6. Ecology and Biodiversity

Introduction

6.1 This chapter considers the likely significant effects on ecology associated with the construction, operation and decommissioning of the proposed Development. The specific objectives of the chapter are to:

- describe the ecological baseline;
- describe the assessment methodology and significance criteria used in completing the impact assessment;
- describe the potential effects, including direct, indirect and cumulative effects;
- describe the mitigation measures proposed to address likely significant effects;
- assess the residual effects remaining following the implementation of mitigation.

6.2 The assessment has been carried out by Senior Ecologist Gareth Lang ACIEEM, of BSG Ecology.

6.3 The chapter is supported by:

- Appendix 6.1 – Legislation and Planning Policy
- Appendix 6.2 – Consultation Meeting Minutes
- Appendix 6.3 - Baseline Ecology and Ornithology Reports
- Appendix 6.4 – Collision Risk Analysis

6.4 Figures 6.1 – 6.11 are referenced in the text where relevant.

Legislation & Planning Policy

6.5 There are a number of national, regional and local policies and guidance documents that relate to nature conservation and ecology within the planning process that are relevant to the Development. Reference to these provides an indication of the likely requirements and expectations of statutory authorities and others in relation to planning applications and nature conservation and ecology within a given area. There are also legislative requirements of new development. The relevant national, regional and local planning policies are listed below (further detail of the below policies are provided in Appendix 6.1).

- Planning Policy Wales (Edition 10, December 2018).
- Technical Advice Note (TAN) 5 Nature Conservation and Planning (2009).
- Bridgend County Borough Local Biodiversity Action Plan (2014)

- Bridgend Local Development Plan (2006-2021), including:
- Strategic Policy SP4 Conservation and Enhancement of the Natural Environment
- Policy ENV4 Local/Regional Nature Conservation Sites
- Policy ENV5 Green Infrastructure
- Policy ENV6 Nature Conservation
- The Environment (Wales) Act (2016).
- The Conservation of Habitats and Species Regulations 2017.
- The Wildlife and Countryside Act (1981) as amended.

6.6 This chapter has been based principally on relevant parts of the 2018 Guidelines for Ecological Impact Assessment in the United Kingdom developed by the Chartered Institute of Ecology and Environmental Management (CIEEM, September 2018).

Site Description

6.7 The site is an area of upland moorland located at the head of the Garw and Ogmore Valleys. The majority of the site is a mosaic of acid and marshy grassland, with the former occurring in the better drained areas.

6.8 Small areas of wet modified bog and marshy grassland are present in the north-eastern part of the site, and acid dry dwarf shrub heath occurs locally where grazing pressure is reduced. Enclosed semi-improved and improved pasture fields are present in the eastern part of the site.

6.9 Several small flushes are present beyond the eastern and western sides of the developable area (defined by <15% slope as described in Chapter 2; the extent of the developable area is shown in Figures 6.1-6.11) where the ground slopes steeply down and groundwater emerges. These areas are frequently punctuated by rock escarpments. Below the natural exposures there are large scree slopes present amongst a mosaic of acid dry dwarf shrub heath and unimproved acid grassland.

6.10 A transmission mast and associated buildings are present in the central part of the site within a fenced compound. The area is accessed via a concreted road leading from the A4107 to the north.

6.11 A larch *Larix decidua* dominated plantation is present immediately beyond the site boundary to the east, much of which has been felled. Plantations are also present to the north and west of the site boundary.

6.12 The proposed Development includes seven turbines and associated infrastructure (see Chapter 1). The maximum height of the turbines is 149.9 m. These will all be positioned on the flatter ground within the developable area.

6.13 The proposed access route will follow the existing NRW Forestry track between the southern extent of the operational Pen-y-Cymoedd Wind Farm to the Bwlch forestry access point at the A4107 (a distance of approximately 3.6 km). Localised widening of the forestry track will be required to allow passage of abnormal indivisible loads. The site and forestry track are presented in Figure 1.2.

Scope of Assessment

6.14 The methods for ecological survey of the site, results and evaluation of receptors are provided in this assessment. The assessment considers potential effects on habitats and protected species at each of the construction, operational and decommissioning phases of the proposed Development.

6.15 Survey work at the site to inform this assessment has included:

- An extended Phase 1 Habitat Survey of the site and proposed access route
- A Phase 2 botanical survey of an area of higher quality habitat
- Vantage point bird survey (two years)
- Targeted honey buzzard survey
- Moorland breeding bird survey
- Wintering bird walkover survey
- Targeted breeding merlin survey
- Bat activity survey (seasonal walked transect and automated detector)
- Bat roost survey
- Great crested newt survey
- Water vole survey

Consultation

6.16 BSG Ecology produced an Ecological Scoping Report which was issued to Natural Resources Wales on 7th December 2015 as part of pre-application consultation. The Extended Phase 1 Survey Report and Baseline Breeding Bird Report 2014 were appended to the scoping document. A response was received (ref: CAS-13525-N6P1) from David Watkins[1] of NRW on 16 February 2016. This is contained in Appendix 6.2.

6.17 A Discretionary Planning Advice (DPA) meeting was subsequently set up with Natural Resources Wales on the 13th December 2017 to discuss the scope of

[1] Now retired.

ornithological survey work, as well as wider ecological and peat considerations at the site. All baseline ornithology and ecology reports were provided to Natural Resources Wales prior to the DPA meeting request. NRW raised no concerns during the consultation meeting regarding the scope of ornithological survey work. The minutes of the meeting are provided in Appendix 6.2.

Assessment Methodology

Baseline Characterisation

Study Area

6.18 The extent of field survey was based on relevant industry standard guidance, as indicated in Table 6.1 below.

Table 6.1. Study area for each survey completed to inform this assessment.

Survey type	Guidance followed	Study Area
Phase 1 habitat survey	JNCC (2010)	Limited to the developable area within the site boundary and a perimeter area of approximately 200 m from the existing NRW Forestry track. Any potential groundwater dependant terrestrial ecosystems immediately beyond these limits were also considered.
Phase 2 botanical survey	N/A	Informed by an area of apparent higher quality habitat as identified in the Phase 1 survey.
Vantage point bird survey	Scottish Natural Heritage (SNH) (2014)[2].	2 km viewing arcs covering the site and a 500 m perimeter of turbine locations.
Targeted honey buzzard survey	Hardey *et al* (2013); SNH (2014)	2 km viewing arcs covering areas of suitable habitat adjacent to the site.
Moorland breeding bird survey	SNH (2014)	Suitable habitat within 620 m of turbine locations, where terrain was accessible and potentially suitable for breeding waders.
Wintering bird walkover survey	SNH (2014)	Suitable habitat within 500 m of turbine locations, where terrain allowed[3].
Targeted breeding merlin survey	Hardey *et al* (2013)	Suitable breeding habitat within 500 m of the site.
Bat activity survey	Hundt (2012)	Sample of turbine locations within the site.
Bat roost survey	Hundt (2012) & Collins, J. (ed.) (2016)	Suitable roost features within 200 m of the developable area.
Great crested newt survey	English Nature (2001)	Ponds within 250 m of the site and NRW Forestry track.

[2] This has since been updated (March 2017). However, the methods used remain consistent with the latest guidance.
[3] Steeply sloping land beyond the developable area was not accessed on foot.

Survey type	Guidance followed	Study Area
Water vole survey	Dean *et al* (2016)	All watercourses within the developable area and up to 100 m of it where terrain allowed. Up to 100 m up and down stream of existing culverts along the NRW Forestry track.

Baseline data collection

6.19 All baseline data collection was carried out by BSG Ecology between April 2014 and October 2019. Full methods and results of the baseline data collection are presented in Appendix 6.3.

Desk Study

6.20 The presence of statutory designated sites of nature conservation interest in relation to the site was established using the Magic website (http://magic.defra.gov.uk/). This was initially accessed ahead of work completed in 2014, with further checks to ensure information remained consistent[4].

6.21 The South East Wales Biodiversity Records Centre (SEWBReC) was asked to provide records of non-statutory designated sites and records of protected/notable species and habitats within 2 km of the site boundary. For low and medium-risk species of bats records were requested within 5 km of the site, and statutory designated sites (designated for bats) and high-risk bats within 10 km. The data request was first made on 06 January 2015 and updated on 21 March 2016. Detailed information from SEWBReC can be provided on request.

6.22 The 2010 Llynfi Afan Renewable Energy Park (REP) Environmental Statement (RPS 2010) was interrogated for ornithological information relevant to the site and surrounding area. The Llynfi Afan REP Pre-Construction Ornithological Survey Report 2015 (Natural Power 2016) was also reviewed[5].

Phase 1 habitat surveys

6.23 An extended Phase 1 habitat survey was completed on 21 May 2018[6] on finalisation of the scheme design. This followed an initial extended Phase 1 habitat survey covering a wider working site boundary (since superseded) on 24 July 2014 and 02-04 September 2014. A survey of the NRW Forestry track, between the track junction with the A4107 and the southern extent of the Pen-y-Cymoedd wind farm site was completed on 04 June 2020, covering an area of up to 200 m from the track centre (where access through dense plantation allowed). This updated the

[4] Completed regularly in 2016, 2017 and 2018
[5] In addition to publicly available baseline survey data. The report was provided by Gamesa.
6 The survey was completed by an experienced botanist at an optimal time of year as defined in JNCC (2010).

initial survey on 07 October 2016. The surveys involved mapping habitats using industry standard methods (JNCC, 2010)[7]. They were extended to include searches for signs of protected or rare species, or the presence of suitable habitats for such species following IEA (1995).

Phase 2 Botanical surveys

6.24 The presence of some areas of higher quality habitat, including degraded blanket bog (on deep peat), in the north-eastern part of the site were identified during the Phase 1 survey in 2014.

6.25 An NVC survey was carried out in this area on 08 and 09 July 2016. Areas with consistent botanical characteristics (stands of homogenous vegetation) were initially identified. Five quadrats[8] from each area of homogenous vegetation were then taken where possible. However, it wasn't possible to achieve five quadrats for all vegetation communities due to the limited extent of some stands. The classification of habitats was made with reference to vegetative communities described in Rodwell (1991b, 1992)[9] [10].

Ornithological surveys

Vantage point surveys

6.26 SNH guidance is that vantage-points (VPs) should be chosen parsimoniously in order to achieve maximum visibility from the minimum number of survey locations. An arc of up to 180 degrees extending to 2km from the observer can be effectively surveyed from each VP (subject to topography and any other constraints to effective survey).

6.27 SNH guidance further states that a minimum of 36 hours of survey effort should be completed at each VP during both the breeding season and winter periods, and that the timing of VP watches should be varied to ensure that all times of day are appropriately covered.

6.28 Two VP locations were chosen during a reconnaissance visit in April 2014. Both were located in the northern part of the Site allowing access to both locations along existing tracks linked to the A4107 (therefore not requiring the surveyor to walk through the VP viewsheds). The 2 km viewing arcs from the selected VP locations provided visual coverage of all turbine locations within the Wind Farm

[7] JNCC (2010) Handbook for Phase 1 Habitat Survey. A Technique for Environmental Audit. JNCC
[8] Five is the minimum recommended number of quadrats to allow a robust calculation of inter-stand frequency classes which is an important step in determining the NVC community present.
[9] Rodwell, J S (ed.) (1991b) British Plant Communities, Vol. 2: mires and heaths. Cambridge University Press, Cambridge
[10] Rodwell, J S (ed.) (1992) British Plant Communities, Vol. 3: grasslands and montane communities. Cambridge University Press, Cambridge

and approximately 88% of a 500 m perimeter area around them[11]. All turbine locations within the current scheme design were observed throughout the 2014, 2015-2016 and 2020 surveys.

6.29 Following a change to the project design in 2015, the VP locations were adjusted ahead of the second year of survey to provide maximum coverage of the 500 m perimeter area around a revised layout. The VP locations used in the 2015/2016 and 2020 surveys are shown on Figure 6.1.

6.30 Vantage point survey work completed between April 2014 and August 2014 inclusive were updated in 2020 to ensure that all survey data used to inform this assessment were collected within the last five years (following recommendations in SNH 2017). The survey work completed between October 2014 and August 2020 inclusive resulted in a total of 180 hours of observation from each of the two VP locations.

Honey buzzard surveys

6.31 There are records of honey buzzard *Pernis apivorus* nest sites within the Neath Valley (approximately 10 km north-west of the site); however, the specific locations of these are confidential and not described in published literature. Honey buzzard survey was recommended by consultees to inform the adjacent Llynfi Afan (REP) application.

6.32 There is no suitable foraging or breeding habitat for honey buzzard on the site. In addition, the nearest breeding locations are within the Neath Valley (approximately 9 km north-west of the site). However, there are areas of plantation that have some potential to support honey buzzard adjacent to the site boundary. These are: woodlands north and west of Blaengarw, and an area of plantation north of Nant-y-moel.

6.33 The plantation in the Nant-y-Moel valley, adjacent to the east of the site (approximately 250 m from the nearest turbine), has been largely clear-felled, but does retain some mature stands adjacent to the A4061 and surrounding Nant-y-Moel village. These areas may be too disturbed and limited in size to support breeding honey buzzard (which prefer 'extensive' woodland; Hardey *et al* 2013). Although suboptimal in terms of extent, the habitat structure remains suitable for

[11] The character of the site (occupying a steep-sided ridge between two valleys) restricted opportunities for selecting viable VP locations outside of the development boundary: any VP location fit for purpose would have been located on this ridge. VP locations were chosen following consideration of visual coverage and accessibility. The survey results do not suggest observer influence on bird behaviour. The level of target species activity observed in close proximity to the VP locations was no lower than that observed at distance and no alteration of target species flight trajectory or height was recorded that could be attributed to surveyor presence. The adjusted VP locations following the reduction of the scheme to eight turbines in early 2015 provided greater surveyor screening to reduce the risk of influencing bird behaviour. Again, no evidence to suggest surveyor influence was recorded during the 2015-2016 surveys

this species. The woodland to the west of the site (approximately 650 m from the nearest turbine), north and west of Blaengarw, is extensive and includes mature stands, although areas nearest the site are relatively young and have not been subject to thinning. The land between the site and this woodland is occupied by open moorland habitat on steep slopes with areas of exposed rock and scree.

6.34 An additional twelve hours of survey were completed from both of two additional VP locations during the period when breeding honey buzzards are likely to be displaying (late May / early June) and foraging beyond woodland cover (in late July / early August). The additional VP locations were chosen to provide visual coverage of the woodlands beyond the site, and are indicated on Figure 6.2. The locations of the additional VPs also allowed for observation of scree slopes, steep-sided streams and felled plantation, which are potentially suitable breeding habitat for merlin *Falco columbarius*. The survey for merlin was a precursor to more detailed work that was carried out in 2015.

Merlin surveys

6.35 Merlin surveys were completed in 2015 following observations of merlin during the 2014 breeding bird surveys. It was considered very unlikely that merlin could breed within the site; there are no trees, suitable rocky escarpments, stream valleys or areas of moorland. Less intensively grazed, dry heath habitats occur predominantly on the steep slopes that demarcate the limits of the developable area. Given this, it was considered that merlin, if present in the locality, would breed off-site. In addition, breeding bird walkover surveys of the site and a 500 m perimeter of it completed between April and June 2014 did not result in records of breeding merlin. Survey work therefore focused on surveying suitable habitat beyond the developable area from local vantage points.

6.36 Surveys followed standard methods that were adapted to reflect the habitats present (which were mainly too steep to be walked). The method included a combination of short VP watches with walks in between to cover all suitable nesting habitat for the species. VP locations were selected to enable visual coverage of rocky slopes and plantation edges surrounding the site. The VP locations are shown on Figure 6.2. Surveys were completed on four days during April-June 2015 by an experienced raptor surveyor. The results did not suggest breeding on, or immediately adjacent to the site, and so additional visits to confirm breeding and/or establish the number of pairs and breeding success were not therefore necessary.

6.37 Observations of merlin made during the 2020 breeding season VP work suggest that merlin bred near to the Site. Two additional three-hour watches were completed from each of two VP locations overlooking the stream valley on the northern

boundary of the Site in June and July to scan for merlin activity. This work supplemented raptor walkover survey work.

Raptor Walkover Survey

6.38 The approach to the raptor survey was based on methods provided in Hardey et al. (2013) and SNH (2017) guidance, which recommends that surveys for red kite, kestrel and merlin are completed within 2 km of a proposed wind farm. The approach was also informed by study of aerial photographs.

6.39 Survey to confirm occupancy of territories by red kite, kestrel and merlin included a combination of short watches from local vantage points and walking a route through areas of suitable breeding habitat[12] on three visits between May and July 2020 inclusive. An area extending to all open common land within 2 km of indicative turbine locations was covered by the survey.

Moorland breeding bird surveys

6.40 Moorland bird survey using a walkover technique based on the Brown & Shepherd (1993) method, as recommended in SNH (2014) guidance[13] was undertaken during the 2014 breeding season and updated in 2020. The survey area was defined by a 620 m perimeter area around an indicative turbine layout, where access allowed. Three visits were completed between April and June inclusive. The SNH (2014, and subsequent 2016) guidance recommends that four visits (three visits were suggested under earlier iterations of the guidance) should be completed over the breeding season, based on recommendations set out in Calladine *et al*. (2009). A fourth survey was not considered necessary, as per SNH (2014), as those species that are likely to be under-recorded by three visits (e.g. red grouse *Lagopus lagopus scotica*) were not present on the site.

6.41 VP survey work and other targeted raptor work did not indicate the presence of breeding waders in 2015 or in 2020.

Wintering bird walkover surveys

6.42 Monthly wintering bird walkover surveys were completed between October 2014 and March 2015 inclusive, covering the site and a 500 m perimeter area. These were not repeated in the 2015/2016 winter period due to the low level of wintering bird interest recorded. In addition, the VPs provided a good visual coverage of the site between April 2014 and March 2016 inclusive to supplement the bird walkover survey work.

[12] Such as stream valleys, rock outcrops and woodland edge.
[13] The SNH guidance has since been updated (current version was published March 2017), but the recommendations in relation to moorland breeding bird survey methods remains consistent with the 2014 guidance.

Bat surveys

Automated detector surveys

6.43 Automated detector survey was undertaken in October 2015, June and August 2016 and in September 2018 based on methods recommended in the (now superseded) Bat Conservation Trust (BCT) guidelines (Hundt, 2012)[14]. The BCT guidance recommended that a representative sample of turbine locations were surveyed. For open homogeneous moorland, the guidance suggested that a quarter of the turbine locations should be sampled along with paired locations on adjacent habitat features (such as hedges located relatively close to turbines). At Upper Ogmore, none of the turbine locations are close to any higher quality habitat features for bats, such as woodland, watercourses, or hedgerows. As such the use of paired detectors was not appropriate.

6.44 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 for bats to exploit. Four detectors were deployed for a period of five nights during early October 2015 (in 'autumn') and redeployed for an additional five nights in June ('spring') and August ('summer') 2016. Further autumn sampling was completed in September 2018 to refresh the data set). The update survey comprised automated detector deployment over a period of 10 nights[15]. The selected automated detector locations were representative of indicative turbine locations, but were also chosen to provide some security from damage by the public and livestock (as the survey area is partly located on common land). Therefore, detector locations coincide with existing structures to mask their presence, as follows:

- Detector 1 (D1) located on the security fence of the Werfa mast compound (representative of the habitat present at turbine locations 1, 2, 3 and 4);
- Detector 2 (D2) located on a wooden electricity pylon (adjacent to turbine 7); and
- Detectors 3 (D3) and 4 (D4) located on stock fence posts (adjacent to turbines 5 and 6 respectively).

6.45 The automated detector surveys were further updated in 2019 in response to the multi-agency guidance on assessing impacts of wind farms on bats, 'Bats and onshore wind turbines: survey, assessment and mitigation' (SNH *et al.*, 2019). The guidance recommends that all proposed turbine locations[16] are sampled for a

[14] The 2012 edition of the guidance covers onshore wind farms in Chapter 10. This chapter has not yet been superseded, although the rest of the guidance has by the third edition (Collins, J. (ed.), 2016).
[15] Ten nights were sampled in 2018 in line with forthcoming Scottish Natural Heritage guidance for bat survey at wind farms (SNH, 2019)
[16] For proposed wind farms of up to 10 turbines. Where more than 10 turbines are proposed, detectors should sample 10 locations, plus a third of additional turbine locations.

period of 10 nights per season. Automated detectors were, therefore, set to sample at all seven proposed turbine locations during spring, summer and autumn 2019.

6.46 The detector locations used during the surveys are presented on Figure 6.3a and b.

Walked transect surveys

6.47 As per the BCT guidelines for survey of a low risk site, one walked transect survey was completed per season. These were: early October 2015 (autumn), June 2016 (spring) and August 2016 (summer). Walked transect surveys were not completed as part of the updated autumn season work in 2018[17] or 2019. The transect route is illustrated on Figure 6.3.

Bat roost surveys

6.48 In accordance with BCT survey guidelines (Collins, J. (ed.), 2016)[18], daytime inspection of a building within the Werfa mast compound, and a single emergence survey (following an assessment of the building as being of low potential to support roosting bats) was carried out as a precautionary measure during August 2016. An external daytime inspection of the building was completed again during 2019 to assess whether or not the suitability of the building to support roosting bats had changed since the 2016 survey. There are no further structures and trees suitable for roosting bats within 200m of the site. The extended Phase 1 survey of the existing NRW forestry track did not identify any trees with potential to support a bat roost.

Great crested newt surveys

6.49 Three ponds with potential for great crested newt *Triturus cristatus* were identified within the site. The pond locations are shown on Figure 6.4. Survey of these ponds was completed in accordance with English Nature GCN guidance (2001)[19] on four dates between 14th April and 19th May 2016 inclusive. Survey methods included torch survey, bottle-trapping and egg search (facilitated with the use of egg strips). These ponds were assessed again in April and May 2020, but were found to be dry in both months (due to a prolonged period of dry weather). No further survey of these ponds was possible within the recommended survey period for great crested newt.

[17] The walked transect work added little useful data to that collected by the static detectors during the 2015 and 2016 work. In addition, the multi-agency guidance for bat survey at wind farms (SNH, 2019) does not recommend this method..
[18] The latest edition of the guidelines (2016) is used to inform the approach to assessing built structures for roosting bats.
[19] English Nature (2001) Great Crested Newt Mitigation Guidelines. English Nature, Peterborough

6.50 Two ponds adjacent to the existing NRW Forestry track (see Figure 6.4) were surveyed on 27 April 2017 using an eDNA sample technique in accordance with the published methods (Williams, 2013)[20] presented in DEFRA's Technical Advice Note WC1067 (Biggs *et al* 2014)[21]. eDNA survey was considered the most appropriate survey method due to the likelihood of the ponds returning a negative result. This initial conclusion was based on the isolation of the ponds from other ponds networks in the local area, and the absence of great crested newt from the site (inferred following survey of the on-site ponds). An updated assessment of the two ponds was made in June 2020. One of the ponds held very little standing water (> 10 cm), and was considered likely to have been dry for much of the great crested newt breeding season. The second pond was surveyed on 24 June 2020 using the eDNA sample technique.

Water vole surveys

6.51 Targeted survey for water vole *Arvicola amphibius* was undertaken following identification of water vole droppings and feeding stations during the Phase 1 survey of the site. Several water courses and a wet flush within the site were identified as having potential to support water vole and were therefore surveyed for the species (see Figure 6.4). The survey was completed over two visits (spaced two months apart) as recommended within the Water Vole Mitigation Handbook[22]. The first visit was conducted during the first half of the water vole breeding season (08 and 09 June 2016) and the subsequent visit during the second half of the breeding season (03 August 2016). A further survey visit was completed on 17 May 2020 to update the 2016 data. All watercourses within 100 m of the existing NRW Forestry track were also searched for signs of water vole during the Phase 1 surveys on 07 October 2016 and 04 June 2020.

6.52 In addition to searching for field signs of water vole presence (such as latrines, feeding signs and burrows), evidence of use by otter was also considered during the survey.

Assessment Process

6.53 The evaluation and assessment within this chapter has been undertaken with reference to the 2018 Guidelines for Ecological Impact Assessment in the United Kingdom developed by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018). Although this is recognised as the industry standard

[20] Williams, P. (2013). How to collect a water sample to detect Great Crested Newt eDNA. GCN eDNA protocol, Freshwater Habitats Trust
[21] Biggs, J., Ewald, N., Valentini, A., Gaboriaud, C., Griffiths, RA., Foster, J., Wilkinson, J., Arnett. A., Williams, P., and Dunn, F. (2014). Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA. Freshwater Habitats Trust, Oxford
[22] Dean et al. (2016) Water Vole Mitigation Handbook, Mammal Society Mitigation Guidance Series

for ecological assessment, the guidance is not prescriptive; rather, it aims to "provide guidance to practitioners for refining their own methodologies".

Important Ecological Features

6.54 A first step in EcIA is determination of which ecological features (habitats, species, ecosystems and their functions/processes) are important. Important features should then be subject to detailed assessment if they are likely to be affected by a proposed development. It is not necessary to carry out detailed assessment of features that are sufficiently widespread, unthreatened and resilient to effects of the proposal, such that there is no risk to their viability.

6.55 Ecological features can be important for a variety of reasons and the rationale used to identify these is explained below. Importance may relate, for example, to the quality or extent of designated sites or habitats, to habitat/species rarity, to the extent to which they are threatened throughout their range, or to their rate of decline.

Establishing the zone of influence for birds and bats

6.56 The areas / resources that may be affected by the biophysical changes caused by activities associated with a project can be referred to as the 'ecological zone of influence' (EZoI) (CIEEM, 2018). Birds and bats are highly mobile, and capable of travelling large distances to forage and during migration.

6.57 A 10 km EZoI for birds is used in this assessment, and is considered to be precautionary with reference to industry guidance for assessing the impacts of proposed wind farm developments on birds (SNH, 2017). The SNH guidance states: '*depending on the species using the area, there may be a need for further species or species group-specific survey to establish nest, roost or display sites up to 6 km from the proposed development site*'.

6.58 For bats, the area around a bat roost in which habitat availability and quality will have an influence on the resilience and conservation status of that roost (the core sustenance zone) is of particular importance. For UK bat species, core sustenance zones range from approximately 1 to 4 km (Collins, 2016), although individual flights can be longer. Given the long distances that can be travelled by bats a zone of influence of 10 km for bat species is considered appropriate for Upper Ogmore Wind Farm. This distance is supported by current guidance on assessing impacts of wind farms on bats (SNH *et al.*, 2019), which suggests that relevant bat information within 10 km of the proposed wind energy site is obtained as well as the location, number and size of turbines in other wind energy developments within the surrounding 10 km.

Evaluation: Determining Importance

6.59 The importance of an ecological feature should be considered within a defined geographical context. The following frame of reference has been used in this case:

- International and European
- National (UK)
- Regional (Wales)
- County (Bridgend)
- Local (Garw and Ogmore Valley Communities)
- Site

6.60 In certain circumstances particular receptors may be valued below the Site level. In these instances they are described as being of Negligible importance.

6.61 The CIEEM guidance indicates that features of less than Local importance are generally considered unlikely to trigger a mitigation or policy response in EcIA terms.

Characterising and Quantifying Effects and Assessing their Significance

6.62 The CIEEM (2018) guidelines state that ecological effects or impacts should be characterised in terms of ecosystem structure and function and reference should be made to: beneficial, adverse or neutral effects; extent; magnitude; duration; reversibility; timing and frequency; and cumulative effects. The guidelines provide a list of "aspects of ecological structure and function to consider when predicting impacts and effects" (Box 16). The terms impact and effect are used within this chapter in accordance with the following definitions (as provided by the guidelines):

Impact: *Actions resulting in changes to an ecological feature. For example, the construction activities of a development removing a hedgerow.*
Effect: *Outcome to an ecological feature from an impact. For example, the effects on a dormouse population from loss of a hedgerow.*

6.63 Following the characterisation of effects, an assessment of their ecological significance is made. The guidelines promote a transparent approach in which a beneficial or adverse effect is determined to be significant or not, in ecological terms, in relation to the integrity of the defined site or ecosystem(s) and/or the conservation status of habitats or species within a given geographical area, which relates to the level at which it has been valued. The decision about whether an effect is significant or not, is independent of the value of the ecological feature; the value of any feature that will be significantly affected is then used to determine the implications, in terms of legislation and / or policy (CIEEM, 2018).

6.64 Significance is a concept related to the weight that should be attached to effects when decisions are made. For the purpose of this assessment, 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features'. A significant effect is simply an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project. The EcIA guidelines (CIEEM, 2018) state that "A significant effect does not necessarily equate to an effect so severe that consent for the project should be refused planning permission. For example, many projects with significant adverse ecological effects can be lawfully permitted following EIA procedures". The assessment of significance is based on professional judgement.

Collision Risk Analysis

6.65 The risk of birds colliding with operating wind turbines has been assessed using the methods described by Band et al (2007).

6.66 Prediction of collision risk involves extrapolation of flight-data obtained during VP surveys, to calculate the number of flights likely to occur through the rotor swept area when the wind farm becomes operational. There are two variations of the model: the first assumes that flight activity occurs randomly across the airspace (and is applicable to many raptors); the second assumes that flights are direct and well defined (and is often most applicable to swans and geese).

6.67 The analysis follows the following process:

- Bird flights for which data can be used to model collision risk are identified (i.e. those within a defined distance of proposed turbines).
- The length of time that each flight occurred within the rotor swept zone is determined.
- The proportion of time that each species might occupy the rotor swept zone in a year period is calculated.

6.68 Bird flights were selected for use in the model based on their occupancy at collision risk height within the flight risk area (FRA), which equals a rectangular area encompassing the turbines plus a 250 m ‘buffer’ zone (to account for the sweep of the blades (50 m) and observer error (200 m, as recommended in the relevant guidance (SNH, 2000; Band et al, 2007)). In this instance the FRA was calculated to be 2608 m (the distance between turbines 1 and 6 plus 500 m (2 x 250 m buffer)) x 842 m (the distance between turbines 1 and 4 plus 500 m). This was calculated using ArcGIS.

6.69 Worked collision risk analysis for target bird species is contained in Appendix 6.4.

Assessing Potential Risk to Bats

6.70 Wind farms can affect bats in the following ways SNH *et al.*, 2019):

- Collision mortality, barotrauma and other injuries (although it is important to consider these in the context of other forms of anthropogenic mortality)
- Loss or damage to commuting and foraging habitat, (wind farms may form barriers to commuting or seasonal movements, and can result in severance of foraging habitat);
- Loss of, or damage to, roosts;
- Displacement of individuals or populations (due to wind farm construction or because bats avoid the wind farm area).

6.71 To ensure that bats are protected by minimising the risk of collision, an assessment of impact at a site requires a detailed appraisal of:

- The risk of turbine-related mortality for all bat species recorded at the site during bat activity surveys.
- The effect on the species' population status if predicted impacts are not mitigated.
- The level of activity of all bat species recorded at the site assessed both spatially and temporally.

6.72 The above information should be interpreted in the context of likely impacts on local populations. Relevant factors that should be considered include whether populations are at the edge of their range, cumulative effects, presence of protected areas designated for their bat interest and proximity to maternity roosts, key foraging areas or key flight routes, including possible migration routes.

6.73 The risk of mortality of bat species at wind farms was categorised by NE (2012) as high, medium and low, based on mortality data from monitoring studies at wind farms as well as habitat preferences, echolocation characteristics, weight, wing-shape, flight speed and height, hunting techniques, flight behaviour, and use of the landscape. This has since been amended in SNH *et al*. (2019) to re-classify common pipistrelle and soprano pipistrelle as "High Risk" based on evidence from a Defra-commissioned study (Mathews *et al*., 2016).

6.74 Table 6.2 assigns species of bats a category of likely level of risk of death through interaction with operational wind turbines.

Table 6.2: The likelihood of bat species being killed by wind turbines (based on Table 2 in SNH *et al.*, 2019).

High-risk	Medium-risk	Low-risk
Nathusius' pipistrelle	Serotine	Myotis[23] species
Common pipistrelle	Barbastelle	Long-eared bats
Soprano pipistrelle		Horseshoe bats

[23] Refers to any bat species of the genus Myotis.

Noctule		
Leisler's bat		

6.75 In addition, SNH *et al.* (2019) guidance assesses the potential threat (high, medium or low) posed to species populations from mortality caused by collision with wind turbines. Table 6.3 lists the likely level of risk of bat populations in Wales to wind-farm related adverse effects, which are adapted from Wray *et al.* (2010).

Table 6.3: Threat to bat populations in Wales from wind turbines (based on Table 2 in SNH *et al.*, 2019).

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

Site Risk Level for Bats

6.76 Table 3a in SNH *et al.* (2019) sets out a matrix to derive an indicative risk for sites based on the habitats present and the scale of the proposed development. The Upper Ogmore Site has been categorised as a "low site risk" (risk level =2) according to the supporting definitions of low habitat risk and medium project size in Table 6.4 and the matrix in Table 6.5. Note that, whilst the height of the turbines within the proposed Development exceed the defined height (up to 149.9 m to tip) for medium project size, the number of proposed turbines are fewer (and meet the definition for "small" project size).

Table 6.4. Descriptions of habitat risk and project size categories used to inform the site risk level for bats.

Habitat Risk	Description
Low	Small number of potential roost features, of low quality. Low quality foraging habitat that could be used by small numbers of foraging bats. Isolated site not connected to the wider landscape by prominent linear features.
Moderate	Buildings, trees or other structures with moderate-high potential as roost sites on or near the site. Habitat could be used extensively by foraging bats. Site is connected to the wider landscape by linear features such as scrub, tree lines and streams.
High	Numerous suitable buildings, trees (particularly mature ancient woodland) or other structures with moderate-high potential as roost sites on or near the site, and/or confirmed roosts present close to or on the site. Extensive and diverse habitat mosaic of high quality for foraging bats. Site is connected to the wider landscape by a network of strong linear features such as rivers, blocks of woodland and mature hedgerows. At/near edge of range and/or on an important flyway. Close to key roost and/or swarming site.
Project Size	Description
Small	Small scale development (≤10 turbines). No other wind energy developments within 10km. Comprising turbines <50m in height.
Medium	Larger developments (between 10 and 40 turbines). May have some other wind developments within 5km. Comprising turbines 50-100m in height.
Large	Largest developments (>40 turbines) with other wind energy developments within 5km. Comprising turbines >100m in height.

Table 6.5. Site risk level derived from the outcome of Table 6.4 (taken from SNH *et al.*, 2019).

Site Risk Level		Project Size		
		Small	Medium	Large
Habitat Risk	Low	1	2	3
	Moderate	2	3	4
	High	3	4	5

Bat activity assessment

6.77 The SNH *et al*. (2019) assessment of potential risk involves consideration of habitat and development related features, the relative vulnerability of each species of bat potentially at risk. and the bat activity output from the EcoBat tool.

6.78 At the current time, the EcoBat tool is in development[24], and the supporting database used for activity level comparison is limited[25]. For this reason, the EcoBat tool has not been used to support this assessment. A categorisation of bat activity has instead been derived through comparison with bat activity data collected by BSG Ecology at 52 other sites[26] across England, Wales and Scotland.

6.79 Table 6.6 presents activity categories based on the spread of reference data split by 20th percentile (fifths of the data spread) for each species considered to be of high collision risk as defined in Table 6.2 above. Of those species considered to be of high collision risk, common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, noctule bat and Leisler's bat have been recorded at Upper Ogmore. In addition, serotine, a species of high population vulnerability to wind farms in Wales, has also been recorded at Upper Ogmore. Table 6.6 also provides the reference size of the comparison data for each species. This equals the sum of the hours of each survey during which the species was recorded.

Table 6.6. Descriptions of habitat risk and project size categories used to inform the site risk level for bats.

Species	Low	Low-moderate	Moderate	Moderate-high	High	Reference Range (hours)
Nathusius' pipistrelle	<0.001	0.001-0.004	0.004-0.01	0.01-0.07	>0.07	59,188
Common pipistrelle	<0.82	0.82-2.82	2.82-8.44	8.44-13.98	>13.98	76,663
Soprano pipistrelle	<0.14	0.14-0.46	0.46-1.48	1.48-5.88	>5.88	76,663
Noctule	<0.06	0.06-0.13	0.13-0.23	0.23-0.65	>0.65	75,277
Leisler's bat	<0.003	0.003-0.01	0.01-0.05	0.05-0.12	>0.12	58,349
Serotine	<0.002	0.002-0.006	0.006-0.024	0.024-0.076	>0.076	33,606

[24] Bat survey data collected at Upper Ogmore has been entered into the EcoBat database, and an analysis has been generated. However, some errors have been identified in the analysis code. Whilst the EcoBat development team are looking into this, it had not been resolved at the time of writing.
[25] There is an absence of data for comparable sites (both in altitude and habitat) within a 100 km reference range of the Upper Ogmore Site. In addition, the total available data within the 100 km reference range for comparison of bat activity is below the level recommended by EcoBat for meaningful analysis (the recommended comparison data set size is 2000+ nights; the maximum data set available for comparison against the Upper Ogmore survey data is 1059 nights). The reference range used for comparison is expected to grow as adoption of the EcoBat tool for analysis of data increases.
[26] Of which 28 sites are proposed wind farm sites; 5 are other proposed energy production sites, 12 are proposed residential and infrastructure developments, 2 are mineral extraction sites, and 5 are other non-development lowland, wetland and island sites.

Deriving an overall risk assessment

6.80 In order to derive an "overall risk assessment" for a wind farm development site, SNH *et al*. (2019) guidance suggests that an activity category is derived from comparison of the recorded activity of each species of high collision risk (as defined in Table 6.2 above) at the site against a data set (summarised in Table 6.6 above). These scores should then be set against the "site risk level" (as defined in Table 6.5 above) in the matrix presented in Table 6.7. below (based on Table 3b in the guidance document) to determine the level of overall risk.

Table 6.7: Overall risk assessment (taken from SNH *et al*., 2019)

	Activity category					
Site Risk Level (taken from Table 6.5)	Nil (0)	Low (1)	Low-moderate (2)	Moderate (3)	Moderate-high (4)	High (5)
Lowest (1)	0	1	2	3	4	5
Low (2)	0	2	4	6	8	10
Moderate (3)	0	3	6	9	12	15
High (4)	0	4	8	12	15	18
Highest (5)	0	5	10	15	20	25

Baseline Conditions and Evaluation

6.81 This section sets out the findings of consultation, baseline ecological survey work and desk study. It then goes on to assess the interest of the identified ecological resources.

6.82 Ecological receptors are considered in the following order:

- Protected sites – both statutory (e.g. SSSI) and non-statutory (e.g. SINC).
- Habitats.
- Protected or otherwise notable species – this includes consideration of those species protected under UK or EU legislation (e.g. bats) and consideration of those species listed as being of conservation importance in accordance with Section 7 of the Environment (Wales) Act (2016).

6.83 It has been possible to "scope out" of the assessment, at this stage, some species and habitats that are not likely to be significantly affected (for example by virtue of the design or operation of the Development, or because they are very commonplace and / or of very low conservation value) unless there are other reasons to consider them further (for example, they may be legally protected or require special care and therefore require particular mitigation measures to be adopted when developing or operating the site).

6.84 For birds and bats, the decision as to whether to scope species in or out of further assessment considers their known susceptibility to collision with wind turbines, their importance in nature conservation terms, and their level of use of the turbine locations and the airspace above them based on survey and desk study.

6.85 Where it has been possible to scope out a particular ecological feature, the rationale for doing so is outlined in the following text.

Designated Sites

6.86 There are four statutory sites of nature conservation interest within 5 km of the site. These are, Mynydd Ty-isaf Site of Special Scientific Interest (SSSI), Cwm Cyffog SSSI, Blaenrhondda Road Cutting SSSI, and Cwm Du Woodlands SSSI. The nearest internationally important site is the Blackmill Woodlands Special Area of Conservation (SAC) and SSSI located approximately 7.2 km south of the site, and the nearest Special Protection Area (SPA) is the Severn Estuary SPA, located approximately 34 km south-east of the site. The locations of designated sites in relation to the Wind Farm site are presented in Figure 6.5.

6.87 SACs and SPAs are of **International** and SSSIs of **National Importance**. This reflects the role of SACs and SPAs in maintaining a network of internationally important sites for biodiversity (the Natura 2000 network established under the EC Habitats and Birds Directives) and the role of SSSI's in providing the best examples of the UK's flora, fauna, or geological or physiographical features (notified under the Wildlife and Countryside Act 1981).

Mynydd Ty-isaf SSSI

6.88 The Mynydd Ty-isaf SSSI is located immediately north of the site (north of the A4107). It is of special interest for its crags, scree slopes and ffridd habitats. The higher crags are known to provide nesting sites for peregrine falcon. Although not a feature for which the SSSI is notified, effects on the breeding population of peregrine within Mynydd Ty-isaf are considered in this assessment.

6.89 The SSSI is separated from the site by the A4107. Construction work will not result in any loss of habitats within the SSSI. It is unlikely that direct effects will occur on the habitats of the SSSI through changes in hydrology or pollution, even in the absence of mitigation. The Mynydd Ty-isaf SSSI is therefore **not considered further** in this assessment.

Cwm Cyffog SSSI

6.90 The Cwm Cyffog SSSI is located approximately 3.1 km south of the site. It is notified for its upland blanket mire habitats dominated by *Molinia caerulea* with a range of Sphagnum species.

6.91 There is no hydrological connectivity between the site and Cwm Cyffog SSSI. In addition, because of the relatively large distance between the site and the SSSI, it is not considered likely that effects on the SSSI interest will arise as a result of the Development. Cwm Cyffog SSSI is therefore **not considered further** in this assessment.

Blaenrhondda Road Cutting SSSI

6.92 The Blaenrhondda Road Cutting SSSI is approximately 4.7 km north of the site and 3.1 km north-east of the existing NRW Forestry track (at its closest point). It is notified for its geological interest, including sandstones, shale and coal seams.

6.93 Given the distance of the Blaenrhondda Road Cutting SSSI from the site and the geological interests of the SSSI, it is unlikely that any adverse impacts upon the designated interest of the SSSI will occur as a result of the proposed Development. The Blaenrhondda Road Cutting SSSI is therefore **not considered further.**

Cwm Du Woodlands SSSI

6.94 The Cwm Du Woodlands is located approximately 4.5 km south-west of the site. It is notified for its ancient woodland habitats dominated by sessile oak *Quercus petraea* with alder *Alnus glutinosa* carr.

6.95 Given the distance of the Cwm Du Woodlands SSSI and absence of representative habitats on the site, it is unlikely that any adverse impacts upon the designated interest of the SSSI will occur as a result of the proposed Development. The Cwm Du Woodlands SSSI is therefore **not considered further.**

Blackmill Woodlands SAC/SSSI

6.96 The Blackmill Woodlands SAC/SSSI is designated for its expanse of sessile oak woods at the southern extreme of the habitat's range in Wales. The core management plan (dated 2008) for the SAC indicates that the primary threats to the condition of the designated habitats are livestock grazing, invasive species, and air pollution.

6.97 Given the distance of the site from the SAC/SSSI (7.2 km), it is unlikely that adverse effects on the condition of the designated habitats will occur. The proposed Development will not result in significant levels of air pollution during any of the construction, operational or decommissioning phases. Therefore, the Blackmill Woodlands SAC/SSSI is **not considered further** in this assessment.

Severn Estuary SPA

6.98 The nearest Special Protection Area (SPA) is the Severn Estuary SPA, located approximately 34 km south-east of the site. The site is classified for its wintering population of Bewick's swan *Cygnus columbianus bewickii*, curlew *Numenius arquata*, dunlin *Calidris alpina alpina*, pintail *Anas acuta*, redshank *Tringa tetanus*, shelduck *Tadorna tadorna*, and passage ringed plover *Charadrius hiaticula*.

6.99 None of the SPA species have been recorded using or overflying the site during the ornithological survey work completed between April 2014 and March 2016 inclusive (which included VP survey during spring and autumn passage periods). The absence of observations of SPA species over the site suggests that the site is unlikely to be on a narrow front migratory pathway for SPA birds. Given this, and the large distance of the site from the SPA, it unlikely that any effects on the features for which the SPA was classified will arise as a result of the development. The Severn Estuary SPA is therefore **not considered further** in this assessment.

Sites of Importance for Nature Conservation (SINCs)

6.100 There are eight local authority designated Sites of Importance for Nature Conservation (SINCs) within 2 km of the site: four in Bridgend County Borough (BCB) and four in Rhondda Cynon Taf (RCT). There are also an additional five sites that meet SINC criteria in Neath Port Talbot (NPT); however, NPT SINC descriptions are not currently published (SEWBReC currently only hold qualifying habitat lists for each SINC). All SINCs are considered to be of **County importance**. The SINCs within 2 km of the site are listed in Table 6.8 (and illustrated on Figure 6.5). Additional sites that meet the SINC criteria in Neath Port Talbot are provided in Table 6.9.

Table 6.8. SINCs within 2 km of the site boundary

County	SINC	Description	Distance (km) and direction from site
Bridgend	Blaengarw North-East	Semi-improved neutral grassland, dense continuous scrub, semi-improved acid grassland, wet dwarf shrub heath, marsh/marshy grassland, acid/neutral flush.	The limit of the SINC is adjacent to the south-western boundary of the site.
Bridgend	Nant-y-Moel Farm	Damp semi-improved acid grassland fields including patchy bracken and scrub and several small flushes. The other parts of the valley sides support marshy grassland and small stands of broad-leaved woodland.	850 m south-east

County	SINC	Description	Distance (km) and direction from site
Bridgend	Rhiw Fer	This site follows the Nant Dyri stream from its source in an area of upland marshy grassland and down through a steep wooded valley supporting broadleaved woodland. The fields adjacent to the wooded valley support a mix of semi-improved acid grassland including waxcap fungi, and marshy grassland dominated by purple moor-grass and sharp-flowered rush with a good diversity of wetland plants including bog asphodel, star sedge, marsh violet and sphagnum mosses.	1.2 km south-east
Bridgend	Fforch Wen Mosaic	An extensive area of farmland supporting a mosaic of semi-improved acid grassland, marshy grassland, heath, bracken, over-mature hedgerows and scrub. Sessile Oak and Hawthorn are associated with field boundaries, and a few small patches of woodland support locally abundant Bluebells. The northern part of the site includes a mix of heath and acid grassland, dominated by bilberry and wavy hair-grass, with former coal tips in its lower part. Areas of species-rich marshy grassland dominated by dense purple moor-grass, with wetland plants including marsh violet, bog asphodel, star sedge and sphagnum mosses. occur on higher ground but also on low ground in the far north of the SINC.	1.73 km south
Rhondda Cynon Taff	Cwmparc	An extensive area of wetland habitat in the bowl of Graig-fawr and Graig Fach (SSSI). The site represents a complex mosaic of grassland and marshy grasslands, intersected by streams and issues. The marshy grassland is an expanse of purple moor-grass and soft rush. These marshy expanses grade in and out of drier acid grassland. The complex of streams and issues adds diversity with wetter gullies and areas of inundated vegetation. There are smaller areas of heather and bilberry heath, and where land reclamation has occurred, areas of drier semi-improved neutral and acid grassland. There are a few areas of oak and rowan woodland.	1 km east

County	SINC	Description	Distance (km) and direction from site
Rhondda Cynon Taff	Ton Pentre Slopes	A large upland SINC, which encompasses the uplands of Mynydd Maendy and Mynydd Ton and the valley of the Cwm lan. The SINC supports a complex mosaic of upland grassland and heath, crags, and forestry plantation. The upland grassland includes sheep-grazed acid and marshy grassland. Associated areas of old quarry working and crags supports areas of heather and bilberry heath and acid grassland.	1.7 km east north-east
Rhondda Cynon Taff	Mynydd Tyle-coch	The steep heavily-forested slopes on the western valleyside of the Rhondda Fawr above Treorchy. The forestry plantation is an extensive area of mixed larch, Sitka spruce, western hemlock, douglas fir, Norway spruce and lodgepole pine. Much of this conifer plantation is replanted ancient woodland and the remainder was planted onto acid grassland/heath.	1.9 km east
Rhondda Cynon Taff	Mynydd Blaenrhondda and Mynydd Ty-isaf	An extensive upland and valley side SINC which occupies the western uplands above Blaenrhondda and Blaencwm. The lower slopes around the western valley-side of Blaenrhondda and Blaencwm support a complex mosaic of dry and wet heath, acid grassland, crags, scree, marshy grassland, acid flushes, bracken slopes and conifer and native woodland. Arctic alpines are a feature of the crags. The upland plateau supports an expanse of upland Conifer Plantation managed by the Forestry Commission. Much of this plantation lies on upland peatbog.	1.9 km north of the site; 250 m east of the NRW Forestry track

Table 6.9. Sites that meet SINC criteria in Neath Port Talbot

County	SINC	Qualifying Habitats	Distance (km) and direction from site
Neath Port Talbot	NPT Watercourses	Rivers and Streams	The limit of the SINC is adjacent to the northern boundary of the site.
Neath Port Talbot	Scotch Street	Lowland Heathland; Open Mosaic Habitats on Previous Developed Land	1.2 km north-west

County	SINC	Qualifying Habitats	Distance (km) and direction from site
Neath Port Talbot	Caroline Street	Scrub Communities; Neutral Grasslands; Purple Moorgrass and Rush Pasture; Fridd	1.6 km north-west
Neath Port Talbot	Ancient Semi-Natural Woodland	Native Woodland (Upland Oak Woodland, Lowland Beech & Yew Woodland)	1.9 km north west
Neath Port Talbot	Gwynfi Street	Scrub Communities; Neutral Grasslands; Purple Moorgrass and Rush Pasture; Fridd	2 km north-west

6.101 The SINC sites form a mosaic of woodlands, upland marshy grasslands and ffridd habitats throughout the local landscape.

6.102 Impacts on SINC habitats as a result of the proposed Development are only likely to occur where there is a risk of direct adverse effects, such as pollution of watercourses or dust deposition. Such effects are only likely at those SINCs that are hydrologically connected to the site or located adjacent to the proposed Development. This is only likely to include the NPT Watercourses SINC due to its proximity to the site and likely hydrological influence from within the site (refer to Chapter 8).

6.103 The Blaengarw North-East SINC is also adjacent to the site boundary. However, the proposed Development will not extend beyond the developable boundary, and ground works will be approximately 1 km distant from the Blaengarw North-East SINC at its nearest point. It is therefore considered unlikely that any significant adverse effects on the Blaengarw North-East SINC will occur because of the proposed development.

6.104 It is not considered likely that direct or indirect adverse effects will occur on the remaining SINCs as a result of the proposed development given their interest features and distance from the site. The Nant-y-Moel Farm SINC, Rhiw Fer SINC, Fforch Wen Mosaic SINC, Cwmparc SINC, Ton Pentre Slopes SINC, Mynydd Tyle-coch SINC, Mynydd Blaenrhondda SINC, Mynydd Ty-isaf SINC, Scotch Street SINC, Caroline Street SINC, Ancient Semi Natural Woodlands SINC, and Gwynfi Street SINC are therefore **not considered further** in this assessment.

Habitats

6.105 The habitats present within the site and adjacent to the NRW Forestry Track are described below. Full habitat descriptions can be found in Appendix 6.3. The Phase 1 habitat and NVC survey maps are presented in Figures 6.6, 6.7 and 6.8 respectively.

Acid and marshy grassland mosaic

6.106 The site is dominated by unenclosed upland moorland which frequently grades between acid grassland and marshy grassland with a continuum of both types present as a complicated mosaic. The majority of these habitats have therefore been mapped as acid grassland / marshy grassland mosaic and are described below.

Unimproved acid grassland

6.107 This habitat type dominates the freer draining areas of the site such as the steep slopes that occur just outside of the study area. The freer draining area extends over the shoulder of the slopes onto the outside edge of the plateaux that forms the study area. Common bent *Agrostis capillaris* and sweet vernal grass *Anthoxanthum odoratum* are dominant, and there is occasional purple moor grass *Molinia caerulea* and heath bedstraw *Gallium saxatile*.

6.108 The NVC survey identified U6 *Juncus squarrosus-Festuca ovina* grassland and U5a *Nardus stricta-Galium saxatile* grassland, species-poor sub-community within areas of this habitat. However, the area of habitat sampled was not considered to provide a good fit to published NVC datasets due to modification, primarily through agricultural improvement of the surrounding areas for livestock grazing.

6.109 This habitat is common throughout the uplands of Wales, and is closely grazed, and modified. The value of this habitat is therefore unlikely to extend to the County level. The unimproved acid grassland is considered to be of importance at the **Local** level.

Marshy grassland

6.110 Grazed marshy grassland is present across much of the flatter areas and occasionally on steeper ground. With a very similar composition to the unimproved acid grassland described above but with a greater abundance of purple moor grass. In a few places soft rush *Juncus effusus* becomes dominant and this has also been mapped as marshy grassland.

6.111 Areas of M25 *Molinea caerulea-Potentilla erecta* mire / degraded M15d *Scirpus cespitosus-Erica tetralix* communities and U5a *Nardus stricta-Galium saxatile* grassland, species-poor sub-community were identified within this habitat during the NVC survey. An area of S9 *Carex rostrata* swamp was also identified within this habitat where a flush is formed by road drainage at the northern boundary of the site. None of the areas sampled during the NVC survey were considered to provide a good fit to published NVC datasets due to modification, primarily through agricultural improvement of the surrounding areas for livestock grazing.

6.112 Under the UK Biodiversity Action Plan[27] definition of blanket bog, the principal (NVC) types include M25. The habitat "encompasses all areas of blanket bog supporting semi-natural blanket bog vegetation, whether or not it may be defined as active".

6.113 The degraded nature of the unimproved acid grassland will limit its importance to below the level of the County. It is also common throughout Wales (particularly in its modified state). The marshy grassland is therefore considered to be of importance at the **Local** level.

Semi-Improved Acid Grassland

6.114 High grazing pressure has caused changes in the species composition and the sward structure of the common land in some parts of the site. In these areas sweet vernal grass dominates with common bent and frequent purple moor grass, abundant sheep's fescue *Festuca ovina* and springy turf-moss *Rhytidiadelphus squarrosus*. Soft rush dominates where localised wetter ground conditions occur (where ground water emerges).

6.115 Small areas of acid grassland are also present along the A4107 between the southern extent of the NRW Forestry track and site entrance. The verges are close grazed and likely to be influenced by run-off and salting of the road.

6.116 This habitat is common throughout the uplands of Wales, is relatively limited in extent on the site (occupying 10.69 ha) and is intensively grazed and lacking in species diversity. It is considered to be of importance at the level of the **Site**.

Improved grassland and arable

6.117 A number of enclosed fields are present in the north-eastern part of the site; the flatter areas of these fields all support improved acid grassland. The extent of these areas is defined by the ability of a tractor to access the land, with all accessible areas demonstrating evidence of having been cultivated and reseeded in the past, apart from a few areas which have very wet ground conditions.

6.118 The update Phase 1 survey in May 2018 identified that an area of this habitat (at the location of turbine 6) had been ploughed and re-seeded with perennial rye-grass *Lolium perenne*; therefore, conforming to the arable habitat classification.

6.119 Improved grassland and highly-managed arable habitats are of little ecological value and are widely represented in both lowland and upland farmland. The importance of these habitats is likely to be **negligible**. Improved grassland and arable habitats are not considered further in this assessment.

[27] The UK list of priority habitats has been used to help draw up the statutory Section 7 lists of priority habitats.

Wet modified bog

6.120 Two large areas of degraded blanket bog are present in the northern part of the site. Peat depths in excess of two metres were recorded during the 2014 survey. Under Phase 1 guidance on habitat classification, peat depth is an important factor in differentiating marshy grassland from wet modified bog. The results of the 2017 peat depth survey (refer to Chapter 8 - Hydrology) have therefore been incorporated into the classification of habitats at the site and used as a guide to broadly estimate the extent of both habitat types.

6.121 The plant communities associated with wet modified bog on the site are similar to that of the marshy grassland but have a higher proportion of deer grass *Scirpus cespitosus* in the sward.

6.122 The NVC survey identified an area of this habitat as an M19 (*Calluna vulgaris - Eriophorum vaginatum* blanket mire) / M20 (*Eriophorum vaginatum* blanket and raised mire) transition, with localised M6 (*Carex echinata-Sphagnum recurvum/auriculatum* mire) / M23 (*Juncus effusus/acutiflorus-Galium palustre*) communities present in gullies. However, none of the areas of this habitat sampled during the NVC survey were considered to provide a good fit to published NVC datasets due to modification, primarily through agricultural improvement of the surrounding areas for livestock grazing.

6.123 This habitat is likely to be included within the Section 7 (Environment (Wales) Act 2016) blanket bog definition and wet habitat networks are a key feature of the Mynydd Llangeinwyr Uplands Area as defined in the Bridgend LBAP. However, the importance of this habitat is likely to be lower than the County level because of its modified and intensively grazed condition. The wet modified bog within the site is therefore of importance at the **Local** level.

Bog pool

6.124 There is a circular bog pool occupying approximately 3 m^2 in the northern part of the site. It is dominated by common cottongrass *Eriophorum angustifolium* and pill sedge *Carex pilulifera*. Applying community identification keys (Rodwell *et al* (1995)) suggests that the bog pool has an M3 *Eriophorum angustifolium* bog pool community with *Eriophorum angustifolium* being a constant where other vascular species and bog mosses (Sphgnum species) play a relatively minor role. The community description describes the habitat as being typically found as small stands on barer exposures of acid raw peat soils in depressions, erosion channels or shallow peat cuttings.

6.125 This bog pool is likely to qualify as a Section 7 (Environment (Wales) Act 2016) habitat. However, it is limited in extent, relatively isolated and likely to be

influenced by surface run off from the A4107, all of which affect its biodiversity value. Notwithstanding this, it is not a common habitat locally or in BCBC and this would elevate its importance. It is assessed as important at the **local** level.

Dry heath

6.126 Acid dry dwarf shrub heath also occurs where grazing pressure is reduced. Common heather typically dominates areas of this habitat within the site, with abundant bilberry *Vaccinium myrtillus* dominates, and occasional bell heather *Erica cinerea*. Small saplings and stunted semi-mature rowan *Sorbus aucuparia* are also occasionally present.

6.127 Heathland is a priority habitat in Wales (with reference to Section 7 of the Environment (Wales) Act 2016). It is also a feature of the Mynydd Llangeinwyr Uplands Area as defined in the Bridgend LBAP and identified as an important local resource for pollination.

6.128 The areas of dry heath within the site are limited in extent but may connect similar areas of heath as a pollination resource across the Mynydd Llangeinwyr Uplands. The value of the dry heath on the site is therefore likely to be of Local importance.

6.129 Dry heath is not present within the developable area of the site, being confined to the steeper slopes in the eastern part of the site. Because the extent of dry heath within the site lies beyond the developable area it is unlikely to be affected by the proposed Development. Dry heath is **not considered further** in this assessment.

Streams and flushes

6.130 Several small flushes were identified around the edges of the developable area, where the ground slopes steeply down and groundwater emerges. The flushes are typically dominated by purple moor grass and soft rush with abundant sphagnum species.

6.131 Rivers and streams are Environment (Wales) Act 2016 priority habitats. The relatively natural course of the streams within the site are likely to qualify them as priority habitats. As they all rise within the site and are minor and seasonal within the bounds of the site, their interest is lessened, but they contribute to the surface water resource of the locality and are considered likely to be of ecological interest in a **Local** context.

Ponds

6.132 Two ponds and one section of flooded track (indicated on Figure 6.4) are present within the site. Pond P1 is an oval shaped pond approximately 15 m by 7 m. The margins are poached by livestock with soft rush dominating the less trampled sections. Common haircap *Polytrichum commune*, water crowfoot *Ranunculus sp.*, water starwort *Callitriche sp.*, toad rush *Juncus bufonius* and marsh foxtail

Alopecurus geniculatus occur occasionally. Pond P2 is a circular pond approximately 10 m in diameter. The pond margins are dominated by soft rush with occasional floating sweet grass Glyceria fluitans, Sphagnum mosses, marsh foxtail, water crow foot and toad rush. The section of Flooded Track (P3) which appears to hold water year-round is approximately 2 m wide and 40 m long. Aquatic vegetation is limited to very occasional water starwort and water crowfoot species.

6.133 The habitat immediately surrounding the ponds consists of wet modified bog and acid/marshy grassland (grazed by cattle and sheep) with occasional ditches. This habitat, particularly the grass tussocks, is likely to provide refuge for newts and other amphibians when they leave the ponds.

6.134 Two additional Ponds (P4 and P5) are present adjacent to the existing NRW Forestry track (as indicated on Figure 6.4). These ponds are small (approximately 3 x 5 m and 7 x 8 m respectively) and located in plantation edge habitats, with small areas of marshy grassland dominated by purple moor-grass around the margins.

6.135 Ponds qualify as an Environment (Wales) Act 2016 Section 7 habitat when they meet one or more of the following criteria: they support species of high conservation importance; they support exceptional assemblages of key biotic groups; they are of high ecological quality; or they represent individual ponds or groups of ponds with a limited geographic distribution recognised as important because of their age, rarity of type or landscape context. None of the ponds meet these criteria. Given the isolated nature of the ponds, and their failure to meet the criteria required for a Section 7 habitat, it is likely that their importance is at the level of the **Site**.

Rock escarpments and scree slopes

6.136 The slopes present just outside the developable area are frequently punctuated by rock escarpments. In places these exposures have been quarried and are of more significant proportions. Below the natural exposures there are substantial areas of scree and patches of acid dry dwarf shrub heath and unimproved acid grassland.

6.137 Inland rock outcrop and scree habitats are a Section 7 habitat of principal importance to biodiversity conservation in Wales. However, this habitat is well represented throughout the local area, and is a feature of valley ridges throughout the County and south-east Wales. Rock escarpments and scree slopes are therefore unlikely to be of importance at more than the **County** level.

6.138 All examples of this habitat within the site are located beyond the developable area and will not be affected either directly or indirectly by the proposed

Development. Rock escarpments and scree slopes are **not considered further** in this assessment.

Plantation woodland

6.139 A larch *Larix decidua* dominated plantation is present immediately beyond the site to the east, much of which has been felled. Sitka spruce *Picea sitchensis* plantations are also present to the north and west of the site.

6.140 The existing NRW Forestry track passes through sitka spruce plantation, with stands of varying stages of maturity present between the northern and southern extents of the track.

6.141 Planted coniferous woodland is a common habitat throughout the uplands of Wales and has limited biodiversity value when semi-mature. Plantations are harvested on rotation and are therefore of low importance in EIA terms when considered alone. However, coniferous and larch plantations can support species of bird protected under Schedule 1 of the Wildlife & Countryside Act 1981 (as amended) (such as common crossbill *Loxia curvirostra* and goshawk *Accipiter gentilis*) and provide a valuable habitat for these species locally. The plantation woodland adjacent to the site and NRW Forestry track is therefore considered to be of potential importance at a **Local** level.

Birds

6.142 Ornithological survey work recorded a low number and diversity of breeding and wintering bird species present within the Site.

6.143 There is no evidence (from survey work completed at the site) that any target species breed within the site, although kestrel *Falco tinnunculus* and merlin *Falco subbuteo* are likely to breed within suitable habitats locally, and red kite *Milvus milvus* are present in low number throughout the year. Other target species recorded during the work include hen harrier *Circus cyaneus*, goshawk, peregrine, hobby, short-eared owl *Asio flammeus* and golden plover. Flights within the FRA recorded during the 2014 – 2016 VP survey work are presented in Figures 6.9a (red kite), 6.9b (kestrel) and 6.9c (merlin, goshawk, peregrine, and golden plover). Flights within the FRA recorded during the 2020 VP survey work are presented in Figure 6.9d (red kite, kestrel, merlin, and goshawk).

Red kite

6.144 Data obtained from SEWBReC included nine breeding season and five winter season records of red kite *Milvus milvus* within the 2 km search area of the site.

6.145 Ornithological survey work between April 2014 and August 2020 inclusive recorded red kite in generally low numbers[28].

6.146 A total of 14 flights were recorded during the breeding season 2014; 19 flights during the winter 2014/15; 23 flights during the breeding season 2015; 30 flights during the winter 2015/16; and 53 flights during the breeding season 2020. Of these, 72 passed within 250 m of the turbine locations at least partly at collision risk height. The total combined duration of flights passing (at least in part) within 250 m of the turbine locations and at collision risk height was 72 minutes and 30 seconds during a total 360 hours of observation.

6.147 Flight activity appeared to be randomly distributed in the local landscape with no particular concentrations of activity. However, peaks in activity were observed during watches on 28 October 2014 (11 flights); 13 May 2015 (9 flights) and 19 October 2015 (8 flights). Flights were generally made by single birds, but up to four birds were noted in flight together (on 13 May 2015), and three birds recorded on 25 April 2014, 17 July 2014 and 19 October 2015. Two birds were noted in flight together on two dates in 2020: 16 April and 06 May. One of the flights recorded on 16 April was made by two birds soaring at collision risk height over the valley in the south-eastern part of the Site for a total of 50 minutes.

6.148 The site is not considered to provide an exceptional foraging resource for red kite, with carcasses unlikely to be frequent. Foraging opportunities within the site are likely to be greatest during lambing periods and in the improved fields in the eastern parts of the site following soil stripping / re-seeding activity (thereby exposing worms).

6.149 The conservation status of red kite was amended from amber-listed in the UK to green-listed in 2015 on account of its rapidly expanding range (Eaton *et al*, 2015). The species is listed as a locally common resident in the northern part of the recording area of East Glamorgan (Glamorgan Bird Club, 2017); and an increasingly widespread resident breeder throughout Wales with a breeding population of at least 1,200 pairs (WOS, 2014)[29]. Data from the Welsh Kite Trust estimate a 286 % increase in the national population between 2000 and 2010 from 259 to in excess of 1,000 pairs in Wales.

6.150 Data from monitored nests has demonstrated that approximately 65 % tend to be productive, and that 1.4 young birds typically fledge per pair (Welsh Kite Trust, 2011). This has resulted in continued national population growth, and the species is now increasingly common in East Glamorgan, as well as in West Glamorgan and

[28] When compared to other Welsh upland moorland areas surveyed by BSG Ecology.
[29] Kelvin Jones (Wales Development Officer at the British Trust for Ornithology; pers. comms.) has suggested that the population is now over 2000 pairs.

Pembrokeshire (areas in which monitored populations were very small when the last population data was published by the Welsh Kite Trust in 2011). Populations in both core and expansion areas are now not actively monitored at a scale that allows the size of the national population to be accurately assessed. However, even if a modest year-on-year increase of 10 % in the national breeding population is assumed from 2010 onwards, the Welsh breeding population is likely to be well in excess of 2,000 pairs[19], and there are also likely to be large numbers of sub adult / non-breeding birds.

6.151 Given the rapidly expanding populations throughout both mid and south Wales, low quality of foraging habitat within the site, and generally low levels of recorded activity, it is unlikely that the importance of the site for red kite will extend beyond the **Local** level.

Hen harrier

6.152 The SEWBReC data search did not return any breeding season records of hen harrier from within the search area but did include one winter season record from moorland approximately 800 m south of the site dated December 2006.

6.153 Hen harrier flights were noted on 28 October 2014 (4 flights), 28 August 2015 (1 flight) and 29 September 2015 (2 flights). No flights by this species were recorded in 2020. All flights were of single ringtail (female or juvenile) birds.

6.154 Flight activity by hen harrier was generally of low, quartering flights. Of the total of seven flights recorded, none were at collision risk height within 250 m of the turbine locations.

6.155 Hen harrier are a scarce winter visitor and passage migrant in East Glamorgan (Glamorgan Bird Club, 2015) and in Wales (WOS, 2014) with a long-term decline in the national population evident (18 % between 2004 and 2010) (Balmer *et al*, 2013). Hen harrier is red-listed in Wales (Johnstone *et al*, 2010) and the UK (Hayhow *et al* 2017) and listed in Section 7 of the Environment (Wales) Act 2016.

6.156 The timing of the observations suggest that the birds were on passage and did not breed or overwinter on the site. The level of activity within the airspace over the site is insufficient to allow a valid assessment of collision risk to be made for hen harrier. Therefore, despite the national vulnerability of hen harrier, the importance of the site for this species is likely to be **negligible**. Hen harrier is **not considered further** in this assessment.

Honey buzzard

6.157 No honey buzzard were recorded during the targeted survey work in 2014 or other ornithological survey work at Upper Ogmore in 2014, 2015, or 2020. In addition, desk study data indicated that no evidence of honey buzzard had been found during targeted survey completed by RPS in 2005 and 2008 to support the adjacent Llynfi

Afan REP. The SEWBReC data search returned one record of honey buzzard approximately 2 km west of the site, to the west of Blaengarw, dated August 2006.

6.158 No honey buzzard territories were identified during the updated 2015 Llynfi Afan REP survey work. A single bird was noted during survey on 05 July but was not seen again during the remainder of the work. It was suggested in the report that the bird was likely to have been a foraging bird from a known nest site approximately 7 km distant from the Llynfi Afan REP site (9 km distant from the site).

6.159 Honey buzzard are a scarce spring and autumn migrant in East Glamorgan, with sightings remaining erratic and infrequent (Glamorgan Bird Club, 2017). The species breeds in small numbers in Wales with little evidence that their population is increasing (Balmer *et al*, 2013).

6.160 There is no suitable breeding or foraging habitat for honey buzzard on the site, and monitoring work completed by Steve Roberts[30] indicates that, for at least the last ten years, territories have been typically present in areas in excess of 9 km from the site. Honey buzzard are therefore unlikely to overfly the site with any regularity.

6.161 It is concluded that the site is of **negligible** importance to honey buzzard. Honey buzzard is **not considered further** in this assessment.

Goshawk

6.162 The nearest record of goshawk returned by SEWBReC is dated May 2011 and located approximately 300 m east of the site at the head of the Nant-y-moel valley. Other records include single birds at approximately 800 m south of the site, 1 km south-east of the site, and 2 km south-west of the site towards Maesteg.

6.163 Goshawk was recorded flying over the site on 16 February 2016. The bird was first noted over the Nant-y-moel valley being mobbed by several carrion crow. It then flew north-west, over the site toward the plantation at Mynydd Blaenafan, north of the site boundary. The flight was timed at 1 minute; 45 seconds of which was spent at collision risk height. No further observations of this species were made during the 2015/16 or 2014/15 VP survey work. Two separate flights (one bird was identified as a female) were recorded overflying the eastern part of the site, heading to the plantation at Nant y Moel on 16 April 2020. No further observations of goshawk were made on other watches in 2020.

6.164 Two birds (a female and juvenile) were recorded over the plantation at Mynydd Blaenafan during merlin survey on 11 June 2015, approximately 1.2 km north of

[30] Steve Roberts has led long-term honey buzzard monitoring work within the Neath Valley and wider area.

the site. The birds were noted flying up from the canopy in pursuit of a flock of racing pigeons *Columba livia domestica*. The juvenile returned to the plantation (following the unsuccessful attack) and the adult continued west towards Blaengwynfi.

6.165 Goshawk is an introduced, increasingly reported resident breeder in the East Glamorgan recording area (Glamorgan Bird Club, 2017), and an increasing breeding resident in all Welsh counties (WOS, 2014). Goshawk breed in dense, mature woodland areas, only leaving regularly during periods of territorial display between early-February and mid-April (Hardey *et al*, 2013); although they will hunt grouse and lagomorphs over open areas throughout the year (Marquiss & Newton, 1982).

6.166 There is no breeding habitat for goshawk on the site, and plantation blocks (primarily of mature sitka spruce) present in the wider area will limit the availability of suitable breeding habitat locally. However, the observation of a juvenile bird during the survey work in 2016 and two birds in 2020 does indicate likely breeding within 2 km of the site. Despite this, the site supports no suitable prey and, therefore, it is unlikely that goshawk use the airspace over the site on a regular basis (and are therefore unlikely to collide with the Wind Farm), as evidenced by the low encounter rate of this species during the survey work. The open moorland and pasture habitats typifying the site are unlikely to be of importance to goshawk at any geographic level. However, plantation edge adjacent to the existing NRW Forestry track may support breeding goshawk, and likely to be important at the **Local** level (owing to their status as an increasingly reported breeder in the County).

Peregrine

6.167 The data search returned four breeding season records of peregrine from within 2 km of the site. The nearest peregrine record to the site is approximately 300 m south-west of the site boundary within the Blaengarw Valley[31]. The remaining 3 records are greater than 1.5 km to the west of the Site, between Blaengarw and Caerau. The search returned a single winter period record located more than 2 km to the west of the site, west of Blaengarw, dated March 2007.

6.168 Five flights of peregrine falcon were recorded during VP work between April and September 2015 inclusive; one flight was recorded on each of 31 July and 24 August 2015, and three flights on 09 September 2015. The bird recorded on 31 July 2015 passed over VP2 from Mynydd Ty-isaf, heading south-west over the site. The flight was observed for approximately 120 seconds and was entirely above collision risk height. On 09 September 2015 a bird was recorded taking a similar flight path but spent 135 seconds at collision risk height.

[31] The resolution of this record was provided to 100m^2

6.169 The flight recorded on 24 August 2015, and two of the three flights recorded on 09 September 2015 were recorded over the valley east of Mynydd Ty-isaf and were entirely beyond the site boundary. The two flights recorded on 09 September 2015 were of separate birds flying up from the crags at Mynydd Ty-isaf concurrently: one bird flew east out of view, and the other returned to the crags in rapid descent.

6.170 One peregrine was recorded on 22 April 2020 commuting east through the site. The bird was recorded for 45 seconds; 15 seconds of which were at collision risk height.

6.171 Five flights of peregrine were recorded over three dates during the merlin survey work: 22 April (1 flight of two birds), 15 May (2 flights), and 11 June 2015 (2 flights). The pair of birds noted on 22 April were detected flying up from the cliffs at Graig Fach to attack the merlin recorded on the same date. A bird was also noted flying up from this area to mob the hen harrier recorded on 11 June. Two peregrine were also noted flying east over plantation at Mynydd Blaenafan on the same date

6.172 Peregrine was recorded on one date during the 2014 breeding season VP work (the flight was entirely below collision risk height)) and incidentally on two moorland wader visits (one bird in April and June 2014 respectively).

6.173 A total of 4 minutes of flight time was observed at collision risk height within 250 m of the turbine locations between April 2014 and March 2016 inclusive.

6.174 The location of the sightings in 2015 suggests that peregrine are likely to have bred in a traditional location north of the site. Breeding was confirmed at this location in 2015 by Natural Power (2016), having recorded two fledged young at the nest. The traditional breeding area was scanned for peregrine during breeding raptor walkover surveys on 26 April, 17 May, 24 June and 14 July 2020, but no evidence of presence was recorded.

6.175 Peregrine is a locally common resident breeder in the East Glamorgan recording area (Glamorgan Bird Club, 2017) and an increasing breeding species in all counties in Wales, with a current estimated population of 300 pairs (WOS, 2014). The crags of the Mynydd Ty-isaf SSSI are known to provide nesting sites for peregrine falcon (albeit with unknown frequency).

6.176 Despite the proximity of the site to known nesting sites within the Mynydd Ty-isaf SSSI, the absence of suitable prey supported by the site and low-level activity recorded in the airspace over it suggest that the site is of low value to the species. The value of the site for peregrine is therefore unlikely to extend beyond the **Local** level.

Merlin

6.177 The data search returned one winter record of merlin (from the Pontycymer area approximately 1.5 km west of the site).

6.178 The targeted merlin survey work completed between April and June 2015 resulted in one flight of merlin being recorded. The flight was made by a female bird to the north of the site, heading north over Graig Fawr (approximately 500m north of the site) on 22 April 2015.

6.179 Merlin were also recorded during VP survey work on four dates in 2014 (06 June, 17 July, 28 October, 18 November 2014) and three dates in 2015 (31 July, 28 August and 09 September). Of these, only one flight (on 28 October 2014) was at collision risk height and was timed at 45 seconds.

6.180 A flight by merlin was also recorded during moorland wader survey in May 2014 and a bird was noted flying low in direct flight over the grazed fields in the eastern part of the site during a winter walkover survey in November 2014.

6.181 Merlin was recorded at collision risk height within 250 m of the turbine locations for a total of 10 seconds during the VP work between April 2014 and March 2016 inclusive.

6.182 Three flights of merlin were recorded during VP work in 2020. Two flights were recorded on 16 April 2020. One bird was identified as a female in low flight over the eastern part of the site; the second was a high and distant flight of a bird in pursuit of a meadow pipit to the east of the site. A third flight was recorded during a watch on 03 June 2020 and involved a male bird commuting across the western part of the site.

6.183 No observations of merlin were made during targeted watches over the western part of the site, or during breeding raptor walkover surveys in 2020.

6.184 Merlin is a scarce breeding resident, uncommon passage migrant and winter visitor in the East Glamorgan recording area (Glamorgan Bird Club, 2017). It is a generally rare breeder and winter resident throughout Wales (WOS, 2014).

6.185 The observations made during 2020 indicate that merlin may breed within areas of suitable habitat locally. However, breeding is very unlikely to occur within 500 m of the proposed turbine infrastructure. No nest sites were recorded during merlin survey within the Llynfi Afan REP site in 2015 (Natural Power, 2016).

6.186 It is considered unlikely that merlin could breed within the developable area on the site. The majority of merlin nests identified in a study by Rebecca (2011) were located on the ground (48% of nests found in Wales). Despite this, conifer plantation was the principal habitat for 45% of nest sites in Wales, with 36% of identified sites being associated with dry heath. There are no trees within the developable area, and less intensively grazed, dry heath habitats occur predominantly on the steep slopes that demarcate the site boundary. The moorland and dwarf heath habitats present at the periphery of the site provide suitable breeding and foraging opportunities for the species.

6.187 Given the low level of use of the site by merlin, it is unlikely to be of importance at more than a local level. The level of activity recorded for merlin during VP survey is insufficient to accurately inform collision risk and has therefore not been modelled. However, the suitability of habitats present (suitable prey, rocky outcrops and forest edge at the site boundary) the value is greater than negligible. It is concluded that the site is of **Local** importance for merlin.

Kestrel

6.188 SEWBReC returned four breeding season and six winter period records of kestrel within 2 km of the site. None of the records are reported from within the site. The nearest is approximately 1 km north of the site (recorded September 2015). All other records are located west of Blaengarw, in excess of 1.5 km west of the site.

6.189 Kestrel was the most commonly encountered target species during the 2015 breeding season VP work with a total of 41 flights (76 minutes and 45 seconds of flight time) being recorded. This contrasts markedly to the total two flights (one in each of May and September) recorded for this species during the 2014 breeding season work. Eight flights were recorded during VP watches in 2020, of which two were at collision risk height for a combined duration of 2 minutes and 45 seconds.

6.190 Flights by this species recorded in 2015 appeared to be concentrated over areas of less intensively grazed grassland, with avoidance of the enclosed acid grassland fields in the eastern part of the site. Highest activity was observed over areas of rougher vegetation on sloping ground, and this is reflective of the presumed higher density of prey items, such as field vole *Microtus agrestis*, in these areas. The flights recorded in 2020 were also over common land and stream valleys on the periphery of the site.

6.191 Two kestrel were recorded flying north-east from a valley at the southern boundary of the site during a raptor walkover survey on 15 July 2020. A juvenile kestrel was also recorded hunting beyond the western site boundary during a merlin VP survey on 15 July 2020.

6.192 The level of activity recorded for kestrel in 2015, observation of juvenile birds in 2020, and frequent observation of two birds in flight, suggests local breeding. However, breeding opportunities on the site are limited to structures within the Werfa mast compound and associated pylons. These structures were scanned during VP watches in 2015 and 2020, and during breeding raptor survey visits in 2020, but no nests were observed. There are no trees, rock shelfs, or other structures not visible from the VP locations within the site.

6.193 A contrast in activity by kestrel between years was also observed during the winter work. A total of ten flights were recorded between October 2014 and March 2015 inclusive. Only three flights (one flight on 12 October 2015, and two flights on 19 October 2015) were recorded during the winter 2015/16. However, five of the total ten flights recorded during the winter 2014/15 were noted during one three-hour watch on one date (18 November 2014).

6.194 Kestrel spent a total of 29 minutes and 25 seconds at collision risk height within 250 m of the turbine locations during a total 360 hours of observation.

6.195 Kestrel is included in Section 7 of the Environment (Wales) Act 2016 and is red-listed in Wales (Johnstone *et al,* 2010) and amber-listed in the UK (Hayhow *et al*, 2017). Kestrel is noted as being a rather scarce breeding resident throughout Wales (WOS, 2014). Bird atlas work reports a contraction of range by 6 % across the UK since 1968/72, with losses occurring throughout Wales (Balmer *et al*, 2013). However, kestrel is a common resident breeder in East Glamorgan, with reports of this species being widespread throughout the recording area (Glamorgan Bird Club, 2017).

6.196 Survey results suggest that kestrel may have bred locally in 2015 and 2020, but that local breeding was unlikely in 2014. In addition, the site offers limited breeding features for kestrel, and it is unlikely that kestrel bred on the site in either survey year. Use of the site by kestrel in the winter appears to be irregular; however, the habitats on and surrounding the site clearly do provide foraging opportunities for this locally declining species. Given this, it is likely that the site is of **Local** importance for kestrel.

Hobby

6.197 No records of hobby within a 10-year period were provided by the data search.

6.198 Hobby was recorded flying east over the central part of the site during a watch on 31 July 2015.

6.199 The bird was observed to make a (failed) attempt at catching a meadow pipit as it passed through. The flight was timed at 45 seconds, entirely below collision risk height.

6.200 A flight was also recorded during a VP watch on 06 May 2020. The bird was flying east over the southern part of the site, entirely below collision risk height.

6.201 Hobby was not recorded during the 2014 breeding season work, and no further observation of the species were made during any other site visit.

6.202 Hobby is an uncommon spring, summer and autumn visitor to the East Glamorgan recording area (Glamorgan Bird Club, 2017). It is a rare breeder in Wales with a total breeding population of approximately 30 pairs (WOS, 2014).

6.203 There is no suitable breeding habitat for hobby within the site, and the single (late) breeding season observation of hobby suggests that it is unlikely to breed locally. The low number of records during the survey work at Upper Ogmore further indicate that the site is unlikely to be of value to foraging birds.

6.204 It is concluded that the site is of **negligible** importance for hobby, and the low-level of flight activity within the airspace of the site is insufficient to accurately inform collision risk. Hobby is **not considered further** in this assessment.

Short-eared owl

6.205 No records of short-eared owl were returned by the data search.

6.206 Short-eared owl was recorded during a watch at VP1 on 12 February 2015. Two flights were noted, both approximately 700 m south west of VP1, entirely below collision risk height. No further observations of this species were made during the survey work between April 2014 and March 2016 inclusive.

6.207 Short-eared owl is an uncommon winter visitor and passage migrant in East Glamorgan (Glamorgan Bird Club, 2017), and present in small numbers in all counties in Wales (WOS, 2014).

6.208 The infrequent observations of short-eared owl during the survey work indicate that the species is unlikely to use the site for foraging or roosting with any regularity.

6.209 It is concluded that the site is of **negligible** importance for short-eared owl, and the low-level use of the site is insufficient to accurately inform collision risk. Short-eared owl is **not considered further** in this assessment.

Golden plover

6.210 Four records of golden plover *Pluvialis apricaria* were returned by the data search, all of wintering or passage birds. One record was returned for the site, and comprised 48 birds recorded in February 2005. The nearest off-site record of golden plover is approximately 700 m south of the Site (5 birds during December 2006).

6.211 Three golden plover were noted during moorland wader survey on 24 April 2014: the first was identified as a nonbreeding adult or second year bird at approximately 100 m south west of the transmitter mast and the second, identified as an adult male, approximately 1.5 km further south[32]. A third bird was later noted flying south near the southern part of the developable area.

[32] The plumage of breeding golden plover is similar between sexes, and this makes sexing difficult in the field. However, breeding males do have more extensive black than females making identification to sex possible with good views. First and second calendar year birds cannot be reliably sexed and, without exceptional views,

6.212 One golden plover flight (involving one bird) was recorded during a watch on 15 May 2020. The bird made a low flight of 45 seconds duration over the common land in the south-eastern part of the site. One bird was also recorded loafing in this area during a wader survey on 26 April 2020. The area was searched for evidence of nesting, but none were found. No observations of this species were made on subsequent visits.

6.213 Golden plover were recorded during winter walkover surveys on 16th December 2014 (five birds) and 6th January 2015 (one bird).

6.214 Nine flights of golden plover were recorded over five survey days during the winter 2014/15 VP work. Four flights were recorded on 26 January 2015, two flights on 12 February 2015, and one flight on each of 28 October 2014, 19 January 2015 and 26 February 2015. The largest flock size was 43 on 12 February 2015. All other flights comprised flocks of between 1 and 14 birds.

6.215 Four flights of golden plover were recorded over three survey days during the winter 2015/16 VP work. These were: 12 October 2015 (2 flights), 25 November (1 flight), and 25 February 2016 (1 flight). Golden plover were also heard calling to the north-east of VP 1 on 12 October 2015, and on the slope to the Nant-y-moel valley, immediately south of the site on 21 March 2016, but no flight was observed on either occasion. Flocks were small, with a maximum count of 7 birds present on 25 November 2015 and 24 February 2016. The two flights recorded on 12 October 2015 were made by one bird.

6.216 Flights were generally recorded at the centre of the site where the land slopes away to the south-east from the Werfa mast compound.

6.217 Golden plover were recorded at collision risk height within 250 m of the turbine locations for a total of 6 minutes and 30 seconds during the VP work between April 2014 and March 2016 inclusive.

6.218 Golden plover is included in Section 7 of the Environment (Wales) Act 2016 and is a locally common winter visitor and passage migrant in East Glamorgan (Glamorgan Bird Club, 2017). They are a scarce and declining breeding species in Wales (WOS, 2014) with Welsh breeding densities being low (following a loss of a fifth of their British range over the last 40 years) in comparison to the core UK breeding range (in the uplands of Scotland) (Balmer *et al* 2013).

6.219 The site is beyond the current breeding range of golden plover (Glamorgan Bird Club, 2017). It is likely that the birds observed during the 2014 and 2020 surveys were on passage given the timing of the observations, presence of single birds, and

resemble non-breeding adult birds. Therefore, unless a bird is confirmed to be breeding, it should be recorded as a non-breeding adult or an immature bird.

lack of subsequent sightings beyond mid-May. No evidence of breeding was recorded on the site during the 2014, 2015 or 2020 breeding season work

6.220 The survey results indicate that golden plover do use areas of common land on and around the site during the winter, but peak numbers are likely to occur in late autumn and are largely represented by passage birds. The airspace above the site is not likely to be of high value to golden plover (based on observation), although birds will inevitably fly through it on occasion if roosting or feeding nearby. Given this, the importance of site for golden plover is likely to be limited to the **Local** level.

Other waders

6.221 A common snipe *Gallinago gallinago* was noted calling in the north-western part of the site during a moorland wader survey on 20 June 2014. No further registrations of this species were made during moorland wader survey in 2014 or breeding season VP survey work in 2014 and 2015.

6.222 Snipe were recorded in low number (total of 18 observations) on all survey dates during the 2014/15 winter walkover surveys with the exception of the 16 December 2014. Registrations of snipe were distributed across the site, with a broad association with marshier areas.

6.223 Jack snipe *Lymnocryptes minimus* was recorded during walkover survey on 06 January 2015. The bird was flushed by the surveyor at close range in the north western part of the site. Records of snipe and jack snipe made during the winter walkover survey work are presented in Figure 6.10.

6.224 Snipe is an amber-listed species in the UK (Eaton *et al*, 2015) and an occasional summer visitor at suitable breeding sites in the East Glamorgan recording area (Glamorgan Bird Club, 2017). They are present in 'substantial numbers' during winter in Wales, breeding in all counties, but declining in number (WOS, 2014).

6.225 Jack snipe are a locally common winter visitor and passage migrant (Glamorgan Bird Club, 2017) and are a fairly common passage and winter visitor in Wales (WOS, 2014).There are no records of this species having bred in Britain (Balmer *et al*, 2013)

6.226 The low level of activity reported during the survey work suggests that snipe and jack snipe use the moorland on and adjacent to the site in low number during the winter. No flights of either species were recorded during the VP work. Given the status of the wintering snipe population in East Glamorgan, and the extensive availability of suitable wintering habitat available locally, the importance of site for snipe and jack snipe likely to be at the level of the **Site**.

Other species

6.227 Buzzard *Buteo buteo* were recorded frequently during all VP survey work. Up to five birds were recorded using the airspace adjacent to the site in mid-winter 2014 and late winter 2015, and up to five birds during breeding season work in 2020.

6.228 Buzzard is a common and widespread breeding resident throughout Wales. The species is categorised as being of 'least concern' in conservation terms, and has increased considerably in number over the past twenty years at both the UK and European levels. Atlas work has demonstrated that the largest concentrations in the UK are in Wales and the south-west of England (Balmer *et al*, 2013), and the UK population is estimated at 57,000-79,000 pairs (Musgrove *et al*, 2013). Given the size of the population, and low quality of the habitats on site for foraging, the site is unlikely to be of value to buzzard populations at any geographic level. Buzzard is therefore **not considered further** in this assessment.

6.229 Raven *Corvus corax* was recorded frequently during all survey work, with up to twenty-four birds recorded overflying the site on 31 July 2015. Raven are common and widespread throughout Wales and the west and north UK, and have shown an expansion in their range by around 70 % since the late 1970's (Balmer *et al*, 2013). The current UK population is estimated at 7,000 pairs. The use of the airspace over the site is unexceptional, and the habitats within it are unlikely to provide a rich foraging resource for raven. Therefore, the importance of the site for the local population is likely to be negligible. Raven is therefore **not considered further** in this assessment.

6.230 Herring gull *Larus argentatus* and greater *Larus marinus* and lesser black-backed gulls *Larus fuscus* were noted flying through the area infrequently during the survey work between 2014 and 2016 (herring gull on ten dates, greater black-backed gull on one date, and lesser black-backed gull on two dates). A peak count of to 14 herring gull and 9 lesser black-backed gull were recorded in the area during the 2020 survey work. Aside from the occasional scavenging opportunity provided by livestock fatality, the site is unlikely to support foraging gulls. Therefore, gulls are **not considered** further in this assessment.

6.231 A grey heron *Ardea cinerea* was recorded in flight to the east of the site in June 2014, and heading south over the site on 19 March 2015. This species was not recorded during watches in 2016 or 2020.

6.232 Given the low level of activity recorded for grey heron, it can be concluded that the airspace above the site is used infrequently, and therefore, this species is **not considered further** in this assessment.

6.233 Cuckoo *Cuculus canorus* was recorded at Nant-y-Moel beyond the eastern boundary of the site during the moorland wader surveys in 2014 and 2020, and during VP

work on two dates in 2015. Jackdaw *Corvus monedula* were regularly recorded in sheep grazed pastures near Nant-y-Moel to the east of the to the site, and carrion crow were noted on the majority of survey dates, typically foraging on semi-improved fields in flocks of up to 37 birds in the south-eastern part of the site.

6.234 The breeding passerine bird community of the site was dominated by skylark *Alauda arvensis* and meadow pipit *Anthus pratensis*, and reflective of the homogenous moorland present on the site. Wheatear *Oenanthe oenanthe* and stonechat *Saxicola rubicola* territories were generally associated with landscape features, such as infrequent rocky outcrops and the Werfa mast compound; while other common species were confined to stream valleys and plantation edge beyond the site boundary.

6.235 Ring ouzel *Turdus torquatus* were recorded breeding at a crag on the eastern boundary of the site during a water vole survey visit on 09 June 2016. No use of the site was detected during ornithological survey work in 2014-16 or in 2020.

6.236 The data search returned 14 records of common crossbill (10 breeding season records and 2 winter period records), and one record of firecrest *Regulus ignicapilla* (October 2010), all of which were from areas more than 1.5 km west of the site, west of Blaengarw. Common crossbill and firecrest are protected under Schedule 1 of the Wildlife & Countryside Act 1981 (as amended). There is no suitable habitat within the site for common crossbill, and therefore the site is unlikely to be important for the species. However, they may be present in areas of plantation adjacent to the existing NRW Forestry track.

6.237 All territories recorded during the breeding bird survey work in 2014 are presented in Figure 6.11.

6.238 The breeding passerine community is considered to be typical of the habitats present within the site, which are unremarkable in the context of the wider landscape. The breeding passerine community is therefore considered to be important at the level of the **Site**.

6.239 Collision and displacement of passerines are not generally considered issues for wind farm developments (SNH (2017) guidance does not recommend passerine surveys for wind farm proposals). Any effect on populations arising as a result of collision with turbines is likely to be very localised owing to the high reproductive rates and low annual survival of passerines. However, some adverse effects may occur as a result of loss of breeding habitat and disturbance during construction phase works.

Bats

6.240 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 for bats to exploit. This was confirmed by the survey results which recorded consistently low bat activity across the site for all sampling periods, and absence of evidence that the Werfa Mast buildings are used for roosting. Most bat passes were recorded within the first two of hours after sunset, when they are typically foraging (Altringham, 2003). A lack of calls close to sunset and sunrise suggests that it is unlikely that there is a significant roost nearby for any of the species recorded. This conclusion is supported by the lack of roosting habitat within or near to the site.

6.241 Figure 6.3a illustrates the locations of automated detectors during the work in 2015, 2016 and 2018, and the transect route walked in 2015 and 2016. The locations of recorded bat passes are also presented in the Figure. Figure 6.3b illustrates the locations of automated detectors during the work in 2019.

6.242 The review of bat records provided by SEWBReC indicated that brown long-eared bat *Plecotus auritus*, common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, Nathusius's pipistrelle *Pipistrellus nathusii*, lesser horseshoe bat *Rhinolophus hipposideros*, Leisler's bat *Nyctalus leisleri*, Noctule *Nyctalus noctula*, Daubenton's bat *Myotis daubentonii*, and Natterer's bat *Myotis nattereri* have been recorded within 10 km of the site.

6.243 The closest bat record for the site was for common pipistrelle 1.2 km to the south east in the bottom of the valley (Nant-y-moel). This is also the closest bat roost record to the site.

6.244 There were 37 bat roosts recorded within 5 km of the site, all of which were located in buildings at the base of valleys within the search area.

6.245 The extended 10 km search for noctule, Leisler's bat and Nathusius' pipistrelle returned 79 records. These included:

- 61 records of noctule, the closest being 3 km to the south of the site;
- Five records of Leisler's bat, the closest being 10 km to the south east of the site; and,
- Nine records of Nathusius' pipistrelle, the closest being 10 km to the south east of the site.
- Four records of bats in the genus Nyctalus[33] (unidentified to species level), all beyond 9 km south-east of the site.

[33] Includes Leisler's bat and noctule.

6.246 Bats and their habitats are protected under the Wildlife and Countryside Act 1981 (as amended), and by the Conservation of Habitats and Species Regulations 2010 (as amended). In summary, these make it an offence to damage, destroy or obstruct any place used by bats for breeding and shelter, disturb a bat, or kill, injure or take any bat. In Wales, eight bat species are listed as Section 7 species of principal importance under the provisions of the Environment (Wales) Act 2016.

6.247 Article 16 of the Habitats Directive establishes in which situations Member States are allowed to make exceptions (i.e. derogate) from the strict species protection provisions. Where European Protected Species are present and affected by development proposals, Local Planning Authorities must take into account the 'three tests' as set out in Article 16. These include whether the proposed development: (i) is of overriding public interest; (ii) there is no satisfactory alternative; and (iii) the action will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their range. Demonstration of overriding public interest and satisfactory alternatives are planning issues which will be detailed within the planning statement.

Nathusius' pipistrelle

6.248 There was one Nathusius' pipistrelle bat call recorded during the survey period, on 9 June 2016 at 03:59. No confirmed passes of this species were recorded during the 2019 survey work

6.249 There were 196 passes recorded during the 2015, 2016 and 2018 survey work that could have been either Nathusius' pipistrelle or common pipistrelle but could not be determined to species level due to overlapping call parameters. These were recorded in spring and summer 2016 and autumn 2018 (165 passes in spring 2016, 16 passes in summer 2016, 15 passes in autumn 2018, 2 passes in spring 2019, and 13 passes in summer 2019), and occurred most frequently at the beginning and end of the night (the same pattern as common pipistrelle, and therefore most likely to be this species).

6.250 There were 15 passes during the 2019 survey work that could have been either Nathusius' pipistrelle or common pipistrelle. The majority of passes (13) were recorded during the summer period. None were recorded during the autumn

6.251 Nathusius' pipistrelle is a relatively rare species (although records have increased in recent years (BCT, 2017)) with an estimated UK population of around 16,000. Historic population trends do not exist for this species due to its relatively recent discovery as a resident species in the UK (Battersby, 2005). Insufficient data has been collected by the BCT to inform a calculation of population trends for Nathusius' pipistrelle (BCT, 2017).

6.252 The population of Nathusius' pipistrelle in the UK is at least partly migratory (Hutterer *et al*. 2005) although low numbers of maternity roosts are known to be present in east England. There are currently no maternity roosts reported in Wales, and records of the species are scattered (JNCC, 2019). Nathusius' pipistrelle are known to be heavily associated with large water bodies, riparian habitats, broadleaved and mixed woodland and parkland. Roost sites are typically in trees, with use of buildings also reported (Dietz *et al*., 2009; JNCC, 2019).

6.253 The absence of habitats with which the species is known to be associated suggests that the site is unlikely to be of importance to a local population. However, the site may be located on a broad-front migratory route for the species, and may occasionally support over-flying individuals (as indicated by the very low number of confirmed passes for this species recorded during survey work). The site is therefore considered to be of **Site-level** importance for Nathusius' pipistrelle.

Common pipistrelle

6.254 Common pipistrelles were recorded in spring and summer 2016 and autumn 2018, and at all detector locations during the survey period. Bat activity was highest in spring (20.8 bat passes per hour (B/h)), followed by autumn (1.0 B/h)[34], with summer having lowest level of activity (0.2 B/h).

6.255 The highest activity was recorded from 41 minutes and 100 minutes after sunset (10.6-11.0 B/h), this reduced during the middle of the night (1.4 B/h). There was a secondary peak in activity between 120 minutes and 61 minutes before sunrise (4.6-7.6 B/h). No bat passes were recorded later than 39 minutes before sunrise, and only two passes (both at detector D4 on 26 September 2018) were recorded earlier than 40 minutes after sunset, suggesting that the presence of a local roost is unlikely.

6.256 During the 2019 survey work, common pipistrelles were recorded during all sample periods, and at all detector locations. Bat activity was highest in summer (1.1 B/h), followed by spring (0.2 B/h), with autumn having lowest level of activity (<0.1 B/h).

6.257 The highest activity was recorded from 41 minutes to 60 minutes after sunset (2 B/h). This reduced during the middle of the night (0.2 B/h). There was a secondary peak in activity between 100 minutes and 81 minutes before sunrise (0.8 B/h). No bat passes were recorded later than 40 minutes before sunrise, and only two passes (both at detector D3 on 02 August 2019) were recorded earlier than 30 minutes after sunset (25 minutes and 27 minutes after sunset respectively).

6.258 Common pipistrelle is the most abundant species of bat across the UK with a UK population of around 3,040,000 (Matthews *et al*., 2018). Breakdowns by country

[34] No passes by this species was recorded during the autumn 2015 sampling period

are not available, although Harris *et al*. (1995) suggest a population of 200,000 bats in the genus *Pipistrellus* in Wales. The species is thought to have undergone declines of around 55% since the 1960s although there is evidence of populations becoming stable or possibly increasing within the last ten years (Battersby, 2005). BCT field data indicates that populations may have increased by 25.5 % since 2006 (BCT, 2017). No population estimate for this species is available at the local authority or regional levels.

6.259 Given the abundance of the common pipistrelle in the UK, and the fairly low activity levels recorded for this species within the site, it considered that the value of the site for the species does not extend beyond the **Site** level.

Soprano pipistrelle

6.260 Soprano pipistrelles were recorded at D1, D3 and D4 during spring 2016 and autumn 2018. Passes by this species were only recorded at D2 during autumn 2018. The highest level of overall activity was recorded at D1 (0.4 B/h) followed by D3 (0.3 B/h) then D4 (0.2 B/h). These results are shown in Figure 6.3.

6.261 The highest activity was recorded from 81-120 mins after sunset (1.5-1.2 B/h), activity then dropped to 0.1 B/h and remained low for the rest of the night period.

6.262 There were 67 bat passes that could have been either common pipistrelle or soprano pipistrelle, based on overlapping call parameters. The majority of passes were recorded during the middle of the night, and patterns in activity matched those for both common and soprano pipistrelle species.

6.263 During the 2019 survey work, soprano pipistrelles were recorded infrequently at all detector locations. The majority of passes were recorded at detector D4 (23 passes of a total 47 recorded across the Site). Of these, 12 were recorded on one night (02 August 2019) and likely to have been a single bat making multiple passes near the detector. No passes by this species were recorded during the autumn period; 43 were recorded during the summer, and 4 passes recorded during spring. These results are shown in Figure 6.3b.

6.264 The highest activity was recorded from 41-100 mins after sunset (0.1 B/h). Activity was less than 0.1 B/h at all other times. No bats were recorded earlier than 48 minutes after sunset or 54 minutes before sunrise.

6.265 There were 25 bat passes during the 2019 survey that could have been either common pipistrelle or soprano pipistrelle, based on overlapping call parameters. The majority of passes (16) were recorded during the middle of the night, with no passes recorded earlier than 40 minutes after sunset or later than 80 minutes before sunrise

6.266 Soprano pipistrelle is the second most common species of bat in the UK with a UK population of around 4,670,000 (Matthews, *et al*. 2018). Historic population trends do not exist for this species as it was not described until 1997 although recent work suggests the population is stable or increasing (Battersby, 2005) with an upward trend of 18.1 % since 2006 from BCT data (BCT, 2017).

6.267 Due to the low recorded activity, the importance of the site for this species is likely to be limited to the level of the **Site**.

Myotis species

6.268 Low numbers of Myotis sp. bat passes were recorded in spring (B=27) and summer (B=1) 2016, and in Autumn (B=9) 2018. The highest number of bat passes was recorded at D3 (B=25). Bat passes were most frequently recorded in the middle of the night (B=21).

6.269 It is difficult to generalise about the population status of *Myotis* bats. Table 6.10 (below) lists an estimated UK population status and Welsh population size (from Battersby, 2005) for each *Myotis* species that could be found within the area of the Site.

6.270 During the 2019 survey work, *Myotis* sp. passes were recorded most frequently in the period between 2 hours after sunset and 2 hours before sunrise (B=128 of a total 136 passes; 0.1 B/h), and most frequently during the summer period (B=126; 0.2 B/h).

Table 6.10: Population status of Myotis bat species which may be found at the site (data from Matthews *et al*., 2018 and Battersby, 2005).

Common Name	Scientific Name	UK population status	UK population	Welsh population
Whiskered bat	Myotis mystacinus	Local	Not available	8,000
Brandt's bat	Myotis brandtii	Common in north and west, rare or absent elsewhere	Not available	22,500
Natterer's bat	Myotis nattereri	Fairly common throughout much of the UK	973,000	70,000
Daubenton's Bat	Myotis daubentonii	Common throughout much of the UK	1,030,000	95,000
Bechstein's bat	Myotis bechsteinii	Very rare	21,800	1,500

6.271 It is considered unlikely that Bechstein's bat is present due to its rarity and preference for woodland habitats (Battersby, 2005). Whiskered bat and Brandt's bat are also predominantly woodland species (Dietz *et al*., 2009), and unlikely to use open habitats at Upper Ogmore. The species recorded at Upper Ogmore are

therefore likely to be the more widespread and common Natterer's bat or Daubenton's bat. The number of recordings of Myotis bat passes is low, and it is unlikely that this species group uses the site with regularity. Natterer's bat and Daubenton's bat are also considered to have a low population vulnerability (see Table 6.3). The site is therefore considered to be of **negligible** importance for this species group. *Myotis* sp. bats are therefore not considered further in this assessment.

Long-eared bat sp.

6.272 One long-eared bat *Plecotus* sp. pass was recorded at D3 at 03:44 on 11 October 2015, and 31 passes recorded during the autumn 2018 sampling period. Passes were recorded at all detector locations in autumn 2018, with most passes at detector D3 (B=14). No activity by this species was recorded during the spring and summer sampling periods.

6.273 Long-eared bats were recorded infrequently during 2019. The majority of activity (B=43 of a total 49 passes; 0.1 B/h) were recorded during the summer period.

6.274 It is unlikely that these records relate to grey long-eared bat *Plecotus austriacus* due to its rarity in the UK and restricted confirmed distribution for this species (primarily confined to the southern English counties and south-west Wales (Razgour, 2012)). Therefore, it is considered that the species recorded at the site is brown long-eared bat.

6.275 This species has an estimated population in the UK of 934,000 (Matthews *et al.* 2018) and 17,500 in Wales (Harris *et al.*, 1995). It primarily roosts and forages in woodland, but has shown a preference for roosting in large loft spaces. Brown long-eared bats are foliage gleaning specialists, and do not typically cross open spaces (Battersby, 2005). Given the ecology of this species, absence of recorded passes at the site in spring and summer 2016 and low activity recorded during the autumn period, it is not likely that brown long-eared bats use the site on more than an occasional basis. The site is therefore considered to be of **negligible** importance for long-eared bats, and they are not considered further in this assessment.

Noctule, Leisler's bat and Serotine ('Big Bats')

6.276 No big bats were recorded during survey work during 2015-2018.

6.277 Noctule, Leisler's bat and serotine *Eptesicus serotinus* were recorded infrequently during the 2019 surveys. For noctule, a total of 11 passes (<0.1 B/h) were recorded, all during the summer period. Passes were recorded at all detectors except D1. Two passes of Leisler's bat were recorded during the survey: one on 02 June (at

D2) and one on 01 August 2019 (at D6). Three passes were recorded for serotine (two on 01 August and one on 27 July 2019), all at detector location D4.

6.278 Noctule has an estimated population in Wales of 91,900 (Matthews *et al*. 2018), and serotine an estimated population in the UK of 136,000 (Matthews *et al*. 2018) (population estimates for noctule in the UK, Leisler's bat, and serotine in Wales are not available).

6.279 Noctule, Leisler's bat and serotine are all considered to be at high population vulnerability on account of their risk of collision and relative abundance in Wales (see Tables 6.2 and 6.3). Given the absence of recorded passes at the site during the 2015, 2016 and 2018 sampling periods and low activity recorded during 2019 for all species of big bat, it unlikely that noctule, Leisler's bat or serotine bats use the site on more than an occasional basis and the site is considered to be of importance at the **Site** level.

Amphibians

6.280 No records of great crested newt within 2 km of the site were returned by SEWBReC. The closest 1 x 1 km Grid Square in which great crested newt records have been recorded is approximately 8.8 km to the south-east of the Site, in Penygraig.

6.281 No great crested newts were found in any of the ponds during the surveys. Palmate newts were present in all ponds, with a peak count of nine individuals. eDNA samples from two ponds adjacent to the NRW Forestry track returned negative results for presence of great crested newt.

6.282 The absence of the species from suitable habitat within the site indicates that the site is of **negligible** value to the species. Great crested newts are therefore not considered further in this assessment.

6.283 Common species of amphibian, including palmate newt *Lissotriton helveticus*, common toad *Bufo bufo* and common frog *Rana temporaria*, were found in low numbers during the 2016 surveys. Given their widespread and common status throughout Wales, it is unlikely that the importance of the site for these species extends beyond the level of the **Site**.

Reptiles

6.284 SEWBReC provided one record of common lizard *Zootoca vivipara* from within 2 km of the site (Nant-y-Moel grassland in August 2003). No further records of reptiles were returned by the search.

6.285 The habitats on the site are likely to support common lizard[35], slow worm *Anguis fragilis* and adder *Vipera berus* (likely to be confined to areas of drier habitat on less intensively grazed slopes and woodland edge beyond the developable area).

6.286 Common lizard, slow worm *Anguis fragilis* and adder are Section 7 species of principal importance for biodiversity in Wales as a result of national population declines. The habitats present in the wider landscape are broadly similar to those found on the site, but more suitable, drier habitats can be found throughout BCB. The value of the site for reptiles is therefore unlikely to extend to the level of the County. However, the habitats on site, particularly on the drier slopes, are likely to be of value to reptiles at a level greater than the Site itself. The site is therefore considered to be important to reptiles at the **Local** level.

Water vole

6.287 No records of water vole within the search area were held by SEWBReC.

6.288 Field signs of water vole (including latrines and a feeding station) were found alongside a watercourse within the site, and within a wet flush area approximately 100 m north of the site boundary during the Phase 1 survey in 2014. Further droppings and feeding signs were found in the off-site wet flush area during targeted survey work in 2016. The targeted work also identified some burrows alongside watercourses within the site that had dimensions suitable for use by water vole and/or bank vole *Myodes glareolus* and brown rat *Rattus norvegicus*, but did not exhibit signs of current use. No evidence of water vole were recorded during a survey visit in May 2020, suggesting that the area is unlikely to be frequently used by this species. The locations of water vole field signs recorded during the work are illustrated on Figure 6.4.

6.289 Water vole are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). They are a Section 7 species of principal importance for biodiversity under the Environment (Wales) Act 2016. A species action plan for water vole was included within the 2002 Bridgend LBAP. Species action plans do not form part of the most recent 2014 LBAP, but water vole remain a notable species, providing an indicator of the condition of riverine and wetland habitats within the county.

6.290 Water vole are a native and locally common species but vulnerable to extinction in the UK. The UK population of water vole has seen significant declines (estimated at 90%[36]) since the introduction of the American mink *Neovison vison* in the 1960's.

[35] A juvenile common lizard was observed basking on a rock exposure within the site during the Phase 1 habitat survey in 2014.
[36] Source: https://ptes.org/campaigns/water-voles

Unsympathetic riverside management, urbanisation of floodplains, and water pollution have also impacted on populations.

6.291 There are a number of water vole reintroduction projects in South Wales (such as at Magor Marsh and Cosmeston Lakes) that have attempted to reconnect fragmented water vole populations occurring across the area. Local populations are likely to be an important constituent of fragmented meta-populations and, therefore, and in this context are considered important at the **County** level.

Otter

6.292 SEWBReC did not hold any records for otter *Lutra lutra* within 2 km of the site. No evidence of otter, such as prints or spraints, was recorded along any of the watercourses during the water vole survey work in 2016 and 2020.

6.293 The watercourses on the site are considered to be sub-optimal for use by otters for foraging due to the small nature of the channels (all sourced within the site) and the assumed lack of (large) fish prey and other prey items such as amphibians. The wet flushes on and adjacent to the site are similarly considered to be of little value to otter. The lack of suitable shelter opportunities also reduces the likelihood of otter using the site. For this reason, otters are **not considered further**.

Badger

6.294 SEWBReC provided two records of badger *Meles meles* from the area of search: approximately 1.5 km east of the site (July 2014) and 2 km south-east of the site (September 2011) respectively. No further information regarding the type of record (i.e. sett or individual) was provided in either case.

6.295 No evidence of the presence of badger, such as setts, latrines, or trails, was recorded on the site through all the survey visits, and it is unlikely that badgers use the site on more than an occasional basis.

6.296 Given that no setts were found on the site, it is very unlikely that badgers will be affected, or that an offence under the Protection of Badgers Act 1992 would occur as a result of the Development. Notwithstanding this, areas within the developable area considered to be suitable for sett excavation (particularly drier areas of acid grassland) will be subject to a pre-construction check for evidence of badger use and the presence of setts. This will be prescribed in the Construction Environment Management Plan (CEMP) for the proposed Development. Badgers are **not considered further** in this assessment.

Invertebrates

6.297 The SEWBReC data search did not return any records of invertebrate species of principal importance for biodiversity conservation in Wales (with reference to

Section 7 of the Environment (Wales) Act 2016) within 2 km of the site for the last 10 years.

6.298 The habitats present within the site are modified and heavily grazed. Whilst the habitats on steeper parts of the site (particularly areas of dry heath) may support Section 7 species (such as shrill carder bee *Bombus sylvarum*), these areas will not be affected by the proposed Development. No evidence of devil's bit scabious *Succisa pratensis* (the host plant of marsh fritillary *Euphydryas auriniawas*) was found during the Phase 1 and NVC survey work.

6.299 The loss of low quality and degraded moorland and grassland habitats as a result of the proposed Development is only likely to result in a minor effect on commonly occurring species. Therefore, invertebrates are **not considered further** in this assessment.

Summary of Evaluation of Resources

Table 6.11. Summary of evaluation of resources

Receptor		Evaluation	Further consideration required
Statutory Sites	Mynydd Ty-isaf SSSI	National	No
	Cwm Cyffog SSSI	National	No
	Blaenrhondda Road Cutting SSSI	National	No
	Cwm Du Woodlands SSSI	National	No
	Blackmill Woodlands SAC/SSSI	International	No
	Severn Estuary SPA	International	No
Non-Statutory Sites (SINCs)	NPT Watercourses	County	Yes
	Blaengarw North-East, Nant-y-Moel Farm, Rhiw Fer, Fforch Wen Mosaic, Cwmparc, Ton Pentre Slopes, Mynydd Tyle-coch, Mynydd Blaenrhondda and Mynydd Ty-isaf, Scotch Street, Caroline Street, Ancient Woodland, Gwynfi Street	County	No
Habitats	Acid and marshy grassland mosaic	Local	Yes
	Improved grassland and arable	Negligible	No
	Semi-improved acid grassland	Site	No
	Wet modified bog	Local	Yes
	Bog pool	Local	Yes
	Dry heath	Local	No
	Streams and flushes	Local	Yes
	Ponds	Site	Yes
	Rock escarpments and scree slopes	County	No
	Plantation woodland	Local	No
Birds	Red kite	Local	Yes
	Hen harrier	Negligible	No
	Honey buzzard	Negligible	No
	Goshawk	Local	Yes (construction phase only)
	Peregrine	Local	Yes
	Merlin	Local	Yes
	Kestrel	Local	Yes
	Hobby	Negligible	No

Receptor		Evaluation	Further consideration required
	Short-eared owl	Negligible	No
Birds	Golden plover	Local	Yes
	Other waders	Site	Yes
	Other Species	Site (for breeding passerines only)	Yes (construction phase only: standard practice avoidance of impacts breeding passerines)
Bats	Nathusius' pipistrelle	Site	Yes
	Common pipistrelle	Site	Yes
	Soprano pipistrelle	Site	Yes
	Myotis sp.	Negligible	No
	Long-eared bat sp.	Negligible	No
	Noctule	Site	Yes
	Leisler's bat	Site	Yes
	Serotine	Site	Yes
Amphibians	All species	Site	Yes
Reptiles	All species	Local	Yes
Other mammals	Water vole	County	Yes
	Otter	Negligible	No
	Badger	Negligible	No (but pre-construction checks for setts required)
Invertebrates	All species	Negligible	No

Likely Significant Effects

6.300 This section of the chapter includes:

- A detailed assessment of potential effects on each ecological and ornithological receptor identified in the evaluation of resources section as requiring further assessment;
- Conclusions with regard to the significance of these impacts that could arise in the absence of mitigation.

Construction Effects

6.301 Construction of the Proposed Development is likely to extend over 10 months. Construction activities will include ground clearance (including selected felling of trees adjacent to the NRW Forestry track – refer to Chapter 3 for further information), excavation and construction of the turbine bases and access tracks, the erection of the turbines and the movements of machinery and construction personnel.

6.302 Temporary land take will be needed for construction compounds and borrow pits which total approximately 11.7 ha. There would be temporary disturbance on land surrounding the turbine bases and some of the access road that would be subject to restoration once construction is complete.

6.303 The grid connection cable will be installed underground to the north-western corner of the site. It will then continue south along the western boundary of the site above ground on wooden poles to join the existing 66kV wood pole connection from the Llynfi Afan Wind Farm to Pyle. The underground section within the site will follow the track infrastructure from the substation.

Protected Sites

6.304 The NPT Watercourses SINC is important at **County** level. The SINC extends to the site boundary, and sections of included watercourses are adjacent to the NRW Forestry track (see Figure 6.5).

6.305 The nearest watercourses included within the SINC are 150 m distant from the proposed Development. This is also the nearest point to the SINC at which ground works will occur on the site. Given the nature of the SINC (which will likely be fed by ground and surface water collecting within the site and areas adjacent to the NRW Forestry track), there is the potential for an adverse effect on the SINC arising because of sedimentation and pollution during the construction phase.

6.306 The proposed Development has been designed to avoid direct effects on watercourses (no channel crossings or other alterations to watercourses are required). Residual effects on watercourses following mitigation as outlined in Chapter 8 - Hydrology and Hydrogeology is likely to be negligible to minor.

6.307 Chapter 8 - Hydrology and Hydrogeology also notes that the track widening works to the existing NRW Forestry track are considered to have negligible impact on hydrology as works are limited to minor widening of the existing forestry track and diversions of existing drainage features, e.g. swales. It follows that there are unlikely to be any significant effects on the nature of the NPT Watercourses SINC as a result of the proposed track upgrade works.

6.308 Overall, impacts on the NPT Watercourses SINC **is** likely to be **negligible** without further mitigation measures over and above those applied as standard practice.

Habitats

Acid and marshy grassland

6.309 The acid and marshy grassland mosaic habitats are assessed as important at the level of the **Site.** The proposed Development will result in a permanent loss of 5.29 ha of the acid and marshy grassland mosaic within the site. This habitat is widely represented on the site (total 120.3 ha, of which 111.5 ha has been mapped as mosaic and 8.8 ha mapped as marshy grassland only), and a small proportion (4.3 %) will be lost through construction of site infrastructure.

6.310 The grid connection cable will be installed within the same trenches as the internal Wind Farm cables (located alongside access tracks). The cable route will continue west from turbine T1 to the north-western corner of the site. It will then continue south along the western boundary of the site as an overhead line supported by wooden poles spaced at approximately 35 m intervals.

6.311 Approximately 0.21 ha will be lost as a result of trenching works during installation of the grid connection cable from the track at turbine T1 to the western boundary of the site. This loss will be temporary in nature, and it is anticipated that the disturbed area will begin re-colonise within the first growing season.

6.312 The grid connection cable will be supported by wooden poles as an overhead line along the western boundary of the site (a length of approximately 0.4 km within the site).

6.313 Additional habitat loss resulting from installation of the overhead section will be limited to the footprint of the wooden poles (spaced at approximately 35 m intervals) and will be negligible in relation to the extent of the acid and marshy grassland mosaic within the site.

6.314 Given that a small proportion of this modified and grazed habitat will be affected, impacts are likely to be adverse, but **significant** at the level of the **Site** only.

Wet modified bog

6.315 The wet modified bog habitats are assessed as important at the **Local** level. A loss of 0.08 ha (of a total 11.4 ha mapped within the site) of this habitat will occur during construction phase works to allow for construction of access tracks. The access tracks in this area will follow the principles of a floating track design (see Chapter 8 – Hydrology and Hydrogeology): stone and/or geotextile will be laid directly onto existing vegetation in order to maintain the existing hydrology. Given this, it is likely that impacts will be temporary (for the life of the Wind Farm) and

the habitat would be expected to recolonise following decommissioning. Indirect, hydrological impacts on surrounding areas of this habitat are not likely to occur.

6.316 Given the limited, temporary nature of impacts on wet modified bog habitat the significance of effects is likely to be low, and unlikely to extend beyond the level of the **Site**.

Bog pool

6.317 The bog pool is assessed as important at the **local** level**.** It is set within an area of wet modified bog and will not be directly impacted by construction phase works. Short-term indirect hydrological effects from nearby groundworks are unlikely due to the use of a floating track design. The significance of effects is likely to be **negligible**.

Streams and flushes

6.318 The streams and flushes are assessed as important at the **Local** level**.** All streams present on site source from within the site boundary and are therefore minor in extent and seasonal in nature. None of the streams will be crossed by infrastructure and will therefore not be directly affected during the construction phase. Residual impacts on streams are assessed as being "Negligible to Minor" (see Chapter 8 – Hydrology and Hydrogeology, and as described in the Protected Sites section above). Therefore, impacts on stream ecology are also likely to be **negligible**.

Ponds

6.319 The ponds are assessed as important at the level of the **Site.** The on-site ponds will not be directly affected during the construction phase. The nearest works will be 300 m north of the ponds, and there is no hydrological connection between the ponds and nearest works area. No track upgrade works will be required in areas adjacent to the ponds alongside the existing NRW Forestry track. Use of the track by construction traffic may result in minor and temporary dust deposition and sedimentation. However, these effects will be mitigated through standard control measures as specified in the CEMP for the proposed Development. The significance of effects is likely to be **negligible**.

Plantation woodland

6.320 The plantation woodland habitat has been assessed as important at the **Local level.** Removal of small areas[37] of mature plantation woodland will result in a permanent,

[37] Whilst only a metre or two of additional track width is required at most, there might be a need to fell larger blocks (up to approximately 8.6 ha). The maximum felling requirements have been agreed in consultation between RES and NRW and have been designed to ensure that trees will be felled back to a firm edge to avoid wind throw. However, it is anticipated that significantly less felling will be required, as only minor widening of the forest track is required. Exact felling requirements will be agreed with the AIL delivery haulier prior to construction.

adverse impact. However, the effects are unlikely to be significant because of the small extent of the loss in respect of the total extent of this habitat locally, and the nature of the affected habitat (mature sitka spruce is of low biodiversity value). Notwithstanding the potential for impacts on breeding birds (which will be mitigated through standard practices (see the following section)), the significance of the loss of small areas of mature sitka spruce plantation is considered to be **negligible**.

Birds

6.321 Effects of land take (i.e. decreased resource availability) on birds are likely to be negligible as only common ground-nesting passerines (meadow pipit and skylark) have been shown to use the open areas of the site for breeding. The main construction phase consideration is disturbance leading to displacement.

6.322 The extent of the effects of construction on birds would depend upon the timing of disturbing activities, the degree of displacement (spatially and temporally) that occurs, the size, suitability and proximity of habitats available to displaced birds, and their capacity to accommodate them.

6.323 There is little readily available literature that details how birds respond to construction-related disturbance associated with proposed Development. This is likely to be because disturbance during construction is short term and can often be mitigated by avoiding sensitive areas and certain times of year. Most studies of bird wind farm interactions have concentrated on operational phase disturbance and collision.

6.324 Notwithstanding the above, there is a risk that if construction work is undertaken in the breeding season (the species recorded during baseline breeding bird survey work will predominantly breed between March and August inclusive) the active nests or eggs of ground-nesting birds, and those breeding in the Bwlch Forestry could be damaged or destroyed, or young birds killed or injured. Without mitigation this would contravene the provisions of the Wildlife and Countryside Act 1981 (as amended). The effect of this has not been assessed as measures would inevitably need to be taken to ensure legislative compliance. There is specific guidance, last updated in March 2016, on the SNH website with regard to this[38]. The measures to manage the implementation of appropriate protection measures would be included in the CEMP.

[38] https://www.nature.scot/sites/default/files/2017-09/Guidance%20note%20-%20Dealing%20with%20construction%20and%20birds.pdf

Red Kite

6.325 The population of red kite using the site is considered to be of importance at the **Local** level. There is no breeding habitat for red kite within the site, and no evidence was found to indicate breeding red kite within woodland edges immediately adjacent to the site during breeding season survey work in 2014, 2015 and 2020. In addition, the low level of recorded activity of this species over the site suggests that any adverse effect that could arise from disturbance or foraging habitat loss during the Construction Phase would not be significant. Impacts on red kite as a result of habitat loss and disturbance could be adverse but would be **not significant** at any geographical level.

Goshawk

6.326 The value of the site to goshawk is considered to be **negligible**. However, goshawks breed in the local area, and the plantation adjacent to the NRW Forestry track is considered to be of **Local** importance for the species.

6.327 It is possible, in the absence of mitigation, that disturbance to nest sites could occur if felling in areas adjacent to the NRW Forestry track takes place within 250 – 450 m (FCS, 2006) during the breeding season.

6.328 Such disturbance effects could be adverse, but likely to be **not significant** at any geographical level in terms of the local and favourable conservation status of goshawk. However, in the absence of mitigation measures disturbance could represent an offence under the Wildlife & Countryside Act 1981 and mitigation needs to be considered.

Peregrine

6.329 The population of peregrine using the site has been considered to be of **Local importance**. However, breeding season survey work completed in 2014, 2015 and 2020 did not record peregrine breeding within the site. Peregrine are likely to overfly the site on an occasional basis, although the lack of supporting habitat for suitable prey (such as wood pigeon *Columba palumbus*) makes it likely that habitat loss during the Construction Phase would be of **negligible significance**. Disturbance effects are also assessed as being **not significant** at any geographical level given that the nearest known breeding territory (located at Mynydd Ty Isaf) is beyond the published minimum distance of disturbance for the species (FCS, 2006).

Merlin

6.330 The site is considered to be of importance at the **Local** level for merlin. The habitats within the developable area have limited potential for breeding merlin, and no evidence of breeding was recorded during the 2014, 2015, 2016 and 2020

survey work. Therefore, direct impacts to breeding birds (through potential disturbance or destruction of nests) are considered unlikely. The habitats within the site are considered to be of value to foraging merlin as they support breeding passerines. Loss of a small proportion of these habitats during the construction phase is likely to result in an adverse effect. However, the limited extent of habitat lost (11.7 ha) is a small proportion of the total available locally and is not likely to result in a significant effect on the local population of merlin. Habitat loss during construction is considered to be **adverse** but **not significant**. Foraging birds may be temporarily displaced as a result of construction phase disturbance; however, effects are likely to be very localised (around active machinery), and **not significant** at any geographical level when taken with the area of foraging habitat available locally.

Kestrel

6.331 The site is considered to be of importance at the **Local** level for kestrel. The available breeding habitat for kestrel within the site is limited to the Werfa Masts and associated powerline poles. No breeding was observed on these features during breeding season survey work in 2014, 2015 and 2020.

6.332 Kestrel were recorded foraging over the site irregularly during the survey work. The habitats on the site are likely to support suitable prey items for kestrel (such as small mammals and amphibians). However, the loss of approximately 11.7 ha (6.5 % of the total available habitat (177.43 ha) within the developable area, and a very small proportion of the total habitat available locally) during construction is likely to be **not significant**. As is the case for merlin, foraging birds may be temporarily displaced as a result of construction phase disturbance, but effects are likely to be very localised, and **not significant** at any geographical level.

Golden plover

6.333 The site is considered to be of importance for golden plover at the **Local** level. The site is beyond the breeding range for golden plover. Effects of habitat loss are likely to be **not significant** given the availability of suitable habitat locally. Disturbance effects on wintering and passage birds will be localised and short-term and, given the low-level use of the site recorded for this species, the local conservation status of these species is likely to be **not significant** at any geographical level.

Other Waders

6.334 The site is considered to be of importance for wintering and passage snipe and jack snipe at the **Site** level. Effects will be limited to habitat loss and localised and short-term disturbance of roosting birds. Habitat loss effects will be **not**

significant given the total area of similar habitat available locally. It is considered likely that a small number of birds will be disturbed during construction given the low-level use of the site recorded for both species. Disturbance effects are likely to be **not significant** at any geographical level.

Passerines

6.335 The breeding bird population is considered likely to be of interest at a **Site** level. The effect on breeding passerines will be the long-term loss of 11.7 ha of suitable breeding habitat from within the site. The direct effect of the loss of a small amount of ground-nesting habitat is assessed as being permanent and adverse, but of negligible significance when taken with the total area of available habitat locally. Indirect effects arising from direct disturbance of nesting birds adjacent to the Wind Farm infrastructure would also limited in extent and be temporary, especially given the low density of common ground nesting birds present on the site. The overall direct and indirect disturbance effects are assessed as adverse, but **not significant** at any geographical level.

Bats

6.336 The site is considered to be of importance for Nathusius' pipistrelle, common pipistrelle, soprano pipistrelle, noctule bat, Leisler's bat and serotine at the **Site** level.

6.337 The relatively low value of the habitats (as foraging habitat) and the limited extent of these habitats to be lost during Construction Phase works will not give rise to a significant effect on the bat community. The effect of habitat loss will therefore be neutral and will not impact on the local or favourable conservation status of any species. No significant nocturnal disturbance through lighting, noise or vibration is anticipated, and indirect effects on bats will be **not significant** at any geographical level.

Amphibians

6.338 The site is considered to be of interest at the **Site** level for amphibians.

6.339 Common species of amphibian were found at low density in aquatic habitats during the 2015 surveys and are likely to be present in low number in surrounding terrestrial habitat. The limited extent of effects on terrestrial habitat arising from Construction Phase Works makes it likely that any direct effects on amphibians would be temporary, adverse, but of **negligible significance**. No direct adverse effects are likely to occur on the ponds on the site or adjacent to the NRW Forestry track.

Reptiles

6.340 The site is of importance to reptiles at the level of the **Site**. In the absence of mitigation, the Construction Phase Works carry a risk of killing or injury of reptiles. The extent of habitat loss during the Construction Phase Works will be limited, and the majority of available habitat for reptiles within and adjacent to the site will be retained. General good practice measures will be implemented as prescribed in the CEMP to avoid killing or injury of reptiles during ground works within the site and localised upgrade works to the NRW Forestry Track. The significance of the effects on the population of reptiles at this stage is therefore likely to be **negligible**.

Water Vole

6.341 The site is considered to be of importance to water vole at the **County** level. Adverse effects to the water courses within the site will not occur (see Streams and Flushes section above). Measures to avoid indirect effects on watercourses arising as a result of pollution and sedimentation will be implemented as standard practice and further details are included in Chapter 3 and Chapter 13.

6.342 The Construction Phase works will result in minor loss of wet habitats within the site which may be used by water vole (4.3 % of marshy grassland / mosaic and >1 % of wet modified bog mapped within the site). The loss of habitat is considered adverse but is not likely to have a significant effect on the local water vole population on account of its limited extent, and likely low-level use of the site (based on the absence of any signs of presence in 2020). In addition, the infrastructure layout will avoid any direct impacts on watercourses, and the location of new tracks (near to an existing road) will not result in habitat fragmentation. However, works in these areas carry a low risk of killing or injury of water vole. Measures to avoid the risk of killing or injury will be implemented as part of the CEMP. Given the low risk of impacts and employment of standard practice avoidance measures, it is considered that direct adverse effects on water vole are likely to be **significant** at the level of the **Site**.

Operational Effects

Protected Sites and Habitats

6.343 Land take resulting from access tracks, turbine bases, areas of hard standing and ancillary structures will result in the permanent loss of approximately 11.7 ha hectares of habitat. This equates to approximately 0.3 % of the total land area within the site boundary.

6.344 Aside from loss of area due to land take, no additional effects are likely to occur on protected sites or habitats during Wind Farm operation. There is the potential

for hydrological effects to occur as a result of alterations to ground and surface water flows around the built infrastructure. However, the residual operational phase hydrological effects are considered to be Negligible or Minor (see Chapter 8 – Hydrology and Hydrogeology).

6.345 It is likely that the energy storage facility will be installed during the operational phase of the Wind Farm. However, this will be sited within the construction compound area and therefore no additional land-take will be required[39].

Birds

6.346 There are two ways in which birds can be affected by operational wind farms: through displacement due to ongoing disturbance caused by the machines (and by periodic servicing of them), and through collision with moving blades or associated infrastructure, e.g. the guy lines of meteorological masts.

6.347 A range of studies have concluded that most bird species are not significantly affected by operational wind farms (e.g. Vauk, 1990; Phillips, 1994; Percival, 2005, 2000 Devereux *et al* 2008; Winkelmann, 1994; Langston & Pullan, 2003; Hotker *et al*, 2006). This is reflected by SNH Guidance (2017) on birds and wind farms which does not, for example, normally recommend surveys for breeding passerines. SNH Guidance, which is the UK standard. indicates that effort should focus on species / species groups that are thought to be susceptible to the effects of wind farms or highly protected species on which effects remain unclear. In the context of the site, those species that are most susceptible are likely to be those that have a low tolerance to disturbance (such as golden plover; Pearce-Higgins *et al*, 2009), that breed on open moorland (such as merlin), and are susceptible to collision (such as red kite and kestrel; inferred from collision data presented by the Brandenburg Institute: Dürr,2020[40]).

Displacement

6.348 Survey work between April 2014 and March 2016 inclusive, and between April and August 2020 inclusive did not record any breeding raptors on the site. Potential disturbance effects will be limited to foraging birds.

6.349 There appear to be few if any studies of red kite displacement as a result of wind farms. In deriving an avoidance rate for red kite, Urquhart & Whitfield (2016) reference an unpublished report[41] that concluded any background change in post-construction potential for flight activity [as a result of displacement] would be unlikely at the study wind farm (Braes of Doune) due to the effect of an expanding

[39] Additional cables will pass directly from the energy storage facility to the adjacent substation
[40] https://lfu.brandenburg.de/cms/detail.php/bb1.c.312579.de (last updated January 2020)
[41] Fielding, A.H. & Urquhart, B. 2013. Modelling the potential impacts of wind farm mortality on the Central Scotland red kite Milvus milvus population. Unpublished report to the Braes of Doune Wind Farm Ornithology Steering Group.

population. In addition, baseline survey data to support repowering and extension of life schemes, such as that at Bryn Titli (Powys) indicate that flights regularly occur within 200 m of turbines, which therefore suggests that displacement effects are minimal. Authors such as Bellebaum *et al* (2013) have concluded that kites are not displaced based on finding corpses close to turbines in Germany. However, this may not be entirely representative of the situation on the site, as in the German study the turbines are in arable land and kites are more likely to forage in the habitat around the turbine bases than elsewhere.

6.350 It is concluded that very localised displacement of red kite may occur in the immediate vicinity of turbines, but the principal issue for assessment is potential for collision.

6.351 The VP survey work in 2014-16 and 2020 resulted in three flights of goshawk being recorded over the site. There is no breeding habitat for goshawk within the site, and the value of the site for goshawk has been assessed as of negligible importance for the species.

6.352 There are no breeding peregrine within the site, and the site is of little value to foraging birds (evidenced by the low level of recorded activity during the 2014-16 and 2020 work). The eyrie at Mynydd Ty-isaf is beyond the published minimum distance of disturbance for peregrine (FCS, 2006). It is therefore concluded that displacement of peregrine during operation of the Wind Farm is unlikely to occur.

6.353 There is limited breeding habitat for kestrel within the site, and breeding was not recorded during the 2014-16 or 2020 work. Given this, displacement of breeding birds is unlikely to occur. Kestrel do use the site for foraging (albeit irregularly); however, they are known to continue foraging activity close to turbines, showing low levels of turbine avoidance (Pearce-Higgins *et al,* 2009).

6.354 Golden plover do not breed on the site, and use of the site during passage and winter months is irregular involving low numbers of birds. Hotker *et al* (2006) reported that of 22 operational wind farm sites for which monitoring of wintering golden plover was conducted, six sites showed a minimum disturbance (displacement) distance of 50 m, nine of 150 m, four of 250 m, two of 350 m and one 850 m. The latter result appears likely to reflect localised circumstances (such as a lack of alternative habitat closer to the site), as it is exceptional. McLoughlin *et al* (2012) conducted post construction monitoring at Out Newton Wind Farm, in the East Riding of Yorkshire. This study, which recorded considerable baseline use of the area by plovers pre-construction, did not suggest that birds were displaced, as slightly elevated use of the airspace close to the turbines was recorded after construction.

6.355 Recent studies by BSG Ecology[42] at a wind farm in East Yorkshire have recorded golden plover in winter flocks foraging close to the base of an operational wind turbine, suggesting that golden plovers are tolerant of turbines outside of the breeding season.

6.356 Taking a worst-case scenario, if golden plovers are displaced from the turbine locations, based on their frequency of use of the site and the maximum flock size recorded, the effect is likely to be negligible.

6.357 Snipe and jack snipe do not breed on the site. Studies indicating disturbance and displacement of snipe at wind farms have focussed on breeding birds (e.g. Pearce-Higgins *et al*, 2009). As with golden plover, displacement of birds (if construction phase work is carried out during the winter period) is likely to result in a minor and temporary adverse effect that is unlikely to be significant.

6.358 It follows that displacement effects during operation of the Wind Farm on any raptor or wader species at any geographical level are **not significant**.

Collision

6.359 The level of collision will depend on the extent to which birds are displaced, and their ability to detect and manoeuvre around rotating turbine blades. Birds that collide with blades are likely to be killed or fatally injured.

6.360 NRW and other nature conservation consultees recommend that collision risk of birds at wind farms is calculated using the model developed by Bill Band of SNH (in de Lucas *et al*, 2007). The extent to which outcomes of modelling reflect observed mortality rates has always been questionable, and the subject of academic debate (Chamberlain *et al*., 2005; Chamberlain *et al*, 2006; Madders & Whitfield, 2006; Drewitt & Langston, 2006; Fernley, Lowther & Whitfield (2006)). The main limitations of the model are that pre-construction use of the airspace above a site by birds is assumed to be representative of the use of the airspace following wind farm construction, and that the rate of avoidance applied to the output of the model is often arbitrary. Where empirical estimates of avoidance can be applied, the model becomes a far more useful tool.

6.361 Red kite, kestrel, peregrine, goshawk, merlin and golden plover were recorded flying at collision risk height within 250 m of the Turbine Array. SNH accepts avoidance rates of 98 % can be applied when modelling collision risk for red kite, peregrine. For kestrel, the accepted avoidance rate is 95 % to reflect the increased susceptibility to collision due to the species' flight behaviour (including hovering) (Urquhart, 2010)[43].

[42] http://www.bsg-ecology.com/golden-plover-operational-wind-farm/
[43] An avoidance rate of 99 % is accepted for hen harrier, and 98 % for merlin, and goshawk; although insufficient 'at risk' flight data was generated for these species to complete a meaningful analysis with regard to the site.

6.362 The approach that has therefore been taken has been to look at empirical data for avoidance or typical flight characteristics that may have a bearing on likelihood of collision in each species seen, while also considering modelled collision risk where data have been collected that allow calculations to be made.

6.363 Various published studies have concluded that collisions are rare events, often occurring in situations where there are large numbers of birds (such as on narrow-front migratory flyways), or where the behaviour of birds leads to high risk situations (such as where wind turbines are located on the shortest route between a breeding colony and a foraging area) (e.g. Langston & Pullan, 2003 ; Drewitt & Langston, 2006 ; Hotker *et al.*, 2006). Any source of additional mortality may be significant for long-lived species with low productivity and slow maturation rates, especially if these species are relatively rare or in decline. Assessment of collision risk therefore concentrates on these species, as relevant to the site.

6.364 Knowledge of the susceptibility of bird species to collision with wind turbines has taken many years to emerge. Before empirical data were available, it was assumed that species with a high wing loading and low manoeuvrability in flight were likely to be most susceptible to collision with turbine blades. However, as data have emerged it has become clear that this initial assessment was too simplistic.

6.365 Table 6.12 below provides a summary of current knowledge of the UK and European population sizes and the known collisions of red kite, kestrel, peregrine and golden plover. It is based on mortality data collated by Dürr (2020), with context provided by European bird population estimates from Birdlife International (2004) and Mebs & Schmidt (2006) and UK population estimates by Musgrove *et al* (2013).

Table 6.12 Known collisions of birds with Wind Turbines in Europe (in the context of populations).

Species	Known collisions in Europe to date (UK component in brackets where relevant)	UK population estimate		European population estimate	
		Breeding	Winter	Breeding	Winter
Red kite	605 (5)	2,800 pairs	N/D*	25-33,000 pairs	N/D
Kestrel	598	46,000 pairs	N/D	300,000-440,000	N/D
Peregrine	31 (1)	1,500 pairs	N/D	100,000-499,999	N/D
Goshawk	16	280–420 pairs	N/D	166,000-220,000	N/D
Merlin	4	900-1,500 pairs	N/D	32,000-51,600	N/D

Golden plover	42	38,000–59,000 pairs	420,000	1300,000-1750,000	N/D

*N/D = Data not available

6.366 Robust monitoring of bird mortality at wind farms is uncommon, and collisions may be under recorded. There will also be biases in the data, as wind farms in some parts of Europe are more frequently and effectively monitored than others, and bird species show differences in abundance across their range which may influence their likelihood of encountering wind farms. Many collisions of raptors have occurred around migratory bottlenecks, particularly Southern Spain where wind farms are located close to the Strait of Gibraltar, and some individual wind farms account for a disproportionately large proportion of total collisions.

6.367 Despite these shortcomings and biases, however, the data collated by Dürr on behalf of the Brandenburg Institute indicate that some species and species groups appear more susceptible to collision than others. There is very little evidence, for example, of collision of swans or geese, and in the context of populations, the number of collisions of wader species such as golden plover and snipe is very small. For some raptor species collisions are clearly higher in the context of populations.

Red kite

6.368 Data collated by Dürr (2020) indicate there have been 605 collisions of red kites with wind turbines recorded in Europe to date (latest update 07 January 2020). Of these, 532 have been in Germany, 1 in Denmark, 30 in Spain, 19 in France, 5 in Great Britain and 12 in Sweden. Other sources suggest that at least 7 collisions of red kites have now occurred in Great Britain (Duffy & Urquhart, 2014), with three at the Braes of Doune Wind Farm (Stirlingshire), one at Fairburn Wind Farm in Ross-shire, one at Llandinam Wind Farm (Powys) a collision near a feeding station at Bwlch Nant-yr-Arian (Aberystwyth, Ceredigion) and one reported from Craig Cefn Parc (Swansea)[44].

6.369 At the Braes of Doune Wind Farm, post construction monitoring has included the radio tracking of red kites, in combination with regular surveys of the area and corpse searches informed by scavenger removal and searcher efficiency studies. Three collisions of kites have been recorded in 4.5 years, which is less than the estimated number of collisions predicted through modelling to support the planning application for the site (albeit not all corpses may have necessarily been detected). The other UK collisions were not recorded as part of structured post construction monitoring work.

[44] Online information suggests that this collision has been incorrectly attributed to the Swansea area, and in fact refers to a collision that occurred in Powys in 2003. There is a wind farm above Craig Cefn Parc (Mynydd y Betws), but this only became operational in 2013.

6.370 The population of red kite in Germany is between six and nine times larger than that of the UK based on Birdlife International (2004) data and more recent UK population estimates (Musgrove *et al*, 2013).

6.371 Uncultivated land around turbines in arable areas has been linked to mortality in Germany, i.e. the areas that cannot be ploughed become far richer in terms of small mammal prey than surrounding arable land, and kites therefore preferentially forage close to turbines (putting themselves at risk of collision). Red kites in northern Europe also have a far greater tendency to migrate, with many birds moving to the Iberian Peninsula in winter, whereas UK birds tend to be relatively sedentary. It is possible that birds moving through unfamiliar landscapes are more susceptible to collision mortality than their UK counterparts. The Braes of Doune work is therefore considered to be more applicable to the site than statistics from continental Europe until further research is completed.

6.372 A total of 80 red kite flights were recorded through the turbine locations (and a 'buffer' area of 250 m around them) at collision risk height during the 2014-16 work. Modelling has resulted in a predicted rate of collision of 0.31 kites per year (on the basis of 98 % avoidance. Details are presented in Appendix 6.4).

6.373 During the breeding season 2020, a total of 10 red kite were recorded through the turbine locations (and a 'buffer' area of 250 m around them) at collision risk height. Modelling on the 2020 data has resulted in a predicted rate of collision of 0.27 kites per year (on the basis of 98 % avoidance. Details are presented in Appendix 6.4).

6.374 Survey work completed on extension of life schemes by BSG Ecology (for example, BSG 2017) has resulted in observations of frequent avoidance behaviour by red kite within the airspace over existing wind farms. Birds were typically seen to adjust their course to avoid the rotor swept area of a turbine and, occasionally, were observed to fly into areas of turbulence created by the rotors and remain there for a few seconds before proceeding on their flight path. No kites were observed to collide with turbines during survey work over the course of a year. This, together with the low number (5) of reported collisions in the UK, suggests that the actual avoidance rate for red kite is likely to be higher than the published rate of 98 %.

6.375 Notwithstanding this, the collision rate of 0.31 kites per annum (based on 2014-16 data) and 0.27 kites per annum (based on 2020 data), as predicted by the model, equates to the loss of approximately 1 bird every three years. Should the predicted collisions affect young (first winter / sub adult) birds the effect on the population is likely to be imperceptible, as rates of overwinter survival for first year birds are likely to be low. If adult / birds of breeding age were killed, this would potentially open up an opportunity for the recruitment of sub adults into the local population to replace them (which is likely given the expanding regional population). Adverse

effects on red kite arising as a result of collision are considered to be **not significant** at any geographical level.

Kestrel

6.376 Of a total of 598 officially documented collisions in Europe, none are from the UK. Large proportions of the total collisions across Europe were reported from Germany (135 collisions) and Spain (273 collisions) (Dürr, 2020). Thirty-six of the collisions in Spain have been recorded at the Park Pesur, Gibraltar, and are likely to include migrating birds.

6.377 A review of data by Whitfield and Madders (2006) suggest that kestrel appear to be relatively vulnerable to collision strikes. This observation was based on collision fatality data collected at 13 wind farms in northern Spain by Lekuona & Ursúa (2006). During the two-year study, a total of 457 observations of kestrel were made, and 12 birds were found dead as a result of collision.

6.378 Martin (2017) notes that some collision-prone species (including species of crane, bustard, vulture and eagle) have frontal binocular fields that are of restricted vertical extent and include extensive blind areas above and below them. In these birds a relatively small change in the pitch of the head brings this blind area forwards in the direction of travel. The aforementioned species typically spend time looking downwards for habitats in which to forage or roost or for prey / carrion. This is likely to make them susceptible to collision. It is possible, given the manner in which kestrel forage, that this is also a reason why relatively large numbers of collision victims have been recorded in that species in Europe.

6.379 Survey work in 2014-16 recorded 25 kestrel flights that passed through the turbine locations and a 'buffer' area of 250 m around them at collision risk height. In 2020, three flights were recorded at collision risk height within 250 m of turbine locations. Modelling of the 2014-16 data has resulted in a predicted rate of collision of 0.28 kestrel per year or 1 bird every 3 years (on the basis of 95 % avoidance). Insufficient flight activity within 250 m of turbine locations was recorded for kestrel in 2020 to complete a meaningful analysis, and therefore, collision risk based on 2020 data has not been modelled. Details are presented in Appendix 6.4.

6.380 As with kite, the risk of collision may be weighted towards newly fledged, inexperienced birds. If this were to be the case, then impacts on the local population would be imperceptible due to likely low winter survival rates. However, the local population status is unclear and therefore, the loss of adult birds from the population would be significant, particularly given reported regional declines (Balmer *et al*, 2017) and red conservation status in Wales (Johnstone *et al*, 2010).

6.381 The East Glamorgan Bird Atlas[45] indicates that breeding season records of kestrel occurred in 159 tetrads within the recording area between 2008 and 2011. Of these, breeding was likely to have occurred in 101 tetrads. Given this, the productivity at the County level would be likely to exceed the loss of breeding adults as a result of collision (even if, in the worst case scenario, the risk of collision was weighted towards breeding adults).

6.382 Considering the model prediction, collisions of kestrel over the life of the 35-year Wind Farm are likely and effects are considered to be **significant** at the **Local** level. This conclusion is precautionary; in the event that juvenile or first winter birds were killed, the potential for a discernible impact on the population at any geographical level would be minimal.

Peregrine

6.383 Dürr (2020) reports 28 collisions in Europe for peregrine, one of which is from the UK (at Burgar Hill, Scotland). The majority of reported collisions are from Germany (19 collisions), with six reported from Spain, three from Belgium, one from Austria and one from Netherlands.

6.384 Five flights of peregrine were recorded through the turbine locations (and a 'buffer' area of 250 m around them) at collision risk height. No flights at collision risk height were recorded during the 2020 survey work. The model (based on 2014-16 data) predicts a rate of collision of 0.017 peregrine per year (on the basis of 98 % avoidance), or 1 collision every 55 years.

6.385 Given the model prediction, the likelihood of collision of peregrine over the term of the Wind Farm is negligible and **not significant** at any geographical level.

Goshawk

6.386 Data collated by Dürr (2020) indicate there have been 16 collisions of goshawk with wind turbines recorded in Europe. Of these, nine were reported from Germany, and four from Spain; none have occurred in the UK.

6.387 Two flights of goshawk were recorded within 250 m of turbine locations at collision risk height during the 2020 survey work. No flights were observed within the collision risk zone during the 2014-16 survey work. Given the very low number of flights recorded for this species, the collision risk data is unlikely to be robust, and therefore, modelling has not been undertaken for goshawk.

6.388 It is reasonable to conclude that the likelihood of collision of goshawk over the term of the Wind Farm is negligible and **not significant** at any geographical level.

[45] http://www.eastglamorganbirdatlas.org.uk

Merlin

6.389 Dürr (2020) reports four collisions in Europe for merlin: two of which are from Germany, one from Spain and one from Norway.

6.390 One flight of merlin was recorded within 250 m of turbines at collision risk height during the 2020 survey work. No flights were observed within the collision risk zone during the 2014-16 survey work. Collision risk modelling has, therefore, not been undertaken as it would be unlikely to provide a meaningful result.

6.391 Given the very low level use of the airspace within the collision risk zone by merlin, it can be concluded that the likelihood of collision over the term of the Wind Farm is negligible and **not significant** at any geographical level.

Golden Plover

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

6.393 A total of 189 flights by golden plover were made through the turbine locations and a 250 m buffer area around them. No flights at collision risk height were recorded during the 2020 survey work. Modelling has predicted a collision rate of 0.24 birds per annum (based on 2014-16 data and applying the default 98 % avoidance rate). However, collision risk modelling, which either assumes a random flight path is taken by (typically) a single bird (such as an eagle or a kite) or a predictable flight path is taken by flocks of birds (such as geese or swans), is not suitable for flocking species that undertake non-directional, wheeling flights, such as golden plover. SNH reportedly accept the limitations of their model, and it is not always used for modelling likely effects on the basis that there is little faith in the outputs.

6.394 Given the unexceptional nature of the habitats on the site (in relation to those available in the wider area), the low level of use recorded, and the very low levels of fatality recorded in Europe to date, it is considered that the calculated collision risk for the site is an over-estimate of the likely scenario. Studies by Whitfield (2007) concluded that the American golden plover *Pluvialis dominica* was able to take avoidance action in more than 99% of potential collision events. Given the close relationship (in both phylogeny and behaviour) between the two species, it is reasonable to assume that a 99% avoidance rate can also be applied to European golden plover, resulting in a calculated collision rate at Upper Ogmore of one bird every 7 years. It is likely, given the exceptionally low mortality rate recorded by Dürr (2020), that the predicted number of collisions is an overestimate. Notwithstanding this, the risk of collision is considered unlikely to result in a significant impact on the local population, and effects will be indiscernible over

the life of the Wind Farm. It is considered that collision effects on non-breeding golden plover will be adverse but **not significant** at any geographical level.

Bats

Vulnerability to collision

6.395 The potential risk to bats colliding with operating wind turbines has been assessed using professional judgement with reference to the methods described by SNH *et al*. (2019) and outlined in the Assessment Methodology section of this chapter.

6.396 A study undertaken by the University of Exeter on behalf of Defra (Mathews *et al*., 2016) indicated the mortality rate of bats at wind turbines in the UK ranged from 0 to 5.25 bats per turbine per month across 46 sites sampled over a three year period.

6.397 The study indicated that bat casualty rates are highly variable and cannot be simply correlated with activity levels (Mathews *et al*., 2016). I.e. higher levels of baseline activity do not necessarily result in a higher risk to bats. Notwithstanding this, the Defra study indicated that the UK bats which were most likely to be killed at wind farm sites were common and soprano pipistrelle and noctule bats.

6.398 Table 6.13 below provides a summary of current knowledge of the UK population sizes[46] and the known collisions of Nathusius' pipistrelle, common pipistrelle, soprano pipistrelle, noctule, Leisler's bat and serotine. It is based on mortality data collated by Dürr (2019), with context provided by Matthews *et al*., (2018).

Table 6.13 Known collisions of birds with Wind Turbines in Europe (in the context of populations).

Species	Known collisions in Europe to date (UK component in brackets)	UK population estimate
Nathusius' pipistrelle	1538 (1)	16,000[+]
Common pipistrelle	2362 (46)	3,040,000
Soprano pipistrelle	439 (52)	4,670,000
Noctule	1538 (11)	656,900 (exc. Scotland)
Leisler's bat	711 (0)	10,000[I]
Serotine	611 (0)	136,000

*N/D = Data not available

[+]Estimated by BCT (2017).

[I]Taken from Harris *et al.* (1995) and graded as poor reliability by the authors.

[46] There are no currently published reliable estimates of population sizes in Europe.

Nathusius' Pipistrelle

6.399 Mathews *et al*, (2018) indicates that there is insufficient basis to form a reliable population estimate of Nathusius' pipistrelle in the UK. However, BCT (2017) suggest a UK population of 16,000 bats. The UK is likely to be at the edge of the species' range, with strongholds in central Europe (Dietz *et al*., 2009) and this is reflected in the collision data reported by Dürr (2019) for the UK and Europe respectively. The IUCN Red List status for Nathusius' pipistrelle is Least Concern (Paunović & Juste, 2016).

6.400 The likelihood of collision of Nathusius' pipistrelle is increased due to the tendency of the species to commute over open habitats. Nathusius' pipistrelle is, therefore, at high risk of collision with wind turbines and that populations of this species have a high likelihood of being threatened by collision events.

6.401 However, the level of activity recorded within the site is "low" for Nathusius' pipistrelle. One confirmed pass of this species was recorded in a total of 1061.5 hours of survey time during the 2015, 2016 and 2018 work, and a further 2107 hours of survey time during 2019. This equates to an overall average encounter rate of 0.0003 B/h, and falls below the 20th percentile of bat activity data collected by BSG Ecology at 52 other sites across England, Wales and Scotland (20th percentile = 0.001 B/h. see Table 6.6). The overall risk assessment for Nathusius' pipistrelle is therefore Low in accordance with the matrix presented in Table 6.7.

6.402 It is reasonable to conclude, given the very low recorded use of the site by Nathusius' pipistrelle, that collision events are unlikely to occur (despite a high risk of collision at the individual level), and the proposed Development is unlikely to have any discernible impact on the population at any geographic level. The risks to Nathusius' pipistrelle are, therefore, considered to be **not significant**

Common and Soprano Pipistrelle

6.403 Dürr (2019) reports 2362 collisions of common pipistrelle and 439 collisions of soprano pipistrelle in Europe, with 46 and 52 collisions respectively reported in the UK.

6.404 Both common and soprano pipistrelle bats are considered common at the local, county and national level (Wray *et al*, 2010). In addition, they are known to favour foraging in edge habitat (Natural England, 2014); therefore there is a low likelihood that individuals of these bat species will collide with the turbines at Upper Ogmore at a level which would adversely affect the favourable conservation status of the local population. Presence of woodland within 1.5 km of wind farms has been found to reduce risk to pipistrelle bats (Mathews *et al*, 2016). In this case, there are areas of woodland adjacent to the western and eastern boundaries of the site and within 240 m to the north of the site.

6.405 The level of activity recorded within the site is "low" for both species based on 2019 survey data (0.3 B/h for common pipistrelle and <0.1 B/h for soprano pipistrelle) in comparison to bat activity data collected by BSG Ecology at 52 other sites across England, Wales and Scotland[47] (median = 4.1 B/h for common pipistrelle and 0.8 B/h for soprano pipistrelle. See Table 6.6). The overall risk assessment for both species is therefore Low in accordance with the matrix presented in Table 6.7.

6.406 Given that the favourable conservation status of common and soprano pipistrelle bats using the site will be maintained, the risks to these species are considered to be **not significant**.

Noctule, Leisler's bat and Serotine

6.407 Dürr (2019) reported 1538 collisions of noctule in Europe, including 11 in the UK[48]. This is the third highest number of collisions for a species reported by Dürr (following common and Nathusius' pipistrelle with 2362 and 1564 reported collisions respectively). Comparatively few collisions of Leisler's bat and serotine have been reported in Europe (with no records for the UK). However, this is likely to be reflective of relatively lower populations (based on the UK estimates (in the absence of European population estimates) provided in Table 6.13)

6.408 The level of activity recorded within the site is "low" for noctule, Leisler's bat and serotine based on 2019 survey data (noctule = 0.005 B/h; Leisler's bat = 0.0009 B/h; serotine = 0.001 B/h) in comparison to other bat activity data collected by BSG Ecology at 52 other sites across England, Wales and Scotland (20th percentile = 0.06 B/h (noctule), 0.003 B/h (Leisler's bat); and 0.002 B/h (serotine) respectively. See Table 6.6). None of these species were recorded over the site during the survey work in 2015, 2016 and 2018.

6.409 The overall risk assessment for noctule, Leisler's bat and serotine is therefore Low in accordance with the matrix presented in Table 6.7, and the risks to these species are considered to be **not significant**.

Other Species

6.410 It is not anticipated that further adverse effects on amphibians, reptiles or water vole will occur during operation of the Wind Farm. Operational phase hydrological effects are considered to be Negligible or Minor (see Chapter 8 – Hydrology and Hydrogeology) and no further land take will occur.

[47] Based on this activity rate falling into the lower fifth of activity rates (split by 20th percentile) from results from similar surveys carried out by BSG at 52 locations in England, Wales and Scotland where these species were recorded.
[48] The date and location(s) of the UK collisions are not provided.

6.411 For amphibians and water vole, operational phase effects will be **neutral**. The creation of access tracks and associated drainage features may provide basking and sheltering opportunities for reptiles. This could constitute a **minor**, **beneficial effect**.

Decommissioning Effects

6.412 The effects of decommissioning have the potential to be similar to those during construction phase but are likely to occur over a shorter time period.

6.413 In the absence of any significant residual hydrological effects (see Chapter 8 – Hydrology and Hydrogeology) there are unlikely to be any effects on protected sites, or habitats that are present within the site at the time of decommission. Habitats lost during the construction phase will be allowed to regenerate to a condition representative of the baseline (such as the area of wet modified bog) due to the floating track construction that will be removable in its entirety. Turbine foundations may be left in situ but will be buried with top-soil to allow colonisation of species present within the surrounding sward.

6.414 Species most likely to be disturbed and displaced from the site during decommissioning are those that breed, roost or forage within it at that time.

6.415 It is reasonable to expect that there will be changes in legislation concerning protected species, as well as changes in local populations and distribution over the operational life of the Wind Farm. These may be driven by climatic change, landscape-scale land management, increased effectiveness / policing of protection, changes in the attitude of land managers to birds, the spread of reintroduced populations, changes on the wintering and staging grounds of migrant species and other factors.

6.416 Predictions are not therefore possible, with any confidence, over a 35-year period (particularly given the rate of change in number and distribution of many protected species over the past 35 years). It follows that effects on birds, bats, reptiles, amphibians and water vole would be best addressed through a decommissioning phase Environmental Management Plan.

Mitigation

6.417 Measures to avoid or minimise the severity of impacts on ecological features and that are not already designed into the CDMS (as set out in Chapter 3: Proposed Development), are set out in this section. Also set out are other measures to ensure compliance with wildlife legislation in the case of protected species.

6.418 Full mitigation measures will be set out in an Ecological Management Plan, as referenced in Chapter 13. This will detail all measures to avoid killing or injury to protected species, and habitat protection methods.

Ecological Management Plan

6.419 Documentation will be produced that sets out the initial broad objectives for mitigation, monitoring, and ecological protection. This can be incorporated into the CEMP for the proposed Development, or as a standalone Ecological Management Plan (EMP). The EMP will include a Water Vole Conservation Strategy (WVCS) which will detail the construction phase working methods to be implemented to avoid killing or injury of water vole, as well as protection and management of habitats that may be used by water vole.

6.420 In addition to the requirements of the WVCS, the EMP should set out a framework for more general ecological measures throughout the lifetime of the Wind Farm, including any pre-work measures that are required. The EMP and WVCS will be submitted to Statutory Consultees for review prior to the commencement of construction.

6.421 Key aims of the Ecological Management Plan should be agreed with Statutory Consultees and are expected to include:

- Identification of broad objectives of the Ecological Management Plan;
- Appointment of an ecologist to monitor the project and ensure compliance with all relevant regulatory and other requirements, method statements and plans, and to report to the principal contractor and statutory consultees;
- Detailed methods for all species and habitat protection including aftercare and including timescales for each element;
- Detailed methods for all habitat re-instatement measures include detailed timescales for each element;
- An agreed programme of monitoring and / or identification of practical options for input into local initiatives. This should be drawn up in consultation with statutory consultees; and
- The identification of appropriate ecological awareness training for site staff and contractors in respect of the presence of protected and sensitive species and the importance of species mitigation measures.

6.422 An outline of specific methods to mitigate impacts on habitats and protected species is provided below.

Habitats

6.423 Measures for topsoil and peat removal, storage and replacement are set out in Chapter 8 – Hydrology. Common land de-registered as a result of land-take during construction of the Wind Farm will be replaced through a land swap agreement. The replacement land is within the site boundary (see Figure 12.2), and primarily comprises semi-improved grassland with areas of improved grassland, marshy

grassland and flush habitats. It is considered likely that the replacement land would develop into an acid and marshy grassland mosaic, reflective of the common land lost to the development, when taken out of active agricultural improvement.

6.424 The potential for on-site habitat enhancement is very limited, and any enhancement measures are unlikely to provide biodiversity resilience in the long term (due to the isolated nature of the Site). Off-site habitat enhancement will be delivered through contributions to local initiatives. The availability of suitable local habitat restoration and management initiatives has been confirmed with the BCBC Ecologist, Robert Jones (pers. comm. 03 February 2020). The allocation of contributions will be agreed with NRW and BCBC, and secured prior to commencement of construction works.

Birds

6.425 For any elements of the work that cannot be completed outside the breeding season, construction phase surveys for active nests ahead of ground works will take place.

6.426 If breeding birds are found within the development footprint, work in the affected area will be re-scheduled until after the young birds have successfully fledged (or breeding has failed).

6.427 It may be possible to clear areas for subsequent development ahead of the breeding season, and keep these areas cut short to prevent birds from nesting. Maintenance of the sward in these areas would have to be regular and informed by checks by an ecological clerk of works.

6.428 Impacts on kestrel can be mitigated through contributions to local initiatives focussed on management of moorland habitats (as suggested in para. 6.407). Improvement of off-site foraging resources will aim to improve reproductive success and allow expansion of local populations.

Bats

6.429 The overall risk to all species of bat recorded at Upper Ogmore has been assessed as being "Low" in accordance with assessment methods outlined in SNH *et al.*, (2019). It is therefore not considered necessary to provide a curtailment regime during operation of the proposed Development.

6.430 SNH *et al.* (2019) further indicates that post-construction monitoring is "*normally only required where the mitigation involves curtailment*". Therefore, post-construction casualty searches are not considered necessary at Upper Ogmore.

6.431 However, SNH *et al.* (2019) guidance recommends that, wherever it is practically possible, turbine blades are pitched out of the wind (feathered) to reduce their rotation speeds below 2 rpm when idling. This is only applied when the turbines

are not generating a commercial output, and may reduce fatality rates by up to 50 % (SNH *et al.*, 2019). The feathering of blades when idling is also a mitigation measure proposed in the Action Plan for the Conservation of All Bat Species in the European Union 2018-2024 (Barova & Streit, 2018). Therefore, it is proposed that the turbines at Upper Ogmore will be feathered when not generating a useable output.

Reptiles and Amphibians

6.432 All vegetation within the footprint of the proposed Development should be managed prior to commencement of the construction phase. All vegetation within the footprint of the Wind Farm infrastructure will be reduced to ground level over a two-stage cutting regime to allow reptiles and amphibians to disperse from the construction area. These areas will be checked by an ecologist prior to ground works taking place. Vegetation in these areas will not be allowed to re-grow once reduced down to ground and cutting should be carried out regularly as required throughout the construction period.

Water vole

6.433 The proposed Development has been designed to avoid effects on watercourses within the site (see Chapter 3: Proposed Development and Chapter 8 - Hydrology). However, other wet habitats within the site (such as marshy grassland and wet modified bog) may be used by water vole. Measures to avoid indirect effects (such as pollution or sedimentation of wet habitats and killing or injury of water vole) will be set out in the WVCS and implemented through the project CEMP. Thorough checks of areas of wet habitats within the footprint of the proposed Development will be completed immediately prior to vegetation management (as detailed above) to ensure absence of water vole. Vegetation management will prevent water vole colonising the construction footprint for the duration of the works. These measures will avoid killing or injury of water vole during construction.

Other protected species

6.434 Although no impact on badgers is predicted, and no setts have been located, it is possible that badgers could move on to the site and create a sett that would have to be taken account of appropriately prior to work starting. During the construction phase, checks should be made by ecologists while on the site for any evidence of badgers using the site more frequently. If a sett is located at any time then its implications for development should be assessed at that point and an appropriate mitigation identified and documented. NRW and the LPA will be informed of how this was dealt with and consulted when necessary if the situation is considered complicated.

Cumulative Effects

Guidance

6.435 SNH (2012) guidance states that a cumulative ornithological assessment should assess the effects of the proposal in combination with:

- existing development, either built or under construction;
- approved development, awaiting implementation; and,
- proposals awaiting determination within the planning process with design information in the public domain.

6.436 Cumulative effects are most likely to result with regard to those receptors for which a significant residual effect is predicted, particularly if the core range of these receptors includes other planned, consented or built development. Based on the baseline data collected in relation to the scheme, there are no ornithological receptors that occur regularly on or in the airspace over the site that would be expected to range beyond 10km from it. This distance has therefore been taken as a reasonable distance over which cumulative effects should be considered.

Wind farm Developments Considered

6.437 There are nine consented or operational wind farms within 10 km of the site for which information has been sought. These are presented in table 6.14 (below).

Table 6.14 Wind farm developments considered as part of cumulative assessment.

Wind Farm	Easting	Northing	Distance (km)[49]	Status
Llynfi Afan	290057	195043	1.6	Operational
Pant y Wal Extension	294934	191615	4.5	Operational
Pant y Wal / Fforch Nest	296123	190975	5.8	Operational
Abergorki	295989	199006	6.1	Consented
Pen y Cymoedd	289656	200850	6.5	Operational
Maerdy	295548	200072	6.7	Operational
Ferndale	298901	196403	7.5	Operational
Ffynnon Oer	284567	198831	8.2	Operational
Mynydd Bwllfa	295411	201989	8.2	Operational
Melin Court	284952	200550	8.9	Consented[50]

[49] Distances are taken from centre point of the Wind Farm to the centre point of each scheme considered in the assessment.
[50] An amendment to increase the height of the turbines (from 145 m to 149.9 m) has been submitted)

6.438 The twelve turbine Llynfi Afan Renewable Energy Park is characterised by a mosaic of acid, improved and species poor semi-improved upland grasslands. Other habitats, including marshy grassland (which is the most frequent), scree, dense scrub and bog occur more locally.

6.439 While a variety of protected and scarce bird species were noted using the site / the airspace above it, no significant adverse ornithological effects were predicted in the ES for the site[51]. Wider ecological impacts were assessed as being slight (adverse) with regard to two SINCs, reptiles, amphibians and a variety of representative habitats during construction, and on bats and marshy grassland during operation. A commitment was made to a Habitat Management Plan aimed at the restoration and management of semi-natural moorland and woodland habitats in the area and to a commuted sum to a community scheme with similar aims, and to monitoring of locally-breeding raptors in the ES.

6.440 The twenty-one turbine Pant y Wal wind farm (which incorporates the Fforch Nest wind farm) and the twelve turbine Pant y Wal Extension site are located in upland moorland (open and rushy pasture) to the east of the Ogmore Valley. The Non-Technical summary for the Pant y Wal Extension (WYG, 2014) noted that residual impacts of the site were not considered significant, as the design had sought to avoid loss of sensitive habitats (such as bog and watercourses) and mitigation and habitat management was proposed to minimise effects on otter, goshawk and reptiles. The Pant y Wal site is subject to a Landscape and Ecological Management Plan, while it is understood from planning information[52] contained on the BCBC website that it was recommended that consent of the Extension was also subject to conditions relating to a Construction Environmental Management Plan and a Habitat Management Plan.

6.441 The consented three turbine Abergorki wind farm, will essentially form an extension to the operational Pen y Cymoedd and Maerdy wind farms (detailed below). The Non-Technical Summary of the Environmental Statement for the site (LUC, 2013) identified that impacts on blanket bog and valley mire habitats had been minimised through avoidance, and collision of bats and peregrine falcon (the only bird species to generate a collision risk) would not result in significant effects. A habitat management plan to restore bog and dry heath habitats was proposed; it is expected that this has been conditioned.

6.442 Pen y Cymoedd is the largest onshore wind farm in Wales (76 turbines) and became fully operational in Spring 2017. It is located in upland conifer plantation across two local authority areas, Neath Port Talbot and Rhondda Cynon Taf.

[51] Effects on kestrel were not considered the ES.
[52] https://democratic.bridgend.gov.uk/documents/s4013/4%20P%2014%20293%20FUL.pdf

6.443 The residual impacts of the Pen y Cymoedd wind farm were stated as being:

- The direct loss of 0.85 ha of bog and marshy grassland (along with 250 ha of plantation of which 55 ha was on peat), and indirect impacts (through drainage) on a further 172 ha of peat. However, it was noted that 200 ha of the area to be cleared would be allowed to regenerate as semi-natural habitat, and that up to 327 ha of bog and 50 ha of river corridor would be restored in connection with the development.
- Potential collision risk to birds and bats. This was assessed as being a slight risk, and unlikely to significantly impact local populations.

6.444 Habitat restoration, monitoring of impacts on bats (collision) and breeding birds (location and productivity of nests of honey buzzard and nightjar) were conditions of the Pen y Cymoedd planning consent.

6.445 Maerdy is an eight-turbine wind farm located in upland moorland adjacent to Pen y Cymoedd. It has been operational since 2013. There is very little information publically available in relation to the scheme, but key ecological issues are likely to have been impacts on typical upland habitats, raptors and bats.

6.446 Ffynnon Oer is a sixteen-turbine wind farm located in an open area of sheep-grazed, rushy moorland adjacent to the Pen y Cymoedd wind farm. It has been operational since 2006. Public domain information is not freely available (assumedly due to the age of the scheme); however, it is likely that the main ornithological and ecological considerations for the site will have been collision of birds (and potentially bats) during the operational phase of the scheme.

6.447 The consented five-turbine Melin Court wind farm would also be located on moorland adjacent to the Pen y Cymoedd wind farm. The non-technical summary for the site (Hyder Consulting, 2014) indicates that (following confirmation of these through scoping), the main considerations for the assessment were potential impacts on marshy grassland (including rhos pasture), bog, bats and a range of locally-occurring bird species (including honey buzzard, nightjar, red kite and kestrel). Commitments also included habitat enhancement to mitigate impacts on bats and some bird species and monitoring of honey buzzard. Further measures to mitigate the ecological impacts of the scheme were the subject of planning conditions. These included the production of a Construction Phase Environmental Management Plan (with various ecological requirements) and the employment an ecological clerk of works (ECoW) to ensure construction phase impacts were minimised.

6.448 The eight turbine Ferndale wind farm has been operational since 2011. It is located in upland moorland habitats. Limited information is publically available with regard to the scheme, but it is likely that collision of peregrine falcon and impacts

on bog, acid grassland and the local SINC network were key concerns for assessment.

6.449 Mynydd Bwllfa is a twelve-turbine scheme that has been operational since 2015. There is limited public domain information available with regard to the scheme, but neither the Countryside Council for Wales (now part of NRW) or RSPB Cymru objected to it, with the latter recommending appropriate conditions (such as a Habitat Management Plan) be conditions of consent. In addition, the Inspector found no compelling ecological or ornithological reasons for refusal of the scheme at planning appeal[53].

Assessment of Cumulative Effects

6.450 The review of wind farm impacts and measures to address these suggests that effects on habitats are largely offset on a site-by-site basis through habitat management and restoration initiatives and, where proportionate to impacts, consideration of funding of local landscape scale habitat restoration projects.

6.451 Cumulative impacts are therefore likely to be restricted to those species that range across a variety of sites.

6.452 A locally significant effect has been predicted for kestrel as a result of operation of the Wind Farm. Given that the schemes assessed for cumulative effects typically occupy similar habitats within the local landscape, it is likely that kestrel will range and disperse across them to some extent, and there is therefore the potential for a cumulative effect.

6.453 Impacts on kestrel have not been assessed in detail by these schemes (with the exception of Melin Court) due to the relatively recent change in status of this species in Wales.

6.454 The Melin Court Ornithological Impact Assessment suggested habitat creation and management within the respective application site to directly benefit kestrel and offset potential cumulative impacts in relation to the Ffynnon Oer wind farm.

6.455 Proposals for habitat management offered by other schemes, such as for Pen y Cymoedd, and financial input into local initiatives aimed at enhancing biodiversity as offered by Llynfi Afan may also benefit kestrel (albeit indirectly) in terms of the availability of foraging and breeding resources locally.

6.456 It follows that while it is possible that cumulative effects on kestrel are significant at a higher geographical level than 'Local' any effects may be partially offset by measures delivered by these schemes.

[53] http://pennantwalters.co.uk/assets/projects/4/pdfs/2011%20RCT%20Planning%20Officer's%20Reports.pdf

6.457 Given the very low levels of use of the site and the airspace above it by other bird species that have the potential to collide with or be displaced by wind farms, the limited foraging potential of the site, and typical ranging distances of these species, significant cumulative effects are unlikely to occur.

6.458 Bat survey resulted in very low levels of activity being recorded over the site; it follows that it would be logical to conclude that no significant effects on bats will occur from the construction and operation of the project. .

Residual Effects

6.459 The assessment of effects on each receptor has accounted for measures designed into the Development and those that will be committed to in the project CEMP. Residual effects for all receptors described, with the exception of kestrel, are unlikely to be significant at more than the **Site** level.

6.460 For kestrel, effects are currently assessed as being of significance at the **Local** to **District** level, with the latter area referring to the wider area in which turbines are located. A proposed contribution to local initiatives focussed on management of moorland habitats will aim to mitigate impacts to the local population during operation of the Wind Farm. Providing enhanced resources locally will enable greater resilience in the population should a collision event occur.

6.461 The proposed Development has been designed to avoid direct impacts on watercourses, and thorough checks of areas of wet habitats within the footprint of the proposed Development will be completed to avoid the risk of killing or injuring water vole. Residual effects are considered to be **not significant**.

6.462 This assessment has fully considered the principles of and guidance provided by Planning Policy Wales 10, TAN 5, the Environment (Wales) Act, the Bridgend LDP, Strategic Policy 4 and associated Policies ENV4, 5 and 6. In particular, consideration has been given to international responsibilities and the protection of designated sites. From an ornithological and ecological perspective, the scheme is compatible with all relevant recommendations of these policy documents.

Summary

6.463 Table 6.8 (below) summarises the residual effects of the proposed Development

Table 6.15: Summary of Residual Effects

Receptor		Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Non-Statutory Sites (SINCs)	NPT Watercourses	Negligible	None (more than already already designed into the CDMS)	Commitment to CDMS	Negligible
Habitats	Acid and marshy grassland mosaic	Habitat loss at construction phase. Site significance	Habitat protection for retained habitat areas. Replacement common land.	Ecological Management Plan / CEMP. Common land swap agreement.	Habitat loss. Site significance
	Wet modified bog	Habitat loss at construction phase. Site significance	Habitat protection for retained habitat areas	Ecological Management Plan / CEMP	Habitat loss. Site significance
	Bog pool	Indirect hydrological effects at construction and operational phase Site significance	Habitat protection for retained habitat areas.	Ecological Management Plan / CEMP Commitment to CDMS	Indirect hydrological effects Site significance
	Streams and flushes	Indirect hydrological effects at construction and operational phase Site significance	Habitat protection for retained habitat areas	Ecological Management Plan / CEMP Commitment to CDMS	Indirect hydrological effects Site significance
	Ponds	Negligible	None (more than already already	Commitment to CDMS	Negligible

			designed into the CDMS)		
Receptor		Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Birds	Red kite	Foraging habitat loss, collision and displacement effects. Not significant.	None	N/A	Not significant
	Goshawk	Habitat loss at construction phase. Adverse effect but not significant. Negligible collision and displacement effects.	Timing of works. Pre-construction check for nest sites	Ecological Management Plan / CEMP	Not significant
	Peregrine	Collision and displacement effects. Not significant.	None	N/A	Not significant
	Merlin	Foraging habitat loss, collision and displacement effects. Not significant.	None	N/A	Not significant
	Kestrel	Habitat loss not significant. Collision effects of Local significance.	Funding off-site habitat creation initiatives	Agreement with NRW and BCBC	Local to District level significance (precautionary)
	Golden plover	Habitat loss and localised disturbance during construction phase. Risk of collision	None	N/A	Not significant

		Not significant			
Receptor		Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Birds	Other waders	Habitat loss and localised disturbance during construction phase. Not significant	None	N/A	Not significant
	Passerines	Destruction of nests and disturbance of breeding birds. Not significant	Timing of works or pre-construction check for nesting birds	Ecological Management Plan / CEMP	Not significant
Bats	All species	Habitat loss and risk of collision. Not significant	Feathering turbine blades on idle.	Ecological Management Plan	Not significant
Amphibians	All species	Potential for killing or injury. Habitat destruction during construction phase. Adverse effects but not significant	Vegetation management pre-construction	Ecological Management Plan / CEMP	Not significant
Reptiles	All species	Potential for killing or injury. Habitat destruction during construction phase. Adverse effects but not significant	Vegetation management pre-construction	Ecological Management Plan / CEMP	Not significant

Receptor		Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Other mammals	Water vole	Potential for killing or injury. Habitat destruction during construction phase. Adverse effects significant at the Site level	Pre-construction survey and hand search of sensitive areas prior to ground disturbance	Ecological Management Plan / CEMP	Not significant

References

Balmer D., Gillings, S., Caffrey, B., Swann, B., Downie, I., & Fuller, R. (2013). Bird Atlas 2007 – 2011. The breeding and wintering birds of Britain and Ireland. BTO Books, Thetford.

Bat Conservation Trust (2012). The state of the UK's bats: National Bat Monitoring Programme Population Trends 2012. The Bat Conservation Trust.

Bat Conservation Trust (2017). The National Bat Monitoring Programme. Annual Report 2017. Bat Conservation Trust, London.

Bat Conservation Trust (2018). The National Bat Monitoring Programme. Annual Report 2018. Bat Conservation Trust, London.

Band, W, Madders, M, & Whitfield, D.P. (2007) Developing field and analytical methods to assess avian collision risk at wind farms. In: Janss, G, de Lucas, M & Ferrer, M (eds.) Birds and Wind Farms. Quercus, Madrid. 259-275

Battersby, J. (Ed) & Tracking Mammals Partnership. 2005. UK Mammals: Species Status and Population Trends. First Report by the Tracking Mammals Partnership. JNCC/Tracking Mammals Partnership, Peterborough

Brown, A.F. & Shepherd, K.B (1993). A Method for Censusing Upland Breeding Waders. Bird Study, Vol. 40: 3, pp. 189 -195.

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

Collins, J. (ed.) (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London.

Cochran, W.W. & Applegate, R.D. (1986) Speed of flapping flight of merlins and peregrine falcons. The Condor. 88:397-398

Chamberlain, D.E., Freeman, S.N., Rehfisch, M.R., Fox, T. & Desholm, M. (2005). Appraisal of Scottish Natural Heritage's wind farm collision risk model and its application. BTO Research Report 401. British Trust for Ornithology, Thetford.

Chamberlain, D.E., Rehfisch, M.R., Fox, A.F., Desholm, M & Anthony, S.J. (2006). The effect of avoidance rates on bird mortality predictions made by wind turbine collision risk models. Ibis 148, 198-202

Cramp, S. 1980. Handbook of the Birds of Europe the Middle East and North Africa. The Birds of the Western Palearctic. RSPB / Oxford University Press.

de Lucas, M.G.F., Janss, S.F.E & Ferrer, M. (2007). Birds and wind farms: risk assessment and mitigation. Quercus, Madrid, Spain.

Dean, M., Strachan, R., Gow, D., & Andrews, R. (2016) The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series). Eds. Fiona Matthews and Paul Chanin. The Mammal Society, London

Devereux, C.L., Denny, M.J.H. & Whittingham, M.J. (2008) Minimal effects of wind turbines on the distribution of wintering farmland birds. Journal of Applied Ecology doi: 10.1111/j.1365-2664.2008.01560.x

Dietz, C., Helverson, O., Nill, D. (2009) Bats of Britain, Europe and North-West Africa. A & C Black.

Douglas, D. J. T. , Bellamy, P.E. & Pearce-Higgins, J. W.(2011). Changes in the abundance and distribution of upland breeding birds at an operational wind farm. Bird Study, 58: 1, 37-43

Drewitt, A.L & Langston, R.H.W. (2006). Assessing the impacts of wind farms on birds. Ibis 148: 29-42.

Duffy, K. & Urquhart, B. (2014) Braes of Doune Windfarm Report on Red Kite Studies 2004 – 2012. Natural Research Projects Ltd.

Dürr, T. (2020). Vogelverluste an Windenergieanlagen / bird fatalities at wind turbines in Europe. http://ow.ly/wusS9

Dürr, T. (2019). Auswirkungen von Windenergieanlagen auf Fledermäuse / bat fatalities at wind turbines in Europe. http://ow.ly/wusS9

Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA & Gregory RD (2015). Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708–746.

English Nature (2001) The Great Crested Newt Mitigation Guidelines Peterborough, English Nature

European Commission (1992) Council Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC).

Entwistle, A., Gibson, S., Harris, S., Hutson, A., Racey, P. and Walsh, A. (2001). Habitat management for bats. A guide for land managers, land owners and their advisors. Joint Nature Conservation Committee.

Hardey, J., Crick, H., Riley, H., Etheridge, B., and Thompson, D. (2013) Raptors: A field guide to surveys and monitoring. The Stationery Office; 3rd revised edition.

Harris, S., Morris, P., Wray, S. & Yalden, D. (1995). A review of British mammals: population estimates and conservation status of British mammals other than cetaceans. University of Bristol.

Hayhow DB, Ausden MA, Bradbury RB, Burnell D, Copeland AI, Crick HQP, Eaton MA, Frost T, Grice PV, Hall C, Harris SJ, Morecroft MD, Noble DG, Pearce-Higgins JW, Watts O, Williams JM (2017), The state of the UK's birds 2017. The RSPB, BTO, WWT, DAERA, JNCC, NE and NRW, Sandy, Bedfordshire.

Hötker, H., Thomsen, K-M & Koster, H. (2006) The impact of renewable energy generation on biodiversity with reference to birds and bats – facts, gaps in our knowledge, areas for further research and ornithological criteria for the expansion of renewables. NABU Report, Germany.

Huso M, Dalthorp, D and Korner-Nievergelt, F. (2017) Statistical principles of post construction fatality monitoring in Perrow, M (2017). Wildlife and wind farms, conflicts and solutions. Volume 2 Onshore: Monitoring and Mitigation. Pelagic Publishing, Exeter UK.

JNCC (2010) Handbook for Phase 1 Habitat Survey. A Technique for Environmental Audit. JNCC

JNCC (2013) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Supporting documentation for the Third Report by the United Kingdom under Article 17. (Bat Species Reports). Joint Nature Conservation Committee

JNCC (2019) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC). Fourth Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2013 to December 2018. Supporting documentation for the conservation status assessment for the species: S1317 - Nathusius' pipistrelle (*Pipistrellus nathusii*). Joint Nature Conservation Committee

Johnstone I.G., Thorpe R.I. & Noble D.G. (2010). The state of birds in Wales 6. RSPB Cymru, Cardiff

Langston, R.H.W. & Pullan, J.D., (2003) Wind farms and Birds: An analysis of the effects of wind farms on birds, and guidance on environmental assessment criteria and site selection issues. Birdlife International.

Madders, M. & Whitfield, D.P. (2006). Upland raptors and the assessment of wind farm impacts. Ibis 148, 43-56.

Mathews, F., Richardson, S., Lintott, P. and Hosken, D. (2016). Defra report - Understanding the risk to European Protected Species (bats) at onshore wind turbine sites to inform risk management. University of Exeter.

Mathews F, Kubasiewicz LM, Gurnell J, Harrower CA, McDonald RA, Shore RF. (2018) A Review of the Population and Conservation Status of British Mammals: Technical Summary. A report by the Mammal Society under contract to Natural England, Natural Resources Wales and Scottish Natural Heritage. Natural England, Peterborough.

Marquiss, M., and Newton, I. (1982) The goshawk in Britain. British Birds 75, 243-260

Morrison, M. (2002). Searcher bias and scavenging rates in bird/wind energy studies. National Renewable Energy Laboratory. Golden, Colarado, USA.

Musgrove, A., Aebischer, N., Eaton, M., Hearn, R., Newson, S., Noble, D., Parsons, M., Risley, K & Stroud, D. (2013). Population estimates of birds in Great Britain and the United Kingdom. British Birds 106: 64-100.

Natural England (2014). Bats and onshore wind turbines: Interim Guidance. Technical Information Note. TIN051 published by Natural England, February 2009. Natural England.

Natural Power (2016) Llynfi Afan Renewable Energy Park Pre-Construction Ornithological Surveys 2015. Gamesa Energy UK. Unpublished

Paunović, M. & Juste, J. (2016) *Pipistrellus nathusii*. The IUCN Red List of Threatened Species 2016

Pearce-Higgins, J.W., Stephen, L., Langston, R.H.W., Bainbridge, I.P., Bullman, R (2009) The distribution of breeding birds around upland wind farms. Journal of Applied Ecology. 46:1323-1331

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

Percival, S.M. (2000). Birds and wind turbines in Britain. British Wildlife 12:1 pp 8-15

Percival, S.M. (2005) Birds and wind farms: what are the real issues? British Birds 98: 194-204.

Razgour O. (2012) From genes to landscapes: conservation biology of the grey long-eared bat, Plecotus austriacus, across spatio-temporal scales. PhD thesis, University of Bristol, UK

Rebecca, G.W. (2011) Spatial and habitat related influences on the breeding performance of Merlins in Britain. British Birds vol.104, pp.202-216.

RPS Planning and Development (2010). Llynfi Afan Renewable Energy Park Environmental Statement. Chapter 9: Ornithology. Gamesa Energy UK

Russ, J.M. (2012). British Bat Calls: A Guide to Species Identification. Pelagic Publishing, Exeter.

Rydell, J., Bach, L., Dubourg-Savage, M., Green, M., Rodrigues, L. and Hendenström, A. (2010). Bat mortality at wind turbines in northwestern Europe. Acta Chiroptirologica 12: 261-274.

Scottish Natural Heritage (2000) Windfarms and Birds - Calculating a theoretical collision risk assuming no avoiding action. SNH Guidance Note. Available at http://www.snh.gov.uk/docs/C205425.pdf

Scottish Natural Heritage (2013). Avoidance rates for wintering species of geese in Scotland at onshore wind farms. SNH, Inverness.

Scottish Natural Heritage (2014). Recommended bird survey methods to inform impact assessment of onshore wind farms. Scottish Natural Heritage, Inverness.

Scottish Natural Heritage (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. Version 2. Scottish Natural Heritage, Inverness.

The Welsh Ornithological Society (2014) Birds in Wales. Vol.11 No.2. Welsh Bird Report No.27 for 2013. CMP UK Ltd, Poole, Dorset.

Urquhart, B. (2010). Use of avoidance rates in the SNH wind farm collision risk model. SNH, Lochgilphead.

Urquhart B. & Whitfield D.P. (2016) Derivation of an avoidance rate for red kite Milvus milvus suitable for onshore wind farm collision risk modelling. Natural Research Information Note 7. Natur

Vauk, G. (1990) Biological and ecological study of the effects of construction and operation of wind power land ownerships. Jahrgang/Sonderheft, Endbericht. Norddeutsche Naturschutzakemie, Germany.

Welsh Kite Trust (2011) Boda Wennol. The Newsletter of the Welsh Kite Trust. Issue 26. Autumn 2011.

Wernham, C.V., Toms, M.P., Marchant, J.H., Clark, J.A., Sitiwardena, G.M., & Baillie, S.R. (2002). The migration atlas: movements of the birds of Britain and Ireland. T. & A.D. Poyser. London

Whitfield, D.P. & Madders, M. (2006). Deriving collision avoidance rates for red kites Milvus milvus. Natural Research Information Note 3. Natural Research Ltd, Banchory, UK.

Whitfield, D.P. & Madders, M. (2006). A review of the impacts of wind farms on hen harriers Circus cyaneus and an estimation of collision avoidance rates. Natural Research Information Note 1 (revised). Natural Research Ltd, Banchory, UK

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

Winkelmann, J.E. (1994) Bird/wind turbine investigations in Europe. Proc. of the National Avian Wind Power Planning Meeting, Denver, Colorado, pp 43-48.

Wray, S., Wells, D., Long, E., Mitchell-Jones, T. (2010) Valuing Bats in Ecological Impact Assessment. IEEM In Practice December 2010, 23-25.