Environmental Impact Assessment Report

Volume 3

Chapter 13 Offshore Bats

codling wind park

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Abbreviations

Abbreviation	Term in Full
ABP	An Bord Pleanála
AEZ	Archaeological exclusion zone
BAI	Bat Activity Index
BC	Bat Conservation
BS	British Standard
BWF	Bat Worker Forum
CEA	Cumulative Effects Assessment
CEMP	Construction Environmental Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CWP	Codling Wind Park
CWPL	Codling Wind Park Limited
EC	European Commission
EIA	Environmental Impact Assessment
EcIA	Ecological Impact Assessment
ECoW	Ecological Clerk of Works
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
EU	European Union
EVMP	Ecological Vessel Management Plan
GB	Great Britain
GIS	Geographic Information System
GW	Gigawatt
IAM	Impact Assessment Matrix
IEF	Important ecological feature
IGR	Irish Grid Reference
IPPEMP	In Principle Project Environmental Monitoring Plan
LSE	Likely significant effects
MAGIC	Multi-Agency Geographic Information for the Countryside
MAP	Maritime Area Planning
MISE	Mammals in a Sustainable Environment
MSFD	Marine Strategy Framework Directive

Abbreviation	Term in Full
MSP	Maritime Spatial Planning
MW	Megawatts
NBDC	National Biodiversity Data Centre
NHA	Natural Heritage Area
NIS	Natura Impact Statement
NMPF	National Marine Planning Framework
NPF	National Planning Framework
NPWS	National Parks and Wildlife Services
O&M	Operations and maintenance
OESEA4	UK Offshore Energy Strategic Environmental Assessment 4
OfTI	Offshore transmission infrastructure
OTI	Onshore transmission infrastructure
ORE	Offshore Renewable Energy
OREDP	Offshore Renewable Energy Development Plan
OREDPII	Offshore Renewable Energy Development Plan II
OS	Ordnance Survey
OSS	Offshore substation structure
OWF	Offshore wind farm
PDA	Planning and Development Act 2000
QI	Qualifying Interest
ROI	Republic of Ireland
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SAR	Search and Rescue
SCI	Special Conservation Interest
SEA	Strategic Environmental Assessment
SPA	Special Protection Area
SSSI	Sites of Special Scientific Interest
UNEP	United Nations Environmental Programme
WTG	Wind turbine generator
ZoI	Zone of influence

Definitions

Glossary	Meaning
the Applicant	The developer, Codling Wind Park Limited (CWPL).
array site	The area within which the wind turbine generators (WTGs), inter-array cables (IACs) and the offshore substation structures (OSSs) are proposed.
Codling Wind Park (CWP) Project	The proposed development as a whole is referred to as the Codling Wind Park (CWP) Project, comprising of the offshore infrastructure, the onshore infrastructure and any associated temporary works.
Environmental Impact Assessment (EIA)	A systematic means of assessing the likely significant effects of a proposed project, undertaken in accordance with the EIA Directive and the relevant Irish legislation.
Environmental Impact Assessment Report (EIAR)	The report prepared by the Applicant to describe the findings of the EIA for the CWP Project.
landfall	The point at which the offshore export cables are brought onshore and connected to the onshore export cables via the transition joint bays (TJB). For the CWP Project, the landfall works include the installation of the offshore export cables within Dublin Bay out to approximately 4 km offshore, where water depths are too shallow for conventional cable lay vessels to operate.
Maritime Area Consent (MAC)	A Maritime Area Consent (MAC) provides State authorisation for a prospective developer to undertake a maritime usage and occupy a specified part of the maritime area. A MAC is required to be in place before planning consent can be sought.
offshore development area	The total footprint of the offshore infrastructure and associated temporary works including the array site and the OECC.
offshore infrastructure	The permanent offshore infrastructure, comprising of the WTGs, IACs, OSSs, interconnector cables, offshore export cables and other associated infrastructure, such as cable and scour protection.
offshore substation structure (OSS)	A fixed structure located within the array site, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore.
operations and maintenance (O&M) activities	Activities (e.g., monitoring, inspections, reactive repairs, planned maintenance) undertaken during the O&M phase of the CWP Project.
O&M phase	This is the period of time during which the CWP Project will be operated and maintained.
planning application boundary	The area subject to the application for development consent, including all permanent and temporary works for the CWP Project.
zone of influence (ZoI)	Spatial extent of potential impacts resulting from the project.

13 OFFSHORE BATS

13.1 Introduction

1. Codling Wind Park Limited (hereafter 'the Applicant') is proposing to develop the Codling Wind Park (CWP) Project, which is located in the Irish Sea approximately 13–22 km off the east coast of Ireland, at County Wicklow.

2. This chapter forms part of the Environmental Impact Assessment Report (EIAR) for the CWP Project. The purpose of the EIAR is to provide the decision-maker, stakeholders and all interested parties with the environmental information required to develop an informed view of any likely significant effects resulting from the CWP Project, as required by the European Union (EU) Directive 2011/92/EU (as amended by Directive 2014/52/EU) (the Environmental Impact Assessment (EIA) Directive).

3. This EIAR chapter describes the potential impacts of the CWP Project's offshore infrastructure on bats during the construction, operation and maintenance, and decommissioning phases. Of the 18 bat species resident in Great Britain (GB) and nine present in Ireland, some are known to migrate overseas including from GB. Therefore, the potential for impacts of CWP Project on migratory bats is the sole focus of this chapter. Potential impacts on bats associated with the onshore or near-shore infrastructure are considered within **Chapter 21 Onshore Biodiversity**.

4. In summary, this EIAR chapter:

   - Details the EIA scoping and consultation process undertaken and sets out the scope of the impact assessment for offshore bats;
   - Identifies the key legislation and guidance relevant to offshore bats, with reference to the latest updates in guidance and approaches;
   - Confirms the study area for the assessment and presents the impact assessment methodology for offshore bats;
   - Describes and characterises the baseline environment for offshore bats, established from desk studies, project survey data and consultation;
   - Defines the project design parameters for the impact assessment and describes any embedded mitigation measures relevant to the offshore bats assessment;
   - Presents the assessment of potential impacts on offshore bats and identifies any assumptions and limitations encountered in compiling the impact assessment; and
   - Details any additional mitigation and / or monitoring necessary to prevent, minimise, reduce or offset potentially significant effects identified in the impact assessment.

5. The assessment should be read in conjunction with **Appendix 13.1 Offshore Bats Cumulative Effects Assessment (CEA)**, which considers other plans, projects and activities that may act cumulatively with the CWP Project and provides an assessment of the potential cumulative impacts on offshore bats.

6. A summary of the CEA for Offshore Bats is presented in **Section 13.11**.

7. Additional information to support the assessment includes:

   - **Appendix 13.1 Offshore Bats CEA;**
   - **Appendix 13.2 Offshore Bats Representative Scenario and Limit of Deviation Assessment; and**
   - **Appendix 13.3: Offshore Bat Results Tables.**

13.2 Consultation

8. Consultation with statutory and non-statutory organisations is a key part of the EIA process. Consultation with regard to offshore bats has been undertaken to inform the approach to and scope of the assessment.

9. The key elements to date have included EIA scoping and consultation over the survey methodology, as well as public consultation events. The feedback received throughout this process has been considered in preparing the EIAR. EIA consultation is described further in **Chapter 5 EIA Methodology,** the **Planning Documents** and in the **Public and Stakeholder Consultation Report**, which has been submitted as part of the development consent application.

10. **Table 13-1** provides a summary of the key topics raised during the consultation process relevant to offshore bats and details how these topics have been considered in the production of this EIAR chapter.

Table 13-1 Consultation responses relevant to offshore bats

Consultee	Comment	How issues have been addressed
Scoping responses		
Bat Conservation (BC) Ireland 1 December 2020	BC Ireland were sent the request for feedback on the EIA scoping report – which included reference to assessing impact on offshore bats. No response was received. Followed by the onshore scoping report on 30 April 2021, a follow up email was then sent on 14 June 2021. A response was received 15 June 2021 recommending adherence to best practice survey guidance.	The potential for impacts on bats associated with the offshore development remains 'scoped in' the EIAR (**Section 13.10 Impact Assessment**). Best practice guidance was used to inform the survey design and BC Ireland were consulted again on 14 March 2022 regarding the chosen survey methodology. No response was received.
National Parks and Wildlife Service (NPWS) 1 December 2020	Request for feedback on the EIA scoping report – which included reference to assessing impact on offshore bats. No response received. NPWS were sent the onshore scoping report on 30 April 2021. A follow up email was then sent on 14 June 2021. No response was received.	The potential for impacts on bats associated with the offshore development remains 'scoped in' the EIAR (**Section 13.10 Impact Assessment**).
Survey Methodology		
BC Ireland 1 March 2022	The proposed survey methodology was issued to BC Ireland, who responded on 2 March 2022, recommending adherence to best practice survey guidance.	N/A

Consultee	Comment	How issues have been addressed
	A targeted follow up was sent on 14 March 2022 seeking additional information regarding placement of detectors – no response was received.	
NPWS 1 March 2022	The proposed survey methodology was issued to NPWS. The Head of Animal Ecology responded positively via email on 8 March 2022 with *'…the survey work you are proposing (in terms of detectors, locations and time periods) is reasonable given the challenges involved in collecting useful data for that site. Your plan to examine the data from the Dublin Array should also help provide an informed assessment'*.	The proposed survey methodology was utilised and is described in **Section 13.4 Impact assessment methodology**.
Other		
NPWS 14 March 2022	NPWS provided additional background information on the ongoing survey work into bat migration in Ireland (NWPS 2021).	Included within **Section 13.6 Desk study**.

13.3 Legislation, policy and guidance

13.3.1 Legislation

11. The legislation that is applicable to the assessment of offshore bats is summarised below. Further detail is provided in **Chapter 2 Policy and Legislative Context**.

- EIA Directive 2011/92/EU, as amended by Directive 2014/52/EU and transposed into Irish law in the Planning and Development Act, 2000–2020 and the Planning and Development Regulations 2001–2020 as amended by S.I. No. 296 of 2018;
- Marine Strategy Framework Directive (MSFD) (2008/56/EC);
- Marine Planning Policy Statement (November 2019);
- Maritime Spatial Planning (MSP) Directive (2014/89/EU);
- The Convention on Migratory Species of Wild Animals Treaty (Bonn Convention 1979 enacted 1983);
- The Agreement on the Conservation of Populations of European Bats (Eurobats 1991);
- The European Union (EU) Habitats Directive 192 as amended (EEC Council Directive 92/43/EEC) is transposed into law by the European Communities Regulations 2011 (as amended) and includes all Irish and British bats within Annex four; and

- In The Republic of Ireland (ROI) the European legislation builds upon the Wildlife Act 1976 (as amended) and forms part of the European Communities (Birds and Natural Habitats) Regulations 2011.

12. Under all the above-mentioned legislation it is an offence to deliberately disturb, injure or kill bats or disturb or to destroy their roosts. This chapter only considers the risks posed to migratory bats as a result of the offshore works, any impacts associated with the on or near shore works are included within **Chapter 21 Onshore Biodiversity**.

13.3.2 Policy

13. The overarching planning policy relevant to the CWP Project is described in EIAR **Chapter 2 Policy and Legislative Context.**

14. The assessment of the CWP Project against relevant planning policy is provided in the **Planning Report**. This includes planning policy relevant to offshore bats.

13.3.3 Guidance

15. The principal guidance and best practice documents used to inform the assessment of potential impacts on offshore bats are summarised below.

16. Eurobats Guidance (Rodrigues et al., 2015) includes details of suitable survey methodologies for offshore development, which were used in the design of the survey methodology as agreed by the consultees above. The guidelines recommend:

- Collation and review of existing information;
- Long-term bat detector surveys from prominent landmarks on the ground to allow a calculation of Bat Activity Index (BAI);
- Use of infrared or thermal imaging camera wherever available;
- Consideration of data at sea such as boat surveys, detectors on buoys, oil platforms or regular night ferries; and
- The use of tracking radar.

17. Consideration of these approaches and the chosen survey methodologies is provided within **Section 13.4 Impact assessment methodology**. **Section 13.10** presents the impact assessment, thus meeting the requirements of this guidance.

18. The Bat Mitigation Guidelines for Ireland – V2 (Marnell, Kelleher & Mullen, 2022) highlights the potential for offences under Regulation 51 of the European Communities (Birds and Natural Habitats) Regulations, 2011, which includes deliberately disturbing a bat 'particularly during the period of breeding, rearing, hibernation and migration'. The Bat Mitigation Guidelines also mention the potential for long distance oversea migration in relation to Nathusius' pipistrelle (*Pipistrellus nathusii)* bats and states '*Given the proven ability of Nathusius' pipistrelle to cross open seas, it is important to bear this species in mind when planning offshore windfarm projects'.* Due to the location and type of the development, this chapter focuses principally on the potential for migratory bats, with **Section 13.10** providing a detailed impact assessment on migratory bats associated with the development.

19. The Bat Mitigation Guidelines for Ireland (Marnell, Kelleher & Mullen, 2022) ratifies the Eurobats agreement and recommends adherence to survey effort guidelines published by Eurobats (Rodrigues et al., 2015), Natural England (2012), The Northern Ireland Environment Agency (2014) and BC Ireland (2012) in relation to wind farm developments. Of this list, only the Eurobats guidance (Rodrigues et al., 2015) includes information pertaining to offshore projects and is thereby considered the only one relevant to this project. This guidance has been considered throughout this Chapter. Natural England

have since published Best Practice Guidance in relation to Offshore Wind (Natural England, 2021), however this does not include any reference to bats.

13.4 Impact assessment methodology

20. **Chapter 5 EIA Methodology** provides a summary of the general impact assessment methodology applied to the CWP Project, which includes the approach to the assessment of transboundary and inter-related effects. The approach to the assessment of cumulative impacts is provided in **Chapter 5, Appendix 5.1 CEA Methodology**.

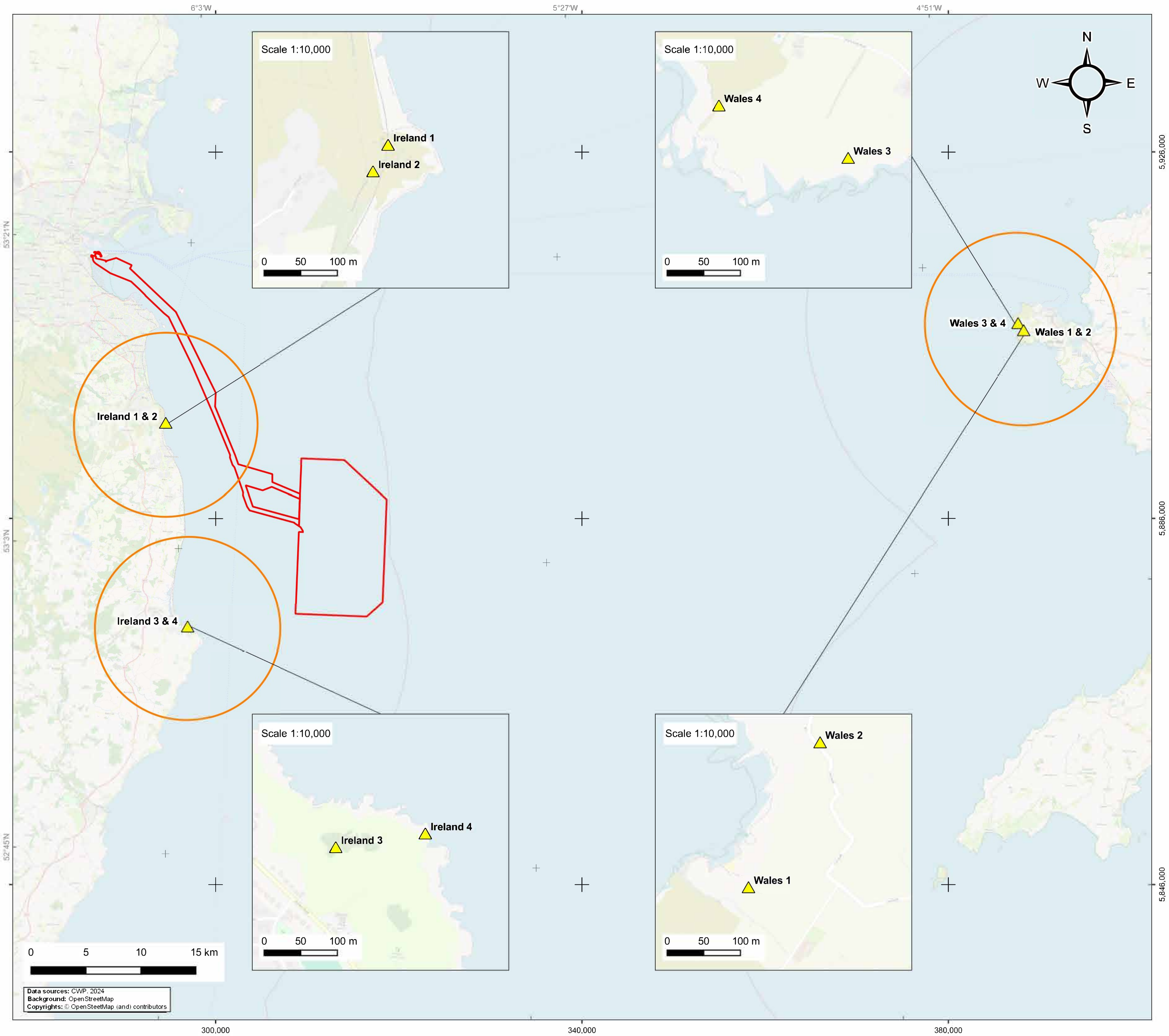
21. The following sections confirm the methodology used to assess the potential impacts on offshore bats.

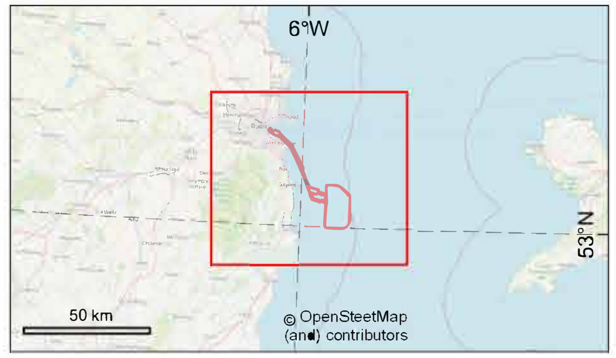
13.4.1 Study area

22. The study area has been defined through reference to the offshore development area, as this represents the area in which construction and operation of the development will take place, with the Marine Safety Demarcation Area being used only for short term navigation safety activities such as deployment of buoyage.

23. The study area for the offshore bats assessment has also been defined following the Eurobats guidance (Rodrigues et al., 2015), principally looking at the potential for impacts on migratory bats. To this end, bat activity at potential landfall points on the Welsh and Irish coasts was the key focus, reflecting where bats may be likely to leave, or arrive at, one landmass in order to cross to another, i.e., the start or end of any potential offshore migration routes. As there is no information available on potential migratory routes between Ireland and Wales, survey areas were chosen based on the closest and most prominent landfall points to the project, where access was available. The potential landfall points chosen for this study were at the Wicklow Light House and golf course on the Irish coast, and the area around Royal Society for the Protection of Birds (RSPB) reserve at South Stack lighthouse in North Wales, as shown in **Figure 13-1** below.

24. Different landfall points were considered but were ruled out based on the distance from these locations to the CWP Project, and due to the availability of other data (existing data from two detectors on Bardsey Point (NPWS, 2019) and Dublin Array OWF). The suitability of different habitats was also evaluated in order to ensure the potential landfall points were suitable for use by bats.





Legend

- Planning Application Boundary (PAB)
- Indicative location of static bat detector
- 10 km buffer of static bat detector

codling wind park	Project: Codling Wind Park	Contractor: www.naturalpower.com natural power

Figure 13.1
Static bat detector locations

CWP doc. number:	CWP-NPC-ENG-08-01-MAP-0751		
Internal descriptive code: IS - PAB - BAT.DET._BUFF.10km - EIAR.FIG.13.01	Size: A3 / Scale: 1:400,000	CRS: EPSG 25830	

Rev.	Updates	Date	By	Chk'd	App'd
00	Final for issue	2024/06/13	AC	BH/EA	LS

13.4.2 Data and information sources

Desk study

25. A comprehensive desk-based review was undertaken to inform the baseline for offshore bats. Key data sources used to inform the assessment are set out in **Table 13-2**. This includes a data search from local records centres, and research on contextual information on species and bat migration from relevant projects and research papers.

Table 13-2 Data sources

Data	Source	Date [1]	Notes
Bat records within 10 km of the potential landfall on the Welsh Coast.	Cofnod – North Wales Environmental Information Service	14 November 2022	All records of bats from the last 15 years within 10 km of the static detectors along the Welsh coast.
Bat records within 10 km of the potential landfall on the Irish Coast.	BC Ireland	21 January 2023	All records of bat roosts and sensitive records from the last 15 years within 10 km of the static detectors along the Irish coast.
Bat records within 10 km of the potential landfall on the Irish Coast.	Biodiversity Maps (Biodiversity Ireland, 2022)	21 October 2022	All publicly available records within 10 km of the static detectors along the Irish coast from the last 15 years.
Designated sites database – GB.	Multi-Agency Geographic Information for the Countryside (MAGIC) database MAGIC (defra.gov.uk)	21 October 2022	Publicly available information on nationally and internationally designated sites within 10 km of the static detectors along the Welsh coast.
Background research – All-Ireland Nathusius's [*sic*] Pipistrelle Bat Project (Department of Housing, Local Government and Heritage, 2021).	BC Ireland	15 November 2021	BC Ireland research from 2015–2021 into the distribution and potential migration of Nathusius' pipistrelles within and to Ireland.
Background research – Bat Migration Project Report (2017 to 2018) (Dyer, 2019).	NRW	20 March 2019	Research into Nathusius' pipistrelle and Leisler's bat migration from Wales to Ireland using static bat detectors, including looking at the areas around South Stack Lighthouse and Bardsey Island as potential

[1] The dates given are the dates the database search was conducted or the date published for reports.

Data	Source	Date [1]	Notes
			landfall points and using ferries to record bats at sea.
Further information on the Mammals in a Sustainable Environment (MISE) Project (MISE, 2015) (which included coastal bat surveys at South Stack Lighthouse) was sought to provide background information.	NRW	20 October 2022	Research into potential bat migratory movements between Ireland and Wales, which provides additional context included within the desk study section.
The Status of EU Protected Habitats and Species in Ireland (NPWS, 2019).	NPWS	April 2019	Overview of the population status and trends of protected mammals (including all bat species) in Ireland, used in the assessment of population vulnerability.
Irish Bat Monitoring Programme 2018–2021 (Aughney, Roche, and Langton, 2022).	NPWS	2022	Overview of the population status and trends of bat species, based on the targeted monitoring, in Ireland, used in the assessment of population vulnerability.
North Sea Ferries Bat Migration Research Report (BSG 2014a).	BSG	2014	Research, using ferry mounted static bat detectors, into use of the North Sea by bats.
Bat Migration (Fleming, 2019).	Fleming	2019	A literature review of known migrating bat species used in the assessment of which species may be present in the offshore environment.

Site specific surveys

2022 CWP bat activity surveys

26. In order to provide site specific and up to date information on which to base the impact assessment, detailed bat activity surveys were undertaken at both landfalls using full spectrum static bat detectors. The detectors, Wildlife Acoustics Song Meter 4 (SM4) were set to record all bat activity within one hour prior to sunset through to one hour after sunrise, every night for the approximate 12-week long deployments; the batteries and memory cards were changed frequently throughout this period to minimise chances of detector failures. The 12-week deployments over each migration period (spring and autumn) were timed to record as much of each migration period as possible, as agreed in consultation as detailed in **Table 13-1.**

27. The timing of the surveys was designed to detect any bat activity over the potential spring and autumn migration periods, with detectors deployed for approximately 12 weeks during each period. Due to access considerations, it was not possible to deploy and collect the detectors on the exact same dates in both locations. As such, though each deployment was for the 12 weeks, to increase comparability

of the data sets the following dates have been used in the analysis (when all static detectors were deployed):

- 20 April–4 July 2022; and
- 21 August–14 November 2022.

28. With four detectors placed along either coast, a total of eight static bat detectors were used. The static detectors were deployed as close to the coast as possible (restricted by access, the risks of public interference and health and safety) and as far as possible away from potential roost sites (as identified during a desk-based assessment). The detectors were deployed in the same locations during each deployment, utilising existing features within the landscape such as fence posts or bushes to ensure they blend in as well as possible with the landscape and reduce chances of interference. The locations used are shown on **Figure 13-1**, the grid references are provided in **Table 13-3.**

29. Bat activity survey results are typically considered valid for up to three years following completion of the surveys, however this varies dependant on changes in the environment or local populations within the survey area. As such the survey data remains valid and an appropriate characterisation of the receiving environment at the point of application.

Table 13-3 Static detector locations

Location	Grid reference[2]	Detector reference	Broad habitats
Bray Head – Ireland	O 28797 15651	Ireland 1	Coastal heath and grassland.
Bray Head – Ireland	O 28761 15576	Ireland 2	Coastal scrub and heath.
Wicklow Golf Course – Ireland	T 32600 93566	Ireland 3	Edge of patch of scrub surrounded by amenity grassland with patches of broadleaved trees nearby.
Wicklow Golf Course – Ireland	T 32841 93620	Ireland 4	Edge of small (approximately 0.046 ha) patch of broadleaved woodland and amenity grassland with patches of scrub.
South Stack RSPB Reserve – Wales	SH 21577 80625	Wales 1	Hedgerow between two pasture fields.
South Stack RSPB Reserve – Wales	SH 21778 81018	Wales 2	Hedgerow between two pasture fields 7 m from the single-track road (Lon Isallt).
South Stack RSPB Reserve – Wales	SH 21253 81531	Wales 3	Hedgerow between two pasture fields approximately 12 m from the coastal scrub / cliff.
South Stack RSPB Reserve – Wales	SH 20902 81679	Wales 4	Scrub and post-and-rail fence line between the pasture field and the coastal scrub / cliff.

2021 Dublin Array OWF bat surveys

30. Further to the above, additional data was acquired from the proposed Dublin Array Offshore Wind Farm (OWF) (currently at planning stage). To enable an assessment of the impacts of the proposed

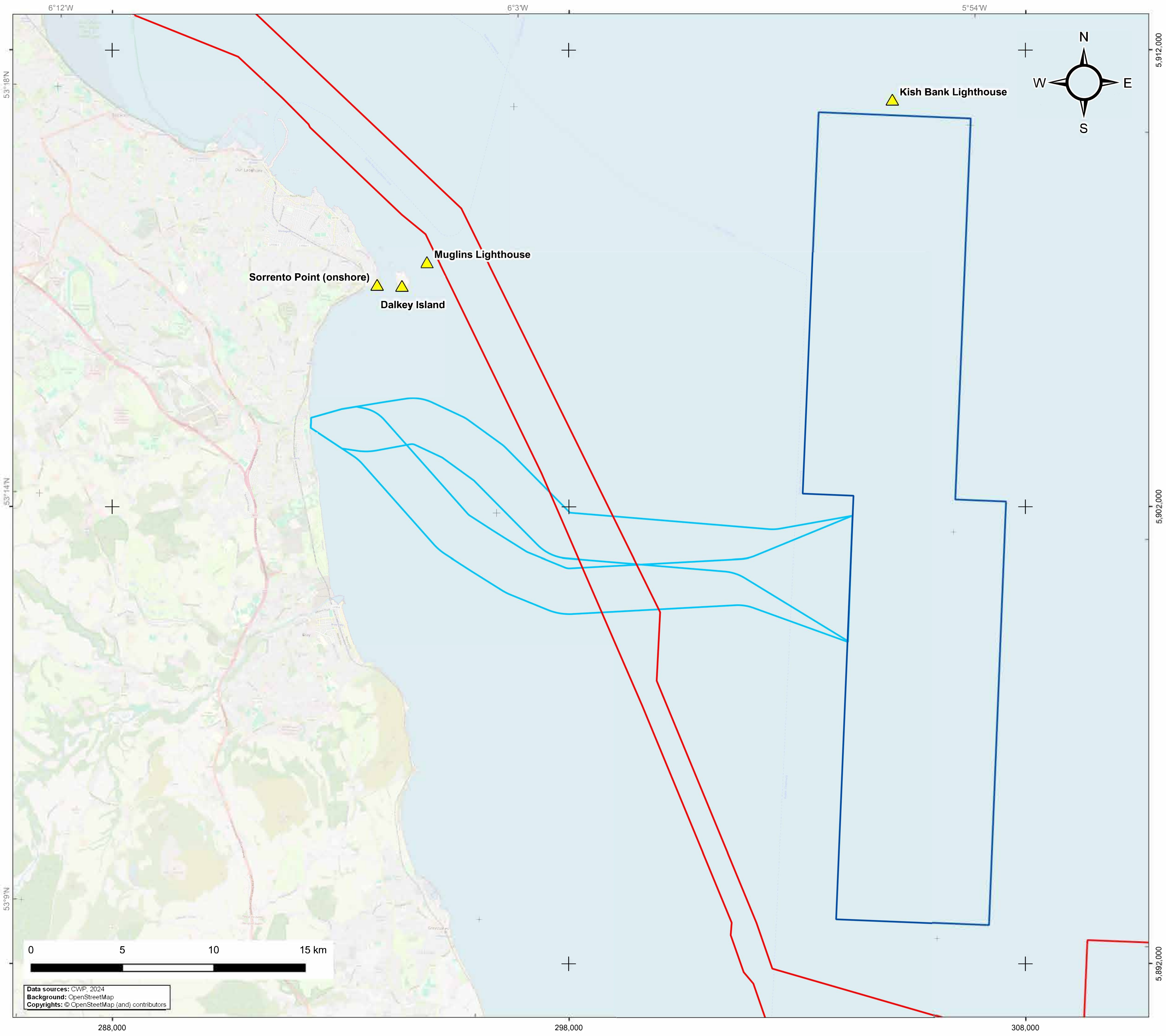
[2] The Irish Grid Reference (IGR) system has been used for the detectors in Ireland while Ordnance Survey (OS) grid references have been provided for the detectors in Wales.

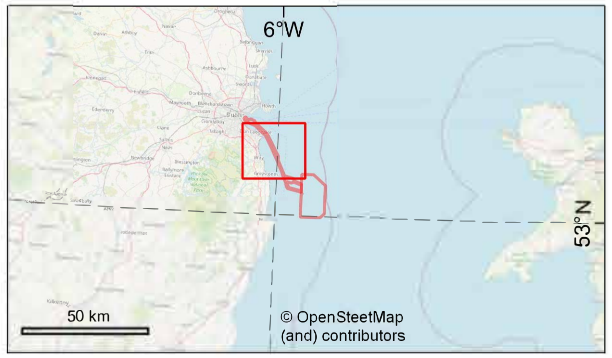
Dublin Array OWF on offshore bats, four detectors were deployed from 27–28 May 2021 until 4 November 2021 (the detector at Sorrento Point was stolen after 20 September 2021). These detectors were deployed in a linear pattern to attempt to detect bats as they travelled across the sea, with one onshore and the remaining three on islands up to 11.89 km from the shore. Grid references and broad habitats for each of these detectors is provided in **Table 13-4** and shown on **Figure 13-2.**

Table 13-4 Dublin Array OWF static detector locations

Location	Grid reference[3]	Broad habitats
Sorrento Point (on shore)	O 27303 26135	On a conifer tree at the coastline
Dalkey Island	O 27848 26150	Coastal heath and grassland
Muglins Lighthouse	O 28356 26702	Offshore lighthouse – rocky
Kish Bank Lighthouse	O 38277 30969	Offshore lighthouse – rocky

[3] The IGR system has been used for the detectors in Ireland while OS grid references have been provided for the detectors in Wales.





Legend

- Planning Application Boundary (PAB)
- Dublin Array offshore wind farm
- Dublin Array offshore export cable corridor
- Dublin Array indicative location of static bat detector

codling wind park

Project: Codling Wind Park

Contractor: www.naturalpower.com natural power

Figure 13.2
Dublin array – static bat detectors

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1135

Internal descriptive code:	*Size:* A3	*CRS:*
DA.FILA - PAB - DA.BAT.DET..DA.WF.OECCs - EIAR.FIG.13.02	*Scale:* 1:80,000	EPSG 25830

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
00	Final for issue	2024/06/13	AC	BH/EA	LS

Data analysis

31. Acoustic data analysis was undertaken to bat species or genus level using Kaleidoscope automatic identification software. This software provides automatic identifications which are assumed to be correct for common pipistrelle (*Pipistrellus pipistrellus)* and soprano pipistrelle (*Pipistrellus pygmaeus)* bats (and for identifying noise). Identification of other bat species records is considered less reliable and manual identification was therefore performed on all other acoustic records. The analysis of the bat survey data was undertaken following the methodology outlined in guidance (Collins, 2016). Signal parameters were 16–120 kHz, 2–500 ms, 500 ms maximum inter-syllable gap and with a minimum of two pulses. Kaleidoscope provides an automatic identification and up to two alternative identifications depending on call parameters.

32. *Myotis* sp. were not identified further than genus due to the overlap between species frequency calls. Pipistrelle bats (*Pipistrellus* sp.*)* and *Nyctalus* sp. noctule *(Nyctalus noctule)* and Leisler's bat *(Nyctalus leisleri)* bats were classified to species when possible. Where it was not possible to distinguish call types to species level (due to overlaps in call frequencies between noctule / Leisler's, between Nathusius' pipistrelle / common pipistrelle, and common pipistrelle / soprano pipistrelle), they were classified to species group. Overlaps in frequency typically only occurs in pipistrelle species either when multiple bats are present at once (and consequently bats need to adjust their own frequencies to avoid confusion) or for juvenile bats, in both instances the software typically flags the unusual calls due to too much variation.

33. A bat pass was defined as a sequence of bat pulses captured on a 15 second sound file. One sound file was counted as one bat pass. Different species within the same 15 second sound file were counted as separate bat passes. An individual bat can pass a particular feature on several occasions while foraging. It is therefore important to acknowledge that bat passes are an index of bat activity rather than a measure of number of individuals in a population. Bat activity indices are therefore indices of the amount of use bats make of an area.

34. The Dublin Array OWF detector recordings were provided to CWP Project in raw format, and therefore the data was analysed by CWP Project following the same analysis procedure.

Weather parameters

35. Peaks in activity at different times of the night, different times throughout the year and under different weather conditions, including wind direction, has been considered. The weather data, including wind direction, has been downloaded from visualcrossing.com for every hour the static detectors were deployed from the nearest weather station to each of the detectors as shown in **Table 13-5.** This was compared for each landfall to identify potential patterns indicative of migration.

Table 13-5 Weather station locations used for analysis of bat passes

Bat detector locations	Latitude / longitude	Location
CWP Ireland	53.18859 / -6.07723	Bray Greystones Cliff Walk
CWP Wales	53.300487 / -4.683796	South Stack Road
Dublin Array OWF	53.275597 / -6.075862	Muglins Lighthouse

Migration parameters

36. Studies looking at the weather conditions for migration have found that the majority of bat migrations take place above 13°C. Brabant et al., (2021) found 90% of *Pipistrellus* sp. bat activity in the North Sea was recorded when temperatures exceeded 13°C. While Lagerveld et al., (2021) recorded 89% of Nathusius' pipistrelle activity above 15°C when looking at potential migration in the North Sea. Wind speeds were also assessed and both studies found below 5 m/s to be optimal. Brabant et al., (2021) found 80.5% of *Pipistrellus* sp. activity was recorded below 5 m/s; Lagerveld et al., (2021) recorded 67% of activity below 5 m/s. The Lagerveld (2021) study also found the wind direction affected the number of bat passes.

37. As such, for the purposes of this assessment, bat migration is considered to be most likely when temperatures are above 13°C and when wind is below 5 m/s and wind direction is favourable. Looking at wind direction to further refine the potential migratory passes, while Nathusius' pipistrelle migrate from Western Europe to the Baltics for summer, the direction of any travel between Ireland and GB is unknown (Russ et al., 2001). If looking at the wind direction, all easterly winds would aid migrations to Ireland from Wales while all westerly winds excepting south-southwesterlies would aid in travel between Ireland and Wales. As such we have included indications for migration towards Ireland from Wales as easterly winds, as these would be the most direct, while westerlies would be the most direct from Ireland towards Wales.

38. When considering wind direction, we can also rule out calls that are too early to be newly arrived bats based on the time of call. Depending on the study, the range of estimated Nathusius' pipistrelle flight speeds varied between 8–11 m/s (Troxell et al., 2019) (or 28.8–39.6 km/hour) and 11.2–15.2 m/s (Suba, 2014) (or 40.32–54.72 km/hour). Based on these speeds it would take a Nathusius' pipistrelle between 102 and 193 minutes to travel the 93 km from Bray Head to South Stack, suggesting that if recordings from before 103 minutes after sunset are associated with migratory bats they did not arrive in that country that night. Calls within 103 minutes of sunset and in wind directions unsuitable for migration out of the country of detection are not considered migratory as this would involve either flying against the prevailing wind or having departed the country of origin during daytime or flying faster than current research indicates. However, calls within 103 minutes of sunset during weather conditions and wind directions suitable for migration out of the country of recording are considered to be from potentially migratory bats.

39. In the absence of detailed research, the same weather conditions have been applied to other potentially migratory species to identify suitability for migration. Flight speeds for Leisler's bats while migrating is unknown, however they have been found to commute at speeds of up to 40 km/h, though higher speeds have been recorded (Shiel, Shiel and Fairley, 2016). As such it is possible that Leisler's bats could cross the Irish Sea in a similar time to Nathusius' pipistrelles and therefore any calls within 103 minutes of sunset during unfavourable wind directions for arrival (easterly winds) have been discounted as not migratory. Even less is known about potential migrations in other pipistrelle species, and potential flight speeds during migration is not well studied, as they are smaller than Nathusius' pipistrelles and Leisler's bats they are presumed to be slower fliers with Spoelstra et al., (2017) suggesting an average of 46 km/day. Studies looking at flight speeds of the similarly sized Kuhl's pipistrelle (*Pipistrellus kuhlii)* (which has a wing span of 210–230 mm and an average weight of 5–10 g compared to the common pipistrelles 200–230 mm wing span and 3–8 g body weight) found an average speed while commuting of 9.3 m/s (Grodzinski et al., 2009) which would be 33.48 km/h and would suggest a flight time of 161 minutes to cross the Irish Sea. However, this was for commuting only and it is likely that with favourable wind direction migratory bats could travel faster. As such, in the absence of other information and to avoid discounting potential migratory passes the same 103 minutes during favourable wind direction has been applied to the common pipistrelle passes as has been applied to Nathusius' pipistrelles and *Nyctalus* passes.

40. In summary, the following parameters have been identified as suitable for migration and have been used in this assessment:

- Average overnight temperature above 13°C;
- Average wind speed below 5 m/s;
- Prevailing overnight wind direction either easterly or westerly; and
- Calls more than 103 minutes after sunset (or calls within 103 minutes of sunset during winds suitable for outwards migration).

41. This is considered proportionate and precautionary due to the potential for multiple recordings to be associated with individual bats. Full results are provided in **Appendix 13.3**, however as the assessment is based on these criteria, **Section 13.6.2 CWP – static detector** results provide the results associated with the potential for migration. Additionally, the potential for offshore foraging by bats has been assessed and included within **Section 13.6 Existing environment**.

42. The relative bat activity, using BAI as outlined in Eurobats Guidance (Rodrigues et al., 2015), was calculated looking at the mean number of bat passes per night across the survey season, looking at both the number of nights surveyed across all detectors over both spring and autumn. To assess the proportion of activity which was migratory, the number of potentially migratory passes for each species was divided by the number of nights surveyed. For the CWP baseline the number of nights surveyed was 665 nights, while the Dublin Array OWF data set included 596 nights of data. The ratio of potentially migratory passes is the proportion of each recorded pass for each species considered associated with migration.

13.4.3 Impact assessment

43. The desk study data and field survey recordings were used to characterise the receiving environment before evaluating likely significant effects on potentially migrating bats, using professional judgement and application of the EIA methodology. The significance of potential effects has been evaluated using a systematic approach, based upon identification of the importance / value of receptors and their sensitivity to the project activity, together with the predicted magnitude of the impact. The latest population estimates for Ireland (NPWS, 2019) and GB (BCT, 2022a) have been used to inform the potential significance. Due to the lack of data on bat migrations, particularly between Ireland and GB, the assessment methodology has necessitated a broadly qualitative, risk-based approach whereby the likely risk of a significant effect is identified using professional judgement through reference to the literature, importance and sensitivity of the receptor, and the predicted magnitude of the impact.

44. The terms used to define receptor sensitivity and magnitude of impact are based on the industry standard Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2022), EIA guidelines for Ireland (Government of Ireland, 2018b) and the Guidelines on the information to be contained in Environmental Impact Assessment Reports (Environmental Protection Agency (EPA), 2022). The Guidelines for consideration of bats in wind farm projects (Eurobats 2015) have also been used.

Determining Important Ecological Features (IEFs)

45. In accordance with CIEEM guidelines (2018, amended April 2022), the importance of an ecological feature is determined based upon its respective elements relating to biodiversity and ecosystem services within a geographical frame of reference as detailed in **Table 13-6.**

Table 13-6 Geographical context relating to the evaluation of an IEF

Level of value	Example of IEF
International	Species populations / habitat areas present with sufficient conservation importance to meet criteria for SAC selection.
National	Species populations present, with sufficient conservation importance to meet criteria for Sites of Special Scientific Interest (SSSI) selection.
Regional	Species populations, at present falling short of SSSI selection criteria, but with sufficient conservation importance to likely meet criteria for selection as a local site.
Local	Species populations considered to appreciably enrich the ecological resource within the local context, e.g., evidence of regular common pipistrelle activity.
Negligible	Usually widespread and common species. Features falling below Local importance are not normally considered in detail in the assessment process.

Source: CIEEM, 2022

46. Attributing geographical value to a feature is generally straightforward in the case of designated sites, as the designations themselves are normally indicative of level of value. However, all bat species are of international importance due to their protection under Annex IV of the Habitats Directive. As such, professional judgement has been applied and rationale for decreasing or increasing the geographical level of value of a feature is given based on the existing baseline. For instance, if only very few foraging / commuting records of common and widespread bat species were made in an area, attributing international importance to the population present at the proposed development would be disproportionate, and the importance would be reduced accordingly (noting that this does not change the protection level from a legislative standpoint).

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

Sensitivity of receptor

48. For each potential effect, the assessment identifies receptors sensitive to that effect and implements a systematic approach to understanding the impact pathways and the level of impacts on given receptors.

49. Given the lack of data on bat migrations between GB and Ireland, a precautionary approach has been taken considering the potential for impacts on all species present in the area, known or suspected to migrate overseas. The sensitivity of each species is dependent on the population vulnerability in either Ireland or Wales and the collision risks as set out within the Eurobats guidance (Rodrigues et al., 2015). It is worth noting that both the population and collision risk relates to onshore data only.

50. Receptor sensitivity is determined by considering a combination of value, tolerance, adaptability and recoverability. In relation to bat population vulnerability, a combination of data from Valuing Bats (Wray et al., 2010) and the Irish Bat Monitoring Programme 2018–2021 (Aughney, Roche and Langton., 2022) allows assessment of population vulnerability. The definitions of receptor sensitivity for the purpose of the offshore bats are in **Table 13-7**. Where a receptor could reasonably be assigned more

than one level of sensitivity, professional judgement has been used to determine which level is most appropriate.

Table 13-7 Criteria for determination of receptor sensitivity

Sensitivity	Criteria
High	Adaptability: The receptor cannot avoid or adapt to an impact. A bat species known to migrate across the Irish sea and / or forage offshore, unlikely to change habitats. Tolerance: The receptor has no or very low capacity to accommodate the proposed form of change. A bat species with a high population vulnerability (rare species in Ireland or UK west coast). Recoverability: The effect on the receptor is anticipated to be permanent (i.e., over 60 years) and recovery is not anticipated. A bat species which has a limited ability to recover if mortality risk increases. Value: The receptor is of international importance.
Medium	Adaptability: The receptor has a limited ability to avoid or adapt to an impact. A bat species known to migrate across the Irish sea and / or forage offshore, unlikely to change habitats. Tolerance: The receptor has a moderate to low capacity to accommodate the proposed form of change. A species that is considered widespread but not common would be predicted to have a moderate population vulnerability. Recoverability: The receptor is anticipated to recover fully within the medium-term (i.e., 7 to 15 years) to long-term (15–60 years). Bat species would recover but only after cessation of the operation of the wind farm (as operational phase will be the impact phase). Value: The receptor is of national or international importance.
Low	Adaptability: The receptor has a reasonable capacity to avoid or adapt to an impact. A bat species known to migrate across the Irish sea and / or forage offshore, unlikely to change habitats or a species which does not migrate but may forage offshore. Tolerance: The receptor has a high capacity to accommodate the proposed form of change. A species with a low population vulnerability, as it is considered to be a common species. Recoverability: The receptor is anticipated to recover fully within the short-term (i.e., 1 to 7 years). A common species for which limited increased mortality risk is unlikely to have a significant impact on population status. Value: The receptor is of national importance.
Negligible	Adaptability: The receptor has a high capacity to avoid or adapt to an impact. A bat species which does not migrate and is not known to forage in the offshore environment. Tolerance: The receptor has a high capacity to accommodate the proposed form of change.

Sensitivity	Criteria
	A species with a low population vulnerability, as it is a common species. Recoverability: The receptor is anticipated to recover fully and impacts will be temporary (i.e., lasting less than one year). The receptor would not be impacted as there is no mechanism for impact (no migration and no offshore foraging). Value: The receptor is of local importance.

Magnitude of impact

51. The scale or magnitude of potential impacts (both beneficial or adverse) depends on the degree and extent to which the CWP Project activities may change the environment, which usually varies according to project phase (i.e., construction, operation and maintenance and decommissioning).

52. Factors that have been considered to determine the magnitude of potential impacts as set out in **Table 13-8** include:

- The spatial extent of the impact (such as the Zone of Influence (ZoI) and potential impact on the population);
- Duration of impact;
- Frequency of the impact; and
- Reversibility of the impact.

53. After the impact is identified, the assessment then considers whether the effect of that impact is positive or adverse. In terms of duration and reversibility of effect, the EPA (2022) Guidelines set out the following definitions:

- Temporary – lasting less than a year;
- Short-term – lasting 1 to 7 years;
- Medium-term – lasting 7 to 15 years;
- Long-term – lasting 15–60 years;
- Permanent – lasting longer than 60 years; and
- Reversible – can be undone e.g., through remediation or restoration.

54. Knowledge of how rapidly the population or performance of a species is likely to recover following loss or disturbance (e.g., by individuals being recruited from other populations elsewhere) is used to assess duration, where such information is available. Where an impact could reasonably be assigned more than one level of magnitude, professional judgement has been used to determine which level is most appropriate for the impact.

Table 13-8 Criteria for determination of magnitude of impact

Magnitude	Criteria
High	Extent: Impact occurs over a large spatial extent, or a large proportion of a given habitat type. Duration: The impact is anticipated to be permanent (i.e., over 60 years). So would result in permanent or long-term changes to a bat species population, potentially leading to a change in the conservation status of that species. Frequency: The impact will occur constantly throughout the relevant project phase.

Magnitude	Criteria
	For bats this would be the operational phase when turbines are active. Consequences: Permanent changes to key characteristics or features of the particular environmental aspect's character or distinctiveness.
Medium	Extent: Impact occurs over a moderate spatial extent or moderate proportion of a given habitat type. Duration: The impact is anticipated to be medium-term (i.e., 7 to 15 years) to long-term (15–60 years). So population recovery of bat species is anticipated to occur either through avoidance during the operational period, or following decommissioning. Frequency: impact occurs continuously or repeatedly. For bats this would be the operational phase when turbines are active. Consequences: Noticeable change to key characteristics or features of the particular environmental aspect's character or distinctiveness. For bats there would be no long-term change in the conservation status of each bat species affected, and any negative population impacts would be reversible.
Low	Extent: Impact occurs over a small to moderate spatial extent or small proportion of a given habitat type. Duration: The impact is anticipated to be temporary (i.e., lasting less than one year) to short-term (i.e., 1 to 7 years). Frequency: Impact will occur once or repeatedly. Consequences: Barely discernible to noticeable change to key characteristics or features of the particular environmental aspect's character or distinctiveness. For bats this would be if there is no, or very limited change to a bat species population, so their conservation status would remain unchanged (also favourable).
Negligible	Extent: Impact occurs over a small spatial extent or small proportion of a given habitat type. Duration: The impact is anticipated to be momentary (seconds to minutes) to brief (lasting less than one day). For bats, duration would still be when turbines are operational. Frequency: Impact will occur once or infrequently. Consequences: No discernible to barely discernible change to key characteristics or features of the particular environmental aspect's character or distinctiveness. For bat species, there would be no measurable change in individual species populations from the usual annual variation.

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

56. Due to the offshore nature of the proposals, the relationship between pre-construction activity and post construction mortality on bats is ill defined (Matthews et al., 2016). For each potential impact, the following are presented:

- Overview of impact;
- Prediction of potential impact;
- Significance of impact;
- Assessment of all impacts during all development phases (construction, operation and decommissioning) and considering migratory species;
- Frequency of impact (e.g., annually or daily);
- Assessment of potential cumulative impacts; and
- Summary tables of impact significance.

Significance of effect

57. Only features for which there is considered to be the potential for significant effects are identified as IEFs and taken forward for EcIA. Having followed the process of identifying an IEF, determining its sensitivity, and characterising potential impacts, the significance of the effect is then determined. The CIEEM (2022) guidelines use only two categories to classify effects: 'significant' or 'not significant'. In this EIA chapter, significance of effects is assessed following an assumption of the application of embedded mitigation measures.

58. The significance of an effect is determined by considering the importance of the feature, the magnitude of the impact and applying professional judgement as to whether the integrity of the feature will be affected. The assessment includes potential impacts on each IEF from all relevant phases of the development, e.g., construction and operation, and considers direct, indirect, secondary and cumulative impacts and whether the impacts and their effects are short, medium, long-term, permanent, temporary, reversible, irreversible, positive and / or adverse.

59. As set out in **Chapter 5 EIA Methodology**, an Impact Assessment Matrix (IAM) is used to determine the significance of an effect. In basic terms, the potential significance of an effect is a function of the sensitivity of the receptor and the magnitude of the impact, as shown in **Table 13-9.** Effects are more likely to be considered significant where the feature affected is of higher conservation importance or where the magnitude of the impact is high. Effects not considered to be significant would be those where the integrity of the feature (or favourable conservation status) is not threatened, effects on features of lower conservation importance, or where the magnitude of the impact is low.

60. The matrix provides a framework for the consistent and transparent assessment of predicted effects across all technical chapters, however it is important to note that the assessments are based on the application of expert judgement.

61. The matrix provides levels of effect significance ranging from Imperceptible to Very Significant (profound). For the purposes of this assessment, potential adverse effects identified to be of Moderate significance or above are considered to be significant in EIA terms and additional mitigation will be required. Adverse effects identified as less than Moderate significance are generally considered to be not significant in EIA terms.

Table 13-9 Impact assessment matrix for determination of significance of effect

Magnitude of Impact		Sensitivity of Receptor			
		High	Medium	Low	Negligible
Adverse impact	High	Very Significant	Significant	Moderate	Imperceptible
	Medium	Significant	Moderate	Slight	Imperceptible
	Low	Moderate	Slight	Slight	Imperceptible
Neutral impact	Negligible	Not significant	Not significant	Not significant	Imperceptible
Positive impact	Low	Moderate	Slight	Slight	Imperceptible
	Medium	Significant	Moderate	Slight	Imperceptible
	High	Very Significant	Significant	Moderate	Imperceptible

62. Where potential adverse effects on an IEF of the proposed development are assessed as significant, specific mitigation measures are identified following the recognised hierarchy of 'avoid, minimise, off-set' in order to avoid, reduce and / or compensate for potentially significant effects.

63. The level of significance of residual effects on features after the implementation of mitigation measures can then be determined, along with any monitoring requirements.

13.5 Assumptions and limitations

64. While Eurobats guidance (Rodrigues et al., 2015) recommends that surveys should be undertaken with detectors on vessels, this was not possible primarily due to the lack of suitable night ferries in the area. The chosen survey methods, including approximate detector locations and the omission of detectors on vessels were agreed during consultation. Where ferries have been used in attempts to detect bats at sea in other projects, these have had mixed success. For instance, surveys placing detectors as part of the MISE Research Project (MISE, 2015) (which was later included in the All-Ireland Nathusius's Pipistrelle Bat Project (Department of Housing, Local Government and Heritage, 2021), did not recorded any bat passes out at sea (Bat Workers Forum (BWF, 2020)). Other projects have had more success, for instance the BSG North Sea Ferries study (2014a) where detectors were deployed on two ferries for 171 and 177 nights, recording 19 and 34 bat passes respectively, all passes were by Nathusius' pipistrelle, Leisler's or soprano pipistrelle, with one unidentified pipistrelle (either common or Nathusius'). The omission of this approach has been balanced by the limited success in other projects and the precautionary approach taken in this chapter when interpreting the field records.

65. Though the static detectors were checked approximately every two weeks to prevent significant data losses, there were two instances of failures. One of the detectors on the Welsh coast on one occasion did not record for two weeks (20 April 2022–8 May 2022) and on one occasion three of the detectors on the Irish coast did not record (22 April 2022–09 May 2022). Though the failure to record for two weeks reduces comparability slightly, not all detectors were affected and data was gathered from both sides of the coast for a full 12 weeks during each migration period. Therefore, these brief data gaps are not considered to significantly impact the assessment.

66. Any potential differences in the analysis of the Dublin Array OWF data with the Dublin Array OWF planning application are associated with the different methodologies in conducting acoustic analysis. The data presented within **Section 13.6 Existing environment** has been analysed using the same process as the data collected directly for CWP, this was done so they are comparable. Any differences

in the results presented within the Dublin Array OWF EIA Chapter and this are unlikely to be significant or significantly alter the assessment.

67. Research by Ahlén, Baagøe and Bach (2009) highlights the potential for offshore foraging by bats, though flight heights and distance out to sea remain unknown, for the purposes of this EIA a precautionary approach has been taken, assuming that any bats which may forage or migrate this far out at sea would be impacted. Oversea bat migration remains poorly understood, with numerous ongoing research projects aiming to improve the understanding of how often and where bats migrate from / to. The chosen detector locations were based on a review of aerial imagery and Eurobats guidance (Rodrigues et al., 2015), though they are not the only potential landfalls by which bats could pass through the CWP Project area. However, data obtained on behalf of CWP has been bolstered with the addition of the Dublin Array OWF data and that available within the public domain as part of the desk study.

68. Bat migration remains under-researched and though notable efforts have been made to further gather knowledge of flightpaths and to better understand a range of bat behaviours, additional research is required to fully understand which species undertake migrations and how else they may use the offshore environment. As such this EIA has taken a precautionary approach in relation to the likelihood of different bat species using the CWP Project area.

13.6 Existing environment

13.6.1 Desk study

69. The following sections describe the baseline conditions for offshore bats.

Designated sites

70. Whilst the desk study identified seven Sites of Special Scientific Interest (SSSIs) and three Special Areas of Conservation (SACs) within 10 km of the static detectors on the Welsh Coast, bats are not listed as a feature of interest or reason for designation for any of these 10 sites. Similarly, of the five SACs within 10 km of the Irish static detector locations, none were designated for significant bat interest. It is also worth noting that of the 41 areas designated for significant bat roosts in Ireland, all are designated for the sedentary lesser horseshoe bat, which is not known to migrate, and is largely associated with the west coast of Ireland. Of the areas designated for roosting bats in Wales they are all designated for either barbastelle (one SAC in west Wales), lesser horseshoe (eight SACs which mention lesser horseshoes) or greater horseshoe bats (three SACs all in south Wales), all of which are considered non-migratory. The closest SAC designated for bats was Glynllifon SAC, 25 km south of the Anglesey landfall, and is designated for lesser horseshoe bats.

Contextual information

Migration in bats

71. A brief summary of locally relevant studies is provided below to give additional context, before moving onto whether different species are considered migratory in Table 13-12.

72. The UK Offshore Energy Strategic Environmental Assessment (OESEA4) (Department for Business, Energy & Industrial Strategy, 2022a) highlights species known to have been encountered over the North Sea as most frequently Nathusius' pipistrelle, but common pipistrelle, common noctule, Leisler's

bat, particolored bat (*Vespertilio murinus)*, Northern bat (*Eptesicus nilssonii)*, and Serotine bat are also recorded (Boshamer et al., 2008, Lagerveld et al., 2012, Hüppop et al., 2016, Hüppop et al., 2019). Though there are no known defined migration routes in the Irish Sea, particolored bat and Northern bat are not present in Ireland or GB. The OESEA4 also highlights that there are relatively few studies into bat migration in this region, and they often show contradictory results, however the risk of collision remains.

73. Studies into the timing and directions of migration have identified bimodal peaks during May and September to November in the North Sea (Russ et al., 2001) with most bats recorded during the migration seasons, from late March until June and from late August until October (Strelkov, 1969).

74. The All-Ireland report (Department of Housing, Local Government and Heritage, 2021) stated that *'To date there has been no evidence of internal or international migration of any bat species in Ireland, compared to the European continent where several species are known to move across large distances'.* The All-Ireland project (Department of Housing, Local Government and Heritage, 2021) included stable isotope analysis of two Nathusius' pipistrelle roosts in Northern Ireland in 2016, which was inconclusive in identifying whether the Nathusius' pipistrelle bats are migratory. Between 2018 and 2020, 21 Nathusius' pipistrelle bats were captured and ringed in County Cavan and County Wexford, and while none of these bats were reported as recaptured prior to publication of the report (November 2021) Covid-19 restrictions reduced survey capacity. In 2021, 10 static bat detectors were deployed in late summer–autumn along the south Wexford coast. Of these the majority (538) of the Nathusius' pipistrelle calls were recorded on Lady's Island, Wexford in the south-eastern corner of Ireland, over 90 km south of the CWP Project. The findings included a clear peak in Nathusius' activity during 9–23 September 2021 and suggested that this would coincide with the expected peak of bats heading southwest from the north of Europe, though was not enough evidence to confirm the migration. The study also recorded Leisler's, common pipistrelle, soprano pipistrelle and *Myotis* bats, with peaks in activity between 26 August 2021 and 25 September 2021.

75. In Wales, the NRW Bat Migration Project Report (Dyer, 2019) looked at Leisler's and Nathusius' pipistrelle activity recorded on static detectors at offshore (Bardsey Island) and three coastal locations in Wales, including South Stack Lighthouse. All locations were considered potential landfall points for migratory bats. Both Leisler's and Nathusius' bats were recorded at South Stack and Bardsey Lighthouse in 2017 and single Leisler's passes were recorded at Bardsey Bird Observatory in 2017 and 2018. A total of 38 Nathusius' pipistrelle passes were recorded at Treginnis and while Wooltack Point was only monitored for a short period of time, three Nathusius' pipistrelle passes were recorded. The results from Treginnis included Nathusius' calls every month with small peaks in May and October, suggesting a resident Nathusius' in the area. The detector at Bardsey Island bird observatory (approximately 2.9 km from the Welsh coast) recorded a high number of common pipistrelle calls during both deployments and use by foraging common pipistrelles was considered likely. The Bat Migration Project Report (Dyer, 2019) highlights that the assumption that any migratory bats would make the shortest possible crossing may not be correct, and suggests that the bats may follow other routes, such as heading towards estuaries to follow riparian corridors inland.

76. As part of the MISE project (MISE, 2015), static bat detectors were deployed at South Stack Lighthouse in conjunction with the RSPB in 2015, 2017 and 2018. The data from this is available, not just within the MISE (2015) report but also returned within the Cofnod 10 km data search summarised in **Table 13-8**. The Motus Wildlife Tracking System online database (MOTUS, 2023) was reviewed for any recent radio tagged Nathusius' pipistrelle bats undertaking migrations around the region. To date the only Motus array between GB and Ireland was installed on 31 October 2022 on the Isle of Man and at the time of writing (13 April 2023) had not yet recorded any tagged birds or bats. However, of the network's 27 masts around England, eight masts along the east coast have recorded tagged Nathusius' pipistrelles. This included individual bats which were recorded on multiple coastal masts in Norfolk and Suffolk before being recorded in the Netherlands. The dataset includes the longest known Nathusius' flight in a single night from Minsmere 200 km east to Wijk aan Zee (Wageningen University

& Research, 2021). Individual Nathusius' recorded at Minsmere at 21:30 on 6 May 2022, arriving at Noordwijk aan Zee 190 km east at 02:07 on 7 May 2022, suggesting an average flight speed of 41.3 km/h. While a Nathusius' pipistrelle recorded at Minsmere at 22:14 on 11 May 2022 was then recorded 170 km southeast at 00:57 on 12 May 2022, which would allow for an average flight speed of 62.7 km/h. Other relevant recordings include a Nathusius' pipistrelle recorded at 22:46 on 25 May 2022 before being detected at the offshore Belwind Voltage Station, 103 km southeast, at 23:57 the following night.

77. It is noted that bats can be seen on the Motus network to move along the coast before crossing the sea, though not always to the geographically closest point which would thereby be the shortest distance in a straight line. The reason behind use of different departure points and means of navigation remain the point of much research and academic discussion, with research by Voigt et al., (2017) suggesting weather patterns and food availability are the principal drivers. Lagerveld et al., (2021) found that when looking at the North Sea the highest probability of bat presence occurred with wind from east-northeast, which they concluded was a direction that corresponded with the migration paths of virtually all ringing recoveries in Great Britain.

78. Research into offshore flight heights continue to be underway with a variety of studies and results depending on species and location. There is evidence to suggest that bats fly higher when migrating (Lagerveld, Jonge Poerink and Geelhoed, 2021), using the prevailing wind to aid migration similar to insects and birds. Other research suggests lower flights, for instance at an OWF 27 km from the coast in the North Sea (Poerink, Lagerveld and Verdaat, 2013), recorded significantly less activity of Nathusius' pipistrelles at nacelle height than at lower heights. Which ties in with the evidence suggesting the majority of bats recorded around OWFs are at less than 10 m high (Brabant et al., 2019a) which would reflect what is seen on ferries and in Scandinavia (Ahlén, Baagøe and Bach 2009). There are many limitations to such studies, not least microphone height, and further research is needed.

79. Research in relation to the suitable conditions for bat migration has been provided in **Section 13.4 Migration parameters**.

Baseline species summary

80. Species known to be present on land on both sides of the CWP Project are:

- Common pipistrelle;
- Soprano pipistrelle;
- Nathusius' pipistrelle;
- Leisler's;
- Whiskered (*Myotis mystacinus*);
- Daubenton's (*Myotis daubentoniid)*;
- Natterer's (*Myotis nattereri)*;
- Lesser horseshoe (*Rhinolophus hipposideros)*; and
- Brown long-eared (*Plecotus auratus)*.

81. In addition to these nine resident bat species in Ireland, two vagrants have been recorded, a Brandt's bat (*Myotis brandtii)* and a greater horseshoe *(Rhinolophus ferrumequinum)*. The only confirmed Brandt's bat recorded in County Wicklow in 2003 (BC Ireland, 2022a) was considered to be a vagrant, highlighting potential to cross the sea from GB where they are present across England and Wales (as well as across much of continental Europe). It is worth noting however, that Brandt's bats are difficult to distinguish from whiskered bats, which are present across Ireland. Research by Boston et al., (2010) was conducted to confirm absence of resident Brandt's bats in Ireland using DNA analysis, however further surveys are considered necessary to confirm absence of Brandt's bat as residents. The single greater horseshoe bat, potentially from Wales, was found in County Wexford in 2013 (A ughney, Roche

and Langton, 2022). Greater horseshoe and Brandt's bats are not considered to be migratory nor resident in Ireland; these are rare vagrants that have likely been blown off course and arrived on the east coast of Ireland by chance.

82. There are 16 known bat species resident in Wales, which includes all species present in Ireland as well as:

- Serotine (*Eptesicus serotinus)*;
- Noctule;
- Brandt's;
- Bechstein's (*Myotis bechsteinii)*;
- Alcathoe (*Myotis alcathoe)*;
- Barbastelle (*Barbastella barbastellus)*; and
- Greater horseshoe.

83. Barbastelle and Bechstein's bats are present in Wales, though not in Anglesey (Gwynedd bats, 2022). The distribution of Alcathoe bat remains unknown due to the similarities between whiskered and Brandt's bats; from which it was only genetically distinguished in Europe in 2001. Given that these species are not known to be present in Ireland (aside from the potential for occasional vagrants as mentioned in paragraph 81**81**) these seven species are not considered likely to be present in the area or to migrate in any number, and as such there is no potential for significant impacts to arise on these species. Therefore serotine, noctule, Brandt's, Bechstein's, Alcathoe, barbastelle and greater horseshoe bats are scoped out of any further assessment.

84. Of the species retained for consideration, there are offshore records of single Leisler's bats, several records from around Europe of common pipistrelle, and frequent records of Nathusius' pipistrelle. It is considered possible that soprano pipistrelle may also migrate (Lindecke et al., 2019) although there are no records to date. Further details as to the species likely to be sedentary or migrate are provided below.

Data search results

85. A summary of the BC Ireland data search is provided in **Table 13-10** below.

Table 13-10 Summary of BC Ireland records within 10 km of the proposed Irish landfall locations since 2008

Species	Number of recordings	Nearest recording – km (year)	Number of roosts within 10 km
Bat (species unknown)	19	5.05 (unknown)	6
Common pipistrelle	242	2.90 (2017)	12
Soprano pipistrelle	167	2.90 (2017)	16
Nathusius' pipistrelle	6	7.50 (2021)	0
Pipistrellus sp.	19	7.32 (2016)	9
Leisler's	186	2.90 (2017)	9
Whiskered	14	7.32 (2016)	1
Daubenton's	61	4.11 (2020)	6
Natterer's	19	2.90 (2017)	3

Species	Number of recordings	Nearest recording – km (year)	Number of roosts within 10 km
Myotis sp.	46	3.37 (2008)	4
Brown long-eared	75	2.90 (2017)	15
TOTAL	**854**	**–**	**81**

86. The six Nathusius' records related to two different projects. Four of the recordings are from one location in Kilcoole, across four nights in August 2021 as part of the Neighbourhood Bats 2021 surveys (BC Ireland, 2021). The other two recordings relate to surveys in June–July 2017 for the Pilot Woodland Monitoring Scheme (Boston et al., 2017).

87. A summary of all records returned within the Cofnod data search is provided in **Table 13-11.**

Table 13-11 Summary of Cofnod records within 10 km of the proposed Welsh landfall locations since 2008

Species	Number of recordings	Nearest recording (km – year)	Nearest roost (km – year)
Bat (species unknown)	4	2 km – 2015	2 km – 2015 unidentified bat emergence
Common pipistrelle	72	0.17 km – 2012	0.17 km – 2012 individual bat roost
Soprano pipistrelle	17	0.23 km – 2017/18 for MISE project	None within 10 km.
Nathusius' pipistrelle	2	0.23 km and 276 m – 2015 for MISE project	None within 10 km.
Pipistrellus sp.	3	0.23 km – 2017/18 for MISE project noted as possible Nathusius'	None within 10 km.
Noctule	18	0.22 km – 2015 for MISE project	None within 10 km.
Leisler's	2	0.23 km – one pass recorded for MISE project 2017	None within 10 km.
Nyctalus sp.	1	0.23 km – 2017 MISE Project	None within 10 km.
Whiskered / Brandt's	2	9.31 km – 2015	9.31 km – 2015 single bat
Daubenton's	1	9.26 km – 2014 foraging	None within 10 km.
Natterer's	2	1.49 km – 2011	1.49 km – 2011 single bat roost
Myotis sp.	6	0.23 km – 2017/18 MISE project	2.01 km - 2015 – single bat roost
Lesser horseshoe	0	None within 10 km.	None within 10 km.

Species	Number of recordings	Nearest recording (km – year)	Nearest roost (km – year)
Greater horseshoe	0	None within 10 km.	None within 10 km.
Brown long-eared	21	0.23 km – 2015 MISE project	1.49 km – 2011 suspected maternity roost

88. **Table 13-11** includes the results from the MISE (2015) project, which involved a detector 276 m from the closest static detector deployed for the CWP baseline surveys.

Summary of desk study data

89. Further details on the remaining nine species obtained from relevant sources including research papers and studies identified are provided in **Table 13-12** below.

Table 13-12 Population status and known migration information for bat species present on both sides of the Irish Sea

Species	Species status in Ireland	Flight, migration and wind turbine association	Potential to be present offshore and migrate
Common pipistrelle	Broadly widespread and common across Ireland, with the favourable conservation status in Ireland found to be increasing with an estimated 1.5–2 million common pipistrelles in Ireland (NPWS, 2019).	Common pipistrelle are known to migrate in the Baltic regions (Ahlén, Baagøe and Bach, 2009), but this has not been observed yet in central Europe. Distances between summer and winter roosts in Europe are typically between 10–20 km, and foraging is within 5 km of roosts (Rodrigues et al., 2015). However, some long-distance movements have been recorded (Hutterer et al., 2005) and low numbers have been recorded at sea (Department for Business, Energy & Industrial Strategy, 2022b). Wing shape and flight speed are suitable for migration and while typically low fliers on land, flight patterns offshore and during any migration may vary and largely remain unknown (BCT, 2022b). There is recent evidence to suggest common pipistrelles may be attracted to onshore turbines (Richardson et al., 2021); the comparability between this effect onshore and offshore has not yet been studied. All Pipistrellus species are at high risk of collision with wind turbines (Rodrigues et al., 2015).	Yes
Soprano pipistrelle	The most widespread bat species in Ireland, with an increasing population estimated at 500,000–1,200,000 individuals (NPWS, 2019).	Soprano pipistrelle bats are the same size with the same wing shape as common pipistrelle bats and have been recorded offshore, including at all three of the Pembroke Islands (BSG, 2014b). Soprano pipistrelles are known to migrate across the Baltic Sea (Lindecke et al., 2019), though migration closer to Ireland is unknown. There is evidence of bats taking rests on offshore turbines (The Swedish Environmental Protection Agency, 2007), as they do with ferries and offshore platforms, particularly during migration. All Pipistrellus species are at a high risk of collision with wind turbines (Rodrigues et al., 2015).	Yes
Nathusius' pipistrelle	While maternity and hibernation roosts of Nathusius' pipistrelle have been found	Nathusius' pipistrelles are known to migrate between wintering areas in Western Europe and their breeding grounds in the Baltic States in	Yes

Species	Species status in Ireland	Flight, migration and wind turbine association	Potential to be present offshore and migrate
	in Northern Ireland, none have yet been identified in ROI, though suitable habitat is present, and the species may have been under-recorded. Nathusius' pipistrelles were first recorded in GB on the Shetland Isles in the 1940s (Heymer, 1964) and in Ireland in 1996 (NPWS, 2013). Studies are underway to find maternity and hibernation roosts (which are likely to be the end point of migration) in ROI. The population is estimated to be 3,000–5,000 individuals (NPWS, 2019) across Ireland. Biodiversity Ireland (2022) shows a scattered distribution centred around Northern Ireland, though with scattered records elsewhere.	spring, and then the reverse in autumn (Russ et al., 2001). While seasonal migration between Russia and western Europe has been suggested since Strelkov, 1969, the presence of sedentary populations complicates the picture (Russ et al., 2001) as does the unknown extent of population mixing between sedentary and migratory individuals (Boston et al., 2006). However, migrations as far as 2,018 km were proven in 2021 when a ringed bat was recorded in London and then Russia (BCT, 2021). As with all bat species, there has not been enough research to identify UK / Ireland bat migration routes, however there are several projects underway which involve capturing and ringing Nathusius' pipistrelles which may provide data in the future (Department of Housing, Local Government and Heritage, 2021), (MISE, 2015). All Pipistrellus species are at a high risk of collision with wind turbines (Rodrigues et al., 2015).	
Leisler's	Leisler's bats are one of the most common species in Ireland with 60,000–100,000 individuals (NPWS, 2019). They are widespread but more densely found in the southeast of Ireland, though the population is increasing. Wind energy is listed as one of the main threats to Leisler's bats (Marnell, Kelleher and Mullen, 2022).	In the North Sea Leisler's bats are one of the most common species recorded on offshore platforms (BSG, 2014a), and have been recorded migrating over 1,500 km within Europe, though distances over 1,000 km are more common (Wohlgemuth et al., 2004). Given the potential to fly offshore and presence in both GB and Ireland, it is assumed Leisler's can cross the Irish Sea (Jones et al., 2009). Leisler's bats are considered at a high risk of collision with wind turbines (Rodrigues et al., 2015).	Yes

Species	Species status in Ireland	Flight, migration and wind turbine association	Potential to be present offshore and migrate
Whiskered	Widespread but not common with a relatively dispersed but stable population, for which no estimates are given (NPWS, 2019).	While there are some records of whiskered bats migrating (Jones et al., 2009; Heymer, 1964)[i], this species is generally considered to be sedentary. The same report which highlights the records of whiskered bats migrating (Jones et al., 2009, prepared on behalf of BCT) does not consider whiskered bats to migrate or undertake long-distance movements.	No
Daubenton's	Monitoring of the Irish Daubenton's population suggests this relatively common and widespread species is currently stable (BC Ireland, 2022b). The estimated population of Daubenton's bats in Ireland is 57,000–79,000 individuals (NPWS, 2019), with an estimated population of 108,000 in Wales (BCT, 2021).	Daubenton's bats have been recorded up to 10 km offshore (Ahlén et al., 2007), however as they are also thought to be non-migratory, current thought is that these records have been in relation to coastal / offshore foraging only (Ahlén, Baagøe and Bach, 2009). Eurobats (Rodrigues et al., 2015) provides the maximum foraging distance for Daubenton's on land as 15 km, however the distance offshore that they may forage at sea is unknown. As Daubenton's forage by gleaning invertebrates from the surface of the water, it is assumed any foraging activity will be undertaken at low heights, however further research into offshore flight heights and the potential uses of offshore infrastructure is recommended by BCT (2022b).	Yes – foraging only
Natterer's	BC Ireland (2022c) lists Natterer's as one of the rarest species in Ireland and as such the population is vulnerable to change, however the NPWS 2019 report lists the population as Favourable.	To date, no evidence of migration by Natterer's bats has been recorded, with no Natterer's bats recorded on North Sea platforms, offshore islands or on ferries. It is considered that this species does not undertake extensive migrations and is therefore unlikely to be encountered offshore.	No
Lesser horseshoe	The most recent estimate of the lesser horseshoe bat's population is 12,000–13,000 individuals (NPWS and The Vincent Wildlife Trust, 2022), distributed predominantly along the west of Ireland.	A sedentary species, that is not known to migrate, the average distance between its roosts range from 5–50 km overland (UNEP / Eurobats, 2022). Lesser horseshoe bat echolocation is directional and they rely heavily on linear features to move through the landscape as	No

Species	Species status in Ireland	Flight, migration and wind turbine association	Potential to be present offshore and migrate
	Lesser horseshoes are experiencing declines in habitat (broad-leaved woodland and riparian areas) though the population remains stable (NPWS, 2019).	such are unlikely to be found offshore, unless blown off course (as is the case with the greater horseshoe vagrant recorded in Ireland.	
Brown long-eared bats	Widespread across Ireland with recent estimates at 60,000–100,000 individuals, with a recent significant increase in population seen in monitoring (NPWS, 2019). The population is therefore seen as favourable increasing.	There is no evidence to suggest brown long-eared bats are a migratory species and they are not recorded on North Sea platforms, offshore islands or on ferries.	No

13.6.2 CWP – static detector results

90. In Wales, nine different species / species groups were recorded, and eight species / species groups were recorded in Ireland. The only difference in species being the recording of Leisler's in Ireland but noctules and potential serotine in Wales (noctules are not known to be present in Ireland). The same species were recorded within each country during both deployments (spring and autumn).

91. A brief summary of all the species recorded during the deployments is shown in **Table 13-13**. Species recorded but not known to be present offshore are included within this table for reference, but as specified in **Section 13.4 Impact assessment methodology** are not included further in this assessment.

Table 13-13 Summary of bat passes recorded on each detector during the deployments

Location	Common pipistrelle	Soprano pipistrelle	Nathusius' pipistrelle	Pipistrellus sp.	Noctule	Leisler' s	*Nyctalus* sp.	*Myotis* sp.	Brown long-eared	Total bat passes per detector
Wales 1	1,273	1	14	47	66	0	9	198	84	1,692
Wales 2	3,976	9	3	50	276	0	12	78	52	4,453
Wales 3	668	2	17	83	99	0	14	24	82	989
Wales 4	1,064	4	5	8	162	0	31	27	56	1,357
Ireland 1	1,228	248	12	39	0	4,665	252	16	14	6,474
Ireland 2	8,115	1,571	26	229	0	3,925	253	7	18	14,144
Ireland 3	6,255	390	31	180	0	1,996	369	5	35	9,261
Ireland 4	59,089	16,355	53	2,547	0	4,402	246	7	7	82,706
Total passes per species in Wales	6,981	16	39	188	603	0	66	327	274	8,491
Total passes per species in Ireland	74,687	18,564	122	2,995	0	14,988	1,120	35	74	112,585

92. As is shown in **Table 13-13** there were significantly more bat passes recorded in Ireland compared to Wales, this was influenced by Ireland 4 (Wicklow golf course), where 68.31% of all passes were recorded. Though all detectors in Ireland recorded more passes than any detector in Wales, with 29,879 passes recorded across Ireland 1–3. Throughout both deployments there were more passes at Ireland 4 than any of the others combined, largely due to the abundance of common pipistrelle and soprano pipistrelle calls (75,444 passes in total or 91.22% of all the passes recorded at Ireland 4). This detector was located at the edge of a small (approximately 0.046 ha) block of broadleaved planting at the edge of the golf course approximately 18 m from the shoreline, the habitat here may account for the high number of passes. Common pipistrelle passes were the most abundant recordings at every detector location, excepting Ireland 1 (Bray Head), where the 4,665 Leisler's passes constituted

72.07% of the recordings at this location. There was a particularly low number of soprano pipistrelle recordings in Wales, total 16 with only two recordings in spring.

93. Nathusius' pipistrelle bats were recorded on every detector in spring, in both Wales and Ireland. All 35 of the Nathusius' pipistrelle passes recorded in Wales during spring were recorded in June. Nathusius' pipistrelle were first recorded on 16 April in Ireland and continued to be recorded throughout the spring deployment with a total of 86 passes.

94. In autumn there were fewer Nathusius' pipistrelle calls. Four were recorded in Wales at three of the detectors (with none recorded at Wales 2) between 20 September and 11 October, with a maximum of one pass per night. In Ireland there were 36 passes between the four detectors recorded between 25 August and 3 November, with between one and three calls recorded in a single night.

95. Although Leisler's were not confirmed at all during the surveys in Wales, there were 66 unidentified *Nyctalus* sp. calls recorded in Wales. On further analysis, 14 of these calls had parameters which overlapped with Leisler's and noctule, but as a precaution have been assessed as being Leisler given the potential for both species to be present in Wales. There were 1,120 unidentified *Nyctalus* sp. calls recorded in Ireland, however this approach has not been undertaken as Leisler's is the only *Nyctalus* species considered to be resident in Ireland.

96. Throughout the surveys the majority (90.33%) of the *Myotis* sp. calls were recorded in Wales. As *Myotis* species are considered non-migratory, the recordings from Wales will not be subject to further analysis. However, as this species group has been recorded foraging up to 10 km offshore (Ahlén et al., 2007) the 35 *Myotis* sp. recordings from Ireland will be considered in relation to potential offshore foraging given the proximity of the CWP Project to the Irish coast.

97. When looking at bat calls recorded within the previously identified migration parameters, peaks in activity varied greatly both between Ireland and Wales and between species. **Table 4 in Appendix 13.3** provides dates of highest activity. There is no clear connection between the peaks in activity at the different locations for any of the species. Results are also provided for Ireland, with Ireland 4 removed from the results due to the potential of the large dataset skewing the results.

98. As there are no corresponding peaks of activity on nights that warrants further discussion, the following results provided are based on the Migration Parameters outlined in **Section 13.4 Impact assessment methodology**.

99. **Appendix 13.3 Table 3** provides the details of the number of records where conditions were considered suitable for migration. One night, 28 August, had weather conditions suitable for migration for the whole night on both sides of the sea the whole night through. As such, the records in **Table 13-14** are provided in migratory hours rather than nights.

100. In Ireland, 17 nights in spring and 26 nights in autumn included hours where conditions were optimal for migration. In Wales, 18 nights in spring and 13 in autumn included hours where conditions were optimal for migration. If looking for these conditions on both sides of the Irish Sea, only five nights during the spring deployment and two during the autumn deployment had any weather record of above 13°C and winds below 5 m/s in favourable directions for migration. This does not account for the average temperatures or wind speeds, which would further reduce this number, or any other external variables which may be potential indicators of bat migration, such as cloud cover or lunar phase.

Table 13-14 Species passes by suitability for migration

	Suitability for migration	Wind direction	Common pipistrelle	Soprano pipistrelle	Nathusius' pipistrelle	*Pipistrellus* sp.	Leisler's	Noctule	*Nyctalus* sp.	Other bats	Total
Spring											
Ireland	Suitable weather for migration	Winds towards Ireland (E-SE / NE-E)	220	1	0	2	24		0	0	247
Ireland	Suitable weather for migration	Winds towards Wales (W-NW / SW-W)	2,260	379	5	199	1,936		99	0	4,878
Ireland	Unsuitable weather / wind direction for migration		36,805	6,120	81	2,259	6,895		511	16	52,687
Wales	Suitable weather for migration	Winds towards Ireland (E-SE / NE-E)	70	0	8	11		5	2	7	103
Wales	Suitable weather for migration	Winds towards Wales (W-NW / SW-W)	133	0	1	3		6	0	1	144
Wales	Unsuitable weather / wind direction for migration		3,782	2	26	150		449	29	145	4,583
Autumn											
Ireland	Suitable weather for migration	Winds towards Ireland	1,145	127	4	45	240		13	12	1,586
Ireland	Suitable weather for migration	Winds towards Wales	1,923	157	4	30	545		49	5	2,713
Ireland	Unsuitable weather / wind direction for migration		32,334	11,780	28	460	5,348		448	76	50,474
Wales	Suitable weather for migration	Winds towards Ireland	290	7	0	0		31	11	44	383
Wales	Suitable weather for migration	Winds towards Wales	118	1	1	1		1	0	5	127

	Suitability for migration	Wind direction	Common pipistrelle	Soprano pipistrelle	Nathusius' pipistrelle	*Pipistrellus* sp.	Leisler's	Noctule	*Nyctalus* sp.	Other bats	Total
	Unsuitable weather / wind direction for migration		2,588	6	3	23		111	24	399	3,154

101. In line with the methods outlined in the Migration parameters section, the time of calls in relation to sunset and the wind direction at that time for calls recorded during weather conditions considered suitable for migration has also been reviewed. For Nathusius' pipistrelles this is presented in **Appendix 13.3 Table 5**, though the full data can be provided upon request.

102. It is unclear whether all passes during suitable wind direction and weather conditions constitute migratory passes, however using current data they are within the 'most likely' parameters, so are considered possible. Given the high number of Nathusius' passes (11) over a short period of time at Wales 1 on 2 June 2022 it is probable that at least one bat was foraging in the area.

103. Looking at the timing of calls, calls within 103 minutes of sunset during suitable wind direction for migration out of the country of detection cannot be discounted, such as the Nathusius' pipistrelle recording at Ireland 2 on 12 July 2022. Though calls within 103 minutes and in wind directions unsuitable for migration out of the country of detection are not considered migratory, as this would involve either flying against the prevailing wind or having departed the country of origin during daytime, as such the Nathusius' pipistrelle call recorded at Ireland 1 on 21 June 2022 has been discounted as unsuitable for migration. For calls recorded in Wales there are no potentially unsuitable wind directions for travel to / from Ireland, however only recordings going to or from due east would pass through the CWP Project and so only the passes during easterly winds are considered potentially impacted by the CWP Project.

104. Overall, it is possible, taking a precautionary approach, that up to 13 of the calls in Ireland and 10 in Wales of Nathusius' pipistrelles may be associated with migration. The BAI of calls during conditions suitable for migration compared to calls recorded throughout the survey period (665 detector nights), including the maximum number of passes per night per species is provided below in **Table 13-15** and **Table 13-16.**

105. Using the above parameters for Leisler's calls recorded in Ireland, 2,745 of the 14,988 calls recorded are considered suitable for migration. An additional unidentified 161 *Nyctalus* sp. passes were recorded in Ireland during suitable weather conditions and times of night. As with Nathusius' pipistrelles, from the wind direction it is only possible to infer potential direction of travel, as no calls (meeting the previously mentioned parameters) were recorded during north-north-westerly winds. Suitable passes peaked on 22 August 2022, with 288 Leisler's and 18 *Nyctalus* sp. passes suitable for migration recorded in a single night. Though Leisler's bats are known to migrate around Europe, there is also a resident population in Ireland and the number which were associated with migration is unknown. By contrast, only 13 of the *Nyctalus* sp. recordings in Wales were during suitable conditions and at suitable times, and all were between 21 August 2022 and 10 September 2022.

106. **Table 13-15** provides the BAI for all species recorded in Ireland, and has separated these out to provide the total BAI for the whole survey period, and the BAI for those calls that were considered to be migratory based on the previously defined criteria (set out in **Section 13.4**). **Table 13-16** provides the same for passes recorded in Wales. Overall activity for *Myotis* sp. in both Ireland and Wales have been included to show the potential level of foraging in Ireland compared to Wales, with only the *Myotis* sp. bats recorded in Ireland being considered in the Impact Assessment **Section 13.10**. **Table 13-15** and **Table 13-16** are considered precautionary as outlined above, passes which may be associated with migration cannot be further distinguished and so all potential migratory passes have been included.

Table 13-15 BAI showing overall passes and potentially migratory passes in Ireland

Species potentially found offshore	**Potentially migratory passes**				**Overall passes**		
	BAI (mean bat activity per night)	Maximum bat passes per night	Ratio of recorded calls considered migratory	Number of passes	BAI (mean bat activity per night)	Maximum bat passes per night	Total number of passes
Nathusius' pipistrelle	0.019549	2	0.106557	13	0.183459	13	122
Common pipistrelle	8.342857	397	0.074283	5,548	112.3113	1,736	74,687
Leisler's bat	4.12782	164	0.183147	2,745	22.53835	352	14,988
Nyctalus sp.	0.242105	15	0.14375	13	1.684211	73	1,120
Myotis sp.	–	–	–	–	0.052632	3	35

Table 13-16 BAI showing overall passes and potentially migratory passes in Wales

Species potentially found offshore	**Potentially migratory passes**				**Overall passes**		
	BAI (mean bat activity per night)	Maximum bat passes per night	Ratio of recorded calls considered migratory	Number of passes	BAI (mean bat activity per night)	Maximum bat passes per night	Total number of passes
Nathusius' pipistrelle	0.015038	9	0.25641	10	0.058647	12	39
Common pipistrelle	0.918797	94	0.087523	611	10.49774	309	6,981
Leisler's bat	–	–	–	0	–	–	0
Nyctalus sp.	0.019549	3	0.19697	13	0.099248	7	66
Myotis sp.	–	–	–	–	0.491729	14	327

13.6.3 Dublin Array OWF results

107. The same species were recorded during the Dublin Array OWF deployment as the CWP deployments in Ireland. The number of passes by each detector is shown in **Table 13-17**. Sorento point (onshore) had the highest number of passes for all, but soprano pipistrelles and unidentified *Nyctalus* species calls were highest at Dalkey Island, 0.39 km offshore. All species recorded at Sorento point were also recorded at Dalkey Island, which is within foraging distance of shore and from aerial imagery appears to have suitable roost locations present, which may further account for the high number of passes here.

Table 13-17 Bat species recorded during the Dublin Array OWF detector deployments

Detector details	Common pipistrelle	Soprano pipistrelle	Nathusius' pipistrelle	Pipistrellus sp.	Leisler' s	Nyctalus sp.	Myotis sp.	Brown long-eared	Total bat passes per detector
Sorrento (onshore)	8,056	65	105	278	12,959	19	5	21	21,508
Dalkey Island (0.39 km from shore)	6,784	68	49	211	2,325	272	3	5	9,717
Muglins Lighthouse (1.13 km from shore)	145	12	2	1	160			2	322
Kish Lighthouse (11.89 km from shore)	1		1		229	32			263
Grand Total	14,986	145	157	490	15,673	323	8	28	31,810

108. While it is interesting to note that long-eared passes were recorded offshore, particularly at Muglins Lighthouse, 1.13 km from the shore, as a non-migratory species these and *Myotis* sp. will not be further investigated. The number of passes shown in **Table 13-17** at Kish, 11.89 km from shore, is more likely to be indicative of migration, though it is possible some bat species forage this far out at sea (Poerink et al., 2013).

109. Results are presented in **Table 13-18** looking at the number of passes during conditions suitable for migration during different wind directions by species and season in line with **Migration parameters** defined above.

Table 13-18 Migratory bat species recorded during the Dublin Array OWF during different deployments and weather conditions

Location	Suitability for migration	Wind direction	Common pipistrelle	Soprano pipistrelle	Nathusius' pipistrelle	Pipistrellus sp.	Leisler's	*Nyctalus* sp.	Other bats	Total
Spring										
Sorrento (onshore)	Suitable weather for migration	Winds towards Ireland (E-SE / NE-E)	88	1	2	3	270	1	2	367
Sorrento (onshore)	Suitable weather for migration	Winds towards Wales (W-NW / SW-W)	856	2	16	32	2,598	3	2	3509
Sorrento (onshore)	Unsuitable weather / wind direction for migration		4,695	6	37	149	7,692	2	9	12,590
Dalkey Island (0.39 km from shore)	Suitable weather for migration	Winds towards Ireland (E-SE / NE-E)	270	0	2	10	128	27	1	438
Dalkey Island (0.39 km from shore)	Suitable weather for migration	Winds towards Wales (W-NW / SW-W)	442	2	2	18	220	23	0	707
Dalkey Island (0.39 km from shore)	Unsuitable weather / wind direction for migration		2,062	4	31	117	988	130	0	3,332
Muglins Lighthouse (1.13 km from shore)	Suitable weather for migration	Winds towards Ireland (E-SE / NE-E)	1	0	0	0	1	0	0	2
Muglins Lighthouse (1.13 km from shore)	Suitable weather for migration	Winds towards Wales (W-NW / SW-W)	14	0	0	0	5	0	0	19
Muglins Lighthouse (1.13 km from shore)	Unsuitable weather / wind direction for migration		6	1	2	0	61	0	0	70
Kish Lighthouse		Winds towards Ireland (E-SE / NE-E)	0	0	0	0	13	0	0	13

Location	Suitability for migration	Wind direction	Common pipistrelle	Soprano pipistrelle	Nathusius' pipistrelle	Pipistrellus sp.	Leisler's	*Nyctalus* sp.	Other bats	Total
(11.89 km from shore)*	Suitable weather for migration	Winds towards Wales (W-NW / SW-W)	0	0	0	0	16	2	0	18
	Unsuitable weather / wind direction for migration*		0	0	0	0	17	0	0	17
Autumn										
Sorrento (onshore)	Suitable weather for migration	Winds towards Ireland	327	18	5	6	385	3	3	747
		Winds towards Wales	627	13	9	14	665	1	5	1,334
	Unsuitable weather / wind direction for migration		1,463	25	36	74	1,349	9	5	2,961
Dalkey Island (0.39 km from shore)	Suitable weather for migration	Winds towards Ireland	881	23	3	8	67	10	0	992
		Winds towards Wales	433	10	0	8	327	7	1	786
	Unsuitable weather / wind direction for migration		2,696	29	11	50	595	75	6	3,462
Muglins Lighthouse (1.13 km from shore)	Suitable weather for migration	Winds towards Ireland	12	0	0	1	17	0	2	32
		Winds towards Wales	9	3	0	0	9	0	0	21
	Unsuitable weather / wind direction for migration		103	8	0	0	67	0	0	178
Kish Lighthouse	Suitable weather for migration	Winds towards Ireland	0	0	0	0	106	25	0	131
		Winds towards Wales	1	0	1	0	39	3	0	44

Location	Suitability for migration	Wind direction	Common pipistrelle	Soprano pipistrelle	Nathusius' pipistrelle	Pipistrellus sp.	Leisler's	*Nyctalus* sp.	Other bats	Total
(11.89 km from shore)*	Unsuitable weather / wind direction for migration*		0	0	0	0	38	2	0	40

*all recordings at Kish are considered potentially migratory

110. The results shown in **Table 13-18** show significantly more bats during periods of unsuitable weather compared to suitable weather conditions for migration. BC Ireland Wind Farm Survey Guidelines (2012) suggests dusk temperatures above 7°C and a wind speed below 10 m/s are suitable recommended for surveys and thereby bat activity within these parameters is anticipated. When looking at Sorento Point and Dalkey Island, which are both anticipated to have numbers of foraging and commuting bats, in spring 24.06% of recorded activity was during weather suitable for migration, though in autumn 38.1% of activity at these locations was recorded during weather suitable for migration.

111. When looking at the 263 calls recorded at Kish Lighthouse, 11.89 km from shore, all 48 passes recorded in spring were at least 116 minutes after sunset and included calls during both westerly and easterly winds with 31 during weather conditions and wind directions suitable for migration. Seven of the 17 Leisler's recordings during unsuitable weather in spring were between 00:14 and 00:47 on the morning of 14 July 2021, when the air temperature was 11–11.9°C. While in autumn 36 of the 199 recordings were within 103 minutes of sunset, with the earliest being 67 minutes after sunset on 25 August 2021 during easterly winds, 34 of these early recordings were during easterly winds and all but one was during air temperatures suitable for migration. However, the location, so far out at sea would suggest otherwise and as such all calls at this location are considered potentially migratory. Though it is worth noting that all passes at Kish were recorded across eight nights in spring and 13 in autumn. When crudely looking into the time of calls with no more than five minutes between two calls of the same species, the number of potentially migratory incidents drops to 15 in spring and 57 in autumn (55 *Nyctalus* / Leisler's).

112. A summary **Table 13-19** below outlines all potentially migratory passes.

Table 13-19 BAI showing overall passes and potentially migratory passes within the Dublin Array OWF dataset

Species	Potentially migratory passes*				Overall passes		
	Average bat activity (mean passes per night)	Maximum bat activity (passes per night)	Ratio	Number of passes	Average bat activity (mean passes per night)	Maximum bat activity (passes per night)	Total number of passes
Nathusius' pipistrelle	0.067114094	5	0.254777	40	0.263423	16	157
Common pipistrelle	6.645973154	338	0.264313	3,961	25.1443	681	14,986
Leisler's bat	8.256711409	685	0.313979	4,866	26.29698	1,022	15,673
Nyctalus sp.	0.179530201	22	0.331269	105	0.541946	26	323
Myotis sp.	–	–	–	–	0.013423	3	8

13.6.4 Climate change and natural trends

113. Though the population varies annually, the ongoing monitoring programmes in GB (BCT, 2022a) and Ireland (NWPS, 2019) suggest that all, but Daubenton's bats, are increasing in population. It is worth noting, however, that this may instead reflect increased monitoring effort and technological advancements. The NPWS 2019 report instead suggests stable or improving populations for all bat species.

114. Bats are expected to be impacted by climate change (Razgour et al., 2018) due to the need to hibernate when food is unavailable, and early emergence due to temperatures which do not correlate to invertebrate availability negatively impacting fat reserves and subsequently the survival rate through winter (Sherwin et al., 2012). In addition, exceptionally hot summers such as the 2020 heat wave are linked to higher rates of infant mortality (BCT, 2021). There are limits to the known impacts this will have on migration and other oversea activities, though changes in the overall range of each species are anticipated in line with core habitat changes. The impacts of climate change on populations will depend largely on the population vulnerability (numbers and geographic spread) as well as the habitats in which they are present.

13.6.5 Predicted future baseline

115. In the absence of the proposed development, and any impacts associated with climate change, it is assumed that the steady increase in population of the majority of bat species in both Wales and Ireland would continue. An outline of the likely population, without implementation of the development as far as natural changes from the baseline scenario, can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.

13.7 Scope of the assessment

116. An EIA Scoping Report for the Offshore Infrastructure was published on the 6 January 2021. The Scoping Report was uploaded to the CWP Project website and shared with regulators, prescribed bodies and other relevant consultees, inviting them to provide relevant information and to comment on the proposed approach being adopted by the Applicant in relation to the offshore elements of the EIA.

117. Based on responses to the Scoping Report, further consultation and refinement of the CWP Project design, potential impacts to offshore bats scoped into the assessment are listed below in **Table 13-20**.

Table 13-20 Potential impacts scoped into the assessment

Impact No.	Description of impact	Notes
Construction		
Impact 1	Disturbance	There is some possibility of disturbance if roosting on partially constructed structures. Exposed roosting is a last resort, with bats being more likely to roost in any crevices created part way through construction. Disturbance while in flight, for instance from increased noise or human activity, is unknown and any impacts from such activity not well studied.
Impact 2	Lighting	Impacts from lighting depend on the species. Lighting may attract insects which may in turn attract bats, while lighting

Impact No.	Description of impact	Notes
		may also discourage light-shy species from foraging or otherwise flying through the area. However, with limitations on the knowledge of bat flight heights during migration, the impacts cannot be accurately anticipated. Though impacts during foraging are much better studied, and with the potential for foraging offshore and the need for construction work 24 hours a day, these impacts are assessed during the construction phase.
Operation and Maintenance (O&M)		
Impact 1	Disturbance	Disturbance during maintenance activities if bats are roosting on structures. The maintenance visits will be timed to take place during low winds. The extent to which bats may roost on turbines is unknown, with the ad-hoc reportings by operations teams not publicly available, if logged at all.
Impact 2	Collision	Bats are known to collide with moving turbine blades at onshore schemes and this is likely to be the case offshore as well. The flight heights during migration are unknown and so it is not possible to calculate the probability of collision.
Impact 3	Lighting	The lighting would be 13–22 km offshore, any impacts of such operational lighting at sea are not known.
Decommissioning		
Impact 1	Disturbance	As construction
Impact 2	Lighting	As construction
Cumulative		
Impact 1	Collision	Collision or barotrauma because of bats flying within the rotor swept path of the active wind farm may occur over a wider area if there is a cumulative impact of windfarms across an area used for foraging and migration.

118. Based on responses to the Scoping Report, further consultation and refinement of the CWP Project design, potential impacts to offshore bats scoped out of the assessment are listed below in **Table 13-21**.

Table 13-21 Potential impacts scoped out of the assessment

Description of impact	Justification for scoping out
Barrier effects	The turbines will be spaced to allow for their own movement, and animals will be able to move between them. As yet there is no evidence to suggest turbines present a barrier to bat movements, though there is evidence to suggest bats are attracted to offshore structures. Therefore, effects will be negligible and thus there will be no potential for a significant impact to arise.

Description of impact	Justification for scoping out
Construction and decommissioning phase collision	Bats are not at risk of colliding with stationary objects, however they can collide with vehicles, while this is the case on land (Fensome and Matthews, 2016) [ii] the number of bats which collide with vessels offshore is unknown. As bats, in line with other fauna (Altringham and Kerth, 2016), are considered less likely to collide with slower moving vehicles, the slow speed of construction / decommissioning vessels reduces the risk of collision. No bats are expected to collide with the WTGs during construction or decommissioning, due to the stationary nature of the WTGs during these phases, thus there will be no construction or decommissioning collision effects on bats.

13.8 Assessment parameters

13.8.1 Background

119. Complex, large-scale infrastructure projects with a terrestrial and marine interface, such as the CWP Project, are consented and constructed over extended timeframes. The ability to adapt to changing supply chain, policy or environmental conditions and to make use of the best available information to feed into project design, promotes environmentally sound and sustainable development. This ultimately reduces project development costs and therefore electricity costs for consumers and reduces CO_2 emissions.

120. In this regard the approach to the design development of the CWP Project has sought to introduce flexibility where required, among other things, to enable the best available technology to be constructed and to respond to dynamic maritime conditions, while at the same time to specify project boundaries, project components and project parameters wherever possible, having regard to known environmental constraints.

121. **Chapter 4 Project Description** describes the design approach that has been taken for each component of the CWP Project. Wherever possible the location and detailed parameters of the CWP Project components are identified and described in full within the EIAR. However, for the reasons outlined above, certain design decisions and installation methods will be confirmed post-consent, requiring a degree of flexibility in the planning consent.

122. Where necessary, flexibility is sought in terms of:

- Up to two options for certain permanent infrastructure details and layouts such as the WTG layouts.
- Dimensional flexibility; described as a limited parameter range i.e., upper and lower values for a given detail such as cable length.
- Locational flexibility of permanent infrastructure, described as Limit of Deviation (LoD) from a specific point or alignment.

123. The CWP Project had to procure an opinion from An Bord Pleanála to confirm that it was appropriate that this application be made and determined before certain details of the development were confirmed. An Bord Pleanála issued that opinion on 25 March 2024 (as amended in May 2024) and it confirms that the CWP Project could make an application for permission before the details of certain permanent infrastructure described in Section 4.3 of **Chapter 4 Project Description** is confirmed.

124. In addition, the application for permission relies on the standard flexibility for the final choice of installation methods and O&M activities.

125. Notwithstanding the flexibility in design and methods, the EIAR identifies, describes and assesses all of the likely significant impacts of the CWP Project on the environment.

13.8.2 Options and dimensional flexibility

126. Where the application for permission seeks options or dimensional flexibility for infrastructure or installation methods, the impacts on the environment are assessed using a representative scenario approach. A 'representative scenario' is a combination of options and dimensional flexibility that has been selected by the author of this EIAR chapter to represent all of the likely significant effects of the project on the environment. Sometimes, the author will have to consider several representative scenarios to ensure all impacts are identified, described and assessed.

127. For offshore bats, this analysis is presented in **Appendix 13.2**, which identifies one or more representative scenarios for each impact with supporting text to demonstrate that no other scenarios would give rise to new or materially different effects; taking into consideration the potential impact of other scenarios on the magnitude of the impact or the sensitivity of the receptor(s) that is being considered.

128. **Table 13-22** below presents a summarised version of **Appendix 13.2** and describes the representative scenarios on which the construction and O&M phase offshore bats assessment has been based. Where options exist, for each receptor and potential impact, the table identifies the representative scenario and provides a justification for this.

13.8.3 Limit of deviation

129. Where the application for permission seeks locational flexibility for infrastructure, the impacts on the environment are assessed using a LoD. The LoD is the furthest distance that a specified element of the CWP Project can be constructed.

130. This chapter assesses the specific preferred location for permanent infrastructure. However, **Appendix 13.2** provides further analysis to determine if the proposed LoD for permanent infrastructure may give rise to any new or materially different effects, taking into consideration the potential impact of the proposed LoD on the magnitude of the impact.

131. For offshore bats this analysis is summarised in **Table 13-23.**

132. Where the potential for LoD to cause a new or materially different effect is identified, then this is noted in **Table 13-23** and is considered in more detail within **Section 13.8.3** of this chapter.

Table 13-22 Representative scenario summary

Impact	Representative scenario details	Value	Notes / Assumptions
Construction			
Impact 1: Disturbance	Permanent infrastructure (WTG Option A)		Bats are at risk of disturbance when roosting or when moving through the area. Disturbance will occur within the area of works and vary depending upon the number of structures in place during the bat active season and number of vessel movements required during the season. Differences in the amount of works at night would affect the amount of disturbance during flight.
	Number of WTGs	75	
	Number of OSSs	3	
	Temporary infrastructure (WTG Option A)		Both WTG Option A and WTG Option B would require an indicative peak of 38 vessels on site simultaneously with 17 in the nearshore, however WTG Option A would require more round trips in total. As such WTG Option A would result in the highest potential for disturbance as it provides the higher number of potential roosting / resting opportunities for bats at sea, which could then be disturbed.
	Indicative peak number of vessels on site	38	
	Number of vessels simultaneously within the nearshore	17	
	Number of vessel movements – round trips	2,409	
Impact 2: Lighting	Permanent infrastructure (WTG Option A)		Lighting affects different bat species in different ways, with more common species typically benefitting or being less negatively affected, though at increased risks of disturbance, than rarer species. The greater the level of lighting, particularly within 10 km of the shore (where bats are known to forage), the greater the potential for impacts. The number of WTGs is not anticipated to alter the number of artificial lights required, so the higher number of WTGs has been used.
	Number of WTGs	75	
	Number of OSSs	3	
	Temporary infrastructure (WTG Option A)		Lighting affects different bat species in different ways, with more common species typically benefitting or being
	Indicative peak number of vessels on site	38	

Impact	Representative scenario details	Value	Notes / Assumptions
	Number of vessels simultaneously within the nearshore	17	less negatively affected, though at increased risks of disturbance, than rarer species. The greater the level of lighting, particularly within 10 km of the shore (where bats are known to forage), the greater the potential for impacts. WTG Option A will require high number of vessel movements (higher number of anticipated round trips) and therefore result in higher potential occurrences of artificial lighting.
	Number of vessel movements – round trips	2,409	
Operations and maintenance			
Impact 1: Temporary habitat disturbance	Permanent infrastructure (WTG Option A)		Bats may roost on any objects out to sea, being encountered on vessels or offshore turbines / associated infrastructure, when roosting they are at risk of disturbance. The greater the number of turbines, offshore structures and greater number of vessel movements will therefore have a greater potential for disturbance.
	Number of WTGs	75	
	Number of OSSs	3	
	Total O&M vessel round trips	1,209	
Impact 2: Collision	Permanent infrastructure (WTG Option A)		Bats are known to collide with onshore wind turbines, as such they are considered at risk of collision with offshore turbines. The greater the amount of area being swept by the rotors the greater the potential for bats to collide. WTG Option A, with 75 WTGs each with a rotor diameter of 250 m, would have the highest number of turbines and has the highest total rotor swept area of 3,681,554 m^2 and therefore the highest potential for impact.
	Number of WTGs	75	
	Total rotor swept area (m^2)	3,681,554	
Impact 3: Lighting	Permanent infrastructure (WTG Option A)		The impacts of offshore aviation lighting on bats is debated while impacts on foraging bats within 10 km of the shore are anticipated to align with impacts onshore. Some bat species utilise well-lit areas for foraging while others avoid lighting, benefitting those light tolerant, and typically more common, species. See the **Lighting and Marking Plan** which provides further information on the
	Aviation lighting of the WTGs	Lighting requirements	
	Annual vessel trips for maintenance (round trips)	1,209	

Impact	Representative scenario details	Value	Notes / Assumptions
			proposed lighting and marking for the WTGs and OSSs. WTG Options A and B will require the same number of vessel trips for maintenance, as such WTG Option A is considered to have the highest potential lighting requirements due to the higher number of WTGs.
Decommissioning			
Impact 1: Disturbance **Impact 2**: Lighting	It is recognised that legislation and industry best practice change over time. However, for the purposes of the EIA, at the end of the operational lifetime of the CWP Project, it is assumed that all offshore infrastructure will be removed where practical to do so. In this regard, for the purposes of a representative scenario for decommissioning impacts, the following assumptions have been made: • The WTGs and OSS topsides will be completely removed. • Following WTG and OSS topside decommissioning and removal, the monopile foundations will be cut below the seabed level, to a depth that will ensure the remaining foundation is unlikely to become exposed. This is likely to be approximately one metre below seabed, although the exact depth will depend upon the seabed conditions and site characteristics at the time of decommissioning. • All cables and associated cable protection in the offshore environment will be wholly removed. It is likely that equipment similar to that which is used to install the cables may be used to reverse the burial process and expose them. Therefore, the area of seabed impacted during the removal of the cables is anticipated to be the same as the area impacted during the installation of the cables. • Generally, decommissioning is anticipated to be a reverse of the construction and installation process for the CWP Project and the assumptions around the number of vessels on site, and vessel round trips is therefore the same as described for the construction phase of the offshore components. Given the above it is anticipated that for the purposes of a representative scenario, the impacts will be no greater than those identified for the construction phase.		

Table 13-23: Limit of Deviation summary

Project component	Limit of deviation	Conclusion from Appendix 13.2
WTGs	100 m from the centre point of each WTG location is proposed to allow for small adjustments to be made to the structure locations.	No potential for new or materially different effects; the magnitude of direct effects on offshore bats is not anticipated to be materially affected by WTG micro-siting choices or implementation of the LoD.
OSSs	100 m from the centre point of each OSS location is proposed to allow for small adjustments to be made to the structure locations.	No potential for new or materially different effects; the magnitude of direct effects on offshore bats is not anticipated to be materially affected by OSS micro-siting choices or implementation of the LoD.

13.9 Primary mitigation measures

133. Throughout the development of the CWP Project, measures have been adopted as part of the evolution of the project design and approach to construction, to avoid or otherwise reduce adverse impacts on the environment. These mitigation measures are referred to as 'primary mitigation'. They are an inherent part of the CWP Project and are effectively 'built in' to the impact assessment.

134. Primary mitigation measures relevant to the assessment of offshore bats are set out in **Table 13-24**. Where additional mitigation measures are proposed, these are detailed in the impact assessment (**Section 13.10**). Additional mitigation includes measures that are not incorporated into the design of the CWP Project and require further activity to secure the required outcome of avoiding or reducing impact significance.

Table 13-24 Primary mitigation measures

Project Element	Description
WTG spacing	Positions of WTGs and OSSs have been informed by a wide range of site specific data, including metocean data (e.g., wind speed and direction), geophysical and geotechnical survey data (e.g., bathymetry), environmental data (e.g., benthic surveys and archaeological assessment) and stakeholder consultation. Designing and optimising the layout of the WTGs has considered multiple constraints identified from analysis of these datasets, alongside the consideration of layout principles taken from relevant guidance on the design of OWFs. A summary of the key actions taken to avoid or otherwise reduce impacts is provided below: • The WTG layout options include Search and Rescue (SAR) access lanes to allow a SAR resource to fly on the same orientation continuously through the array site. This is provided to minimise risks to surface vessels and / or SAR resource transiting through the array site. • Archaeological exclusion zones (AEZs) around known features of archaeological interest have been avoided. No works that impact the seabed will be undertaken within the extent of an AEZ during the construction, operational or decommissioning phases. • The locations of offshore infrastructure been developed to avoid known sensitive ecological habitats, including areas with suitable conditions for *Sabellaria spinulosa*, which can form reefs under some circumstances. Whilst reefs were not identified during the characterisation surveys, as an ephemeral feature it will be necessary to validate the results in advance of construction. A pre-construction geophysical survey will therefore be undertaken to facilitate the micro-siting around sensitive habitats, such as those with *Sabellaria spinulosa*. • The WTG layout options have been developed to avoid or minimise interaction with known areas of high fishing density, where possible. As avoidance is not always possible, the layouts have also been developed to increase the potential for coexistence. • A paleochannel (the remnants of a river or stream channel that flowed in the past) in the centre west of the array site has been avoided.
Ecological Vessel Management Plan (EVMP)	An Ecological Vessel Management Plan (EVMP) has been prepared to determine vessel routing to and from construction sites and ports and to include a code of conduct for vessel operators. The EVMP includes details of: • The types and specifications of vessels for the CWP Project;

Project Element	Description
	• How vessels will be monitored and coordinated; and • The use of defined transit routes to site from key construction and operation ports, where practicable to do so. The EVMP will be implemented by the Applicant and its appointed contractor(s) and will be secured through conditions of the development consent. It will be a live document which will be updated and submitted to the relevant authority, prior to the start of construction.
Construction Environmental Management Plan (CEMP)	A CEMP has been prepared to provide a management framework, to ensure appropriate controls are in place to manage environmental risks associated with the construction of the CWP Project. It outlines environmental procedures that require consideration throughout the construction process, in accordance with legislative requirements and industry best practice. In summary, the CEMP includes details of: • The Environmental Management Framework for the CWP Project including environmental roles and responsibilities (i.e., ecological clerk of works) and contractor requirements (i.e., method statements for specific construction activities); • Mitigation measures and commitments made within the EIAR, Natura Impact Statement (NIS) and supporting documentation for the CWP Project; • Measures proposed to ensure effective handling of chemicals, oils and fuels including compliance with the MARPOL convention; • A Marine Pollution Prevention and Contingency Plan to address the procedures to be followed in the event of a marine pollution incident originating from the operations of the CWP Project; • An Emergency Response Plan adhered to in the event of discovering unexploded ordnance; • Offshore biosecurity and invasive species management detailing how the risk of introduction and spread of invasive non-native species will be minimised; and • Offshore waste management and disposal arrangements. The CEMP will be implemented by the Applicant and its appointed contractor(s) and will be secured through conditions of the development consent. It will be a live document which will be updated and submitted to the relevant authority, prior to the start of construction.
Rehabilitation Schedule	A Rehabilitation Schedule is provided as part of the planning application. This has been prepared in accordance with the MAP Act (as amended by the Maritime and Valuation (Amendment) Act 2022) to provide preliminary information on the approaches to decommissioning the offshore and onshore components of the CWP Project. A final Rehabilitation Schedule will require approval from the statutory consultees prior to the undertaking of decommissioning works. This will reflect discussions held with stakeholders and regulators to determine the exact methodology for decommissioning, taking into account available methods, best practice and likely environmental effects.

13.10 Impact assessment

13.10.1 Construction phase

135. The potential environmental impacts arising from the construction of the CWP Project are listed in **Table 13-20** along with the parameters against which each construction phase impact has been assessed. A description of the potential effect on offshore bat receptors caused by each identified impact is given below.

Impact 1: Disturbance

136. Under Irish law it is an offence to disturb, injure or kill all species of bats or disturb or destroy their roosts. Disturbance of bats while in flight is not well studied, bats are assumed to avoid human activity while out of the roost and avoid construction activities; excepting where they opportunistically make use of them, for instance by resting on vessels during migration. Due to the lack of recording and detailed research into the occurrences of bats on vessels or offshore platforms, the suitability of chosen roosts and the condition of the bats while utilising such structures is not known. However, such open roosting is dangerous to bats, with increased risks of predation. Bats are vulnerable to disturbance during roosting, with risks of predation further increasing if disturbed during daytime, and are vulnerable to shortages in fresh drinking water, poor weather and prey availability.

137. The extent to which bats may rest on vessels is considered to be low, with only occasionally reported incidences, most being ad hoc reports from the owners / operators or ferries or the workers on offshore oil platforms / wind turbines (Petersen et al., 2014; Lagerveld, Jonge Poerink and Geelhoed, 2021). Such reports are often associated with migration, though could also be from bats foraging offshore or otherwise blown offshore by wind.

138. Additionally, exposed roosting is not ideal and bats roosting onshore in daylight are often injured or unable to get to a preferred roosting location. Bats in this position are extremely vulnerable to predation, though the impacts of disturbance on fat stores or ability to survive (provided the bats are not disturbed to such an extent as to fly off) are unknown.

Receptor sensitivity

139. The number and species of bats which rest or roost while migrating or foraging at sea are unknown and as such the assessment of impacts is based on current knowledge, results from the baseline surveys and professional judgement. Of the species which may be found at sea, the following sensitivity has been assigned based on the parameters set out inTable 13-7:

- Common pipistrelle – low;
- Soprano pipistrelle – low;
- Nathusius' pipistrelle – medium;
- Leisler's bat – low; and
- Daubenton's bat – low.

Magnitude of impact

140. Most observations of bats at sea including resting on vessels / offshore structures are of individuals, roosting or otherwise resting. Brabant, et al., (2019b) included reference to bats roosting on the grate floor of a WTG and another on the foundation of a WTG, both in April 2019. Construction phase

impacts are considered to be short-term, lasting no more than the maximum of the construction window (three years). The number and species of bats which roost on vessels, WTGs or other offshore infrastructure is considered to be low, based on current knowledge, results from the baseline surveys and professional judgement.

141. Daubenton's bats are known to forage up to 10 km offshore, though opportunistic foraging by other species during migration is anticipated. Of the 35 *Myotis* sp. passes recorded on the four CWP Project Ireland detectors and eight on the Dublin Array OWF detectors, any of these could be Daubenton's and as such to provide a worst-case scenario, it has been assumed that they are all potentially foraging bats. Surveys for Dublin Array OWF were undertaken on offshore islands up to 11.89 km offshore. During these surveys Dalkey island, 0.39 km offshore, was the furthest offshore where *Myotis* sp. were recorded, and therefore consideration of foraging activity up to 10 km offshore is a highly precautionary approach.

142. Looking at **Table 13-15** and **Table 13-16**, the average number of recorded passes during conditions suitable for migration (migration BAI) for *Nyctalus* sp. and Nathusius' pipistrelle was less than one per night across the surveyed season (BAI of 0.24 and 0.02 respectively in Ireland, 0.02 and 0.02 in Wales). The numbers were higher for Leisler's and common pipistrelles (migratory BAI of 4.13 and 8), which would reflect the larger populations of these species, however when compared to overall BAI in Ireland, which was 112.31 for common pipistrelle and 22.54 for Leisler's, the migratory BAI was considered low. The ratio of migratory bat passes for every non migratory bat pass was 0.18:1 for Leisler's and 0.07:1 for common pipistrelle. It is worth noting that all of the CWP detectors were onshore and not all potentially migratory passes would be associated with migratory bats, however with current knowledge the migratory BAI or the number of individual bats cannot be further calculated.

143. The Dublin Array OWF dataset, which assumes all bat passes recorded at Kish Lighthouse are migratory based on location (11.89 km offshore) had a migratory BAI of 8.26 for Leisler's and 6.65 for common pipistrelles. Overall BAI at Dublin Array OWF was 26.3 for Leisler's and 25.14 for common pipistrelle. The ratio of migratory passes for every non migratory pass was 0.31:1 for Leisler's and 0.26:1 for common pipistrelle. The precautionary nature of the results and resulting ratio of migratory calls across both data sets would suggest that the numbers of bats which may migrate across this area is low compared to the overall BAI and species population.

144. Of the species potentially encountered in the area, Nathusius' pipistrelle have the lowest population in Ireland (estimated to be 3,000–5,000 individuals (NPWS, 2019)) and therefore the recoverability of this species is reduced, which is reflected in the receptor sensitivity above. Where individuals are disturbed the favourable conservation status of the species would not be at risk as less than 1% of the population would be affected. Given the scarcity of recorded incidences and number of vessels at sea at any one time, as well as the level to which bats roosting in such conditions are affected by disturbance, any impacts would be not be discernible from annual variation. As such, although there is the potential for a negative impact it is considered to be of negligible magnitude.

Significance of the effect

145. The sensitivity of offshore bats in the study area is considered to be low to medium for all species and the magnitude of the impact for all species is assessed as negligible. Therefore (as per the matrix in **Table 13-9**), a negligible effect is predicted for all species which are of low–medium sensitivity, which is **not significant** as shown by species in **Table 13-25**. Where flexibility in the proposed design exists, there is no other scenario which would lead to a more significant effect.

Table 13-25 Significance of construction phase disturbance per species

Offshore bat species	Receptor sensitivity	Magnitude of Impact	Significance of effect
Common pipistrelle	Low	Negligible	**Not significant**
Soprano pipistrelle	Low	Negligible	**Not significant**
Nathusius' pipistrelle	Medium	Negligible	**Not significant**
Leisler's bat	Low	Negligible	**Not significant**
Daubenton's bat	Low	Negligible	**Not significant**

146. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the embedded mitigation described in **Section 13.9 Primary mitigation measures**. However, in the interest of animal welfare and research additional mitigation is provided below.

Additional mitigation

147. A CEMP has been prepared to provide a management framework, to ensure appropriate controls are in place to manage environmental risks associated with the construction of the CWP Project. The CEMP will include the responsibilities of an experienced Ecological Clerk of Works (ECoW), to be appointed throughout the construction phase of the project. Though considered to be of low likelihood, it is possible that bats will roost on the construction vessels, the WTGs or OSSs during construction. As such, the ECoW will be available for advice should any bats be seen resting or otherwise stopping on the vessels or infrastructure. Guides on how to identify the different bats, with life size photos, will also be available to the construction personnel to aid with identification of any bats which are seen. If bats are seen this will be logged, with the date, location and weather conditions recorded to aid future research into bat movements within the area.

Residual effect

148. The magnitude of effect will remain very low, but with the adoption of the additional mitigation measures will aid future knowledge regarding bat movements in the area. The significance of the residual effect is therefore predicted to remain as **not significant**, which is not significant in EIA terms.

Impact 2: Lighting

149. The impacts of lighting on bats on land is relatively well studied. Different species including *Myotis* species are considered 'light-shy' and tend to avoid areas of white or green lights; while Pipistrellus species are more abundant in the same lights (Spoelstra et al., 2017). Though different research found Nathusius' pipistrelles not to be affected by artificial lighting, with no differences in the number of passes recorded on lights which are lit all night and those with only part night lighting (Azam et al., 2015). Lights are also known to draw different invertebrates towards them and thereby away from areas used by lightshy species, thus benefitting more light tolerant species. The extent to which this will affect bats foraging and migrating offshore is unknown, including evaluating habitat suitability. However, as the area south of Dublin Port, the cable route corridor and vessel route, is already well used by vessels the level of intermittent / transient artificial lighting here is assumed to be relatively high.

150. Daubenton's bats, which are considered light-shy, have been found to forage up to 10 km out to sea in other regions, so it remains possible that they forage to the same distance off the coast of Ireland. Therefore, when vessels are travelling or working within 10 km of the shore, for instance whilst laying cables overnight, the use of lighting may alter bat behaviour.

Receptor sensitivity

151. Of the species which may be found at sea, the following sensitivity has been assigned based on the parameters set out in **Table 13-7**:

- Common pipistrelle – low;
- Soprano pipistrelle – low;
- Nathusius' pipistrelle – medium (due to population size only);
- Leisler's – low; and
- Daubenton's – low.

Magnitude of impact

152. A summary of the light sensitivity (based on terrestrial studies as summarised in the BCT 2018 Bats and artificial lighting guidance note) of the different species potentially using the area of works is provided below:

- Common pipistrelle – will forage around lighting;
- Soprano pipistrelle – will forage around lighting;
- Nathusius' pipistrelle – will forage around lighting;
- Leisler's bat – will forage around lighting; and
- Daubenton's bat – will avoid lighting.

153. Given these are construction phase impacts, they are short-term, lasting at most for the three-year construction window. The assessment of impacts is based on current knowledge as to use of the offshore environment by bats, results from the baseline surveys and professional judgement. Pipistrellus species, which were by far the most abundantly recorded during the surveys (as shown in **Table 13-13**) are found to be positively affected by lighting, while Daubenton's would be negatively impacted.

154. *Myotis* bats in Wales are more than 10 km from any of the proposed works and so will not be affected. Though light sensitive, only very low numbers of Daubenton's bats are expected to be foraging at sea within the CWP Project area, with an average of 0.05 passes per night recorded across the CWP Ireland detectors. This is further supported by the lack of *Myotis* recordings at Muglins (1.13 km offshore) within the Dublin Array OWF dataset. The area of works, south of the Dublin Port, is also already well used by vessels, including at night. The low level of *Myotis* activity would suggest the habitat is of less local value to *Myotis*.

155. The number of vessels required has been minimised throughout the project's design, as included within **Table 13-24**, and the use of targeted task specific lighting would reduce the magnitude of this impact. It would also be noted that the Dublin port area is already well used by vessels including at night.

156. Any impacts on lighting offshore would be indistinguishable from the current baseline and annual variation, as such would be of negligible magnitude.

Significance of the effect

157. The sensitivity of offshore bats in the study area is considered to be low to medium for all species and the magnitude of the impact for all species is assessed as negligible. Therefore (as per the matrix in **Table 13-9**), a **not significant** effect is predicted for all species, as shown per species in **Table 13-26**. Where flexibility in the proposed design exists there is no other scenario which would lead to a more significant effect on bat populations from offshore lighting.

Table 13-26 Significance of construction phase lighting per species

Offshore bat species	Receptor sensitivity	Magnitude of Impact	Significance of effect
Common pipistrelle	Low	Negligible	**Not significant**
Soprano pipistrelle	Low	Negligible	**Not significant**
Nathusius' pipistrelle	Medium	Negligible	**Not significant**
Leisler's bat	Low	Negligible	**Not significant**
Daubenton's bat	Low	Negligible	**Not significant**

158. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the embedded mitigation described in **Section 13.9 Primary mitigation measures**.

Additional mitigation

159. Though not considered significant, to further mitigate the potential of impacts with lighting associated with offshore construction works, proper placement of light sources in addition to using lights with high directionality shall be included. The amount of lighting should be targeted to achieve minimum required or necessary light levels, by reducing the number of lights or by moving from general area lighting to specifically focused task-based lighting.

13.10.2 Operation and maintenance

Impact 1: Disturbance

160. The susceptibility of bats to disturbance during exposed roosting and legal status of roosts is outlined in **Construction Phase Impact 1: Disturbance**. The extent to which bats may rest on WTGs and vessels is considered to be low, with only occasionally reported incidences, most being ad hoc reports from the owners / operators of ferries or the workers on offshore oil platforms / wind turbines (Petersen et al., 2014; Lagerveld, Jonge Poerink and Geelhoed, 2021). Such reports are often associated with migration, though could also be from bats foraging offshore or elsewise blown offshore by wind.

161. Exposed roosting onshore in daylight is often a sign of distress, though can be associated with bats unable to get to preferred roosts either due to weather or disturbance. Bats in this position are extremely vulnerable, though the numbers and species found at sea are largely unknown. A study by Petersen et al., (2014) found that 44.5% of bats recorded offshore in the northeast Atlantic and on North Sea installations could not be identified beyond 'bat species' either due to the fact they were observed in flight or, if resting, were left in order to avoid disturbance.

Receptor sensitivity

162. The number and species of bats which rest or roost while migrating or otherwise at sea are unknown; as such the assessment of impacts is based on current knowledge, results from the baseline surveys and professional judgement. Of the species which may be found at sea, the following sensitivity has been assigned based on the parameters set out in **Table 13-7**:

- Common pipistrelle – low;
- Soprano pipistrelle – low;
- Nathusius' pipistrelle – medium;
- Leisler's – low; and
- Daubenton's – low.

Magnitude of impact

163. The number and species of bats which roost on vessels or turbines at sea, and the number which migrate or forage out at such distances, are considered to be low based on current evidence, the baseline results and professional judgement. Looking at **Table 13-15** and **Table 13-16**, the ratio of the bats recorded in either Ireland or Wales which may be migratory compared to all calls, and thereby may cross this portion of sea twice a year, is at most 0.26:1 for Nathusius' pipistrelles in Wales, which is compared to 0.11:1 for Nathusius' in Ireland.

164. The BAI during conditions suitable for migration for *Nyctalus* sp. and Nathusius' pipistrelle was less than one per night across the survey season (0.24 and 0.02 respectively in Ireland, 0.02 and 0.02 in Wales). The numbers were higher for Leisler's and common pipistrelles (4.13 and 8.34 migratory BAI), which would reflect the increased populations of these species, however when compared to overall BAI in Ireland was 112.31 for common pipistrelle and 22.54 for Leisler's. The migratory BAI from Dublin Array OWF shows 6.65 for common pipistrelles, compared to 25.14 overall, and migratory BAI of 8.26 for Leisler's compared to overall BAI of 26.3.

165. The overall BAI for *Nyctalus* sp. and Nathusius' pipistrelles was below 0.25 in both CWP baselines and the Dublin Array OWF dataset. The precautionary nature of the results and resulting proportion which could be associated with migration, would suggest that the numbers of bats which may migrate across this area is low compared to the overall bat activity within the area. Population estimates are provided in **Table 13-12**, however of the species potentially encountered in the area, Nathusius' pipistrelle have the lowest population in Ireland (estimated to be 3,000–5,000 individuals (NPWS, 2019)).

166. Most observations of bats at sea, including resting on vessels / offshore structures, are of individuals roosting or otherwise resting (Petersen et al., 2014). Roosting on vessels / offshore structures can include roosting on any part of the structure, with Brabant et al., (2019b) highlighting individual bats at two different wind farms in April 2019 roosting on the grate floor of a WTG and another the foundation of a WTG. Brabant et al., (2019b) and Lagerveld et al., (2014) suggested bats may actively seek roosting opportunities at offshore windfarms during migration.

167. Where individuals are disturbed, the favourable conservation status of the species would not be at risk, as less than one per cent of the population would be affected. Given the scarcity of recorded incidences, number of WTGs / OSSs and other infrastructure as well as the number of vessels at sea at any one time, any impacts would be indistinguishable from the baseline and thereby of **negligible magnitude**.

Significance of the effect

168. The sensitivity of offshore bats in the study area is considered to be low to medium for all species and the magnitude of the impact for all species is assessed as negligible. Therefore (as per the matrix in **Table 13-9**), at most a **not significant effect** is predicted for all species, as shown in **Table 13-27**. Where flexibility in the proposed design exists there is no other scenario which would lead to a more significant effect.

Table 13-27 Significance of operation phase disturbance per species

Offshore bat species	Receptor sensitivity	Magnitude of Impact	Significance of effect
Common pipistrelle	Low	Negligible	**Not significant**
Soprano pipistrelle	Low	Negligible	**Not significant**
Nathusius' pipistrelle	Medium	Negligible	**Not significant**
Leisler's bat	Low	Negligible	**Not significant**
Daubenton's bat	Low	Negligible	**Not significant**

169. Based on the predicted level of effect, it is concluded that no additional mitigation is required beyond the embedded mitigation described in **Section 13.9 Primary mitigation measures**. However, in the interest of animal welfare and research additional mitigation is provided below.

Additional mitigation

170. A Construction Environmental Management Plan (CEMP) has been prepared to provide a management framework, to ensure appropriate controls are in place to manage environmental risks associated with the construction of the CWP Project. The CEMP will include the responsibilities of an experienced Ecological Clerk of Works (ECoW), to be appointed throughout the construction phase of the project. Though considered to be of low likelihood, it is possible that bats will roost on the construction vessels, the WTGs or OSSs during construction. As such, the ECoW will be available for advice should any bats be seen resting or otherwise stopping on the vessels or infrastructure. Guides on how to identify the different bats, with life size photos, will also be available to the construction personnel to aid with identification of any bats which are seen. If bats are seen this will be logged, with the date, location and weather conditions recorded to aid future research into bat movements within the area.

Residual effect

171. The magnitude of effect will remain negligible, but with the adoption of the additional mitigation measures will aid future knowledge regarding bat movements in the area. The significance of the residual effect is therefore predicted to remain **not significant**.

Impact 2: Collision

172. Bats are known to collide with onshore wind WTGs, as such they are considered at risk of collision with offshore WTGs. The comparability between the onshore and offshore collision rate has not been

studied, due to the difficulties in carcass retrieval offshore. In addition, some research suggests that the flight heights of different species varies during migration to take advantage of favourable tailwinds, with flights at greater heights (above 40 m) putting migratory species within the rotor sweep zone and therefore at greater risk of collision with WTGs compared to foraging bats.

Receptor sensitivity

173. The number and species of bats found at sea is unknown, as such the assessment of impacts is based on current knowledge, results from the baseline surveys and professional judgement. Of the species which may be found at sea, the following sensitivity has been assigned based on the parameters set out in **Table 13-7**:

- Common pipistrelle – low;
- Soprano pipistrelle – low;
- Nathusius' pipistrelle – medium;
- Leisler's – low; and
- Daubenton's – low.

Magnitude of impact

174. Bat sightings offshore in Europe, for the species present in this area, are typically of individuals, though groups of up to 12 common pipistrelles have been seen flying over the North Sea (Petersen et al., 2014).

175. Based on flight patterns and behaviours, Eurobats (Rodrigues et al., 2015) list the different susceptibilities of each species to collision as below:

- Common pipistrelle – high;
- Soprano pipistrelle – high;
- Nathusius' pipistrelle – high;
- Leisler's – high; and
- Daubenton's – low.

176. The above collision risk also accounts for the potential for Nathusius' pipistrelle bats to fly at higher altitudes during migration. Lower flying bats such as Daubenton's, which if present over 10 km at sea would be foraging off the water's surface and therefore at most 10 m above sea level and below the swept area, are at a lower risk of collision. Given the low potential for collision, the magnitude of collision impacts on Daubenton's bats are considered to be negligible with no discernible change in the population beyond annual variation.

177. Looking at the species with higher risk of collision; the CWP baseline recorded high numbers of passes overall, particularly in Ireland. However, as stated in **Table 13-12**, populations of the above species are expected to be both residents and migrants in Ireland, with the proportion which migrate the subject of much research (Department of Housing, Local Government and Heritage, 2021).

178. The ratio of the baseline calls which were potentially migratory, and could therefore be associated with movements offshore, was low compared to the overall number of passes, as shown in **Table 13-15** and **Table 13-16**. When looking at proportions, Nathusius' calls recorded in Wales were 0.25:1 potentially migratory; overall, though, this accounts for a total of 10 passes. With eight calls during suitable weather conditions in an east-southeast / northeast-east winds suggesting migration towards Ireland during spring and single calls during west-northwest / southwest-west winds suitable for migration towards Wales in both spring and autumn. In Ireland a total of 13 Nathusius' passes were considered potentially migratory, out of the 157 recordings.

179. The highest numbers of potentially migratory calls recorded as part of the CWP baseline were associated with the more common species; common pipistrelle (migratory BAI of 8.34 in Ireland and 10.5 per night in Wales) and Leisler's bats (migratory BAI of 4.13), which have a more stable population and would be less affected by any impact at the population level. Leisler's or *Nyctalus* sp. were the only species recorded at Kish Lighthouse (11.89 km offshore) in spring, with a single Nathusius' pipistrelle and a single common pipistrelle pass detected in autumn. Leisler's bats were not recorded on any of the four CWP Wales detectors, though they were recorded at South Stack lighthouse in 2017 as part of the MISE project (Dyer, 2019). The exact locations bats may depart and land during migration is being much researched.

180. Given the precautionary approach to identifying calls as potentially migratory and that it is not possible to distinguish different individual bats from the calls, the number of potentially migratory passes are considered very low relative to the populations of the areas. In line with the lack of evidence to support significant numbers of collisions offshore, the highly precautionary baseline results showing low numbers of bats potentially using the area and ability of bats to cross from / to various different landfall locations; any collisions will not affect the favourable conservation status of the species (less than one per cent of the population affected), as such the consequence would be low with a limited / barely discernible change to the species population. The potential collision is continuous while the WTGs are operational, however the proportion of bats recorded in the area with potential to be migratory suggests the favourable conservation status of the species would be maintained and the magnitude of impact would therefore be low.

181. The magnitude of effects is therefore **low**.

Significance of the effect

182. The sensitivity of offshore receptors in the study area is considered to be low–medium and the magnitude of the impact for all species (excepting Daubenton's) is assessed as low. The magnitude of impact on Daubenton's would be negligible, as shown in **Table 13-28** an effect of **slight** significance is predicted for all species, except Daubenton's which would be not significant. Where flexibility in the proposed design exists, there is no other scenario which would lead to a more significant effect.

Table 13-28 Significance of operation phase collision per species

Offshore bat species	Receptor sensitivity	Magnitude of Impact	Significance of effect
Common pipistrelle	Low	Low	**Slight**
Soprano pipistrelle	Low	Low	**Slight**
Nathusius' pipistrelle	Medium	Low	**Slight**
Leisler's bat	Low	Low	**Slight**
Daubenton's bat	Low	Negligible	**Not significant**

183. As yet, no material migratory path has been identified, the significance of effect is **slight** and therefore the need for substantiative mitigation, such as curtailment, would not be proportionate and is not recommended. CWP Project will undertake long term monitoring with a view to implementing mitigation measures if appropriate through an agreed approach of adaptive management. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the embedded mitigation described in **Section 13.9 Primary mitigation measures**.

Residual effect

184. If collisions are recorded during the monitoring and mitigation is undertaken, the frequency of the impact would reduce as would the duration of consequences to **negligible magnitude**. The impact will thereby be reduced to not significant, and the additional monitoring will aid future knowledge regarding bat movements in the area. The significance of the residual effect is therefore predicted to be **not significant**.

Impact 3: Lighting

185. While the impacts of lighting on bats on land is relatively well studied (BCT, 2018; Spoelstra et al., 2017; Azam et al., 2015), the impacts of lighting at sea is debated. Looking at WTGs specifically, studies in the US have found no impacts on bat mortality associated with aviation lighting (Guest et al., 2022), with Cryan and Barclay (2009) finding no difference in mortality at lit WTGs compared to unlit WTGs.

186. As bats may use the first 10 km out at sea to forage, any changes in this area could affect foraging bats, favouring more light tolerant species while limiting areas available for light-shy species. In addition, there is some research (Brabant et al., 2019b; Lagerveld et al., 2014) which suggests aviation lighting may attract light tolerant species, such as Nathusius' pipistrelles, towards operational offshore WTGs, thereby increasing other risks and further changing their behaviours.

Receptor sensitivity

187. Of the species which may be found at sea, the following sensitivity has been assigned based on the parameters set out in **Table 13-7**:

- Common pipistrelle – low;
- Soprano pipistrelle – low;
- Nathusius' pipistrelle – medium;
- Leisler's – low; and
- Daubenton's – low.

Magnitude of impact

188. The suitability of the offshore environment for bat foraging, and thereby assessing habitat quality for foraging, is unresearched. When assessing terrestrial habitat quality, an assessment of connectivity via linear features, invertebrate diversity (typically diverse or mature habitats) and artificial lighting are undertaken. Of these criteria only artificial lighting is applicable to the offshore habitat, and it is generally considered that well-lit areas, particularly with white or yellow lighting, is less suitable for a range of bat species with only the light tolerant species expected to be present in significant numbers.

189. A summary of the light sensitivity (based on terrestrial studies as summarised in the BCT 2018 Bats and artificial lighting guidance note) of the different species potentially using the area of works is provided below:

- Common pipistrelle – will forage around lighting;
- Soprano pipistrelle – will forage around lighting;
- Nathusius' pipistrelle – will forage around lighting;
- Leisler's bat – will forage around lighting; and
- Daubenton's bat – will avoid lighting.

190. The number of vessels and lighting will be limited to the needs of the time, to reduce the magnitude of this impact, particularly within the nearshore on species such as Daubenton's which are known to forage up to 10 km from the coast. The area which will be used by vessels associated with the CWP Project is already well used by vessels, being south of Dublin Port.

191. As structures within the CWP Project array site will be marked and lit in accordance with the International Association of Marine Aids to Navigation and Lighthouse Authorities and Civil Aviation Authority requirements, there is potential for impacts associated with lighting. This would include either red or white lights at the nacelle of each WTG, in addition the six corners of the array would feature more heavily lit WTGs, with four additional yellow flashing lights spaced around the mast. The lights will be up to 2,000 candela and be visible from five nautical miles. In addition, each WTG would have discreetly lit identifiers, a maximum of 10 candela. Studies have found red lights to be less impactful to nocturnal wildlife, with Bat Conservation Trust and Institution of Lighting Professionals guidance note 08/23 (2023) highlighting multiple studies where bat activity and abundance does not appear to be affected by red lights, while the species composition and levels of activity was altered in streets lit with white spectrum lighting. The lighting of the WTGs and OSSs is a health and safety requirement, as such cannot be avoided or minimised, however at closest it will be seven nautical miles from the shore, and as the lighting should be restricted to five nautical miles the effects will be restricted to bats already within the offshore environment. All species which may migrate through the area are considered light tolerant and will actively forage around white lights (Spoelstra et al., 2017; BCT, 2018) which would theoretically increase the risk of collision with the WTGs. In addition, there is the potential for additional bats to be drawn to the WTGs, (as noted in Brabant et al., 2019b; Lagerveld et al., 2014), however no increase in mortality at lit WTGs compared to unlit WTGs has been found (Guest et al., 2022; Cryan and Barclay, 2009).

192. The number of bat passes considered potentially linked to migration compared to the overall number of recorded passes and relative BAI, as outlined in **Table 13-15, Table 13-16** and **Table 13-17**, was low for all species at all locations.

193. As such any impacts from lighting offshore would be indistinguishable from the current baseline and any annual variation. The magnitude relative to the current baseline is **negligible**.

Significance of the effect

194. The sensitivity of offshore bats in the study area is considered to be low to medium for all species and the magnitude of the impact for all species is assessed as negligible. Therefore (as per the matrix in **Table 13-9**), a **not significant effect** is predicted for all species, as shown in **Table 13-29.** Where flexibility in the proposed design exists, there is no other scenario which would lead to a more significant effect. The significance of the residual effect is therefore predicted to be **not significant**.

Table 13-29 Significance of operation phase lighting per species

Offshore bat species	Receptor sensitivity	Magnitude of Impact	Significance of effect
Common pipistrelle	Low	Negligible	**Not significant**
Soprano pipistrelle	Low	Negligible	**Not significant**
Nathusius' pipistrelle	Medium	Negligible	**Not significant**
Leisler's bat	Low	Negligible	**Not significant**
Daubenton's bat	Low	Negligible	**Not significant**

195. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the embedded mitigation described in **Section 13.9 Primary mitigation measures**.

13.10.3 Decommissioning phase

Impact 1: Disturbance

196. The susceptibility of bats to disturbance during exposed roosting and legal status of roosts is outlined in **Construction Phase Impact 1: Disturbance**. For the purposes of this assessment, a similar approach to construction has been taken. However, as bats will have become habituated to the presence of the WTGs it is possible more bats will be present; this would also account for the continued increase in bat numbers if current population trends continue (NWPS, 2019; BCT, 2021). The records of bats found throughout the construction and operational lifetime of CWP would be consulted and an experienced ecologist contacted to assess whether bats are likely to be impacted in this way.

Receptor sensitivity

197. The number and species of bats which rest while migrating or otherwise roost at sea are unknown, as such the assessment of impacts is based on current knowledge, results from the baseline surveys and professional judgement. Of the species which may be found at sea, the following sensitivity has been assigned based on the parameters set out in **Table 13-7**:

- Common pipistrelle – low;
- Soprano pipistrelle – low;
- Nathusius' pipistrelle – medium;
- Leisler's – low; and
- Daubenton's – low.

Magnitude of impact

198. Decommissioning phase impacts are considered to be short-term and are considered to last no longer than the period of works (to be confirmed at the time though assumed at this stage to be similar to the three-year construction period). Bats are known to roost on structures at sea and given the relatively low level of disturbance during operation it is possible that the incidents would increase over time as bats become habituated to their presence. Brabant, et al., (2019b) included reference to bats roosting on the grate floor of a WTG and another on the foundation of a WTG, though other roosting locations are possible. Current research suggests only individual bats roost on offshore structure at any one time (Petersen et al., 2014; Lagerveld, Jonge Poerink and Geelhoed, 2021). Of the species potentially encountered in the area, Nathusius' pipistrelle has the lowest population in Ireland (estimated to be 3,000–5,000 individuals (NPWS, 2019)). Where individuals are disturbed, the favourable conservation status of the species would not be at risk as less than one per cent of the population would be affected.

199. The low proportions of recorded calls associated with migration across both data sets would suggest that the numbers of bats which may cross this area is low compared to the overall population status.

200. As outlined within the Construction Phase Impact 1: Disturbance, given the low number of recorded incidences, the baseline results, as well as the level to which bats roosting in such conditions are affected by disturbance, the magnitude would therefore be **negligible**.

Significance of effect

201. The sensitivity of offshore bats in the study area is considered to be low to medium for all species and the magnitude of the impact for all species is assessed as negligible. Therefore (as per the matrix in **Table 13-9**), at most a **not significant** effect is predicted for all species as shown in **Table 13-30**.

Table 13-30 Significance of decommissioning phase disturbance per species

Offshore bat species	Receptor sensitivity	Magnitude of Impact	Significance of effect
Common pipistrelle	Low	Negligible	**Not significant**
Soprano pipistrelle	Low	Negligible	**Not significant**
Nathusius' pipistrelle	Medium	Negligible	**Not significant**
Leisler's bat	Low	Negligible	**Not significant**
Daubenton's bat	Low	Negligible	**Not significant**

202. Where flexibility in the proposed design exists, there is no other scenario which would lead to a more significant effect. Based upon the predicted level of effect it is concluded that no additional mitigation is required beyond the embedded mitigation described in **Section 13.9 Primary mitigation measures**. However, in the interest of animal welfare and research additional mitigation is provided below.

Additional mitigation

203. As bats will have had a minimum of 25 years to find roosting opportunities within the offshore infrastructure, should any gaps, expansion joints, or other crevices be present these will be noted and infrared cameras (or similar) used to check for evidence of potential bat roosting. Any such features will be dismantled carefully, by hand where possible, to ensure that if there are bats roosting within the structures (considered highly unlikely at this time), any risks to them are minimised. An appropriately experienced ecologist would be available for contact regarding any bats found resting during this phase.

Residual effect

204. The magnitude of effect will remain negligible but the adoption of the additional mitigation measures will aid future knowledge regarding bat movements in the area. The significance of the residual effect is therefore predicted to remain **not significant**.

Impact 2: Lighting

205. As outlined in **Construction Phase Impact 2: Lighting**, the impacts of lighting on bats on land is relatively well studied (BCT, 2018; Spoelstra et al., 2017; Azam et al., 2015), while the effect at sea and associated with WTGs is debated, with some studies suggesting it attracts bats towards WTGs while others suggest aviation lighting does not affect bats (Guest et al., 2022; Conservation Evidence, 2021). As bats may use the first 10 km out at sea to forage, any changes to lighting levels in this area could affect foraging bats, favouring more light tolerant species while limiting areas available for light-

shy species. While the changes in lighting further out, through removal of aviation lighting on the WTGs during the decommissioning phase, would alter behaviour of bats which may have otherwise been habituated to the lights. This would likely affect the light tolerant species that may have opportunistically foraged around these lights or been attracted to them whilst on migration.

Receptor sensitivity

206. Of the species which may be found at sea, the following sensitivity has been assigned based on the parameters set out in **Table 13-7**:

- Common pipistrelle – low;
- Soprano pipistrelle – low;
- Nathusius' pipistrelle – medium;
- Leisler's – low; and
- Daubenton's – low.

Magnitude of impact

207. Decommissioning phase impacts are considered short-term, lasting for the duration of the decommissioning phase before returning the area to the baseline condition with the removal of artificial lighting used during operation, however there would be a short-term increase in vessels while decommissioning as outlined in **Table 13-22**. The vessel route to the array is south of the Dublin Port and therefore already well used by vessels, including at night. As outlined within the Construction Phase Impact: 2, low numbers of potential Daubenton's passes were recorded on the detectors in Ireland, both for the CWP baseline and as part of the Dublin Array OWF dataset and therefore any impacts on the relatively common species (estimated population of 57,000–79,000 individuals in Ireland (NPWS, 2019)) would be imperceptible from current baseline, particularly if the population continues to increase.

208. Aviation and maritime lighting during the decommissioning phase would follow industry requirements, with some lighting required throughout the decommissioning phase. The effects on bats from the removal of aviation lighting would depend largely on the level of associations which develop over the operational lifetime of the project. However, as it is a return to baseline conditions, it is assumed that would also be the case for bat behaviours. The low number of migratory passes detected using the above precautionary approach suggests that any changes would be imperceptible and not affect the favourable conservation status of the migratory species. As such, any impacts on lighting offshore would be indistinguishable from the current baseline and any annual variation and thereby of **negligible** magnitude.

Significance of the effect

209. The sensitivity of offshore bats in the study area is considered to be low to medium for all species and the magnitude of the impact for all species is assessed as negligible. Therefore (as per the matrix in **Table 13-9**), a not significant effect is predicted for all species. Where flexibility in the proposed design exists, there is no other scenario which would lead to a more significant effect. The significance of the residual effect is therefore predicted to be at most **not significant**, as shown in **Table 13-31.**

Table 13-31 Significance of decommissioning phase lighting per species

Offshore bat species	Receptor sensitivity	Magnitude of Impact	Significance of effect
Common pipistrelle	Low	Negligible	**Not significant**
Soprano pipistrelle	Low	Negligible	**Not significant**
Nathusius' pipistrelle	Medium	Negligible	**Not significant**
Leisler's bat	Low	Negligible	**Not significant**
Daubenton's bat	Low	Negligible	**Not significant**

210. Based on the predicted level of effect it is concluded that no additional mitigation is required beyond the embedded mitigation described in **Section 13.9 Primary mitigation measures**.

13.11 Cumulative impacts

211. A fundamental component of the EIA is to consider and assess the potential for cumulative effects of the CWP Project with other projects, plans and activities (hereafter referred to as 'other development').

212. **Appendix 13.1** presents the findings of the CEA for offshore bats, which considers the residual effects presented in **Section 13.10 Impact assessment** alongside the potential effects of other proposed and reasonably foreseeable other development.

13.12 Transboundary impacts

213. While the impacts on foraging bats would be limited to Ireland, impacts on migratory bats would be considered transboundary. As wide-ranging species, migratory bats passing through the CWP area could have travelled from non-Irish locations. The Irish population of all potentially migratory bats are thought to include resident (non-migratory) populations as well, and the proportion which migrate and migratory routes remains the subject of research. As **Section 13.10 Impact assessment** assesses impacts on all bats which may be using the project area against the Irish population, which is smaller than the larger international population from which bats may have travelled from, no significant impacts have been identified, and no significant transboundary impacts are anticipated.

13.13 Inter-relationships

214. The inter-related effects assessment considers the potential for all relevant effects across multiple topics to interact, spatially and temporally, to create inter-related effects on a receptor group. This includes incorporating the findings of the individual assessment chapters to describe potential additional effects that may be of greater significance when compared to individual effects acting on a receptor group.

215. The term 'receptor group' is used to highlight the fact that the proposed approach to the inter-relationships assessment has assessed every individual receptor considered in this chapter, but instead focuses on groups of receptors that may be sensitive to inter-related effects.

216. **Chapter 5 EIA Methodology** provides a matrix to show at a broad level where across the EIAR interactions between effects on different receptor groups have been identified.

217. The potential inter-related effects that could arise in relation to offshore bats are presented in **Table 13-32.** If there are additional effects, these are considered additively and qualitatively using expert judgement.

Table 13-32 Inter-related effects (phase) assessment for offshore bats

<table>
<tr><th>Impact / Receptor</th><th>Related chapter</th><th>Phase Assessment</th></tr>
<tr><td>Impact 1: Disturbance of roosting / resting bats during migration or foraging offshore</td><td>Chapter 21 Onshore biodiversity</td><td rowspan="3">The scope of this chapter (offshore bats) assessment has been limited to potential impacts on foraging or migrating bats during construction, O&M and decommissioning of the CWP Project.

Impacts to bats onshore associated with bats onshore are covered with Chapter 21: Biodiversity.

It is therefore considered that there is no potential for any additional inter-related effects to bats, which have not already been identified in the separate assessments (Chapter 21 Onshore Biodiversity).</td></tr>
<tr><td>Impact 2: Collision with WGTs during O&M</td><td>Chapter 21 Onshore biodiversity also looks at impacts on bats but will not have assessed WTGs</td></tr>
<tr><td>Impact 3: Lighting</td><td>Chapter 21 Onshore biodiversity</td></tr>
</table>

13.14 Potential monitoring requirements

218. Monitoring requirements for the CWP Project will be described in the **In Principle Project Environmental Monitoring Plan** (IPPEMP) submitted alongside the EIAR and further developed and agreed with stakeholders prior to construction.

219. The assessment of impacts on offshore bats as a result of the construction, operation and maintenance, and decommissioning phases of the CWP Project are predicted to be not significant. Based on the predicted impacts it is concluded that no specific monitoring is required, however additional monitoring during and following the construction phase will be undertaken to capture additional data as to how bats use the area and inform mitigation measures such as adaptive management if appropriate. Where possible, the offshore platforms including the OSSs, or vessels will be used for bat monitoring within the array area during the migration seasons, to be agreed within the IPPEMP.

220. The proposed development is committed to participating in the 'East Coast Monitoring Group' (ECMG), to discuss and agree potential strategic monitoring initiatives in relation to offshore bats. The need for strategic monitoring, and the level of participation by individual projects, will be determined by the conclusions of the EIAR process, in consultation with statutory and technical stakeholders, and with a focus on validation and evidence gathering.

13.15 Impact assessment summary

221. This chapter of the EIAR has assessed the potential environmental impacts on offshore bats from the construction, operation and maintenance, and decommissioning phases of the CWP Project. Where significant impacts have been identified, additional mitigation has been considered and incorporated into the assessment.

222. This section, including **Table 13-33,** summarises the impact assessment undertaken and confirms the significance of any residual effects, following the application of additional mitigation.

Table 13-33 Summary of potential Impacts and residual effects

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of Impact	Significance of effect	Additional Mitigation	Residual effect
Construction						
Impact 1: Disturbance	Offshore bats – foraging or migrating	Low for all species except Nathusius' pipistrelle, which is medium	Negligible	Not significant	No additional mitigation is required; however, an appropriately experienced ECoW will be available for advice should any bats be seen resting or otherwise stopping on the vessels or infrastructure. Guides on how to identify the different bats, with life size photos, will be available to aid with the identification of any bats seen. If bats are seen this will be logged, with the date, location and weather conditions recorded to aid future research into bat movements within the area.	**Not significant**
Impact 2: Lighting	Foraging bats	Low for all species except Nathusius' pipistrelle, which is medium	Negligible	Not significant	No additional mitigation is required, however the impact of light associated with offshore construction works will be reduced through proper placement of light sources in addition to using lights with high directionality. The amount of lighting should be targeted to achieve minimum required or necessary light levels, by reducing the number of lights or by moving from general area lighting to specifically focused task-based lighting.	**Not significant**
Operation and Maintenance						

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of Impact	Significance of effect	Additional Mitigation	Residual effect
Impact 1: Disturbance	Offshore bats – foraging or migrating	Low for all species except Nathusius' pipistrelle, which is medium	Negligible	Not significant	No additional mitigation is required; however, an appropriately experienced ECoW will be available for advice should any bats be seen resting or otherwise stopping on the construction vessels or infrastructure. Guides on how to identify the different bats, with life size photos, will be available to the construction personnel to aid with identification of any bats which are seen. If bats are seen this will be logged, with the date, location and weather conditions recorded to aid future research into bat movements within the area.	**Not significant**
Impact 2: Collision	Migrating bats	Low for all species except Nathusius' pipistrelle, which is medium	Low	Slight for all species except Daubenton's, which would be Not significant	No additional mitigation is required.	**Not significant**
Impact 3: Lighting	Offshore bats – foraging or migrating	Low for all species except Nathusius' pipistrelle, which is medium	Negligible	Not significant	No additional mitigation is required.	**Not significant**
Decommissioning						

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of Impact	Significance of effect	Additional Mitigation	Residual effect
Impact 1: Disturbance	Offshore bats – foraging or migrating	Low for all species except Nathusius' pipistrelle, which is medium	Negligible	Not significant	As bats will have had a minimum of 25 years to find roosting opportunities within the offshore infrastructure, should any gaps, expansion joints, or other crevices be present these will be noted and infrared cameras (or similar) used to check for evidence of potential bat roosting. Any such features will be dismantled carefully, by hand where possible, to ensure that if there are bats roosting within the structures (considered highly unlikely at this time), any risks to them are minimised. An appropriately experienced ecologist would be available for contact regarding any bats found resting during this phase.	**Not significant**
Impact 2: Lighting	Offshore bats – foraging or migrating	Low for all species except Nathusius' pipistrelle, which is medium	Negligible	Not significant	No additional mitigation is required.	**Not significant**

13.16 References

223. Ahlén I, Bach L, Baagoe H.J. and Pettersson J., (2007). Bats and offshore wind turbines studied in southern Scandinavia. Swedish Environmental Protection Agency.

224. Ahlén I., Baagøe H.J. and Bach, l. (2009). Behaviour of Scandinavian Bats during Migration and Foraging at Sea, Journal of Mammalogy, Volume 90, Issue 6, Pages 1318–1323, https://doi.org/10.1644/09-MAMM-S-223R.1 .

225. Altringham, J., and Kerth, G. (2016). Bats and Roads. In: Voigt, C., Kingston, T. (eds) Bats in the Anthropocene: Conservation of Bats in a Changing World. Springer, Cham. https://doi.org/10.1007/978-3-319-25220-9_3 .

226. Aughney, T., Roche, N. and Langton, S. (2022). Irish Bat Monitoring Programme 2018–2021. Irish Wildlife Manuals, No. 137. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

227. Azam C., Kerbiriou C., Vernet A., Julien J.-F., Bas Y., Plichard L., Maratrat J. and Le Viol I. (2015). Is part-night lighting an effective measure to limit the impacts of artificial lighting on bats. Global Change Biology, 21, 4333–4341.

228. Bat Conservation Ireland (2012). Wind Turbine/Wind Farm Development Bat Survey Guidelines, Version 2.8, December 2012. Bat Conservation Ireland, www.batconservationireland.org

229. Bat Conservation Ireland. (2021). Neighbourhood Bats with a little help from neighbourhood citizen scientists. Available online: Neighbourhood-Bats-with-a-little-help-from-Neighbourhood-Citizen-Scientists-FINAL-REPORT.pdf (batconservationireland.org) Accessed November 2022.

230. Bat Conservation Ireland (2022a). bat species information available online: Unconfirmed/Vagrant – Bat Conservation Ireland Accessed October 2022.

231. Bat Conservation Ireland (2022b). Daubenton's Bat Waterways Survey information available online: https://www.batconservationireland.org/what-we-do/monitoring-distribution-projects/ireland-daubentons-bat-waterways-survey Accessed 04.11.2022.

232. Bat Conservation Ireland (2022c) Natterers Bat Information available online: https://www.batconservationireland.org/irish-bats/species/natterers-bat Accessed 04.11.2022.

233. Bat Conservation Trust, (2018). Bats and artificial lighting in the UK Bats and the Built Environment series. Guidance Note 08/18 available online: https://cdn.bats.org.uk/uploads/pdf/Resources/ilp-guidance-note-8-bats-and-artificial-lighting-compressed.pdf?v=1542109349 Accessed 05.05.2023.

234. Bat Conservation Trust (2021). Bat Conservation Trust are calling for more focus on bats at COP26 citing the exceptional heat of 2020 and the impacts on infant bats, available online: A focus on helping bats for COP26 - News - Bat Conservation Trust Accessed 07.11.2022.

235. Bat Conservation Trust, (2022a). The National Bat Monitoring Programme Annual Report 2021. Bat Conservation Trust, London. Available online: NBMP Annual Report - Reports - Bat Conservation Trust (bats.org.uk).

236. Bat Conservation Trust (2022b). Offshore SEA consultation response dated 24 May 2022, available online: Offshore-SEA-consultation-response-24.05.22.pdf (bats.org.uk) Accessed November 2022.

237. Bat Conservation Trust and Institution of Lighting Professionals (2023). Guidance note GN08/23 – Bats and Artificial Lighting at Night. Institute of Lighting Professionals, Warwickshire.

238. Bat Worker Forum (BWF) (2020). Zoom meeting September 2020 19:00 – 20:30 Via Zoom Minutes available: Bat-Worker-Forum-minutes-22.09.20.pdf (bats.org.uk).

239. Biodiversity Ireland Maps (2022). are available online: Maps – Biodiversity Maps (biodiversityireland.ie) Accessed 09.11.2022.

240. Boshamer, J.P.C. and Bekker, J.P. (2008). Nathusius' pipistrelles (*Pipistrellus nathusii*) and other species of bats on offshore platforms in the Dutch sector of the North Sea. Lutra 51 (1): 17-36

241. Boston E., Buckley D., Bekaert M., Gager Y., Lundy M., Scott D., Prodöhl P., Montgomery I., Marnell F and Teeling E. (2010). The Status of the Cryptic Bat Species, *Myotis mystacinus* and *Myotis brandtii* in Ireland. Acta Chiropterologica. 12. 457-461. 10.3161/150811010X538025.

242. Boston E, Jones J, Whelan C, Montgomery I and Teeling E (2016). Updating the distribution and status of the Nathusius' pipistrelle (*Pipistrellus nathusii*) in Ireland: Final Report. Commissioned by National Parks and Wildlife Service (NPWS), Department of Arts, Heritage and the Gaeltacht & *Quercus*, Queen's University Belfast.

243. Boston, E., Roche, N., Aughney, T., and Langton, S. (2017). Development of a Woodland Monitoring Scheme for Bats in Ireland 2016–2017 (Irish Wildlife Manuals No. In press) (p. 33). Dublin, Ireland: National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

244. Brabant R., Laurent Y., Poerink B., and Degraer S. (2019a). Activity and Behaviour of Nathusius' Pipistrelle *Pipistrellus nathusii* at Low and High Altitude in a North Sea Offshore Wind Farm. Acta Chiropterologica; 21:341–348. doi: 10.3161/15081109ACC2019.21.2.009.

245. Brabant, R., Laurent, Y., Muteti, J., Poerink, B and Degraer, S. (2019b). The influence of meteorological conditions on the presence of Nathusius' pipistrelle (*Pipistrellus nathusii*) at sea.

246. Brabant R, Laurent Y, Jonge Poerink B and Degraer S (2021). The Relation between Migratory Activity of *Pipistrellus* Bats at Sea and Weather Conditions Offers Possibilities to Reduce Offshore Wind Farm Effects. Animals; 11(12):3457. https://doi.org/10.3390/ani11123457.

247. BSG Ecology (2014a). North Sea Ferries Bat Migration Research Report, Oxfordshire, December 2014.

248. BSG Ecology (2014b). Pembroke Islands Bat Report, reference BMP_Pembroke_Islands_2014_0922014 Monmouth, December 2014.

249. CIEEM (2018 amended April 2022). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.2. Chartered Institute of Ecology and Environmental Management, Winchester.

250. ClearLead Consulting Limited (2022a). Offshore Renewable Energy Development Plan II (OREDPII): Strategic Environmental Assessment - Scoping Report. Prepared on behalf of the Department of the Environment, Climate and Communications, and the Sustainable Energy Authority of Ireland, dated 19 April 2022. Available online: gov.ie - Offshore Renewable Energy Development Plan II (OREDP II) (www.gov.ie) Accessed November 2022 N.B. this is a draft document awaiting consultation response.

251. ClearLead Consulting Limited (2022b). OREDPII: Appropriate Assessment - Principles Report. Prepared by ClearLead Consulting Limited on behalf of the Department of the Environment, Climate and Communications, and the Sustainable Energy Authority of Ireland, dated 30 May 2022. Available online: gov.ie - Offshore Renewable Energy Development Plan II (OREDP II) (www.gov.ie) Accessed April 2023.

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

253. Conservation Evidence (2021). Impacts of artificial lighting of wind turbines available online: Remove turbine lighting to reduce bat and insect attraction - Conservation Evidence Accessed April 2023.

254. Cryan P and Barclay R (2009). Causes of bat fatalities at wind turbines: hypotheses and predictions. Journal of Mammalogy, 464, 1330–1340.

255. Department for Business, Energy and Industrial Strategy (2022a). UK Offshore Energy Strategic Environmental Assessment: Future Leasing / Licensing for Offshore Renewable Energy, Offshore Oil & Gas and Gas Storage and Associated Infrastructure OESEA4 Environmental Report.

256. Department for Business, Energy and Industrial Strategy (2022b). UK Offshore Energy Strategic Environmental Assessment: Future Leasing / Licensing for Offshore Renewable Energy, Offshore Oil & Gas and Gas Storage and Associated Infrastructure OESEA4 Environmental Report: Appendix 1 Environmental Baseline.

257. Department of Communications, Energy and Natural Resources (2014). Offshore Renewable Energy Development Plan – A Framework for the Sustainable Development of Ireland's Offshore Renewable Energy Resource.

258. Department of Communications, Energy and Natural Resources (2014). Offshore Renewable Energy Development Plan (OREDP). Strategic Environmental Assessment – SEA Statement. Prepared on behalf of the Department of Communications, Energy & Natural Resources under the direction of the Sustainable Energy Authority of Ireland as part of the Strategic Environmental Assessment of the Offshore Renewable Energy Development Plan for Ireland. Available online: gov.ie - Offshore Renewable Energy Development Plan (OREDP) (www.gov.ie) Accessed April 2023.

259. Department of Housing, Local Government and Heritage (2020). National Marine Planning Framework – Post Consultation Natura Impact Statement. Available online: National Marine Planning Framework Post Consultation (www.gov.ie) Accessed April 2023.

260. Department of Housing, Local Government and Heritage (2021). National Marine Planning Framework, Project Ireland 2040. Prepared by the gov.ie/housing. Available online: gov.ie - National Marine Planning Framework (www.gov.ie) Accessed April 2023.

261. Dyer, S (2019). Bat Migration Project Report (2017 to 2018). NRW Evidence Report No: 335, 23 pp, Natural Resources Wales, Bangor.

262. EPA (2022). Guidelines on the information to be contained in Environmental Impact Assessment Reports. May 2022.

263. Fensome, A.G. and Mathews, F. (2016). Roads and bats: a meta-analysis and review of the evidence on vehicle collisions and barrier effects. Mam Rev, 46: 311–323. https://doi.org/10.1111/mam.12072

264. Fleming TH (2019). Bat Migration. Encyclopedia of Animal Behavior. 2019:605–10. Doi: 10.1016/B978-0-12-809633-8.20764-4.

265. Government of Ireland (2018a). National Planning Framework (NPF) – Project Ireland 2040. Available online: Ireland 2040 Our Plan – National Planning Framework » The National Planning Framework (npf.ie) Accessed March 2023.

266. Government of Ireland (2018b). Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.

267. Grodzinski, U. Spiegel, O. Korine, C. and Holderied, M. (2009). Context-dependent flight speed: Evidence for energetically optimal flight speed in the bat *Pipistrellus kuhlii*. The Journal of animal ecology. 78. 540–8. 10.1111/j.1365-2656.2009.01526.x.

268. Guest, E., Stamps, B., Durish, N., Hale, A., Hein, C., Morton, B., Weaver, S., and Fritts, S. (2022). An Updated Review of Hypotheses Regarding Bat Attraction to Wind Turbines. Animals. 12. 343. 10.3390/ani12030343.

269. Gwynedd Bats (2022). North Wales bat species are available online: Species (gwyneddbats.org.uk) Accessed November 2022.

270. Heymer, A. (1964): Resultats du baguage de chauves souris dans les Pyrenees-orientales de 1945 ä 1959. Vie et Milieu A15, 765–799.

271. Hüppop O and Hill R (2016). Migration phenology and behaviour of bats at a research platform in the southeastern North Sea. Lutra 59, 5–22.

272. Hüppop O, Michalik B, Bach L, Hill R and Pelletier S (2019). Migratory birds and bats. In Wildlife and Wind farms, Conflicts and Solutions; Perrow, M.R., Ed.; Pelagic Publishing: Essex, UK, pp. 142–173.

273. Hutterer, R., Ivanova, T., Meyer-Cords, C.H. and Rodrigues, L. (2005). Bat migration in Europe. A review of banding data and literature. Naturschutz und Biologische Vielfalt Volume: 28. German Federal Agency for Nature Conservation.

274. Jones, G. Cooper-Bohannon, R., Barlow, K., and Parsons, K (2009). Scoping and method development Report – Determining the potential ecological impact of wind turbines on bat populations in Britain. On behalf of Bat Conservation Trust and University of Bristol.

275. Lagerveld S, Jonge Poerink B, Haselager R and Verdaat H (2012). Bats in Dutch offshore wind farms in autumn. Lutra, 57: 61–69.

276. Lagerveld, S., B. Jonge Poerink, R. Haselager, and H. Ver – Daat. (2014). Bats in Dutch offshore wind farms in autumn 2012. Lutra, 57: 61–69.

277. Lagerveld S, Jonge Poerink B, and Geelhoed SCV (2021). Offshore Occurrence of a Migratory Bat, *Pipistrellus nathusii*, Depends on Seasonality and Weather Conditions. Animals (Basel). doi: 10.3390/ani11123442. PMID: 34944219; PMCID: PMC8698179.

278. Lindecke, O, Elksne, A, Holland, R, Petersons, G and Voigt, CC (2019). 'Orientation and flight behaviour identify the Soprano pipistrelle as a migratory bat species at the Baltic Sea coast', Journal of Zoology, vol. 308, no. 1, pp. 56–65. https://doi.org/10.1111/jzo.12654.

National Nathusius' Pipistrelle Project (2022) Information available online: National Nathusius' Pipistrelle Project - Explore NBMP Surveys - Bat Conservation Trust (bats.org.uk).

279. Marnell, F., Kelleher, C. and Mullen, E. (2022). Bat mitigation guidelines for Ireland v2. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

280. Matthews, F., Richardson, S., Lintott, P., and Hosken, D. (2016). Understanding the risk to European protected species (bats) at onshore wind turbine sites to inform risk management. Phase 2 Final Report.

281. MISE – Mammal in a Sustainable Environment project report (2015). The project ran from 2011 to 2015 and was a partnership between Vincent Wildlife Trust, Natural Resources Wales, Snowdonia National Park Authority, Waterford Institute of Technology, Waterford City and County Council and The National Biodiversity Data Centre.

282. MOTUS database Available online: About - Motus Wildlife Tracking System Accessed April 2023.

283. Natural England (2012). Bats and Onshore Wind Turbines: Interim Guidance: Natural England Technical Information Note TIN051. Natural England, York.

284. Natural England (2021). Natural England's Approach to Offshore Wind. Natural England Technical Information Note, TIN181. Natural England.

285. National Parks and Wildlife Service's Grants for small recording projects & Department of Housing, Local Government and Heritage (2021). All-Ireland Nathusius's Pipistrelle Bat Project – updating the distribution and status of the Nathusius's pipistrelle (*Pipistrellus Nathusii*) in Ireland: Phase 5. Coastal Monitoring Project (Autumn 2021).

286. Northern Ireland Environment Agency (2014). Bat Surveys – NIEA Specific Requirements. NIEA, Department of the Environment, Belfast.

287. NPWS (2013). 1317_Nathusius_Pipistrelle_assessment.pdf National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

288. NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill Cover photo: Lough Ygananvan, Kerry. Deirdre Lynn This page photo: Mayo coastline. Deirdre Lynn.

289. NPWS and Vincent Wildlife Trust (2022). Lesser Horseshoe Bat Species Action Plan 2022–2026. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

290. Petersen, A., Jensen, J-K., Jenkins, P., Bloch, D., and Ingimarsson, F. (2014). A Review of the Occurrence of Bats (*Chiroptera*) on Islands in the North East Atlantic and on North Sea Installations. Acta Chiropterologica. 16. 10.3161/150811014X683381.

291. Poerink, D., Lagerveld, S., and Verdaat, H (2013). Pilot study Bat activity in the Dutch offshore wind farm OWEZ and PAWP.

292. Razgour, O, Taggart, JB, Manel, S, Juste, J., Ibáñez, C., Rebelo, H., Alerbi, A., Jones, G and Park, K. (2018). An integrated framework to identify wildlife populations under threat from climate change. *Mol Ecol Resour*; 18: 18–31. https://doi.org/10.1111/1755-0998.12694.

293. Richardson, S.M., Lintott, P.R., Hosken, D.J., Economou, T and Mathews, F. (2021). Peaks in bat activity at turbines and the implications for mitigating the impact of wind energy developments on bats. Sci Rep 11, 3636. https://doi.org/10.1038/s41598-021-82014-9.

294. Rodrigues, L., Bach, L., Dubourg-Savage, M-J., Karapandža, B., Kovač, D., Kervyn, T., Dekker, J., Kepel, A., Bach, P., Collins, J., Harbusch, C., Park, K., Micevski, B. and Minderman, J. (2015). Guidelines for Consideration of Bats in Wind Farm Projects – Revision 2014. Eurobats Publication Series No. 6. UNEP / Eurobats Secretariat, Bonn, Germany. Department of Communications, Energy and Natural Resources.

295. Russ, J & Hutson, A. & Montgomery, I & Racey, P & Speakman, J. (2001). The status of Nathusius' pipistrelle (Pipistrellus nathusii Keyserling & Blasius, 1839) in the British Isles. Journal of Zoology. 254. 91–100. 10.1017/S0952836901000589.

296. Sherwin, H.A., Montgomery, W.I. and Lundy, M.G. (2012), The impact and implications of climate change for bats. Mammal Review, 43: 171–182. https://doi.org/10.1111/j.1365-2907.2012.00214.x

297. Shiel, C. Shiel, R. and Fairley, J. (2006). Seasonal changes in the foraging behaviour of Leisler's bats (*Nyctalus leisleri*) in Ireland as revealed by radio-telemetry. Journal of Zoology. 249. 347–358. 10.1111/j.1469-7998.1999.tb00770.x.

298. Spoelstra, K., van Grunsven, RHA., Ramakers, JJC., Ferguson, KB., Raap, T., Donners, M., Veenendaal, EM., and Visser ME. (2017). Response of bats to light with different spectra: light-shy and agile bat presence is affected by white and green, but not red light. Proc Biol Sci.doi: 10.1098/rspb.2017.0075.

299. Strelkov, P. (1969). Migratory and stationary bats (Chiroptera) of the European part of the Soviet Union. Acta zool. Cracov.14: 393±440.

300. Suba, J. (2014). Migrating Nathusius's pipistrelles Pipistrellus nathusii (Chiroptera: Vespertilionidae) optimise flight speed and maintain acoustic contact with the ground. *Environmental and Experimental Biology* 12: 7–14.

301. The Swedish Environmental Protection Agency (2007). Report 5571 – Bats and offshore wind turbines studied in south Scandinavia. Naturvårdsverket. ISBN 91-620-5571-2.pdf.

302. Troxell, S., Holderied, M., Pētersons, G., and Voigt, C. (2019). Nathusius' bats optimize long-distance migration by flying at maximum range speed. *J Exp Biol*; 222 (4): jeb176396. doi: https://doi.org/10.1242/jeb.176396

303. UNEP / Eurobats (2022). Information on the status and ecology of lesser horseshoe bats Available online: Rhinolophus hipposideros | UNEP/EUROBATS Accessed 12.04.2023.

304. UNEP / Eurobats (2023). Information on the Eurobats 1991 agreement including the Agreement Text is available online: Agreement Text | UNEP/EUROBATS Accessed November 2022.

305. Voigt, C. Frick, w. Holderied, M. Holland, R. Kerth, G. Mello, M. Plowright, R. Swartz, S and Yovel, Y (2017). Principles and patterns of bat movements: from aerodynamics to ecology. Q Rev Biol. 2017 Sep; 92(3): 267–287.10.1086/693847.

306. Wageningen University and Research (2021). Record of longest known single night flight is available at Nathusius' pipistrelle crosses the North Sea in one night – WUR Accessed 13.02.2023.

307. Wicklow County Council (2016). Wicklow County Development Plan 2016–2022 – Adopted 14 November 2016, Effective 11, December 2016.

308. Wohlgemuth, R and Devrient, I & García, A and Hutterer, R. (2004). Long-distance flight of a Lesser noctule (*Nyctalus leisleri*) after rehabilitation. Myotis. 41-42. 69-73.

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