

Chapter 7 - Ecology

Introduction

7.1 This chapter details the Ecological Impact Assessment (EclA) of the proposed Rhoscrowther wind farm development site on land beside the Pembroke Refinery at Rhoscrowther, Pembrokeshire (hereafter referred to as the 'Proposed Development'). The boundary of the Core Study area (ES Figure 7.2) is more extensive than the boundary of the turbines, tracks and other infrastructure as shown on ES Figure 1.1. Where studies for individual ecological groups encompass a larger or different area, this is explicitly outlined under the section relevant to that group. The assessment was designed to identify those ecological receptors (i.e. species and habitats) that may be significantly affected by the Proposed Development. The significance of potential effects was gauged with respect to The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2017 (HMSO, 2017) as amended and the assessment methodology is set out below. The original assessment of the site took place in 2012. Surveys to update data took place in 2020 and again in 2021 and this chapter has been updated accordingly.

7.2 The assessment includes the following aspects:

- i. Description and evaluation of the baseline conditions (flora and fauna) potentially affected by the Proposed Development;
- ii. Description of the potential effects of the Proposed Development on these conditions;
- iii. Evaluation of the potential effects of the Proposed Development.
- iv. Avoidance and mitigation measures for potential significant effects; and
- v. Identification of residual effects arising from the Proposed Development following mitigation and measures designed to compensate for these residual effects.

- 7.3 Key issues under consideration in this assessment are:
- i. Direct and indirect effects of construction on ecological receptors (e.g. habitat loss and the effects of altered hydrological regimes on wetland habitats);
 - ii. Direct and indirect effects of operation on ecological receptors (e.g. disturbance of habitats and/or species); and
 - iii. Opportunities for habitat maintenance and enhancement.
- 7.4 Updated ecological surveys were undertaken between spring 2020 and winter 2021. Ecological baseline conditions were assessed through a combination of desk study and original field surveys. All surveys and assessment were carried out to best practice methodologies and none were subject to any significant limitations. Species and habitats are described and evaluated in terms of recognised criteria.
- 7.5 Potential impacts of the construction, operational and decommissioning phases have been assessed, with particular attention paid to species and habitats of high vulnerability to the Proposed Development. Consideration has also been given to the potential for cumulative effects. Definitions of ecological evaluation criteria are provided in ES Appendix 7.1: Ecological Evaluation Criteria.
- 7.6 This Chapter is supported by and should be read in conjunction with ES Figures 7.1 – 7.6 contained in Volume II (Figures) and Technical Definitions of ecological evaluation criteria are provided in ES Appendix 7.1 of Volume III (Technical Appendices).

Legislation and Planning Policy Context

Legislative Context

7.7 An analysis of the legislative framework relevant to the ecology assessment is presented below.

International Habitat Designations

7.8 Habitats of European-wide importance (other than for birds) are listed under Annex I of the Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC, 1992)¹. Habitats designated under this Directive are Special Areas of Conservation (SAC). Sites identified as potential SAC (pSAC) and candidate SAC (cSAC) are provided with the same level of protection as SAC.

7.9 Habitats of European-wide importance for birds are listed under the EC Wild Birds Directive (79/409/EEC as amended and subsequently codified by Directive 2009/147/EC) (EC, 1979)². Habitats designated under this Directive are Special Protection Areas (SPA). Any site identified as a potential SPA (pSPA) is provided with the same level of protection as an established SPA.

7.10 Wetlands of International Importance are designated under the Ramsar Convention³.

UK Habitat Designations

7.11 National ecological designations, such as Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR), are also afforded statutory protection. SSSIs are notified and protected under the jurisdiction of the Wildlife and Countryside Act 1981 (WCA) as

¹ Council Directive 92/43/EEC On the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive). Annex I, 1992.

² Council of the European Communities Council Directive on the Conservation of Wild Birds (79/409/EEC), 1979.

³ The Ramsar Convention on Wetlands, 1971.

amended (HMSO, 1981)⁴. SSSIs are notified based on specific criteria, including the general condition and rarity of the site and of the species or habitats supported by it.

7.12 Ancient Woodland Sites are woodlands that have existed since at least the Seventeenth Century. They are of biodiversity importance due to their longevity, which often gives rise to high species diversity. Many Ancient Woodland Sites are given national or county designations.

County Level Designations

7.13 Wildlife Sites may be considered as of county-wide importance for nature conservation but below the standard for selection as SSSIs. Two kilometres is generally considered to be a reasonable buffer in which to conduct a data search for designated and non-statutory sites, as impacts on sites outside of this buffer would generally not be significant. However, during the assessment process, the possibility of indirect impacts on sites further afield was always borne in mind. For example, hydrological connections between the Development site and designated sites at some distance may conceivably exist.

European Protected Species

7.14 The principal means by which EC Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the “Habitats Directive”) is transposed for domestic legislation is The Conservation of Habitats and Species Regulations 2017 (HMSO, 2017)⁵. These Regulations update and consolidate the Conservation (Natural Habitats, &c.) Regulations 1994. To date, the legislation remains largely unaffected by Britain’s withdrawal from the EU. Under Regulation 41 of these Regulations, it is an offence to deliberately kill, injure, capture, or disturb a European Protected Species (EPS), or to damage or destroy the breeding site or resting place of such an animal. The definition of

⁴ HMSO. Wildlife and Countryside (Amendment) Act 1981.

⁵ The Conservation of Habitats and Species Regulations 2017 (SI 2010/1012).

disturbance includes in particular any disturbance which is likely to impair their ability to survive, to breed or reproduce, or to rear or nurture their young, or in the case of animals of a hibernating or migratory species, to hibernate or migrate; or to affect significantly the local distribution or abundance of the species to which they belong. Regulation 45 of the Conservation of Habitats and Species Regulations 2017 also protects certain plants in that it is an offence to deliberately pick, collect, uproot or destroy a wild plant identified in Schedule 5 as an EPS.

Nationally Protected Species

The Wildlife and Countryside Act

- 7.15 Species in need of special protection in Britain, for reasons of dramatic decline, loss of habitat, rarity or restricted distribution, are listed under the various Schedules of the Wildlife and Countryside Act 1981 (as amended) (WCA) (HMSO, 1981)⁶. Schedule 1 covers birds, while Schedule 5 covers non-avian vertebrates and invertebrates and Schedule 6 details animals which may not be killed or taken by certain methods. Schedule 8 of the Wildlife and Countryside Act 1981 lists species of plants which are afforded special protection.
- 7.16 Schedule 5 of the WCA 1981 covers the non-avian animals that are afforded special protection. This Schedule makes it an offence to damage, destroy, or obstruct access to any structure or place which any Schedule 5 animal inhabits. It is also an offence to disturb any such animal while it is occupying a structure or place which it uses for that purpose. This legislation has been updated by the Countryside and Rights of Way Act 2000 (CROW) (HMSO, 2005)⁷ which includes measures to prevent reckless disturbance. For certain species, different levels of protection are afforded.

⁶ HMSO. Wildlife and Countryside (Amendment) Act 1981.

⁷ HMSO. Countryside and Rights of Way Act 2000. (Commencement No. 7) (Wales) Order 2005.

- 7.17 Schedule 8 of the WCA 1981 lists species of plants which are afforded special protection. It is an offence to pick, uproot or destroy any species listed on Schedule 8 without prior authorisation, and all plants are protected from unauthorised uprooting (i.e. without the landowner's permission) under Schedule 13 of the WCA 1981. The Red Data Book (RDB) system (JNCC)⁸ applies standard criteria to define the national conservation status of animal and plant species according to the following categories: Extinct (EX), Critically endangered (CR), Endangered (EN), Vulnerable (VU), Near-threatened (NT) and Least Concern (LC). The RDB system was devised by the International Union for the Conservation of Nature (IUCN), which allocates species to the various categories according to the degree of threat to the British populations.
- 7.18 Biodiversity Action Plans (BAPs) stem from the Convention on Biological Diversity, also known as the 'Earth Summit' (1992) (JNCC, 2012)⁹, which called for the creation and enforcement of national strategies and action plans to conserve, protect and enhance biological diversity. The UK Post-2010 Biodiversity Framework 2012 (UK BF) (UN, 1992)¹⁰ succeeded the UK Biodiversity Action Plan (UK BAP) published in 1994, and updated in 2007. It covers the period 2011 – 2020. It is the government's mechanism for implementing strategies for conserving species and habitats in accordance with the Convention on Biological Diversity. The UK BF presents an action plan for a variety of priority species and habitats which is now more focussed at a country level. The UK BF still makes reference to the UK BAP list of priority habitats and species however and will still be referred to in this report as such. Local Biodiversity Action Plans (LBAPs) were set up to implement the national BAP locally and to identify targets for local action plans.

⁸ Joint Nature Conservation Committee, British Red Data Books. JNCC, Peterborough.

⁹UN Convention on Biological Diversity. 1992.

¹⁰ JNCC and Defra, (2012). UK Post-2010 Biodiversity Framework.

7.19 The Environment (Wales) Act 2016 requires public authorities to seek to maintain and enhance biodiversity in the exercise of their functions. Section 6 of this Act requires that public authorities must seek to maintain and enhance biodiversity so far as consistent with the proper exercise of their functions and in so doing promote the resilience of ecosystems. Section 7 of this Act requires Welsh Ministers to publish a list of organisms and habitats which are of principal importance for maintaining and enhancing biodiversity in Wales.

Planning Policy Context and Guidance

7.20 A full explanation of the relevant planning policy framework and relevant legislation is presented in Chapter 4: Planning and Energy Policy Context and its relevance to the Proposed Development is considered in the separate Planning Statement, which accompanies the planning application. An analysis of nature conservation policies relevant to the Proposed Development is provided below.

Planning Policy Wales

7.21 The 11th Edition of Planning Policy Wales (PPW) (WG, 2021)¹¹ sets out the strategic framework for the effective operation of the planning system in Wales. Of most relevance to EclA is Chapter 6: Distinctive and Natural Places.

7.22 Chapter 6 (which relates to conserving and enhancing the natural environment) requires development proposals to consider the need to:

- i. Support the conservation of biodiversity, in particular the conservation of wildlife and habitats;
- ii. Ensure action in Wales contributes to meeting international responsibilities and obligations for biodiversity and habitats;

¹¹ Welsh Government, (2021). Planning Policy Wales. Edition 11; February 2021.

- iii. Ensure statutorily and non-statutorily designated sites are properly protected and managed;
- iv. Safeguard protected and priority species and existing biodiversity assets from impacts which directly affect their nature conservation interests and compromise the resilience of ecological networks and the components which underpin them, such as water and soil, including peat; and
- v. Secure enhancement of and improvements to ecosystem resilience by improving diversity, condition, extent and connectivity of ecological networks.

7.23 Section 6.4.5 of PPW goes on to state that:

'Planning authorities must seek to maintain and enhance biodiversity in the exercise of their functions. This means development should not cause any significant loss of habitats or populations of species, locally or nationally and must provide a net benefit for biodiversity.'

7.24 In doing so planning authorities must also take account of and promote the resilience of ecosystems, in particular:

- i. Diversity between and within ecosystems;
- ii. The connections between and within ecosystems;
- iii. The scale of ecosystems;
- iv. The condition of ecosystems including their structure and functioning; and
- v. The adaptability of ecosystems.

7.25 In fulfilling this duty, planning authorities must have regard to:

- i. The list of habitats and species of principal importance for Wales, published under Section 7 of the Environment (Wales) Act 2016;

- ii. The SoNaRR, published by NRW; and
- iii. Any Area Statement that covers all or part of the area in which the authority exercises its functions.

7.26 Planning Authorities should also refer to up to date ecological survey information (where appropriate). A proactive approach towards facilitating the delivery of biodiversity and resilience outcomes should be taken by all those participating in the planning process. In particular, planning authorities must demonstrate that they have sought to fulfil the duties and requirements of Section 6 of the Environment Act by taking all reasonable steps to maintain and enhance biodiversity in the exercise of their functions.

Technical Advice Note 8

7.27 The Welsh Assembly Government (WAG) produced Technical Advice Note (TAN) 8 (Renewable Energy) (WG, 2005)¹² which provides technical advice on renewable energy proposals supplementing the policies in PPW. TAN 8 states in Section 2.7 that large areas of Wales were excluded from consideration as Strategic Search Areas (SSAs) by features that militate against larger wind power developments, including the highest level of nature conservation and heritage designations (Natura 2000 sites) as well as “...*the core area of the Dyfi Biosphere Reserve*”. Section 2.8 explains that the SSAs display a characteristic of having a general absence of nature conservation designations. Section 2.10 of the TAN 8 document goes on to highlight that consideration should be given, amongst other things, to “*the creation of alternative wildlife habitat*”.

¹² Welsh Government, (2005). Planning Policy Wales Technical Advice Note 8: Renewable Energy.

Technical Advice Note 5

- 7.28 WAG also produced TAN 5 (Nature Conservation and Planning) (WG, 2009)¹³ which provides advice about how the land use planning system should contribute to protecting and enhancing biodiversity and geological conservation. It brings together advice on sources of legislation relevant to various nature conservation topics which may be encountered by local planning authorities. It sets out the key principles of planning for nature conservation and addresses nature conservation in development control procedures. It also deals with the conservation of protected and priority species.
- 7.29 Development that may adversely impact on sites designated for their national nature conservation interest will generally not be permitted.

Local Planning Policy

- 7.30 The Local Development Plan (LDP) was adopted by Pembrokeshire County Council in February 2013 and runs until 2021 (Pembrokeshire County Council, 2013)¹⁴. The LDP was reviewed to identify nature conservation policies relevant to the Proposed Development.
- 7.31 The main policy with regard to renewable energy is Policy GN.4 which states that *“Developments which enable the supply of renewable energy through environmentally acceptable solutions will be supported.”*
- 7.32 The main nature conservation policy is Policy GN.37: Protection and Enhancement of Biodiversity, which states that: *“All development should demonstrate a positive approach to maintaining and, wherever possible, enhancing biodiversity. Development that would disturb or otherwise harm protected species or their habitats, or the integrity of other habitats, sites or features of importance to wildlife and individual species, will only be*

¹³ Welsh Government, (2009). Planning Policy Wales Technical Advice Note 5: Nature Conservation and Planning.

¹⁴ Pembrokeshire County Council, (2013). Local Development Plan - Adopted 2013.

permitted in exceptional circumstances where the effects are minimised or mitigated through careful design, work scheduling or other appropriate measures.”

7.33 The LDP goes on to state that the effect on a designated site is a material consideration and will be assessed in accordance with national planning policy and guidance. Effects on a European site or species would be subject to an Appropriate Assessment. The LDP also advises that *“mitigation and/or enhancement may be required as an integral part of a development proposal.”* Due regard is also given to ecological connectivity, the Pembrokeshire LBAP and the Environment (Wales) Act 2016 Section 7 list.

Assessment Guidelines

7.34 The main source of guidance used in the preparation of the ecology chapter of the Environmental Statement is the Chartered Institute of Ecology and Environmental Management’s (CIEEM) Guidelines for Ecological Impact Assessment (CIEEM, 2018)¹⁵. In addition to this, the following guidance has also been used:

- i. Scottish Natural Heritage (SNH), (2014). Recommended bird survey methods to inform impact assessment of onshore wind farms
- ii. SNH, (2006). Assessing significance of impacts from onshore windfarms on birds outwith designated areas
- iii. 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. For the Council of Europe Directorate of Culture and of Cultural and Natural Heritage by RSPB and Birdlife International

¹⁵ Chartered Institute of Ecology and Environmental Management (2017). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Technical Guidance Series. www.cieem.net

- iv. English Nature, RSPB, WWF-UK and BWEA, (2001). Wind Farm Development and Nature Conservation
- v. BWEA, (1994). Best Practice Guidelines for Wind Energy Development
- vi. Natural England, (2012). Bats and onshore wind turbines: Interim guidance. Natural England Technical Information Note TIN051. Second Edition
- vii. Scottish Natural Heritage, Natural England, Natural Resources Wales, Renewable UK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter and the Bat Conservation Trust (BCT) January 2019 Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation

7.35 This list is not exhaustive and where survey or assessment methods are subject to species specific guidance or standard methods, then these are referenced in subsequent sections.

Assessment Method

7.36 The original EclA was based on the following key stages described in Table 7.1 below.

Table 7.1: EclA Key Stages

Stage	Key Activities
Scoping	A walkover visit was made to the site to form an initial view on the likely key ecological issues, to scope the surveys required and to identify potential vantage point survey locations. Initial consultation was held with NRW at this stage.
Baseline Desk Study	A desk study was completed to further establish the likely key ecological receptors and to identify any designated sites or protected species which may need to be accounted for in the survey design.

Stage	Key Activities
Baseline Field Studies	Targeted field studies were carried out. The scope and extent of these have been developed with reference to standard methods and guidance, and in accordance where appropriate with the NRW consultation response received at the project outset.
Identification of Valued Ecological Receptors (VERs)	VERs have been identified based on the surveys completed. VERs include species and habitats and the basic criteria for their selection and identification are that they represent those aspects of the site’s ecology most likely to be significantly affected by the scheme by virtue of either their value / rarity or due to the likelihood of negative effects.
Assessment of Impacts	Each VER was assessed in the context of the Proposed Development to identify the potential effects, positive or negative, to characterise and describe these effects and to assess the predicted magnitude and significance.
Mitigation and Compensation	The assessment of impacts process was used to guide the need for mitigation and compensation. Where necessary, mitigation proposals have been drawn up in consultation with NRW. The residual impact of the scheme was then assessed.

7.37 The CIEEM has produced guidelines to assist with ecological evaluation and impact assessment. These were produced in 2018 (CIEEM, 2018)¹⁶. Whilst these guidelines provide a robust basis for the assessment of ecological impacts, they do not have any legal standing. In addition, they are not a substitute for professional judgement and

¹⁶ Chartered Institute of Ecology and Environmental Management (2017). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Technical Guidance Series. www.cieem.net

interpretation, particularly where ecological value and/or the magnitude of effect for a Proposed Development are not clear.

7.38 The ecological value of a habitat or species can be expressed in terms of its geographical significance. CIEEM guidelines (CIEEM, 2017)¹⁷ state that a habitat or species may be considered ecologically valuable at one of the following levels:

- i. International;
- ii. National;
- iii. Regional;
- iv. County/metropolitan;
- v. District/borough; and
- vi. Parish/neighbourhood;

7.39 These categories are defined, with examples in ES Appendix 7.1 (Ecological Evaluation Criteria). It can be seen from this Appendix that the categories have been derived from both statutory measures (e.g. legally protected sites and species) and non-statutory but widely accepted measures, such as BAPs and Red Data Book (RDB) criteria. A further category is that of 'less than local/neighbourhood' i.e. of little or no ecological value. An example of this would be improved, rye-grass-dominated grassland. In determining ecological value, use is also made of the Ratcliffe assessment criteria (Ratcliffe, 1977)¹⁸ for the selection of sites with nature conservation value. In addition, RSPB Wales (2016)¹⁹ lists

¹⁷ Chartered Institute of Ecology and Environmental Management (2017). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Technical Guidance Series. www.cieem.net

¹⁸ Ratcliffe, D.A. (1977). A Nature Conservation Review - Volumes 1 and 2. Cambridge University Press, Cambridge.

¹⁹ Johnstone, I. and Bladwell, S. (2016). Birds of Conservation Concern in Wales 3: the population status of birds in Wales, RSPB

Birds of Conservation Concern (BoCC), under three categories: red list (species of high concern), amber list (species of medium concern) and green list (species of lower concern). Species are placed on these lists broadly based on the percentage decline of breeding populations in the recent past, as well as other criteria. Listing under Section 7 of the Environment (Wales) Act (WG, 2016)²⁰ is also used as a basis for assigning ecological value.

7.40 It should be noted that whilst a particular species or habitat may be subject to national or international legislation, this does not mean that this species or habitat will always be rated at this value regardless of context. For example, bat species are EPS, and are thus of international value in terms of legislation. However, in the context of a particular site, the size and viability of a bat population must be taken into account, as should the 'importance' of the site for bats (i.e. whether they are a regularly occurring species, whether they use the site simply for occasional foraging and so on). Similarly, a particular habitat may be listed under the UK BAP. Listing under the UK BAP does not, however, automatically confer national value on this habitat in every case. Valuation is also dependent on such factors as the size and viability of this habitat. Therefore, in assigning value to individual species and habitats in the context of a particular site, CIEEM advocate using professional judgement, based on available guidance and information. Individual species and habitat value in a site context is particularly based on local expert knowledge. This is made explicit in the CIEEM guidelines (CIEEM, 2018²¹).

7.41 The descriptions in Table 7.2 were used to categorise impacts on species and habitats. Thus, if the predicted change is likely to cause a permanent adverse effect on the integrity of an ecological receptor (that is, species or habitat), this effect would be described as 'major negative'. The term 'ecological integrity' is used here, as defined by the Office of

²⁰ Welsh Government. Environment (Wales) Act 2016: Section 7 list of species of principal importance for conservation of biological diversity in Wales.

²¹ Chartered Institute of Ecology and Environmental Management (2017). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Technical Guidance Series. www.cieem.net

the Deputy Prime Minister (ODPM) Circular 06/2005 on Biodiversity and Geological Conservation (ODPM, 2005)²² where the integrity of a designated site refers to “*coherence of ecological structure and function...that enables it to sustain the habitat, complex of habitats and/or levels of populations of species for which it was classified*”. For species and for non-designated habitats, the ODPM Circular (and CIEEM guidance) refers to ‘conservation status’. The Circular states (in Part IV, Paragraph 96) that species and habitats are normally legally protected because of their vulnerable conservation status (i.e. the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations). Conservation status is thus a key concept in the assessment of effects on species and non-designated habitats. The judgement on the severity of effects was based on a combination of the following: knowledge of the requirements of the species or habitat in question, and an evaluation of the effect itself. In describing the effects, reference was made to the following factors:

- i. Confidence in predictions;
- ii. Spatial extent of effect;
- iii. Temporal extent of effect;
- iv. Reversibility of effect; and
- v. Timing and frequency of effect.

7.42 In reality, evaluation of the severity of effects is frequently made on the basis of ‘professional judgement’ (which would include such factors as the fragility of the habitat receiving the effect) and this was used where required.

²² ODPM, (2005). Circular 06/2005: Biodiversity and Geological Conservation.

Table 7.2: Determining Magnitude of Effects on an Ecological Receptor

Description	Criteria
Major negative	The change is likely to cause a permanent adverse effect on the integrity of a valued ecological receptor. In the case of habitats, this is largely as a result of permanent loss or degradation of habitat. In the case of species, it is the result of a permanent effect on the conservation status of the species. This could be an indirect impact e.g. as a result of loss of habitat or through a direct impact e.g. collision with turbine blades. In all cases, the effect on the species is such that a significant proportion of its population is affected, and therefore the viability of the population is significantly affected.
Negative	The change adversely affects the valued ecological receptor, but there will probably be no permanent effect on its integrity. In the case of habitats, any loss or degradation is likely to be temporary. In the case of species, any effect on conservation status is likely to be temporary.
Neutral	No effect.
Positive	The change is likely to benefit the receptor in terms of its conservation status, but not so far as to achieve favourable conservation status.
Major positive	The change is likely to restore an ecological receptor to favourable conservation status, or to create a feature of recognisable value.

Assessment of Significance

7.43 In this assessment, the significance of an effect was determined through a combination of the ecological value of the species and/or habitat, (ES Appendix 7.1: Ecological Evaluation Criteria) and the effect description from Table 7.2. The matrix in Table 7.3 displays the

significance criteria. As an example, a sustainable (i.e. ecologically viable) area of County BAP habitat would be valued at 'County/metropolitan' level of value (ES Appendix 7.1). If a substantial proportion of this were to be removed for turbine bases and access tracks, this would mean the effect was of a large extent (meaning that what habitat remains no longer functions as a viable ecosystem). The effect would also be irreversible (at least for the foreseeable future). A high degree of confidence can be placed in this prediction. Taken together, these factors would result in the effect being classed as 'major negative' (Table 7.2). The combination of 'County/metropolitan' level of value and 'major negative' effect would give a significance value of 'major – moderate' (Table 7.3). In cases such as this, where the significance falls within a range (e.g. between 'major' and 'moderate'), a decision is made as to which is the correct value. This decision is based on the factors listed in para 7.36 onwards, and particularly on 'professional judgement'.

7.44 In this assessment, any effect that is of at least 'moderate' significance (with Ecological Value of at least a 'County/metropolitan' level) is considered as significant in the overall context of the development and in terms of the EIA Regulations. Where Ecological Value is assessed as District/borough level or below, effects of 'moderate' significance are considered to be not significant in terms of the EIA Regulations. Professional judgement is an important factor in determining the level of ecological value, the magnitude of the impact and the overall significance. An effect may be either negatively or positively significant.

Table 7.3: Determining Significance of Ecological Effects

	International	National	Regional	County/ metropolitan	District/ borough	Parish/ neighborhood
Major negative	Critical	Critical	Critical-moderate	Major - moderate	Moderate-minor	Minor-moderate
Negative	Major-minor	Major - minor	Major - minor	Moderate – minor	Moderate – minor	Minor
Neutral	No impact					
Positive	Major – minor	Major – minor	Major – minor	Moderate – minor	Moderate – minor	Minor
Major positive	Critical	Critical	Critical – moderate	Major – moderate	Moderate – minor	Minor - moderate

7.45 The 2018 CIEEM guidelines use only two categories: ‘significant’ or ‘not significant’. In assessing whether an impact is significant, expert judgement will be used to consider the probability, characteristics and duration of the impact and will also take into account the sensitivity of the receptor to change. In general terms however it is considered that an impact falling into shaded cells on the above matrix will have a high probability of being assessed as ‘significant’.

Data Gathering

7.46 Baseline conditions were characterised by field survey and desk study. The desk-based study determined the necessary scope of the assessment and was conducted to determine the recorded and potential ecological interests within 3km of the Proposed Development. Information relating to the location of key sites and species of nature conservation interest within the search area was obtained from the West Wales Biodiversity Information Centre (WWBIC). Information was also obtained from a number of internet sources.

Survey Methods

7.47 The following formal ecological field surveys were carried out to update and inform the ecological impact assessment:

- i. Updated Phase 1 Habitat survey completed in summer 2020;
- ii. Updated National Vegetation Classification (NVC) survey completed in summer 2020;
- iii. Updated Breeding Bird Survey completed in spring and summer 2020 with further surveys in spring and summer 2021;
- iv. Updated Vantage Point surveys for birds completed in spring, summer and autumn (i.e. breeding season VPs) 2021;
- v. Updated Bat survey, completed in spring, summer and autumn 2020, with further surveys in spring, summer and autumn 2021;
- vi. Updated Otter survey completed in summer 2020;
- vii. Updated Badger survey completed in 2020; and

7.48 The methodologies for each of these surveys are described in the relevant sub-sections as set out below.

Description of Baseline Conditions

Statutory and Non-statutory Designated Sites

Statutory Sites

7.49 Two SACs, one SPA and six SSSIs are located within a 3km search area²³. These are summarised in Table 7.4 below. The locations of the sites are shown on ES Figure 7.1. the Pembrokeshire Coast National Park is also located within 3km.

Table 7.4: Statutory Designated Sites within 3km

Site Name	NGR (centre of site)	Approx. Distance from Core Study Area	Description
SAC			
Limestone Coast of South West Wales	SR885969	610m to south-west	Annex I habitats that are a primary reason for designation of this site include vegetated sea cliffs and fixed dunes with herbaceous vegetation (a Priority feature). Annex II species that are a primary reason for selection of this site include greater horsehoe bat

²³ 3km was chosen as a reasonable buffer area, in which indirect effects from the development could potentially be manifest e.g. effects on mobile species from these sites such as birds.

Site Name	NGR (centre of site)	Approx. Distance from Core Study Area	Description
Pembrokeshire Marine	SM503093	730m to west	Annex I habitats including estuaries and reefs are the primary reason for selection of this site, with other Annex I habitats (coastal lagoons, Atlantic salt meadows and submerged or partially submerged sea caves) also present.
SPA			
Castlemartin Coast	SR885999	800m to southwest	This site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of Chough <i>Pyrrhocorax pyrrhocorax</i> , a species of European importance listed on Annex I of the Directive.
SSSI			
Angle Peninsula Coast	SM851038 – SM877006	2.7km to west south-west	Of special interest for its geology and for its population of roosting and feeding Chough. Peregrine <i>Falco peregrinus</i> and Greater and Lesser Horseshoe Bat <i>Rhinolophus ferrumequinum</i> and <i>R. hipposideros</i> have also been recorded in this SSSI.

Site Name	NGR (centre of site)	Approx. Distance from Core Study Area	Description
Broomhill Burrows	SM890004	610m to south-west	One of Pembrokeshire's largest dune systems, with dune slack vegetation and species-rich dune grassland, supporting large orchid populations including Early Marsh-orchid <i>Dactylorhiza incarnata</i> and Northern Marsh-orchid <i>D. purpurella</i> .
Castlemartin Range (formally part of Castlemartin Cliffs & Dunes SSSI)	SR926959	2.5km to south-west	14km section of coastline comprising Carboniferous Limestone cliffs. Of special interest for its geology, marine biology, sand dunes, wetland habitats, calcareous grassland, cliff and coastal grassland and heath, together with the most extensive area of species-rich neutral grassland in Wales.
Castlemartin Corse	SR896998	1.4km to south-west	Of special interest primarily for its swamp and fen Meadow habitats. Other habitats which contribute to the special wildlife interest include neutral grassland, scrub and open water.
Milford Haven Waterway	SM830040 - SM960120	715m to west	Of special interest for its geology, ancient woodland, marine biology, saltmarsh, swamp, saline lagoons, rare and scarce plants and invertebrates, nationally important numbers of migratory waterfowl, Greater and Lesser Horseshoe Bats and Otter <i>Lutra lutra</i> .

Site Name	NGR (centre of site)	Approx. Distance from Core Study Area	Description
Gweunydd Somerton Meadows	SM9314 0028	2km to south-east	A recently designated site, of special interest for its grassland fungi.

- 7.50 The closest statutory site to the Proposed Development is Limestone Coast of South West Wales SAC / Broomhill Burrows SSSI, located approximately 610m to the south-west of the core study area and approximately 1km from the nearest turbine.
- 7.51 Limestone Coast of South West Wales SAC covers nearly 1600ha and consists of tidal rivers, estuaries, mudflats, coastal sand dunes and shingle. Annex I habitats that are a primary reason for designation of this site include vegetated sea cliffs and fixed dunes with herbaceous vegetation (a Priority feature). Other Annex I habitats present as qualifying features are European dry heaths, semi-natural dry grasslands and scrubland facies (on calcareous substrates) and submerged or partially submerged sea caves. Greater horseshoe bat is an Annex II species given as a primary reason for selection of this site. The SAC provides the main hibernation site for individuals of this species from the Pembrokeshire Bat Sites SAC.
- 7.52 Pembrokeshire Marine SAC is located 730m to the west and approximately 1km from the nearest turbine. It comprises marine areas, sea inlets, tidal rivers, estuaries, mud flats and salt marshes. Annex I habitats including estuaries and reefs are the primary reason for selection of this site, with other Annex I habitats (coastal lagoons, Atlantic salt meadows and submerged or partially submerged sea caves) also present. The site is important for its Grey Seal *Halichoerus grypus* populations – it has the largest breeding colony on the west

coast, south of the Solway Firth. Otter is another Annex II species present as a qualifying feature.

7.53 It should be noted that Pembrokeshire Bat Sites and Bosherton Lakes SAC is located approximately 4.5km to the south-east of the development. This is described here in recognition of the fact that bat species from this SAC have the potential to interact with the development site. The SAC supports 9.5% of the UK population of greater horseshoe bat. It is at the north-western extremity of its range. It represents a mixture of maternity, transitory and hibernation sites.

7.54 There is one SPA within 3km. Castlemartin Coast SPA to the south of the Development site includes 20km of rocky coast with sea cliffs of Carboniferous Limestone, of national geological and biological interest. The exposed sea cliffs support characteristic plants such as Thrift *Armeria maritima*, Golden-samphire *Inula crithmoides* and Rock Sea-lavender *Limonium binervosum*. The cliffs are of importance for breeding Chough, which depend on the diverse mix of habitats present within the site and their continued low-intensity agricultural management. This site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of Chough, a species of European importance listed on Annex I of the Directive.

Non-Statutory Sites

7.55 There are no non-statutory designated sites within 3km of the core study area.

Phase I Habitats and Communities

Method

7.56 An Extended Phase 1 Habitat Survey of the core study area and access roads was completed in summer 2020 based on standard techniques described in the JNCC handbook (JNCC,

2010)²⁴. This constituted an updated survey from 2012. Phase I categories were mapped on a base map, using lettered codes. These were subsequently digitally mapped (ES Figure 7.2). Habitats and plant species of more interest were target-noted (TN) (see ES Appendix 7.3). Where applicable, the BAP categories were also recorded.

Results

7.57 The core study area is approximately 109ha in total. The Proposed Development is entirely in agricultural use of one form or another and comprises a fairly typical mix of arable, semi-natural and improved habitats. One main watercourse flows west – east through the centre of the site, and the majority of semi-natural habitat is associated with this.

7.58 The core study area can be divided into the following basic Phase I categories:

- i. Woodlands;
 - a. Broadleaved woodland;
 - b. Scattered broadleaved trees;
 - c. Dense/continuous scrub;
- ii. Grasslands:
 - a. Improved grassland;
 - b. Poor semi-improved grassland;
 - c. Semi-improved neutral grassland;
 - d. Unimproved neutral grassland;

²⁴ JNCC, (2010). Handbook for Phase 1 habitat survey: A technique for environmental audit. Joint Nature Conservation Committee.

- e. Marsh/marshy grassland;
- iii. Basic flush;
- iv. Open water/swamp:
 - a. Swamp;
 - b. Standing water mesotrophic;
 - c. Running water;
- v. Arable;
- vi. Boundary:
 - a. Species-poor intact hedge;
 - b. Species-poor intact hedge with trees;
 - c. Earth bank.

Woodland

- 7.59 Semi-natural broadleaved woodland comprises approximately 2.25ha and is found in the far west of the site, associated with the watercourse in this area. The area of TN1 is dominated by Ash *Fraxinus excelsior* woodland backing onto scrub *Salix*, which dominates the northern edge. Bramble *Rubus fruticosus* and Blackthorn *Prunus spinosa* dominate the area in places.
- 7.60 Dense/continuous scrub forms approximately 5.1ha of the core study area. The corners of four fields are dominated by dense scrub. This is largely Willow *Salix* (particularly Grey Willow *Salix cinerea*), though Hawthorn *Crataegus monogyna* and Blackthorn are mixed with this in some sections. Small areas of Willow scrub are also found in the east of the

site. Two small areas of mixed scrub are also found in the far south east of the Proposed Development. These are co-dominated by Blackthorn and Gorse *Ulex europaeus*.

- 7.61 Scattered broadleaved trees are found to the north of Cheveralton along the field boundary running north – south here. A very small area (0.06ha) is marked as scattered broadleaved woodland.

Grassland

- 7.62 Arable fields are interspersed with improved and poor semi-improved grassland fields. All these supported a low diversity of species. They are largely dominated by Perennial Ryegrass *Lolium perenne* and White Clover *Trifolium repens*. In the case of poor semi-improved grasslands, species diversity is slightly higher. In particular, species such as Yorkshire-fog *Holcus lanatus* become more prominent in the sward. Improved and poor semi-improved grassland comprises approximately 68ha i.e. c. 62% of the study area.
- 7.63 An area of unimproved and semi-improved neutral grassland is found towards the east of the site, east of Cheveralton Farm. This totals 1.2ha. This supports a mix of tall ruderal (i.e. species growing in ‘waste places’ or ‘neglected areas’) and damp grassland species. The most frequent grass in this area was Yorkshire-fog (abundant to dominant). In addition, there was frequent to abundant Cock’s-foot *Dactylis glomerata*, frequent Common Couch *Elytrigia repens* and occasional Creeping Bent *Agrostis stolonifera*. Other species that occur here are Hogweed *Heracleum sphondylium* (occasional), Nettle *Urtica dioica* (occasional) and Broad-leaved dock *Rumex obtusifolius* (occasional). Species indicative of the damp conditions include Silverweed *Potentilla anserina* (occasional), Common Fleabane *Pulicaria dysenterica* (occasional), Field Horsetail *Equisetum arvense* (occasional), Greater Bird’s-foot-trefoil *Lotus pedunculatus* (occasional) and Great Willowherb *Epilobium hirsutum* (frequent). Purple-loosestrife *Lythrum salicaria* is also occasional. This area of grassland is juxtaposed with an area of Willow scrub.

7.64 A very small area of marsh/marshy grassland is found near the eastern boundary along the watercourse. Soft Rush *Juncus effusus* is the most prominent species in this area. Marshy grassland comprises 0.13ha.

Basic Flush

7.65 A small basic flush area is found in the far south east corner of the site, again adjacent to an area of willow scrub (TN6). This supports Glaucous Sedge *Carex flacca*, a good indicator of base-rich conditions. Few other species were present here, apart from the moss *Calliergonella cuspidata*.

Open Water/Swamp

7.66 One main watercourse flows east – west through the centre of the site and includes a number of tributaries from the north and the south of the site.

7.67 A series of small mesotrophic or eutrophic ponds are found adjacent to the main watercourse in the centre of the site. A number of species characteristic of swamps are associated with these. These include Branched Bur-reed *Sparganium erectum*, Bulrush *Typha latifolia* and Water Horsetail *Equisetum fluviatile*. The area of swamp continues south east from the main ponds, adjacent to the watercourse. This supports similar species, along with occasional Hemlock Water-dropwort *Oenanthe crocata*, occasional Water Mint *Mentha aquatica*, local Yellow Iris *Iris pseudacorus*, frequent Fool's Water-cress *Apium nodiflorum* and occasional Water-cress *Rorippa nasturtium-aquaticum*.

7.68 Three larger mesotrophic or eutrophic ponds are located either side of the small ponds. The pond at TN4 consisted of mainly open water with Bulrush around the edges. The edges are Bramble and Gorse scrub-dominated. Standing water totals 0.5ha, with a further 0.14ha categorised as swamp.

Arable

7.69 Arable fields form 31ha of the overall total core study area . The main crop growing here was a species of Wheat *Triticum* sp. Other fields had been sown as grass leys and these contained species similar to improved grassland i.e. Perennial Rye-grass and White Clover.

Boundary

7.70 The majority of the field boundaries consist of species-poor intact hedges. Some of the hedges include trees and/or earth banks. The main hedgerow species was Hawthorn.

National Vegetation Classification

Method

7.71 All areas of semi-natural vegetation were mapped to NVC level in summer 2020 following standard methodologies (Rodwell, 2006)²⁵ and with reference to standard texts (e.g. Rodwell, 1991 *et seq*)²⁶. The NVC map of the study area is reproduced in ES Figure 7.3.

7.72 Notes were taken in order to aid sub-community classification. The locations of rare and otherwise notable plant species were mapped and referenced.

Results

7.73 In terms of the NVC, the following communities were identified within the study area:

- i. W1 *Salix cinerea-Galium palustre* woodland;
- ii. W8 *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland;
- iii. W9 *Fraxinus excelsior-Sorbus aucuparia-Mercurialis perennis* woodland;

²⁵ Rodwell, J.S. (2006). National Vegetation Classification: Users' handbook. Joint Nature Conservation Committee.

²⁶ Rodwell, J.S. *et seq.*, (1991). British Plant Communities Vols 1-5. Cambridge University Press: Cambridge.

- iv. W14 *Fagus sylvatica*-*Rubus fruticosus* woodland;
- v. W22 *Prunus spinosa*-*Rubus fruticosus* scrub;
- vi. W23 *Ulex europaeus*-*Rubus fruticosus* scrub; and
- vii. W24 *Rubus fruticosus*-*Holcus lanatus* under scrub.
- viii. MG1 *Arrhenatherum elatius* grassland;
- ix. MG6 *Lolium perenne*-*Cynosurus cristatus* grassland
- x. MG7 *Lolium perenne* leys and related grasslands
- xi. MG10 *Holcus lanatus*-*Juncus effusus* rush-pasture;
- xii. MG11 *Festuca rubra*-*Agrostis stolonifera*-*Potentilla anserina* grassland;
- xiii. MG13 *Agrostis stolonifera*-*Alopecurus geniculatus* grassland;
- xiv. OV26 *Epilobium hirsutum* community;
- xv. S10 *Equisetum fluviatile* swamp;
- xvi. S12 *Typha latifolia* swamp;
- xvii. S14 *Sparganium erectum* swamp;
- xviii. A2 *Lemna minor* community

7.74 No rare plants were recorded. NVC communities are discussed more fully below under broad habitat headings:

- i. Woodland.
- ii. Mesotrophic grassland; and

- iii. Open water/swamp;

Woodland

7.75 Scrub areas, particularly those close to watercourses, typically consisted of W1 *Salix cinerea-Galium palustre* woodland, dominated by Grey Willow. In drier areas, where Blackthorn became the predominant species, these were classified as W22 *Prunus spinosa-Rubus fruticosus* scrub. Only small areas were classified as W22. Similarly, small areas were classified as W23 *Ulex europaeus-Rubus fruticosus* scrub. The principal species in W23 was Gorse, alongside Bramble. The main broadleaved woodland areas were dominated by Ash and Dog's Mercury *Mercurialis perennis* and were categorised as W8 *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland and/or W9 *Fraxinus excelsior-Sorbus aucuparia-Mercurialis perennis* woodland. These are the characteristic woodlands of neutral soils in the lowlands. In the Proposed Development, they are found in the west, towards Hilton Farm. A very small area has been recorded as W14 *Fagus sylvatica-Rubus fruticosus* woodland. The principal species of tree in this woodland is Beech *Fagus sylvatica*, which at this location is not native and would have been planted.

Mesotrophic Grassland

7.76 The great majority of the site comprised improved and poor semi-improved neutral grassland communities – MG6 *Lolium perenne-Cynosurus cristatus* grassland and MG7 *Lolium perenne* leys and related grasslands. These were very species-poor, supporting species typical of agricultural improvement e.g. Perennial Rye-grass and White Clover. Damper areas (the Phase I semi-improved neutral grassland areas) supported a combination of MG10, MG11 and MG13. MG10 *Holcus lanatus-Juncus effusus* rush-pasture comprises a mix of the grass Yorkshire-fog *Holcus lanatus*, alongside Soft Rush *Juncus effusus*. In MG13 *Agrostis stolonifera-Alopecurus geniculatus* grassland, Creeping Bent *Agrostis stolonifera* becomes more prevalent. The area of unimproved neutral grassland in the east of the Proposed Development has been recorded as MG11 *Festuca*

rubra-Agrostis stolonifera-Potentilla anserina grassland. Here, Creeping Bent and Silverweed are occasional to frequent in the sward. Adjacent to this area is an area of ranker grassland, in which the main species is False Oat-grass *Arrhenatherum elatius*. This has been recorded as MG1 *Arrhenatherum elatius* grassland.

Open Water/Swamp

7.77 The swamp areas associated with the ponds in the centre of the site, were categorised according to their main constituent species. Thus, S10 *Equisetum fluviatile* swamp is dominated by Water Horsetail, S12 *Typha latifolia* swamp by Bulrush and S14 *Sparganium erectum* swamp by Branched Bur-reed. All three of these swamp types are dominated by single species, with few associated species. In addition, all three are found in standing water. The open water areas of the ponds are best categorised as the A2 *Lemna minor* community, which is characterised by the presence of abundant Common Duckweed *Lemna minor*. This species, and the presence of Bulrush and Branched Bur-reed all indicate that these ponds are either mesotrophic or eutrophic (mesotrophic being at or around neutral in terms of pH and eutrophic having a pH over 7).

Ornithology

Desk Study

- 7.78 The desk study identified in the 2km search area, records for 11 species on the EC Birds Directive Annex I and 19 species protected by the WCA 1981 Schedule 1 (as amended).
- 7.79 Most of these records are from Angle Bay and Freshwater West on the coast, and from Castlemartin further inland. These mainly comprised wader and wildfowl species.
- 7.80 The desk study identified 16 Section 7 (Environment (Wales) Act) bird species. There were also 16 species of red-listed Birds of Conservation Concern (Wales) recorded, most of which are the same as the S.7 species. The majority of the above species recorded close to the

site were passerine species, including Skylark *Alauda arvensis*, Linnet *Carduelis cannabina*, Dunnock *Prunella modularis* and Yellowhammer *Emberiza citrinella*.

7.81 In order to gain an updated picture of bird activity on the site, bird activity was surveyed through breeding bird surveys, Vantage Point surveys and wintering bird surveys. The surveys were designed following consultation responses and using expert knowledge of the proposed site and through work on many other wind farm sites. The methodology and results of the Vantage Point surveys were conducted in line with SNH methodology and guidance.

Breeding Bird Surveys

Method

7.82 Breeding bird surveys were carried out to gauge the value of the breeding bird community at the site during the spring and summer of 2020 and again during the spring and summer of 2021. It was determined that the most appropriate method for surveying breeding birds at the Proposed Development was an abridged version of the Common Birds Census (CBC) (Marchant, 1983)²⁷. The full CBC methodology requires ten visits to a study area. Previous experience and discussion and advice from NRW suggested that three survey visits would be required to obtain an accurate picture of breeding bird interest at the Proposed Development. To this end, three visits were carried out, between early and late June. The locations of all individual birds were marked onto field survey maps, with the emphasis placed on recording Birds of Conservation Concern (see Section 7.4). Wildlife and Countryside Act Schedule 1 species were also targeted.

²⁷ Marchant, J.H. (1983). Common Birds Census instructions. BTO, Tring.

Results

7.83 The results of the survey are shown in ES Figure 7.4 and Table 7.5 below. These indicated that in general the site is very poor for breeding birds of conservation concern. No waders or raptors were recorded as breeding at the site. Surveys in spring and summer 2021 corroborated this position.

Table 7.5: Birds of Conservation Concern Species Recorded During Breeding Bird Survey

Species	Estimated Breeding Status	Comments
Linnet <i>Carduelis cannabina</i>	Three or four pairs probably breeding within Core Study area	It is difficult to estimate the number of breeding pairs of Linnet in a given area, as the species is often semi-colonial.
Yellowhammer <i>Emberiza citrinella</i>	One pair probably breeding within the Core Study area	Yellowhammer were recorded at the eastern edge of the site.

Vantage Point Surveys

Method

7.84 VP surveys were conducted in line with the Scottish Natural Heritage (SNH) methodology (Ref. 6-29)²⁸. Thus, a minimum 36 ours of VP survey were conducted at each VP during the non-breeding season and 36 hours during the breeding season.

²⁸ SNH, (2014). Recommended Bird Survey Methods to inform Impact Assessment of Onshore Wind Farms SNH Advisory Services.

- 7.85 The target species recorded were selected as per SNH guidance and included species listed on Annex 1 of the EC Birds Directive, Schedule 1 of the WCA 1981 (as amended), Red-listed BoCC and migratory waterfowl.
- 7.86 Two VPs were selected to cover the site. VP locations were chosen digitally and the viewsheds corroborated in the field. The locations were chosen to provide the required coverage of the turbine areas from the minimum possible number of locations.

Results

- 7.87 Very few target species were recorded throughout the year and none in significant numbers.

Mammals

Bats

- 7.88 All British bats are species of European importance and are protected by The Conservation of Habitats and Species Regulations 2010. Under this legislation, it is an offence to:
- i. Intentionally or deliberately or recklessly kill, injure or capture (take) bats;
 - ii. Deliberately or recklessly disturb bats (whether in a roost or not);
 - iii. Deliberately or recklessly damage, destroy or obstruct access to bat roosts;
 - iv. Possess or transport a bat or any parts of bats, unless acquired legally; and
 - v. Sell, barter or exchange bats, or parts of bats.
- 7.89 The definition of disturbance includes in particular any disturbance which is likely to impair their ability to survive, to breed or reproduce, or to rear or nurture their young, or in the case of animals of a hibernating or migratory species, to hibernate or migrate; or to affect significantly the local distribution or abundance of the species to which they belong. The

definition of a bat roost is 'any structure or place which any bat uses for shelter or protection'. As bats tend to re-use the same roosts, general opinion amongst conservation agencies is that the roost is protected whether or not the bats are present at the time.

- 7.90 A licence is usually required in derogation from the otherwise illegal activities, including development that could affect bat roosts in the manner described above. This is obtainable from the Welsh Government or NRW (depending on the type and purpose of activity) on the submission of a method statement detailing the works required, and a mitigation package designed to maintain a favourable conservation status of bat populations.
- 7.91 A search of bat records through WWBIC was carried out in order to compile existing information, particularly on known roosts.
- 7.92 Seven species of bat have been recorded in the search area. These are Greater Horseshoe *Rhinolophus ferrumequinum*, Lesser Horseshoe *R. hipposideros*, Daubenton's Bat *Myotis daubentonii*, Common Pipistrelle *Pipistrellus pipistrellus*, Soprano Pipistrelle *P. pygmaeus*, Brown Long-eared *Plecotus auritus* and Noctule *Nyctalus noctula*. Greater Horseshoe and Lesser Horseshoe are listed on Annex II(a) and IV(a) of the EC Habitats Directive and all other bat species are on Annex IV(a) of the EC Habitats Directive. All bat species are listed on Schedule 5 of the WCA 1981 (as amended). All these species, apart from Daubenton's Bat are also listed on Section 7 of the Environment (Wales) Act (2016).
- 7.93 Records are available for four main bat roosts in the 2km search area and cover the period between 1978 and 2015. A further seven roosts are found within the 2 – 4km search area. None are within the core study area. The closest records are for Greater Horseshoe bat, Daubenton's Bat, Common Pipistrelle and Noctule, all from a roost at Wogaston Farm, Angle, approximately 1km away from the core study area.

Survey Method

- 7.94 Bats were surveyed in accordance with recent Bat Conservation Trust (BCT) guidelines (Bat Conservation Trust, 2019)²⁹. The survey method entailed the use of static recording surveys with survey effort and timing determined with reference to the BCT guidelines.
- 7.95 The site was rated as high risk in line with the BCT guidelines. This was because the site had a number of known bat roosts within the immediate surrounding area (within 2km). It also supported a network of hedgerows and watercourses, all of which could act as linear flight line features. Furthermore, this area of Pembrokeshire is known to support a high diversity of bat species, some of which are known to be present in high numbers. These include species, such as Greater and Lesser Horseshoe, regarded as of particular conservation concern. In line with the BCT guidelines, in 2020, five Song Meter SM2 detectors were deployed for ten night periods during the spring, summer and autumn. These were located at the Turbine positions. Further survey took place during spring and summer 2021 and autumn 2021. In 2021, survey concentrated on three turbine positions, as the scheme had changed from a five turbine proposal to a three turbine proposal. In addition, on the recommendation of NRW, static detectors were placed in locations at which hedgerows would potentially be severed by tracks. Details of relevant roosts will also be included in this standalone report, along with details of surveyors, survey timings and weather conditions.

Results

- 7.96 The results from static surveys generally recorded low levels of bat activity at each of the Turbine locations, with moderate activity in the vicinity of Turbine 2 (spring and autumn), Turbine 4 (autumn) and Turbine 5 (autumn); four of the Song Meter recorders recorded

²⁹ Scottish Natural Heritage, Natural England, Natural Resources Wales, Renewable UK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter and the Bat Conservation Trust (BCT) January 2019 Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation

Greater Horseshoe and two recorded Lesser Horseshoe. Both these species are of particular conservation concern on the basis of low overall population numbers. These species are not prone to collision risk from wind turbines. They are reliant on the presence of good flight lines i.e. the retention of boundaries.

7.97 The species recorded at the three turbine locations³⁰ in 2020 are described below and total numbers tabulated in Table 7.7:

- i. Turbine 1 (formerly Turbine 1): Low levels of Pipistrelle activity in this area, this consisting of both Common and Soprano species. Two passes of Greater Horseshoe were also recorded.
- ii. Turbine 2a (formerly Turbine 2): Moderate numbers of Pipistrelles (Common and Soprano) were recorded at this location. Several passes of Noctule were also recorded in the spring and a single Lesser Horseshoe pass was recorded. In the autumn, 83 passes of Greater Horseshoe were recorded. It is likely that higher numbers of bats were recorded here as it is relatively close to an area of rank grassland and scrub, which would increase numbers of insect prey.
- iii. Turbine 3 (formerly Turbine 5): Very low numbers of Pipistrelles and Noctule were recorded in the spring along with a single Brown Long-eared. A higher number of passes of Soprano Pipistrelle were recorded in the autumn (146). Low numbers of passes of Greater Horseshoe were recorded in both the summer (3) and autumn (1).

³⁰ The results presented here take account of the change of layout from five to three turbines.

Table 7.7: Summary of Species Detected at SM2 Locations

Species	Detector Turbine 1	Detector Turbine 2a	Detector Turbine 3
Common Pipistrelle	6	71	26
Soprano Pipistrelle	13	76	154
Nathusius' Pipistrelle			
Noctule	0	29	3
Brown Long-eared	0	0	1
Lesser Horseshoe	0	1	0
Greater Horseshoe	2	83	4
Daubenton's		1	

¹ Numbers refer to numbers of Song Meter files generated (i.e. registrations) and not to total numbers of individuals.

* Some of these were possible/probable recordings.

Otter

7.98 Otter *Lutra lutra* is an EPS and is protected under Annex II(a) and IV(a) of the EC Habitats Directive, which has been transposed into UK law through the Conservation of Habitats and Species Regulations 2010. Under the Regulations 2010 it is an offence to deliberately kill, capture, or disturb an EPS, or to damage or destroy the breeding site or resting place of

such an animal. If construction works are planned within 200m of an otter breeding site, this will require an EPS licence. Similarly, works within 30m of a resting place also require a licence. Otter is also protected under Schedule 5 of the WCA 1981 (as amended) and is a UK BAP and Pembrokeshire LBAP species (Powys Biodiversity Partnership, 2011)³¹.

7.99 The desk study identified that there are four records for Otter across four sites in the search area (i.e. within the 2km surrounding the application area), covering the period 1988 to 1993. None of the records are within the Core Study area, the closest record is 761m to the south-west.

Survey Method

7.100 Updated surveys for Otter were carried out in summer 2020. The surveys targeted all watercourses and other suitable habitat and followed standard methodologies for these species (Chanin and Strachan *et al.*)³². Otter survey entailed searching for field signs, including spraints (faeces), tracks, paths, food remains and shelters (holts and couches). This last (i.e. the presence of holts and/or couches) is a particularly important survey requirement, in that breeding sites and resting places are specifically mentioned in the European legislation covering this species. Survey after heavy rain was avoided, as such conditions frequently wash Otter signs away.

Results

7.101 No signs of Otter were recorded.

Water Vole

7.102 Water Vole *Arvicola amphibius* is a fully protected species under section 9 of the WCA 1981. Amendments to the WCA (in 2008) mean that it is now an offence to intentionally kill, injure

³¹ A Local Biodiversity Action Plan for Pembrokeshire. (2011). Pembrokeshire Biodiversity Partnership.

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

or take the animal itself. Water vole is also listed as a Priority Species under the UK BAP and Pembrokeshire LBAP (Pembrokeshire Biodiversity Partnership, 2011)³³.

7.103 There are no records of Water Vole in the 2km search area.

Survey Method

7.104 Surveys for Water Vole following standard methodologies (Strachan *et al*, 2011)³⁴ were carried out in autumn 2020. Water Vole survey encompassed the survey of water courses and the edges of waterbodies, searching for field signs: burrows, droppings and feeding piles (for example, piles of pith from Soft Rush *Juncus effusus*). All water courses were walked and banks and adjacent riparian vegetation checked for signs of Water Voles. Areas of marshy grassland dominated by rush, tall grass and sedge and adjacent to watercourses (favoured Water Vole habitat), were particularly targeted, as were any 'swampy' areas. Field signs of Water Vole include burrows, latrines and feeding piles. Particular emphasis was applied to the recording of droppings which are now regarded as the most reliable field sign. Habitat type and quality were recorded, and positions of features established using a GPS.

Results

7.105 No signs of Water Vole were recorded.

Badger

7.106 Badger *Meles meles* is protected under the Protection of Badgers Act 1992. Under this legislation, the following are considered to be criminal offences:

³³ Chanin, P. (2003). Monitoring the Otter *Lutra lutra*. Conserving Natura 2000 Rivers. Monitoring Series No.10. English Nature, Peterborough.

³⁴ Strachan, R. et al. (2011). Water Vole Conservation Handbook: Third Edition. WildCRU, Oxford.

- i. To wilfully (or recklessly) kill, injure, take, possess or cruelly ill-treat a badger, or to attempt to do so;
- ii. To interfere with a sett by damaging or destroying it;
- iii. To obstruct access to, or any entrance of, a badger sett; and
- iv. To disturb a badger when it is occupying a sett.

7.107 Disturbance is defined by NRW as any new procedure that approaches within a minimum of 30m of a sett margin. For particularly severe effects, likely to cause major disturbance, this buffer zone may be extended to 100m. Activities within these zones can only be undertaken legally under a licence from NRW.

7.108 The desk study identified five records for Badger in the 2km search area. None of the records are from within the core study area, though the closest record is just to the west of the core study area boundary. Records were from north-east of the site as well as further to the south-west.

Survey Method

7.109 A Badger survey of the application site was completed in summer 2020 following standard guidance from the Mammal Society (Harris *et al*, 1991)³⁵. Targeted areas featured slopes and track margins, and especially any areas with free-draining soils, which would be most suitable for sett excavation. Field signs of Badger included tracks, paths, feeding signs, latrines and setts. Survey concentrated on the recording of active Badger setts.

Results

7.110 Four Badger setts were identified within the core study area (location provided in Confidential ES Figure 7.6). The closest sett is located over 150m from the closest proposed

³⁵ Harris, S., Cresswell, P. & Jeffries, D., (1991). Surveying for Badgers. Mammal Society.

turbine location. Other signs of Badgers such as latrines were frequent in parts of the site, particularly associated with hedgerows.

Great Crested Newt

- 7.111 Great Crested Newt *Triturus cristatus* is an EPS and is fully protected through the EC Habitats Directive, as transposed by the Conservation of Habitats and Species Regulations 2010, and under the WCA 1981 (and Amendments) and it is also a UK BAP species.
- 7.112 There were no records of Great Crested Newt within the search area. Based on previous survey results (from 2012 when none were found) and the geographical location (away from the known Great Crested Newt range), no original survey for this species was carried out. It is considered that Great Crested Newt are not present at the site.

Other Fauna

- 7.113 The desk study identified records of other notable species in the 2km search area including Polecat *Mustela putorius*, Stoat *M. erminea*, Weasel *Micromys minutus*, Roe Deer *Capreolus capreolus*, Common Toad *Bufo bufo*, Common Frog *Rana temporaria*, Palmate Newt *Lissotriton helveticus*, Common Lizard *Zootoca vivipara*, Grass Snake *Natrix natrix*, and Slow-worm *Anguis fragilis*. None of these records were from within the core study area.
- 7.114 The desk study identified a number of other notable vascular plants, bryophytes, lichens, fungi and invertebrates in the search area, although none within the core study area.

Ecological Evaluation of the Study Area

Legislative Requirements

- 7.115 A number of habitats and species that were recorded within the study area are subject to legislative requirements. These habitats and species are listed in

7.116 8, together with the relevant legislation.

Other Evaluation Criteria

7.117 A number of the species recorded in the study area are listed as BAP species, either at a national level or at a local level, or both. In addition, some of the bird species are listed by RSPB Wales as BoCC (RSPB, 2016)³⁶. These species are detailed in

7.118 8. In this table, 'rare' indicates the species is found in very low numbers within the core study area, 'scarce' in slightly greater numbers, and 'common' in high numbers.

Overall Evaluation

Habitats

7.119 The key habitats present in the Proposed Development are semi-natural broadleaved woodland, wet woodland and swamp. All three are UK BAP priority habitats, the first encompassed by the category 'lowland mixed deciduous woodland', the second by 'wet woodland' and the last by the category 'fens'. The UK BAP is underlined by legislation in the Environment (Wales) Act (Section 7) (Welsh Government, 2016)³⁷.

7.120 The total area of lowland mixed deciduous woodland in Wales has been estimated at 12,310 ha (Jones *et al*, 2003)³⁸. The total for Pembrokeshire is estimated as 1,800ha. The total for the Proposed Development is 2.25ha. It is thus a very small proportion of the total area for Pembrokeshire. Despite this, some of the species associated with the mixed

³⁶ Johnstone, I. and Bladwell, S. (2016). Birds of Conservation Concern in Wales 3: the population status of birds in Wales, RSPB

³⁷ Welsh Government. Environment (Wales) Act 2016: Section 7 list of species of principal importance for conservation of biological diversity in Wales.

³⁸ Jones, P.S., Stevens, D.P., Blackstock, T.H., Burrows, C.R. and Howe, E.A.. 2003. Priority habitats of Wales a technical guide. Countryside Council for Wales.

deciduous woodland in the proposal appear to be long-established and potentially indicative of ancient woodland. This habitat is therefore rated as of District level of value.

- 7.121 The total area of wet woodland in Wales has been estimated as 9,060 ha (Jones *et al*, 2003)³⁹. It is a widespread, though localised habitat. The total for Pembrokeshire is estimated at 520ha. The total for the Proposed Development is in the order of 4.5ha. The majority of the areas marked as scrub as a Phase I category comprise wet woodland, principally of the NVC community W1, dominated by Grey Willow. These are largely associated with the main watercourse through the site (alongside the swamp communities), though also with areas of impeded drainage elsewhere in the site. Many areas of wet woodland in Wales have been subject to felling and drainage and for this reason the wet woodland within the Proposed Development must be regarded as important. However, the small extent of this woodland, forming only 0.9% of the total for Pembrokeshire, means that it should only be rated as of District level of value.
- 7.122 The areas of swamp within the Proposed Development are representative of the UK BAP habitat 'fens'. They include the NVC categories S10, S12 and S14. Together they form only a small area of the total Proposed Development (0.14ha). The total for Wales as a whole is 1,370ha, the small extent reflecting the fact that this is a localised habitat. The total for Pembrokeshire is 220ha, a relatively high proportion of the total Wales extent. The Proposed Development therefore supports only a very small percentage of the overall Pembrokeshire total (i.e. 0.06%). It has therefore been rated as of District level of value.
- 7.123 The other UK BAP habitats in the Proposed Development – basic flush (UK BAP habitat Fens) and unimproved neutral grassland (UK BAP habitat Lowland meadows) have been rated as of Parish/neighbourhood level of value. This is because they are species-poor, and limited in their extent. They are still, however, above the level of negligible ecological value.

³⁹ Jones, P.S., Stevens, D.P., Blackstock, T.H., Burrows, C.R. and Howe, E.A.. 2003. Priority habitats of Wales a technical guide. Countryside Council for Wales.

7.124 The remaining habitats on the site – improved and poor semi-improved grassland and arable, are of less than local value in terms of their vegetation. However, it should be noted that arable habitats provide suitable conditions for a number of declining species, including a number of bird species. This is the case at the Proposed Development with both Yellowhammer and Linnet associated with the arable areas.

7.125 No individual species of higher or lower plants were recorded that are either legislated for or are regarded as of particular value under other criteria (e.g. red list status).

Birds

7.126 Two passerines, Yellowhammer and Linnet, are listed in Table 7.8. These were probably breeding in very low numbers in the Proposed Development. Accurate figures for total populations of these species are not available for Wales. However, based on Welsh Breeding Birds Survey data, Linnet and particularly Yellowhammer continue to undergo declines nationally. Figures for breeding Linnet in Pembrokeshire suggest that the county population was approximately 8,600 pairs in the 1980s and has potentially increased since then (there has been an increase in the number of occupied survey tetrads) (Haycock *et al*, 2008)⁴⁰. This is in contrast to national UK and Welsh trends for this species. The very low numbers of Linnet recorded as probably breeding in the Proposed Development cannot be regarded as significant in the context of an overall county population of 8,600 pairs. They are therefore rated as of Parish/neighbourhood level of value.

7.127 In contrast to Linnet, Yellowhammer have undergone substantial declines in the county (as well as Wales as a whole and at a national UK level). Figures for breeding Yellowhammer in Pembrokeshire suggest that the county population is approximately 800 pairs. This has

⁴⁰ Haycock, A., Haycock, B., Rees, G., Sutcliffe, S., Hodges, J. (2008). Atlas of Breeding Birds in Pembrokeshire 2003 – 2007.

declined from an estimated 13,000 pairs in the 1980s (Haycock *et al*, 2008)⁴¹. The fact that a single pair is breeding at the Proposed Development assumes some importance in relation to the total county population. Yellowhammer within the Proposed Development has therefore been rated as of District level of value.

Bats

- 7.128 The site is clearly of value overall for its assemblage of bat species. This is both in terms of the range of bat species using the site and the numbers of certain species. At least 8 species of bat were found to use the site, including a number of localised species (both Horseshoe species and Noctule). The site appeared to be more important for some species than others, and this must relate to the proximity of roost sites. The regularity of records of Greater Horseshoe suggests the site is of County level of value for this species. This is allowing for the fact that Pembrokeshire as a whole is a key county for this species. The other species that have been rated as of County level of value at the site are Common and Soprano Pipistrelles. This is based on the moderate number of these species recorded. The records of Nathusius' Pipistrelle are also of interest as this species is greatly under-recorded and it is unclear how widespread it is.
- 7.129 All other species of bat were rated as of District level of value. This is based on the fact that populations of these species foraging at the site were not markedly high and/or that records were intermittent. Static recording records of these species did not indicate that the site is a key foraging location for any of these species.

Other Mammals

⁴¹ Haycock, A., Haycock, B., Rees, G., Sutcliffe, S., Hodges, J. (2008). Atlas of Breeding Birds in Pembrokeshire 2003 – 2007.

7.130 For the most part, the Proposed Development cannot be regarded as holding significant populations of any of the other mammal species recorded. Indeed, no records were made of the majority of protected mammal species, including Otter and Water Vole. The exception to this was Badger, and the site has been rated as of District value for this species. This is because there are at least four active setts on the site. Even in the context of a county which has generally high Badger numbers, this appears to be a high density.

Table 7.8: Ecological Value of Sensitive Receptors in the Context of the Study Area

Habitat/Species	Ecological Value	Description/Status	Legislation	BAP status*	Wales BoCC Status
Designated Sites					
Limestone Coast of South West Wales SAC	International	610m sw of core study area	EC Habitats Directive	-	-
Pembrokeshire Marine SAC	International	730m w of core study area	EC Habitats Directive	-	-
Pembrokeshire Bat Sites and Bosherton Lakes SAC	International	4.5km sw of core study area	EC Habitats Directive		
Castlemartin Coast SPA	International	800m to sw of core study area	EC Habitats Directive	-	-
Angle peninsula Coast	National	2.7km to wsw of core study area	WCA	-	-
Broomhill Burrows	National	610m to sw of core study area	WCA	-	-
Castlemartin Range	National	2.5km to sw of core study area	WCA	-	-
Castlemartin Corse	National	1.4km to sw of core study area	WCA	-	-
Milford Haven Waterway	National	715m to w of core study area	WCA	-	-
Gweunydd Somerton Meadows	National	2km to se	WCA	-	-

Table 7.8: Ecological Value of Sensitive Receptors in the Context of the Study Area

Habitat/Species	Ecological Value	Description/Status	Legislation	BAP status*	Wales BoCC Status
Habitats					
Broad-leaved woodland	District	Small area (2.25ha) of semi-natural UK BAP habitat (lowland mixed deciduous woodland)	-	UK BAP, LBAP	-
Wet woodland	District	Small areas close to watercourses (approximately 4.5ha)	-	UK BAP, LBAP	-
Swamp (Fen)	District	Small area (0.14ha) of UK BAP habitat fens, which encompasses swamps	-	UK BAP, LBAP	-
Basic flush	Parish/ neighbourhood	0.4ha small species-poor example	-	UK BAP, LBAP	-
Unimproved neutral grassland	Parish/ neighbourhood	1.2ha poor quality example of UK BAP habitat	-	UK BAP, LBAP	-
Fauna					
Badger	District	Four active setts within the core study area (Common)	Protection of Badgers Act 1992	-	-
Noctule	District	Small numbers foraging over site	Schedule 5 WCA;	UKBAP	-

Table 7.8: Ecological Value of Sensitive Receptors in the Context of the Study Area

Habitat/Species	Ecological Value	Description/Status	Legislation	BAP status*	Wales BoCC Status
		occasionally; no roost potential on site (Scarce)	European Protected Species; Section 7, Environment(Wales) Act		
Greater Horseshoe Bat	County	Regular site records, suggesting site forms key foraging area; no roost potential on site (Scarce/common)	Schedule 5 WCA; European Protected Species; Section 7, Environment(Wales) Act	UK BAP, LBAP	-
Lesser Horseshoe Bat	District	Occasional site records, site probably not a key foraging area; no roost potential on site (Scarce)	Schedule 5 WCA; European Protected Species; Section 7, Environment(Wales) Act	UK BAP, LBAP	-
<i>Pipistrelles</i> spp.	County	Regular site records, probably a key foraging area (especially for Soprano Pipistrelle); roost sites close to site boundary (e.g.	Schedule 5 WCA; European Protected Species; Section 7, Environment	UKBAP, LBAP	-

Table 7.8: Ecological Value of Sensitive Receptors in the Context of the Study Area

Habitat/Species	Ecological Value	Description/Status	Legislation	BAP status*	Wales BoCC Status
		Rhoscrowther church) (Common)	nt(Wales) Act		
Brown long-eared bat	District	Low number of site records; not recorded from nearby roosts (Rare)	Schedule 5 WCA; European Protected Species; Section 7, Environment(Wales) Act	UKBAP, LBAP	-
Daubenton’s bat	District	Low number of site records; not recorded from nearby roosts (Rare)	Schedule 5 WCA; European Protected Species; Section 7, Environment(Wales) Act		
Linnet	Parish/ neighbourhood	Very small numbers of birds probably breeding (Scarce)	Section 7, Environment(Wales) Act	UK BAP, LBAP	Red list
Yellowhammer	District	Very small numbers of birds probably breeding (Scarce)	Section 7, Environment(Wales) Act	UK BAP, LBAP	Red list

Design Optimisation

7.131 The layout of the wind farm has followed an iterative approach, with turbine, track and other infrastructure locations being partly dictated by the presence of on-site constraints, including sensitive ecological receptors. Turbine locations have been moved to avoid sensitive habitats. The wind farm design has also sought to avoid collision risk impacts on bats by ensuring each turbine position is greater than 50m from the nearest boundary feature (i.e., boundaries that could be used as flight lines for bats).

Description of Construction Period Effects

7.132 The construction, operation and decommissioning of the Proposed Development may result in a range of effects on sensitive ecological receptors. The proposed turbine and track locations are detailed in Chapter 3: Project Description, along with the locations of other infrastructure. Potential effects may be either temporary or permanent. For example, potential temporary displacement effects may be reversible either after construction or upon decommissioning. The hazard exposure of a particular species should consider the number of individuals observed and the behaviour of those individuals in the proximity of the proposed turbines, e.g., level of flight activity. Consideration is also given to the potential for indirect effects, e.g., hydrological effects or the effects of airborne particles on habitats. There may also be the potential for the Development to indirectly affect nearby designated sites such as SSSIs, etc by, for example, affecting species which are present in the designated site for part of their life cycle/at certain times of year, and are present within the study area at other times of the year.

Internationally Designated Sites and Habitats Regulations Assessment

7.133 Consideration was given to potential impacts on internationally designated sites within a 3km radius of the Development proposal. These include Limestone Coast of South West

Wales SAC, Pembrokeshire Marine SAC and Castlemartin Coast SPA. A review of the features for which these international sites are designated ascertained that they will not be directly or indirectly impacted by the Proposed Development. There is no possible ecological connection, between these internationally designated sites and the Proposed Development.

- 7.134 Consideration was given to the possibility of greater horseshoe bats associated with the Limestone Coast of South West Wales SAC and Pembrokeshire Bat Sites and Bosherton Lakes SAC interacting with the development. It was considered unlikely that individuals from these sites would choose to forage at the development in preference to the many other areas of suitable habitat much closer to the SACs. Therefore, there is no functional linkage between the bat SACs and the development. In addition, greater horseshoe bat is not considered a collision risk species (hunting at a much lower height than turbine blade sweep) and therefore populations will not be at risk from the operation of a three-turbine wind farm. Consideration is given to the severance of hedgerows in relation to flightlines and mitigation is proposed in 7.143. Given the slight possibility that the site has some very minor connection with the SACs, an HRA screening was conducted. This can be found at ES Appendix 7.4.
- 7.135 There is no functional linkage between bird features of the Castlemartin SPA (i.e., chough) and the development. Repeated bird surveys at the site have never recorded this species as being present. Chough is further considered in an HRA in Appendix 7.4.

Nationally Designated Sites

- 7.136 Six SSSIs are located within a 3km radius of the edge of the Proposed Development. These include Angle Peninsula Coast, Broomhill Burrows, Castlemartin Range, Castlemartin Corse, Milford Haven Waterway and Gweunydd Somerton Meadows. A review of the citation information for these SSSIs ascertained that they will not be directly or indirectly impacted by the Proposed Development. This is based on a consideration of the species/habitats for

which they are designated, the distance at which they lie from the Proposed Development and the potential for any possible ecological connection.

Habitats

Physical Landtake and Subsequent Loss of Habitat from The Wind Farm Infrastructure

7.137 Physical landtake would entail both the direct removal of habitat for turbines and associated infrastructure (access tracks, construction compound, substation, borrow pits, anemometer mast etc). The total landtake for the Proposed Development is approximately 13.4ha. This figure includes landtake for all infrastructure within the Proposed Development and for the main access track to the site. Landtake will result in the permanent loss of habitat from these areas at least for the 35-year duration of the project. It could also cause the indirect effect of habitat degradation in surrounding areas.

7.138 Physical landtake will only take place in the following habitats: improved and poor semi-improved grassland and arable. These are habitats of very low ecological value. Effects are anticipated as being negative (minor significance).

Alteration In The Ph of Surrounding Habitats

7.139 Materials from construction (alkaline dust, particulates, etc) may drift on to surrounding good quality habitat (e.g. the main watercourse and associated swamp communities). 'Natural' dust suppression is likely to take place through the presence of wet woodland and swamp habitats. These are both known to be ecosystems that are able to counteract the effects of pollutants. Furthermore, the normal dust suppression measures adopted in good construction practice would also avoid such effects on valued vegetation. Effects are anticipated as being negative (minor significance).

Deposition of Waste Materials

7.140 Soil could potentially be deposited in some of the on-site good quality habitats. This would have negative impacts on biodiversity associated with these habitats. See Chapter 9: Soils and Water for discussion of potential pollution incidents. Waste soil will be deposited on low value habitats, such as improved or poor semi-improved grasslands/arable habitats. Effects are anticipated as being negative (minor significance).

Fauna

Birds

Disturbance to Breeding Birds

7.141 The breeding bird assemblage at Rhoscrowther is limited, with only a very small number of species/pairs of conservation concern (e.g. Yellowhammer, Linnet). However, all birds and their nests are protected by the Wildlife and Countryside Act. There is potential for disturbance to breeding birds should construction works be carried out during the breeding season. Effects are anticipated as being negative (moderate to minor significance). The range of significance is a result of the different conservation value of the different species. For example, the loss of a breeding pair of Yellowhammer would be rated as of moderate significance, whereas the loss of a breeding pair of a species of less conservation value (e.g. Robin *Erithacus rubecula*) would be rated as of minor significance.

Removal of Habitat

7.142 The removal of habitat for construction could potentially have impacts on the breeding bird assemblage. However, the habitats proposed for construction are of very low ecological quality and are only likely to support very few breeding birds. However, if hedgerows or sections of hedgerows are to be removed during the breeding season, this could have a detrimental impact (both Linnet and Yellowhammer breed in hedgerows). Effects are anticipated as being negative (moderate significance).

Bats**Lighting**

7.143 If any construction was to take place during the hours of darkness, this could have negative effects on bats foraging. It is anticipated however, that controls will be in place, limiting the amount of artificial lighting of the Proposed Development during the construction phase. Effects are anticipated as being negative (minor significance).

Removal of Flight Lines

7.144 The Proposed Development is of importance for foraging bats. In particular, specific flight lines may be of importance. It is not anticipated that significant lengths of hedgerow will be removed. However, if hedgerows were removed, particularly in key foraging sections, this would have a detrimental effect on bat flight lines⁴². Effects are anticipated as being negative (moderate significance) (Table 7.3).

Disturbance To Badger

7.145 Construction works could potentially disturb active Badger setts if carried out within close proximity. In reality, effects are unlikely to take place, as the turbine positions are at a sufficient distance from identified Badger setts. Setts are closely associated with site boundaries. Track positions would avoid known setts. Effects are anticipated as being negative (moderate significance) (Table 7.3).

Dormouse

7.146 Consideration was given to the potential for impacts on dormouse through the severance of hedgerows (i.e., preventing passage of this largely arboreal species). It is considered extremely unlikely that dormouse are present in hedgerows at the site, given that there

⁴² Surveys have taken place during 2021 of potential foraging locations across the site. These comprise hedgerow locations that may be impacted by removal of sections for tracks.

are very few records for the immediate area, the lack of connection from the development footprint and woodlands and the poor diversity of food plants. Standard mitigation working practices will be adopted with respect to dormouse (see 7.148).

Mitigation of Construction Period Effects

Habitats

7.147 No significant construction period effects are anticipated for habitats as all infrastructure is proposed for areas of low ecological value (i.e., improved and poor semi-improved grasslands and arable areas). Potential effects from drifting of dust on to higher quality habitats will be counteracted through normal working practices.

Fauna

Birds

7.148 In order to avoid disturbance effects on breeding birds, and to comply with the Wildlife and Countryside Act in this respect, works should be undertaken outside the main bird nesting season, considered to be March – August inclusive. Furthermore, in order to mitigate vegetation removal effects on nesting birds, again, the main nesting season should be avoided.

7.149 If this is unworkable, vegetation should be checked immediately ahead of the works for the presence of nesting or nest-building birds. If nests are found, then they should be left undisturbed with at least 5m (recommended standard) of cover around the nest, until the young have fledged, and the nest is no longer in use.

Bats

7.150 Key bat flight line areas (i.e., boundaries showing high usage by bats) have largely been avoided. In general, hedgerow removal should be kept to a minimum. If hedges or other flight lines are to be removed for the construction of tracks, and this takes place during the

active bat season, gaps should be temporarily 'closed' before dusk each day. This can be achieved through the use of suitable fencing such as 'Heras'. At the conclusion of construction works, as much of the gap area as possible (allowing for access by construction traffic) should be replanted and the remaining entrance should be gated. This will ensure that boundaries are continuous and can continue to function as flight lines for foraging bats.

Badger

7.151 All turbines, tracks and other infrastructure will be positioned over 30m from the nearest active badger setts.

Dormouse

7.152 Pre-construction surveys will take place with respect to dormouse. These will include checks for nests should any hedgerow clearance take place during the hibernation period. If dormouse are found to be present in hedgerows at the development, appropriate vegetation clearance methods will be instigated. An EPS licence will be obtained for hedgerow removal. The use of licensed surveyors with a high degree of experience in working with dormice, will ensure that there will be no residual impact to this species. There will be no impact on this species' conservation status.

Residual Construction Period Effects

7.153 Following the implementation of suitable mitigation measures, it is not anticipated that there will be any significant residual construction period effects.

Description of Operational and Long-term Effects

Designated Sites

7.154 The lack of ecological connection between the Proposed Development and any internationally or nationally designated sites means that there will be no impact on these sites.

Habitats

7.155 The low levels of traffic associated with maintenance of the Proposed Development, and the avoidance of key habitats (during construction) means that there will be negligible impact on habitats from site operation.

Fauna

Birds

7.156 The combination of well-spaced turbines and the relatively low density of birds using the proposed site makes the risk of bird collision very low. Bird collisions are often raised as an issue concerning wind farm developments. However, a number of studies (Winkelman, 1985⁴³, Winkelman, 1992⁴⁴, Musters *et al*, 1996⁴⁵, Still *et al*, 1995⁴⁶) have shown that, in general, operational wind turbines have negligible effects on bird populations. Where turbines are present in much greater numbers, and are inappropriately sited on migration

⁴³ Winkelman, J.E. (1985) Impact of medium-sized wind turbines on birds: a survey of flight behaviour, victims and disturbance. *Neth.J.Agric.Sci.* 33:75-78.

⁴⁴ Winkelman, J.E., (1992). The impact of the Sep Wind park near Oosterbierum, The Netherlands, on birds, 1: collision risks. RIN Report No. 92/2.

⁴⁵ Musters, C.J.M., Noordervliet, M.A.W. and Ter Keurs, W. J., (1996). Bird casualties caused by a wind energy project in an estuary. *Bird Study* 43: 124 – 126.

⁴⁶ Still, D., Little, B. and Lawrence, S., (1995). The effect of wind turbines on the bird population at Blyth Harbour ETSU Report. 34pp.

and/or important breeding sites, more serious effects can arise (Orloff and Flannery, 1992⁴⁷, SEO/Birdlife, 1995⁴⁸). The proposed site is not on a recognised migration route. It does, however, provide occasional hunting or foraging habitat for a number of species protected by legislation and/or of conservation concern. Despite this, the numbers of birds breeding or flying over the proposed site do not pose any serious risk of collision.

7.157 Overall effects are therefore anticipated as being negative (minor).

Bats

7.158 There is a low potential for blades to strike resident bat species. Mitchell-Jones and Carlin (2009)⁴⁹ have carried out an analysis of available information related to UK bats and wind turbines. Although some areas are still in need of research (e.g. definitive answers as to whether any British bats migrate), it is clear from the available information that those species that forage at height are much more likely to collide with operational turbine blades. The only species recorded in the proposed site which falls into the higher risk category of Mitchell-Jones and Carlin (2009)⁵⁰ is Noctule. However, few records were made of Noctule over the course of the survey, from the static recordings. Two species recorded within the PDA (Common and Soprano Pipistrelle) fall into the medium risk category of Mitchell-Jones and Carlin (2009)⁵¹. However, records of these species were made from

⁴⁷ Orloff, S. & Flannery, A., (1992). Wind Turbine Effects on Avian Activity, Habitat Use and Mortality in Altamont Pass and Solano County Wind Resource Areas, 1989-1991. California Energy Commission. www.energy.ca.gov/reports

⁴⁸ SEO/BirdLife, (1995). Effects of wind turbine power plants on the avifauna in the Campo de Gibraltar region. Summary of final report commissioned by the Environmental Agency of the Regional Government of Andalusia. Unpublished, Sociedad Espanola de Ornitologia, Madrid.

⁴⁹ Mitchell-Jones T. & Carlin C., (2009). Bats and onshore wind turbines. Natural England Technical Information Note TIN051.

⁵⁰ Mitchell-Jones T. & Carlin C., (2009). Bats and onshore wind turbines. Natural England Technical Information Note TIN051.

⁵¹ Mitchell-Jones T. & Carlin C., (2009). Bats and onshore wind turbines. Natural England Technical Information Note TIN051.

areas well away from proposed turbines. In addition, all turbines are positioned at greater than 50m from any boundaries. The majority of species recorded were highly associated with on-site boundaries and with areas of scrub. Furthermore, survey revealed that these species were not flying at a height that would intersect with the blade sweep of the turbine dimensions proposed. A number of the key conservation species recorded e.g. Greater and Lesser Horseshoes are known to fly at very low heights, typically below 5m (Billington and Rawlinson, 2003)⁵². In summary, the paucity of at-risk species (i.e. Noctule) means that effects are anticipated as negative (minor).

Mitigation of Operational and Long-term Effects

Designated Sites

7.159 No mitigation is considered necessary for effects on designated sites, as these effects are negligible.

Habitats

7.160 No mitigation is considered necessary for effects on habitats, as these effects are negligible.

Fauna

Birds

7.161 No mitigation is considered necessary for effects on birds, as these effects are not significant.

Bats

7.162 No mitigation is considered necessary for effects on bats, as these effects are not significant.

⁵² Billington G. & Rawlinson M.D. (2003). A review of horseshoe bats flight lines and feeding areas.

Cumulative Effects

7.163 The potential for cumulative effects was considered. Three other relevant schemes are found within 10km of the Proposed Development. These are Castle Pill, Lower Scoveston Farm and Wear Point. There is a complete lack of significant effects from the current proposal (and very low level of impact generally). It is therefore inconceivable that, even in combination with other schemes, that effects from this proposal could be considered as significant.

Assessment of Transport Routes

7.164 The modification of existing road networks outside the core study area for use by HGVs and site vehicles has some minor potential (based on OS map and aerial photo assessment of the corridor route) for the following impacts during construction (no effects are anticipated once installed):

- i. Possible disruption and disturbance to protected species (e.g. badger, otter, water vole)
- ii. Temporary damage to semi-improved grassland

7.165 In order to avoid or mitigate for such effects, the following measures will be taken:

- i. Any unavoidable disturbance to woodland, trees or hedgerows that may be required should be timed to avoid the bird breeding season if possible, but may proceed with care by having working areas inspected by an ECoW immediately prior to construction and provision of a 5m buffer around active nests as described in 7.140;
- ii. Any badger setts identified should be avoided by at least 30 metres if using heavy plant in any more than a passing capacity. Sustained activity up to 20 metres away may be acceptable if undertaken with light plant only;
- iii. Watercourses with the potential to support otter and water vole should be avoided wherever possible by a distance of 50m for any new access track;

- iv. On a precautionary basis, ponds should be avoided by at least 10 metres by the works corridor.

7.166 No significant effects are anticipated from these works.

Description of Decommissioning Period Effects

7.167 The ecological impact associated with the decommissioning phase cannot be fully addressed in this ES, due to the high level of ecological uncertainty, as the decommissioning phase is more than 35 years away. During this period, a multiplicity of factors could take place e.g. effects of climate change and major land use changes. However, appropriate habitat and species surveys will be undertaken on site as part of the Decommissioning Method Statement, which will be agreed with the relevant consultees. This will ensure that necessary mitigation measures are in place. These surveys will be based on the best practice and legislative controls at that time. See Chapter 3: Project Description of this ES for further details on the decommissioning phase.

7.168 It is unlikely that the ecological impact during the decommissioning phase will be greater than during the construction phase as assessed above. It is suggested that appropriate consultations are carried out with the relevant consultees, a Decommissioning Plan be prepared and that ecological surveys are conducted immediately before and post-decommissioning.

Best Practice Management Measures for Non-significant Species Effects

Badger

7.169 Badgers and their setts are protected under the Protection of Badgers Act 1992. Pre-felling and pre-construction surveys for active badger setts will take place. If any additional badger setts are located during construction operations, all work should cease and advice should be sought from the Ecological Clerk of Works or suitably qualified ecologist and NRW to avoid disturbance of the sett.

Amphibians

7.170 No mitigation is considered necessary in respect of amphibians (aside from maintaining a 19mph speed limit on the site). This is because the likelihood of negative effects is very low.

Reptiles

7.171 No mitigation is considered necessary in respect of reptiles (aside from maintaining a 19mph speed limit on the site). This is because the likelihood of negative effects is very low.

General

7.172 A species protection plan will be agreed prior to construction to ensure that all reasonably practical measures are taken to avoid obstruction of species from protected sites and disturbance, injury or death to protected species. An EPS licence will be sought should the need arise through the pre-construction survey or the implementation of the CEMP.

Watercourses and Associated Habitats

7.173 Construction activities around watercourses and associated habitats such as swamps will adhere to general good practice management measures, as described in Chapter 9: Soils and Water, seeking to maintain water quality and flow on the site. In particular, chemicals, oils and hazardous materials will be stored securely away from watercourses. All temporary exposed pipelines adjacent to watercourses will be capped at the end of each working day, and trenches will be ramped for easy exit by mammals. In these instances, standard practice will control activities on access track construction to ensure any earthworks and hardcore placement do not generate turbid water and affect the water quality status (see Chapter 9 for further detail on hydrological mitigation). A speed limit of 19mph for all construction traffic will be strictly adhered to, particularly during hours of darkness.

7.174 A pre-construction survey for bats will take place to provide an assessment of any changes in distribution across the development site.

Residual Effects and their Significance

7.175 Following the implementation of the relevant mitigation, it is anticipated that there will be no significant residual effects, as illustrated in Table 7.9.

Table 7.9: Residual Effects

Receptor	Value	Nature of Effect	Significance (pre-mitigation)	Proposed Mitigation and Ecological Enhancement	Residual Significance (post mitigation)
Breeding birds	Parish/neighbourhood - District	Disturbance and removal of habitat	Moderate negative	Pre-construction check of vegetation; any breeding birds found will be allowed to complete nesting until young have fledged	Non-significant
Bats	District - county	Removal of hedgerows, resulting in discontinuous flightlines	Moderate negative	Temporary gaps in flightlines (e.g. small sections of hedgerow removed) will be temporarily 'filled' on a nightly basis with heras fencing or similar; these areas will be replanted and gated to reform continuous flightlines	Non-significant
Badger	District	Disturbance to active setts	Moderate negative	Construction to retain at least 30m distance from active setts	Non-significant

Biodiversity Net Gain

7.176 The concept of biodiversity net gain will be employed at the Rhoscrowther proposed site. Essentially, this is ensuring that biodiversity gains will outweigh losses. In the case of Rhoscrowther, following mitigation, residual effects will be minor and non-significant. Nevertheless, the developer will commit to a habitat management programme at the site in order to ensure that biodiversity gains will be tangible and clearly exceed any small biodiversity losses. Details of this habitat management programme have not been fully worked out and will be discussed with Natural Resources Wales and Pembrokeshire County Council. However, they are likely to include the implementation of greater habitat connectivity at the site, including the enhancement of bat flightlines where applicable, as well as the provision of suitable winter crops as bird food source (for yellowhammer, linnet and other species). Hedgerow planting will be implemented to mitigate for loss due to severance. Approximately 100m of hedgerow (which are approx. 3m at the bottom grading to 1m at the top) will be removed for access and this will be replaced by 175m of hedgerow. The establishment of new hedgerows, combined with winter food crops for buntings and finches will provide a net biodiversity gain for these declining species. Similarly, hedgerow planting will ensure that bat flightlines are maintained and enhanced. This will include the 'gapping up' of existing hedgerows where gaps exist, leading to functional flightlines. The planting of arable areas on currently improved fields will also be encouraged to increase biodiversity in terms of food source for birds and potential for arable weeds in the margins.

Monitoring

7.177 A monitoring programme will be suggested and carried out to ensure the mitigation as described in this report is adhered to and working properly so that the residual effects are of the same level as predicted. In addition, an update of species and habitats will be valuable information if any alterations are needed to the Rhoscrowther wind farm. In particular, monitoring and surveillance during and post construction would be carried out for bats. It is highly recommended that, if the proposed site is developed as planned, post-

consent monitoring is carried out to add to the research on the impact of wind turbines on UK bats. Such monitoring would aid the understanding of the impacts upon bats at and around wind farms in the UK.

Conclusion

7.178 A summary of effects before and after proposed mitigation measures is provided in Table 7.9 above. None of the residual effects are considered significant.