More activity was observed outside of the breeding season. The increase in winter observations could be contributed to immature dispersing birds, or adults moving to and utilizing the site post breeding.

9.3.64 Following current population trends, assuming no change takes place over the next 30 years, the CRM calculation predicts 1.46 mortalities per year by the 30th year of operation. This is a decrease following national trends for this species.

9.3.65 The risk of collision may be weighted towards newly fledged, inexperienced birds. If this were to be the case, then impacts on the local population could be low due to likely low winter survival rates. However, the local population status is unclear and therefore, the loss of adult birds from the population would be significant, particularly given reported regional declines (Harris *et al,* 2021) and red conservation status in Wales (Johnstone et al., 2010).

9.3.66 Considering the model prediction, collisions of kestrel over the life of the 30-year wind farm are likely and effects are considered to be **moderate** and significant at the **Local** level. This conclusion is precautionary; in the event that juvenile or first winter birds were killed, the potential for a discernible impact on the population at any geographical level would be minimal.

9.3.67 The spatial magnitude of impacts, the timeframes of impacts, and significance of effects therefore are expected to follow those published previously within Chapter 9 Ornithology of the ES.

Merlin

9.3.68 Over the two years of survey merlin was observed four times during breeding bird surveys, with 02:00 minutes of flight and 00 minutes within the collision risk height. Following modelling, this equates to no collisions per year, with zero collisions over the lifetime of the operational wind farm.

9.3.69 Current population trend is no significant change (BTO, 2022) therefore, assuming no change takes place over the next 30 years, the CRM calculation predicts 0.0 mortalities per year by the 30th year of operation.

9.3.70 Number of observations were similar across all seasons during the VP surveys (five during the breeding season, and six outside the breeding season), however during the walkthrough surveys a single bird was observed during the breeding season and nine outside the breeding season. The increase in winter observations could be contributed to immature dispersing birds.

[34] Tobias Dürr, 2022, Dokumentation aus der zentralen Datenbank der Staatlichen Vogelschutzwarte, Bird fatalities at wind farms in Europe.

9.3.71 Given the model prediction, the likelihood of collision of merlin over the term of the wind farm is **mino**r and **not significant** at any geographical level.

9.3.72 The spatial magnitude of impacts, the timeframes of impacts, and significance of effects therefore are expected to follow those published previously within Chapter 9 Ornithology of the ES.

Peregrine

9.3.73 Dürr (2020)[35] reports 41 collisions in Europe for peregrine, one of which is from the UK (at Burgar Hill, Scotland). Eleven flights of peregrine were recorded through the turbine locations at collision risk height.

9.3.74 Modelling was not carried out, as it was not possible to reach statistically reliable conclusions on total usage and usage in and out of breeding season with the small data set of 14 observations over a total of 576 hours of survey.

9.3.75 The spatial magnitude of impacts, the timeframes of impacts, and significance of effects therefore are expected to follow those published previously within Chapter 9 Ornithology of the ES.

Golden plover

9.3.76 A total of 39 golden plover fatalities in Europe have been reported by Dürr (2020), with none occurring in the UK. In the context of European breeding and wintering populations, this level of mortality is very low.

9.3.77 The predicted collisions per year using the model is 50.88 per year, with a predicted 1526 over the course of the lifetime of the operational wind farm. All observations were outside of the breeding season. This is based on a 98% avoidance rate as per the SNH (2016) avoidance rates. However, collision risk modelling, which either assumes a random flight path is taken by (typically) a single bird (such as an eagle or a kite) or a predictable flight path is taken by flocks of birds (such as geese or swans), is not suitable for flocking species that undertake non-directional, wheeling flights, such as golden plover. SNH (now NatureScot) reportedly accept the limitations of their model, and it is not always used for modelling likely effects on the basis that there is little faith in the outputs.

9.3.78 Given the very low levels of fatality recorded in Europe to date by Durr (2022)[36] (none in the UK), it is considered that the calculated collision risk for the site is an over-estimate of the likely scenario. Studies by Whitfield[37] (2007) concluded that the American golden plover Pluvialis dominica was able to take avoidance action in more than 99% of potential collision events. Given the close relationship (in both phylogeny and behaviour) between the two species, it is reasonable to assume that a 99% avoidance rate can also be applied to European golden plover.

9.3.79 Following current population trends, assuming no change takes place over the next 30 years, the CRM calculation predicts 0 mortalities per year by the 30th year of operation. This is due to the winter and breeding population in 30 years following current population trends, will result in local extinction of the species, so no birds will be killed because of population decline.

9.3.80 This species is experiencing rapid population declines in the UK as a breeding bird, and especially in Wales (Welsh Ornithological society, Welsh bird report 2018), as well as a passage winter migratory bird where the UK wide trend over the last 10 years has been a decline of 31% which will both likely result in the risk of collisions to decline, with the possible local extinction of this species.

9.3.81 Birds were only recorded during VP, BBS and WBS surveys outside the breeding bird season and in large flocks. There is no risk to the Welsh breeding population.

9.3.82 It is considered that collision effects on non-breeding golden plover will be **moderate**, **adverse** and **significant** at the **Local level**.

9.3.83 The spatial magnitude of impacts, the timeframes of impacts, and significance of effects therefore are expected to follow those published previously within Chapter 9 Ornithology of the ES.

[35] Tobias Dürr, 2022, Dokumentation aus der zentralen Datenbank der Staatlichen Vogelschutzwarte, Bird fatalities at wind farms in Europe.

[36] Tobias Dürr, 2022, Dokumentation aus der zentralen Datenbank der Staatlichen Vogelschutzwarte, Bird fatalities at wind farms in Europe.

[37] Whitfield, D.P. (2007) The effects of Wind farms on shorebirds (Waders: Charadrii), especially with regard to wintering golden plovers. Natural Research Ltd., Banchory

Hen harrier

9.3.84 Over the two years of survey hen harrier was observed 13 times, with seven minutes of flight (19%) within collision risk height. Following modelling, this equates to 0.14 collisions per year, with a predicted 0.422 collisions over the lifetime of the operational wind farm.

9.3.85 Following current population trends, assuming no change takes place over the next 30 years, the CRM calculation predicts no mortalities per year by the 30th years of operation. This is a significant decrease following national trends for this species (BTO, 2022[38]).

9.3.86 This will be due to the national decline of the species across the UK, to which the Garn Fach wind farm project is unlikely to contribute, due to the very small number of expected collisions predicted.

9.3.87 More activity was recorded outside the breeding bird season during both the VP and BBS, WBS surveys. Therefore, risk to breeding birds is reduced however, there is potentially more risk to overwintering birds. The increase in winter observations could be contributed to immature dispersing birds, or the passage of adult and juvenile birds migrating from highland breeding sites to lower altitudes (RSPB, 2023[39]). The Site is unlikely to be a wintering site, due to its relatively high altitude.

9.3.88 Given the model prediction, the likelihood of collision of Hen harrier over the term of the Garn Fach Wind farm is **minor** and **not significant** at any geographical level.

9.3.89 The spatial magnitude of impacts, the timeframes of impacts, and significance of effects therefore are expected to follow those published previously within Chapter 9 Ornithology of the ES.

Goshawk

9.3.90 Over the two years of survey goshawk was observed 10 times, with 08:15 minutes of flight within the collision risk height. Following modelling, this equates to 0.02 collisions per year, with a predicted 0.64 collisions over the lifetime of the operational wind farm.

9.3.91 The species has experienced an exponential population increase of 2,450% nationally over the last 48 years. Over the last 10 years this increase has continued with a 64% increase in numbers nationally.

9.3.92 Following current population trends, assuming no change takes place over the next 30 years, the CRM calculation predicts 0.03 mortalities per year by the 30th years of operation.

9.3.93 This was calculated by comparing historical population estimates (Batten, 2010) with current population estimates (BTO,2022).

9.3.94 The number of observations were similar across all seasons during the VP surveys (4 flights recorded during the breeding season, and 6 outside the breeding season). Due to the small number of occurrences.

9.3.95 Given the model prediction, the likelihood of collision of goshawk over the term of the wind farm is minor and not significant at any geographical level.

9.3.96 The spatial magnitude of impacts, the timeframes of impacts, and significance of effects therefore are expected to follow those published previously within Chapter 9 Ornithology of the ES.

Comment 20

9.3.97 *Paras 9.9.7 – 9.9.28 page 226-228. NRW have the following observations over the use of population-based models:*

- Population Viability Analysis (PVA) has become a commonly used tool in conservation biology and in the management of threatened or endangered species (Keedwell, 2004).
- PVA is a general term for demographic predictive models which forecast the robustness of a population to scenarios of risk (eg threats or predictive pressures to a population, including extinction) comparative to an un-impacted baseline (ie no impact present) (Beissinger et al., 2006). Comparisons are then undertaken using a range of PVA metrics (e.g. 1st year survival, age at first breeding, population estimate) to determine differences between the baseline and scenario-based (in this case licenced removal) population trajectories. This is contrast to the Potential Biological Removal (PBR) approach which is more suited to data-poor situations

[38] www.bto.org/understanding-birds/birdfacts, accessed: 23/10/2022
[39] RSPB, 2023, LAST ACCESSED; 22/02/2023, https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/hen-harrier/

because the PBR formula requires only a recent estimate of abundance (Punt et al., 2020).

NRW accept, there are concerns over PVA application, these are model assumptions, associated uncertainty, and model performance. Furthermore, although PVA is a useful technique, a quality PVA cannot be run without sufficient demographic data (eg population estimate) on the target species (Keedwell, 2004). To run complex PVAs, demographic metrics for most wild birds are typically too poor, and our understanding of nature too incomplete, to provide high certainty in specific predictions, such as the number of years it will take a population to become extinct (Beissinger et al., 2006). However, given our understanding of direct removal of individuals from a population, models can be asked whether a population will persist longer or shorter under one management approach (eg consented and operational wind farm) than another (eg unconsented wind farm).

NRW note Natural England (NE) commissioned work to develop a PVA modelling framework, applicable to seabirds at a variety of scales. This is a front-end, interactive web application user interface to allow users to set-up, apply and run their own PVA models for seabird species without the need for access to specific software. A key development objective of the modelling tool was to allow users the flexibility to explore population effects in circumstances of a defined impact, in this case impacts of seabird mortality because of colliding with offshore wind turbines. The modelling tool can be used to assess any type of impact that changes any avian species survival or productivity rates, or as a cull or licensed removal of a fixed size per year (Searle et al., 2019). In other words, the generic nature of the tool is such that it can be applied to other groups of birds.

Response

9.3.98 The Elenydd Mallaen SPA 200m buffer boundary is greater than the typical home range distance as quoted in SNH guidance (SNH,, 2016[40]) to the nearest turbine. Therefore, there no additional mortality is considered to the breeding adults within the Elenydd-Mallaen SPA, or to the productivity (to the point of fledging) quoted as performance indicators within the core management plan.

9.3.99 As such the PVA results show no change to the population growth within Elenydd-Mallaen SPA breeding population. The risk is considered to be low, and the impact on the feature is also considered to be low, with a permanent timeframe of impacts. Figure 9.5 below shows there is no significant difference between the population trends with and without the Garn Fach wind farm present.

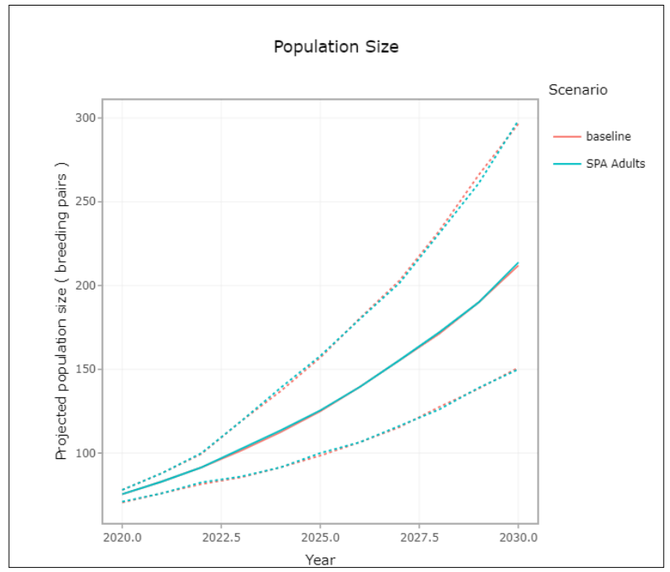


Figure 9.5: Graph showing population trend of Red Kite over 30 years with/without Garn Fach wind farm being present

[40] Scottish Natural Heritage, 2016 Assessing Connectivity with Special Protection Areas (SPAs)

Table 9.12: PVA data input

	Additional CRM	Population in 30 years	Baseline (without Garn Fach wind farm being present) population in 30 years	% Change from baseline	% Population change over 30 years	% Baseline (without Garn Fach wind farm being present) population change over 30 years
Elenydd-Mallaen SPA	0	213.75	212	0.81	233.98	231.25

Cumulative Assessment 6km

9.3.100 There are no windfarms within 6km of the Site with published data except for the immediately adjacent (to the north) Llandinam project with a published CRM estimate of 1.24 red kite per year. This is because many windfarms have been in place for a significant amount of time, with many starting without prior CRM studies.

9.3.101 This is opening a limitation to our study. However as previously discussed, breeding red kite have small ZOI's, and juvenile kites relatively small dispersal distances. The population of red kites in Wales is exponentially increasing, with the Welsh Kite Trust study plots demonstrating how many kites could be present in the valleys woodland and farmland surrounding the SPA. These likely contribute significantly to the SPA, far more than sites like Garn Fach, which are more remote.

9.3.102 Combined with the Site's collision rate this is an estimated 3.77 bird collisions per year, approximately 62% of the Site's population of 6 adults or three pairs.

9.3.103 The PVA analysis results are presented Figure 6 and described below.

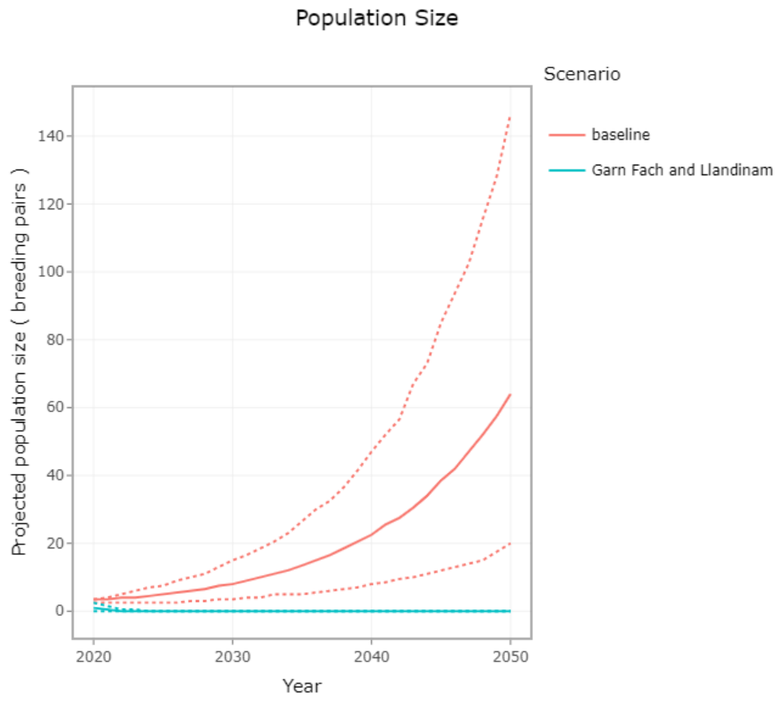


Figure 9.6: NEVPA R package PVA results displaying the baseline population growth (Red line displaying population growth with no additional wind farm related mortalities), and the population growth with additional mortalities cause by wind farm collision (Blue line)

9.3.104 The PVA model, when considering the population in isolation, shows that the effect of the Garn Fach windfarm is likely to reduce the kite population within the Garn Fach site and the Llandinam site alone.

9.3.105 However, there are a number of serious limitations to this approach, related to the unavailability and the classified nature of necessary data (due to the protected schedule 1 status of the nest sites of this species). Firstly, this approach does not include the wider red kite population within the movement limits of red kites. The results of the Welsh Kite Trust area reports (one of which the survey area lies within the range of the Site's kite population) describes how large this unrecorded population likely to be (Smith, 2020) [41].

9.3.106 Secondly, the approach does not allow the significant likely impact of the inclusion of long distance travelling dispersing juveniles from the surrounding populations, into the SPA population and the inflating effect of this is on the population.

[41] Smith, L. 2020, Red Kites in East Powys 2019, The Red Kite Trust

9.3.107 Additionally, the results of Durr (2020)[42] suggest that instances of recorded red kite collisions are rare, with five recorded cases in the UK. However, it is important to consider there is little effective monitoring effort in the UK, and while no clear issue has emerged (and the kite population continues to grow), the true rates of fatality are likely to be higher.

9.3.108 This increased number of birds foraging in the area and the low likelihood of the Garn Fach birds being the individuals impacted, along with juveniles from elsewhere contributing to the breeding population, means the situation described in the PVA model is unrealistic. These results should therefore be considered alongside other available data, such as the Potential Biological Removal (PBR) results submitted within the ES, for example. It is considered therefore the onsite spatial magnitude of impacts remains **low**.

Table 9.13: Wind farm projects within 6km radius of the Elenydd-Mallaen SPA

Project	Predicted mortality data available
Bryn Blaen	2.9
Cefn Croes	No
Bryn Titli	No
Rheidol wind farm	No

[42] Tobias Dürr, 2022, Dokumentation aus der zentralen Datenbank der Staatlichen Vogelschutzwarte, Bird fatalities at wind farms in Europe.

10. HYDROLOGY, HYDROGEOLOGY, GEOLOGY AND PEAT

10.1 Introduction

10.1.1 Following comments received to the Garn Fach Wind Farm application, Wallingford HydroSolutions Ltd (WHS) has been commissioned by Dulas Ltd to produce Supplementary Environmental Information (SEI) to accompany the ES chapter on Hydrology and Peat, providing clarification and additional information to the chapter.

10.1.2 This document therefore forms an addendum to the Environmental Statement (ES), to accompany a planning application for a proposed 17 turbine wind farm to the south of Newtown, Powys, NGR: SO 03413 81467, covering an area of approximately 700ha.

10.2 Additional Peat Information

Peat Management Plan

10.2.1 An Outline Peat Management Plan (OPMP) was submitted as part of the ES (Appendix 10.2) and has been updated as part of this SEI. To address concerns by the Welsh Government's Soil, Peatland and Agricultural Land Use Planning Unit and Natural Resources Wales (NRW) the OPMP has been updated to provide additional information on the reuse of peat, reuse volumes and temporary handling and storage. The OPMP has been submitted in outline to allow for it to be updated prior to construction following the identification of further design details and ground investigation information. It is necessary for the OPMP to be submitted in outline at this stage to allow flexibility for further edits as more information becomes available.

Peat Deposits and Infrastructure

10.2.2 GWDTE's have been defined for areas within 250m of turbine excavations and within 100m of the track footprints (see Figure 1). Highly groundwater dependent areas have been identified adjacent to turbines 1,7 ,8 and 14, with the most vulnerable areas mostly occurring within the northern land parcel. Peat was encountered across the Site (see Figure 2), however the main contiguous areas of deep peat were present within the northern land area. From the peat excavation estimations, it was found that Turbines 2, 3, 5, 7 and 8 required the greatest volumes of peat to be excavated (both temporarily during construction and permanently displaced). The OPMP identifies methods to be adopted when handling and storing peat and reuse volumes have been calculated. In recognition of the potential impact of the development on peatland habitats, restoration measures are proposed to simultaneously provide ongoing and long-term benefits to the habitat. At this early stage, restoration measures are broadly outlined in terms of restoration technique and identification of areas to target within the Site. This includes the use of contour bunding to constrain and intercept surface runoff. Use of this technique can serve to locally increase water levels and the saturation of soils, thereby providing an environment for the establishment and spread of peat forming species. These bunded areas are indicated in Figure 3 and are generally located on the downslope side of existing peat expanses.

Reinstatement of Peat at Borrow Pits

10.2.3 Following completion of material extraction from borrow pits, reinstatement of material will be undertaken. This reinstatement of superficial material will be done in a way which approximates the surrounding geological sequence. Survey points indicate that there is no peat present at the locations of the borrow pits within the south of the Site. If however during construction peat is encountered within the borrow pits, peat will be replaced to an appropriate depth (depth dependent upon the adjacent sequence), covered with vegetated turves to prevent drying. Where vegetation is not present, re-seeding will take place, using locally sourced seeds.

10.2.4 During construction, prior to infilling of the borrow pits, the peat material earmarked for infilling will be stored in temporary locations in-line with the processes described in the revised OPMP. This will involve monitoring of stockpiles by a specially appointed Ecological Clerk of Works (ECoW) and geotechnical engineer (as deemed necessary). The borrow pit restoration would be made to grade the vegetated slope to tie into existing ground levels where possible. Peat from the site would be used to form the surface of the borrow pit, with turves overlying to adequately cover all areas of peat to enable proper restoration and prevent drying. To enable groundwater levels to increase to natural levels within the local area and within the borrow pit restoration, any temporary drains dugs during construction to service the pit/collect runoff (as part of surface water management/pollution prevention practices) will be infilled.

10.2.5 Detailed design for the borrow pit restoration will be given prior to construction to ensure its efficacy in restoring peatland habitat and to ensure its long-term stability.

Transmission Cable Heating Effect on Peat

10.2.6 The high voltage transmission cables running through the site (33KV) are not expected to have an impact on the surrounding peat (such as a drying effect), as the cables to be used are designed never to run higher than 85% of their thermal capacity. This limits losses to approximately 20 watts per metre (W/m), constituting a very low thermal effect. The cables will typically lie between 750mm-900mm below existing ground levels and be fully bedded and surrounded in cable bedding sand (200mm of bed and surround), with suitable backfill materials such as soils or peat placed above (depending upon existing ground conditions). The bedding sand and suitable backfill will fully dissipate the very low levels of heat generated, removing any likelihood of peat desiccation.

10.2.7 The higher voltage lines between the Site and the National Grid connection point does not form part of this application and would be secured via a separate consenting route. However, for completeness it is likely they would predominantly be overhead Power lines. Where this is not the case, underground cabling between the Wind Farm and National Grid connection point would be studied and design engineered accordingly, to accommodate any peak energy periods encountered during the lifetime of the windfarm, based on calculated and known engineering values. Where thermal heating may be an issue, long-term studies will be conducted to determine the cable back fill material (such as cement bound sand or other thermal control elements) to ensure the cables never exceed their upper temperature limits at peak generation and their effect on surrounding peat/soil is not significant.

Carbon Balance

10.2.8 The ES included a carbon balance assessment which was undertaken for the wind farm (Appendix 10.8). This was done using the only available guidance document: Scottish Government Wind Farm developments on Peat Land: Carbon Calculator Tool v1.7.0. In the absence of any recognised guidance document for Wales, the Scottish carbon calculator has been used.

10.2.9 As the volume of excavated peat has been re-calculated following submission of the ES, an updated Appendix 10.8 has been provided.

Decommissioning

10.2.10 Chapter 5 of the ES identifies that the access tracks would remain in situ following decommissioning of the wind farm. The bases of the turbines and other above ground infrastructure including the substation and energy storage facilities (excluding access tracks) will be broken down to a depth of around 1m below ground level. All cabling at a depth of less than 1m will be made safe and removed with trenches reinstated. Any cabling at a depth of more than 1m will be made safe and either left in place or removed depending on the requirements at the time. The full requirements would be established as part of a specific Restoration and Decommissioning Plan for the wind farm in accordance with best practice guidance.

10.2.11 Where the foundations of turbines are partially removed (to a depth of 1m), the verges around the structure will likely be disturbed, whilst infilling of the foundations will also be required. Where these verges have included re-used peat, the decommissioning process will be carried out so as to immediately reposition these deposits within the foundation space created, above a soil fill.

10.2.12 Tracks are to be left in-situ, therefore no disturbance of peat is expected during the decommissioning process for these. For cable trenches, where cables are to be removed, there will be a sequential process of removal of peat, extraction of cabling for the section and immediate replacement of peat, such that storage is not required. The void space left by the cabling is considered to be relatively minimal, so as not to require any compensatory infilling following removal.

Site Layout Justification

10.2.13 The previous iterations of the site layout and a justification of the current layout based on the extensive site constraints are provided in Chapter 4 of the ES and Chapter 4 of the SEI.

10.3 Hydrology, Hydrogeology and Geology

Groundwater monitoring

10.3.1 Baseline information on the groundwater regime has been collected from publicly available sources (including nearby borehole records held by BGS and hydrogeological maps). This is considered to be suitable at this stage of the planning process, with detailed site investigation to be carried out later in the planning process to inform the detailed design of the Site. During a Teams meeting with NRW on 25/07/2022, specialists from NRW agreed to this approach and

the Applicant will seek to agree the wording of a planning condition with NRW as part of the Statement of Common Ground.

10.3.2 Groundwater monitoring will be carried out for a 12 month period prior to the start of construction, to confirm the feasibility of the detailed design and to inform micro-siting. Shallow boreholes will be used for this purpose where peat deposits are identified at or near proposed infrastructure. Water level probes (piezometers) will provide a time-series of ground water levels at monitoring locations, which will identify where locations experience perennially high ground water levels. This will indicate where any infrastructure may present an obstruction to groundwater flow or recharge to a GWDTE. Pre-, during and post-construction, water level monitoring will be carried out 2.5m, 5m and10 m both up and down slope of the outer edge of the construction envelope where the tracks cross peat >0.3m deep. At least three monitoring sites (each comprised of the six sub sites) and one control location (comprised of three sub-sites) will be installed. At least one rain gauge will also be installed on site to enable a comparison of storm events upon recharge throughout the site, during the stages of development.

10.3.3 Data collection will continue until 2 years after construction has been completed, although the monitoring will be extended if impacts are identified which need to be addressed post construction. The purpose of collection of a full 2 years of data pre and post construction is so that the full seasonal cycle can be captured. Monitoring locations will be sufficiently close to the tracks to enable any impacts to be identified (since water level changes will likely reduce with distance from the disturbance) but far enough away to mean they are not damaged during construction. Head recovery tests will be made at each site to assess the hydraulic conductivity of the peat following installation.

Private Water supplies

10.3.4 Monitoring of private water supplies will take place pre-construction (a period of 12 months to capture any seasonal variation), during construction, and post-construction (for a minimum of 12 months). This monitoring will be carried out for any private water supplies identified within the PWSRA as potentially impacted by construction and operational activities at the site. Monitoring will be carried out prior to construction in order to capture a baseline for tested parameters, flagging where these may be outside of normal ranges for drinking water and how these might vary through the year. This will help to determine what changes through the monitoring period may feasibly be attributed to construction and operational activities. Monitoring will be carried out at monthly intervals through the phases, taking samples from the point of supply to each property. Chemical analysis will be carried out on these samples, covering a range of parameters including turbidity (carried out in-situ), suspended solids, nitrate, conductivity and a suite of metals and organic compounds. Monthly review of this data following testing will enable for early identification where a parameter is trending from its normal level (or otherwise exceeds statutory limits for drinking water[43]). Reporting at the end of the monitoring periods will also be carried out, plotting in detail each parameter over the period to identify any longer term trend in the data collected.

Protection or enhancement of water resources and enable flood mitigation

10.3.5 The EIA has included submission of a WFD assessment, reviewing the baseline classification for all waterbodies draining from the site (including groundwater resources) and determined that no detrimental effect will occur as a result of the development. Mitigation provided and measures detailed in the CEMP for the development will ensure no adverse effect through construction.

10.3.6 The impermeable areas created by the development relative to the catchment sizes mean that runoff is not likely to be significantly increased. Moreover, the restoration of peatlands within the site, particularly those that involve blocking of existing field drains/watercourses in the northern section of the Site, will serve to offset any changes and to provide greater attenuation within the catchment uplands, thereby potentially reducing downstream flood risk. Appropriate contour bunding is proposed in certain areas of the northern section of the Site. These are targeted to appropriate areas of the Site which will serve to reduce runoff and locally increase groundwater levels. Further information on the proposed contour bunding is provided in the OPMP.

How the hydrological integrity of the peatland resource will be maintained

10.3.7 The hydrological integrity of the existing peatland resource will be protected in the construction and operation of the proposed development. As outlined in the OPMP, where tracks are

[43] The Water Supply (Water Quality) (Amendment) Regulations 2018.

proposed through areas of peat (>50cm depth), floating tracks will be used. In this way, infrastructure is positioned above the existing deposits and will therefore not have a significant impact upon existing hydrological processes of the peat, in terms of an impediment to throughflow. Soil compaction will be minimised during construction by reducing the number of construction vehicles, their type and frequency of pass.

10.3.8 Where roads or cable trenches cross existing drainage ditches, these may interrupt hydrological pathways, thereby reducing flow to receiving wetlands. These will be maintained through the use of cross track drains and culverts to replicate natural surface drainage. Where existing artificial drains are present in the northern section of the site, some may be blocked to encourage re-wetting of upslope areas to encourage healthy peatland. The exact location and quantity to be blocked will be confirmed at detailed design. Any additional surface drains required to maintain natural flow pathways should be in place ahead of construction of any cut-and-fill tracks. The use of clay plugs has been specified in construction of cable trenches to reduce them becoming preferential flow pathways for subsurface drainage. The frequency of clay plugs will be dependent upon the ground slope within the section of trench and so will be confirmed during detailed design works. However, the frequency will be assessed by trained personnel to ensure they provide the desired result. For these longer-term mitigation measures, post-construction monitoring will be an important instrument by which to inform adaptive management. Recharge to the system will not be significantly impacted by the development of the tracks, since they occupy a relatively minor surface area and will be a permeable construction.

10.3.9 Areas excavated for foundation construction (such as for turbines and substation) will be prevented from functioning as a drainage pocket for groundwater within peatland. Suitable construction methods and materials such as the use of watertight material like a damp-proof membrane around the excavated area will address this risk. As these foundations are in discreet areas, groundwater and near surface water will continue to flow around the impermeable foundations and will continue to drain downslope. Monitoring of groundwater levels across the site, as described above, is proposed to assess the efficacy of these methods during and post-construction. It is recognised that foundations are likely to have a lesser potential upon groundwater flows than linear features such as tracks, since flows can be routed around these obstructions and are largely maintained.

10.3.10 The highlighting in the peat management plan of maintenance of the vegetation in displaced peat deposits and also use of revegetation where this is not possible, will ensure that the moisture levels in peat will be preserved by an overlying layer and prevent drying (and thereby release of carbon from accelerated decomposition).

10.3.11 The assessment of effects identified within the original ES remain relevant and valid.

10.4 Contaminated Land

Comment

10.4.1 *The Council's Senior Contaminated Land Officer advises that the 'site is identified as unknown filled ground, mining and quarrying' and has suggested conditions to address the matter. The applicant is invited to comment on this matter, including whether this issue has been considered as a potential constraint to development.*

Response

10.4.2 The location of the 'unknown filled ground, mining and quarrying' have been identified as lying outside of the site boundary (see image below). No construction activities are proposed in the location of these sites and as such no impacts in relation to contamination are likely. A programme of ground investigation would occur prior to the start of construction to identify the ground conditions. If contaminated materials or 'filled ground' is identified during this investigation appropriate measures such as the implementation of a remediation scheme will be agreed. It is expected a suitably worded condition will be issued to control this.

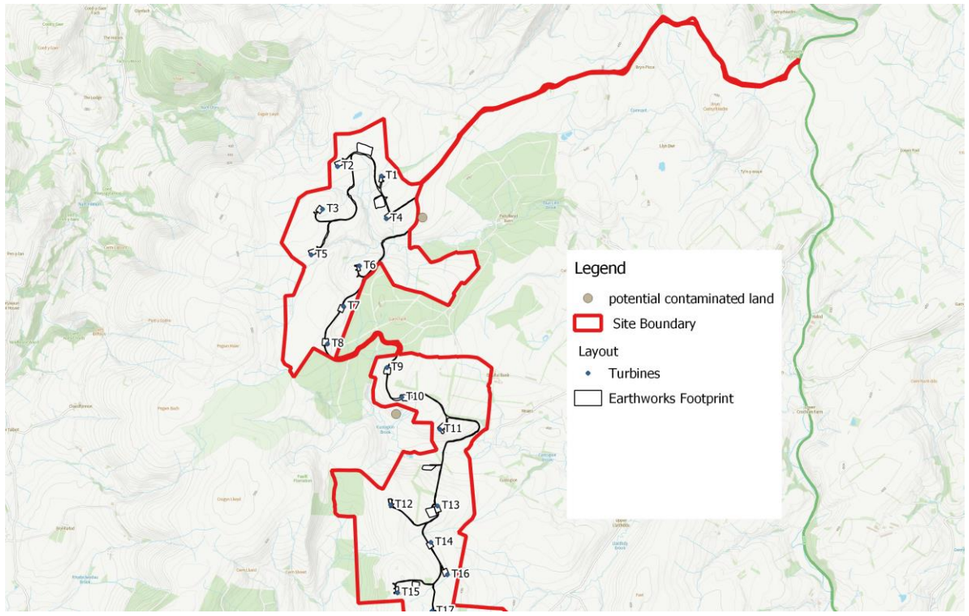


Figure 10.1: Potential contaminated land

10.5 Clarifications to ES and errata

10.5.1 NRW Page 20*: Information concerning the extent of peat soils at the site appears somewhat contradictory. For example, 10.1.4 of the Non-Technical Summary (document file name 2022-02-28 ES Doc Ref 4.01.1e ES Non-Technical Summary (English) (1)_Redacted) states "75% of the proposed development area is composed of peaty soils", with section 10.1.5 going onto say that "Peat is present in deposits throughout the Site". However, Appendix 10-2. p 10-50 then states "The Phase 1 probing indicated that only a small portion of the site is underlain with peaty soils. 83% of the [redacted] samples found no peat. Where peat was identified, 86% of Phase 1 recorded depths were <0.5m thick.". These contradictory statements leave a confusing picture as to the actual extent of peat soils at the site, and we advise clarification must be provided.*

10.5.2 **Clarification:** The 75% value refers to online mapping of the site which indicates peaty soils across the site. This is considered to be superseded by ground surveys conducted as part of the Phase 1 and Phase 2 peat studies, which show a much reduced area of the site is comprised of peat deposits. These surveys recorded that 63% of the Phase 1 survey results and 58% of the Phase 2 results found no peat (deposits ,0.3m). The stated 83% refers to the auger samples rather than the depth probes. The description in the OPMP has been updated to provide greater clarity.

10.5.3 NRW Page 20: *Appendix 10-2. p 10-50 states that the "deepest peat depths on site were observed around Turbine 2 (T2) and Turbine 5 (T5) and the northern construction compound, where peat depths are shown to range from 1-1.5m. Depths around Turbine 7 (T7) are between 0.5-1m deep, at all other proposed infrastructure points peat depths are mostly shown to be below 0.5m.". Based on Appendix 2 page 10-54 (which provides estimates of peat volumes to be "cut from the site") it appears that other turbine locations may also involve significant peat impacts... Clarification is required on why the peat volumes do not accord with the statement made in Appendix 10-2, page 10-50.*

10.5.4 Peat is evidenced through much of the northern land parcel with Turbines 2,3, 5, 7 and Turbine 8, whilst Turbine 14 and 16 in the southern land parcel also overlay peat. Calculation records of peat excavation volumes are provided in Appendix 3 of the updated OPMP.

10.5.5 NRW Page 21: *We consider that the mapping of peat may not have taken account of all relevant published information. For example, Table 10.2 of the Environmental Statement (Volume 1, page 236) does not mention the Unified Peat Map of Wales (see below). Furthermore, Section 10.4.33 p 241 states there were "no published records of peat superficial deposits within or surrounding the Site". However, the published Unified Peat Map clearly shows (by way of an example) a block at NGR 303,101. 281,223 on Waun Ddubarthog which does appear to be inside the boundary of the site.*

10.5.6 The Unified Peat map of Wales shows minor peat deposits in the south-western tip of the northern land parcel and the very southern extremity of the southern land parcel. Figure 10.3 of the ES has been reproduced as part of this SEI to include the Unified Peat map and Wales.

10.5.7 NRW Page 22: *Section 4.2 of Appendix 10-2: Peat Management Plan: it is assumed that ">0.5m" should read "<0.5 m" in the first data row of Table 4-1. If this is incorrect, we advise this must be rectified. Clarification is required on the relevant percentage 89 or 86% - both are used between the table and the supporting text.*

10.5.8 These statements have been corrected in the updated OPMP.

10.5.9 NRW Page 23: *The Peat Management Plan conclusion (section 6) is that "Layout constraints and micro-siting of the development has avoided the placing of infrastructure on areas of deep peat deposits" contradicts Appendix 10-2. p 10-50 which states that the "deepest peat depths on site*

were observed around Turbine 2 (T2) and Turbine 5 (T5) and the northern construction compound, where peat depths are shown to range from 1-1.5m. Depths around Turbine 7 (T7) are between 0.5-1m deep".

10.5.10 These statements have been corrected in the updated OPMP.

10.5.11 NRW Page 19: *The characterisation of hydrological impacts on areas of peatland habitat bordering infrastructure as "indirect "section 8.6.33 page 169 is questioned. In the context to which this applies, these impacts wouldn't happen in the absence of windfarm development of operation and thus must be regarded as potential direct effects.*

10.5.12 The terms 'direct' and 'indirect' effects have been used to distinguish between the physical land take related to the development (direct) and the resultant effect this has on the surrounding environment (indirect). Although these terms are used, they do not imply that 'direct effects' are considered in greater detail or given more emphasis than 'indirect effects'. An assessment has been undertaken on the likely significant effects on the environment and the methodology used to determine significance considers all effects regardless of whether they are stated to be 'direct' or 'indirect'.

Legend

Habitat Survey Area

NVC Type

- Calluna heaths (H8, H12, H21)
- Vaccinium-Empetrum heaths (H18)
- Wet heaths (M15)
- Bogs (M2, M3, M19, M20, M25)
- Molinia grasslands/mires (M25)
- Other mires (M6, M23)
- Unimproved neutral grasslands (MG10)
- Improved grasslands (MG6)
- Acid grasslands (U4, U5, U6)
- Fern-dominated communities (U20)
- Native broadleaved woodland & scrub
- Conifer plantation
- Broadleaved plantation
- Anything else (bare ground, open water)

Layout

- Blade Laydown Clearing
- Blade Laydown Hardstandings
- BorrowPits
- Common Land Construction Corridor
- Construction Compounds
- CranePads
- Energy Storage
- Forestry Track Widening
- Indicative Culverts
- New Track Footprint
- Substation
- Upgraded Track Footprint

0 500 1,000 m

dulas

SCALE: 1:18,000 (A3)

GARN FACH WIND FARM
ENVIRONMENTAL STATEMENT 2021

EDF renewables

Figure 8.16 National Vegetation Classification Habitat Map with Infrastructure Layout

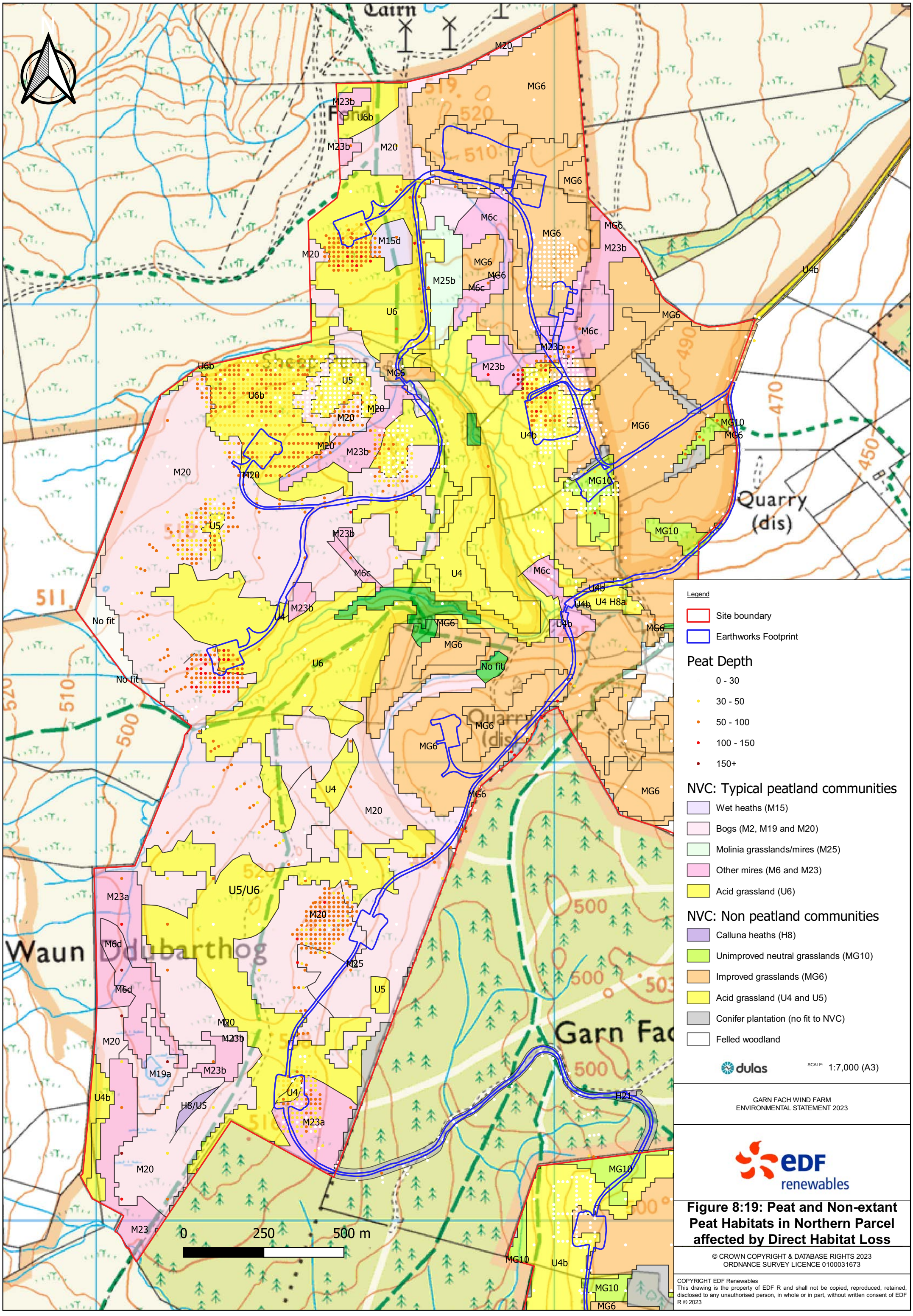
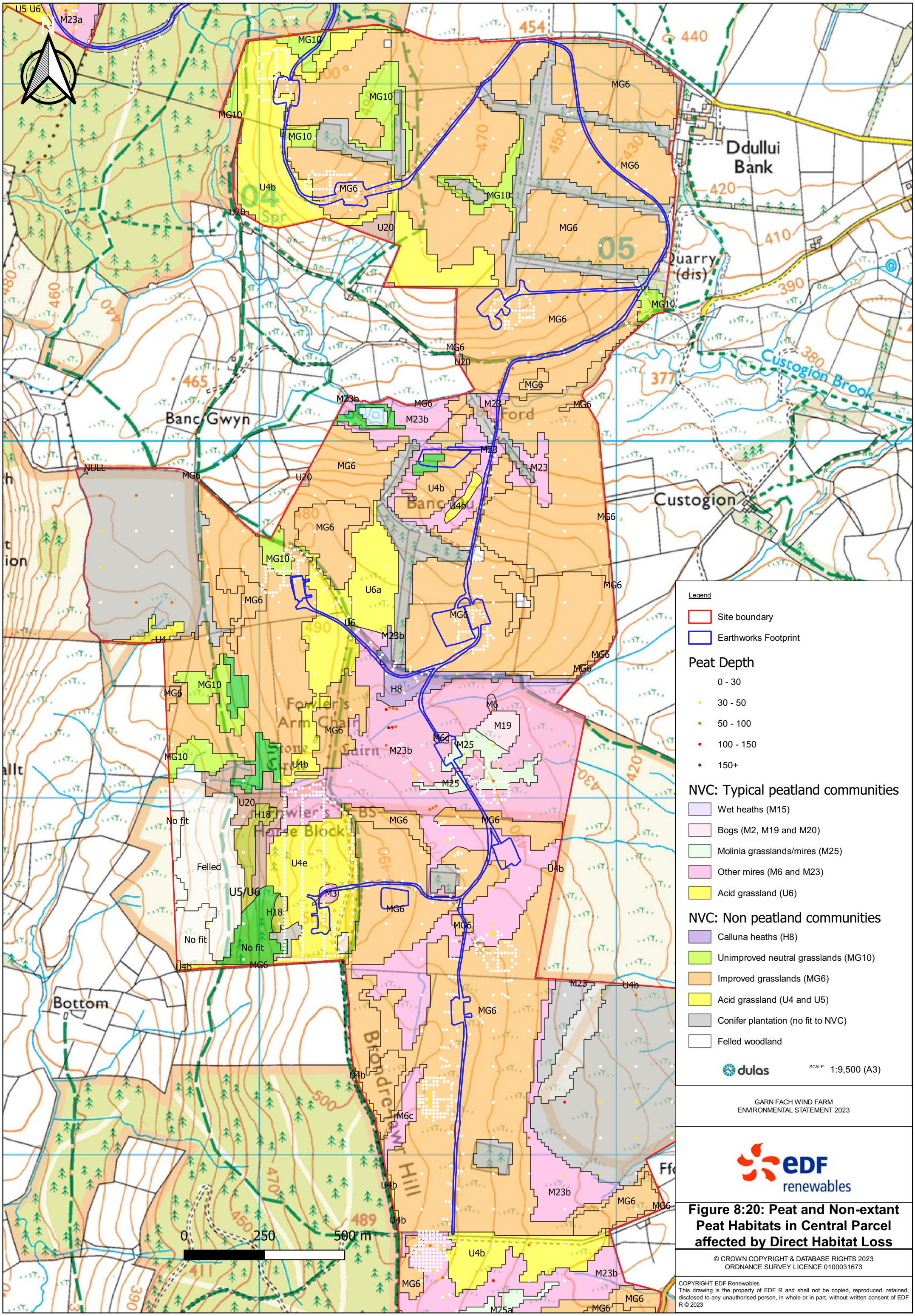


Figure 8:19: Peat and Non-extant Peat Habitats in Northern Parcel affected by Direct Habitat Loss



Legend

- Site boundary
- Earthworks Footprint

Peat Depth

- 0 - 30
- 30 - 50
- 50 - 100
- 100 - 150
- 150+

NVC: Typical peatland communities

- Wet heaths (M15)
- Bogs (M2, M19 and M20)
- Molinia grasslands/mires (M25)
- Other mires (M6 and M23)
- Acid grassland (U6)

NVC: Non peatland communities

- Calluna heaths (H8)
- Unimproved neutral grasslands (MG10)
- Improved grasslands (MG6)
- Acid grassland (U4 and U5)
- Conifer plantation (no fit to NVC)
- Felled woodland

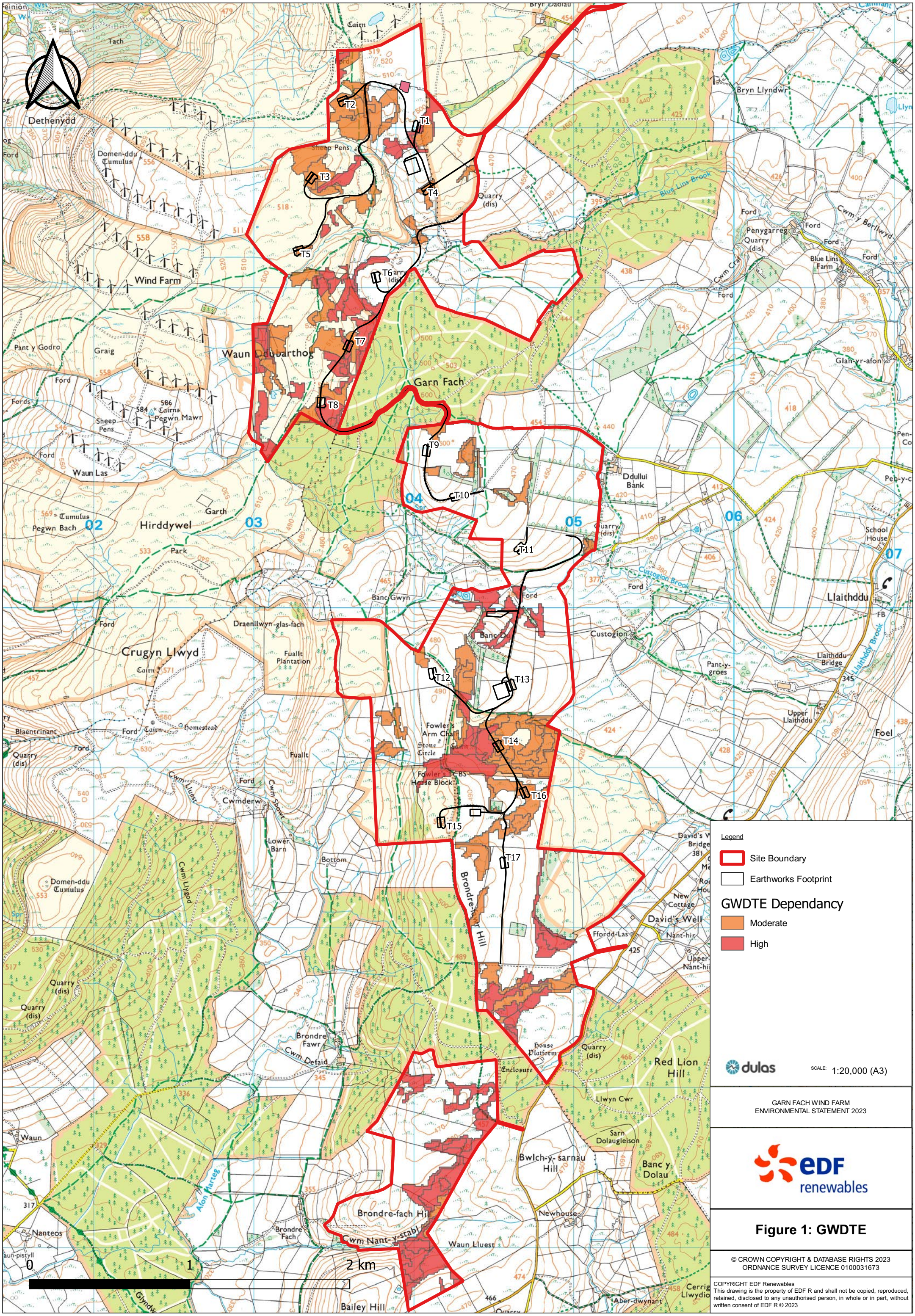
dulas

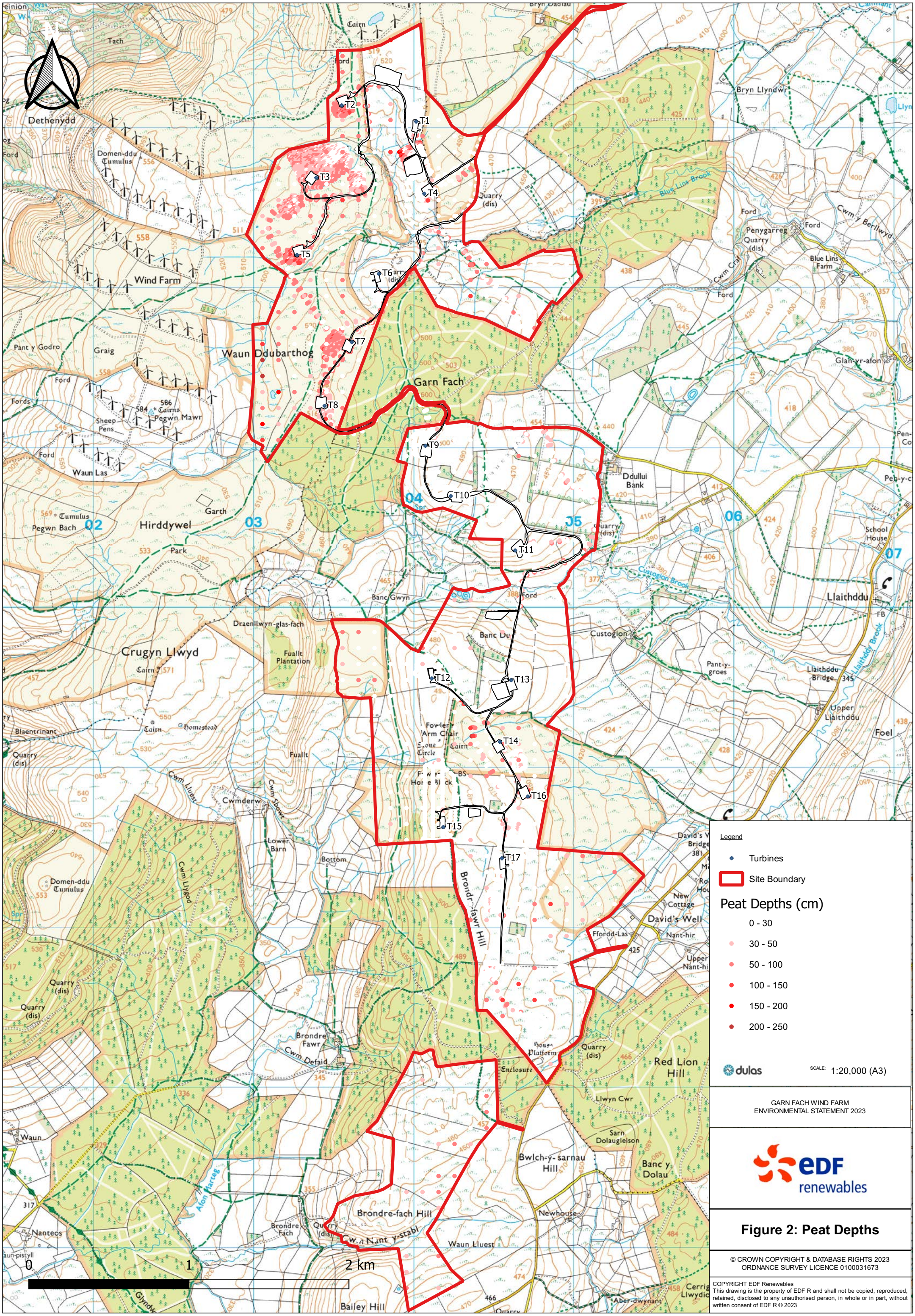
SCALE: 1:9,500 (A3)

GARN FACH WIND FARM
ENVIRONMENTAL STATEMENT 2023

EDF renewables

Figure 8:20: Peat and Non-extant Peat Habitats in Central Parcel affected by Direct Habitat Loss





Legend

- Turbines
- Site Boundary

Peat Depths (cm)

- 0 - 30
- 30 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- 200 - 250

dulas

SCALE: 1:20,000 (A3)

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Figure 2: Peat Depths

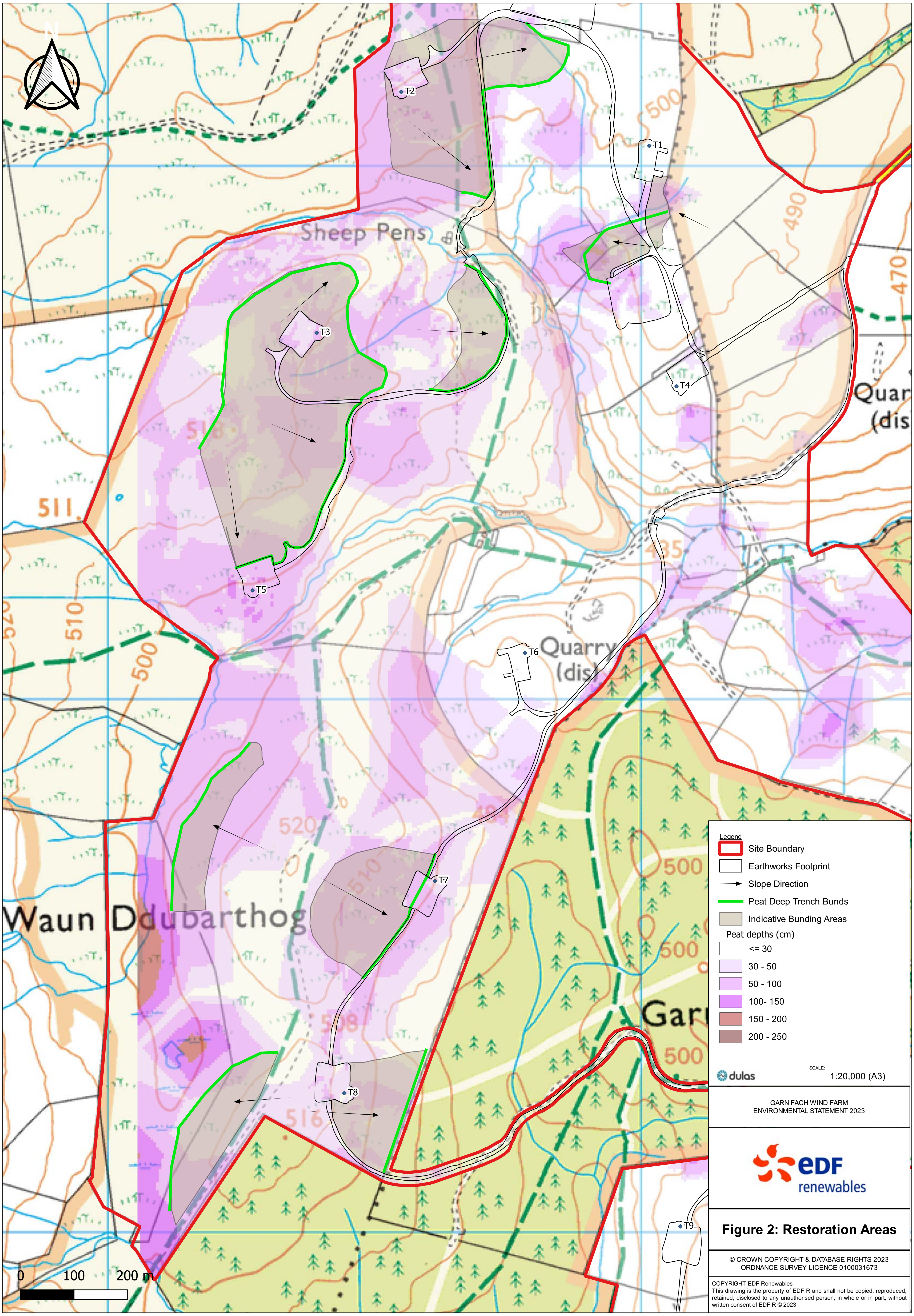

Figure 2: Restoration Areas

N

Legend

- Site Boundary
- Unified Peat Map for Wales
- Alluvial Fan Deposits- Sand and Gravel
- Alluvium- Clay, Silt, Sand and Gravel
- Dolgau Mudstones Formation
- Nant Ysgollon Mudstone Formation
- Nantglyn Flags Formation
- Nantglyn Flags Formation (Slumped)
- Penstrowed Grits Formation
- Till, Devensian- Diamicton

dulas

SCALE: 1:20,000 (A3)

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Figure 10.3: Bedrock and Superficial Geology

0 1 2 km