Chapter 6

Ecology

Contents

Glossary

Term	Definition
Abnormal indivisible load (AIL) areas	That part of the proposed development that is located outside of the forested sections and encompasses the AIL routes that lie to the west of the south section, and which links the north and south section.
Baseline	The existing conditions that prevail against which the effects of the proposed development are compared.
eDNA	Environmental DNA: genetic material that is extracted from an environmental sample (such as water) to detect the presence of an organism.
Ecological Impact Assessment (EcIA)	Ecological Impact Assessment is a process of identifying, quantifying and evaluating potential effects of development-related or other proposed actions on habitats, species and ecosystems.
Infrastructure	This is used to describe all parts of Y Bryn Wind Farm that require construction activities, both temporary and permanent, including turbines, hard standings, borrow pits and tracks (where new or widened).
Mitigation	Measures, including any process, activity or design to avoid, reduce, remedy or compensate for potential negative effects of a development.
North section	That part of the proposed development that is located in the productive forestry north of the B4282 road, also known as Penhydd.
Protected Species	Animals or plants protected by legislation.
Schedule 7 species/habitats	Lists of species and habitats of 'principal importance' for maintaining and enhancing biodiversity, as named under the Environment (Wales) Act 2016.
Site boundary	Includes the wind farm areas and AIL areas.
Site of Importance for Nature Conservation (SINC)	Sites of Importance for Nature Conservation (also known as Wildlife Sites) are non-statutory sites of nature conservation value that are designated locally on biological and/or geological grounds.
Site of Special Scientific Interest (SSSI)	Sites of Special Scientific Interest are protected areas that represent the UK's most important wildlife and/or geological sites.
South section	That part of the proposed development that is located in the productive forestry south of the B4282 road, also known as Bryn.
Special Area of Conservation (SAC)	Special Areas of Conservation protect habitats and species (excluding birds) that are considered to be in need of conservation at an international (European) level and are designated under the Habitats Regulations.
Survey area	The area within which ecology baseline surveys were carried out. This refers to the proposed development or site boundary plus a surrounding buffer, the size of which is determined by the specific survey being described. Details of the area covered are described in the methodology provided for each field survey.
Turbine development area	That part of the wind farm areas in which the proposed turbines are located.
Wind farm areas	All ground within the north and south sections of forestry.
Y Bryn Wind Farm	The turbines and all associated infrastructure required for Y Bryn Wind Farm (also referred to as the 'proposed development').

List of Abbreviations

Abbreviation	Description
AIL	Abnormal Indivisible Load (vehicles)
AOD	Above Ordnance Datum (of height)
BAI	Bat Activity Index
BCBC	Bridgend County Borough Council
BCT	Bat Conservation Trust
CEMP	Construction Environmental Management Plan
CMS	Construction Method Statement
CI	Confidence Interval
CIA	Cumulative Impact Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
EcIA	Ecological Impact Assessment
ECoW	Environmental Clerk of Works
EIA	Environmental Impact Assessment
EPS	European Protected Species
ES	Environmental Statement
GPS	Global Positioning System
GWDTE	Ground Water Dependent Terrestrial Ecosystem
Habs Regs	The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the Habitats Regulations)
HGV	Heavy Goods Vehicle
HLC	Habitat Loss Calculations
HMP	Habitat Management Plan
IEF	Important Ecological Feature
JNCC	Joint Nature Conservation Committee
LBAP	Local Biodiversity Action Plan
LNP	Local Nature Partnership
LNR	Local Nature Reserve
LPA	Local Planning Authority
LWS	Local Wildlife Sites
Natural Power	Natural Power Consultants Limited, the lead EIA Co-Ordinator
NNR	National Nature Reserve
NPTCBC	Neath Port Talbot County Borough Council
NRW	Natural Resources Wales
NVC	National Vegetation Classification
PPW	Planning Policy Wales
SAC	Special Area of Conservation
SEWBReC	South-East Wales Biodiversity Records Centre
SINC	Site of Importance for Nature Conservation
SNH	Scottish Natural Heritage (now NatureScot)
SPP	Species Protection Plan
SSSI	Site of Special Scientific Interest
UNESCO	United Nations Educational Scientific and Cultural Organisation
VWT	Vincent Wildlife Trust
WCA	Wildlife and Countryside Act (1981)
ZoI	Zone of Influence

6.1 INTRODUCTION

Summary of Chapter

6.1.1 Assessments of the relevant potential effects upon ecological features are presented in Chapter 6: Ecology Assessment, of the Environmental Statement (ES).

6.1.2 A programme of baseline ecology surveys was undertaken between August 2020 and June 2022. The following surveys were undertaken:

- Desk based study;
- Phase 1 and National Vegetation Classification (NVC) habitat surveys;
- Bat activity surveys (static detectors and walked transects);
- Preliminary bat roost assessment;
- Protected mammal surveys for: dormouse, otter, water vole, badger, pine marten and polecat; and
- Great crested newt surveys.

All surveys were undertaken following the most relevant industry guidelines and incorporated relevant scoping responses.

6.1.3 No specific surveys were undertaken for fish, reptiles or invertebrates; however these species groups were also included for assessment based on existing site knowledge (desk study, habitat data and supplementary records).

6.1.4 The main ways in which a wind farm may impact upon ecological features are:

- Direct impacts associated with habitat loss;
- Direct impacts on protected species associated with resting place destruction or loss of foraging areas;
- Indirect impacts on habitats associated with dust, siltation, leaks and spillages;
- Indirect impacts on protected species associated with disturbance; and
- Indirect impacts on species through pollution of habitats/watercourses affecting food sources.

6.1.5 The proposed development is not located within any statutory site designated for ecological interests; however one Local Nature Reserve (LNR) (Bryn Tip) is adjacent to the site boundary. The nearest Site of Special Scientific Interest (SSSI) with ecological features listed as an interest is located 2.6 km from the site boundary (Margam Moors) and the nearest Special Area of Conservation (SAC) (Kenfig) with ecological features listed as an interest is located 3.7 km from the site boundary. There are three Sites of Importance for Nature Conservation (SINCs) that overlap with, or lie adjacent to, the site boundary. One SINC (Margam Park) was considered to be an Important Ecological Feature (IEF) and was fully assessed, due to the potential for impacts upon its important bat populations. However, no significant effects have been predicted on any statutory or non-statutory designated sites.

6.1.6 The wind farm areas comprise mostly productive forestry, although there are areas of broadleaved and mixed woodland also present. Linear strips of marsh/marshy grassland and wet and dry dwarf shrub heath are present primarily along the edge of forest rides or tracks. Many of the open grassland and heath areas, where not managed are being encroached by bracken or bramble scrub. Open habitat is mostly present along the Abnormal Indivisible Load (AIL) areas, and this includes neutral and acid grasslands and areas of scrub, particularly on steeper slopes. All habitats present within the site boundary have been assessed in relation to their conservation status and the area and percentage loss predicted as a result of the proposed development. No significant effects on habitats have been predicted.

6.1.7 Records were obtained of polecat (one live sighting), badger (live sighting, feeding signs and setts) and otter (a probable slide/run into a water course). The badger setts were a minimum of 650 m from the nearest infrastructure. No signs of water vole were observed during surveys and little favourable habitat was identified. No evidence was found of dormouse being present. Great crested newt eDNA surveys were undertaken on ten ponds, with all returning a negative result for presence of great crested newt. Physical surveys were undertaken in a sample of six ponds, and these confirmed the eDNA results.

6.1.8 Static and transect bat activity surveys identified a total of seven species/species groups present within the wind farm areas, with activity highest during the summer period. The most frequently recorded species was common pipistrelle followed by soprano pipistrelle. Low numbers of passes were recorded for all other bat species. Bat activity transects, and the deployment of additional static detectors to the south of the proposed development, were undertaken to determine potential commuting routes between Margam Park SINC and the proposed development. The data suggests that bats commute north from Margam Park up corridors provided by watercourses, but few continue into the turbine development area. A preliminary bat roost assessment identified potential roost locations within trees along access tracks, and a supplementary record confirmed an active noctule roost, which was over 160 m from the nearest track and distant from the turbine development area. All bat species were considered to be IEFs and have been fully assessed. No significant effects on bats have been predicted, following embedded mitigation measures.

6.1.9 Controls will be put in place during construction through creation of a site-specific Construction Environment Management Plan (CEMP), Species Protection Plan (SPP) and appointing an Environmental Clerk of Works (ECoW) to monitor adherence to such plans.

6.1.10 In addition, a Habitat Management Plan (HMP) is proposed in alignment with the principle of Biodiversity Net Benefit and enhancements required within the Environment (Wales) Act.

Contents of Chapter

6.1.11 This ecological chapter of the ES has been prepared by Natural Power Consultants (Natural Power) on behalf of Y Bryn Wind Farm Ltd (the applicant) in respect of the proposed Y Bryn Wind Farm (hereafter referred to as the proposed development). The proposed development comprises up to 18 wind turbines and associated infrastructure on Natural Resources Wales (NRW) land in the Penhydd forest (henceforth the 'north section') and Bryn Forest (henceforth the 'south section'), near Maesteg, South Wales (see Figure 6.1, found in Volume 2 of this ES). The site is located mostly within the Neath Port Talbot County Borough Council (NPTCBC) area, though part of the development extends into the Bridgend County Borough Council (BCBC) area.

6.1.12 This chapter provides details of the baseline ecological conditions within the proposed development and the immediate surrounding environment. Baseline ecological conditions have been established for habitats and non-avian fauna through a programme of rigorous ecological field surveys, in addition to a desk-based review to obtain additional relevant ecological data. The identified habitats and species comprising the ecological baseline are described, evaluated and assessed using recognised criteria, in accordance with industry guidelines (e.g. that produced by the Chartered Institute of Ecology and Environmental Management: CIEEM, 2018[1]).

6.1.13 This ES chapter has been prepared following a scoping process which led to a Scoping Report issued to consultees in January 2021 and Scoping Direction received in March 2021.

6.1.14 In line with the principles of proportionate Environmental Impact Assessment (EIA), embedded mitigation is considered at the outset of the assessment (see Section 6.6). Furthermore, to ensure proportionality based on the likelihood of potential effects, only ecological features for which it is considered there may be significant effects in the absence of mitigation are identified as IEFs and are taken forward for a full Ecological Impact Assessment (EcIA).

[1] CIEEM (2018). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal*. Chartered Institute of Ecology and Environmental Management, Winchester.

6.1.15 The potential for ecological impacts (i.e. predicted change to the baseline) as a result of the proposed development during the construction, operational and decommissioning phases have been identified and assessed, with particular attention made to habitats and species of high vulnerability, conservation concern and those afforded a high level of legal protection. These impacts are then assessed in terms of their significance of effects to each IEF (where effects are the consequence of impacts on the environmental resource or receptor). Where potentially adverse ecological effects have been identified and/or predicted for an IEF, appropriate mitigation to avoid or reduce the effects of such impacts are proposed. For IEFs for which greater than negligible residual effects are predicted after the application of this mitigation, cumulative effects with other nearby developments have also been considered within this EcIA.

6.1.16 This Ecology chapter is complemented by Chapter 7: Ornithology Assessment and Chapter 10: Hydrology, Geology and Hydrogeological Assessment.

6.1.17 A list of the English-Latin names used in this chapter can be found in Appendix 6.1: Ecology Technical Appendix, found in Volume 3 of this ES. Full survey data, including details of survey dates, times and weather conditions can also be found in Appendix 6.1: Ecology Technical Appendix.

6.2 LEGISLATION, POLICY AND GUIDANCE

6.2.1 The following framework of international, national and local legislation and planning policy guidance, which exists to protect habitats and specific species, has been considered as part of the assessment. See also Chapter 2: Legal and Policy Context.

Legislation

- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive)[2];
- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the Habitats Regulations), which transposes the Habitats Directive into law in England and Wales[3];
- Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019, which ensures domestic implementation of the Habitats Directive continues from 1 January 2021[4];
- Wildlife and Countryside Act 1981 (as amended)[5];
- The Environment (Wales) Act 2016[6];
- Environment Act 2021[7],
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017[8];
- Well-being of Future Generations (Wales) Act 2015[9]; and
- Protection of Badgers Act 1992 (as amended)[10].

Policy

- Planning Policy Wales (PPW): Edition 11 (2021) [11];
- Future Wales – the National Plan 2040 (2021)[12];
- Technical Advice Note 5 – Nature Conservation and Planning (2009)[13];
- Commission Notice – Guidance on protection of animal species of community interest under the Habitats Directive (2021)[14];
- UK Post 2010 UK biodiversity framework[15];
- NPTCBC Local Development Plan 2011-2026 (2016)[16]; and
- BCBC Local Development Plan 2006-2021 (2011)[17].

Guidance

6.2.2 Particular attention has also been given to the guidance documents listed below, which cover survey methods and assessment of effects of wind farm developments on ecological features. Reference has also been made to these guidance documents across this chapter, where relevant:

- CIEEM (2018). Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland[1];
- CIEEM briefing paper (2022) Welsh Government's approach to net benefits for biodiversity and the DECCA Framework in the terrestrial planning system[18];
- NRW (2021) Terrestrial and freshwater Resilient Ecological Networks: a guide for practitioners in Wales[19]
- Wildlife Sites Guidance Wales: a guide to develop local wildlife systems in Wales[20];
- SNH (2012) Assessing the cumulative impact of onshore wind energy developments[21];

[2] Available from https://www.legislation.gov.uk/eudr/1992/43/contents [Accessed 04/08/2022]

[3] Available from https://www.legislation.gov.uk/uksi/1994/2716/contents/made [Accessed 04/08/2022]

[4] Available from https://www.legislation.gov.uk/ukdsi/2019/9780111176573 [Accessed 04/08/2022]

[5] Available from https://www.legislation.gov.uk/ukpga/1981/69 [Accessed 04/08/2022]

[6] Available from https://www.legislation.gov.uk/anaw/2016/3/contents/enacted [Accessed 04/08/2022]

[7] Available from https://www.legislation.gov.uk/ukpga/2021/30/part/1/enacted [Accessed 04/08/2022]

[8] Available from https://www.legislation.gov.uk/uksi/2017/407/contents/made [Accessed 04/08/2022]

[9] Available from https://www.legislation.gov.uk/anaw/2015/2/contents/enacted [Accessed 04/08/2022]

[10] Available from https://www.legislation.gov.uk/ukpga/1992/51/contents [Accessed 04/08/2022]

[11] Available from: https://gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf [Accessed 03/04/2023]

[12] Available from: https://www.gov.wales/sites/default/files/publications/2021-02/future-wales-the-national-plan-2040.pdf [Accessed 03/04/2023]

[13] Available from: https://gov.wales/sites/default/files/publications/2018-09/tan5-nature-conservation.pdf [Accessed 03/04/2023]

[14] Available from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=PI_COM:C(2021)7301&from=EN [Accessed 03/04/2023]

[15] JNCC and Defra (on behalf of the Four Countries' Biodiversity Group). 2012. UK Post-2010 Biodiversity Framework. July 2012. Available from: https://jncc.gov.uk/our-work/uk-post-2010-biodiversity-framework/ [Accessed 03/04/2023]

[16] Available from: https://www.npt.gov.uk/7328 [Accessed 03/04/2023]

[17] Available from: https://www.bridgend.gov.uk/media/8184/ldp_text.pdf [Accessed 03/04/2023]

[18] Available from: https://cieem.net/wp-content/uploads/2022/08/Net-Benefits-briefing.pdf [Accessed 13/03/2023]

[19] Available from: https://cdn.cyfoethnaturiol.cymru/media/693356/resilient-ecological-networks-practitioner-guide.pdf? [Accessed 13/03/2023]

[20] Wales Biodiversity Partnership. (2008) *Wildlife Sites Guidance Wales: A Guide to Develop Local Wildlife Systems in Wales*. Available from http://biodiversitywales.org.uk [Accessed 04/08/2022]

[21] SNH (2012). *Assessing the cumulative impact of onshore wind energy developments*. SNH, Scotland.

- SNH (2019)[22]/ NatureScot (2021)[23]. Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation;
- SR, SNH, SEPA, FCS (2013) Good Practice during Wind Farm Construction[24]
- Cresswell *et al.* (2012). UK BAP Mammals Interim Guidance for Survey Methodologies, Impact Assessment and Mitigation[25];
- Harris & Yalden (2008). Mammals of the British Isles: Handbook[26];
- Sargent & Morris (2003). How to Find and Identify Mammals[27];
- Bang & Dahlstrøm (2001) Animals Tracks and Signs[28];
- Dean *et al.* (2016). The Water Vole Mitigation Handbook[29];
- Strachan *et al.* (2011) The Water Vole Conservation Handbook[30];
- Chanin (2003a). Ecology of the European Otter[31];
- Chanin (2003b). Monitoring the Otter *Lutra lutra*[32];
- Neal & Cheeseman (1996). Badgers[33];
- Harris *et al.* (1989) Surveying Badgers[34];
- Collins (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines[35];
- Bright *et al.* (2006) The dormouse conservation handbook[36];
- Joint Nature Conservation Committee (JNCC) (2010) Handbook for Phase 1 Habitat Survey[37];
- Rodwell (2006) National Vegetation Classification: Users' handbook[38];
- Averis *et al.* (2004) An Illustrated Guide to British Upland Vegetation[39];
- English Nature (2001) Great Crested Newt Mitigation Guidelines[40]; and
- Froglife (2001) Great Crested Newt Conservation Handbook[41].

6.2.3 In addition, particular attention has been paid to the lists of habitats and species of principal importance, as given in Section 7 of the Environment (Wales) Act 2016[42]. Local biodiversity interests have been assessed using the species/habitats listed by the NPT Nature Partnership[43] and those on the Bridgend Local Biodiversity Action Plan (LBAP)[44] lists.

6.2.4 Note, although some guidance referred to above is provided by NatureScot (formerly SNH (Scottish Natural Heritage)), for example regarding bats, this is accepted as standard wind farm survey guidance by NRW.

6.3 CONSULTATION

6.3.1 Y Bryn Wind Farm Scoping Report was submitted to a range of consultees in January 2021. Responses were returned in March 2021. This in turn led to further liaison between Natural Power and consultees regarding specific elements of ecological recording and assessment. All consultation considered to be relevant to this chapter are summarised in Table 6.1. A full list of all correspondence and scoping opinions are included in Appendix 3 in Volume 3 of the ES.

Table 6.1: Summary of consulation responsess

Consultee	Issues raised and recommendations	Addressed responses/outcomes
Planning Inspectorate Wales (now Planning Environment Decisions Wales)	Assessment should use 3rd edition of Bat Conservation Trust (BCT) guidelines (not 2nd edition as referenced in Scoping).	Acknowledged and correct reference used in the EcIA.
NPTCBC	The list of non-statutory designated sites in the Scoping Report is incomplete.	List of sites corrected ahead of EcIA.
NPTCBC	Sites that meet SINC criteria should be considered as such.	The guidance[20] for identifying and selecting sites was requested and obtained prior to writing the EcIA.

[22] SNH, Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd., the University of Exeter, and Bat Conservation Trust (BCT) (2019). *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation*.

[23] NatureScot, Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd., the University of Exeter, and Bat Conservation Trust (BCT) (2021). *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation (updated)*.

[24] Scottish Renewables, SNH, SEPA, Forestry Commission Scotland (2013). *Good practice during windfarm construction*. 2nd edition.

[25] Cresswell, W. J., Birks, J. D. S., Dean, M., Pacheco, M., Trewhalla, W. J., Wells, D. and Wray, S. (2012). *UK BAP Mammals Interim Guidance for Survey Methodologies, Impact Assessment and Mitigation.* Published by The Mammal Society.

[26] Harris, S. & Yalden, D.W. (eds). (2008). *Mammals of the British Isles: Handbook*, 4th Edition. The Mammal Society, Southampton.

[27] Sargent G. & Morris P. (2003). *How to Find and Identify Mammals*. The Mammal Society, London.

[28] Bang, P. & Dahlstrøm, P. (2001). *Animal Tracks and Signs*. Oxford University Press, Oxford.

[29] Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016). *The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series).* Eds Fiona Mathews and Paul Chanin. The Mammal Society, London.

[30] Strachan, R., Moorhouse, T. & Gelling, M. (2011). *The Water Vole Conservation Handbook*. Third Edition, Wildlife Conservation Research Unit, University of Oxford, Abingdon.

[31] Chanin, P. (2003a). *Ecology of the European Otter*. Conserving Natura 2000 Rivers Ecology Series No. 10. English Nature, Peterborough.

[32] Chanin, P. (2003b). *Monitoring the Otter Lutra lutra*. Conserving Natura 2000 Rivers: Monitoring Series No. 10. English Nature, Peterborough.

[33] Neal, E. and Cheeseman, C. (1996). *Badgers*. T & A D Poyser, London, p271 pp.

[34] Harris S. Cresswell P & Jefferies D., (1989). *Surveying Badgers*. The Mammal Society, London.

[35] Collins, J. (ed.) (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edition). Bat Conservation Trust, London.

[36] Bright, P., Morris, P., & Mitchell-Jones, T. (2006) *The dormouse conservation handbook* (Second Edition). English Nature.

[37] JNCC. (2010) *Handbook for Phase 1 habitat survey – a technique for environmental audit*. JNCC, Peterborough.

[38] Rodwell J. S. (2006). *National Vegetation Classification: Users' handbook*. JNCC, Peterborough.

[39] Averis, A. *et al.* (2004). *An Illustrated Guide to British Upland Vegetation*. Joint Nature Conservation Committee. Peterborough.

[40] Available from: https://webarchive.nationalarchives.gov.uk/ukgwa/20140605121141/http:/publications.naturalengland.org.uk/publication/810429?category=30014 [last accessed 03/04/2023]

[41] Available from: https://www.froglife.org/wp-content/uploads/2013/06/GCN-Conservation-Handbook_compressed.pdf [last accessed 03/04/2023]

[42] Available from: https://www.biodiversitywales.org.uk/environment-wales-act [last accessed 03/04/2023]

[43] Available from: https://www.npt.gov.uk/5405 [last accessed 03/04/2023]

[44] Available from https://www.bridgend.gov.uk/media/8721/bridgendlbapandes_v2-1.pdf [last accessed 03/04/2023]

Consultee	Issues raised and recommendations	Addressed responses/outcomes
Planning Inspectorate Wales	Not enough information provided to scope out designated sites within 10 km.	Designated sites within 10 km are listed in this chapter. The approach to assessing designated sites is clarified.
NRW	Eglwys Nunydd Reservoir SSSI is not listed in the table of relevant designated sites.	This SSSI is designated for its ornithological features and so was included in the Ornithology section of the Scoping Report, as acknowledged. This site is assessed within Chapter 7: Ornithology Assessment of this ES. The SSSI is not designated for non-avian ecological features.
NRW	Description of woodland habitat includes inaccuracies, and it is recommended that Forestry Land Management Team are contacted.	The Phase 1 habitat survey data collected in 2020 has been re-examined. Further habitat surveys (NVC) have been undertaken since scoping. No errors have been identified through liaison with the NRW Forestry Team regarding layout and HMP proposals.
NPTCBC	Incomplete list of the protected habitats on site.	The list of habitats has been updated and included in this chapter.
NPTCBC	To avoid omission of protected species/habitats in the dataset it is recommended that NPTCBC and the Local Nature Partnership are contacted for further information.	Both NPTCBC and the chair of the LNP were contacted and it was confirmed that their records are available through South-East Wales Biodiversity Records Centre (SEWBReC), and so are included in the existing data search.
NPTCBC NRW	Habitat survey undertaken late in season and certain woodland ground flora may have been missed.	The Phase 1 survey was completed within the time period stated in guidance[37] (August/early September). The subsequent NVC survey undertaken in 2021, was carried out in June, thus allowing the detection of early summer species.
NPTCBC	NVC survey should not focus solely on habitats considered to be of high conservation value.	The surveyed area was determined by the location of infrastructure, irrespective of habitat type. Within this, NVC community types were identified and mapped for all areas with the exemption of those identified as coniferous in the Phase 1 survey but including track edges and rides.
NPTCBC	Clarification required as to term ‘infrastructure’ used in Scoping Report.	See ‘Terminology’ section of this chapter.
NPTCBC NRW	When assessing impacts upon habitats this should include a balance of habitat loss/gain.	This is included within this chapter.
NRW	The LPA should be consulted regarding any impacts on Section 7 habitats.	No significant negative effects on Section 7 habitats have been predicted.
NPTCBC	Walked transect/vantage point surveys for bats should be undertaken. Consideration needed as to potential impacts on bats at Margam Park.	Following further consultation with NPTCBC on the necessity of walked transects (these not being a mandatory part of survey guidance[23]) NPTCBC confirmed in July 2021 that they still felt they were required. Walked transects were therefore carried out during August to October 2021 in the area raised as a concern (between the proposed development and Margam Park) and are reported upon in this chapter. Two additional static detectors were deployed to the south of the development area. The potential impacts on bats are assessed.
NRW	Water vole surveys should be undertaken in period mid-April to end of June and July to September. Second visit may not be needed.	The water vole survey was completed in June 2021. This was considered to be satisfactory, and a second survey was not undertaken.
NRW	All ponds within 500 m of permanent infrastructure (250 m of temporary infrastructure) should be surveyed for great crested newt.	All ponds within 500 m of any infrastructure have been subject to presence/absence surveys for great crested newt.
NPTCBC	Due to the unreliability of Edna surveys for great crested newts, physical surveys are requested to back up the findings of the Edna surveys. At least a sample of surveys will be required.	NRW guidance at the time of survey completion was that the use of Edna to determine presence/absence of great crested newts was satisfactory. This guidance was followed by a qualified ecologist. However, following further consultation with NPTCBC when this standpoint was restated, the carrying out of physical surveys was undertaken in spring 2022.
Planning Inspectorate Wales	It is agreed that fish surveys are not required.	Fish are assessed using existing data.
NRW	Following a habitat assessment that indicated low suitability for dormice, NRW was approached as to whether the dormouse survey could be dropped. It was stated that the Natural England habitat scoring system used was not accepted in Wales and that the survey should be undertaken due to dormice having been found in coniferous woodland elsewhere.	A dormouse survey was carried out between May and October 2021.
NRW	Recommendation to consult with LPA Ecologist over scope of ecological features to be scoped into assessment regarding local biodiversity interests (herptiles and bryophytes given as examples).	Baseline conditions have been informed by the inclusion of NPT Nature Partnership data and the assessment has been informed by the inclusion of local ecological features highlighted in the relevant LBAPs[43,44]. Reptiles and amphibians have been scoped into the EcIA, following the advice of the LPA Ecologist
NPTCBC	No surveys for reptiles are required, however they should be scoped into the assessment.	Reptiles are included in the EcIA.
NPTCBC	Invertebrates should not be scoped out due to presence of Section 7 species of butterfly. Invertebrate surveys should be undertaken.	Invertebrates have been assessed within this chapter. This has been undertaken using existing data and the results of the habitat surveys. Dedicated surveys were not considered crucial to undertaking the assessment

Consultee	Issues raised and recommendations	Addressed responses/outcomes
	Further consultation accepted that an assessment could be made without undertaking dedicated surveys, but that presence must be assumed.	and such surveys are not considered to be proportionate given the likely impacts of the proposed development upon invertebrates.
Planning Inspectorate Wales	Scoping Report does not include information on peat. Deep peat areas should be avoided.	Data regarding peat depths was collected in 2021. See Chapter 10: Hydrology, Geology and Hydrogeological Assessment.
NPTCBC	Initial ideas for potential mitigation measures have been provided (subject to the outcomes of the assessment).	Acknowledged and used to inform the mitigation measures listed in this chapter, as well as informing the outline HMP.
NRW	No specific mitigation or enhancement measures are proposed in the Scoping Report.	This is addressed in this chapter.
NRW	The EIA should set out how the long-term security of any mitigation/compensation will be assured.	The measures proposed in the outline HMP have been agreed with NRW (as land manager) and align with the long-term management plans for the forested estate HMP will be secured, monitored and enforced via planning condition.
NPTCBC	An assessment of ecosystem resilience should be included in the EIA.	This is included in this chapter.
NRW	Where the potential for significant impacts on protected species is identified, we advocate a Conservation Plan is included as an Annex to the EIA.	No significant impacts on protected species have been predicted A Construction Environmental Management Plan will be agreed with consultees post-consent, which is discussed in outline in Chapter 10.
NRW	Where a European Protected Species is identified and the development will contravene the legal protection they are afforded, the EIA must consider the requirements for a licence and state how regulations will be met.	The requirement for specific mitigation licences, where appropriate, covering those ecological features identified during the assessment are considered in this chapter.
NPTCBC	No detail as to how cumulative effects will be assessed is included in the Scoping Report.	Cumulative effects are assessed in this chapter with full detail as to approach used.

Source: Natural Power

6.4 METHOD OF ASSESSMENT

Data Collection

Desk Study

6.4.1 A desk-based review has been undertaken to collate relevant existing public domain survey data and records of protected and relevant species and habitats from within the site boundary and surrounding environment. This provided background information on the ecological features that are potentially present, to help inform and guide the baseline ecological field surveys and it also provides context to their results. Combined with the results of the ecological field surveys, this information has been utilised to provide a comprehensive ecological baseline on which to base EcIA.

Statutory, National and Locally Designated Sites of Nature Conservation

6.4.2 A web-based search was undertaken to identify and provide information on statutory designated sites of nature conservation, with non-avian species and protected habitats as listed features. The search was carried out using the online Defra MAGIC Map application tool[45] and the NRW website[46]. The search focussed on identifying the following sites:

- Special Areas of Conservation (SACs) – within 10 km of the wind farm area;
- Sites of Special Scientific Interest (SSSIs) – within 10 km of the wind farm area[47];
- National Nature Reserves (NNRs) – within 10 km of the wind farm area[47]; and
- Local Nature Reserves (LNRs) within 10 km of the wind farm area[48].

6.4.3 Data has also been obtained from the SEWBReC[49] of locally important (non-statutory) SINCs, also known as Local Wildlife Sites (LWS). This data search was undertaken in November 2020 to inform the Scoping Report and included the wind farm areas and a 2 km buffer. The search was updated in November 2021 to cover a 2 km search area around the site boundary.

Protected Species and Habitats

6.4.4 The SEWBReC data searches also requested records of all ecological (non-avian) species of conservation interest, as well as known protected habitats and other priority areas, such as Ancient Semi-Natural Woodlands. As described above, the initial search in November 2020 covered the wind farm areas and a 2 km buffer, but the search was repeated in November 2021 to cover a 2 km search area around and the site boundary to obtain the most recent records available. In addition, the search area for bats was extended to include a 5 km surrounding buffer. The SEWBReC data search returned all historic records with no restriction on the age of the records. However, except where needed for context, only records from 2015 onwards (to cover five full years) are reported upon in this chapter, to avoid the inclusion of species that have only been recorded historically.

6.4.5 The NPT Nature Partnership was contacted (June 2021) for any data that might not be available via SEWBReC. It was confirmed that their data was available through SEWBReC.

6.4.6 The Glamorgan Bat Group was contacted (June and September 2021) to request any records from the vicinity of the proposed development held by the group. It was confirmed that most data would be available through SEWBReC but a request to members was circulated. No additional data was returned.

6.4.7 The Vincent Wildlife Trust (VWT) was also contacted (October 2021) to request any records held from the vicinity of the proposed development regarding mammals (bats, polecat and pine marten). No response was received.

6.4.8 During the consultation process with NRW (as land manager), data was obtained from an NRW environmental advisor with knowledge of the wind farm survey area and relevant ecological data has been included in the assessment where appropriate.

6.4.9 Finally, the ecology chapters and habitat management plans/monitoring reports of other developments in the vicinity of the proposed development were obtained, where possible, for any relevant information.

[45] Available from https://magic.defra.gov.uk/MagicMap.aspx [Accessed 03/04/2023]

[46] Available from: https://naturalresources.wales/ [Accessed 03/04/2023]

[47] A 5 km search area was used in the Scoping Report.

[48] A 2 km search area was used in the Scoping Report.

[49] Available from: http://www.sewbrec.org.uk/ [Accessed 03/04/2023]

Field Surveys

6.4.10 A summary of the baseline ecology surveys undertaken at the proposed development (dates and relevant survey area) is provided in Table 6.2. Details of survey extents can be found in Figure 6.1. Further details are provided in Appendix A6.1: Ecology Technical Appendix. Note that short additional survey visits to complete gaps in coverage are presented in brackets in Table 6.2.

Table 6.2: Summary of baseline ecological surveys undertaken at the proposed development

Survey	Date	Survey Area
Phase 1 habitat survey	August and September 2020 June 2021	Wind farm areas AIL areas
NVC survey	June 2021 (Aug 2021) (April 2022)	Infrastructure[50] plus 250 m buffer
Bat activity survey: static detectors	May to October 2021	Wind farm areas, focussing on turbine development area
Bat activity survey: walked transects	August to October 2021	Wind farm areas: south section
Preliminary bat roost assessment	April and May 2021 June 2021	Infrastructure plus buffers (80 m buffer of tracks and 350 m buffer of turbine locations) AIL areas plus 250 m buffer
Protected mammal survey: otter and water vole	June 2021	Infrastructure plus 750 m buffer (within wind farm areas) AIL areas plus 250 m buffer
Protected mammal survey: badger, pine marten and polecat	June 2021 June to August 2021	AIL areas plus 250 m buffer Infrastructure (within wind farm areas) plus 750 m buffer
Dormouse survey	May to October 2021	Infrastructure plus 120 m buffer
Great-crested newt Edna survey	May 2021	Ponds within 500 m of infrastructure
Great crested newt survey	April to June 2022	Six ponds sampled within/adjacent to site boundary.

Phase 1 Habitat Survey

6.4.11 The Phase 1 habitat survey methodology provides a standardised system for classifying and mapping semi-natural vegetation and wildlife habitats over large areas of countryside. Habitats across the survey area were identified and mapped using the standard Joint Nature Conservation Committee (JNCC) Phase 1 habitat classification[37].

6.4.12 A Phase 1 habitat survey covering the full wind farm areas was undertaken in August and September 2020. The AIL areas plus a 250 m buffer was surveyed in June 2021 (in conjunction with an NVC survey).

6.4.13 The survey was 'extended' to search for and record signs of legally protected or other notable species (such as protected mammals), and to assess the potential for the habitats to support such species. Target notes were made to record features of interest.

[50] Based upon proposed turbine layout and AIL routes at the time of survey completion. Small gaps in coverage following layout changes were surveyed in August 2021.

NVC Survey

6.4.14 The NVC is a detailed phytosociological classification system which assesses the full suite of vascular plant, bryophyte and macro-lichen species within a certain vegetation type. NVC surveys were carried out in June 2021. These surveys covered all infrastructure related to the proposed development (including the AIL access routes) plus a 250 m buffer.

6.4.15 Following some minor layout changes, a few small locations within the turbine development areas that had not been covered initially were surveyed in August 2021 and April 2022 to avoid any gaps in coverage.

6.4.16 NVC community and sub-community types were identified in the field (based on extensive surveyor experience) and delineated and mapped using Global Positioning System (GPS). Where areas were considered to comprise mosaics or complexes of different habitat communities, the proportion of each was estimated in percentage terms. Survey methods followed those described in Rodwell (2006)[38], with further guidance taken from Averis *et al.* (2004)[39].

6.4.17 The NVC survey also included the recording of target notes to provide further details, where necessary, and to record any features of ecological interest.

Bat Activity Survey: Static Detectors

6.4.18 All bat surveys were undertaken in 2021 and were based on best practice guidance (SNH (2019)[22], NatureScot (2021)[23] and Collins (2016)[35]).

6.4.19 A total of 17 full spectrum static detectors (Song Meter SM4s) were utilised to undertake the survey. The number of static detectors that are required is stated in guidance[22,23]. For developments with more than 10 turbines this should be ten detectors at or near turbine locations, plus a third of the additional number of turbines to be stationed at representative habitats across the site. Therefore, for an 18-turbine development, a minimum of 13 static detectors are required.

6.4.20 Fourteen detectors were placed at locations in the wind farm areas near to turbine location, based upon the proposed layout that was current at this time. However, in many cases, a turbine location coincided with habitat unfavourable for positioning a static detector (for example inside dense plantation) and so in these cases the detectors were located to the nearest edge, ride or fire break. As a result of this, detectors may not have been located in the immediate vicinity of proposed turbines. Furthermore, subsequent layout changes have meant that some detectors were sited close to turbines that are no longer being proposed. Despite this, the detector locations cover appropriate examples of the different habitats and topographical features present in the vicinity of the proposed development and provide satisfactory sampling of the turbine development area. This includes open areas such as clearings and felled areas, which can provide an indication of how bats may adapt to, and use, the new habitat created through turbine construction.

6.4.21 In addition to these 'ground level' detectors, another static detector was attached to the wind monitoring equipment present within the proposed development to provide data 'at height'. This was to allow determination of difference between bat activity below canopy level and activity at rotor swept height. A microphone was attached at 80 m height on the wind monitoring equipment, with a cable that ran to ground level to enable the microphone to be attached to a detector for deployment at the same time as the other devices. The wind monitoring equipment is located in an area of stunted mature plantation.

6.4.22 Two further static detectors were positioned in locations to the south of the proposed development. These were located beside two watercourses that were considered to have potential as flight corridors, connecting the turbine development area to known bat populations in Margam Park. These detectors were in addition to the recommended number of devices in guidance and were placed at these locations following an NPTCBC scoping response (see Section 6.3: Consultation).

6.4.23 The locations of the static detectors are listed in Table 6.3 and are shown on Figure 6.2. The 14 ground level detectors within the turbine development area were given a reference of letters 'A'-'N'. 10ed detectors with a prefix of 'WC' were those located close to watercourses to the south of the proposed development. Details of the habitat and elevation of each detector are given in Table 6.4.

Table 6.3: Static bat detector locations

Bat Detector Identifier	Easting/Northing	Nearest Turbine	Distance from Turbine
A	282501 193396	1	477 m
B	283597 193633	2	56 m
C	282837 192898	3	128 m
D	283722 192936	5	177 m
E	281920 190817	7	238 m
F	S81995 190480	7	107 m
G	282050 189912	8	262 m
H	282712 189376	10	78 m
I	283014 189014	11	95 m
J	281066 189889	12	122 m
K	282042 189182	15	125 m
L	280588 189217	17	315 m
M	281426 188858	18	227 m
N	281776 188522	18	706 m
WC1	281498 188585	18	468 m
WC2	282432 188349	16	504 m
Wind Monitoring Equipment	281898 188910	15	370 m

Source: Natural Power

Table 6.4: Static bat detector habitat details

Detector	Habitat	Location description	Elevation (AOD)
A	Grassland; Woodland	Within a wide and managed (mown) grassland forestry ride on edge of young woodland.	350 m
B	Woodland; Heathland	On mature woodland edge adjacent to forestry track with heath verge.	310 m
C	Woodland; Grassland; Heathland	On young woodland edge adjacent to forestry track with grass/heath verge.	290 m
D	Woodland; Grassland; Heathland	On woodland edge adjacent to wide and managed (mown) grass/heath forestry ride.	290 m
E	Woodland; Grassland; Tall herb and fern	On woodland edge within forestry ride with grassland and bracken habitat.	270 m
F	Woodland; Grassland	Within a grassland forestry ride along woodland edge.	270 m
G	Woodland; Grassland	Within a grassland forestry ride near edge of woodland.	245 m
H	Woodland; Heathland	On woodland edge adjacent to forestry track and heathland verge.	310 m
I	Woodland; Grassland	On woodland edge adjacent to forestry track and grassland verge.	330 m
J	Woodland; Grassland	On woodland edge adjacent to forestry track and grassland verge.	265 m
K	Woodland; Grassland	Within a grassland forestry ride along woodland edge.	325 m
L	Woodland; Grassland; Heathland	On woodland edge within a forestry ride with grass and heath habitat.	280 m
M	Woodland; Grassland	On woodland edge adjacent to forestry track and grassland verge.	320 m
N	Woodland; Heathland; Grassland	On woodland edge adjacent to forestry track and wide verge with a mosaic of grassland and heathland habitat.	310 m
WC1	Woodland; Tall herb and fern; Heathland; Running water	Within bracken, heathland and scattered woodland vegetation alongside a stream and adjacent to track.	280 m
WC2	Woodland; Tall herb and fern; Heathland; Running water	Alongside a stream within a forestry ride with a mosaic of bracken and heathland habitat with scattered trees.	305 m
Wind Monitoring Equipment	Grassland; Woodland	At a height of 80 m on the wind monitoring equipment within a managed (mown) forestry ride with grassland habitat.	344 m

Source: Natural Power

6.4.24 Data was collected on a seasonal basis with three deployments, one in each of spring, summer and autumn. All sample locations were deployed simultaneously in order to allow direct comparisons of bat activity. Guidance states that deployments should cover a minimum of 10 nights[22,23]. During the three deployments the detectors were on site for a total of 14 or 15 nights. The dates of the three deployments were as follows:

- Spring deployment: 12 – 26 May 2021 (15 nights);
- Summer deployment: 29 June – 12 July 2021 (14 nights); and
- Autumn deployment: 29 September – 12 October 2021 (14 nights).

6.4.25 The only exception to this was the static detector attached to the wind monitoring equipment, which was not put into position until 14 May and was, therefore, in place for 13 nights during the spring deployment.

6.4.26 The wind monitoring equipment collected site-specific weather data for the duration of the deployments to help in the interpretation of the bat activity data. Following NatureScot[23] guidance, suitable weather conditions for recording bats are considered to be nights that have a temperature above 10°C and a maximum ground level wind speed of 5 m/s, along with very low rainfall. It should be noted, however, that the recorded wind speeds taken by the anemometer on the wind monitoring equipment will exceed wind speeds at ground level. Examination of the weather data allowed those nights of each deployment with the least favourable conditions (those in which bat

activity was likely to be compromised) to be removed from the analysis (see Survey Limitations, paragraphs 6.4.49 to 6.4.51).

6.4.27 Detectors were programmed to commence recording from one hour before sunset and continue until one hour after sunrise, to cover the active period for all species potentially encountered on site. Detectors recorded data to a memory card which was downloaded and later analysed to identify species present. Activity levels can also be established from this data, based on the number of 'bat passes' recorded.

6.4.28 Bat calls were analysed using Kaleidoscope automatic identification software. The software provides automatic identifications which are assumed to be correct for common pipistrelle and soprano pipistrelle bats (and for identifying noise). Identification of other bat species records is considered less reliable and manual identification was therefore performed on all other acoustic records. The analysis of the bat survey data was undertaken following the methodology outlined in guidance[23]. A bat pass was defined as a sequence of bat pulses captured on a 15 second sound file. One sound file was counted as one bat pass. Different species within the same 15 second sound file were counted as separate bat passes.

6.4.29 An individual bat can pass a particular feature on several occasions while foraging. It is therefore important to acknowledge that a bat pass is an index of bat activity that describes the amount of use bats make of an area rather than a measure of the number of individuals in a population.

6.4.30 Following guidance[23], survey data was inputted into the online resource *Ecobat*[51]. This tool allows a user to compare bat data for a specific site with other sites for which data has been uploaded, within a given geographical area and time period. All data submitted to Ecobat is pooled, allowing a statistical comparison to be made regarding relative bat activity and allowing an assessment to be made as to the importance of a particular site in a regional context. Data was obtained for the 'Wales' geographic region and using records obtained within one month of the deployment start date. For all species, the minimum of 200 nights of data required for 'high confidence' in the dataset was met. However, using data from all of Wales means that not all data will come from sites of similar habitat, altitude and geography as the proposed development and so may represent data that is only partly comparable. County level data was not available.

Bat Activity Surveys: Walked Transects

6.4.31 Walked transects are stated in guidance[22,23] as complementing static detector deployments but that their application is discretionary. Following a recommendation from the NPTCBC Ecologist (Section 6.3: Consultation), walked transect surveys to record bat activity were added to the baseline survey programme. The purpose was to aid in the identification of possible flight lines emanating to/from roosts at Margam Park, where it was considered that topographical or habitat features may result in bat flights passing close to the proposed development.

6.4.32 Two transect routes were chosen to cover the area around Cwm Maelwg and Cwm Caetreharn (see Figure 6.2). The routes followed edge habitats as much as possible, whilst taking into consideration health and safety constraints. Each transect was walked at a steady pace by a surveyor carrying an Anabat Express zero crossing detector to record bat passes, along with a heterodyne detector to allow the surveyor to listen for bats. All echolocation calls recorded were subsequently analysed to allow identification and linking to a specific location using GPS. Where possible, the surveyor also recorded visible bats, including number, flight direction and behaviour.

6.4.33 Walked transects were carried out in the late summer and autumn with two visits to each transect per month during August, September and October 2021. Surveys were undertaken in favourable weather conditions. Both dawn and dusk surveys were carried out during this period, but most surveys were undertaken at dusk (starting at sunset and lasting for approximately two hours) as this is considered most effective, as the time of bat emergence is more consistent than the time at which bats return to the roost.

Preliminary Bat Roost Assessment

6.4.34 A bat roost preliminary assessment to identify any key features with potential for holding maternity roosts or significant hibernation/swarming sites was undertaken in April and May 2021 (wind farm areas) and June 2021 (AIL areas). A ground-based assessment of potential roosting sites, such as suitable mature or dead trees, buildings, ruins and bridges, was carried out across the survey area.

6.4.35 The survey area was based upon the proposed layout and AIL routes at the time of survey completion. The area around all infrastructure plus a surrounding buffer was covered (Figure 6.1). For proposed turbine locations a surrounding buffer of 350 m was covered in the survey. Guidance recommends a survey area of maximum rotor length plus 200 m (i.e. 286 m in the case of the proposed development). However, this larger survey area was utilised to allow for micrositing. This exceeds the 250 m buffer proposed in the Scoping Report. Around other proposed infrastructure (including tracks) an 80 m survey buffer was covered. Given the extensive tree cover it was only feasible to survey a targeted area and not the whole of the wind farm areas. For the AIL areas, where the survey was combined with other protected species surveys, potential bat roosts were surveyed within a 250 m buffer of these access routes.

Protected Mammal Survey: Otter and Water Vole

6.4.36 A combined otter and water vole survey was carried by experienced ecologists during June 2021. Water vole surveys can be undertaken from March to September, but NPTCBC recommended undertaking the survey during the most optimal time (May and June) and so the survey was carried out during this period. The survey was informed by the methods described in Bang & Dahlstrøm (2001)[28], Sargent & Morris (2003)[27], Chanin (2003b)[32], Dean *et al*. (2016)[29] and Strachan *et al*. (2011)[30]. Surveys were undertaken in favourable weather conditions when water levels were not prohibitively high (i.e. signs not potentially submerged).

6.4.37 The survey area covered all infrastructure within the wind farm areas plus a surrounding survey area of 750 m (except where this lay outside the north and south sections), plus the AIL areas and a 250 m buffer. Within this survey area all suitable habitat/ permanent watercourses were examined for signs of otter or water vole (see Figure 6.1). The Scoping Report stated that all permanent watercourses within 'Y Bryn Site Boundary' (now the wind farm areas) would be surveyed for otter and water vole, however, much of this area is distant from any planned development. The 750 m buffer covers an area that greatly exceeds that needed for assessing the effect of the proposed development upon these ecological features. Typically, a smaller survey buffer is utilised for these surveys (for example a 200 m search area around proposed development works is stated in guidance for otters) and so the results of these surveys are considered to give a good indication as to the status of these species within the wider area.

6.4.38 Any evidence of otter presence (including spraints, couches, potential holts, etc) or water vole presence (including feeding signs, droppings or burrows) were recorded in the field, including the location of all signs via the use of a handheld GPS. Any signs were photographed to visually catalogue each record.

Protected Mammal Survey: Badger, Pine Marten and Polecat

6.4.39 A protected mammal survey was carried out by experienced ecologists during summer 2021. Although the main focus of the survey was to record signs of badger, it also incorporated surveying for pine marten and polecat. The survey was informed by the methods described in Bang & Dahlstrøm (2001)[28], Sargent & Morris (2003)[27], Dean *et al*. (2016)[29], Harris *et al*. (1989)[26], Neal & Cheeseman (1996)[33] and Cresswell *et al*. (2012)[25].

6.4.40 A survey area covering the AIL areas plus a surrounding 250 m buffer was surveyed in June 2021. A survey area covering all infrastructure within the wind farm areas plus a surrounding survey area of 750 m (except where this lay outside the north and south sections) was surveyed in July and August 2021 (see Figure 6.1). The Scoping Report stated that 'Y Bryn Site Boundary' (now the wind farm areas) would be surveyed for these species, however, much of this area is distant from any planned development. The 750 m buffer covers an area that greatly exceeds that needed for assessing the effect of the proposed development upon these ecological features. Typically, a

[51] Available from www.ecobat.org.uk [Accessed 03/04/2023]

smaller survey buffer is utilised for these surveys (for example only a 30 m buffer is required around an active badger sett) and so the results of these surveys are considered to give a good indication as to the status of these species within the wider area.

6.4.41 Surveyors walked all linear features within the survey area (fences, walls, tracks, rides, forest edges, etc) and any signs of badger presence, such as latrines, feeding signs and runs, were recorded and mapped using a handheld GPS. Runs were followed to determine the presence of any setts. Any signs were photographed to visually catalogue each record. In addition, surveyors also recorded any confirmed or probable signs encountered of pine marten and polecat presence, such as scats and footprints. Any potential den sites encountered in suitable habitat were also examined.

Dormouse Survey

6.4.42 The desk study highlighted that hazel dormouse records existed within 5 km of the wind farm areas. However, a dormouse habitat suitability survey was undertaken in March 2021 within the vicinity of the proposed development, following guidance (Bright *et al.* (2006)[36]) and this suggested a low suitability for dormice. Through consultation with NRW it was stated that this method of habitat assessment is not currently recognised in Wales, and it was therefore recommended that presence/absence surveys for dormouse were undertaken (as had originally been put forward in the Scoping Report) as dormice have been recorded within coniferous woodland at other sites in Wales (see Section 6.3: Consultation). For completeness the dormouse habitat suitability assessment results are presented in Appendix 6.1: Ecology Technical Appendix.

6.4.43 The dormouse surveys involved the placement of nest tubes within the most suitable areas of habitat lying within 120 m of proposed infrastructure within the wind farm areas (based upon the locations proposed at that time). The most suitable habitat present was considered to be areas of scrub and semi-natural deciduous woodland, including isolated and fragmented areas. Coverage of conifers within the productive forestry was also included, especially where these lay close to areas of broad-leaved woodland.

6.4.44 One hundred nest tubes (50 in the north section and 50 in the south section) were placed at 20 m intervals. The locations of the nest tubes are provided in Appendix 6.1: Ecology Technical Appendix and are shown on Figure 6.3. The nest tubes were in place from May to October, so as to adequately judge presence or likely absence in both forestry areas. Adequate survey effort is calculated using an index of probability (based on using 50 nest tubes). A score of 20 is considered sufficient and this is calculated by summing the index of probability given to each month in which the nest tubes were in place (May: 4; June: 2; July: 2; August: 5; September: 7; October: 2 = a score of 22). All tubes were checked monthly by a qualified and licensed ecologist during this period for evidence of occupancy or use.

Great Crested Newt Survey

6.4.45 The Phase 1 habitat survey and aerial imagery were used to identify all ponds present within the site boundary. All ponds in the wind farm areas within 500 m of proposed infrastructure (including tracks) were then subject to a survey for great crested newts. This was undertaken irrespective of the perceived habitat suitability of the pond, following an NRW scoping response (see Section 6.3: Consultation). A total of 10 ponds were identified for survey initially. The locations of these ponds are presented in Table 6.5 and are shown in Figure 6.4 (pond numbers 1-10).

Table 6.5: Great-crested newt surveyed pond locations

Pond ID	X (Easting)	Y (Northing)
1	283264	193353
2	283200	192932
3	283939	192508
4	283823	193019
5	282114	191180
6	283883	193215
7	283082	188813
8	282811	188701
9	282409	188583
10	279248	188606
11	283874	191151

Source: Natural Power

6.4.46 Following NRW guidance[52], the ten ponds were surveyed for the presence of great crested newt using Edna testing. An experienced and licensed ecologist took a sample from each pond on 17 May 2021. The water samples were analysed by ADAS Biotechnology to determine the presence of great crested newt genetic material.

6.4.47 NPTCBC stated that, due to the possible unreliability of Edna analysis, that a sample of ponds would require additional physical surveys, to confirm the findings of the Edna sampling (see Section 6.3: Consultation). A sample of six ponds was chosen for this: two ponds in the north section (#1 and #6), two ponds in the south section (#7 and #9), a pond in the southern AIL area (#10), and a pond located outside the northern AIL area, but within 500 m of it (#11). This latter pond had not been subject to Edna analysis during the initial round of surveys. These additional physical surveys were completed during April to June 2022. Four visits were made in total, with two visits made during the core survey period of mid-March to mid-May. On each visit, surveys comprised bottle trapping, as well as egg searches and refugia searches, with torch surveys completed post sunset. Methods followed those recommended in guidance[40, 41]and were carried out by experienced surveyors under licence.

Survey Limitations

6.4.48 The following survey limitations were experienced.

Bat Activity Surveys: Weather

6.4.49 During the three deployments there were some nights considered to have weather conditions poor enough to have potentially affected bat activity. Details of this are presented below (spring and autumn deployments). There were no weather related issues in the summer deployment: two nights were removed from the analysis (due to excessive wind speeds) and thus 12 nights remained for assessment.

6.4.50 During the spring deployment all nights recorded a temperature below 10°C for some, or all, of the night-time period. In spring 2021 Wales recorded average maximum temperatures amongst the lowest ever recorded during April and the majority of May[53]. Thus, the low temperatures recorded were reflective of general conditions across the spring season and across the region and deploying on other dates in the spring period would not have yielded different results. The five coldest nights were removed from the analysis, leaving a deployment of ten nights in the analysis. During these remaining 10 nights wind speeds were light (below the threshold) and rainfall was low on all nights.

6.4.51 In the autumn deployment the four nights with the least favourable weather were removed from the analysis, to leave 10 nights. However, in these remaining 10 nights there were four nights that recorded temperatures below 10°C for part of the night-time period or in which wind speeds exceeded 5 m/s for part of the night-time period; though, as stated previously this is based upon data supplied by the wind monitoring equipment, which will have

[52] Guidance available from: https://naturalresources.wales/media/3509/guidance-on-use-of-dna-sampling-of-great-crested-newts.pdf [last accessed 03/04/2023]

[53] Met Office press release. Available from: https://www.metoffice.gov.uk/about-us/press-office/news/weather-and-climate/2021/cool-wet-may-concludes-spring-of-marked-contrasts [last accessed 03/04/2023]

recorded wind speeds greater than those recorded at ground level. Data of weather conditions during the static bat detector deployments is presented in Appendix 6.1: Ecology Technical Appendix.

Bat Activity Surveys: Equipment

6.4.52 The functionality of the detectors/microphones was satisfactory for all devices in the spring and summer deployments, but issues arose in the autumn deployment. Detector 'A' did not register the microphone until 6 October giving it a deployment effort of seven nights in that season. Detector 'WC1' had its cable damaged, as it was cut with a flail during bracken control, and only one night of effort was completed for this detector in that season.

6.4.53 No bat calls were recorded on detectors 'A', 'I' or 'wind monitoring equipment' during the spring deployment, on detector A during the summer deployment, or on detector wind monitoring equipment on the autumn deployment. However, in these cases the detectors are believed to have been functioning correctly and so this is considered to reflect an absence of bat passes and not a recording issue with the equipment.

Bat Activity Surveys: Ecobat

6.4.54 It should be noted that Ecobat does not allow for the removal of data from nights where bad weather or technical issues were encountered. For data uploaded to the platform, it therefore assumes the first and last date in a set in which a bat call is detected define the date range for analysis. If a bat call is not detected on the first and/or last nights of effort then there is an overestimation of bat activity, as recorded activity is averaged across fewer nights. In contrast if there are issues associated with weather or technical problems part-way through a deployment, then bat activity is underestimated, as recorded activity is averaged over more nights than were actually conducted.

6.4.55 Another limitation in the Ecobat data is the use of genus level records. Although the 2021 data submitted for the proposed development was able to include genus level records, there is a bug in the Ecobat code that means in most cases this is not possible. If a species has been logged, a record of a bat that has not been identified to species level cannot be submitted for the same night if it belongs to the same genus. So, for example, records of *Pipistrellus* sp. Cannot be submitted if common pipistrelle is recorded on the same night. The result of genus level records not being submitted, is to show a lower level of activity than is actually the case. As a result of this issue, reference data for genus level records is unreliable and, therefore, only species level records are used in the risk assessment that uses Ecobat data (Section 6.5).

Survey Coverage

6.4.56 During the preliminary bat roost assessment it was not possible to survey every mature or dead tree present within the survey area, due to the nature of the habitat in the vicinity of the proposed development (extensive areas of productive forestry consisting of thousands of trees), and the interior of forestry coupes were not surveyed. Attention was focussed on areas where it was considered that roosts were more likely to be present due to the potential for bats to access suitable features located on track edges, forest edges, rides, watercourses, etc. Also, following small layout changes that occurred subsequent to the survey being completed, the preliminary bat roost assessment did not cover all ground within a full 285 m of all turbine locations, as was originally planned. However, the buffer used is considered to be precautionary and the resulting data is sufficient for the assessment, especially when examined alongside the results of the bat activity surveys. All infrastructure is located within the surveyed area, with the exception of a borrow pit in the north section (Figure 6.1). However, the habitat in this area consists of conifer plantation, recently clearfelled plantation and wet dwarf shrub heath; which are of little or no suitability for bat roost locations.

Other Ecological Features for Which Surveys Were Not Undertaken

Fish

6.4.57 The Scoping Report stated that field surveys for recording fish (and fish habitats) would not be undertaken as such surveys can be intrusive and were not considered necessary in order to undertake an assessment. Such an approach was accepted in the scoping responses. Fish are, however, included in the feature assessment of this chapter (Section 6.6).

Reptiles

6.4.58 Following consultation, reptiles have been 'scoped in' to the EcIA. It was agreed (see Section 6.3: Consultation) that by assuming presence, no field surveys would be required. An assessment has been undertaken utilising existing desk study data, the results of the habitat survey and other *ad hoc* data collected during the baseline survey programme.

Invertebrates

6.4.59 Following consultation, invertebrates have been 'scoped in' to the EcIA, however no field surveys for invertebrates have been undertaken. As was accepted through consultation with NPTCBC, the assessment has been undertaken utilising existing desk study data and the results of the habitat survey, but presence at 'full capacity' has been assumed (see Section 6.3: Consultation).

Approach to Impact Assessment

6.4.60 This section presents the approach taken to the EcIA and provides an overview of how the potential for impact has been determined and the method by which impact significance has been ascertained. The approach to the EcIA adopted within this assessment follows the CIEEM guidelines[1], and in line with these guidelines professional judgement has been applied where appropriate. The criteria used and the underlying rationale are described further within the following sections.

Determining Important Ecological Features (IEFs)

6.4.61 In accordance with CIEEM guidelines[1], the importance of an ecological feature is based upon its respective elements relating to biodiversity and ecosystem services. The importance of an ecological feature is determined within a geographical frame of reference and the approach used in this EcIA is detailed in Table 6.6.

Table 6.6: Geographical context relating to the evaluation of an IEF

Level of value	Example of IEF
International	An internationally designated site (e.g. SAC), or site meeting criteria for international designations such as a World Heritage Site or United Nations Educational Scientific and Cultural Organisation (UNESCO) Biosphere Reserve.
	Species populations/habitat areas present with sufficient conservation importance to meet criteria for SAC selection.
National	A nationally designated site such as an SSSI or an NNR, or sites meeting the criteria for national designation (such as the JNCC guidelines).
	Species populations/habitat areas present with sufficient conservation importance to meet criteria for SSSI selection.
Regional	Sites designated as Local Nature Reserves or Local Biodiversity Sites, including SINCs.
	Species populations/habitat areas that meet the criteria for SINC classification.
Local	Areas of semi-natural ancient woodland smaller than 0.25 ha.

Level of value	Example of IEF
	Areas of habitat or species populations considered to appreciably enrich the ecological resource within the local context, e.g. species-rich flushes or evidence of regular otter activity.
Negligible	Widespread and/or common habitats and species. Features falling below Local Importance are not normally considered in detail in the assessment process.

6.4.62 Attributing geographical value to a feature is generally straightforward in the case of designated sites, as the designations themselves are normally indicative of level of value. For example, an SAC designated under the Habitats Directive is explicitly of European (International) importance. However occasionally a default level of value may not be appropriate in the specific context of the proposed development. Where this is the case, professional judgement has been applied and rationale for decreasing or increasing the geographical level of value of a feature is given. An example of this might be bats, all of which are of international importance due to their protection under Annex IV of the Habitats Directive. However, if only very few foraging/commuting records of common and widespread bat species were made at a site, attributing international importance to the population present at the proposed development would be disproportionate and the importance would be reduced accordingly (noting that this does not change the protection level from a legislative standpoint). For non-designated features, the use of guidelines such as that for assessing SINC criteria (Wales Biodiversity Partnership (2008)[20]) provide information for determining a feature's importance and level of value.

6.4.63 Certain ecological features may be assessed as not being subject to significant effects by a proposed development, but due to their high legal protection they must still be considered in the EcIA within the context of legal and policy implications (for example otter, for which their resting places are legally protected from destruction or obstruction).

6.4.64 Part of the process of attributing importance to a species involves defining the population to be valued and requires professional judgment to identify an ecologically coherent population against which effects on integrity[54] can be assessed (see Determining Significance of Ecological Effects, later in this section). For example, for wide-ranging species such as otter, it may be more appropriate to consider the otter population in a whole catchment, whereas for more localised species, such as water vole, importance may be attributed to groups of related colonies which function as a meta-population.

6.4.65 In line with the principles of proportionate EIA, embedded mitigation is considered at the outset of the assessment. IEF status has only been assigned where there is still considered to be the potential for significant effects to the integrity of the feature at the assigned value level arising from the proposed development, after the application of embedded measures.

Valuing Bats

6.4.66 For the purposes of this assessment and of assigning value to bats, the guidance set out by NatureScot[23] has been considered. Table 2 in this guidance identifies the population vulnerability of bat species based on the collision risk posed for individual bat species by wind turbines as determined by behavioural characteristics, and by bat population sensitivity based upon species rarity (adapted from Wray *et al.* (2010)[55]). Table 6.7 summarises the risk of turbine impact (i.e. collision risk) and the sensitivity of bat populations, within Wales.

Table 6.7: Risk of turbine impact affecting Welsh bat populations

Species	Collision risk	Sensitivity of population
Common pipistrelle	High	Medium
Soprano pipistrelle	High	Medium
Nathusius' pipistrelle	High	High
Noctule bat	High	High
Leisler's bat	High	High
Barbastelle	Medium	High
Serotine	Medium	High
Brown long-eared bat	Low	Low
Daubenton's bat	Low	Low
Natterer's bat	Low	Low
Lesser horseshoe	Low	Low
Bechstein's bat	Low	Medium
Brandt's bat	Low	Medium
Greater horseshoe	Low	Medium
Grey long-eared bat	Low	Medium
Whiskered bat	Low	Medium

Source: NatureScot (2021)[23]

6.4.67 The guidance provided by Wray *et al.* (2010)[55] includes a framework for identifying the importance of bats in the landscape through the evaluation of bat roosts and habitats. Applying this framework, bat roosts can be valued according to species rarity and roost status.

Characterising Potential Impacts on Ecological Features

6.4.68 The magnitude of impact is predicted quantitatively where possible, however, a more qualitative approach often has to be taken when characterising ecological features. The criteria used in this assessment for describing the overall magnitude of a potential impact is summarised in Table 6.8.

6.4.69 The assessment also considers whether the impact is positive or negative, short-term or long-term (for example it is only during construction or it lasts throughout the lifetime of the proposed development) and whether the impact is permanent or temporary.

Table 6.8: Criteria used within this EcIA to determine the magnitude of ecological impacts

Impact magnitude	Description
Very highly negative	Total or almost complete loss of an ecological feature resulting in a permanent adverse effect on the integrity of the feature. The conservation status of the feature would be permanently affected.
Highly negative	Large-scale, permanent changes in an ecological feature, likely to change its ecological integrity. These effects are therefore likely to result in overall changes in the conservation status of an ecological feature.
Moderately negative	This includes moderate-scale long-term changes in an ecological feature, or larger-scale temporary changes; however, the integrity of the ecological feature is not likely to be affected. This may result in temporary changes in the conservation status of the ecological feature, but these are reversible and unlikely to be permanent.

[54] Note that integrity in this context refers to ecological integrity of a habitat type or population of a species at a defined value level, i.e. the maintenance of the conservation status of a population of a species at a specific location or geographic scale. This should not be confused with the specific term 'Site Integrity' used in Appropriate Assessment for Natura 2000 sites.

[55] Wray, S., Wells, D., Long, E. & Mitchell-Jones, T. (2010) *Valuing Bats in Ecological Impact Assessment.* IEEM In-Practice p. 23-25.

Impact magnitude	Description
Low negative	This includes small magnitude, long-term effects, or moderate-scale temporary changes, and where integrity of the ecological feature is not affected. These effects are unlikely to result in overall changes in the conservation status of an ecological feature.
Negligible	No perceptible change in the ecological feature.
Positive	The changes in the ecological feature are considered to be beneficial to its ecological integrity and/or nature conservation status.

6.4.70 When characterising ecological impacts, it is essential to consider the likelihood that a change/activity will occur as predicted, with a degree of confidence in the impact assessment (in relation to the impact on ecological structure and function). Where it is not possible to predict quantitatively, a more qualitative approach is taken; particularly where the confidence level can only be based on expert judgement.

Determining Significance of Ecological Effects

6.4.71 CIEEM guidance[1] states that determining the significance of effects using a matrix approach to produce a 'significance score' should be avoided for the ecology discipline of an EIA, due to the assumptions that would be required to create values that are not easily quantified. Therefore, this approach has not been used.

6.4.72 Only features for which there is considered to be the potential for significant effects, after the implementation of embedded mitigation measures, are identified as IEFs and taken forward for EcIA. Having followed the process of identifying an IEF, determining its sensitivity, and characterising potential impacts, the significance of the effect is then determined. The CIEEM guidelines[1] use only two categories to classify effects: 'significant' or 'not significant'. A significant effect is defined in ecological terms as an effect on the integrity or conservation status of a defined site, habitat or species. The significance of an effect is determined by considering the value level of the feature and the magnitude of the impact and applying professional judgement as to whether the integrity/conservation status of the feature will be affected at the given value level. This concept can be applied to both designated and undesignated sites and to defined populations.

6.4.73 In this assessment, effects are more likely to be considered significant where the feature affected is of higher conservation importance or where the magnitude of the effect is high. Effects not considered to be significant would be those where the integrity of the feature is not threatened, effects on features of lower conservation importance, or where the magnitude of the effect is low. It should be noted that, alongside the criteria provided, professional judgement is applied in determining the significance of a potential effect.

6.4.74 Where appropriate, further mitigation and/or compensation measures, are identified in order to avoid and reduce potentially significant effects. It is also good practice to propose mitigation measures to reduce negative effects that are not significant. The significance of residual effects on features after the effects of additional mitigation or enhancement have been considered can then be determined, along with any monitoring requirements.

Trends and Predicted Future Baseline

6.4.75 Current habitat use within the wind farm areas is predominantly productive forestry. In the absence of development, it is assumed that the habitat use would remain the same for the foreseeable future, taking into account the rotational harvesting that is a feature of productive forestry. Current and future management means there are regular, temporary changes in forest structure as coupes are felled and replanted. Small scale changes in management of the forest may occur as productive conifers are harvested but the overall purpose of the land management in the vicinity of the proposed development is expected to remain the production of commercial timber.

6.4.76 The AIL areas cross open areas that include semi-improved pasture and scrub. Baseline conditions include the presence of an operational wind farm to the west of the south section (Mynydd Brombil Wind Farm) and land managed for a golf course to the north of the south section. In the absence of the proposed development it is expected that these habitats/land uses would remain in place for at least the short and medium term.

6.4.77 It is more difficult to predict changes that may occur in the long-term (i.e. the lifetime of the proposed development (50 years)). For example, land use change may occur as a result of policy shift or social and economic factors, and these could result in changes to species and habitat distributions. Such long-term changes cannot be accurately foreseen, and this does not undermine the assessment, which is based upon baseline conditions. It should be borne in mind that most man-made landscapes are relatively dynamic and should be seen in that context.

Climate Change

6.4.78 Conditions within the site boundary will be subject to the impacts of climate change. Such impacts are difficult to predict given the complexity of this issue and the uncertainty in the magnitude of change that may occur following any future alterations in societal behaviour that may mitigate for these changes. The predominant land-use in the wind farm areas (productive forestry) is predicted to continue although climate change may result in potential impacts to this, such as an increase in timber productivity, but also increases in wind damage and pest abundance. This may in turn lead to changes in forest management. However, this can be considered to be part of the dynamicity of productive forestry that already exists under baseline conditions.

6.4.79 Embedded mitigation (Section 6.6) will minimise damage to soils with a high peat content (a carbon store). Measures listed within the outline Habitat Management Plan (Appendix 6.3) include broadleaf tree planting and water retention measures (to reduce flood risk in the event of high rainfall events). See also the result of the Carbon Balance Assessment (see Appendix 10.4).

6.5 BASELINE RESULTS

6.5.1 This section presents the baseline environment from desk-based review and field surveys which we use as the basis for assessing the effects from the proposed development.

Desk Study

Statutory, National and Locally Designated Sites of Nature Conservation

6.5.2 A list of statutory designated sites with an ecological interest (habitat or non-avian species) that are located within 10 km of the site boundary is provided in Table 6.9. This includes four sites of international importance (SACs). The locations of these sites can be found on Figure 6.5. Designated sites with an ornithological interest are discussed in Chapter 7: Ornithology Assessment.

Table 6.9: Designated sites with ecological interests, within 10 km of site boundary

Site	Designation	Distance to site boundary	Size (ha)	Designation criteria
Bryn Tip	LNR	0.0 km (0.7 km to nearest turbine)		Reclaimed coal pit managed to enhance biodiversity, including reptiles and invertebrates.
Margam Moors	SSSI	2.6 km	108	Mesotrophic marsh, fen meadow, ditch communities and associated species of sedge and flowering plant. Also several named species of invertebrate.
Cwm Du Woodlands	SSSI	2.8 km	24.0	Ancient sessile valley oakwood.

Site	Designation	Distance to site boundary	Size (ha)	Designation criteria
Kenfig Pool and Dunes	NNR	3.7 km	514	Sand dunes with associated vascular plants and invertebrates.
Kenfig	SAC/SSSI	3.7 km	1192	Extensive sand dune habitats and standing water, with associated coastal habitats. Assemblages of nationally scarce and rare vascular plants, rare macro fungi and invertebrates.
Waun Cimla	SSSI	4.2 km	15.6	Wet lowland heath and grassland habitats. Also marsh fritillary butterfly.
Eaglebush Valley	LNR	4.4 km		Ancient semi-natural woodland.
Cefn Cribwr Grasslands (includes four neighbouring SSSIs: Bryn-Bach, Caeau, Penycastell, Waun-Fawr)	SAC/SSSI	4.6 km	58.0	Marshy grassland and species-rich neutral grassland and associated habitats. Populations of two notable vascular plants and a nationally scarce butterfly (marsh fritillary).
Cwm Risca Meadow	SSSI	5.1 km	8.2	Wet acidic meadow habitat and associated plants of local distribution. Also marsh fritillary butterfly.
Crymlyn Burrows	SSSI	6.6 km	243.5	Saltmarsh and sand dune habitats and associated flowering plants and an assemblage of invertebrates.
Cwm Cyffog	SSSI	7.2 km	17.9	Upland blanket mire.
Pant-y-Sais	SSSI	7.5 km	19.5	Species-rich lowland fen, with slender cotton-grass and an assemblage of scarce invertebrates.
Mynydd Ty-Isaf, Rhondda	SSSI	7.7 km	322.0	Cliffs and crags which support habitats including arctic-alpine plant species and fern-rich screes.
Crymlyn Bog	SAC/SSSI/ NNR	8.1 km	299.0	Fen habitats, wet woodland and associated invertebrate assemblage.
Blackmill Woodlands	SAC/SSSI	8.4 km	71.0	Old sessile oak woodland.

Source: Magic Map[45], NRW[46]

6.5.3 A list of non-statutory sites (SINCs/LWS) that lie within 2 km of the site boundary is presented in Table 6.10. The distance to the site boundary, as used in the data search, is listed for each SINC, but the table also separates out each site based upon proximity to actual infrastructure. The size of the SINC and its reason for selection is also provided, where this data is available.

Table 6.10: SINCs within 2 km of the site boundary

Site	Distance from search area (site boundary) (m)	Size (ha)	Reason for selection/ Habitat on site
Sites that overlap with infrastructure			
NPT Watercourses (undefined)	0		Rivers and streams
Sites within 250 m of infrastructure			
Nant-y-Crynwydd	0		Marsh/marshy grassland; semi-improved neutral & acid grassland; Sphagnum blanket bog; broad-leaved semi-natural woodland; dense continuous scrub.
Sites 250-500 m from infrastructure			
Bryn Tip	0	23.8	Open mosaic on previously developed land; invertebrates.
Caerau West	0		Marsh/marshy grassland; flush spring & acid/neutral flush; Sphagnum blanket bog; Sphagnum wet modified bog; wet dwarf shrub heath; dry heath acid mosaic; dry dwarf shrub heath; semi-improved acid grassland; scattered bracken.
Cwm Sychbant	0		Broad-leaved semi-natural woodland; semi-improved neutral grassland; marsh/marshy grassland; dense continuous bracken; coniferous plantation.
Y Parc (north)	344		Broad-leaved semi-natural woodland; wet & dry dwarf heath with scattered bracken; semi-improved acid grassland; unimproved neutral grassland; wet modified Sphagnum bog; marsh/marshy grassland; dense continuous scrub.
Sites 500-1000 m from infrastructure			
Cwm Cerdin	2		Broad-leaved semi-natural woodland; unimproved neutral grassland; tall herb fern interspersed in improved grassland.
Cwm Cerwyn	0		Broad-leaved semi-natural woodland; unimproved neutral grassland; dense continuous scrub; coniferous plantation.
Sites 1000-2000 m from infrastructure			
Abercerdin Wood	1		Broad-leaved semi-natural woodland; unimproved neutral grassland; semi-improved neutral grassland; acid/neutral geological outcrop.
Afan Mineral Railway	9	58.0	Native woodland; open mosaic habitats on previously developed land; invertebrates.
Bryn Goytre Cycleway	0	8.8	Boundaries & linear features.

Site	Distance from search area (site boundary) (m)	Size (ha)	Reason for selection/ Habitat on site
Caerau North	931		Marsh/marshy grassland; fen; dry modified bog; wet modified bog; Sphagnum blanket bog; semi-improved acid grassland; wet dwarf shrub heath; broad-leaved semi-natural woodland; acid dry dwarf shrub heath.
Craig Tal-y-Fan	1288		Broad-leaved semi-natural woodland; dense continuous scrub; dense continuous bracken.
Eglwys Nunydd	1527	158.8	Eutrophic standing waters; reedbeds.
Gilfach Uchaf	446		Marsh/marshy grassland; semi-improved acid grassland; acid dry dwarf shrub heath; natural acid/neutral rock exposure.
Harbourside Law Courts	1953	3.0	Open mosaic habitats on previously developed land; invertebrates.
Junction 38 Wetland Complex	1005	20.5	Native woodland; lowland fen; purple moor-grass & rush pastures.
Llan Road Woods	745		Bracken; dense continuous scrub; marsh/marshy grassland; scattered broad-leaved trees.
Margam Country Park	0	326.1	Wood pasture & parkland; ponds; mosaic habitats; mammals.
Meadow Row, Bryn	252	1.8	Lowland dry acid grassland; purple moor-grass & rush pastures; open mosaic on previously developed land.
Nant-y-Castell Grasslands	794		Unimproved neutral grassland; dense continuous bracken.
Sychbant Fields	0		Dry dwarf shrub heath (acid)
Tudor West	659		Marsh/marshy grassland; neutral grassland; broad-leaved semi-natural woodland; semi-improved acid grassland; acid/neutral flush.
Waun-y-Gilfach Woods	1090		Broad-leaved semi-natural woodland; marsh/marshy grassland.
Y Parc (south)	**0**		Broad-leaved semi-natural woodland; unimproved neutral grassland; semi-improved neutral grassland; wet dwarf shrub heath; marsh/marshy grassland; dense continuous scrub; blanket bog.
Sites >2000 m from infrastructure			
Cwmafan Green Corridor	186	12.0	Mosaic habitats.
Cwmavon Coal Tips	5	24.8	Native woodland; scrub communities; purple moor-grass & rush pastures; open mosaic habitats on previously developed land; invertebrates.
Dan-y-Coed	1168	4.4	Native woodland.
Drysity'n-y-waun	1285		Broad-leaved semi-natural woodland; marsh/marshy grassland; acid/neutral rock exposures.
Hawthorn Close	503	3.7	Native woodland.
Llwydarth Wood	1218		Broad-leaved semi-natural woodland; dense continuous scrub.
Penrhys Fawr	1585	5.3	Lowland dry acid grassland; purple moor-grass & rush pastures.
Rhyslyn	42	1.2	Native woodland; scrub communities; purple moor-grass & rush pastures; lowland meadows; other bracken communities.
Rolling Mill Cwmavan	260	1.35	Purple moor-grass & rush pastures; lowland dry acid grassland.
Tonmawr Minewater Treatment & Surrounding Habitats	1792	17.2	Scrub communities; lowland heathland; reedbeds; herptiles.
The Waun, Cimla	1901	154.7	Native woodland; hedgerows; purple moor-grass & rush pastures.

Source: SEWBReC

Habitats

6.5.4 The returned SEWBReC data included information regarding NRW Priority Areas within the search area (site boundary plus 2 km), and these are listed in Table 6.11. The small areas of ancient woodland that have survived within the north and south sections are on the steepest slopes along watercourses and thus do not overlap with any infrastructure related to the proposed development.

Table 6.11: NRW Priority Areas within 2 km of site boundary

Site type	No. of sites	% of search area	Category
B-lines*	1	5.72	Local, non-statutory
Plantation on ancient woodland site	84	3.85	Priority Area
NRW priority area (woodland)	83	3.83	Priority Area
Ancient semi-natural woodland	136	2.86	Priority Area
NRW priority area (heathland and grassland)	4	1.28	Priority Area
NRW priority area (lowland wetland)	1	1.15	Priority Area
Restored ancient woodland site	29	0.83	Priority Area
Ancient woodland site of unknown category	21	0.30	Priority Area

**B-lines are corridors linking wildflower rich habitats for the benefit of pollinating insects.*

Source: SEWBReC

6.5.5 The SEWBReC data includes Phase 1 habitats occurring in the vicinity of the proposed development (site boundary plus 2 km). Conifer plantation accounts for 46% of this search area. Of the Phase 1 habitats listed, those which have potential to contain priority habitats (Section 7[42] listed) are:

- Semi-natural broad-leaved woodland (3.67% of search area);
- Semi-improved acid grassland (2.49%);
- Marshy grassland (2.48%);
- Dry acid heath (1.92%);
- Semi-improved neutral grassland (1.85%);
- Unimproved acid grassland (1.66%); and
- Standing water (1.13%).

Species

6.5.6 The SEWBReC data returned records of protected or notable species within the search area. This was the site boundary plus 2 km for all ecological features except bats, for which a 5 km buffer was used. Table 6.12 summarises these records. Due to the large number of records returned only those recorded since 2015 are included (Ornithological features are listed in Chapter 7: Ornithology Assessment). It should be noted that, as with all data supplied by a biological records centre, the records in the database will be influenced by observer effort (e.g. in the distribution of records and in the species recorded).

6.5.7 Table 6.12 provides information as to the conservation status of these species. Those (non-avian) species listed on the Wildlife & Countryside Act (WCA Sch. 5), the Habitat Regulations (Habs Regs Sch 2), the Section 7 species list[42] (Sec7), priority species listed by NPT Nature Partnership[43] (NBAP) and on the Bridgend LBAP[44] (BBAP) are included in this table. Note that in addition to those species shown in Table 6.12 there were 40 species of moth in the returned data that are not included here but can be found in Appendix 6.1 Ecology Technical Appendix. These are Section 7 listed species, but none appear on the LBAP lists.

Table 6.12: Species recorded within the site boundary + 2 km (5 km for bat species) 2015-2021

Taxon	Species	No. records	Most recent	Protection/ conservation status
Amphibians	Common frog	9	2019	WCA Sch. 5
	Common toad	7	2020	WCA Sch. 5; Sec7
	Palmate newt	4	2019	WCA Sch. 5
	Smooth newt	1	2019	WCA Sch. 5
Reptiles	Adder	17	2021	WCA Sch. 5; Sec7; NBAP
	Common lizard	18	2020	Sec7
	Grass snake	13	2020	WCA Sch. 5; Sec7
	Slow worm	16	2020	WCA Sch. 5; Sec7
Fish	Brown/sea trout	1	2016	Sec7
Mammals	Badger	18	2021	Protection of Badgers Act
	Brown hare	3	2021	Sec 7; NBAP
	Otter	4	2019	Habs Regs Sch. 2; WCA Sch. 5; Sec7; BBAP
	Polecat	2	2019	Sec7
Bats	Barbastelle	1	2015	Habs Regs Sch. 2; WCA Sch. 5; Sec7; BBAP
	Brandt's bat	1	2016	Habs Regs Sch. 2; WCA Sch. 5; BBAP
	Brown long-eared bat	28	2021	Habs Regs Sch. 2; WCA Sch. 5; Sec7; BBAP
	Common pipistrelle	83	2021	Habs Regs Sch. 2; WCA Sch. 5; Sec7; BBAP
	Daubenton's bat	21	2019	Habs Regs Sch. 2; WCA Sch. 5; BBAP; NBAP
	Greater horseshoe bat	5	2016	Habs Regs Sch. 2; WCA Sch. 5; Sec7; BBAP
	Leisler's bat	2	2016	Habs Regs Sch. 2; WCA Sch. 5; BBAP
	Lesser horseshoe bat	8	2021	Habs Regs Sch. 2; WCA Sch. 5; Sec 7; BBAP
	Nathusius's pipistrelle	11	2019	Habs Regs Sch. 2; WCA Sch. 5; BBAP
	Natterer's bat	16	2020	Habs Regs Sch. 2; WCA Sch. 5; BBAP
	Noctule bat	47	2021	Habs Regs Sch. 2; WCA Sch. 5; Sec7; BBAP
	Serotine	3	2016	Habs Regs Sch. 2; WCA Sch. 5; BBAP
	Soprano pipistrelle	75	2021	Habs Regs Sch. 2; WCA Sch. 5; Sec7; BBAP
	Whiskered bat	7	2020	Habs Regs Sch. 2; WCA Sch. 5; BBAP
	Unidentified pipistrelle species	20	2021	Habs Regs Sch. 2; WCA Sch. 5; BBAP
	Unidentified Myotis species	18	2018	Habs Regs Sch. 2; WCA Sch. 5
	Unidentified bat species	3	2020	Habs Regs Sch. 2; WCA Sch. 5
Invertebrates	Black oil-beetle	4	2021	Sec7
	Violet oil-beetle	1	2016	Sec7
	Small pearl-bordered fritillary	12	2021	Sec7
	Small heath	19	2021	Sec7
	Small blue	4	2018	Sec7; NBAP; BBAP
	Dingy skipper	23	2021	Sec7
	Grayling	9	2020	Sec7
	Wall Brown	7	2019	Sec7
	Brown-banded carder bee	10	2021	Sec7; BBAP
Flowering plants	Bluebell	24	2021	NBAP

Taxon	Species	No. records	Most recent	Protection/ conservation status
Lichen	*Usnea articulata*	2	2019	Sec7
Fungus	Bearded tooth	1	2019	Sec7

Source: SEWBReC

6.5.8 Through consultation with NRW (as land manager), a small number of ecology records were obtained from the NRW environmental advisor. It was stated that NRW hold 20 records of noctule bat from the wind farm areas, the most recent being from 2020, although some refer to historical records from the 1970s. Noctule bats are considered to be potentially associated with the Nant Cwm y Garn watercourse. Other relevant confirmed records include ad hoc records of amphibians (common frog and smooth newt) and reptiles (grass snake). Reference is also made to the locally important population of ivy-leaved bellflower that is found within ditches in the wind farm areas.

Field Surveys

Habitats

Overview

6.5.9 The wind farm areas are located predominantly within two areas of productive forestry and thus 'coniferous woodland – plantation' was the Phase 1 habitat type that was recorded across the majority of the survey area. Areas of broadleaved or mixed woodland are also present, some of which has been planted, but more often these are semi-natural. These include woodland along steep inaccessible slopes above watercourses or woodland naturally regenerating within unmanaged or unplanted areas. Linear strips and patches of open ground exist within the north and south sections usually adjacent to forestry tracks and/or within forestry rides, some of which are managed by annual cutting of the vegetation. Phase 1 habitats within these open areas include marsh/marshy grassland and wet and dry dwarf shrub heath. Many of the open grassland and heath areas, where not managed are being encroached by bramble scrub, trees and bracken.

6.5.10 The AIL areas include open habitats of which the greatest areas are neutral grassland and acid grassland, with areas of scrub also present, particularly on steeper slopes. The neutral grassland found within the western AIL area is improved agricultural land and is considered to be species poor. A thin strip of 'broadleaved woodland – plantation' is bisected by the AIL route at its most westerly point.

Phase 1 and NVC Results

6.5.11 The results of the Phase 1 habitat survey, covering the full site boundary, are illustrated in Figure 6.6 and summarised in Table 6.13. The target notes recorded during the Phase 1 habitat survey are provided in Appendix 6.1: Ecology Technical Appendix.

6.5.12 The NVC survey provided detailed habitat characterisation for the surveyed area (infrastructure plus 250 m). The results of this survey are illustrated in Figure 6.7 and summarised in Table 6.13. Target notes recorded during the NVC survey are provided in Appendix 6.1: Ecology Technical Appendix.

6.5.13 Table 6.13 also includes details of any conservation designations that apply to the habitat type: habitats listed on Annex 1 of the Habitats Directive and those regarded as being of principal importance on the Section 7 list[42].

Habitat Loss Calculations

6.5.14 The construction of the proposed development would result in some permanent habitat loss by the infrastructure footprint (e.g. new access tracks, turbine bases, crane hardstandings, substation etc), and habitat loss calculations (HLC) are used to quantify the extent of this loss. Some construction areas will be reinstated following construction (for example the temporary construction compounds and earthworks) and therefore only represent temporary loss. As these losses are not regarded as 'irreversible' these areas are not included in the assessment. Percentage habitat loss is based upon the total area of each Phase 1 habitat type that was recorded within the site boundary. Further details of how the HLC was undertaken can be found in Appendix 6.1: Ecology Technical Appendix.

6.5.15 HLC is provided for all Phase 1 habitats and the results are included in Table 6.13. The area (hectares) of each Phase 1 habitat within the site boundary is listed alongside the percentage loss of these Phase 1 habitats as a result of construction of the proposed development.

Ground Water Dependent Terrestrial Ecosystems

6.5.16 Ground Water Dependent Terrestrial Ecosystems (GWDTEs) have protection under the Water Framework Directive, to prevent deterioration, protect and enhance the status of terrestrial ecosystems and wetlands and the aquatic ecosystems they depend on. Therefore, mitigation must be undertaken when carrying out any activities that may impact upon any of these ecosystems. The NVC survey results were used to identify potential GWDTEs. These are included in Table 6.13. Altogether eleven NVC communities were present which are classed in guidance (SEPA, 2017)[56] as indicative of potential GWDTEs, meaning that they have moderate or high dependency on groundwater in certain hydrological settings. Classification as a GWDTE does not necessarily confer any additional conservation importance to habitats present. Further details on GWDTE assessment can be found in Chapter 10: Hydrology, Geology and Hydrogeology.

Table 6.13 Phase 1 and NVC communities recorded in the vicinity of the proposed development with conservation designations and HLC results.

Phase 1 habitat type	NVC Community	Conservation Designation	GWDTE potential	Area in site boundary (ha)	Area lost to proposed development (ha)	% Lost to proposed development
A1.1.1 Semi-natural broadleaved woodland				134.20	1.21	0.90
	W1 *Salix cinerea-Galium palustre* and W6 *Alnus glutinosa-Urtica dioica* woodlands	Section 7: Wet woodland	Moderate			
	W9 *Fraxinus excelsior-Sorbus aucuparia-Mercurialis perennis* and W11 *Quercus petraea-Betula pubescens-Oxalis acetosella* woodlands	Section 7: Lowland mixed deciduous woodland	No			
	W17 *Quercus petraea-Betula pubescens-Dicranum majus* woodland	Section 7: Upland oak woodland	No			
A1.1.2 Broadleaved woodland: plantation				43.03	0.65	1.51
	W6 *Alnus glutinosa-Urtica dioica* woodland	Section 7: Wet Woodland	Moderate			

[56] Available from: https://www.sepa.org.uk/media/144266/lups-gu31-guidance-on-assessing-the-impacts-of-development-proposals-on-groundwater-abstractions.pdf [Accessed 03/04/2023] [57] MYOsp = unidentified *Myotis* species; NYCNOC = noctule; PIPNAT = Nathusius' pipistrelle; PIPPIP = common pipistrelle; PIPPYG = soprano pipistrelle; PIPsp = unidentified *Pipistrellus* species; PLEAUR = brown long-eared bat; RHIHIP = lesser horseshoe bat

Phase 1 habitat type	NVC Community	Conservation Designation	GWDTE potential	Area in site boundary (ha)	Area lost to proposed development (ha)	% Lost to proposed development
	n/a	n/a				
A1.2.1 Coniferous woodland: semi-natural				32.91	0.00	0.00
	n/a	n/a				
A1.2.2 Coniferous woodland: plantation				1381.67	85.80	6.21
	n/a	n/a				
A1.3.1 Mixed woodland: semi-natural				171.23	0.22	0.13
	W1 *Salix cinerea-Galium palustre* woodland	Section 7: Wet Woodland	Moderate			
	n/a	n/a				
A1.3.2 Mixed woodland: plantation				24.76	0.14	0.57
	n/a	n/a				
A2.1 Scrub: dense/ continuous scrub				62.63	3.87	6.18
	W23 *Ulex europaeus-Rubus fruticosus* scrub and W24 *Rubus fruticosus-Holcus lanatus* and W25 *Pteridium aquilinum-Rubus fruticosus* underscrub	n/a	No			
A2.2 Scrub: scattered				13.47	0.04	0.30
	W23 *Ulex europaeus-Rubus fruticosus* scrub and W24 *Rubus fruticosus-Holcus lanatus* and W25 *Pteridium aquilinum-Rubus fruticosus* underscrub	n/a	No			
A4.2 Recently felled woodland: coniferous				97.81	0.40	0.41
	n/a	n/a				
B1.1 Unimproved acid grassland				4.66	0.33	7.08
	U2 *Deschampsia flexuosa*, U4 *Festuca ovina-Agrostis capillaris-Galium saxatile* and U5 *Nardus stricta-Galium saxatile* grasslands	Section 7: Lowland dry acid grassland	No			
	U6 *Juncus squarrosus-Festuca ovina* grassland	n/a	Moderate			
B1.2 Semi-improved acid grassland				0.32	0.02	5.94
	U4*: Festuca ovina-Agrostis capillaris-Galium saxatile* grassland	n/a	No			
B2.1 Unimproved neutral grassland				5.08	2.07	40.75
	MG1 *Arrhenatherum elatius* and MG6 *Lolium perenne-Cynosurus cristatus* grasslands		No			
	MG5 *Cynosurus cristatus-Centaurea nigra* grassland	Section 7: Lowland Meadows	No			
	MG10 *Holcus lanatus-Juncus effusus* rush-pasture	n/a	Moderate			
B2.2 Semi-improved neutral grassland				1.88	0.57	30.32
	MG6 *Lolium perenne-Cynosurus cristatus* grassland	n/a	No			
B4 Improved grassland				55.90	2.82	5.04
	MG6: *Lolium perenne-Cynosurus cristatus* grassland	n/a	No			
B5 Marshy grassland				66.50	5.49	8.26
	M23 *Juncus effusus/acutiflorus-Galium palustre* rush-pasture	Section 7: Purple moor-grass and rush pastures	High			
	M25 *Molinia caerulea-Potentilla erecta* mire and MG10 *Holcus lanatus-Juncus effusus* rush-pasture	Section 7: Purple moor-grass and rush pastures	Moderate			

Phase 1 habitat type	NVC Community	Conservation Designation	GWDTE potential	Area in site boundary (ha)	Area lost to proposed development (ha)	% Lost to proposed development
B6 Poor semi-improved grassland				5.76	0.19	3.23
	MG6: *Lolium perenne-Cynosurus cristatus* grassland	n/a	No			
C1.1 Bracken: continuous				119.12	4.79	4.02
	U20: *Pteridium aquilinum-Galium saxatile* community	n/a	No			
C1.2 Bracken: scattered				24.22	0.00	0
	U20: *Pteridium aquilinum-Galium saxatile* community	n/a	No			
D1.1 Acid dry dwarf shrub heath				8.41	0.56	6.66
	H12: *Calluna vulgaris-Vaccinium myrtillis*; H18: *Vaccinium myrtillus-Deschampsia flexuosa* heaths.	Annex 1: European dry heaths; Section 7: Upland heathland	No			
D2 Wet dwarf shrub heath				4.23	0.53	12.53
	M15 *Scirpus cespitosus-Erica tetralix* wet heath	Annex 1: Northern Atlantic wet heaths with *Erica tetralix*; Section 7: Upland heathland	Moderate			
D5 Dry heath/acid grassland mosaic				12.63	0.01	0.11
	Transitional between U4 *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland and H18 *Vaccinium myrtillus-Deschampsia flexuosa* heath	Annex 1: European dry heaths; Section 7: Upland heathland	No			
D6 Wet heath/acid grassland mosaic				8.41	1.25	14.86
	M15 *Scirpus cespitosus-Erica tetralix* wet heath; M25 *Molinia caerulea-Potentilla erecta* mire	Annex 1: Northern Atlantic wet heaths with *Erica tetralix*; Section 7: Upland heathland	Moderate			
E2.1 Flush & spring: acid/neutral				0.25	0	0
	M6 *Carex echinata-Sphagnum recurvum/auriculatum* mire	n/a	High			
G1 Standing water				0.02	0	0
	n/a	Section 7: Ponds				
I1.4.1 Acid/neutral pavement				0.17	0	0
	n/a	n/a				
I2.1 Quarry				2.64	0.74	28.03
	n/a	n/a				
J2.3 Hedges with trees				0.12	0	0
	n/a	Section 7: Hedgerows				
J3.6 Buildings				0.08	0	0
	n/a	n/a				
J4 Bare ground				0.06	0	0
	n/a	n/a				

Source: Natural Power

Species – Bats

Bat Activity Surveys: Static Detectors

6.5.17 The results of the three static detector deployments are summarised in this section. In the accompanying graphs the following species codes are used:

- MYOsp = (unidentified) *Myotis* species (species of *Myotis* bat found in Wales are: Brandt's bat, Bechstein's bat, Daubenton's bat, Natterer's bat and whiskered bat);
- NYCNOC = Noctule;
- PIPNAT = Nathusius' pipistrelle;
- PIPPIP = Common pipistrelle;
- PIPPYG = Soprano pipistrelle;
- PIPsp = (unidentified) *Pipistrellus* species (one of the three pipistrelle species listed above);
- PLEAUR = Brown long-eared bat; and
- RHIHIP = Lesser horseshoe bat

6.5.18 Results are presented using the identification reference of each static detector, as described in Section 6.4.

Spring Detector Deployment

6.5.19 The 10 nights for which data has been analysed were 14 – 19 May, 22 May and 24 – 26 May 2021 inclusive. Table 6.14 provides an overview of the number of calls recorded across these 10 nights of the spring deployment. A total of six species were identified to species level, with common pipistrelle accounting for the large majority of records. Two species groups were also recorded.

Table 6.14: Summary of static detector data: spring deployment

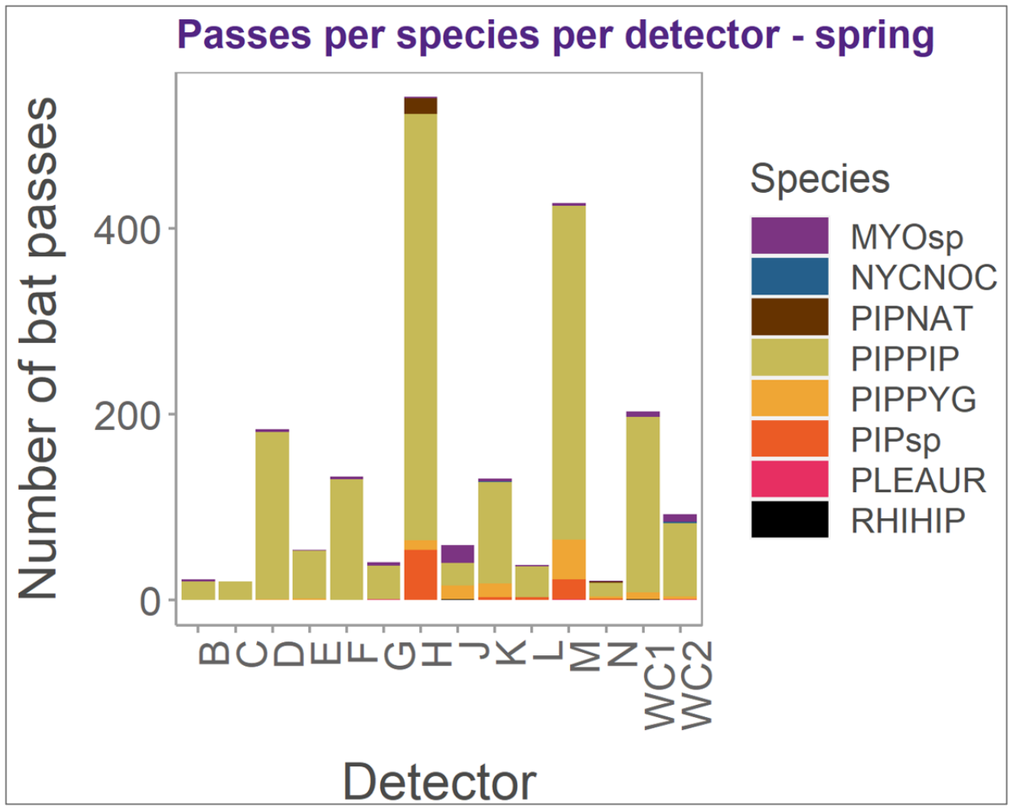
Species/species group	Total number of passes	Percentage of total (%)
Common pipistrelle	1704	86.67
Soprano pipistrelle	98	4.98
Nathusius' pipistrelle	18	0.92
Pipistrellus sp.	83	4.22
Myotis sp.	56	2.85
Noctule	2	0.10
Lesser horseshoe	2	0.10
Brown long-eared	3	0.15
Total	**1966**	**99.99***

** The 'Total' percentage is not exactly 100% due to rounding of the percentages per species*

Source: Natural Power

6.5.20 Graph 6.1 presents the passes per species per detector for the spring deployment. Detector locations 'A', 'I' and 'wind monitoring equipment' did not record any bats during the spring deployment and do not feature on the graph. Detector locations 'H' and 'M' located in the south section recorded the highest levels of bat activity.

Source: Natural Power



Graph 6.1: Total number of passes of each species[57] by detector location: spring 2021 deployment

Summer Detector Deployment

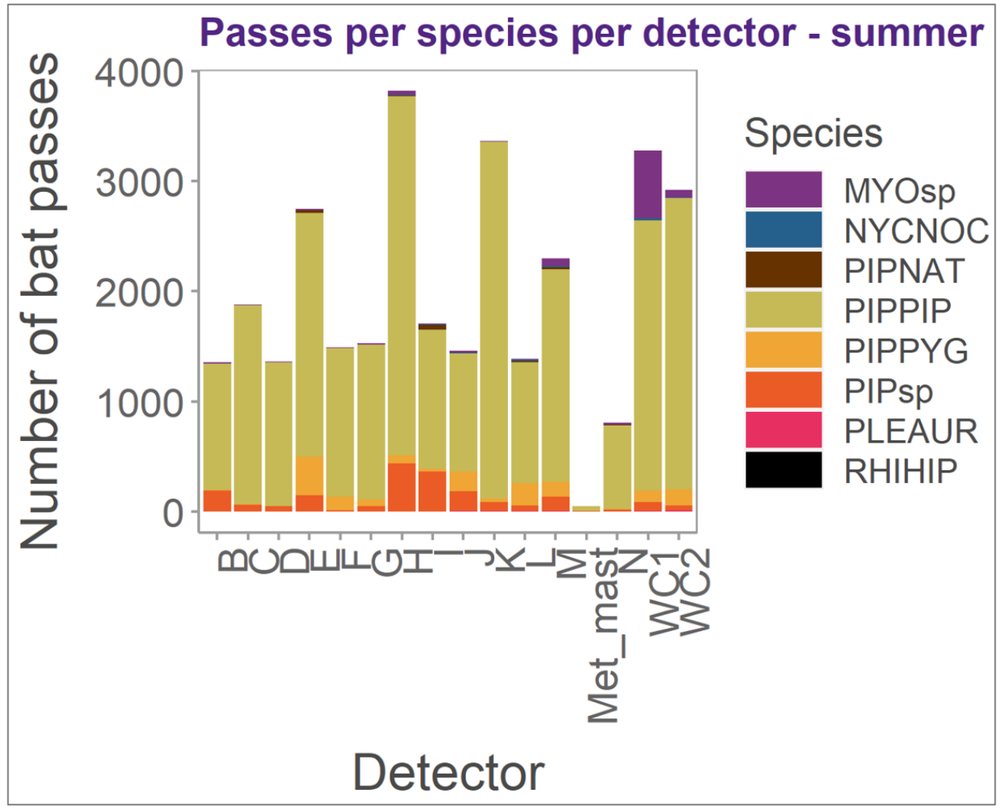
6.5.21 The 12 nights for which data has been analysed were 29 June – 3 July, 5 July and 7 – 12 July 2021 inclusive. Table 6.15 provides an overview of the number of calls recorded across these 12 nights of the summer deployment. The number of bat passes was much larger than that recorded in the spring deployment. The same six species were identified to species level, with common pipistrelle again accounting for the large majority of records. In addition, three unidentified species groups were recorded.

Table 6.15: Summary of static detector data: summer deployment

Species/species group	Total number of passes	Percentage of total (%)
Common pipistrelle	26981	85.77
Soprano pipistrelle	1446	4.60
Nathusius' pipistrelle	117	0.37
Pipistrellus sp.	1903	6.05
Myotis sp.	901	2.86
Noctule	55	0.17
Nyctalus sp.	10	0.03
Brown long-eared	42	0.13
Lesser horseshoe	2	0.01
Total	**31457**	**100**

6.5.22 Graph 6.2 presents the passes per species per detector for the summer deployment. Detector location 'A' did not record any bats during the summer deployment and does not feature on the graph. Activity from the 'at height' detector (wind monitoring equipment) was also low. As in spring, the detector location with the highest level of bat activity was 'H'. High levels of bat activity were also recorded at detector location 'K', which is in a similar vicinity as 'H'. Detectors 'WC1' and 'WC2' located along the edge of watercourses to the south of the turbine development area also recorded high activity levels.

Source: Natural Power



Graph 6.2: Total number of passes of each species[57] by detector location: summer 2021 deployment

Autumn Detector Deployment

6.5.23 The 10 nights for which data has been analysed in the autumn deployment were 1 October, 3 – 4 October and 6 – 12 October 2021. Detector 'A' did not start functioning correctly until 6 October and recorded seven nights in total and 'WC1' only recorded for the first night as it was subsequently damaged. Table 6.16 provides an overview of the number of calls recorded across the 10 nights of the autumn deployment. In acknowledgement that four of these 10 nights were suboptimal in terms of weather conditions (see Survey Limitations, Section 6.4) the data excluding these four nights (i.e. covering six nights only) are also provided in brackets. The four extra nights removed were: 1, 3, 4 and 10 October 2021.

6.5.24 The number of bat passes was much larger than that recorded in the spring deployment but significantly less than that recorded in the summer. The same six species were identified to species level, with common pipistrelle again accounting for the large majority of records.

Table 6.16: Summary of static detector data: autumn deployment

Species/species group	Total number of passes	Percentage of total (%)
Common pipistrelle	15190 (13659)	95.89 (96.74)

[57] MYOsp = unidentified *Myotis* species; NYCNOC = noctule; PIPNAT = Nathusius' pipistrelle; PIPPIP = common pipistrelle; PIPPYG = soprano pipistrelle; PIPsp = unidentified *Pipistrellus* species; PLEAUR = brown long-eared bat; RHIHIP = lesser horseshoe bat

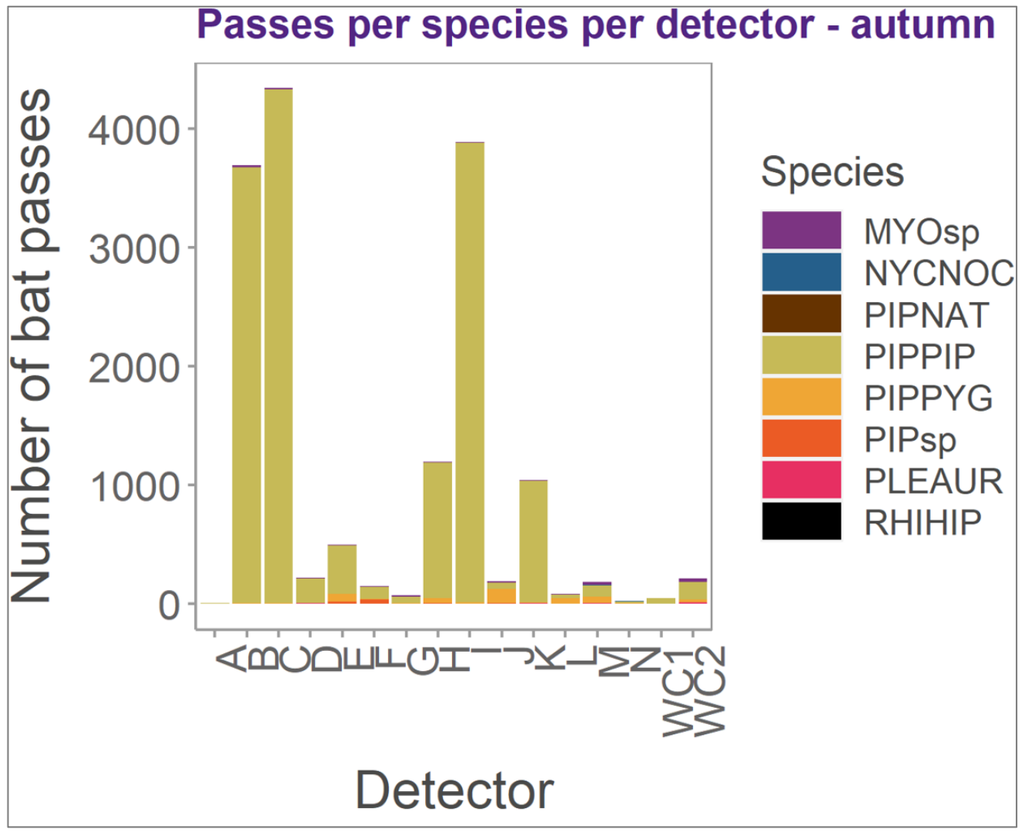
Species/species group	Total number of passes	Percentage of total (%)
Soprano pipistrelle	385 (264)	2.43 (1.87)
Nathusius' pipistrelle	4 (3)	0.03 (0.02)
Pipistrellus sp.	77 (72)	0.49 (0.51)
Myotis sp.	124 (74)	0.78 (0.52)
Noctule	11 (9)	0.07 (0.06)
Lesser horseshoe	4 (4)	0.03 (0.03)
Brown long-eared	46 (34)	0.29 (0.24)
Total	**15841 (14119)**	**100 (99.99*)**

** The 'Total' percentage is not exactly 100% due to rounding of the percentages per species*

Source: Natural Power

6.5.25 Graph 6.3 presents the passes per species per detector for the autumn deployment (10 nights). The detector attached to the wind monitoring equipment did not record any activity in the autumn deployment and is not included on the graph. The locations of highest bat activity in autumn were 'B' and 'C', which are located in the north section, and 'I' located in the south section.

Source: Natural Power



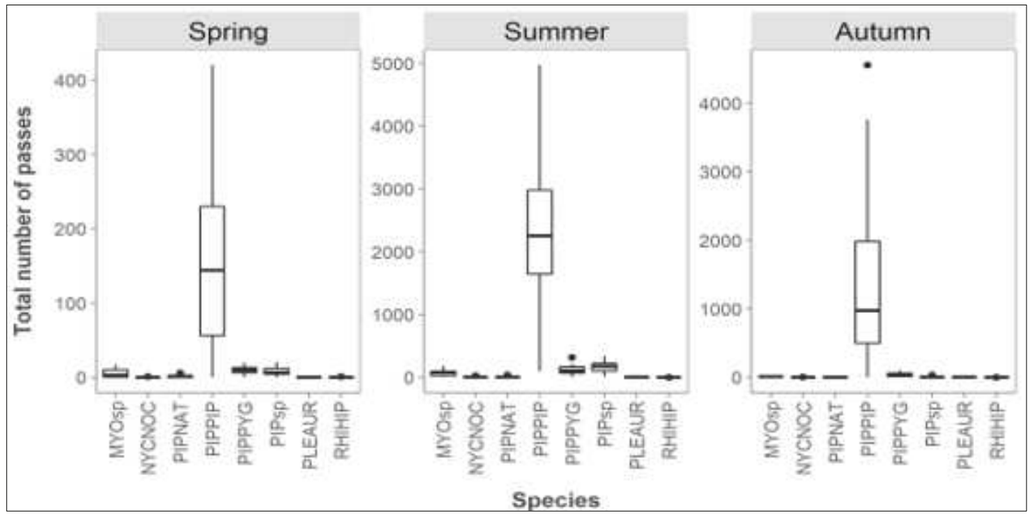
Graph 6.3: Total number of passes of each species[58] by detector location: autumn 2021 deployment

Season Summaries

6.5.26 Graph 6.4 shows the number of bat passes for the three deployments (maximum, median and confidence intervals). Graph 6.5 shows this same data but with the most frequently recorded species (common pipistrelle) removed to aid visibility of the other species. The plots show the 95% confidence interval (CI) as well as the upper and lower percentiles.

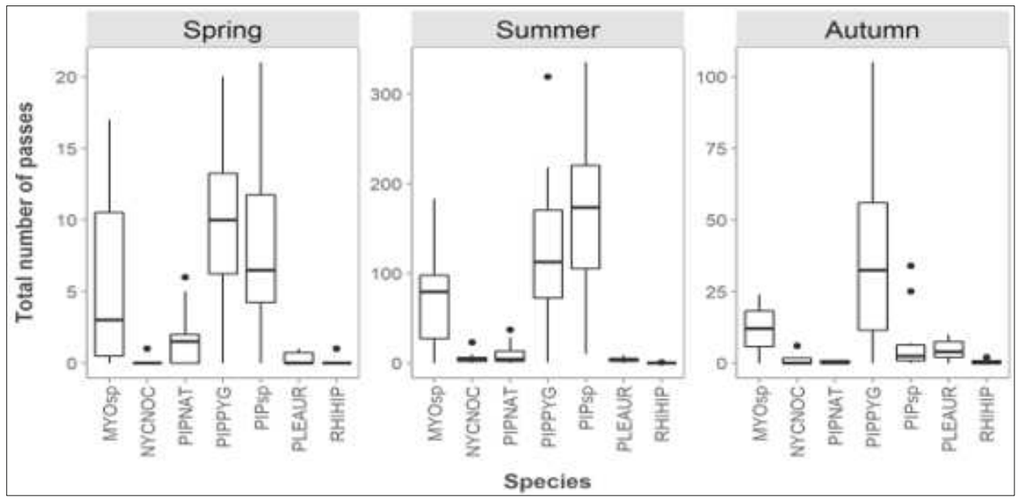
Source: Natural Power

[58] MYOsp = unidentified *Myotis* species; NYCNOC = noctule; PIPNAT = Nathusius' pipistrelle; PIPPIP = common pipistrelle; PIPPYG = soprano pipistrelle; PIPsp = unidentified *Pipistrellus* species; PLEAUR = brown long-eared bat; RHIHIP = lesser horseshoe bat



Graph 6.4: Bat passes per species[58] per deployment

Source: Natural Power



Graph 6.5: Bat passes per species[58] per deployment (excluding common pipistrelle)

6.5.27 Common pipistrelle was the most recorded bat species on all deployments, followed by soprano pipistrelle. Noctule, Nathusius' pipistrelle, brown long-eared and lesser horseshoe were recorded only in very small numbers.

6.5.28 Table 6.17 presents the Bat Activity Index (BAI) for all static detector locations, for the three deployments combined. BAI values refer to bat passes per night. The BAI takes into account the number of nights of deployment, so provides the best measure of activity when comparing detector locations. For this analysis it was considered most appropriate to use six nights for the autumn deployment (sub-optimal nights excluded). Analysis using the full 10 nights are presented in brackets (mean bat activity only). The detector locations are listed from highest median bat activity to lowest.

Table 6.17: Bat activity index (median and maximum) for each detector location, across all deployments

Detector	Median Bat Activity	Maximum Bat Activity
I	186 (53.5)	1330
WC1	172.5 (66)	470
C	135 (92)	1200
H	113.5 (82)	719
B	94.5 (41)	1861
M	62 (42.5)	481
K	57 (26.5)	697
D	55.5 (28)	335
F	40 (7)	411
E	39.5 (19)	502
J	33 (17)	260
WC2	26 (19.5)	616
L	14.5 (8.5)	352
G	12 (10)	357
N	8 (3)	305
Wind monitoring equipment	7 (0)	35
A	1 (0)	4

Source: Natural Power

6.5.29 Table 6.17 shows that the detectors within the turbine development area with the highest median bat activity were 'I', 'C' and 'H'. Location 'A' recorded very low bat activity despite being the closest detector to 'C'. The "at height" detector ('wind monitoring equipment') also recorded very few bat passes.

Emergence Plots

6.5.30 Plots were created to determine the level of bat activity through the night, but especially to look at activity around sunset and sunrise. A focus of activity during the expected emergence/return time for a particular species is considered evidence of there being a roost close to the static detector locations.

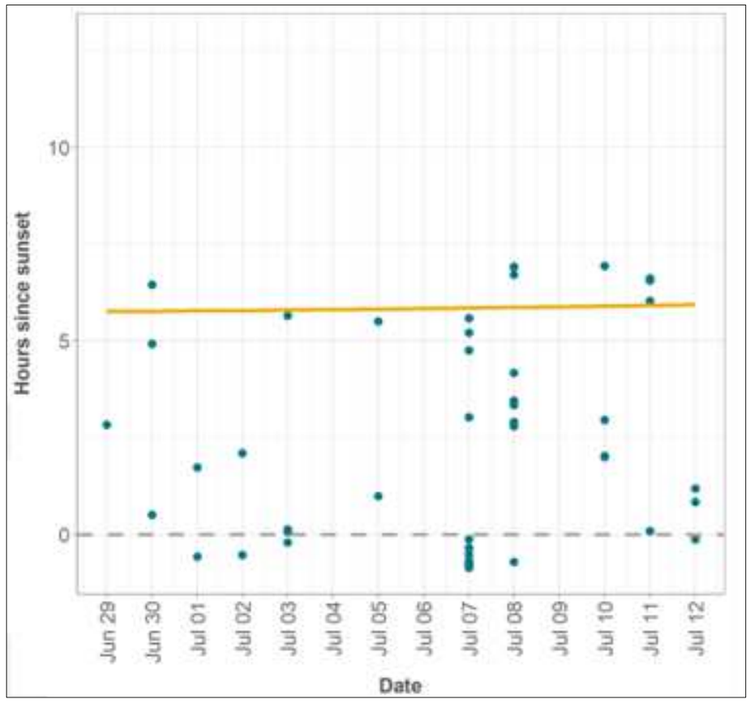
6.5.31 The percentage of bat passes (all species) at each detector that occurred within 0.5 hr of sunrise and sunset across the three deployments is shown in Table 6.18. Detectors 'D', 'M' and 'WC1' show the most activity at sunset/sunrise.

Table 6.18: Percentage of bat passes at sunset and sunrise (all deployments)

	Percentage of Bat Passes (%)		
Detector	Within 0.5 hr of sunset	Night-time period	Within 0.5 hr of sunrise
A	0	100	0
B	1.5	97.7	0.8
C	4.6	94.8	0.6
D	18.4	81.3	0.3

Detector	Percentage of Bat Passes (%)		
	Within 0.5 hr of sunset	Night-time period	Within 0.5 hr of sunrise
E	1.4	98.0	0.6
F	1.3	97.9	0.8
G	1.9	97.5	0.5
H	7.9	90.9	1.2
I	1.2	97.3	1.5
J	6.9	92.1	0.9
K	1.9	96.9	1.2
L	7.4	91.5	1.1
M	15.1	83.6	1.3
N	2.3	97.0	0.7
WC1	16.0	82.8	1.2
WC2	5.4	92.7	1.9
Wind Monitoring Equipment	12.0	88.0	0.0

Source: Natural Power



Graph 6.6: Noctule emergence plot (summer deployment)

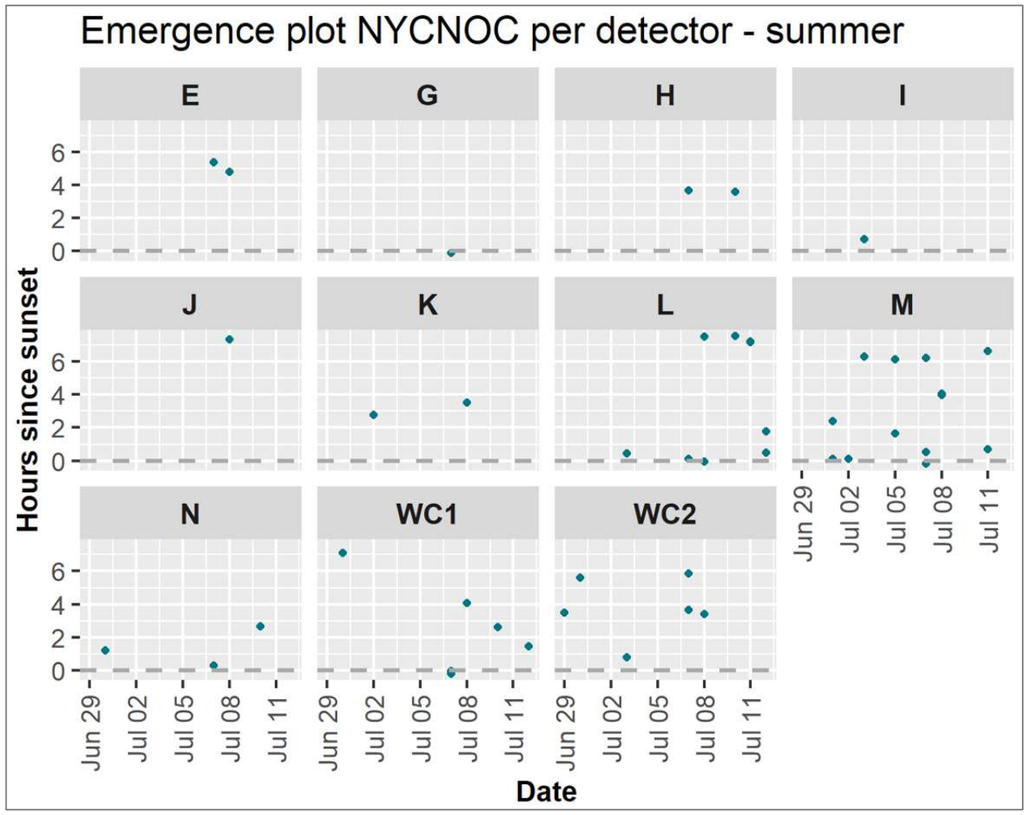
6.5.32 Emergence plots by species have also been generated and these suggest that there are likely to be noctule roosts present within the surveyed area, based upon the timing of recorded activity. Graph 6.6 shows the noctule emergence plot for the summer deployment. On the emergence plots the dashed line represents sunset and the orange line represents sunrise.

6.5.33 Noctule emergence generally occurs 5-10 minutes after sunset, or occasionally before[59]. Graph 6.6 shows that on most nights during the summer deployment noctule bats were recorded before sunset and/or after sunrise. In the spring deployment the only noctules were recorded at sunset and not later in the night but very little noctule activity was recorded in this season, so this pattern may be misleading. In autumn, records also appear to be focused around sunset.

6.5.34 Further analysis was undertaken to determine noctule emergence plots by detector. Graph 6.7 presents the plot for the summer deployment. This shows that detectors 'L' and 'M' both appear to have greatest activity at sunset and sunrise, which suggests they may be closest to potential roost locations.

6.5.35 Examples of the emergence plots produced for the other species/species groups are presented in Appendix 6.1: Ecology Technical Appendix. Common and soprano pipistrelle were recorded before sunset and after sunrise but were recorded throughout the night-time period and show no obvious focus in activity around dusk and dawn. The emergence plots for *Myotis* species and brown-long eared bat show that activity was recorded only in the night-time period and not at sunset or sunrise.

[59] Jones, K. & Walsh, A. (2006) *A Guide to British Bats*. Field Studies Council/The Mammal Society.



Graph 6.7: Noctule emergence plots by detector (summer deployment)

Bat Risk Assessment

6.5.36 Following guidance[23], data from the three seasons was run through Ecobat in order to provide an assessment of relative bat activity at the proposed development when compared with bat activity across Wales.

6.5.37 Using guidance[23] a risk assessment can be made in relation to the site and relative activity. For this assessment the proposed development has been defined as a "Medium" size project (a development of 10-40 turbines which may have other wind developments within 5 km). Although this definition in guidance also states such a project comprises turbines of 50-100 m in height (which does not reflect the size of turbines used in contemporary wind farms), the "Medium" category is considered more appropriate than the "Large" category (>40 turbines), as number of turbines is likely to determine the effect on bats more than turbine size above or below 100 m.

6.5.38 In the risk assessment the proposed development has also been given the "Moderate" habitat category: roost sites with moderate-high potential are on or near the site (but are not numerous); the habitat may be used extensively by foraging bats (but does not contain a high quality diverse habitat mosaic); and the site is connected to the wider landscape by linear features such as streams, scrub and tree lines.

6.5.39 This risk level of the site, combined with the level of bat activity identified from the percentile of relative activity provided in Ecobat (categorised using guidance[23]) provides a classification of overall risk to each species and is provided in Table 6.19 (spring), Table 6.20 (summer) and Table 6.21 (autumn).

6.5.40 Overall risk assessment is classed as low (green), medium (amber) or high (red).

Table 6.19: Bat Activity Index and overall risk assessment by species: spring deployment

Species	Median Percentile	Activity Level (med)	95% Cis*	Max Percentile	Activity Level (max)	Nights Recorded
Lesser horseshoe	11	low	0 – 0	11	low	2
Common pipistrelle	6	low	7.5 – 11	16	low	124
Soprano pipistrelle	1	low	2.5 – 6	7	low	38
Nathusius' pipistrelle	18	low	14.5 – 29	31	low-moderate	9
Noctule	2	low	0 – 0	2	low	2
Brown long-eared	5	low	18 – 18	31	low	5

Cis = Confidence intervals

Source: Ecobat 2021

Table 6.20: Bat activity index and overall risk assessment by species: summer deployment

Species	Median Percentile	Activity Level (med)	95% Cis	Max Percentile	Activity Level (max)	Nights Recorded
Lesser horseshoe	11	low	0 – 0	11	low	2
Common pipistrelle	18	low	7 – 18	52	moderate	207
Soprano pipistrelle	6	low	9 – 16	42	moderate	135
Nathusius' pipistrelle	18	low	18 – 33	44	moderate	39
Noctule	2	low	5 – 5	29	low-moderate	27
Brown long-eared	14	low	25 – 44	44	moderate	15

Source: Ecobat 2021

Table 6.21: Bat activity index and overall risk assessment by species: autumn deployment

Species	Median Percentile	Activity Level (med)	95% Cis	Max Percentile	Activity Level (max)	Nights Recorded
Lesser horseshoe	11	low	11 – 11	11	low	3
Common pipistrelle	7	low	9.5 – 45	68	moderate-high	118
Soprano pipistrelle	3	low	6 – 13	24	low-moderate	69
Nathusius' pipistrelle	11	low	0 – 0	11	low	4
Noctule	4	low	7 – 7	7	low	8
Brown long-eared	15	low	29 – 29	29	low-moderate	14

Source: Ecobat 2021

6.5.41 The data was analysed further to assess risk per static detector location, for each species. Those which determined a medium or high-level risk are presented in Table 6.22. Only one species at one detector location was identified.

Table 6.22: Bat risk assessment by turbine (medium and high risk only)

Detector	Species	Median Percentile	Activity Level (med)	Max Percentile	Activity Level (max)
H	Nathusius' pipistrelle	23	low-moderate	31	low-moderate

Source: Natural Power/Ecobat

Bat Activity Surveys: Walked Transects

6.5.42 The results of the transect surveys can be seen on Figure 6.8. The western transect recorded the most activity, with nearly twice as many calls recorded here than on the eastern transect.

6.5.43 The surveys undertaken in September 2021 accounted for most of the recorded bat activity (by month). Fewest records were made during the October 2021 surveys.

6.5.44 The total number of records of each bat species/species group over the course of the three months of walked transect surveys are shown in Table 6.23. Common pipistrelle was the most frequently recorded bat species on the walked transects but made up a lower proportion of records compared to the static detector surveys. Noctule made up a relatively high proportion of records on the walked transects compared to the static detector surveys. The totals in Table 6.23 exclude 'pipistrellus sp. Social call' records.

Table 6.23:Summary of walked transect bat activity surveys

Species/species group	Total number of passes	Percentage of total (%)
Common pipistrelle	115	45.28
Soprano pipistrelle	69	27.17
Pipistrellus sp.	9	3.54
Myotis sp.	5	1.97
Noctule	52	20.47
Nyctalus sp.	2	0.79
Brown long-eared	2	0.79
Total	**254**	**100.01***

** The 'Total' percentage is not exactly 100% due to rounding of the percentages per species*

Source: Natural Power

Preliminary Bat Roost Assessment

6.5.45 A total of 15 features (or groups of features) with potential for roosting bats were recorded during the dedicated surveys. These are shown in Figure 6.9. Features that were recorded but noted as having 'very low potential' are not included.

6.5.46 All potential roost features regarded as having moderate or good suitability for bats were trees or group of trees. Of the species recorded during the bat activity surveys, only noctule favours trees for roost sites (summer and winter), with the other species favouring, or exclusively using, buildings and/or underground sites for summer and winter roosts.

6.5.47 A confirmed bat roost was identified incidentally by a surveyor undertaking a nightjar survey in July 2020. Two noctule bats were recorded emerging from a hole in the remains of a dead tree standing in an area of clearfell. The location is in the south-west of the south section of forest at location 279907, 188564. It is located 166 m from the nearest track and approximately 1130 m from the nearest turbine. The tree was visited again in 2021 to confirm it was still standing, but the location lies outside the bat roost survey area due to its distance from proposed infrastructure, and this roost site is not included in Table 6.24.

Table 6.24: Features recorded during the preliminary bat roost assessment

Key No.	Easting Northing	Feature Type	Suitability	Distance from infrastructure (m)	Type of Infrastructure
1	282894 193177	Group of dead conifer trees with holes	Good	189	Turbine (T03)
2	281611 191005	Group of dead conifer trees with holes	Good	537	Track
3	282942 190682	Group of mature oak trees with holes	Good	1	Track
4	283091 190079	Small group of moribund conifers with holes	Good	230	Track
5	282368 189068	Dead, mature conifer tree with lifted bark	Good	9	Track
6	282575 189266	Dead, mature conifer tree with holes	Good	7	Track
7	282818 189531	Group of dead conifer trees with holes	Good	6	Track
8	283049 188777	Dead, mature conifer tree with holes	Good	228	Turbine (T11)
9	281408 188517	Small group of mature beech trees with holes	Good	205	Track
10	282862 193251	Group of dead conifer trees	Low	150	Track
11	283783 192062	Breezeblock (with roof)	Low	10	Track
12	283261 191056	Small group of dead conifer trees	Low	38	Track
13	281824 190764	Group of mature beech trees	Moderate	216	Track
14	282079 189663	Mature mixed woodland in a ravine	Moderate	216	Track
15	283841 191146	Row of mature ash and sycamore with holes, etc	Moderate	245	Track

Source: Natural Power

Otter

6.5.48 The only otter sign recorded, was found within the edge of the 250 m buffer that was surveyed for the AIL route. This was considered to be a slide: a location where an otter run leads down a bank and enters a watercourse. The slide was on the side of a stream that is located to the east of the access track, and which shall not be crossed by any proposed infrastructure (see Figure 6.10). No other otter signs were recorded within the surveyed area.

6.5.49 No otter or otter signs were recorded within the wind farm areas during the dedicated surveys undertaken in June 2021, however habitats were observed that have the potential to support this species. The larger watercourses (e.g. Nant Cwmwernderi, Nant Drysiog, Nant Cynon, Arnallt Brook) were recorded as supporting suitable otter habitat. Additionally, fish were noted in some of the larger watercourses, particularly the Nant Cynon in the northern forestry section.

6.5.50 The reservoirs in the south section (Cwmwernderi and Brombil) also supported suitable otter habitat, however these were subject to relatively high levels of human activity including dog walkers, likely reducing the suitability for otter, particularly with regard to resting places/holts. The site boundary also holds a number of ponds that could provide suitable foraging habitats for otter. Many of the smaller watercourses and tributaries to the named watercourses had very low flow or were dry at the time of survey but may provide suitable commuting routes at certain times of year.

Water Vole

6.5.51 No water vole or signs of water vole were recorded during the dedicated surveys undertaken in June 2021.

6.5.52 The habitat in the survey area was considered largely suboptimal for water vole due to the fast flow of the larger watercourses, with most ground being on relatively steep gradients. Additionally, heavy shading from the surrounding forest was associated with the majority of watercourses surveyed. An area of potentially suitable habitat was identified in the vicinity of the ponds that lie south of T16. The vegetation in these areas (purple moor-grass with rush) is considered to be favourable habitat type for water voles in upland areas of south Wales. However, no evidence of presence or use by water voles was identified at the time of survey.

Badger

6.5.53 An active badger sett was located during the dedicated badger surveys undertaken in July and August 2021 (although it is located more than 750 m from infrastructure). A minimum of eight entrances were located and signs of recent digging and fresh latrines were also noted. The sett is located on the edge of the south section and is located over 900 m from the nearest turbine and 650 m from the nearest track.

6.5.54 During the dedicated surveys one feeding sign was recorded. A predated wasp nest was located in the south section close to the eastern edge. It was considered that this was likely to have been the result of badger activity. This was outside the footprint of the proposed development.

6.5.55 Two further incidental records of badger were made during the baseline survey programme. An active badger sett located in August 2021 had a minimum of three entrances and signs of recent digging were noted at one entrance. The sett lies in the south section outside the turbine development area. The sett is located 1,300 m from the nearest turbine.

6.5.56 During a nightjar survey in July 2021 a live sighting of a badger was made as it crossed a track within the south-eastern part of the south section. This was outside the footprint of the proposed development.

6.5.57 The location of badger records are shown on Figure 6.11 in Appendix 6.2: Ecology Confidential Appendix.

Polecat

6.5.58 No polecats or signs of polecats were recorded during the dedicated surveys undertaken in July and August 2021. However, during the baseline survey programme a polecat was incidentally recorded. During a bird survey in July 2021 a live sighting was made of a polecat in the forest of the south section. The location of the sighting is to the west of the turbine development area. Its location is shown in Figure 6.10.

Pine Marten

6.5.59 No pine martens were recorded during the dedicated surveys undertaken in July and August 2021. Nor were any signs, or potential signs, recorded during the course of other baseline surveys.

Dormouse

6.5.60 A dormouse habitat suitability assessment was undertaken at the proposed development in April 2021. Although the scoring system that was used to undertake the assessment is not a currently agreed methodology in Wales (NRW *pers. Comm.*[60]) for completeness the results of this survey are presented in Appendix 6.1: Ecology Technical Appendix.

6.5.61 The 100 dormouse tubes that were deployed were checked monthly between May and October inclusive. No evidence of dormice was recorded.

Great Crested Newt

6.5.62 The ten ponds surveyed using Edna had samples collected on 17 May 2021. These were received by ADAS on 19 May 2021 and tested on 21 May 2021. Eight of the samples were considered to be 'good', with the other two, whilst being within satisfactory limits, were recorded as having 'low sediment'. No samples were classed as being inhibited.

6.5.63 All Edna samples came back as negative for the presence of great crested newts.

6.5.64 Physical surveys to search for great-crested newts were undertaken on six ponds during four visits in April-June 2022. No evidence for the presence of great crested newts were found in any of the surveyed ponds. The only amphibians recorded were palmate newt and common frog.

6.6 ASSESSMENT OF POTENTIAL EFFECTS

6.6.1 The EcIA has been undertaken in accordance with CIEEM guidelines[1] with establishment of baseline ecological conditions within the vicinity of the proposed development and identification of IEFs through a combination of ecological field surveys and a desk-based review. Each identified IEF is assessed separately, with consideration given to impact extent, magnitude, duration, timing, frequency and reversibility, as appropriate, along with an assessment of the level of confidence in the impact assessment for the determination of significance of effect.

Predicted Impacts

6.6.2 Impacts may arise for species and habitats at the proposed development via a number of mechanisms:

- Direct impacts associated with habitat loss and/or mortality;
- Direct impacts on protected species associated with resting place destruction;
- Indirect impacts on habitats and species associated with dust, siltation, leaks and spillages;
- Indirect impacts on protected species associated with disturbance; and
- Indirect impacts on species through pollution of habitats/watercourses affecting food sources.

6.6.3 Embedded mitigation measures are considered to be 'in-built' to the proposed development, to reduce impacts associated with construction and operation. Embedded mitigation is considered at the outset of feature assessment.

Embedded Mitigation

Mitigation By Design

6.6.4 During the design process, several aspects were taken into consideration in order to minimise the potential risk to species and habitats arising from the proposed development. See Chapter 4: Site Selection and Design Evolution for detail on the overall design process.

6.6.5 A minimum distance of 50 m has been maintained between the proposed development and watercourses, with the exception of utilising existing tracks that already cross, or already run within 50 m of, watercourses. Any new watercourse crossings will be constructed, where possible, to be sympathetic to existing natural geomorphological conditions and to allow the safe passage of fish and otters. See Chapter 10: Hydrology, Geology and Hydrogeological Assessment for further information regarding watercourse crossings.

6.6.6 The layout of the proposed development has avoided impacts to sensitive habitats where possible (e.g. the areas of soil with the highest peat content). Where avoidance has not been possible, the infrastructure will be constructed

[60] Email from the NRW Planning Team on 30/04/2021.

in such a way as to maintain the integrity and connectivity of the hydrology of hydrologically sensitive habitats. Access tracks will be designed in keeping with good practice, of which further detail is provided in Chapter 10: Hydrology, Geology and Hydrogeological Assessment.

6.6.7 Trees in the vicinity of turbines will retain a safe buffer distance for bats between blade tip and forest edge, for all turbines. This distance is calculated using the following equation, based on current guidance[23].

$$\sqrt{(50 + bl)^2 - (hh - fh)^2}$$

Where *bl* = blade length, *hh* = hub height and *fh* = feature (tree) height.

6.6.8 This calculation is based on assumed candidate turbine dimensions set out in Chapter 5: Project Description and varies depending on the overall turbine tip height (250 m, 230 m or 206 m). A tree height of 30 m has been used.

6.6.9 For the four turbines, comprising up to 250 m tip heights and 172 m rotor diameters, a 23 m horizontal separation will be required for bats owing to the lowest blade swept height. For the two turbines comprising up to 230 m tip height and 172 m rotor diameters, a 74 m horizontal separation will be required. For the remaining turbines (12), comprising up to 206 m tip height and 172 m rotor diameter, a 102 m horizontal separation will be required.

Construction Phase

6.6.10 A CEMP and Construction Methods Statement (CMS) will be produced prior to construction works commencing in consultation with the Local Planning Authorities (see Chapter 5: Project Description). The document will be a live document and will be updated throughout the pre-construction, construction and post-construction phases and will:

- Include measures to safeguard habitats and species to be implemented prior to construction, during construction and post-construction; and
- Provide details of all pre-construction surveys required including methods and timings.

6.6.11 An ECoW will be present during enabling works and throughout the construction period of the proposed development. They will be a suitably experienced individual, whose role would be to provide advice so that that works are carried out in accordance with environmental measures detailed in the CEMP, and to monitor compliance with relevant environmental legislation and good practice (see Section 6.2 Legislation, Policy and Guidance). The ECoW would contribute to all relevant CMS and CEMP documents. Once work has commenced, their role will be to provide ecological and pollution control advice, undertake water quality monitoring and monitor compliance of all relevant mitigation measures and environmental legislation (see also Chapter 10: Hydrology, Geology and Hydrogeological Assessment).

6.6.12 The ECoW will also give regular toolbox talks to make site personnel aware of the ecological sensitivities on site. The ECoW would have the authority to stop any construction activity that is having or likely to have a significant environmental effect or be in breach of legislation.

Habitats

6.6.13 Detailed mitigation measures will be provided in the CEMP for the protection of sensitive habitats and features during the pre-construction, construction and post-construction phases and will consist of:

- Toolbox talks to inform contractors of the sensitive habitats at the proposed development;
- Marking of sensitive areas of habitat close to construction areas, to prevent accidental encroachment;
- No storage of materials or machinery permitted within exclusion zones; and
- Supervised vegetation clearance by the ECoW in sensitive areas prior to construction.

6.6.14 Construction phase control measures will continue during the operational phase, through the Operational Management Plan (OMP), where potential effects exist.

6.6.15 Where possible (and where permitted by other constraints) an allowance of 50 m micrositing of infrastructure will be undertaken to ensure construction does not impact on the most sensitive habitats and any other identified ecological constraints and will be completed in consultation with the ECoW. This is particularly important when working in close proximity to waterbodies and sensitive habitats. Where micrositing cannot avoid areas of sensitive habitats or features, the ECoW would discuss and agree additional required mitigation to ensure impacts are minimised in line with the terms of the CEMP.

6.6.16 Any land degraded by construction and not required for the operation of the proposed development, such as temporary crane pads and borrow pits, would be restored as soon as possible after construction is completed. Where a good ground flora is established, turves would be carefully removed during construction as far as practicable and stored following good practice for re-use in the restoration of areas not required for the operation of the proposed development. As such, any vegetation removed for the construction phase would be reinstated within the proposed development area facilitating natural re-colonisation of vegetation communities. Permanent habitat loss would be limited to that required for the footprint of infrastructure and good site management practices would be implemented to minimise the risk of encroachment of the construction corridor into adjacent habitats. As far as is reasonably practicable, any notable floral species encountered will be marked with an exclusion zone or translocated to other suitable areas of habitat or stored for reuse in reinstatement of temporary infrastructure. The implementation of these measures will reduce the potential for impacts on sensitive habitats.

6.6.17 Site activities have the potential to cause pollution through dust, siltation, leaks and spillages associated with plant and materials during the construction and operational phases. If such incidents were to occur, then these pollutants may reach waterbodies and surrounding vegetation. Therefore, these activities may directly or indirectly affect habitats and species, especially where they are hydrologically connected.

6.6.18 Pollution incidents may occur during construction as well as within the operational phase during maintenance works. Pollution prevention measures will be detailed in the CEMP and overseen by the ECoW. Pollution with regards to waterbodies is further discussed in Chapter 10: Hydrology, Geology and Hydrogeological Assessment. Measures to control the impact of dust on sensitive habitats would be implemented during the preparation and construction phase. These measures will be adopted, when necessary, in dry weather, in areas of active development, and will most likely involve the controlled dampening of tracks utilised by construction vehicles.

6.6.19 In addition, as far as reasonably practicable, materials for construction will be sourced from on-site borrow pits, which would ensure the composition of materials used is as close to the local conditions as possible. Further detail on the mitigation of potential dust impacts will be detailed within the CEMP.

Watercourses

6.6.20 The pre-construction quality of watercourses and waterbodies would be maintained during construction (see Chapter 10: Hydrology, Geology and Hydrogeological Assessment). Watercourse protection measures would be adopted within the CMS and CEMP and include protection against siltation and sedimentation, and pollution incidents such as the implementation of a pollution response plan and the safe storage of chemicals in bunded containers. Robust mitigation measures will be installed prior to works commencing to ensure the impacts on watercourses are minimised. Mitigation throughout the proposed development will be regularly monitored and maintained/replaced as required. Refuelling of vehicles and machinery will be carried out at central designated areas, on an impermeable surface, located at least 50 m away from any watercourse. Monitoring of water quality would be carried out before and during construction.

Groundwater Dependent Terrestrial Ecosystems

6.6.21 Details of how impacts upon groundwater flow are minimised and mitigated are detailed in Chapter 10: Hydrology, Geology and Hydrogeological Assessment.

Species

6.6.22 A SPP will be produced as part of the CEMP and agreed by consultees prior to the commencement of development, detailing measures to be implemented before and during construction to protect species present in the area of the proposed development. This will include good practice measures to prevent accidental or incidental injury and mortality of protected species during construction, such as:

- A suitable vehicle speed limit to be enforced within the proposed development;
- Warning signs installed, where appropriate, to reduce risk of collision with protected species;
- Covering of deep excavations, foundations and pipe openings (or a ramp installed) when not active to prevent entrapment of animals;
- Watercourse crossings designed so as to not impede otters and fish, or their food sources;
- Lighting design to ensure watercourses and woodland remain unlit at night. Security lighting and lighting associated with the temporary compound will be low lux and directed away from watercourses and woodland to reduce disturbance and no artificial lighting will be installed along or within 20 m of any edge feature to minimise disturbance to bats;
- Pre-construction surveys undertaken for protected species, including badger and otter, within set buffer areas of the proposed development (as stated in the SPP);
- Pre-construction surveys of potential bat roosts undertaken for any trees or structures with potential to support roosting bats, within a minimum of 30 m of working areas;
- If a potential resting place (e.g. bat roost or otter holt) of a protected species is found within the vicinity of construction then work will cease within an appropriate species-specific buffer (as set out in the SPP) until it can be established whether it is in active use by the protected species (to be surveyed by an experienced ecologist holding the appropriate European Protected Species (EPS) licence (if required));
- If presence is confirmed, then NRW will be consulted to discuss possible mitigation measures and/or seek an appropriate protected species licence (as set out by NRW[61]); and
- All site personnel will be made aware of the presence of protected species through toolbox talks.

Operation

6.6.23 With the exception of the operation of the wind turbines and general maintenance of the turbines, there will be little on-site activity during the operational phase.

6.6.24 Where potential effects exist, control measures will be incorporated into an OMP. In particular, the potential for pollution incidents during routine maintenance activities will be minimised by adoption of good practice guidance (see Chapter 10: Hydrology, Geology and Hydrogeological Assessment).

6.6.25 Any routine maintenance works will take place during the day where practicable to minimise the potential for disturbance to protected species within the proposed development in accordance with the HMP (since these are mostly nocturnal/crepuscular).

6.6.26 The OMP will detail any mitigation measures required during the operational phase relating to protected species to ensure ongoing compliance with relevant environmental legislation.

Decommissioning

6.6.27 Good practice measures as described in the construction stage will be followed, including specific guidance for the restoration and decommissioning of wind farms (Welstead *et al.* 2013)[62]. New guidance available at the decommissioning phase would be adopted if appropriate, and a decommissioning plan will be drafted for agreement by consultees prior to commencement of decommissioning.

Feature Assessment

6.6.28 Based on the description of the ecological baseline presented in this chapter, a summary of the habitats and species within the vicinity of the proposed development is provided in Table 6.25.

6.6.29 In identification of designated sites as IEFs, consideration has been given to the existence of pathways for effects to occur. This includes direct impacts such as habitat loss and indirect impacts through downstream hydrological connectivity. Where habitat mosaics have been identified by the baseline survey, the constituent Phase 1 habitat types are taken to be the relevant IEFs.

6.6.30 Where no significant effects are likely with the application of embedded mitigation, this is specified, and the feature is not considered an IEF requiring EcIA. Features considered not to be IEFs are not assessed further in this chapter.

6.6.31 A total of 36 SINCs, local non-statutory designated sites, were identified within the search area of the site boundary plus 2 km buffer. The majority of these SINCs have been selected for their habitats, but plant communities and invertebrates have also been identified as reasons of interest for others. In the case of Tonmawr Minewater Treatment & Surrounding Habitats SINC herptiles are a listed interest and Margam Country Park's interests include mammals (bats).

6.6.32 As shown in Table 6.10, the majority of these SINCs do not lie close to infrastructure associated with the proposed development. Unless SINCs are in close proximity to the proposed development it is unlikely that significant effects to the SINC will occur, as there will be no direct habitat loss and indirect impacts, such as pollution or dust deposition, are considered unlikely to occur after implementation of embedded mitigation. Therefore, only those SINCs located within 500 m of infrastructure are included in Table 6.25. This is considered to be a precautionary distance beyond which no significant negative effects can be predicted to occur. There are six SINCs that meet this criterium: NPT Watercourses, Nant-y-Crynwydd, Cwm Sychbant, Y Parc (north), Caerau West and Bryn Tip (the latter is also an LNR). Additionally, one further SINC (Margam Country Park) has been identified for inclusion due to bats being listed. Therefore, a limit of 500 m from the proposed development is not considered appropriate for this SINC. No other SINCs identified have mammals listed as a feature.

6.6.33 The remaining SINCs listed in Table 6.10 are not discussed further within this chapter.

Table 6.25: Summary of designated sites, habitats and species and their conservation importance

Sites/Habitats/ Species	Covering legislation and guidance/ conservation status	Geographical level of value	IEF	Rationale
Kenfig SAC/SSSI	SACs protect one or more species and/or habitats listed in the Habitats Directive. The listed habitats	International	No	The site is of importance for its habitats (sand dune, standing water and associated coastal habitats) and species assemblages (vascular plants, rare macrofungi and invertebrates). The site is located 3.7 km to the south of the site boundary. Given the distance of

[61] Details of licensing requirements and how to apply are available at: https://naturalresources.wales/permits-and-permissions/species-licensing/apply-for-a-protected-species-licence/?lang=en [Accessed 03/04/2023]

[62] Welstead, J., Hirst, R., Keogh, D., Robb G. and Bainsfair, R. (2013). Research and guidance on restoration and decommissioning of onshore wind farms. Scottish Natural Heritage Commissioned Report No. 591.

Sites/Habitats/ Species	Covering legislation and guidance/ conservation status	Geographical level of value	IEF	Rationale
	and species are considered to be those most in need of conservation at an international level.			the proposed development from the SAC/SSSI and the absence of hydrological connectivity there will be no negative effects on the features for which the site was classified and therefore Kenfig SAC/SSSI is not considered to be an IEF and is not discussed further in this chapter. [Kenfig Pool and Dunes NNR, which overlaps with this SAC/SSSI is also considered not to be an IEF.]
Cefn Cribwr Grasslands SAC/SSSI	SACs protect one or more species and/or habitats listed in the Habitats Directive. The listed habitats and species are considered to be those most in need of conservation at an international level.	International	No	The site is made up of four SSSIs that are of importance for their habitats (marshy grassland and species-rich neutral grassland and associated habitats), particular species of vascular plant and marsh fritillary butterfly. The site is located 4.6 km to the south of the site boundary. Given the distance of the proposed development from the SAC/SSSI and the absence of hydrological connectivity there will be no negative effects on the habitats for which the site was classified. The proposed development provides little suitable habitat for marsh fritillary and there are no records from within the site boundary. Therefore, the proposed development is unlikely to result in negative effects on this ecological feature. Cefn Cribwr SAC/SSSI is not considered to be an IEF and is therefore not discussed further in this chapter.
Crymlyn Bog SAC/SSSI/NNR	SACs protect one or more species and/or habitats listed in the Habitats Directive. The listed habitats and species are considered to be those most in need of conservation at an international level.	International	No	The site is of importance for its fen and wet woodland habitats and associated invertebrate assemblage. The site is located 8.1 km to the north-west of the site boundary. Given the distance of the proposed development from the SAC/SSSI/NNR and the absence of hydrological connectivity there will be no negative effects on the features for which the site was classified and therefore Crymlyn Bog SAC/SSS/NNR is not considered to be an IEF and is not discussed further in this chapter.
Blackmill Woodlands SAC/SSSI	SACs protect one or more species and/or habitats listed in the Habitats Directive. The listed habitats and species are considered to be those most in need of conservation at an international level.	International	No	The site is designated for its sessile oak woodland. The site is located 8.4 km to the south-east of the site boundary. Given the distance of the proposed development from the SAC/SSSI there will be no negative effects on the habitat for which the site was classified and therefore Blackmill Woodlands SAC/SSSI is not considered to be an IEF and is not discussed further in this chapter.
Margam Moors SSSI	SSSIs are areas of special interest due to faunal, floral, geological or physiographical features and are notified under the Wildlife & Countryside Act.	National	No	The site is of importance for its habitats (mesotrophic marsh, fen meadow, ditch communities) and associated species (sedges, flowering plants and invertebrates). The site is located 2.6 km to the south of the site boundary. Given the distance of the proposed development from the SSSI and the absence of hydrological connectivity there will be no negative effects on the features for which the site was classified and therefore Margam Moors SSSI is not considered to be an IEF and is not discussed further in this chapter.
Cwm Du Woodlands SSSI	SSSIs are areas of special interest due to faunal, floral, geological or physiographical features and are notified under the Wildlife & Countryside Act.	National	No	The site is designated for its ancient sessile valley oakwood. The site is located 2.8 km to the east of the site boundary. Given the distance of the proposed development from the SSSI there will be no negative effects on the habitat for which the site was classified and therefore Cwm Du Woodlands SSSI is not considered to be an IEF and is not discussed further in this chapter.
Waun Cimla SSSI	SSSIs are areas of special interest due to faunal, floral, geological or physiographical features and are notified under the Wildlife & Countryside Act.	National	No	The site is of importance for its habitats (wet lowland heath and grassland) as well as marsh fritillary butterfly. The SSSI is located 4.2 km to the south of the site boundary. Given the distance of the proposed development from the SSSI and the absence of hydrological connectivity there will be no negative effects on the habitats for which the site was classified. The proposed development provides little suitable habitat for marsh fritillary and there are no records from within the site boundary. Therefore, the proposed development is unlikely to result in negative effects on this ecological feature. Waun Cimla SSSI is not considered to be an IEF and is therefore not discussed further in this chapter.
Cwm Risca Meadow SSSI	SSSIs are areas of special interest due to faunal, floral, geological or physiographical features and are notified under the Wildlife & Countryside Act.	National	No	The site is of importance for its wet acidic meadow habitat and associated species of plant as well as marsh fritillary butterfly. The site is located 5.1 km to the south-east of the site boundary. Given the distance of the proposed development from the SSSI and the absence of hydrological connectivity there will be no negative effects on the habitats for which the site was classified. The proposed development provides little suitable habitat for marsh fritillary and there are no records from within the site boundary. Therefore, the proposed development is unlikely to result in negative effects on this ecological feature. Cwm Risca Meadow SSSI is not considered to be an IEF and is therefore not discussed further in this chapter.
Crymlyn Burrows SSSI	SSSIs are areas of special interest due to faunal, floral, geological or physiographical features and are notified under the Wildlife & Countryside Act.	National	No	The site is of importance for its habitats (saltmarsh and sand dune habitats) and associated species (flowering plants and assemblage of invertebrates). The site is located 6.6 km to the west of the site boundary. Given the distance of the proposed development from the SSSI and the absence of hydrological connectivity there will be no negative effects on the features for which the site was classified and therefore Crymlyn Burrows SSSI is not considered to be an IEF and is not discussed further in this chapter.

Sites/Habitats/ Species	Covering legislation and guidance/ conservation status	Geographical level of value	IEF	Rationale
Cwm Cyffog SSSI	SSSIs are areas of special interest due to faunal, floral, geological or physiographical features and are notified under the Wildlife & Countryside Act.	National	No	The site is designated for its upland blanket mire habitat. The SSSI is located 7.2 km to the east of the site boundary. Given the distance of the proposed development from the SSSI and the absence of hydrological connectivity there will be no negative effects on the habitat for which the site was classified and therefore Cwm Cyffog SSSI is not considered to be an IEF and is not discussed further in this chapter.
Pant-y-Sais SSSI	SSSIs are areas of special interest due to faunal, floral, geological or physiographical features and are notified under the Wildlife & Countryside Act.	National	No	The site is designated for its species-rich lowland fen, with associated species (slender cotton-grass and assemblage of invertebrates). The site is located 7.5 km to the west of the site boundary. Given the distance of the proposed development from the SSSI and the absence of hydrological connectivity there will be no negative effects on the features for which the site was classified and therefore Pant-y-Sais SSSI is not considered to be an IEF and is not discussed further in this chapter.
Mynydd Ty-Isaf, Rhondda SSSI	SSSIs are areas of special interest due to faunal, floral, geological or physiographical features and are notified under the Wildlife & Countryside Act.	National	No	The site is designated for the habitats and arctic-alpine plants it supports on its crags and cliffs. The site is located 7.7 km to the north-east of the site boundary. Given the distance of the proposed development from the SSSI there will be no negative effects on the habitat for which the site was classified and therefore Mynydd Ty-Isaf, Rhondda SSSI is not considered to be an IEF and is not discussed further in this chapter.
Bryn Tip LNR & SINC	LNRs are areas of special local interest due to wildlife or geological features. They are established by local authorities, who also give them protection from development via local by-laws.	Regional	No	The site is located on previously developed land and is designated for its mosaic of open habitats which include grassland, heathland, scrub, bare patches with lichen and sedge-rich flushes. In addition there is interest from the associated invertebrates, notably dark green fritillary. The LNR/SINC is adjacent to the west boundary of the north section and is over 500 m from the nearest infrastructure. Given the LNR/SINC is located outside the site boundary, construction of the proposed development will not result in any direct loss of habitat within the LNR/SINC. The site is hydrologically connected to the proposed development but embedded mitigation to protect and monitor watercourses are considered sufficient to prevent negative effects. The proposed development may hold dark green fritillaries that are part of the same local population as those in the LNR/SINC, but the project is unlikely to result in a negative effect on this feature and indeed the creation of new track verges and open areas within the forest in the medium and long term will benefit this species. Therefore, Bryn Tip LNR and SINC is not considered to be an IEF and is not discussed further in this chapter.
Eaglebush Valley LNR	LNRs are areas of special local interest due to wildlife or geological features. They are established by local authorities, who also give them protection from development via local by-laws.	Regional	No	The site is an ancient semi-natural woodland and is located 4.4 km to the north-west of the site boundary. Given the distance of the proposed development from the LNR there will be no negative effects on the habitat for which the site was classified and therefore Eaglebush Valley LNR is not considered to be an IEF and is not discussed further in this chapter.
NPT Watercourses SINC	SINCs are non-statutory sites that represent ‘substantive nature conservation value’. They can be important in providing linkages between designated sites. Many support habitats and species that are priorities in local biodiversity action plans.	Regional	No	The SINC encompasses the rivers and streams that lie within the site boundary. Infrastructure for the proposed development will overlap with watercourses that make up parts of this SINC. Protection of watercourses is embedded in the project design through good practice. A pollution prevention plan and measures to control dust will be included in the CEMP and monitored by the EcoW, and so it is considered that embedded mitigation is sufficient to prevent negative effects to the habitat within this SINC. Further information on watercourses can be found in Chapter 10: Hydrology, Geology and Hydrogeological Assessment. The NPT Watercourses SINC is not considered to be an IEF and is not discussed further in this chapter.
Nant-y-Crynwydd SINC	SINCs are non-statutory sites that represent ‘substantive nature conservation value’. They can be important in providing linkages between designated sites. Many support habitats and species that are priorities in local biodiversity action plans.	Regional	No	The site is designated for habitats, which encompass marsh and marshy grassland, semi-improved neutral and acid grassland, blanket bog, semi-natural broad-leaved wood and dense continuous scrub. The SINC is located adjacent to the south-east corner of the north section. The SINC borders the site boundary, and immediately inside the site boundary at this location is the existing track that will be used to provide access to the northern half of the proposed development. There is potential for an indirect impact from dust created during construction works, or from accidental pollution. A pollution prevention plan and measures to control dust will be included in the CEMP and monitored by the ECoW, and it is considered that this embedded mitigation is sufficient to prevent negative effects to the habitats for which the site was classified. Additionally, the level of traffic using the access road during all phases of the proposed development will not be sufficient to result in significant levels of air pollution. Therefore, Nant-y-Crynwydd SINC is not considered to be an IEF and is therefore not discussed further in this chapter.
Cwm Sychbant SINC	SINCs are non-statutory sites that represent ‘substantive nature conservation value’. They can be important in providing linkages between designated sites. Many support habitats and	Regional	No	The site is designated for its habitats, which encompass semi-natural broadleaved and conifer plantation woodland, semi-improved neutral and marshy grassland and dense continuous bracken habitats. The site is located approximately 380 m to the east of the proposed development. Given the SINC is located outside the footprint of the proposed development, construction will not result in any direct loss of habitat within the SINC. The site is hydrologically connected to the proposed development but embedded mitigation to

Sites/Habitats/ Species	Covering legislation and guidance/ conservation status	Geographical level of value	IEF	Rationale
	species that are priorities in local biodiversity action plans.			protect and monitor watercourses are considered sufficient to prevent negative effects. Cwm Sychbant SINC is therefore not considered to be an IEF and is not discussed further in this chapter.
Y Parc (north) SINC	SINCs are non-statutory sites that represent 'substantive nature conservation value'. They can be important in providing linkages between designated sites. Many support habitats and species that are priorities in local biodiversity action plans.	Regional	No	The site is designated for its habitats, which encompass semi-natural broadleaved woodland, wet and dry dwarf heath, semi-improved acid grassland, unimproved neutral grassland and wet modified *Sphagnum* bog. The site is located approximately 400 m to the east of the proposed development. Given the distance from the proposed development, the absence of hydrological connectivity and the nature of the features for which the SINC is designated, it is considered that there will be no negative effects as a result of the proposed development. Therefore, Y Parc (north) SINC is not considered to be an IEF and is not discussed further in this chapter.
Caerau West SINC	SINCs are non-statutory sites that represent 'substantive nature conservation value'. They can be important in providing linkages between designated sites. Many support habitats and species that are priorities in local biodiversity action plans.	Regional	No	The site is designated for its habitats, which encompass marshy grassland, acid/neutral flush, blanket bog, wet modified bog, wet dwarf shrub heath, dry heath and acid grassland mosaic, dry dwarf shrub heath, semi-improved acid grassland and scattered bracken habitats. The site is located approximately 450 m to the north-east of the proposed development. Given the distance from the proposed development, the absence of hydrological connectivity and the nature of the features for which the SINC is designated, it is considered that there will be no negative effects as a result of the proposed development. Therefore, Caerau West SINC is not considered to be an IEF and is not discussed further in this chapter.
Margam Country Park SINC	SINCs are non-statutory sites that represent 'substantive nature conservation value'. They can be important in providing linkages between designated sites. Many support habitats and species that are priorities in local biodiversity action plans.	Regional	**Yes**	The site is designated due to its habitats (wood pasture and parkland, ponds, mosaic habitats) and protected mammals (it is an important site for bats). The northern edge of the site is located approximately 1.5 km to the south of the proposed development (turbine). There is potential hydrological connectivity between the proposed development and the SINC. However, protection of watercourses is embedded in the project design through good practice and these measures are considered sufficient to prevent negative effects to waterbodies within the SINC. Given the distance from the proposed development there will be no direct impacts to the habitats for which the SINC is classified. The distance between the SINC and the proposed development is within the average foraging distance of most bat species and therefore there is potential for the proposed development to have a negative effect on this listed feature of the SINC. **For this reason Margam Country Park is considered to be an IEF and is included in the EcIA.**
Broadleaved woodland: semi-natural	Section 7 (where classed as Wet woodland) Possible GWDTE	Regional	No	Young W1 wet woodland is the prevalent semi-natural broadleaved woodland found within the wind farm areas. It is naturally regenerating on seasonally wet soils and usually in small unplanted areas along forestry tracks, with one large area within 250 m of the western AIL area (surveyed but located outside the site boundary). W9, W11 and W17 NVC communities are also found within the site boundary. The W9 community, a Section 7 priority habitat, is found within steep valleys which lie outside the footprint of the proposed development; approximately 150 m from the nearest infrastructure. In total 1.21 ha of semi-natural broadleaved woodland habitat will be lost as part of the proposed development which is 0.90% of all semi-natural broadleaved woodland within the site boundary. There is also the potential for an indirect impact from dust created during construction works, or from accidental pollution. A pollution prevention plan and measures to control dust will be included in the CEMP and monitored by the ECoW and it is considered that this embedded mitigation will prevent negative effects to this habitat as a result of indirect impacts. As there will be a very small percentage loss in habitat (<1%), no significant effect is predicted on this feature and semi-natural broadleaved woodland is not considered to be an IEF and is not discussed further in this chapter.
Broadleaved woodland: plantation	Section 7 (where classed as Wet woodland) Possible GWDTE	Local	No	This habitat consists mainly of recently planted woodland within the north section. There is also a more mature area classified as W6 priority wet woodland habitat adjacent to the AIL area that links the north and south sections. In total 0.65 ha of broadleaved woodland plantation habitat will be lost as a result of the proposed development, which is 1.51% of the total found within the site boundary. There is also the potential for an indirect impact from dust created during construction works, or from accidental pollution. A pollution prevention plan and measures to control dust will be included in the CEMP and monitored by the ECoW and it is considered that this embedded mitigation will prevent negative effects to this habitat as a result of indirect impacts. Although the NVC community that is being lost is W6 (wet woodland; a Section 7 habitat), because of the small percentage loss in habitat (<2%), no significant effect is predicted on this feature Therefore, broadleaved woodland plantation is not considered to be an IEF and is not discussed further in this chapter.
Coniferous woodland: semi-natural	n/a	Local	No	This habitat consists of areas of conifers that have regenerated rather than having been planted, but the tree species are mostly non-native as their seed source is the nearby plantation. These areas lie outside the footprint of the proposed development with none of

Sites/Habitats/ Species	Covering legislation and guidance/ conservation status	Geographical level of value	IEF	Rationale
				this habitat being lost as a result of development. As such, semi-natural coniferous woodland is not considered to be an IEF and is therefore not discussed further in this chapter.
Coniferous woodland: plantation	n/a	Negligible	No	This habitat makes up the majority of the land within the site boundary, with the rotational felling and replanting of conifers being the predominant land-use. Coniferous plantation is of limited conservation value and is extensive across Wales. A total of 6.21% of conifer plantation within the site boundary is to be permanently lost. Coniferous woodland plantation is not considered to be an IEF and is therefore not discussed further in this chapter.
Mixed woodland: semi-natural	Section 7 (where classed as Wet woodland) Possible GWDTE	Local	No	This habitat is predominantly found growing on the sides of steep valleys or in small unplanted areas, usually adjacent to the forestry tracks. Only 0.13% (0.22 ha) of the semi-natural woodland recorded within the site boundary, and none of the W1 woodland priority habitat, will be lost as a result of the proposed development. Semi-natural mixed woodland is therefore not considered to be an IEF and is not discussed further in this chapter.
Mixed woodland: plantation	n/a	Local	No	Although generally holding limited conservation interests, parts of this habitat within the site boundary hold bluebells, a Section 7 species. A total of 0.14 ha (0.57% of the total) of this habitat is to be lost to the proposed development. Due to the very small percentage loss in this habitat, mixed woodland plantation is not considered to be an IEF and is not discussed further in this chapter.
Scrub: continuous and scattered	n/a	Negligible	No	The habitat in the site boundary is typical of the scrub habitat that is widespread throughout Wales. 6.18% (3.87 ha) of the dense/continuous scrub in the surveyed area will be lost as a result of the proposed development, with only 0.30% (0.04 ha) of scattered scrub to be lost. Due to the relatively small area that will be lost and the low conservation value of these habitats, dense scrub and scattered scrub are not considered to be IEFs and are therefore not discussed further in this chapter.
Recently felled woodland: coniferous	n/a	Negligible	No	This habitat is a result of rotational harvesting of timber. The habitat holds limited conservation interest and is widespread throughout Wales. Recently felled coniferous woodland is not considered to be an IEF and is therefore not discussed further in this chapter.
Unimproved acid grassland	Section 7 (where classed as Lowland dry acid grassland) Possible GWDTE	Local	No	A small area (0.33 ha) of the unimproved acid grassland habitat will be lost as part of the proposed development, equal to 7.08% of this habitat found within the site boundary. As the proposed development is situated in the upland fringe some of this habitat could be classified as priority habitat lowland acid grassland as it is below 300 m Above Ordnance Datum (AOD), especially on the steep hillsides in the vicinity of the western AIL area. Here the infrastructure for the proposed development will mostly follow existing farm tracks and hence, very little of this habitat will be lost. There is also the potential for an indirect impact from dust created during construction works, or from accidental pollution. A pollution prevention plan and measures to control dust will be included in the CEMP and monitored by the ECoW. It is considered that embedded mitigation is sufficient to prevent negative effects to this habitat as a result of these indirect impacts. Given the relatively small area of habitat loss from the proposed development, which is considered to be not significant, unimproved acid grassland is not considered to be an IEF and is therefore not discussed further in this chapter.
Semi-improved acid grassland	n/a	Negligible	No	A very small area (0.02 ha) of the semi-improved acid grassland, accounting for 5.94% of this habitat, will be lost as part of the proposed development. There is also the potential for an indirect impact from dust created during construction works, or from accidental pollution. A pollution prevention plan and measures to control dust will be included in the CEMP and monitored by the ECoW. It is considered that embedded mitigation is sufficient to prevent negative effects to this habitat as a result of these indirect impacts. Given the very small area of direct habitat loss, semi-improved acid grassland is not considered to be an IEF and is therefore not discussed further in this chapter.
Unimproved neutral grassland	Section 7 (where classed as Lowland meadow) Possible GWDTE	Local	No	Lowland meadow is a Section 7 habitat, but the habitat within the site boundary classified as MG5 grassland was recorded only as small, isolated areas within the forest. The majority (>90%) of the unimproved neutral grassland recorded was MG10 (or associated mosaic), which does not have a conservation designation. Most of the unimproved neutral grassland is located within unmanaged areas adjacent to forestry tracks, often with encroaching bramble scrub, bracken and young trees. Species found within the grassland are typical of damp, unmanaged neutral grassland. However, where the soil is shallow at the edge of tracks, this is where rare patches of the more species rich MG5 grassland are present. The proposed development will create new track edges, but this is not considered in the HLC. A small area (2.07 ha/40.75%) of the total unimproved neutral grassland habitat will be lost as a result of the proposed development. There is the potential for an indirect impact from dust created during construction works, or from accidental pollution. A pollution prevention plan and measures to control dust will be included in the CEMP and monitored by the ECoW and it is considered that this embedded mitigation is sufficient to prevent negative effects to this habitat as a result of these indirect impacts. Although the

Sites/Habitats/ Species	Covering legislation and guidance/ conservation status	Geographical level of value	IEF	Rationale
				small area of unimproved neutral grassland that will be lost (2.07 ha) makes up 40.75% of the total, this is not considered to be significant given the low conservation value of the majority of the habitat being lost. This loss is not considered sufficient to have a significant effect on the integrity on this feature, which is already fragmented and localised in its distribution. Therefore, unimproved neutral grassland is not considered to be an IEF and is not discussed further in this chapter.
Semi-improved neutral grassland	n/a	Negligible	No	Some of the semi-improved neutral grassland habitat adjacent to the AIL area that links the north and south section, will be lost as a result of the proposed development (0.57 ha/30.32%). This semi-improved neutral grassland (MG6) contains species typical of damp, less managed grassland and is a widespread habitat of low conservation concern. There is the potential for an indirect impact from dust created during construction works, or from accidental pollution. A pollution prevention plan and measures to control dust will be included in the CEMP and monitored by the ECoW and, it is considered that embedded mitigation is sufficient to prevent negative effects to this habitat as a result of these indirect impacts. The area of habitat loss as a result of the proposed development will be small, as existing tracks will be followed as much as possible. Although the area equates to a relatively high percentage loss of the total present within the surveyed area, it is considered to be not significant, given the extent of this habitat in the wider area, for example to the east of the northern AIL route. Semi-improved neutral grassland is not considered to be an IEF and is therefore not discussed further in this chapter.
Improved grassland	n/a	Negligible	No	Intensively managed grasslands and agriculturally improved farmland hold very little conservation interest. This habitat is also widespread throughout Wales. 5.04% of the improved grassland in the site boundary will be lost. Given the conservation value of this habitat and the relatively small area of habitat loss, improved grassland is not considered to be an IEF and is not discussed further in this chapter.
Marshy grassland	Section 7 (where classed as Purple moorgrass & rush pasture) Possible GWDTE	Local	No	A relatively small area of this habitat will be lost as part of the proposed development: 5.49 ha, or 8.26% of this habitat within the site boundary. This habitat is comprised predominantly of species-poor M25, M23 and MG10 communities dominated by purple moor-grass and/or soft rush with encroaching scrub, trees and bracken. Some forestry rides are managed by annual cutting and here the marshy grassland is more species rich. Additionally, more species-rich examples are present within the 250 m buffer of the AIL area that links the north and south sections. The majority of the habitat that is located within the footprint of the proposed development is not particularly species diverse and is not considered to be of significant conservation interest. There is the potential for an indirect impact from dust created during construction works, or from accidental pollution. A pollution prevention plan and measures to control dust will be included in the CEMP and monitored by the ECoW, and it is considered that embedded mitigation is sufficient to prevent negative effects to this habitat as a result of these indirect impacts. As the marshy grassland habitats identified in the site boundary are mostly species-poor and a relatively small amount will be lost, with no significant effect on the integrity of the feature predicted, marshy grassland is not considered to be an IEF and is not discussed further in this chapter.
Poor semi-improved grassland	n/a	Negligible	No	This habitat consists of MG6 grassland, which is a widespread habitat of low conservation concern. A total of 0.19 ha (3.23%) of the poor semi-improved grassland habitat within the surveyed area will be lost as a result of the development. Given the conservation value of this habitat and the small area of habitat loss, poor semi-improved grassland is not considered to be an IEF and is not discussed further in this chapter.
Bracken: continuous	n/a	Negligible	No	Continuous bracken holds limited conservation interest and is widespread throughout Wales. Given the small area of habitat loss (4.79 ha/ 4.02%), as a result of construction of the proposed development, continuous bracken is not considered to be an IEF and is therefore not discussed further in this chapter.
Bracken: scattered	n/a	Local	No	Scattered bracken habitats are more species diverse than those areas where bracken is continuous. All of the mapped areas of scattered bracken are outside the footprint of the proposed development and therefore none of the scattered bracken within the site boundary will be subject to habitat loss. Scattered bracken is therefore not considered to be an IEF and is not discussed further in this chapter.
Acid dry dwarf shrub heath	Annex 1 of Habitat's Directive Section 7 (where classed as Upland heathland)	Local	No	Dry heath is a priority habitat listed on Annex 1 and Section 7. The proposed development will lead to a loss of 0.56 ha (6.66%) of acid dry dwarf shrub heather cover within the surveyed area. This small loss is not considered sufficient to affect the integrity of this feature. There is potential for an indirect impact from dust created during construction works, or from accidental pollution. A pollution prevention plan and measures to control dust will be included in the CEMP and monitored by the ECoW and it is considered that embedded

Sites/Habitats/ Species	Covering legislation and guidance/ conservation status	Geographical level of value	IEF	Rationale
				mitigation is sufficient to prevent negative effects to this habitat arising from construction. Therefore, acid dry dwarf shrub heath is not considered to be an IEF and is not discussed further in this chapter.
Wet dwarf shrub heath	Annex 1 of Habitat's Directive Section 7 (where classed as Upland heathland) Possible GWDTE	Local	No	Wet heath is a priority habitat listed on Annex 1 and Section 7, but within the site boundary this habitat was mostly recorded as a mosaic with M25 marshy grassland. The habitat was found mostly in small open areas beside tracks and rides in the forest. The proposed development will create new track edges and open areas within the forest similar to those areas where it is currently located, but this is not considered in the HLC. The loss of wet dwarf shrub heath as a result of the proposed development will be 0.53 ha, which equates to 12.53% of the total within the survey area. There is potential for an indirect impact from dust created during construction works, or from accidental pollution. A pollution prevention plan and measures to control dust will be included in the CEMP and monitored by the ECoW and it is considered that embedded mitigation is sufficient to prevent negative effects to this habitat arising from construction. The small area that will be lost (0.53 ha; which is equal to approximately 0.95% of wet dwarf-shrub heath in NPTCBC[63]) is not considered sufficient to have a significant effect on the integrity on this feature, which is already fragmented and localised in its distribution within the site boundary. Therefore, wet dwarf shrub heath is not considered to be an IEF and is not discussed further in this chapter.
Dry heath and acid grassland mosaic	Annex 1 of Habitat's Directive Section 7 (where classed as Upland heathland)	Local	No	A very small area of the dry heath and acid grassland mosaic will be lost (0.01 ha/0.11%), the large majority of this habitat being located outside the footprint of the proposed development. There is potential for an indirect impact from dust created during construction works, or from accidental pollution. A pollution prevention plan and measures to control dust will be included in the CEMP and monitored by the ECoW and it is considered that embedded mitigation is sufficient to prevent negative effects to this habitat arising from construction. Despite its conservation status, dry heath/ acid grassland mosaic is not considered to be an IEF due to the very small area that will be lost, which is not significant, and it is therefore not discussed further in this chapter.
Wet heath and acid grassland mosaic	Annex 1 of Habitat's Directive Section 7 (where classed as Upland heathland) Possible GWDTE	Local	No	This mosaic habitat occurred mostly in small open areas beside tracks and rides in the forest. The proposed development will create new track edges and open areas within the forest similar to those areas where it is currently located, but this is not considered in the HLC. The area of wet heath and acid grassland mosaic that will be lost as a result of the proposed development is 1.25 ha, which is 14.86% of that recorded within the site boundary. There is potential for an indirect impact from dust created during construction works, or from accidental pollution. A pollution prevention plan and measures to control dust will be included in the CEMP and monitored by the ECoW and it is considered that embedded mitigation is sufficient to prevent negative effects to this habitat arising from construction. The relatively small area that will be lost (1.25 ha; which is equal to approximately 0.27% of grass/heath mosaic in NPTCBC area) is not considered sufficient to have a significant effect on the integrity on this feature, which is already fragmented and localised in its distribution within the site boundary. Therefore, wet heath/ acid grassland mosaic is not considered to be an IEF and is not discussed further in this chapter.
Acid/neutral flush	Possible GWDTE	Negligible	No	A small area of M6 acid flush habitat (0.25 ha) is located within 250 m of the AIL area that links the north and south sections. None of this habitat will be lost as a result of the proposed development. This habitat is dominated by soft rush and flat-topped bog-moss and is widespread across Wales. Acid/neutral flush is not considered to be an IEF and is not discussed further in this chapter.
Standing water Running water	Section 7 (Ponds; rivers)	Local	No	Ponds are listed as a priority habitat on Section 7. Note that rivers are also listed as a priority habitat, but though running watercourses are present within the site boundary, only standing water was mapped as part of the Phase 1 survey. The running water habitats on site comprise streams and the upper reaches of rivers. Standing water in the site boundary comprise a number of small ponds, as well as the reservoirs that lie in the low ground in the west of the south section. A minimum distance of 50 m has been maintained between infrastructure and watercourses, with the exception of new water crossings and existing water crossings and roads. Protection of watercourses is embedded in the project design through good practice. A pollution prevention plan and measures to control dust will be included in the CEMP and monitored by the ECoW, and so it is considered that embedded mitigation is sufficient to prevent negative effects to these habitats. Further information on watercourses can be found in Chapter 10: Hydrology, Geology and Hydrogeological Assessment. Running and standing water are not considered to be IEFs and are not discussed further in this chapter.
Bats (all)	Conservation Regulations; Wildlife and Countryside Act; Section 7	various	**Yes**	Six species of bat were positively identified during surveys. Bat activity was recorded within the turbine development area in all seasons, with numbers highest in summer. The data suggests the presence of bat roosts within the site boundary and indeed the preliminary bat roost assessment recorded potential roost features, some of which are adjacent to tracks that are part of the proposed

[63] Jones, P.S., Stevens, D.P., Blackstock, T.H., Burrows, C.R. & Howe, E.A. (eds) (2003) Priority Habitats of Wales: a technical guide. A report published by the Countryside Council for Wales. [last accessed 02/08/2022]

Sites/Habitats/ Species	Covering legislation and guidance/ conservation status	Geographical level of value	IEF	Rationale
				development. It was highlighted in consultation that the proposed development is situated close to Margam Park SINC, which is considered to be particularly important for its variety of bats. As there is potential for the proposed development to have a significant effect on bats, **bats are considered to be an IEF** and are taken forward to EcIA.
Otter	Habitat Regulations; Wildlife and Countryside Act; Section 7	Local	No	There were no signs of otter recorded during baseline surveys within the wind farm areas, although some watercourses/water bodies considered suitable for otter were recorded within this area. The only evidence of otter presence was a probable slide recorded on a watercourse that will not be crossed by any tracks associated with the proposed development. The slide is 290 m to the east of the northern AIL route (which links the two forestry sections). Otters are widespread across Wales being recorded at 90% of survey sites in the last national survey in 2009-2010[64] and they were found to be using many of the rivers located in the south Wales valleys even where disturbed by human activity. Indeed the SEWBReC data produced a record of an otter within the north section from 2016. This data indicates that otter are present within the vicinity the proposed development but are unlikely to be in sufficient numbers to consider the population of greater than Local value. Embedded mitigation measures, including protection via a SPP and a CEMP and pre-construction surveys, will be implemented during construction and operation to prevent a breach of legislation pertaining to this species. A significant effect on the integrity of the local population of otter arising as a result of impacts associated with the proposed development is considered unlikely, and as such otter is not considered an IEF, in line with the principles of proportionate EIA, and is therefore not discussed further in this chapter.
Water Vole	Wildlife and Countryside Act, Section 7	Negligible	No	There were no signs of water vole recorded during baseline surveys and the only record of water vole found in the SEWBReC data concerned a record from Margam town in 1976. The habitat within the site boundary is considered predominantly suboptimal for water vole, particularly in the vicinity of infrastructure within the wind farm areas. Embedded mitigation measures, including protection of watercourses and pre-construction surveys, will be implemented during construction and operation to prevent a breach of legislation pertaining to this species. A significant effect on the integrity of the local population of water vole arising as a result of impacts associated with the proposed development is considered unlikely, and as such they are not considered an IEF, in line with the principles of proportionate EIA, and water vole is therefore not discussed further in this chapter.
Pine Marten	Wildlife and Countryside Act; Section 7	Negligible	No	In Wales, the population of pine marten was thought to be functionally extinct and so, following a feasibility study, VWT translocated a total of 51 pine martens from Scotland to mid-Wales between 2015 and 2017[65]. Additionally, VWT have translocated 18 pine martens from Scotland into the Forest of Dean, Gloucestershire in autumn 2019 with further translocations planned in autumn 2021. VWT studies in 2020 did not find any records of pine marten in the vicinity of the proposed development and it is likely that they are yet to colonise this area. Two records returned by SEWBReC from 2001 and 2008 from the north section are unverified. No signs of pine marten were recorded during baseline surveys. Embedded mitigation measures, including protection via a CEMP will be implemented during construction to prevent a breach of legislation pertaining to this species. A significant effect on pine marten arising as a result of impacts associated with the proposed development is not predicted, and as such they are not considered an IEF, in line with the principles of proportionate EIA, and pine marten is therefore not discussed further in this chapter.
Badger	Protection of Badgers Act	Local	No	An active badger sett was recorded in the south section, approximately 650 m from the nearest infrastructure. Another sett was located within the south section outside the survey area, c. 1200 m from infrastructure. One feeding sign and one live sighting of a badger were also recorded during baseline surveys, both outside the footprint of the proposed development. The proposed development would therefore be unlikely to have a significant effect on the local badger population as no setts will be disturbed. For an omnivorous species such as this, the changes in habitat caused as a result of the proposed development are predicted to have a negligible effect. Furthermore, embedded mitigation including a CEMP and SSP, will ensure no breach of legislation relating to this species. Therefore, badger is not considered to be an IEF and is therefore not discussed further in this chapter.
Dormouse	Habitat Regulations; Wildlife and Countryside Act; Section 7	Negligible	No	There were no presence or signs of dormouse recorded during baseline surveys despite survey effort exceeding requirements. The only records of dormouse found in SEWBReC data were from outside the site boundary (dates: 1976-2007), with most records coming from Craig yr Aber, a separate area of forest that is located to the south-east of the south section. Habitat within the area where the proposed development is located is considered suboptimal for dormouse. The data therefore suggests that dormouse are not present within the site boundary. However, embedded mitigation measures, including protection via a CEMP, will be implemented during

[64] Strachan, R., (2015) Otter Survey of Wales 2009-2010, NRW

[65] MacPherson, J. & Wright, P. (2021) Long term strategic recovery plan for pine martens in Britain, VWT

Sites/Habitats/ Species	Covering legislation and guidance/ conservation status	Geographical level of value	IEF	Rationale
				construction to prevent a breach of legislation pertaining to this species. A significant effect on the integrity of the local population of dormouse arising as a result of impacts associated with the proposed development is not predicted, and as such they are not considered an IEF, in line with the principles of proportionate EIA and dormouse is therefore not discussed further in this chapter.
Fish	Certain species protected under the Wildlife and Countryside Act but these (mostly marine species) are not likely to be present; Section 7 species include European eel, river lamprey, Atlantic salmon, brown/sea trout.	Negligible	No	Permanent watercourses/bodies within the site boundary include small rivers, streams, small reservoirs and ponds. Unidentified fish species were recorded during the otter surveys. The SEWBReC data included fish records from the site boundary plus 2 km buffer, but most records are historical. This suggests the site is of no more than negligible importance for fish. Records of Section 7 species include European eel (last recorded in 2009 (outside site boundary)), Atlantic salmon (last recorded in 2009 (outside site boundary)) and brown/sea trout, which was last recorded in 2016 outside the site boundary and in 2009 inside the site boundary (but at the western edge of the south section, not near the proposed development). As embedded mitigation will protect watercourses and given the apparent low number of fish present in the site boundary, fish are not considered to be an IEF and are therefore not discussed further in this chapter.
Reptiles	Wildlife and Countryside Act (protected against trade); Section 7	Local	No	Consultation with SEWBReC provided records of adder, common lizard, grass snake and slow worm within the vicinity of the proposed development. All four of these reptile species are Section 7 listed. Suitable reptile habitat is present in open areas within the wind farm areas along verges, forest rides and watercourses and in the less intensively grazed parts of the AIL areas. Habitat includes potential refugia/hibernacula. A grass snake was recorded incidentally during baseline recording in the north section, but it is likely that all four species listed above are present, but localised, within the site boundary. Areas of dense conifer plantation are not considered to be good reptile habitat and as this habitat makes up the majority of the site boundary it is unlikely that the proposed development area is of more than local importance. The proposed development would result in the creation of more open areas within the forest, which would be advantageous to reptiles. The loss of high-quality reptile habitat in the AIL areas would be low in magnitude. Furthermore, embedded mitigation, including pre-construction surveys by the ECoW to identify and avoid potential hibernacula, toolbox talks and the implementation of a speed limit, will be sufficient to minimise impacts. No permanent change in the status of reptiles is predicted and therefore reptiles are not considered to be an IEF and are therefore not discussed further in this chapter.
Great Crested Newt	Wildlife and Countryside Act; Section 7	Negligible	No	There were no records of great-crested newt returned through consultation with SEWBReC from within the site boundary. Historical records exist from Margam Park (1974) and there are records from Margam steelworks from 2005. Edna results of samples collected from ten ponds within 500 m of infrastructure were negative for the presence of great-crested newts. The absence of great crested newt was confirmed by the physical surveys. Therefore, the baseline surveys and desk study data both indicate that this species is not present on ponds in, or adjacent to, the site boundary. Embedded mitigation measures, including protection of watercourses and pre-construction surveys, will be implemented during construction, which will safeguard any potential breach of legislation pertaining to this species. Great crested newts are not considered to be an IEF and are therefore not discussed further in this chapter.
Other Amphibians	Annex IV, Wildlife and Countryside Act (protected against trade); Section 7	Negligible	No	SEWBReC data from the site boundary plus 2 km returned records of common frog, common toad and palmate newt from the last five years, whilst there are a small number of records of smooth newt (last recorded 2011) from the search area. Of these, common toad appears on the Section 7 list. Two amphibian species were recorded during the great crested newt physical surveys: palmate newt (all sampled ponds) and common frog (five of the six sampled ponds). Within the site, the distribution of amphibians will be localised, with much of the area not being of favoured habitat (e.g. dense or mature conifer plantation). It is unlikely that the site boundary is of more than negligible importance to these widespread amphibian species. No standing water is to be lost through construction of the proposed development and embedded mitigation including protection of watercourses and sensitive lighting will minimise any impacts. No perceptible change in the status of amphibians is predicted and therefore amphibians are not considered to be an IEF and are not discussed further in this chapter.
Invertebrates	Section 7	Local	No	The desk-based study returned records of invertebrates including species of butterfly (6), bumble bee (1) and beetle (2) listed on the Section 7 list. These species are usually associated with open grassland habitats. Approximately one third (34.7%) of the grassland habitat within the site boundary is improved and considered to be species poor. It was also noted whilst undertaking the baseline surveys, that larvae food plants for some of the butterfly species, such as violets (including marsh violet) for small pearl bordered fritillary, were rarely seen, even within the more species-rich grassland habitats. The limited availability of these food plants within the site boundary is considered to support a butterfly population of no more than local value. The HLC shows that of all grassland habitat present in the site boundary combined (including mosaics), 12.75 ha (equal to 7.91% of the total) will be lost as a result of the proposed development. The habitat lost does not take into account the creation of new open ground habitats within the site boundary,

Sites/Habitats/ Species	Covering legislation and guidance/ conservation status	Geographical level of value	IEF	Rationale
				for example around turbines and along new track edges, which will lead to an increase in suitable habitat for invertebrates as a result of the proposed development. Notwithstanding these potential habitat improvements, the proposed development is predicted to cause no perceptible change in the status of Section 7 invertebrates and therefore invertebrates are not considered to be an IEF and are not discussed further in this chapter.

Source: Natural Power

Impact Assessment

6.6.34 Two features have been identified as IEFs, requiring EcIA following the application of embedded mitigation. These are bats (all species) and Margam Park SINC.

Bats

Baseline

6.6.35 Habitats within the wind farm areas consist predominantly of coniferous plantation but include areas of broadleaved woodland and water courses; resulting in the habitat being given a 'Moderate' rating for bats (see Bat Risk Assessment, Section 6.5).

6.6.36 Ecobat[51] analysis of the static bat detector data considered median bat activity in the turbine development area to be a low risk for all species across the three deployments (Tables 6.19, 6.20 and 6.21). Maximum bat activity was assessed as being of medium risk for common pipistrelle, soprano pipistrelle and brown long-eared bat in summer and autumn; Nathusius' pipistrelle in spring and summer; and noctule in summer only.

6.6.37 Common pipistrelle was the most frequently recorded bat species during the static detector deployments (43875 bat passes), accounting for 89.06% of all passes. Of the species identified during the static detector deployments, the least recorded species was lesser horseshoe (eight passes in total across the three deployments).

6.6.38 Using the BAI as a measure to compare activity between static detectors (Table 6.18), the detector with the highest median bat activity (three deployments combined) was 'I' (186 passes). 91% of the passes recorded here were common pipistrelle. 'I' was the detector location sited closest to the edge of the south section. The next highest level of activity was recorded at 'WC1' (172.5 passes). 'WC1' had the lowest percentage of common pipistrelle records (76.2%) of all static detector locations. It also recorded the largest number of passes of *Myotis* sp. 'C' also recorded relatively high activity (135 passes) and was the static detector in the north section with the highest recorded activity. At this location 98.5% of the passes recorded were of common pipistrelle.

6.6.39 The static detector location with the lowest activity was 'A' (median of one pass per night), despite this location being close to 'C'. Location 'N' recorded very little activity (eight passes) despite this location lying close to WC1. The 'at height' detector (wind monitoring equipment) also recorded a very low level of bat flight activity (seven passes). All bats recorded at wind monitoring equipment were species of pipistrelle.

6.6.40 It should be noted when discussing the static detectors in reference to turbine locations that these do not actually represent the actual turbine location, in most cases. This is due to the detectors being located outside the interior of dense plantation on the nearest forest ride or woodland edge. Thus the detectors will have recorded more bat activity than would currently be expected at the actual turbine locations. However, they do represent the activity that might be expected in the open, key-holed areas that will be created in these locations as a result of the proposed development.

6.6.41 The transect surveys to the south of the turbine development area identified the same suite of species as the static detectors (with the exception of lesser horseshoe, which was not recorded). The composition differed, however, with common pipistrelle only accounting for 45.3% of records. The transects recorded a relatively large proportion of soprano pipistrelle (27.2%) and noctule (20.5%) compared to the static detector surveys.

6.6.42 The preliminary bat roost surveys noted 12 features, or groups of features, regarded as having moderate or good potential as a bat roost, with three of these being immediately beside existing forestry tracks and one being beside the potential HGV route outside the forest.

Construction

6.6.43 Felling of areas of coniferous plantation directly related to the installation of turbines is required as part of the construction phase of the proposed development. These changes will, however, be incorporated into the cyclical felling and replanting of forestry coupes, which are the basis of forestry management within the wind farm areas. Dense stands of mature plantation are avoided by foraging bats of all species and so this change will not result in a negative impact on the availability of foraging habitat within the wind farm areas. Indeed, the creation of additional clearfelled areas and edges within the plantation will create further foraging areas within the site boundary (Kirkpatrick *et al.*, 2017[66]). The presence of stands of broadleaved trees within plantations has been shown to be important for bats, as these provide a diversity of moths (Kirkpatrick, 2016[67]). The HLC shows that there will be a negligible loss of broadleaved and mixed woodland (2.22 ha (0.59%): semi-natural and plantation combined) as result of construction. (Indeed in the longer term, measures prescribed in the outline HMP will increase broadleaved tree cover within the site boundary.) As discussed in paragraph 6.6.7, a safe buffer distance will be maintained between blade tips and forest edges during the operational phase of the proposed development.

6.6.44 Existing foraging and commuting behaviour may be altered as a result of construction, but this is likely to be of short-term duration and low magnitude. Furthermore, the implementation of embedded mitigation regarding lighting will be included within the CEMP to ensure that any disruption caused by construction works will be minimised.

6.6.45 During the preliminary bat roost assessment 12 features, or groups of features, considered to have good or moderate potential for roosting bats were found within the surveyed area. All features were in dead or mature trees and thus any roosts that are present in these locations are likely to be only occasionally used by most of the species recorded. Four of these features (or groups of features) lay immediately adjacent to existing tracks, and one additional feature was within 100 m of an existing track. A supplementary record of a noctule bat roost (from which two individuals were seen emerging) was also obtained during baseline recording, in a standing dead tree. The confirmed noctule roost will not be impacted upon by the proposed development.

6.6.46 The felling of the identified trees will be avoided, where possible, but where any trees considered to have moderate/good potential as a bat roost are required to be felled as a result of the proposed development, these trees will be subject to pre-felling surveys, as will be set out in the CEMP. This embedded mitigation will protect all potential bat roost features. Checks for potential bat roosts within 30 m of working areas will be undertaken as part of standard ecological pre-construction checks. Prior to any tree felling or tree dismantling activity taking place, trees identified as having a medium or high potential for bat presence will be fully inspected by a qualified bat

[66] Kirkpatrick, L., Maher, S.J., Lopez, Z., Lintott, P.R., Bailey, S.A., Dent, D. & Park, K.J. (2017). Bat use of commercial conifer plantations at multiple spatial scales: management and conservation implications. *Biological Conservation* 206, 1-10

[67] Kirkpatrick, L. (2016). *Bat exploitation of Sitka spruce plantations: impacts of management on bats and nocturnal invertebrates*. Thesis produced for School of Natural Sciences, University of Stirling.

ecologist. If bat presence is confirmed, any essential felling that is required will only proceed following the acquisition of the appropriate licence from NRW and following best practice under supervision of the ECoW.

Operation

6.6.47 During the operational phase, rotating turbines present a risk to flying bats as a result of potential collision and/or barotrauma[68] when flying in close proximity to turbines. Research (Mathews *et al.*, 2016[69]) found that most bat fatalities at UK wind farms were common pipistrelle, soprano pipistrelle and noctule. According to this research, there was a significant association between the number of pipistrelle fatalities and the activity category of the site. For instance, sites categorised as low activity had significantly fewer pipistrelle fatalities compared to medium and high category sites but there was no difference between sites categorised as medium and high activity.

6.6.48 Guidance states that common and soprano pipistrelle are at high risk in terms of collision, although they are of medium risk in terms of any threat to their Welsh national population[23]. Noctule is considered to be high risk both in terms of collision risk and population vulnerability[23].

6.6.49 Bat activity levels in the area of the proposed development have been classified according to guidance[23] and are presented in Tables 6.19 to 6.21.

Decommissioning

6.6.50 Impacts on bat foraging and commuting behaviour during decommissioning are expected to be of short-term duration and low negative in magnitude. Furthermore, the implementation of embedded mitigation regarding lighting will be included within the CEMP to ensure that any disruption caused by decommissioning works will be minimised. Changes in habitat following decommissioning are likely to be negligible in the short-term but in the medium and long-term will likely result in an overall increase in the area of mature conifer plantation compared to the operational phase but will be broadly comparable with baseline conditions. It is considered that areas of broadleaved trees established as part of the proposed development's habitat management plan will remain in place following decommissioning, which is likely to support a greater diversity of insect prey within the wind farm areas compared to baseline conditions.

6.6.51 As decommissioning effects are considered to be similar in nature and duration as the potential effects of construction this assessment does not assess decommissioning effects separately.

Common and Soprano Pipistrelle

6.6.52 Pipistrelles are the most abundant and most widely distributed bat species in the UK and have undergone steady population increases since the turn of the century. Common and soprano pipistrelles are very similar in their ecology and are dealt with together in this assessment. Nathusius' pipistrelle is assessed separately. Common and soprano pipistrelle are most often recorded roosting in buildings for both their summer and winter roosts, although they can also be recorded using tree holes and crevices. Common and soprano pipistrelles are considered to be IEFs of local value.

6.6.53 Common pipistrelle was the most frequently recorded bat species during the static detector surveys. Common pipistrelle was recorded at all static detector locations over the course of the three deployments. Common pipistrelle activity was reasonably spread across most bat detector locations, with the highest number of bat passes recorded at 'C' and 'I' and the highest median bat activity also recorded at these two locations. The lowest common pipistrelle activity (median BAI) was recorded at locations 'A', 'N' and 'L' (see Figure 6.2 for static detector locations).

6.6.54 Soprano pipistrelle was recorded in much lower numbers than common pipistrelle but was recorded from all static detector locations, apart from wind monitoring equipment. The detector at 'E' had the highest number of soprano pipistrelle passes overall, but the locations with the largest median activity index were 'L' and 'J'.

6.6.55 Pipistrelles are primarily recorded roosting in buildings, and there are few such locations within the wind farm areas. The only building recorded within the surveyed area was a roofed breezeblock building that was considered to hold low potential as a bat roost. It is likely that the majority of common and soprano pipistrelles recorded within the wind farm areas come from roosts in buildings in the surrounding settlements. The average foraging distance[70] for common pipistrelle is 1.5 km (maximum of 3.24 km[71]) and for soprano pipistrelle is 1.7 km. There is evidence for this, as static detectors 'C' (highest recorded activity of common pipistrelle) and 'E' (largest number of soprano pipistrelle passes) are the two detector locations that lie closest to Bryn village. Any such roost sites will remain unaffected by the proposed development. Where there are tree roosts for common and soprano pipistrelle within the wind farm areas, these will be protected through embedded mitigation.

6.6.56 It is therefore considered that **construction impacts** on common and soprano pipistrelle, as a result of damage to roosting sites, will be of **low negative magnitude** resulting in an effect that is **not significant**.

6.6.57 When looking at relative abundance, common and soprano pipistrelle activity within the wind farm areas have been classed as low risk during all seasons, using the median level of activity. However, when maximum activity is used in the assessment, both species are classed as moderate risk in summer and moderate to high (common pipistrelle) and low to moderate (soprano pipistrelle) in autumn.

6.6.58 The recommended buffer distance will be maintained between turbines (blade tips) and the forest edge; this distance being dependent on turbine dimensions. This is intended to minimise the incidence of bats coming into contact with turbines, however, given the somewhat limited understanding of bat interactions with turbines and the level of activity of common and soprano pipistrelles across the site, there is still a risk that these species will be impacted by the proposed development during its operational phase. Both pipistrelle species are assessed in guidance[23] as having an overall high collision risk with wind turbines, but due to both species being common and widespread across Wales they have a medium population vulnerability to wind turbines. **Operational impacts** of the proposed development on common and soprano pipistrelle due to collisions are considered to be of **moderate negative magnitude** but the integrity of the local populations are not expected to be affected and, thus, operational effects are considered to be **not significant**.

Nathusius' pipistrelle

6.6.59 Nathusius' pipistrelle is relatively rare in the UK when compared to the other pipistrelle species. In recent years the number of records has increased but its status in the UK is still uncertain. Nathusius' pipistrelle differs from the other two species in that the small UK summering population is supplemented in the autumn by migrants from eastern Europe that winter in the UK. Like the other pipistrelle species, Nathusius' pipistrelle predominantly roost in buildings. Nathusius' pipistrelle is an IEF of regional value.

6.6.60 Nathusius' pipistrelle was recorded at most static detector locations but at a very low level. Most activity (84.5% of passes) was recorded in the summer deployment. The low level of activity in the autumn deployment suggests Nathusius' pipistrelle is resident in the proposed development area and does not have the status here of a wintering migrant. The location with the greatest median activity was 'I', of which all activity was recorded in the summer. Most activity in the spring was recorded at 'H'. In autumn there were just single passes at each of 'K', 'N' and 'WC2'.

6.6.61 Pipistrelles are primarily recorded roosting in buildings, and there are few such locations within the wind farm areas. The only building recorded within the surveyed area was a roofed breezeblock building that was considered

[68] Injury caused by a change in air pressure, typically affecting the ears or lungs.

[69] Mathews, F., Richardson, S., Lintott, P. and Hosken, D. (2016). *Understanding the risk to European protected species (bats) at onshore wind turbine sites to inform risk management.* Report by University of Exeter. Report for RenewableUK and UK Department of Energy and Climate Change (DECC)

[70] Dietz, C. & Kiefer, A. (2016) *Bats of Britain and Europe.* Bloomsbury, London.

[71] Nicholls, B. & Racey, P. A. (2006) Contrasting home-range size and spatial partitioning in cryptic and sympatric pipistrelle bats. *Behavioural Ecology and Socio-biology,* 61(1): 131-142.

to hold low potential as a bat roost. It is likely that the majority of Nathusius' pipistrelles recorded within the wind farm areas come from roosts in buildings in the surrounding settlements. This species has a maximum foraging distance of 6.5 km[71]. Any such roost sites will remain unaffected by the proposed development. Should there be any Nathusius' pipistrelle tree roosts within the wind farm areas, these will be protected through embedded mitigation.

6.6.62 It is therefore considered that **construction impacts** on Nathusius' pipistrelle, will be of **low negative magnitude** resulting in an effect that is **not significant**.

6.6.63 Nathusius' pipistrelle's relative abundance determined that the activity within the wind farm areas is classed as low risk for all seasons, when using median activity levels. When using maximum activity levels, they were considered to be at low to moderate risk in spring and moderate risk in summer. However, the low number of Nathusius' pipistrelle passes recorded during the deployments suggests that these relative abundance classifications may be due to under-recording nationally.

6.6.64 The assessment that was carried out to determine risk by detector location for each bat species found that the only turbine location that produced a risk greater than 'low' (excluding *Pipistrellus* sp.) was 'H', which produced a low to moderate risk for Nathusius' pipistrelle (using both median and maximum bat activity).

6.6.65 The recommended buffer distance will be maintained between all turbines (blade tips) and the forest edge; this distance being dependent on turbine dimensions. This is intended to minimise the incidence of bats coming into contact with turbines, however, there is still a risk that this species will be impacted by the proposed development during its operational phase. Nathusius' pipistrelle is assessed in guidance[23] as having an overall high collision risk with wind turbines and a high population vulnerability due to it being considered as a rare species in Wales. **Operational impacts** of the proposed development on Nathusius' pipistrelle due to collision are considered to be of **moderate negative magnitude** but the integrity of the local population is not expected to be affected and, thus, operational effects are considered to be **not significant**.

Noctule

6.6.66 Noctules are widespread in Wales but are considered to be uncommon, although they have shown an increase in their UK population since the turn of the 21st century. Noctules primarily roost in trees and rarely gather in buildings. This species is considered to be an IEF with regional value.

6.6.67 Noctules were infrequently recorded during the static detector surveys. They were mostly recorded in the summer deployment but in this season the total number of passes across all detectors was only 55 (0.17% of all bat passes in that season). Although recorded from 11 static detector locations, eight of these recorded a median BAI of 1. 'L' recorded the most noctule activity (BAI 2.5), although 'M' recorded the largest number of passes overall. No noctules were recorded in the north section. As a proportion of the total, more noctules were recorded during the walked transect surveys (20.5 % of all passes) than during the static detector deployments.

6.6.68 A confirmed noctule roost was recorded during baseline surveys located over 1,100 m from the nearest turbine and over 160 m from the nearest (existing) track. Two noctules were seen to emerge from the roost but no formal emergence survey was undertaken. Although noctules have a maximum foraging range of 26 km[70] it was 'L', the static detector location that is closest to the confirmed roost, that had the greatest recorded noctule activity. Whilst a tree roost was recorded within the wind farm areas, overall the activity levels recorded across the suite of detectors was low. Tree roosts within the wind farm areas will be protected through embedded mitigation.

6.6.69 For noctules, **construction impacts**, as a result of damage to roosting sites, are considered to be of **low negative magnitude** resulting in an effect that is **not significant**.

6.6.70 The relative abundance data for noctules determined that this species' median activity could be classed as low risk in all seasons. Using maximum activity levels, risk remained low in spring and autumn but was low to moderate in summer. Noctules are assessed in guidance[23] as having a high collision risk with wind turbines and a high population vulnerability. Although considered to be a high-flying species, no noctules were recorded by the 'at height' static detector (wind monitoring equipment).

6.6.71 The recommended buffer distance will be maintained between all turbines (blade tips) and the forest edge; this distance being dependent on turbine dimensions. This is intended to minimise the incidence of bats coming into contact with turbines but there is still a potential risk that this species will be impacted by the proposed development during its operational phase. However, the data suggests that only the turbines on the south-western edge have potential to impact noctules, with little or no activity in the vicinity of turbines further north. **Operational impacts** caused by the proposed development as a result of collisions are considered to be of **moderate negative magnitude** for noctules, but the integrity of the local population is not expected to be affected and, thus, the effects will be **not significant**.

Myotis species

6.6.72 Species of *Myotis* bat found in Wales are: Brandt's bat, Bechstein's bat, Daubenton's bat, Natterer's bat and whiskered bat. Daubenton's bat is the most abundant and widespread of these species in Wales and has an increasing population. Daubenton's bats forage over water and their roosts tend to be in underground sites. The SEWBReC data shows Daubenton's bat is the most recorded *Myotis* species in the vicinity of the proposed development, with Natterer's bat the next most frequently recorded. Natterer's bat is a low-flying species that is found most commonly roosting in old stone buildings. Whiskered and Brandt's bat are closely related species that do not use tree roosts. Bechstein's bat is one of the UK's rarest bat species and is mostly restricted to deciduous woodland habitats. It is not known to be in this part of Wales. *Myotis* species are considered to be an IEF with local value.

6.6.73 *'Myotis* sp.' Records were obtained from all static detector locations (except wind monitoring equipment and 'A') but mostly in very low numbers. The exception were the two locations by water courses to the south of the proposed development: 'WC1' recorded a total of 621 passes across the three deployments and 'WC2' recorded a total of 102 passes. 'M' recorded <100 passes, and the remainder recorded <50 passes. The concentration of records at water course locations may be indicative of the *Myotis* records on site referring mostly to Daubenton's bat (which is also indicated in the desk study results).

6.6.74 Although mine entrances are present within the wind farm areas none were located within the surveyed area (350 m of turbines and 80 m of tracks and other infrastructure). Such features will not be impacted upon by the proposed development. The distribution of records combined with the average foraging distance of Daubenton's bat (2.3-3.7 km[70]) suggest an offsite roosting location for the *Myotis* species recorded.

6.6.75 **Construction** impacts on *Myotis* species are considered to be of **negligible magnitude** resulting in an effect that is **not significant**.

6.6.76 The large majority of *Myotis* sp. Bat records came from locations 'WC1' and 'WC2' (75.2% of the *Myotis* sp. Bat passes in the summer season). Both locations lie to the south of the proposed development and the risk within the actual turbine development area, where numbers were mostly very low, can be considered to be small.

6.6.77 *Myotis* sp. Are stated in guidance[23] as being of low risk in terms of collision and having either low population vulnerability (Daubenton's and Natterer's bat) or medium population vulnerability (Bechstein's bat, Brandt's bat and whiskered bat).

6.6.78 Given the majority of *Myotis* sp. Records were outside the turbine development area, that these are low-flying species at low risk of collision and the embedded mitigation that will maintain a buffer between turbines and forest edge, **operational phase** impacts on *Myotis* bat species are considered to be of **low negative magnitude** resulting in an effect that is **not significant**.

Brown Long-Eared Bat

6.6.79 Brown long-eared bat is a widespread, but declining, species. It forages in open woodlands and roosts tend to be in buildings in summer and underground in winter, but they also utilise trees. Brown long-eared bat is considered to be an IEF of local value.

6.6.80 Few records of brown long-eared bat were detected across the three deployments. Records came from 13 locations but 10 of these locations recorded <10 passes in total. In the north section (encompassing four detector locations) a total of 11 passes were recorded in total. The static detector location with the highest number of passes was 'WC2' (43 passes), which is outside the turbine development area. It should be noted, however, that brown long-eared bats can be difficult to detect due to the quietness of their calls.

6.6.81 Roosting locations that are favourable to brown long-eared bats (buildings in summer and underground sites in winter) will not be impacted upon by the proposed development. Should there be any tree roosts within the wind farm areas utilised by brown long-eared bats, these will be protected through embedded mitigation.

6.6.82 **Construction** impacts on brown long-eared bats are considered to be of **low negative magnitude** resulting in an effect that is **not significant**.

6.6.83 The level of activity of brown long-eared bats recorded in the wind farm areas were assessed as being low risk in all seasons when using median activity. When assessed using maximum activity the risk to brown long-eared bats is considered to be moderate in summer and low to moderate in autumn. However, during the summer deployment 42.9% of passes were recorded at 'WC1' and 'WC2' (30.4% in the autumn deployment), which lie to the south of the proposed development, thus, the risk within the actual turbine development area is not as great as this assessment suggests.

6.6.84 Brown long-eared bat is regarded as being at low risk of collision and as having a low population vulnerability[23].

6.6.85 Given the low level of activity of brown long-eared bats within the turbine development area, the low collision risk for this species and the embedded mitigation that will maintain a buffer between turbines and forest edge, **operational phase** impacts on brown long-eared bats are considered to be of **low negative magnitude** resulting in an effect that is **not significant**.

Lesser Horseshoe

6.6.86 In the UK the lesser horseshoe is confined to Wales and south-west England. Its population is increasing, but this follows a previous decline. It is a low-flying species that roosts in caves and buildings. Lesser horseshoe is an IEF of local value.

6.6.87 The overall activity rate of lesser horseshoe was very low across the wind farm areas, with a total of eight passes recorded across all detectors and all deployments. Five detector locations recorded a pass, including 'WC1' and 'WC2', with the maximum being recorded at 'L' (three passes in total). No records came from the north section.

6.6.88 Lesser horseshoe in Wales have a maximum foraging range of 4.2 km[72]. The roosting sites of bats recorded by the static detectors are considered likely to be outside the wind farm areas.

6.6.89 Therefore **construction** impacts on lesser horseshoe are considered to be of **negligible magnitude** resulting in an effect that is **not significant**.

6.6.90 The level of relative activity recorded for lesser horseshoe was assessed as being low risk, using both median and maximum activity levels. Guidance[23] states that lesser horseshoe is at low risk of collision with turbines and that they have a low population vulnerability.

6.6.91 Given the very low level of activity of lesser horseshoe within the turbine development area, the low collision risk for this species and the embedded mitigation that will maintain a buffer between turbines and forest edge, **operational phase** impacts on lesser horseshoe are considered to be of **low negative magnitude** resulting in an effect that is **not significant**.

Margam Park SINC

6.6.92 Margam Park SINC is located 1460 m from the nearest proposed turbine. The site is known to support 14 bat species: common, soprano and Nathusius' pipistrelles, brown long-eared, Brandt's bat, Daubenton's bat, Natterer's bat, whiskered bat, barbastelle, Leisler's bat, noctule, serotine, lesser horseshoe and greater horseshoe.

6.6.93 The six bats recorded to species level during baseline surveys are found at Margam Park. *Myotis* species found at Margam Park are Brandt's bat, Daubenton's bat, Natterer's bat and whiskered bat. Note that '*Nyctalus* sp.' Was recorded during the walked transect surveys. This genus covers both noctule and Leisler's bat, however as all *Nyctalus* that were positively identified during the static detector surveys referred to noctule, it is likely that these records also refer to this species.

6.6.94 Barbastelle, Leisler's bat, serotine and greater horseshoe were not recorded during the baseline surveys. There is therefore no evidence of connectivity between the SINC and the proposed development for these ecological features.

6.6.95 Margam Park is low lying and contains a mix of suitable bat foraging habitats, including patches of deciduous woodland, parkland and water bodies. The wind farm areas are less favourable, being upland areas that contain mostly dense coupes of conifer plantation. It is therefore to be expected that the turbine development area will be a less favoured part of the foraging range of those bats that roost within the SINC. In order to determine any potential impacts upon the SINC, the level of connectivity with the turbine development area requires assessment.

6.6.96 The part of the proposed development that is located within the south section is within the maximum foraging range of all the bat species listed for Margam Park (based upon the closest part of the SINC to the nearest turbine location). However, the north section is outside the maximum foraging range of brown long-eared, common pipistrelle, soprano pipistrelle, greater horseshoe and lesser horseshoe.

6.6.97 The pattern of records obtained during the static detector deployments for common and soprano pipistrelle does not suggest that the 'source' of these bats is located within Margam Park, given the relatively high numbers in the northern half of the proposed development. Nathusius' pipistrelle was most frequently recorded at locations 'H' and 'I', which suggests this species has used the Nant Sychbant watercourse to access the turbine development area, which also suggests no connectivity with Margam Park.

6.6.98 A noctule roost within the forest was confirmed and the low overall activity for this species, as well as a peak in activity around sunset and sunrise, suggests small roost sites lying within the site boundary are more likely to be the source of the noctules recorded than roosts within Margam Park.

6.6.99 The static detectors at 'WC1' and 'WC2' were placed to the south of the proposed development in order to detect any bats that may commute into the site from Margam Park. The watercourses of Nant Cwmcaetreharn ('WC1') and Nant Cwm Philip ('WC2') were considered to provide the most likely corridors for any such movements. If common pipistrelle are excluded, 'WC1' was the location with the greatest number of bat passes (840). Of these, 621 passes (73.8%) were *Myotis sp.* The detector at 'WC2' recorded fewer passes than 'WC1' (357 excluding common pipistrelle) but 'WC2' records included the second highest count of *Myotis* sp. Passes (102) and the largest number of brown long-eared bat passes (29 (31.9% of all brown long-eared passes)).

6.6.100 Comparing the data from 'WC1' and 'WC2' with the adjacent static detector locations provides evidence as to whether commuting bats may continue beyond the watercourses and into the turbine development area. 'N', which was positioned between 'WC1' and 'WC2', had the lowest bat activity of all locations in the south section. Location 'M', which was positioned to the north of 'WC1', did not record a particularly high level of activity overall but it was

[72] Waters, D., Jones, G. & Furlong, M. (1999) Foraging ecology of Leisler's bat (*Nyctalus leisleri*) at two sites in southern Britain. *Journal of Zoology,* 249(2): 173-180.

the detector within the turbine development area that recorded the largest number of passes of *Myotis* sp. (91) and brown long-eared bat (14). Thus the data suggests there may be some connectivity between Margam Park and the turbines in the south-western part of the proposed development (at least for *Myotis* species and brown long-eared bat) but the level of activity here is low and decreases further within the turbine development area. Both *Myotis* sp. And brown long-eared bat are considered to be at low risk of collision with turbines.

6.6.101 The walked transects were also included in the baseline survey programme to help determine any connectivity between the proposed development and Margam Park, with transects sited between these two areas. The data shows that a high proportion of records on these transects were of soprano pipistrelle (27.2% of passes) and noctule (20.5% of passes) when compared to the data gathered on the static detector deployments. Most records of these two species came from the eastern transect. These high proportions of soprano pipistrelle and noctule are not repeated in the data gathered from the detector locations on the south edge of the proposed development. So this data also suggests that although bats from Margam Park may follow water courses north, few of these continue into the turbine development area to forage.

6.6.102 Based on the above information, it is considered that the proposed development will have a **low negative impact** that will not affect the integrity of bat populations within Margam Park. The effect on the SINC will be **not significant**.

6.7 FURTHER MITIGATION AND RESIDUAL EFFECTS

6.7.1 The proposed development is predicted to have an effect that is negligible, or of low negative or moderate negative magnitude, and not significant, for all of the features identified as IEFs.

6.7.2 A number of embedded mitigation measures (see Section 6.6) have been described that will be implemented to ensure the following of good practice guidance and to ensure compliance with legislation.

6.7.3 An additional measure, to be implemented during the operational phase of the proposed development, will be written into the SPP for the benefit of bats. This will state that areas of open-ground around turbines will be managed to ensure that they remain free of tree and tall shrub growth in order to maintain a 50 m buffer between potential bat features and the rotor blade tips.

Summary of Residual Effects Following Mitigation

6.7.4 The further mitigation proposed will prevent any increased risk to bats as a result of habitat changes that may have otherwise occurred during the operational stage. Effects during the operational stage, following this mitigation, are predicted to remain as being of moderate negative magnitude for common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle and noctule; and low negative magnitude for *Myotis* species, brown long-eared and lesser horseshoe and **not significant** for all IEFs.

Habitat Management Plan

6.7.5 An outline HMP that outlines proposed measures for habitat improvements and biodiversity net benefit within the proposed wind farm areas can be found in Appendix 6.3. The final HMP will be subject to agreement with NRW (acting as landowner)s,

6.7.6 NPTCBC and BCBC. The measures proposed in the outline HMP are summarised below:

- Restoration of native broadleaved woodland, focusing on areas alongside watercourses, to create corridors of species-rich habitat that will benefit invertebrates and invertebrate-eating animals, including bats;
- Creation of wet woodland habitat, in an area identified as having soil with a high content of peat, for the benefit of herptiles, invertebrates and bird species;
- Water retention measures to create new ponds and ditches, for the benefit of amphibians, invertebrates and invertebrate-eating animals, as well as being a measure to reduce water flow and aid catchment flood prevention;
- Creation of open ground within the forest, in addition to that required to house infrastructure, to increase grassland/heathland cover for the benefit of ground flora, pollinators and reptiles;
- Clearance of areas of dense, continuous bracken for the benefit of floral diversity, invertebrates and ground-nesting birds; and
- Clearance of invasive alien species, such as Himalayan balsam and rhododendron, to allow the spread of native flora and associated pollinating insects.

6.7.7 Production of a HMP is in line with the Well-being of Future Generations (Wales) Act 2015 goal 'a resilient Wales' for '*a nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change*'.

6.8 SUMMARY OF EFFECTS

6.8.1 Table 6.26 summarises the predicted effects on each IEF. Following the implementation of mitigation the proposed development is not predicted to have a significant effect on any of the IEFs.

Table 6.26: Summary of predicted effects on Important Ecological Features

IEF	Conservation importance	Nature of potential pre-mitigation effect	Magnitude of pre-mitigation effect	Significance of pre-mitigation effect	Specific mitigation/ compensation measure	Magnitude of residual effect	Residual significance	Level of certainty
Construction/Decommissioning								
Common pipistrelle	Local	Loss of summer roosting sites and disturbance/displacement as a result of construction activities	Low negative	Not significant	Nothing in addition to embedded mitigation	Low negative	Not significant	Very high
Soprano pipistrelle	Local	Loss of summer roosting sites and disturbance/displacement as a result of construction activities	Low negative	Not significant	Nothing in addition to embedded mitigation	Low negative	Not significant	Very high
Nathusius' pipistrelle	Regional	Loss of summer roosting sites and disturbance/displacement as a result of construction activities	Low negative	Not significant	Nothing in addition to embedded mitigation	Low negative	Not significant	Very high
Noctule	Regional	Loss of roosting sites and disturbance/displacement as a result of construction activities	Low negative	Not significant	Nothing in addition to embedded mitigation	Low negative	Not significant	Very high
Myotis sp.	Local	Disturbance/displacement of foraging bats as a result of construction activities	Negligible	Not significant	Nothing in addition to embedded mitigation	Negligible	Not significant	Very high
Brown long-eared	Local	Loss of summer roosting sites and disturbance/displacement as a result of construction activities	Low negative	Not significant	Nothing in addition to embedded mitigation	Low negative	Not significant	Very high
Lesser horseshoe	Local	Disturbance/displacement of foraging bats as a result of construction activities	Negligible	Not significant	Nothing in addition to embedded mitigation	Negligible	Not significant	Very high
Margam Park SINC	Regional	Disturbance/displacement of foraging bats as a result of construction activities	Low negative	Not significant	Nothing in addition to embedded mitigation	Low negative	Not significant	Very high
Operation								
Common pipistrelle	Local	Collision risk	Moderate negative	Not significant	In order to maintain safe distance between turbine blade tips and woodland edge (50 m), removal of tree regeneration around turbines will be maintained throughout operational phase	Moderate negative	Not significant	High
Soprano pipistrelle	Local	Collision risk	Moderate negative	Not significant		Moderate negative	Not significant	High
Nathusius' pipistrelle	Regional	Collision risk	Moderate negative	Not significant		Moderate negative	Not significant	High
Noctule	Regional	Collision risk	Moderate negative	Not significant		Moderate negative	Not significant	High
Myotis sp.	Local	Collision risk	Low negative	Not significant		Low negative	Not significant	High
Brown long-eared	Local	Collision risk	Low negative	Not significant		Low negative	Not significant	High
Lesser horseshoe	Local	Collision risk	Low negative	Not significant		Low negative	Not significant	High
Margam Park SINC	Regional	Collision risk	Low negative	Not significant		Low negative	Not significant	High

Source: Natural Power

6.9 ECOSYSTEM RESILIENCE

6.9.1 NRW's *Ecosystem Resilience Field Guide*[73], as well as NPTCBC's *Biodiversity Duty Plan 2020-2023*[74] and BCBC's *Biodiversity and Ecosystem Resilience Forward Plan 2018-2022*[75] highlight the importance of ecosystem resilience and actions that can be undertaken to meet this aim, as required by the Environment (Wales) Act 2016[6]. Resilient ecosystems are those with good levels of diversity, which are of sufficient extent, are in a good condition and have connectivity; referred to as the 'DECCA' framework of measurable attributes[19]. Actions to achieve resilient ecosystems include safeguarding and improving existing ecosystems, restoring degraded habitats and creating new areas of habitat. Measures may also include tackling current pressures, such as removing invasive non-native species and improving air quality. Priority actions to build ecosystem resilience in the uplands include increasing tree cover and managing run-off pathways.

6.9.2 The outline HMP for the proposed development (Appendix A6.3), includes a number of prescriptions that will promote ecosystem resilience within the site boundary. Diversity will be enhanced by the creation of new biodiverse habitats, for example the restoration of broadleaved woodland. The extent of open ground habitats will be increased, for example through bracken control, to create more habitat diverse grassland areas. The removal of invasive species (such as Himalayan balsam) will improve the natural condition of habitats within the site boundary. The broadleaved woodland restoration areas follow watercourses, providing attractive corridors for wildlife to disperse within the forest. Additionally, where it is possible to do so, water retention measures are proposed, that will create new ponds and ditches. As well as increasing biodiversity, these measures aim to reduce water flow during heavy rainfall events, which should aid flood prevention lower down in the catchment. This will provide an ecosystem level solution to the danger of increasingly frequent flooding events as a result of climate change.

6.9.3 Therefore, in addition to the low carbon energy generation that is the main aim of the proposed development, the implementation of the HMP will enhance biodiversity and create new opportunities to improve ecosystem resilience within the site boundary.

6.10 BIODIVERSITY NET BENEFIT

6.10.1 Biodiversity net benefit for a project is mandatory, under the Section 6 duty of the Environment (Wales) Act 2016[6]. At the time of writing this ES chapter, policy changes relating to biodiversity net benefit and ecosystem resilience are open to consultation by the Welsh Government[76]. It is, therefore, acknowledged that guidance may change, but for the purposes of discussing biodiversity net benefit in relation to the proposed development the Welsh Government's approach is taken from that presented by CIEEM (2022)[18]. This guidance states that a metric approach should not be utilised.

6.10.2 As described in Section 6.9 (Ecosystem Resilience) a number of measures to benefit biodiversity are proposed in the HMP (Appendix 6.3). In this section, evidence is provided as to how the proposed development will maintain and enhance biodiversity, through the implementation of the HMP.

6.10.3 The outline HMP, as presented in Appendix 6.3, is subject to change as it will be formalised as part of planning consent (following agreement from NRW (as land manager), NPTCBC and BCBC) but it provides a clear statement of the aims and ambitions of the measures to be implemented.

6.10.4 The HLC (Table 6.14) determined that of the Phase 1 habitats recorded in the surveyed area (wind farm areas plus AIL areas and 250 m buffer) which contain an NVC community with conservation protection, over 97% of these habitat types will be retained. No significant effects are predicted for habitats and the proposed development is not anticipated to affect the overall condition, adaptability, or resilience of the existing ecosystems. No significant effects have been predicted for any SINCs or statutory sites.

6.10.5 Included in the prescriptions of the outline HMP is the restoration of broadleaved woodland, including wet woodland, in areas that were previously conifer plantation. The areas identified for restoration total over 30 ha. This compares to a total of 2.22 ha calculated to be lost in the HLC (broadleaved and mixed woodland of all types combined).

6.10.6 Felling of plantation for construction of the wind farm will create open ground, of which a large area will not be replanted, but will be managed to actively prevent the regeneration of conifers. This will allow grassland and heathland habitats to become established in these areas, which includes track edges, around turbines and dedicated discrete areas. Based on the outline HMP a total of at least 105 ha of such open ground habitat will be created, compared to a total of 11.02 ha (all grassland and heathland habitats/mosaics combined (excluding improved grassland)) that will be lost as a result of the proposed development. Furthermore, there will be additional areas of substantial extent, where continuous areas of bracken will be controlled and the removal of invasive species will take place, which will create further areas of improved biodiverse habitats.

6.10.7 Through minimising the loss of existing habitats of conservation interest, whilst also creating new habitats that will be more favourable to a wide range of ecological interests (including habitat valuable to invertebrates, ground flora, reptiles, amphibians and small mammals), the proposed development will result in biodiversity net benefit.

6.11 CUMULATIVE EFFECTS

6.11.1 A Cumulative Impact Assessment (CIA) has been carried out to assess the potential impacts of the proposed development alongside the collective impacts of other projects in the vicinity of the proposed development. Guidance[23] states that assessments should focus on the most significant cumulative impacts and conclude with a clear assessment of those which are likely to influence decision making. Only IEFs for which a greater than negligible residual impact is predicted are considered in the CIA, as negligible impacts will not result in a detectable increase in cumulative impacts. Following guidance any wind farm developments of fewer than three turbines (small scale wind energy proposals[77]) were excluded from the CIA. This is due both to the lack of quantitative environmental information which usually exists in the public domain for such small-scale developments and the low likelihood that significant negative effects would be predicted for them. Non-wind farm developments were also included and are also considered below.

6.11.2 Bats are likely to be affected by additional wind farm developments because of the distances travelled by some species of foraging bat and the cumulative risks to bat populations as a result of collision with wind turbines during operation. The implementation of good practice measures regarding buffer distances of turbines from linear features (including forestry edges) to minimise impacts on commuting and foraging bats minimises likelihood of cumulative impact.

6.11.3 All existing, consented and submitted developments (of three or more turbines) within 10 km of the proposed development, were considered as part of the CIA.

6.11.4 Within this search area there are a total of seven wind farm developments that have been included in the CIA:

[73] Available from: https://naturalresources.wales/guidance-and-advice/environmental-topics/land-management/ecosystem-resilience-field-guide/?lang=en [Accessed 03/04/2023]

[74] Available from: https://www.npt.gov.uk/30833 [Accessed 03/04/2023]

[75] Available from: https://democratic.bridgend.gov.uk/documents/s15257/180424%206%20Biodiversity%20and%20Ecosystems%20Resiliance%20Forward%20Plan%202018-2022.pdf [Accessed 03/04/2023]

[76] Available from: https://www.gov.wales/targeted-policy-changes-planning-policy-wales-net-benefit-biodiversity-and-ecosystems-resilience [Accessed 03/04/2023]

[77] SNH (2016) Assessing the impact of small-scale wind energy proposals on the natural heritage (Guidance note). Scottish Natural Heritage.

- **Mynydd Brombil Wind Farm (operational)** – This is a four-turbine operational site located adjacent to the south section of the proposed development and the western AIL area is partially within the site;
- **Foel Trawsnant Wind Farm (consented)** – This is an eleven-turbine site, located adjacent to the northern boundary of the north section of the proposed development;
- **Pen y Cymoedd Wind Farm (operational)** – This is a 76-turbine site located (at its closest western end) approximately 2.6 km north of the north section of the proposed development;
- **Llynfi Afan Wind Farm (operational)** – This is a 12-turbine operational site, located approximately 3.3 km east of the north-west corner of the proposed development;
- **Ffynnon Oer Wind Farm (operational) –** This is a 16-turbine site located about 4 km north of the proposed development;
- **Melin Court Wind Farm (consented)** – This is a five-turbine site which has had planning approved and is located approximately 6.5 km north of the proposed development; and
- **Upper Ogmore Wind Farm (consented)** – This is a seven-turbine site located about 7.5 km east of the proposed development.

6.11.5 Within 10 km there were 41 non-wind developments present. Of those, 25 did not have any ecology or bat survey information submitted with the application. Of the 16 applications that did have bat survey information available, 13 found no evidence of roosting bats. Of the remaining three projects, all were housing applications. All had small numbers of roosting bats, which required a derogation licence from NRW for the works to go ahead, which would require appropriate mitigation to ensure no impacts would be anticipated on bat species. The list of non-wind developments included two solar farms, one of which is located close to the south section of the proposed development. Data is not available for these projects (which are at the pre-application stage) so it is not possible to assess their possible impact on bats, although they are not considered unlikely to have a negative impact. As such, no non-wind developments are included within Table 6.27.

6.11.6 It should be noted that cumulative assessments may be complicated by availability of EcIA/ES chapters for consented developments and, where this information is available, survey periods and methods may differ between sites. Furthermore, some wind farms may have been in existence for many years, and thus contemporary data may not be available. No ES was available for Ffynnon Oer Wind Farm, which was consented in 2003 and subsequently became operational in 2006. Thus, cumulative totals reflect minimum values only.

6.11.7 Cumulative impacts are assessed for bats only, as only species/habitats for which a greater than negligible residual impact is predicted are considered in the CIA. The assessment is presented in Table 6.27.

Table 6.27: Cumulative Impact Assessment

Development type	Site	No. Turbines	Site status	Baseline bat surveys undertaken	Bat Assessment
Wind	Y Bryn (proposed development)	18	EcIA	2021	Bat species considered to be of Local or Regional value. Habitat within proposed development considered to be of moderate suitability for bats. Common pipistrelle was the most recorded species. Assessment of relative activity determined low to moderate bat activity. Preliminary bat roost assessment located nine features (or groups of features) considered to have good potential as bat roosts. These were all in trees. A supplementary record of a noctule roost site was located over 1,100 m from the nearest turbine. A low negative impact was predicted for *Myotis* sp., brown long-eared and lesser horseshoe and a moderate negative impact for common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle and noctule. No significant effects predicted.
Wind	Mynydd Brombil	4	Operational since 2017	2011	Low to medium level bat activity.

Development type	Site	No. Turbines	Site status	Baseline bat surveys undertaken	Bat Assessment
					All turbines situated within poor quality bat foraging and commuting habitat. No potential bat roost locations were identified within a 250 m search radius of the site. No significant effect predicted.
Wind	Foel Trawsnant	11	Consented 2021	2018	Bats considered to be of Local value. Activity levels were determined to be relatively low, particularly at turbine locations. No roosts were identified on, or in the immediate vicinity of, the site, although it was considered likely that bats may opportunistically roost in the woodlands near the site, based on occasional atypically early contact times. Wind farm predicted to increase the mortality risk for bats, particularly common pipistrelle. However, no significant effects predicted on local bat populations.
Wind	Pen y Cymoedd	76	Operational since 2016	2008-2009	The species identified most frequently on the site were common and soprano pipistrelle. No species classed as being of high risk from wind farms were detected. No specific flight routes were detected within the site, but mature tree edges and tree-lined roads were found to be used as sheltered feeding areas by bats. The location of the turbines would have no effect on flight or commuting routes. Bat roost assessment concluded a high potential for many species of bat to be roosting close to the site, however the actual results of field surveys suggested this was not the case. The wind farm was considered unlikely to have a significant impact on local bat populations.

Development type	Site	No. Turbines	Site status	Baseline bat surveys undertaken	Bat Assessment
Wind	Llynfi Afan	12	Operational since 2017	2005, 2006, 2008, 2010, 2012	Bats considered to be of Local value. The baseline surveys indicated low numbers of bats, especially in the open habitat areas around the proposed turbines. No evidence of bat flight corridors across the site. No evidence of bat roosts within, or in the near vicinity of, the site. The development was considered not to pose a high risk to bats. No significant effect predicted.
Wind	Melin Court	5	Planning approved	2012-2013	Bats considered to be of Local value. Low levels of bat activity were recorded. No important bat roosts were found to be present within 200 m of the planning application boundary. However, timings of the first bat passes recorded during transect and static surveys suggested roosts of up to five species of bats (common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, *Myotis* sp. and long-eared) could be present in relatively close proximity to the application site. Overall, it was considered that effects on bats would not be significant at any geographical level.
Wind	Upper Ogmore	7	In planning	2015, 2016, 2018 and 2019	The site was categorised as low risk for bats given the exposed, upland setting and the limited diversity and scale of the foraging and roosting habitats present. This was confirmed by survey results which recorded consistently low bat activity across the site for all sampling periods. A low level of activity was recorded within the site for common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, noctule, Leisler's bat and serotine.

Development type	Site	No. Turbines	Site status	Baseline bat surveys undertaken	Bat Assessment
					A lack of calls close to sunset and sunrise suggested it is unlikely that there was a significant roost nearby for any of the species recorded. This conclusion was supported by the lack of roosting habitat within, or near to, the site. The overall risk to all species of bat recorded was assessed as being low. No significant effect predicted.
	Cumulative residual effects	133			The CIA considered projects within 10 km of the proposed development, but not all of these sites are within the foraging distance of the bat species recorded. For example, only three of the projects are located within the maximum foraging distance of common pipistrelle[71], the species that accounted for the large majority of records at the proposed development. Therefore, there is no route for some of the projects listed to impact upon the bat populations that utilise the area in which the proposed development is situated. For all wind farm sites included in the CIA, potential bat roosting sites, where present, are protected through embedded mitigation measures and so no significant effects on roosting sites was concluded. The activity of bats at all sites was such that collision impacts were also concluded to be of low magnitude and not significant in all cases. When looked at cumulatively, it is considered that the low impact of collision predicted at each wind farm site would not result in an overall change in the status to the local bat populations. Therefore, no significant cumulative effect on bats is predicted.

6.11.8 With the application of good practice mitigation in relation to bats, the cumulative impact is predicted to be of **low to moderate negative magnitude** and **no significant effect** is predicted.

6.12 STATEMENT OF SIGNIFICANCE

6.12.1 An assessment has been made of the potential for significant effects of the proposed development on habitats and non-avian protected species. The proposed development includes for a 50 m micrositing allowance where the environmental impacts would be assessed and signed-off by the Environmental Clerk of Works.

6.12.2 By applying effective mitigation measures, mainly through the design process, and following good practice guidelines during construction, including production of an SPP and an HMP, the magnitude of residual impacts of the proposed development are assessed as being of **negligible, low or moderate negative magnitude**. **No significant effects** are predicted.