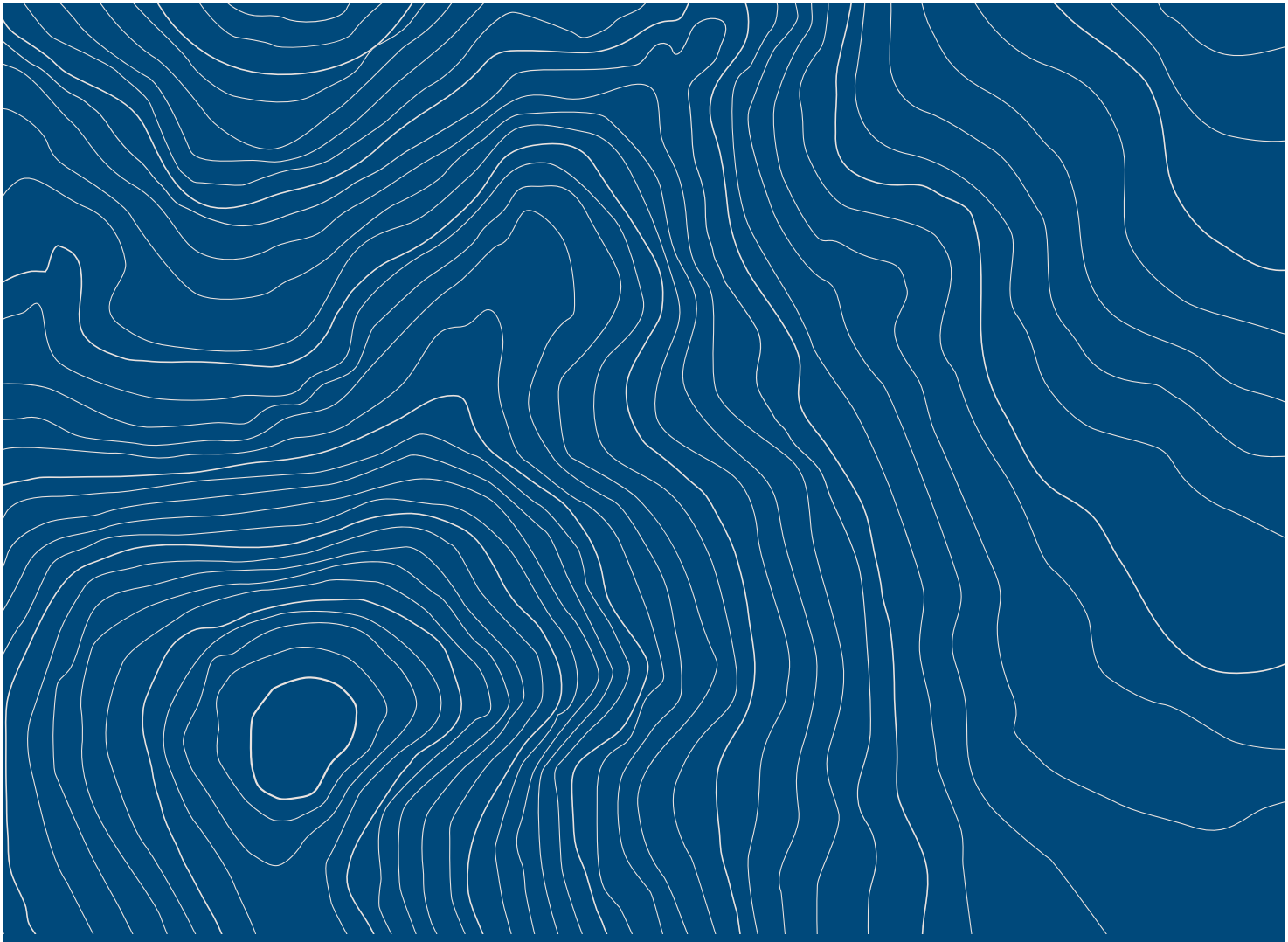

Dublin Array
Generation for generations

EIAR Volume 3: Offshore Infrastructure Assessment Chapters Chapter 7: Bats in the Offshore Environment

Kish Offshore Wind Ltd.

RWE SLR GoBe APEM Group

www.dublinarray-marineplanning.ie

Dublin Array Offshore Wind Farm

Environmental Impact Assessment Report

Volume 3, Chapter 7: Bats in the Offshore Environment

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Glossary

Term	Definition
An Bord Pleanála (ABP)	Competent authority as defined by the Planning Acts to determine the application for development consent for Dublin Array and carry out the EIA and AA of the proposed development.
Applicant	Kish Offshore Wind Limited. Kish Offshore Wind Limited is making the application on behalf of and/or with the consent of the joint holders of the MACs for the maritime area to which the proposed development relates: Kish Offshore Wind Limited, Bray Offshore Wind Limited and DLRCC.
Array Area	That part of the maritime area specified by MAC Reference 2022-MAC-003 and 004 within which it is proposed to locate the wind turbine generators (WTGs) and Offshore Substation Platform (OSP).
Barotrauma	Injury caused by a rapid change in air pressure, which can affect bats flying near wind turbines.
Collision risk	The potential for bats to collide with wind turbine blades.
Cumulative Effects Assessment (CEA)	The assessment of potential cumulative effects that may arise when effects arising from Dublin Array act cumulatively with impacts from other projects considered in the assessment.
DECC	Department of Environment, Climate and Communications (DECC).
Dublin Array	Dublin Array Offshore Wind Farm. Where the context so provides within the EIAR, references to Dublin Array refer to all geographical areas of the proposed development, i.e. both offshore, onshore and including the proposed O&M Base.
Environmental Impact Assessment (EIA)	Assessment of the likely significant effects of a proposed project on the environment. The EIA will be carried out by An Bord Pleanála in this instance.
EIA Report (EIAR)	As defined in the Planning and Development Act 2000, as amended: "environmental impact assessment report" means a report of the effects, if any, which proposed development, if carried out, would have on the environment and shall include the information specified in Annex IV of the Environmental Impact Assessment Directive.
Habitats Directive 92/43/EEC	European Union directive aimed at conserving natural habitats and wild fauna and flora.
Landfall	The location where the Offshore Export Cable Corridor comes ashore at Shanganagh Waste Water Treatment Plant (WWTP).
Maritime Area Consent (MAC)	State consent which grants the holder a right to occupy a specific part of the maritime area for the purposes of a proposed maritime usage as set out in the MAC and subject to such conditions (if any) as may be attached.
Mean High Water Springs (MHWS)	The average level of the highest tides.
Natura 2000	A network of protected areas across the EU, established under the Habitats Directive and Birds Directive.

Term	Definition
Offshore Infrastructure	Wind turbine generators, offshore substation platform, inter array cables, and offshore export cables.
Offshore substation platform (OSP)	Offshore substation which is necessary to connect the WTGs with the Offshore Export Cable.
Phase One Projects	These are the offshore wind farm projects awarded a MAC in 2022 and include Dublin Array, North Irish Sea Array (NISA), Oriel Offshore Wind Farm, Codling Wind Park (CWP), Arklow Phase 2 and Sceirde Rocks. With the exception of Sceirde Rocks these Projects may also be referred to as the East Coast Phase One Projects (see above).
Quasi Constant Frequency (QCF) Call	A type of bat echolocation call with a relatively constant frequency, used for species identification.
Receiving environment	The baseline environment.
Special Areas of Conservation (SACs)	Protected areas designated under the Habitats Directive for the conservation of natural habitats and species.
Special Protection Areas (SPAs)	Protected areas designated under the Birds Directive for the conservation of wild birds.
Static Bat Detectors	Devices used to monitor bat activity by recording their echolocation calls.
Study area	The area which is characterised and assessed in the EIAR chapters.
Wind turbine generators (WTG)	All the components of a wind turbine, including the tower, nacelle and rotor.
Zone of Influence (ZoI)	Areas within which environmental impact may occur. Where used, this area is defined in the relevant EIAR chapter.

Acronyms

Term	Definition
Alternative DO	Alternative Design Option
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPA	The Environmental Protection Agency
ES	Environmental Statement
EU	European Union
EUROBATS	Agreement on the Conservation of Populations of European Bats, 1991
GPG	Good Practice Guidance
LSE	Likely Significant Effects
Maximum DO	Maximum Design Option
MHWS	Mean High Water Springs
MW	Megawatt
NIS	Natura Impact Statement
NMPF	National Marine Planning Framework
NPO	National Planning Objective
NPPF	The National Planning Policy Framework
NPWS	National Parks and Wildlife Service
OREDP	Offshore Renewable Energy Development Plan
PEMP	Project Environmental Management Plan
SEA	Strategic Environmental Assessment
WCDP	Wicklow County Development Plan
WTG	Wind Turbine Generator

Units

Term	Definition
m (metre)	Unit of length
km (kilometre)	Unit of length (1 km = 1,000 metres)
Nm (nautical mile)	Unit of distance used in marine and air navigation (1 Nm = 1.852 kilometres)
m/s (metres per second)	Unit of speed
kHz (kilohertz)	Unit of frequency (1 kHz = 1,000 hertz)
cd (candela)	Unit of luminous intensity
Lux	Unit of illuminance (1 lux = 1 lumen per square metre)
°C (degrees Celsius)	Unit of temperature
MW (megawatt)	Unit of power (1 MW = 1,000,000 watts)
mLAT (metres above Lowest Astronomical Tide)	Unit of height above the lowest tide level

7 Bats in the offshore environment

7.1 Introduction

7.1.1 This chapter of the Environmental Impact Assessment Report (EIAR) presents the results of the Environmental Impact Assessment (EIA) for the potential impacts of the construction, operation and maintenance (O&M), and decommissioning phases of the offshore infrastructure of the proposed Dublin Array Offshore Wind Farm (Dublin Array) on bats in the offshore environment.

7.1.2 This assessment focusses on the potential impacts on bat species associated with the offshore infrastructure, including both species recorded in the offshore environment and those identified through desktop and survey work as potentially present due to known migration patterns. The assessment of bat species in the terrestrial environment is provided in Volume 5, Chapter 2: Biodiversity.

7.1.3 This EIAR chapter should be read in conjunction with the following documents:

- Volume 4, Appendix 4.3.7-1: Bat Technical Baseline (hereafter referred to as the Bat Technical Baseline).

7.1.4 The Bat Technical Baseline provides a detailed characterisation of the receiving environment. Information from the baseline report has been summarised within this chapter but should be read in conjunction for additional detail.

7.2 Regulatory background

7.2.1 In addition to legislation, policy and guidance relevant to offshore renewables captured within the Policy Chapter (Volume 2, Chapter 2: Consents, Legislation, Policy, and Guidance), this section outlines legislation, guidance and policy specific to bats including best practice guidelines. All relevant legislation and policy and how these have been addressed within this assessment are presented in Annex A of this chapter.

7.2.2 Where specific Irish guidance on the assessment of impacts offshore to bats in the offshore environment is not available, given the infancy of offshore wind in Ireland, a number of other guidance documents specific to the consideration of bats in offshore renewable energy projects are available from jurisdictions/countries with more established sectors. As such, the approach for this assessment has been based on the EUROBATS publication 'Guidelines for Consideration of Bats in Wind Farm Projects' (revised 2014), as detailed in Annex A.

Habitats Directive 92/43/EEC

7.2.3 The principal aim of the Habitats Directive (92/43/EEC) is to contribute towards ensuring biodiversity through the conservation of natural habitats and of wild fauna and flora in the EU. Member States are obliged to take measures designed to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of European Community interest. Such measures shall take account of economic, social and cultural requirements and regional and local characteristics.

7.2.4 Under Article 11 of the Habitats Directive, Member States shall monitor the status of the natural habitats and species to which the Directive applies (see, for example, 'Irish Bat Monitoring Programme 2018-2021', Aughney et al, 2022).

7.2.5 Under Articles 12 and 13 of the Habitats Directive, Member States shall take the requisite measures to establish a system of strict protection for the animal species listed in Annex IV(a), and the plant species listed in Annex IV(b). The lesser horseshoe bat (*Rhinolophus hipposideros* – species code 1303) is the only bat species in Ireland that is listed in both Annex II and Annex IV(a). All other known Irish species of bat (of which there are nine in total) are listed in Annex IV(a). The strict protection measures for Annex IV species prohibit all forms of deliberate capture or killing of specimens of these species in the wild, the deliberate disturbance of these species, or the deterioration or destruction of breeding sites or resting places. Member States are further required by Article 12 to establish a system to monitor the incidental capture and killing of the animal species listed in Annex IV(a), and in light of the information gathered pursuant to such monitoring, to take such further research or conservation measures as required to ensure that the incidental capture and killing does not have a significant negative impact on the species concerned. Article 16 offers a limited derogation from the strict protection prohibitions under Articles 12 and 13 of the Habitats Directive.

7.2.6 The system of strict protection for all bat species in Ireland is given effect by the European Communities (Birds and Natural Habitats) Regulations 2011 – S.I. No. 477/2011, as amended (Habitats Regulations), and Section 23 of the Wildlife Act, 1976, as amended (Wildlife Act).

7.2.7 Articles 12 and 16 of the Habitats Directive are mirrored by Regulations 51 and 54 of the Habitats Regulations, which makes a breach of the strict protection regime an offence unless a licence to derogate has been obtained. Under section 23 of the Wildlife Act, 1976, as amended, any person who wilfully interferes with or destroys the breeding place or resting place of any protected wild animal listed in the Fifth Schedule of the Act, shall be guilty of an offence. There is a limited form of derogation from this prohibition in section 23(6) of the Wildlife Act, but the primary form of derogation is found in Regulation 54 of the Habitats Regulations.

7.2.8 Article 17 of the Habitats Directive requires Member States to submit a report ('Article 17 Report') to the European Commission every six years, to include information concerning the conservation measures that Member States are required to take under Article 6(1) of the Directive, as well as an evaluation of the impact of those measures on the conservation status of the Annex I habitats and Annex II species, and the main results of the monitoring of incidental killing and capture of species under Article 11 (see for example 'NPWS (2019). The Status of EU Protected Habitats and Species in Ireland').

7.2.9 Articles 3, 6, and 7 of the Habitats Directive provide for the creation of the ecological 'Natura 2000' network of special areas of conservation (SACs), comprising sites hosting the habitats listed in Annex I and habitats of the species listed in Annex II of the Habitats Directive, and special protection areas (SPAs) classified under the Birds Directive.

7.2.10 Member States are required to establish conservation measures involving, if needs be, the appropriate management plans specifically designed for the SAC or integrated into other development plans, and appropriate measures corresponding to the ecological requirements of the Annex I habitat or Annex II species present on the site. As noted, the lesser horseshoe bat is the only bat species in Ireland that is listed in Annex II. There are 41 SACs designated for this species, and those sites are believed to host a species population of between 5,000 and 7,000 (see, for example, 'NPWS & VWT (2022) Lesser Horseshoe Bat Species Action Plan 2022-2026').

7.2.11 Member States shall, under Article 6(2), take appropriate steps to avoid, in the SAC, the deterioration of natural habitats and the habitats of species as well as disturbance of species for which the areas have been designated, in so far as such disturbance could be significant in relation to the biodiversity objectives of the Directive (see NPWS & VWT (2022) and NPWS (2019)).

7.2.12 Article 6(3) and 6(4) of the Habitats Directive set out the procedures for assessing the likely significant effects of a proposed plan or project (including an activity) on a Special Area of Conservation (SAC) in view of the site's conservation objectives. Article 7 extends the application of Articles 6(2), 6(3), and 6(4) to Special Protection Areas (SPAs) designated under the Birds Directive. In Ireland, for developments requiring planning permission, the Appropriate Assessment (AA) procedures that implement these Articles are outlined in Part XAB of the Planning and Development Act. Further detail on this assessment process is provided in the Natura Impact Statement (NIS) accompanying this application, which specifically addresses potential impacts on designated European sites. For additional guidance, refer to Irish Wildlife Manual No. 134 (2022) Bat Mitigation Guidelines for Ireland and the accompanying AA Screening/NIS.

Guidance

7.2.13 Currently there is no Irish, UK, or pan-European guidance document relating to offshore surveys for assessing risk to bats from offshore wind farms. To date only Germany has devised formal guidance for offshore bat study and impact assessment. According to the NPWS (2022) 'Irish Wildlife Manual No. 134 Bat Mitigation Guidelines' the recommendations in the following documents should be referred to when planning surveys for assessing risk to bats from wind energy developments generally:

- EUROBATS (2014) 'Guidelines for consideration of bats in wind farm projects';
- Natural England, (2012) 'Bats and Onshore Wind Turbines: Interim Guidance: Natural England Technical Information Note TIN051';
- Northern Ireland Environment Agency (2014) 'Bat Surveys – NIEA Specific Requirements'; and
- Bat Conservation Ireland (2012) 'Wind Turbine/Wind Farm Development Bat Survey Guidelines, Version 2.8'.

7.2.14 While not specifically mentioned in NPWS (2022) guidance published by NatureScot 'Bats and Onshore Wind Turbines: Survey Assessment and Mitigation' (NatureScot, 2021) are widely accepted for onshore wind developments in Ireland. They provide updated best practices for developers and planners to ensure that onshore wind energy developments pose minimal risk to bats.

7.2.15 Other European countries have generally accepted a survey approach based on the EUROBATS publication. This publication is principally about conserving bats and so does not fully relate to surveying bats in an offshore environment; especially those species which are likely to migrate or forage out to sea such as Nathusius' pipistrelle (*Pipistrellus nathusii),* soprano pipistrelle and Leisler's bat (*Nyctalus leislerii)* (Arnett *et al* 2015).

7.2.16 As noted in NPWS (2022), *'... it is worth bearing in mind that seasonal migrations may occur in some species. This behaviour is well established in the* Nathusius' pipistrelle *where it has been studied elsewhere in Europe (e.g. Alcalde et al., 2020; Brabant et al, 2020) although it is unclear yet what proportion of the Irish population may migrate. Given the proven ability of* Nathusius' pipistrelle *to cross open seas, it is important to bear this species in mind when planning off-shore wind-farm projects.'*

7.2.17 NPWS (2022) sets out best practice guidelines for how to mitigate against possible negative impacts of onshore wind farm development. It was prepared by Marnell, et al. (2022), and revises an earlier 2006 document by the same authors.

7.2.18 Bat Conservation Ireland (BCI) has also developed guidelines for how to deal with the Annex II protected lesser horseshoe bat in the AA process (BCI, 2012). These guidelines have been devised for developers, ecologists, and relevant authorities; although it is important to note the proposed project area is outside the known distribution of the species in Ireland.

7.3 Consultation

7.3.1 In preparation of the EIAR for Dublin Array, consultation has been undertaken with various statutory and non-statutory authorities. The Dublin Array EIA Scoping Report[1] was made publicly available and issued to statutory consultees on 9th October 2020.

7.3.2 Following the recommendation outlined in the Department of Environment Climate and Communications (DECC) guidelines the Applicant has sought to consult with a range of groups and organisations including the NPWS, the Marine Institute, Environmental Protection Agency (EPA), the Irish Wildlife Trust, and Coastwatch: Environmental Pillar. A copy of the Dublin Array Scoping Report was provided to each of these organisations.

7.3.3 A record of key areas of consultation undertaken during the pre-application phases is summarised within Table 1.

7.3.4 As part of the baseline data collection, a series of bat groups and relevant bat experts were contacted as follows (see Table 2 for further details):

- Bat Conservation Ireland – Irish Bat Monitoring Programme;
- Welsh Nathusius Project – Sam Dyer;
- BSG Ecology – undertaken studies of bats on the Irish Sea;
- Natural Resources Wales – Sam Dyer;
- Northern Ireland Bat Group Records Officer;
- Jon Russ (undertook PhD in Ireland);
- Dumfries and Galloway Bat Group;
- John Haddow – Auritus Wildlife Consultancy;
- Keith Cohen – Ridgeway Ecology;
- Gwynedd Bat Group; and
- Manx Bat Group.

7.3.5 The primary aim in contacting these individuals and groups was to identify any data that may be available to provide evidence of bats migrating across the Irish Sea. For full table of groups and individuals contacted please refer to Table 2. Consultation was also undertaken with NPWS to review the survey methodology and assessment process, as currently no guidance for assessing bats and offshore wind farms has been published.

[1] https://dublinarray.com/wp-content/uploads/2020/10/Dublin-Array-EIAR-Scoping-Report-Part-1-of-2.pdf

Table 1 Summary of consultation relating to bats

Date	Consultation type	Consultation and key issues raised	Response
10th November 2020	Meeting with NPWS	The survey methodology was discussed, using a step wise approach to monitoring, with static detectors located on islands and light houses. NPWS welcomed the approach as an alternative to boat transect and buoy mounted recording devices. NPWS also suggested sourcing information on Nathusius and Leisler's bats from the National Bat Monitoring Programme monitoring reports (Aughney 2022, Aughney 2018).	See Bat Technical Appendix for full methodology used. Information received has been quoted in desk study (section 7.6)
3rd October 2023	Meeting with NPWS	NPWS suggested sourcing data from the Wexford Nathusius' pipistrelle coastal monitoring report to see if there was any evidence of migration of this bat species. The results suggested that '*in one location, Nathusius's pipistrelle bats were more frequently recorded in a concentrated period within the survey period. Whilst this could be caused by the passage of migratory bats from north-east Europe, this could also be due to a small number of resident bats feeding in this particular location. However, this would appear unlikely that this pattern would not be repeated elsewhere or at another time in the survey period.'* The report concluded that '*In the absence of long-term data on the use of these locations by this species during the rest of the year, it is impossible to conclude if the data reflects a migratory wave or just a resident population of bats that are using this habitat more intensively at that period of time.'*	This report was received 11th July 2024. This has been taken into account throughout the assessment.

7.4 Methodology

Study area

7.4.1 The desk study covered the entirety of the Irish Sea, including Republic of Ireland, Scotland, England, Wales, and Northern Ireland. However, the literature review included review of publications within a wider area.

7.4.2 In the absence of published guidance or studies to determine the study area for bats in the marine environment, the survey study area has considered where bats are likely to fly from (land), if they are flying out as far as the array area (sea). The survey study area therefore stretched from the shoreline of the mainland (Sorrento Point) out to Kish Bank Lighthouse, located adjacent to the array area (Figure 1).

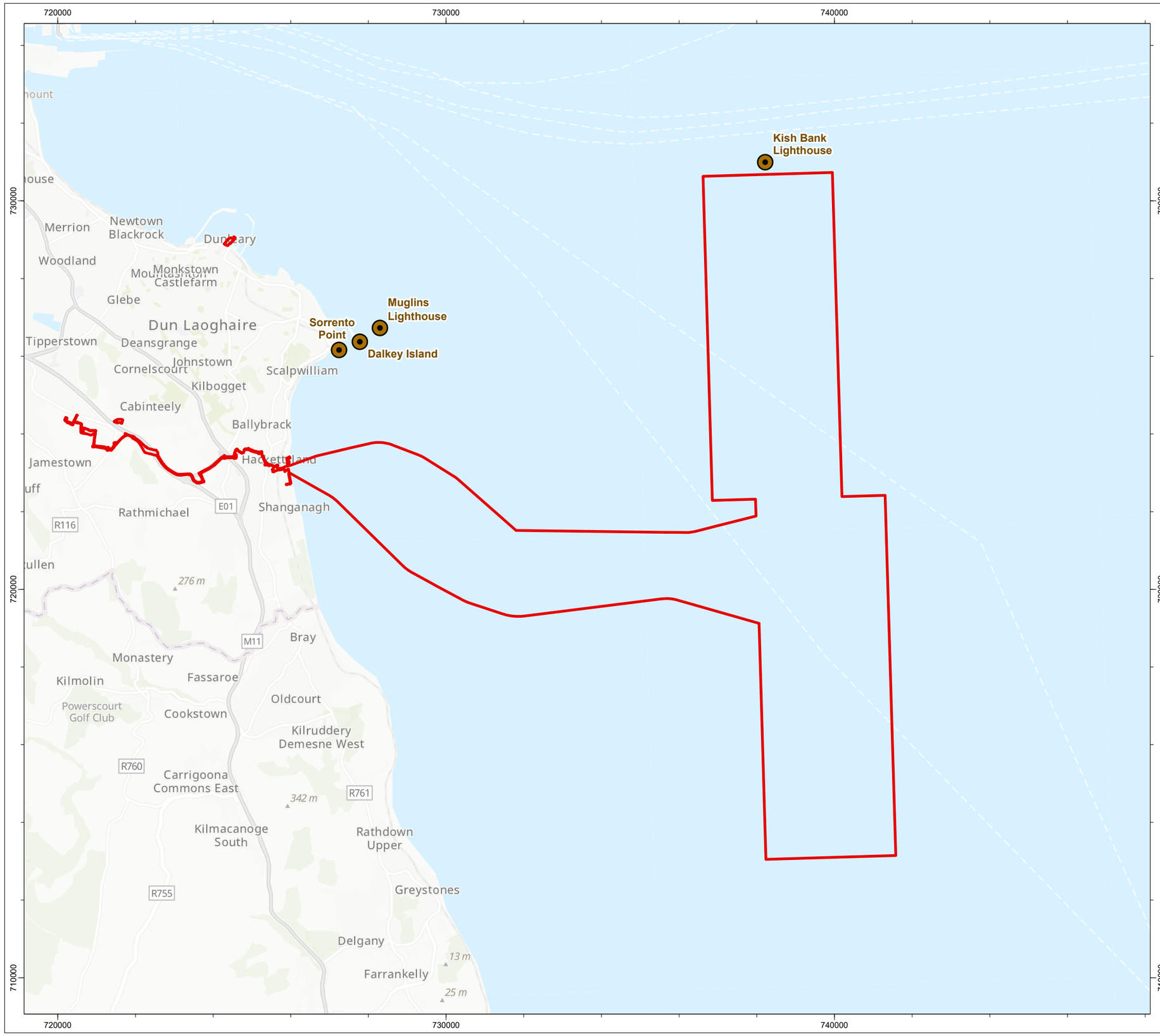
Baseline data

7.4.3 Baseline data presented within this report has been gathered via a desk study (comprising a literature study and requests for data held by local bat groups) and undertaking static monitoring surveys using remote automated 'static' bat detectors.

Desk Study

7.4.4 The desk study aimed to gather data from bat groups and other sources around the Irish Sea to identify records indicating potential bat migration (Table 2). Relevant records included sightings from 1 km offshore to recently landed bats within 500 m of the coast, especially those observed in daylight. Additionally, land-based records within 2 km of Sorrento Point were collected to identify bat species that may forage at sea after leaving their roosts.

7.4.5 Table 2 details the bat groups and data providers contacted, along with their responses. Initial contact was made via email in February 2021, with follow-ups in 2023. The contact list was developed with input from Sam Dyer (Natural Resources Wales) and John Haddow (Auritus Wildlife Consultancy) to identify those most likely to hold relevant data. Groups and individuals were asked for data suggesting bat migrations across the Irish Sea, including records of downed bats on coasts, static and visual daylight observations, or sightings of bats landing on boats or lighthouses.



DRAWING STATUS

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MAP NOTES / DATA SOURCES:

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PROJECT TITLE

Dublin Array

DRAWING TITLE

Offshore Bats: Static Detector Locations

DRAWING NUMBER: **Figure 1**

PAGE NUMBER: **1 of 1**

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	2025-01-30	DRAFT	JK	AB	AE
02	2025-01-30	Public	JK	CB	AM

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0 1 2 Miles

N GRID NORTH

SCALE 1:100,000 PLOT SIZE A3

DATUM IRENET95 VERTICAL REF CDN/LAT/MLLW

PRJ IRENET95 Irish Transverse Mercator

SLR

Dublin Array Generation for generations

Kish Offshore Wind Limited - Bray Offshore Wind Limited

Table 2 Data sources considered in the development of the bat baseline

Group/data provider	Response
Bat Conservation Ireland – Irish Bat Monitoring Programme	Data received in the Irish Bat Monitoring Programme 2018-2021 report.
Welsh Nathusius Project – Sam Dyer	Provided a paper on Mammals in a Sustainable Environment – Detectors on ferries
BSG Ecology – undertaken studies of bats on the Irish sea	Report on Pembrokeshire Islands Bat Surveys
Natural Resources Wales – Sam Dyer	Provided a report: Bat Migration Project Report (2017 – 2018)
Northern Ireland Bat Group Records officer	Holds no relevant records
Dr Jon Russ BSc. (Hons) PhD (The microchiroptera of Northern Ireland: community composition, habitat associations and ultrasound, QUB).	Holds no relevant records
Dumfries and Galloway Bat group	Holds no relevant records
John Haddow – Auritus Wildlife Consultancy	Holds no relevant records
Keith Cohen – Ridgeway Ecology	Holds no relevant records
Gwynedd Bat Group	Hold no relevant records
Manx Bat Group	Response not received
Department of Housing, Local Government and Heritage.	Provided 'All-Ireland Nathusius's Pipistrelle Bat Project: Updating The Distribution and Status of The Nathusius's Pipistrelle (*Pipistrellus Nathusii*) In Ireland: Phase 5 (2021)' NPWS consultation report received 11th July 2024. Both of which were taken into account throughout the assessment.

7.4.6 A literature study was also undertaken for any relevant information relating to bat migrations to and from the UK. This study also included Ireland. A full list of the papers accessed is included in the Reference section of this report.

Site specific surveys

Background

7.4.7 Currently, no specific guidance exists for conducting bat surveys to assess the impact of offshore wind farms. This survey aimed to determine if bats migrate across the Irish Sea, particularly through the Dublin Array area between Ireland and Great Britain.

7.4.8 Static bat detectors were deployed incrementally from the mainland (Sorrento Point) up to 10 km offshore on Kish Bank Lighthouse, mounted on manmade structures, islands, and lighthouses at least 5 m above sea level to mitigate the challenges of using electronic equipment in a saline environment. The locations are listed in Table 3 and shown on Figure 1.

Table 3 Static bat detector locations

Location name	Location	Distance from shore	Detector type
Sorrento Point	53°16.23'N 006°05.54W	Onshore	SM4BAT Full Spectrum Ultrasonic recorder
Dalkey Island	53°16.23'N 006°05.05W	0.21 Nm = 0.39 km	Batlogger C static
Muglins Lighthouse	53°16.52'N 006°04.58W	0.61 Nm = 1.13 km	Batlogger C static
Kish Bank Lighthouse	53°18.67'N 005°55.55W	6.42 Nm = 11.89 km	Batlogger C static

Equipment

7.4.9 Batlogger C static detectors were chosen due to its Global System for Mobile Communications (GSM) module functionality, each morning the units sent a Short Messaging Service (SMS) to a designated phone, to provide an update on status.

7.4.10 Sorrento Point is a publicly accessible area, therefore a smaller SM4BAT Full Spectrum Ultrasonic recorder by Wildlife acoustics with a SMM-U2 microphone was used. This configuration allowed the base unit to be placed at ground level, and a microphone on a cable to be placed above ground on a tree.

Data collection

7.4.11 Each detector was deployed in late spring and retrieved in autumn. Table 4 provides details of the data downloads, equipment checks and battery changes.

Table 4 Dates of detector deployment, battery changes and/or SD card changes

Location name	Deployment start	Battery and/or SD card changed	Deployment end
Kish Bank Lighthouse	28th May 2021	27th August 2021	04th November 2021
Muglins Lighthouse	28th May 2021	27th August 2021	04th November 2021
Dalkey Island	28th May 2021	27th August 2021	04th November 2021
Sorrento Point	27th May 2021	10th June 2021	07th October 2021. Stolen by 3rd party so last data received was dated 20th September 2021 (date of previous battery and SD card change).
		01st July 2021	
		14th July 2021	
		23rd July 2021	
		19th August 2021	
		20th September 2021	

Data analysis

7.4.12 The digital bat recordings were analysed using Kaleidoscope Pro software using the Bats of Europe filter 5.4.0, then manually verified, where necessary, by an ecologist experienced in bat sonogram analysis (Nicola Faulks CEcol, MCIEEM).

7.4.13 Kaleidoscope Pro (version 5.4.2) filters for Leisler's bat and Nathusius' pipistrelle can be unreliable due to overlap in call parameters with noctule and common pipistrelle bats (Nicola Faulks, pers. obs.). However, since noctules are absent and Nathusius' pipistrelles are rare in Ireland, this issue is not significant for the Irish context. All noctule calls were reclassified as Leisler's bats. Nathusius' pipistrelle records were manually checked, and identification was confirmed if a Quasi Constant Frequency (QCF) call was detected with a peak frequency between 35 and 40 kHz (as per Russ 2012).

7.4.14 Although Kaleidoscope Pro attempts to filter Myotis species, all data were collectively assigned to the Myotis genus due to identification challenges and the low-risk status of these species concerning wind turbines (Scottish Natural Heritage et al. 2019). Notably, no Myotis species were detected within 7 km of the turbines or beyond Dalkey Island in the offshore areas, minimising impact on the overall assessment.

7.4.15 Kaleidoscope Pro provides an estimate of bat activity, but faint or poor-quality calls may be missed due to noise filters, although this is unlikely to significantly affect overall activity measures. The software assigns one species label per sound file, even if multiple species are present. In such cases, files were manually reviewed, and species were separately labelled to ensure accurate counts of bat passes.

7.4.16 A bat pass consists of two or more calls representing a single bat flying towards and away from the microphone. Passes can vary from two to 40 calls and are counted as a single bat pass. This measure reflects bat activity, not individual bat numbers; for example, 100 passes could result from 100 bats passing once or one bat passing 100 times.

7.4.17 Files labelled as No-ID were manually checked. Typically, these contained noise or simultaneous calls from multiple species. Such records were labelled accordingly and duplicated to include data from both species. Faint calls that could not be confidently attributed to bats were labelled as 'Noise' and excluded from the analysis.

Wind data

7.4.18 The windspeed data provided by RWE was measured at Kish Bank Lighthouse and used to compare the dates when bat passes occurred with the windspeed (see the Bat Technical Baseline for further information). The data provided includes a range of parameters, including temperature, pressure, humidity, and wind speed. Each parameter has been recorded at ten-minute intervals and so represents an average of the preceding ten minutes.

7.4.19 Wind data was incorporated into the bat activity analysis to investigate any relationship between bat activity and wind speed. The analysis used average wind speeds recorded between 7 pm and midnight, as this period aligns with the typical time bats leave their roosts and begin offshore activity (30 minutes to 2 hours after sunset) (Russ 2012).

7.5 Assessment criteria

Sensitivity of receptor criteria

7.5.1 As set out in the Volume 2, Chapter 3: EIA Methodology, the sensitivity of a receptor is a function of its capacity to accommodate change and reflects its ability to recover if it is affected. Sensitivity is quantified via a consideration of its context (its adaptability, tolerance, and recoverability) and value.

7.5.2 Table 5 outlines the criteria used to define the sensitivity of bat species identified as ecological receptors in this assessment, based on EPA Guidelines (2022). Sensitivity is categorised into four levels: High, Medium, Low, or Negligible. If a species meets any criteria for a particular sensitivity level, that level is assigned. Where a species could reasonably fit more than one sensitivity level, professional judgment is applied, especially given the limited understanding of bats' migration and offshore foraging behaviours. Due to insufficient data on bat migrations between western Wales, England, Scotland, and Ireland, a precautionary approach has been adopted for assessing potential impacts on all species known or suspected to migrate overseas.

7.5.3 The sensitivity of each species has been evaluated based on a) the population vulnerability in either Ireland or mainland UK, and b) the collision risks as set out within the Eurobats guidance (Rodrigues *et al,* 2015) and Bats and Onshore Wind Turbines (NatureScot, 2021) guidance. It is worth noting that both the population vulnerability and collision risk relates to onshore data only, as there is currently a paucity of collision risk data for offshore wind farms.

7.5.4 When assessing receptor sensitivity, a range of data sources have been used. For example, to determine bat population vulnerability data from Valuing bats (Wray et al, 2010) and the Irish Bat Monitoring Programme 2018-2021 (Aughney, Roche, and Langton, 2022) have been used.

7.5.5 The sensitivity definitions should consider the following (as per EPA's guideline):

- Context: The degree to which the receptor will conform or contrast with the established (baseline) conditions. To define the context the following sub-factors will be considered:
  - Adaptability: The degree to which a receptor can avoid or adapt to an impact;
  - Tolerance: The ability of a receptor to accommodate temporary or permanent change without a significant adverse impact;
  - Recoverability: The temporal scale over and extent to which a receptor will recover following an impact; and

- Value: A measure of the receptor's importance, rarity and worth.

7.5.6 Table 5 provides information on how the sensitivity of each bat species was derived. The sensitivity categories have been developed based on established environmental assessment practices and guidance, as above, and relevant scientific literature. These sources informed the definitions of **adaptability**, **tolerance**, and **recoverability**, which were then tailored to reflect the specific context of Irish offshore wind farm developments and their potential impacts on bats.

7.5.7 It is also important to note that the 'value' definition has been omitted from this assessment, as all bat species are considered to have a high value due to their listing under Annex IV of the EU Habitats Directive as European Protected Species of Community Interest requiring strict protection.

Table 5 Sensitivity/importance of the environment

Receptor sensitivity	Definition
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.
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., seven 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).
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.

Receptor sensitivity	Definition
	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., one to seven years). A common species for which limited increase mortality risk is unlikely to have a significant impact on population status.
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. A species with a low population vulnerability, as it is a common species. **Recoverability**: The receptor is anticipated to recover fully and 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).

Magnitude of impact criteria

7.5.8 It is noted here that a distinction is made throughout the assessment between the magnitude of the impact (as defined by the extent, duration[2], frequency, probability[3] and consequences) and the resulting significance of the 'effects' upon bat species, as receptors. The descriptions of magnitude are specific to the assessment of bats and are presented in Table 6. Potential impacts have been considered in terms of whether they are adverse or beneficial effects.

7.5.9 Where an impact could reasonably fit more than one magnitude level, professional judgment was used to determine the most appropriate level, based on the potential consequences defined in Table 6. For instance, even if an impact occurs constantly during the operational or maintenance period, it may be considered of Negligible magnitude if it is indiscernible and immeasurable in practice, despite its frequency.

7.5.10 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. Where this is not possible, a more qualitative approach is taken; particularly where the confidence level can only be based on expert judgement.

[2] Note: this is the duration of the impact and not the time taken for the receptor to recover. Recoverability is considered within the sensitivity determination.
[3] All impacts assessed within this EIAR chapter are considered reasonably likely to occur, and so the probability of the impact has not been a consideration in defining the magnitude of the impact.

7.5.11 For the purposes of the definitions below, near-field has been defined as within the array area and offshore ECC boundary. Far-field has been defined as extending beyond these boundaries.

Table 6 Magnitude of the impact

Magnitude	Definition
High	**Extent**: Impact across the near-field and far-field areas beyond the study area. **Duration**: The impact is anticipated to be permanent (i.e., over 60 years). This 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. **Consequences**: Permanent changes to key characteristics or features of the particular environmental aspect's character or distinctiveness.
Medium	**Extent**: The maximum extent of the impact is restricted to the far-field. **Duration**: The impact is anticipated to medium-term (i.e., seven to 15 years) to long-term (15 – 60 years). Population recovery of bat species is anticipated to occur either through avoidance during the operational period or following decommissioning. **Frequency**: The impact will occur constantly throughout a relevant project phase. **Consequences**: Noticeable change to key characteristics or features of the particular environmental aspect's character or distinctiveness i.e. no long-term change in the conservation status of each bat species affected, and any negative population impacts would be reversible.
Low	**Extent**: The maximum extent of the impact is restricted to the near-field and adjacent far-field areas. **Duration**: The impact is anticipated to be temporary (i.e., lasting less than one year) to short-term (i.e., one to seven years). **Frequency**: The impact will occur frequently throughout a relevant project phase. **Consequences**: Barely discernible to noticeable change to key characteristics or features of the particular environmental aspect's character or distinctiveness i.e. no or very limited change to a bat species population, so their conservation status would remain unchanged (and favourable).
Negligible	**Extent**: The maximum extent of the impact is restricted to the near-field and immediately adjacent far-field areas. **Duration**: The impact is anticipated to be momentary (seconds to minutes) to brief (lasting less than one day). **Frequency**: The impact will occur once or infrequently throughout a relevant project phase. **Consequences**: No discernible to barely discernible change to key characteristics or features of the particular environmental aspect's character or distinctiveness i.e. no measurable change in individual species populations from the usual annual variation.

Defining the significance of effect

7.5.12 The assessment methodology for determining the significance of potential effects is described in Table 7. For bats, effects defined as Moderate, Significant, Very Significant and Profound are considered 'significant' in EIA terms (EPA 2022) and based on the methodology provided in CIEEM (2022). It is also acknowledged that, beyond the EIA framework, there are targets, policies and objectives related to biodiversity set out in Ireland's 4th National Biodiversity Action Plan (2023) (although not specifically related to offshore bats) as well as legally binding obligations under Article 12 of the Habitats Directive, Regulation 51 of the Habitats Regulations, and Section 23 of the Wildlife Acts. These legal regimes require the consideration of potential disturbances to protected species, even where such effects may not meet the threshold for significance in EIA terms.

7.5.13 The significance of an effect is determined by assessing the importance of each bat species (or group), the impact magnitude, and using professional judgment to evaluate whether the species' integrity (conservation status) will be affected. This assessment considers direct, indirect, and cumulative impacts across all development phases, including temporal factors. It is also recognised that, while this assessment focuses on likely significant effects in EIA terms, impacts below this threshold may still constitute adverse effects under strict protection regimes, such as those outlined in Article 12 of the Habitats Directive or Section 23 of the Wildlife Acts, particularly in cases of disturbance or killing of protected species which are considered within the assessment also. It is important to note that likelihood of impacts is an important element considered regarding protected species in this regard – particularly regarding collision risk.

7.5.14 For significant effects, the mitigation hierarchy is applied (see Volume 2, Chapter 3: EIA Methodology).

Table 7 Significance of potential effects

Description of Impact - Magnitude			Existing Environment - Sensitivity			
			High	**Medium**	**Low**	**Negligible**
	Adverse impact	**High**	Profound or Very Significant (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	Profound or Very Significant (significant)	Significant	Moderate	Imperceptible

7.6 Receiving environment

7.6.1 The details of the baseline data are included in the Bat Technical Baseline. A summary is provided below.

Bat species present in the offshore environment

Desk study

7.6.2 Summaries of the reports reviewed as part of the desk study are presented below. The data analysed supports the occurrence of species in the study area. The list of species is presented in paragraph 7.6.4.

- In 2014 BSG Ecology deployed automated (static) bat detectors on three islands (Skomer, Ramsey and Skokholm) along the Pembrokeshire coast, with the aim of monitoring the movements of migratory species (BSG 2014). A peak in bat activity was observed on the islands in the late summer/autumn, for Leislers' and Nathusius' bats, both species which are known to be long distance migrants in Europe. However, the data collected during this study did not confirm that bats were migrating within the UK, or between the UK and Ireland. The data provided an indication that such bat migrations may be occurring.

- In 2015 as part of the Mammals in a Sustainable Environment (MISE, 2015) Project, Anabat Express static bat detectors were installed on a range of ferries sailing between Dublin and Holyhead; and Rosslare and Fishguard. Anabat Expresses were also located on Bardsey Island and South Stack, Anglesey. The project found a very low rate of positive contact (recorded bat passes) at all locations during the whole survey period. Two Leislers' bat passes were recorded in Rosslare Harbour and in Dublin Port; a further single bat pass in Fishguard harbour. No bat passes were recorded offshore (at sea). At South Stack, Nathusius' pipistrelle bat passes were detected twice, with more bat passes being recorded on Bardsey Island. Again, while the two target species were recorded, there was insufficient data to provide evidence that bat migration was taking place.

- The National Resources Wales (NRW) Bat Migration Project Report (2017 to 2018) set out to further investigate the potential for migratory movements of bats to occur between Ireland and Wales. Detectors were located for monitoring during 2017 and 2018 at Bardsey Island (Lighthouse and Bird Observatory) and South Stack, Anglesey. In 2018 two additional locations were added, Treginnis Farm, Ramsey Island and Wooltack Point, Skomer Island. Leisler's and Nathusius' were the target species for the study. The results of the study did not provide any conclusive evidence of bat migrations but did record one Leislers' bat pass and a number of Nathusius' bat passes, providing evidence of presence in these coastal regions. It is understood that the studies are ongoing, though further information has not been received.

- The Irish Bat Monitoring Programme 2018-2021 (Aughney, 2022) confirms that all the species listed in paragraph 7.6.4 is correct, only the Myotis genus bats were not recorded in the sample square (O04), which covers the northern part of Dublin and surrounding area. Square O04 is 30 km northwest of Sorrento Point and therefore the closest survey square to the study area. The same study considered Nathusius' pipistrelle bats a rarity in Square O03 too, with an average encounter rate of 1.5 or less bat passes from this species recorded per hour. Leisler's bats had an average encounter rate of 12-24 bat passes per hour.

- Of relevance to this assessment is a paper titled 'Offshore Occurrence of a Migratory Bat, *Pipistrellus nathusii*, Depends on Seasonality and Weather Conditions' (Lagerveld 2021). The study found that when bats migrate over the North Sea, windspeed, direction and temperature is important. The study monitored at multiple locations offshore, between 2012 and 2016 on 480 monitoring nights. In summary, their model derived from the data, found that important explanatory variables for the offshore occurrence of Nathusius' pipistrelle are as follows: seasonality (night in year), wind speed, wind direction, and temperature. The species' migration is strongest in early September, with east-north easterly tailwinds, wind speeds < 5 m/s, and temperatures > 15 ◦C. Lunar cycle, cloud cover, atmospheric pressure, atmospheric pressure change, rain, and visibility were excluded during the model selection, so were not evaluated.

Site survey data

7.6.3 Table 8 and Table 9 show the observations by location. Figure 1 shows the detector locations in relation to the Dublin Array. Bats were recorded in significant numbers within the onshore area, but limited numbers within the array area (represented by Kish Bank Lighthouse).

7.6.4 The following bat species were found within the study area:

- NYCLEI – *Nyctalus leisleri* – Leisler's bat;
- PIPNAT – *Pipistrellus nathusii* – Nathusius' pipistrelle;
- PIPPIP – *Pipistrellus pipistrellus* – common pipistrelle;
- PIPPYG – *Pipistrellus pygmaeus* – soprano pipistrelle;
- PLEAUR – *Plecotus auritus* – Brown long-eared bat; and
- MYO – *Myotis* genus – likely to be *Myotis daubentonii* – Daubenton's bat.

7.6.5 The field studies found that five species (and one species group – Myotis) of bat were present at Sorrento Point, where bat calls from the Myotis genus were also recorded (Table 8). Bat activity at Sorrento Point was consistently higher than at the offshore locations. The same species were recorded at Dalkey Island as at Sorrento Point, but the bat activity was half of the levels recorded at Sorrento Point.

7.6.6 Offshore further, at Muglins Lighthouse, only four bat species were recorded (Leisler's bat and three species of pipistrelle), but the bat activity was 6% of that recorded at Sorrento Point. At Kish Bank Lighthouse, only three species were recorded, Nathusius' and common pipistrelle (one occurrence), the remaining bat passes recorded were all attributed to Leisler's bat. The activity at Kish Bank Lighthouse was 1.5% of that recorded at Sorrento Point, and bat activity only occurred between 14th June and 7th September 2021.

7.6.7 The data from Kish Bank Lighthouse showed low levels of bat activity and number of nights with bat activity recorded (Table 9). All but one of the nights on which bats were recorded at Kish Bank Lighthouse, the wind speed was less than 5 m/s. During the recording period of 160 nights, bats were recorded on only 21 nights at Kish Bank Lighthouse.

Table 8 Average bat pass count per night for each species at each location

Species	Sorrento Point*	Dalkey Island	Muglins Lighthouse	Kish Bank Lighthouse
NYCLEI	102.63	21.57	2.79	2.14
PIPNAT	1.21	1.10	0.06	0.01
PIPPIP	63.00	59.69	6.93	0.01
PIPPYG	0.69	0.88	0.25	0.00
PLEAUR	0.09	0.03	0.00	0.00
MYO	0.01	0.01	0.00	0.00
Mean bat pass (per night, all species)	**167.63**	**83.28**	**10.03**	**2.16**

Table 9 Summary information of bat records at each location

Location name	First bat record	Last bat record	No. nights with bats recorded/ total nights	Nights with bat activity (%)
Sorrento Point*	28th May 2021	20th September 2021	105/115	91.30
Dalkey Island	28th May 2021	4th November 2021	135/160	84.38
Muglins Lighthouse	6th June 2021	26th October 2021	84/143	52.25
Kish Bank Lighthouse	14th June 2021	7th September 2021	21/160	13.13

* The static detector located at Sorrento Point was stolen after the last memory card/battery change on the 20th of September 2021.

Bat migration

7.6.8 Published evidence (see section 7.20 for full references) shows that bats, particularly Nathusius' pipistrelle and larger Nyctalus species, migrate across the North Sea between mainland Europe and England (Bach et al (2017), BSG (2014), Clews-Reberts (2015), Lagerveld (2019) and Petersen (2014)). Given that Leisler's bat and Nathusius' pipistrelle are present in Ireland and that similar species are known to migrate over large bodies of water, it was considered plausible that these bats might also migrate across the Irish Sea. However, the desk study found no evidence to confirm this hypothesis.

7.6.9 Evidence suggests that the species detected in the Dublin Array survey data may undertake some form of migratory movement, but evidence for migration across the Irish sea is lacking. For example, the Bat Conservation Trust and University of Bristol paper (BCT, 2009) states that while the Leisler's bat is a seasonal migrant in mainland Europe, the species is considered more sedentary in north-west Europe. The paper also states that genetics suggests that gene flow between Britain and continental Europe for common and soprano pipistrelle, provides no evidence that the North Sea acts as a barrier. The *Nathusius' pipistrelle* is known to migrate across the North Sea from mainland Europe to the UK, this has been confirmed most recently trough the Motus Wildlife Tracking System (www.motus.org), with records made of tagged *Nathusius' pipistrelle* bats crossing between Holland and England on an ongoing basis. It is partly because of the potential for migratory behaviour, these four species have been brought forward for further assessment as sensitive receptors.

7.6.10 The data showed site usage of the Kish lighthouse area by bats on 21 nights from the 13th of July to the 7th of September. Of this data over 70% of the records were after midnight – which would be beyond the peak foraging period. Similarly, over 60% of the records were between the 22nd of August and the 28th of August. With a peak of activity on the 27th of August with over 70 records spanning the night.

7.6.11 The baseline data aimed to determine if bat migration across the Irish Sea occurs, although there was no firm evidence to support migration, there is data to support its potential. The data suggest that bats are active at sea under low wind and warm nighttime conditions, reaching distances of up to 11.89 km. It is therefore determined that any migration is likely to be limited to late August and occur during favourable weather conditions.

7.7 Defining the sensitivity of the baseline

7.7.1 The sensitivity of bat species using the criteria outlined in section 7.5, has been set as high. This decision is based on factors such as likelihood of migration, flight height etc. and the fact that there are gaps in our knowledge of the behaviours of bat species.

7.7.2 It is also worth noting that in their publication Bats and Onshore Wind Turbine Survey Assessment (NatureScot, 2021) all four of the species brought forward for further assessment are also classified as being at a high risk of collision with wind turbines (onshore) due to their foraging strategy and flight height, further confirming their potential sensitivity. To date, no offshore specific collision risk assessments have been published, this is why the onshore guidance has been referenced herein.

7.8 Uncertainties and technical difficulties encountered

7.8.1 Various survey methodologies were evaluated for monitoring bat activity offshore. Installing static bat detectors on ferries was considered, but ferry schedules had nocturnal crossing but did not align with peak bat activity times, as only daytime sailings were available within 50 km of the proposed Dublin Array. Therefore, this option was deemed unviable. Placing static bat recorders on mooring buoys was also assessed, but the potential issues with sea state variability, corrosion, and salt ingress made it a costly, impractical and unreliable solution for bat monitoring.

7.8.2 The static detector at Sorrento Point was stolen after the last memory card and battery change on 20th September 2021, resulting in the loss of approximately 6 weeks of data. While this theft complicates direct comparisons after 20th September 2021, it is not a major constraint for data analysis. No bat activity was recorded at Kish Bank Lighthouse after 7th September 2021, indicating that even if bats were present at Sorrento Point, they were not foraging or migrating out to sea. Therefore, the focus remains on bat numbers at Muglins and Kish Bank Lighthouse for this analysis.

7.9 Scope of the assessment

Scoped in

7.9.1 The impacts described in Table 10 have been assessed. This list of impacts has been derived through both collaboration with consultants working on other Irish offshore wind farm projects, and from professional judgement.

Table 10 Impacts scoped into this assessment.

Impact	Potential impact/change
Construction	
Impact 1	Disturbance of roosting bats, by loud sudden noise, moving light, and vibration could occur if bats are roosting on partially constructed offshore structures.
Impact 2	Disturbance of foraging/migrating bats, while in flight (loud sudden noise and moving or bright light) could occur when wind farm construction occurs between sun set and sun rise.
Operation and maintenance	
Impact 3	If suitable roosting features are present, disturbance during maintenance activities may occur if bats are roosting on structures.
Impact 4	Collision or barotrauma because of bats flying within the rotor swept path of the active wind farm.
Impact 5	Potential for limited impacts due to wind turbine and offshore service platform (OSP) lights as lighting may attract bats towards the offshore installation at night.
Impact 6	Accidental provision of roosting or foraging resource due to wind turbine placement, may facilitate migration or provide additional foraging resource.
Decommissioning	
Impact 7	If suitable roosting features are present, disturbance during decommissioning activities may occur if bats are roosting on structures.
Impact 8	If bats utilise the wind farm infrastructure for roosting or foraging, the removal of such structures during decommissioning could have a detrimental impact by eliminating potential migration facilitation or additional foraging resources provided by the existing offshore wind farm infrastructure.

Scoped out from further evaluation in this EIAR

7.9.2 Onshore impacts, arising from the proposed onshore infrastructure are not part of this assessment, and have been assessed in Volume 5, Chapter 2: Biodiversity. In addition to this, any submarine impacts have not been considered herein, such as the deposition of disturbed sediments to the seabed due to dredging in preparation for foundation installation. It is considered that as bats are flying in the air above the sea and do not directly interact with the sea or seabed, that submarine impacts would not be relevant to this assessment. Hence impacts which occur below the surface of the sea have been scoped out from further consideration.

7.9.3 Species recorded in the offshore environment at Kish Bank Lighthouse and (as a conservative approach) Muglins Lighthouse (1.13 km offshore) have been included in the analysis, as they represent marine occurrences of bats. Additionally, the common pipistrelle has been included due to its similar behaviour to the soprano pipistrelle (which was recorded at Kish Bank Lighthouse) and its known migratory patterns.

7.9.4 Furthermore, species known to migrate and present in Ireland but not recorded at Kish Bank Lighthouse have been selected for further assessment. These species are:

- NYCLEI – *Nyctalus leisleri* – Leisler's bat;
- PIPNAT – *Pipistrellus nathusii* – Nathusius' pipistrelle;
- PIPPIP – *Pipistrellus pipistrellus* – common pipistrelle; and
- PIPPYG – *Pipistrellus pygmaeus* – soprano pipistrelle.

7.10 Key parameters for assessment

7.10.1 In accordance with Section 287B of the Planning and Development Act 2000, flexibility is being sought where details or groups of details may not be confirmed at the time of the Planning Application. In summary, and as subsequently set out in the ABP Opinion on Flexibility (detailed within Volume 2, Chapter 3: EIA Methodology) the flexibility being sought relates to those details or groups of details associated with the following components (in summary - see further detail in see Volume 2, Chapter 6: Project Description):

- WTG (model – dimensions and number);
- OSP (dimensions);
- Array layout;
- Foundation type (WTG and OSP; types and dimensions and scour protection techniques); and
- Offshore cables (IAC and ECC; length and layout).

7.10.2 To ensure a robust and transparent assessment, and one that is compliant with the ABP Opinion on Flexibility under Section 287B, the details or groups of details associated with those components where flexibility is being sought are defined in the form of a Maximum Design Option (MDO) and alternative design option(s). The MDO and alternative design option(s) are then assessed in terms of the magnitude of the effect, to provide certainty that any option within the range of parameters will not give rise to an effect which is of greater significance than that which could occur from the MDO.

7.10.3 In addition to the details or groups of details associated with the components listed above (where flexibility is being sought), the confirmed design details and the range of normal construction practises are also assessed within the EIAR (see Volume 2, Chapter 6: Project Description). Whilst flexibility is not being sought for these elements (for which plans and particulars are not required under the Planning Regulations), the relevant parameters are also incorporated into the MDO and alternative option(s) table (Table 11) to ensure that all elements of the project details are fully considered and assessed.

7.10.4 With respect to project design features where flexibility is not being sought, such as trenchless cable installation methodology at the landfall, the MDO and alternative design option(s) are the same (as there is no alternative). With respect to the range of normal construction practises that are intrinsic to installation of the development, such as the nature and extent of protection for offshore cables and the design of cable crossings, but which cannot be finally determined until after consent has been secured and detailed design is completed, the parameters relevant to the receptor being assessed are quantified, assigned and assessed as a maximum and alternative, as informed by the potential for impact upon that receptor. In the event of a favourable decision on the application they will be agreed prior to the commencement of the relevant part of the development by way of compliance with a standard 'matters of detail' planning condition (see Volume 2, Chapter 2: Consents, Legislation, Policy and Guidance). Throughout, an explanation and justification is provided for the MDO and alternative(s) within the relevant tables, as it relates the details or groups of details where statutory design flexibility is being sought, and wider construction practises where flexibility is provided by way of planning compliance condition.

Table 11 Maximum and alternative design options considered for the assessment of bats

Potential impact	Maximum Design Option	Alternative Design Options	Justification
Construction			
All impacts	Sequential installation of 50 WTGs with a blade tip height of 267.6 mLAT, and 1 x OSP. The closest structures (WTG) located a minimum distance of approximately 9 km from the closest mainland coastal edge.	Sequential installation of alternative layouts which comprise either 45 WTGs with a blade tip height of 281.6 mLAT, or 39 WTGs at a height of 309.6 m LAT, and 1 x OSP. The closest structures (WTG) located a minimum distance of approximately 9 km from the closest mainland coastal edge.	It is considered that the differences between the MDO and Alternative Design Options would have negligible difference on bats as receptors. The key parameter that could impact bats is the proximity to the coast. The distance from shore remains constant for all design options for Dublin Array. Variations in the number and height of turbines being constructed, while present in the different design scenarios, are unlikely to significantly affect bats in the offshore environment. Due to the increased number of constructed elements, it is considered that there is a higher risk of construction related incidence due to number of construction locations – hence this is the MDO. However, this is considered to be negligible.
Operation and maintenance			
All impacts	50 WTGs with a blade tip height of 267.6 mLAT, and 1 x OSP. The closest structures (WTG) located a minimum distance of approximately	Alternative layouts which comprise either 45 WTGs with a blade tip height of 281.6 mLAT, or 39 WTGs at a height of 309.6 m LAT, and 1 x OSP. The closest structures (WTG) located a minimum distance of approximately	Both options introduce mortality risk for bat species due to collision potential. It is considered that the differences between the MDO and Alternative Design Options would have negligible difference on bats as receptors. The key parameter that could impact bats is the proximity to the coast.

Potential impact	Maximum Design Option	Alternative Design Options	Justification
	9 km from the closest mainland coastal edge.	9 km from the closest mainland coastal edge.	The distance from shore remains constant for all design options for Dublin Array. Variations in the number and height of turbines being constructed, while present in the different design scenarios, are unlikely to significantly affect bats in the offshore environment. Due to the increased number of constructed elements, it is considered that there is a higher risk of construction related incidence due to number of construction locations – hence this is the MDO. However, this is considered to be negligible.
Decommissioning			
All impacts	The sequential removal of 50 WTGs with a blade tip height of 267.6 mLAT, and 1 x OSP. The closest structures (WTG) located a minimum distance of approximately 9 km from the closest mainland coastal edge.	The sequential removal of alternative layouts which comprise either 45 WTGs with a blade tip height of 281.6 mLAT, or 39 WTGs at a height of 309.6 m LAT, and 1 x OSP. The closest structures (WTG) located a minimum distance of approximately 9 km from the closest mainland coastal edge.	It is considered that the differences between the MDO and Alternative Design Options would have negligible difference on bats as receptors. The key parameter that could impact bats is the proximity to the coast. The distance from shore remains constant for all design options for Dublin Array. Variations in the number and height of turbines being decommissioned, while present in the different design scenarios, are unlikely to significantly affect bats in the offshore environment. Due to the increased number of constructed elements, it is considered that there is a higher risk of decommissioning related work incidence due to number of construction

Potential impact	Maximum Design Option	Alternative Design Options	Justification
			locations – hence this is the MDO. However, this is considered to be negligible.

7.11 Project Design Features and Avoidance and Preventative Measures

7.11.1 As outlined within the EIA Methodology Chapter and in accordance with the EPA Guidelines (2022), this EIAR describes the following:

- Project Design Features: These are features of the Dublin Array project that were selected as part of the iterative design process, which are demonstrated to avoid and prevent significant adverse effects on the environment in relation to benthic, subtidal and intertidal ecology.
- Other Avoidance and Preventative Measures: These are measures that were identified throughout the early development phase of the Dublin Array project, also to avoid and prevent likely significant effects, which go beyond design features. These measures were incorporated in as constituent elements of the project, they are referenced in the Project Description Chapter of this EIAR, and they form part of the project for which development consent is being sought. These measures are distinct from design features and are found within our suite of management plans.
- Additional Mitigation: These are measures that were introduced to the Dublin Array project after a likely significant effect was identified during the EIA assessment process. These measures either mitigate against the identified significant adverse effect or reduce the significance of the residual effect on the environment.

7.11.2 All measures are secured within Volume 8, Part 2: Schedule of Commitments.

7.11.3 With regards to bats in the offshore environment, no specific bat related design features have been embedded in the design. The offshore environment is one where bat activity is limited; therefore, as a consequence of siting a wind farm offshore, the likelihood of impacts on bats is significantly reduced. Environmental aspects and other options relating to the array area and offshore ECC have been considered within the Volume 2, Chapter 5: Consideration of Alternatives.

7.12 Environmental assessment: construction phase

7.12.1 The effects of the construction of Dublin Array have been assessed for bats in the offshore environment. The environmental impacts arising from construction are detailed below, which is applicable to both the MDO and alternative design options.

Impact 1: Disturbance of roosting bats

7.12.2 During the baseline surveys, small numbers of bats were detected at Kish Bank Lighthouse (equivalent distance from the shore as the wind farm array area). Bats were detected on 21 of 160 nights, and were recorded only between the 13th of July and the 7th of September 2021, on 19 nights[4]. The data also shows that the highest wind speed for bat activity was 5.36 m/s for one survey – but that all other surveys the wind speed was less than 5 m/s and on all occasions the nighttime temperature was above 12.6° C.

7.12.3 The low bat activity at Kish Bank Lighthouse, with no evidence of bats roosting there, suggests that bats recorded at the site were only foraging during favourable weather (wind speed below 5 m/s) and returned to land each morning. If bats were roosting on the lighthouse, activity would likely be detected even in less favourable conditions, and calls would be recorded closer to sunset, indicating a shorter distance from the roost to the detector.

7.12.4 Wind turbines are constructed in sections: steel tower sections are bolted together, followed by the addition of the nacelle and rotor blades. This assembly process does not create suitable roosting opportunities for bats, as the smooth steel and sealed components prevent access. The turbine platform, a low, sealed structure, also lacks roosting potential. If construction is delayed due to weather or other factors, all turbine elements are sealed to maintain weather tightness, which also excludes bats. The same applies to offshore substation platforms (OSP).

7.12.5 It is therefore concluded that during the construction phase, the likelihood of bats using partially constructed offshore structures for roosting is negligible.

Table 12 Determination of magnitude for impact 1

Definition	Maximum design option	Alternative design option
Extent	Partially constructed wind turbines, where gaps, cracks or small accessible spaces may be present.	In line with the MDO, partially constructed wind turbines, where gaps, cracks or small accessible spaces may be present.
Duration	During the whole construction phase, but for each individual turbine and the OSP, this would be short duration and temporary.	In line with the MDO, during the whole construction phase, but for each individual turbine and the OSP, this would be short duration and temporary.
Frequency	The effect is anticipated to infrequently occur during the proposed construction activities due to the low numbers of bats present at this distance from the shore and the limited number of structures present for the bats to roost on.	As for the MDO, though the total number of turbines providing potential roosting habitat will be less.
Probability	The impact is unlikely to occur due to the low numbers of bats present and the limited number of suitable	As for the MDO, though the total number of turbines providing potential roosting habitat will be less.

4 Bats are assessed as having been detected if a call sequence of that bat species was recoded to the static bat detector's SD card. One recording (a maximum 15 second sound file) of a sequence of calls of a single bat is referred to as a bat pass. The number of bat passes per night can be used to quantify activity levels, but not the number of individual bats present.

Definition	Maximum design option	Alternative design option
	structures which they could be roosting upon for the construction works to cause disturbance. No roosting bats were identified at the Kish lighthouse receptor location.	
Consequence	The disturbance of a single bat would be entirely incidental and would have no impact at a population/conservation level of the species.	The disturbance of a single bat would be entirely incidental and would have no impact at a population/conservation level of the species.
Overall magnitude	*The potential magnitude on bats is rated as **Negligible**.*	*The potential magnitude on bats is rated as **Negligible**.*

7.12.6 Each bat species has been assessed for sensitivity based on a range of criteria, the four bat species brought forward are considered to be of high sensitivity.

7.12.7 The magnitude of the impact has been assessed as **Negligible** for all options, with the maximum sensitivity of the receptors being **High**. Therefore, the significance of effect from lighting and disturbance of roosting bats is **Negligible**, which is not significant in EIA terms.

Proposed mitigation

7.12.8 No mitigation is proposed, as the impact is assessed to be negligible.

Residual effect assessment

7.12.9 The significance of effect is negligible, therefore is not significant in EIA terms. No additional mitigation is considered necessary. Therefore, **no ecologically significant adverse residual effects** have been predicted in respect of disturbance (noise, light, movement) if bats are roosting on partially constructed offshore structures.

Impact 2: Disturbance while in flight

7.12.10 Disturbance while in flight due to noise and light could occur as wind farm construction will occur between sun set and sun rise, during the night when bats maybe are foraging/migrating offshore. Disturbance would displace bats, causing them to fly elsewhere to forage, or change commuting patterns. During the baseline surveys, small numbers of bats were detected at Kish Bank Lighthouse as discussed under Impact 1. The lighthouse, as a navigational aid, emits a distinctive flashing light pattern (Fl (2) 20s, 24-hour light)[5], which operates continuously and forms part of the receiving baseline condition. As detailed in the project design – all Peripheral WTGs will be fitted with red lights as per aviation hazard specifications. These will be 2000 cd (candela) lights which will be dimmable to 200 cd when visibility is greater than 5 km at night. This is aligned with the Guidance Note 8 on Bats and Artificial Lighting by the Bat Conservation Trust[6]. Moreover, it has been shown that red light does not impact bat flight or agility by Spoelstra et., al., 2017[7].

7.12.11 Again, as discussed under Impact 1, the data also shows that bat activity occurred when the windspeed was 5 m/s or less (one exception at 5.36 m/s) and on all occasions the nighttime temperature was above 12.6° C. These parameters significantly limit the number of nights when bats would be foraging offshore. For this reason, it is concluded that during the construction phase, the likelihood of bats being disturbed while in flight is negligible.

Table 13 Determination of magnitude for impact 2

Definition	Maximum design option	Alternative design option
Extent	Installations that are lit overnight.	As for the MDO, though the total number of installations that are lit overnight will be less.
Duration	During the construction phase, it's anticipated to be short durations and temporary.	In line with the MDO, during the construction phase, it's anticipated to be short durations and temporary.
Frequency	The effect is anticipated to infrequently occur during the proposed construction activities as it would be restricted to structures mid construction that would be lit at night.	As for the MDO, though the total number of installations that are lit overnight will be less.
Probability	Unlikely, as bats activity 9 km + offshore is very low.	As for the MDO, though the total number of installations that are lit overnight will be less.
Consequence	The disturbance of a single bat changing its flight direction while foraging offshore would be entirely	The disturbance of a single bat changing its flight direction, while foraging offshore would be entirely

[5] 'Fl (2) 20s' indicates a flashing light with two flashes per 20-second cycle, helping mariners identify the lighthouse. '24-hour light' means the light operates continuously, both day and night.
[6] Bat Conservation Trust (2023), Guidance Note GN08/23 Bats and Artificial Lighting at Night; available at Guidance Note 8 Bats and Artificial Lighting | Institution of Lighting Professionals (t https://theilp.org.uk/publication/guidance-note-8-bats-and-artificial-lighting/heilp.org.uk)
[7] Spoelstra, K., van Grunsven, R.H., Ramakers, J.J., Ferguson, K.B., Raap, T., Donners, M., Veenendaal, E.M. and Visser, M.E., 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. Proceedings of the Royal Society B: Biological Sciences, 284(1855), p.20170075.

Definition	Maximum design option	Alternative design option
	incidental and would have no impact at a population/conservation level of the species.	incidental and would have no impact at a population/conservation level of the species.
Overall magnitude	*The potential magnitude on bats is rated as **Negligible**.*	*The potential magnitude on bats is rated as **Negligible**.*

7.12.12 Each bat species has been assessed for sensitivity based on a range of criteria, the four bat species brought forward are of high sensitivity.

7.12.13 The magnitude of the impact has been assessed as **Negligible** for all options, with the maximum sensitivity of the receptors being **High**. Therefore, the significance of effect from lighting and disturbance of flying bats is **Negligible**, which is not significant in EIA terms.

Proposed mitigation

7.12.14 No mitigation is proposed, as the impact is assessed to be negligible.

Residual effect assessment

7.12.15 The significance of effect is negligible, therefore is not significant in EIA terms. No additional mitigation is considered necessary. Therefore, **no ecologically significant adverse residual effects** have been predicted in respect of disturbance (noise, light, movement) while in flight during constructions phase.

7.13 Environmental assessment: operational phase

7.13.1 The effects of the operation and maintenance of Dublin Array have been assessed for bats in the offshore environment, which is applicable to both the MDO and alternative design options.

Impact 3: Bats roosting in/on wind turbines

7.13.2 Impact 3 relates to the hypothesis that if suitable roosting features are present, disturbance during maintenance activities may occur if bats are roosting on structures. However, as indicated above it is not likely that roost features will be created. Wind turbines by their very nature are constructed as a sealed entity, especially offshore to prevent ingress of seawater or rainwater. The turbines are designed to minimise wind flow disturbance, so do not support features that may be used by bat species. A literature search did not yield any evidence of bats roosting in turbines on a regular basis due to lack of suitable features.

7.13.3 It is therefore concluded that during the operation phase, the likelihood of bats using offshore turbines for roosting is negligible and so the likelihood that they would be disturbed during maintenance activities is also negligible.

Table 14 Determination of magnitude for impact 3

Definition	Maximum design option	Alternative design option
Extent	All wind turbines when maintenance is required.	As for the MDO, though the total number of turbines providing potential roosting habitat will be less.
Duration	During maintenance procedures short duration and temporary.	As for the MDO, though the total number of turbines providing potential roosting habitat will be less.
Frequency	Routine maintenance would be on monthly/biannual basis as required. Major maintenance would be infrequent.	Routine maintenance would be on monthly/biannual basis as required. Major maintenance would be infrequent.
Probability	Unlikely as bats are not considered likely to use wind turbines for roosting.	Unlikely as bats are not considered likely to use wind turbines for roosting.
Consequence	The disturbance of a single bat would be entirely incidental and would have no impact at a population/conservation level.	The disturbance of a single bat would be entirely incidental and would have no impact at a population/conservation level.
Overall magnitude	*The potential magnitude on bats is rated as **Negligible**.*	*The potential magnitude on bats is rated as **Negligible**.*

7.13.4 Each bat species has been assessed for sensitivity based on a range of criteria. The magnitude of the impact has been assessed as **Negligible** for all options, with the maximum sensitivity of the receptors being **High**. Therefore, the significance of effect from lighting and disturbance of roosting bats is **Negligible**, which is not significant in EIA terms.

Proposed mitigation

7.13.5 No mitigation is proposed, as the impact is assessed to be negligible.

Residual effect assessment

7.13.6 The significance of effect is negligible, therefore is not significant in EIA terms. No additional mitigation is considered necessary. Therefore, **no ecologically significant adverse residual effects** have been predicted in respect of the disturbance of bats roosting on wind turbines.

Impact 4: Collision or barotrauma

7.13.7 The operation of Dublin Array has the potential to result in injury and/or death to bat species in the offshore environment either through collision with moving wind turbine blades, or due to barotrauma caused by sudden atmospheric pressure changes, resulting in severe tissue damage and/or haemorrhaging.

7.13.8 Although studies suggest barotrauma contributes significantly to bat fatalities at wind turbines, research on the exact pressure changes bats experience near turbines is limited. Lawson et al. (2020) found that pressure changes are localised near turbine blades, making barotrauma less likely than collisions. However, Baerwald et al. (2008) reported that 57% of bats killed at a wind facility had internal injuries consistent with barotrauma. Despite challenges in attributing deaths solely to barotrauma or collision, research indicates both factors play a role. This assessment has considered the potential for impact from collision to include barotrauma.

7.13.9 As stated under Impact 1, during the baseline surveys, small numbers of bats were detected at Kish Bank Lighthouse (equivalent distance from the shore as the wind farm site). Bats were detected on 21 of 160 nights and were recorded only between the 13th of July and the 7th of September 2021. Which when compared with the onshore Sorrento Point data, with activity on 91% of nights, and a bat pass per night comparison of 103:2 (Sorrento Point: Kish Bank Lighthouse), it can be concluded that bat activity at this distance offshore, is low. The data also shows that bat activity only occurred offshore when the windspeed was 5 m/s or less (one exception at 5.36 m/s).

7.13.10 As the bat activity out at Kish Bank Lighthouse is low, the risk of collision is also considered to be low. It is not possible to determine if the bat calls that were recorded at Kish Bank Lighthouse were made by one or many bats. Further analysis of the bat calls does show grouping of calls with a cluster of data between the 22nd and 28th of August. There is a peak of activity on the 27th of August showing over 70 records during that night. However, these numbers still indicate very low site usage. This scenario would further support the conclusion that bat activity offshore is low. Although this data supports the concept of the potential for migrating bats it is not conclusive. Furthermore, it shows that numbers of bats using the marine space – either for foraging or migrating are low (see the Bat Technical Baseline for more information). It is important to note that Leisler bats in Ireland have shown a 5% p.a. increase with 112,800 being the current lower end of the estimated national population (Roche and Langton, 2024). The total number of bat records (which does not equate to individual bat counts) expressed as a percentage of the national population is 0.002%. This is identified to be negligible.

7.13.11 As the activity is low and the magnitude of effect is high – with the potential to influence migrating bats in very small numbers particularly with respect to the national population it is therefore identified that the impact to bats is likely to be negligible.

Table 15 Determination of magnitude for impact 4

Definition	Maximum design option	Alternative design option
Extent	Rotor swept area of each wind turbine	In line with the MDO, though the total number of turbines will be less.
Duration	During the operational phase when wind turbines are turning – duration of wind farm operation.	As for the MDO, though the total number of turbines will be less.
Frequency	The effect is anticipated to rarely occur during the operational phase as bat usage of the area is low.	The effect is anticipated to rarely occur during the operational phase as bat usage of the area is low.
Probability	Unlikely as few bats are using the offshore environment for foraging.	Unlikely as few bats are using the offshore environment for foraging.
Consequence	The loss of a single bat would be entirely incidental and would have no impact at a population/conservation level.	The loss of a single bat would be entirely incidental and would have no impact at a population/conservation level.
Overall magnitude	*The potential magnitude on bats is rated as **Negligible**.*	*The potential magnitude on bats is rated as **Negligible.***

7.13.12 Each bat species has been assessed for sensitivity based on a range of criteria, the four bat species brought forward are considered to be of high sensitivity.

7.13.13 The magnitude of the impact has been assessed as **Negligible** for all options, with the maximum sensitivity of the receptors being **High**. Therefore, the significance of effect from lighting and disturbance of roosting bats is **Low**, which is not significant in EIA terms.

Proposed mitigation

7.13.14 No mitigation is proposed, as the impact is assessed to be low.

Residual effect assessment

7.13.15 The significance of effect is negligible, therefore is not significant in EIA terms. No additional mitigation is considered necessary. Therefore, **no ecologically significant adverse residual effects** have been predicted in respect of collision or barotrauma, as so few bats forage in the offshore environment. It is anticipated that Kish Lighthouse – if used as a migrating pathway – is a stepping stone between Wales and Ireland and that the likely path of such a migration would be around the array area.

Impact 5: Disturbance from lighting

7.13.16 There is limited published data available that provides hypothetical evidence that bats are attracted to structures offshore, because they are lit. It might be that bats were recorded around Kish Bank Lighthouse because they were attracted by the light of the lighthouse itself, or potentially the insects that are present; however, is not possible to test this hypothesis unless comparative monitoring at the lighthouse was possible with the light switched off. The light on Kish Bank Lighthouse can be seen for 27 nautical miles, or approximately 50 km. Therefore, it is possible that the lighthouse, can be seen from shore, and may attract foraging bats (as the baseline data shows), in small numbers. Light sources are known to attract invertebrate populations – thus creating a prey rich area which are then utilised by bats. Therefore, some bats could be attracted to light sources.

7.13.17 Aviation lighting on top of wind turbines might cause a fatal attraction over kilometres when bats may fly toward the light source and then collide with the operating rotor blades, yet there is a lack comprehensive studies addressing this for European bat species (Ballasus, Kill, & Hüppop, 2009; Bennett & Hale, 2014). Migratory bats are by far the species with the highest collision risk at wind turbines (Rydell et al., 2010, Voigt et al. 422012, 2015). Therefore, the lighting design has potential to impact offshore bats.

7.13.18 There are two possible lighting scenarios: either the use of red lights or the use of white lights. At the time of writing ASAM No. 018, January 2015 requires all significant peripheral structures to display white flashing lights; we note however that amended guidance may bring IAA requirements in line with other European and neighbouring states which require red aviation lights. It is not currently clear which lighting solution will be used; therefore, both are assessed in this report. In both scenarios the lights will be 2000 cd (candela) lights which will be dimmable to 200 cd when visibility is greater than 5 km at night.

7.13.19 The red-light scenario is aligned with the Guidance Note 8 on Bats and Artificial Lighting by the Bat Conservation Trust[8]. Moreover, it has been shown that red light does not impact bat flight or agility by Spoelstra et., al., 2017[9]. Studies indicate that red lighting has less negative impact on bats than other colours, as bats are more sensitive to shorter wavelengths (blue and ultraviolet light) than longer wavelengths (red light) (Müller et al. 200f). In contrast, a study in Latvia found that migratory bats may be attracted to red lighting, which could have negative consequences (Voigt et al. 2018). However, the results presented above have shown there are no migratory bats identified using the site and therefore, the potential impacts are identified to be negligible.

[8] Bat Conservation Trust (2023), Guidance Note GN08/23 Bats and Artificial Lighting at Night; available at Guidance Note 8 Bats and Artificial Lighting | Institution of Lighting Professionals (https://theilp.org.uk/publication/guidance-note-8-bats-and-artificial-lighting/heilp.org.uk)

[9] Spoelstra, K., van Grunsven, R.H., Ramakers, J.J., Ferguson, K.B., Raap, T., Donners, M., Veenendaal, E.M. and Visser, M.E., 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. Proceedings of the Royal Society B: Biological Sciences, 284(1855), p.20170075.

7.13.20 The white light option has higher potential for impacts to offshore bats due to the potential attraction. It is important to note that Kish Bank Lighthouse is visible from shore, yet only low levels of bat activity were detected there, this suggests that the white light (from Kish Bank Lighthouse) when seen from shore does not attract significant numbers of bats. Nonetheless, there is potential for the light from Dublin Array to be visible from the land – thus potentially attracting bats or impacting the onshore species. The worst-case scenario is white lights at 2000 cd, although at nights with visibility beyond 5 km these will be dimmed as standard protocol. For the purposes of this assessment, 2000 cd has been considered which equates to 0.008 lux at 500 m[10] from the source emission. Guidance Note 8 states that complete darkness is stated as 0.02 lux on a horizontal plain and 0.04 lux on a vertical plain. As the light sources are over 8 km from the shoreline, these are identified to be background lighting levels considered to be imperceptible from the perspective of onshore bats potentially being attracted offshore or impacts by additional lighting within the onshore environment. Therefore, this option is considered to have negligible impacts for offshore bats.

7.13.21 The red-light option has been evaluated as the lowest risk regarding impacts for offshore bats, although both options/scenarios are identified to have negligible impacts due to the distance from the light source to the nearest recorded sensitive receptor (bat).

7.13.22 It is therefore concluded that during the operational phase, the likelihood of bats being attracted to wind turbines by the lighting is negligible, especially as no evidence for migration within the survey area was identified during the baseline surveys.

Table 16 Determination of magnitude for impact 5

Definition	Maximum design option	Alternative design option
Extent	White Lights on each WTG and the OSP.	Red light option has reduced intensity.
Duration	During the operational phase.	In line with the MDO, during the operational phase.
Frequency	The effect would only occur between sunset and sunrise on days when weather conditions are favourable for bat flight.	The effect would only occur between sunset and sunrise on days when weather conditions are favourable for bat flight.
Probability (how likely is the impact to occur)	Unlikely considering the distance of the sources from the shore and the low levels of bat activity identified at the Kish lighthouse.	Unlikely, bats are attracted less to red light than to white light and levels of bat activity are currently low.
Consequence (the degree of change relative to the baseline level and change in character)	White lights have a higher chance of attracting bats to the offshore environment – however, given the distance of the sources from the shore and the absence of recorded migrating bats this is identified as negligible.	As for the MDO, red lights are identified to have less impacts on bats based on the literature provided above. Associated impacts are identified to be negligible.
Overall magnitude	*The potential magnitude on bats is rated as **Negligible**.*	*The potential magnitude on bats is rated as **Negligible**.*

10 Ev(lx) = 10.76391 × Iv(cd) / (d(ft))2

7.13.23 Each bat species has been assessed for sensitivity based on a range of criteria, the four bat species brought forward are considered to be of high sensitivity.

7.13.24 The magnitude of the impact has been assessed as **Negligible** for all options, with the maximum sensitivity of the receptors being **High**. Therefore, the significance of effect from lighting is **Negligible**, which is not significant in EIA terms.

Proposed mitigation

7.13.25 No mitigation is proposed, as the impact is assessed to be negligible. The dimming protocol has been implemented to comply with aviation lighting requirements and therefore is not a mitigation measure as it is required independent of any potential impacts to bats.

Residual effect assessment

7.13.26 The significance of effect is negligible, therefore is not significant in EIA terms. No additional mitigation is considered necessary. Therefore, **no ecologically significant adverse residual effects** have been predicted in respect of offshore lighting on wind turbines.

Impact 6: Provision of roosting or foraging resource

7.13.27 As stated under Impact 3, the WTGs are designed to minimise wind flow disturbance, so do not support features that may be used by bat species. There is a limited selection of papers that have been published relating to insects being attracted to wind turbines (e.g. Ahlen, 2009), which in turn may attract bats. Most studies on insect and bat attraction to wind turbines have been conducted on the Swedish coast, a less exposed environment than the Irish Sea. Insect aggregations around turbines have been observed in the Baltic Sea, but there is no evidence that similar aggregations occur in the more exposed Irish Sea. Ahlen (2009) noted that insect aggregations mainly occurred during calm weather with light breezes (less than 2.5 m/s), and bats generally flew only when wind speeds were below 2.5 m/s, though a few exceptions were noted without clear indication of migration or foraging behaviour.

7.13.28 The baseline studies found no evidence of migration (see the Bat Technical Baseline for more information). The most likely species to migrate is considered to be the Nathusius' pipistrelle. There was one record of this species made at the Kish Lighthouse, and there was no notable increase in records made in September at Sorrento Point this would be expected if bats were leaving/arriving on the coast. In addition, the patterns of activity attributed to the Leisler's bat also did not provide evidence that migration may be taking place.

7.13.29 It is therefore concluded that during the operation phase, the accidental provision of roosting or foraging resource due to wind turbine placement, and therefore any associated collision/barotrauma risk is negligible. In addition to this, there is no evidence that bats are migrating across the Irish Sea within the study area. As a result, it is considered that the likelihood of impact is therefore negligible.

Table 17 Determination of magnitude for impact 6

Definition	Maximum design option	Alternative design option
Extent	All wind turbines, during the operational phase.	As for the MDO, though the total number of turbines providing potential roosting habitat will be less.
Duration	During operation when weather conditions are calm (<5 m/s) and stable – short term and temporary.	During operation when weather conditions are calm (<5 m/s) and stable – short term and temporary.
Frequency	Suitable weather conditions may occur in the summer, 10 days or less each year.	Suitable weather conditions may occur in the summer, 10 days or less each year.
Probability	Due to low levels of bat activity, combined with the limited occurrence of suitable weather conditions, the impact is unlikely to occur.	As for the MDO, though the total number of turbines providing potential roosting habitat will be less.
Consequence	The death of a single bat, from incidental collision/barotrauma, would have no impact at a population/conservation level.	The death of a single bat, from incidental collision/barotrauma, would have no impact at a population/conservation level.
Overall magnitude	*The potential magnitude on bats is rated as **Negligible**.*	*The potential magnitude on bats is rated as **Negligible**.*

7.13.30 Each bat species has been assessed for sensitivity based on a range of criteria, the four bat species brought forward are considered to be of high sensitivity.

7.13.31 The magnitude of the impact has been assessed as **Negligible** for all options, with the maximum sensitivity of the receptors being **High**. Therefore, the significance of effect accidental provision of roosting or foraging resource for bats is **Negligible**, which is not significant in EIA terms.

Proposed mitigation

7.13.32 No mitigation is proposed, as the impact is assessed to be negligible.

Residual effect assessment

7.13.33 The significance of effect is negligible, therefore is not significant in EIA terms. No additional mitigation is considered necessary. Therefore, **no ecologically significant adverse residual effects** have been predicted in respect of the accidental provision of roosting or foraging resource for bats.

7.14 Environmental assessment: decommissioning phase

Impact 7: Disturbance during decommissioning activities

7.14.1 For the reasons stated under Impact 1 and Impact 3, it is concluded that during the decommissioning phase, the likelihood of bats using partially dismantled offshore structures for roosting is negligible.

Table 18 Determination of magnitude for impact 7

Definition	Maximum design option	Alternative design option
Extent	Partially de-constructed wind turbines, where gaps, cracks or small accessible spaces may be present.	As for the MDO, though the total number of turbines will be less.
Duration	During the decommissioning phase estimated to be up to three years duration, so would be of limited duration and temporary.	In line with the MDO, during the decommissioning phase estimated to be up to three years duration, so would be of limited duration and temporary.
Frequency	The effect is anticipated to rarely occur during the proposed construction activities.	The effect is anticipated to rarely occur during the proposed construction activities.
Probability	The dismantling sequence will limit the time and suitability for the turbine to provide suitable roosting habitat. Therefore, it is unlikely that bats would use the partially dismantled wind farm infrastructure for roosting.	As for the MDO, though the total number of turbines being dismantled will be less.
Consequence	The incidental loss or disturbance of a single bat would have no impact at a population/conservation level.	The incidental loss or disturbance of a single bat would have no impact at a population/conservation level.
Overall magnitude	*The potential magnitude on bats is rated as **Negligible**.*	*The potential magnitude on bats is rated as **Negligible**.*

7.14.2 Each bat species has been assessed for sensitivity based on a range of criteria, the four bat species brought forward are considered to be of high sensitivity.

7.14.3 The magnitude of the impact has been assessed as **Negligible** for all options, with the maximum sensitivity of the receptors being **High**. Therefore, the significance of effect from disturbance of roosting bats is **Negligible**, which is not significant in EIA terms.

Proposed mitigation

7.14.4 No mitigation is proposed, as the impact is assessed to be negligible.

Residual effect assessment

7.14.5 The significance of effect is negligible, therefore is not significant in EIA terms. No additional mitigation is considered necessary. Therefore, **no ecologically significant adverse residual effects** have been predicted in respect of disturbance if bats are roosting on partially constructed offshore structures.

Impact 8: Removal of roosting or foraging resources

7.14.6 As the turbines are designed to minimise wind flow disturbance and be watertight to prevent corrosion in an offshore environment, they do not support features that may be used by bat species. The baseline studies found no evidence of migration (see the Bat Technical Baseline for more information).

7.14.7 It was therefore concluded that during the operational phase, the accidental provision of roosting or foraging resource due to wind turbine placement, is negligible. In addition to this, there is no evidence that bats are migrating across the Irish Sea, within the study area. As a result, the decommissioning phase, would not remove what has not been created/provisioned, therefore it is considered that the likelihood of impact is negligible.

Table 19 Determination of magnitude for impact 8

Definition	Maximum design option	Alternative design option
Extent	All wind turbines, during the decommissioning phase.	As per the MDO, but the number of turbines being decommissioned will be less.
Duration	During the decommissioning phase, short term and temporary.	In line with the MDO, during the decommissioning phase, short term and temporary.
Frequency	July – September during the decommissioning phase.	July – September during the decommissioning phase
Probability	Due to low levels of bat activity, combined with no provision of bat roost habitat, and lack of migratory activity, the impact is unlikely to occur.	Due to low levels of bat activity, combined with no provision of bat roost habitat, and lack of migratory activity, the impact is unlikely to occur.
Consequence	The incidental death of a single bat, during decommissioning would have no impact at a population/conservation level.	The incidental death of a single bat, during decommissioning would have no impact at a population/conservation level.
Overall magnitude	*The potential magnitude on bats is rated as **Negligible**.*	*The potential magnitude on bats is rated as **Negligible**.*

7.14.8 Each bat species has been assessed for sensitivity based on a range of criteria, the four bat species brought forward are considered to be of high sensitivity.

7.14.9 The magnitude of the impact has been assessed as **Negligible** for all options, with the maximum sensitivity of the receptors being **High**. Therefore, the significance of effect is **Negligible**, which is not significant in EIA terms. This conclusion is based on the assessment that the provision of roosting features on wind turbines (refer to Table 14) and any potential increase in bat migration activity would not occur during operation. Thus, if not created initially, this scenario would not be removed during decommissioning.

Proposed mitigation

7.14.10 No mitigation is proposed, as the impact is assessed to be negligible.

Residual effect assessment

7.14.11 The significance of effect is negligible, therefore is not significant in EIA terms. No additional mitigation is considered necessary. Therefore, **no ecologically significant adverse residual effects** have been predicted in respect of the accidental removal of the provision of roosting or foraging resource for bats.

7.15 Environmental assessment: cumulative effects

7.15.1 Cumulative effects are defined as the effects on a receptor that may arise when the development is considered together with other existing and/or approved projects, plans and activities. This cumulative assessment is consistent with the methodology presented in Volume 2, Chapter 4: Cumulative Effects Assessment Methodology (hereafter referred to as the Cumulative Effects Assessment Methodology Chapter).

7.15.2 For bats in an offshore environment, cumulative impacts would likely occur if significant numbers of bats were foraging offshore on a frequent basis, far enough from land to forage in proximity to the wind turbines. Evidence from the baseline surveys for the Dublin Array (see Site survey data) show that only low numbers of bats forage 10 km or more offshore, and only then when weather conditions are suitable. Due to the low levels of bat activity, principally concerning Leisler's bat, but also a single record each from soprano and Nathusius' pipistrelle; it has been assessed that all likely impacts identified are negligible.

Projects screened out

7.15.3 The projects and plans selected as relevant to the cumulative effects assessment presented within this chapter are based upon the results of a screening exercise; each project has been considered on a case-by-case basis for screening in or out based upon effect-receptor pathways and the spatial/temporal scales involved.

7.15.4 A long list of reasonably foreseeable proposals has been identified and reduced to a shortlist for assessment on bat receptors in this EIAR based on the following staged process:

- Stage 1: Identification of whether a spatial overlap between the effects of the project may exist which could potentially result in significant effects on bats

- For the purposes of this assessment, it has been considered as 4 km from Dublin Array, i.e. the core sustenance zone for the bat species identified (as per the Collins 2023 guidelines). Therefore, any projects that are located over 4 km from the Dublin Array offshore works area will not result in an additive cumulative effect. The potential spatial overlap will therefore be considered within 4 km from the array area.
- The NISA has used a 40 km screening range surrounding the array – which are included for completeness though identified to be excessive given the ecological pathways by which bats travel. Bats are known to have substantially smaller core sustenance zones as per the Collins 2023 guidelines which determine the Irish species have ranges lower than 10 km, therefore, 40 km is determined to not be reflective of the requirements for the species

- Stage 2: This list was then further refined to whether there may be a temporal overlap between the potential effects of the projects. A potential temporal overlap is defined as:
  - Proposed but not yet constructed (either pre- or post-consent);
  - Only partially constructed at the time that baseline characterisation was undertaken;
  - Recently completed during the development of the baseline characterisation, and the full extent of the impacts arising from the development(s) may not be reflected in the baseline; and/or
  - May have consent or licences to undertake further work, such as maintenance dredging or notable maintenance works which may arise in additional effects.
- Stage 3: Defining the degree of certainty and data confidence was then considered to identify an appropriate tier for each of the projects (see Table 20).

7.15.5 Where there is a spatial and temporal overlap of effects (i.e. stages one and two), a potential source-receptor pathway is identified. The cumulative effects assessment for bats in the offshore environment has scoped in only offshore wind farm projects, excluding other project types such as oil and gas pipelines, transboundary disposal sites, and aggregate production, due to a lack of spatial overlap (i.e., stage one) and therefore a lack of pathway which could result in significant effects in EIA terms.

Projects for cumulative assessment

7.15.6 In assessing the potential cumulative impacts for Dublin Array, it is essential to consider the certainty and stage of other projects. Projects have been categorised into tiers based on their development stage, as detailed in the Cumulative Impact Assessment Methodology Chapter. This tiering approach enables the assessment of various future development scenarios with differing likelihoods of completion, providing appropriate weight to each scenario. Additionally, all Phase 1 offshore wind projects in Ireland, which have been awarded a Maritime Area Consent (MAC) are assessed based on the available information due to their similar development timelines and potential cumulative impacts.

7.15.7 Phase One offshore wind projects are unlikely to be awarded development consent before the Dublin Array application is made. Phase 1 projects have, nonetheless, been assessed based on information available at the time of preparing this EIAR up to 1st August 2024. The relevant Phase 1 projects located within the Cumulative Assessment study area are included in Table 20.

7.15.8 The specific projects scoped into this cumulative impact assessment, and the tiers into which they have been allocated are presented in Table 20. For the purposes of the cumulative impact assessment, a precautionary construction period has been assumed between the years 2029 to 2032, with offshore construction (excluding preparation works) lasting up 30 months as a continuous phase within this period (refer to the Project Description Chapter).

Table 20 Projects for cumulative assessment

Development type	Project name	Current status of development	Data confidence assessment/phase	Planned programme
Tier 1				
None				
Tier 2				
None				
Tier 3				
Phase 1 offshore wind projects				
Offshore wind farm	Oriel	Submitted	High – application submitted. EIAR available.	Construction 2026-2028
Offshore wind farm	Arklow Bank Wind Park Phase 2	Submitted	High – application submitted. EIAR available.	Construction 2026-2030
Offshore wind farm	Codling Wind Park Extension	Submitted	Low – Scoping Report available at the time of writing. A foreshore licence has been granted for site investigations. Reference FS007045	Commencement in 2027 with construction lasting 2-3 years.
Offshore wind farm	North Irish Sea Array (NISA)	Submitted	High – application submitted. EIAR available	Construction 2027-2029.

Potential cumulative effects

7.15.9 Dublin Array has been assessed to have a low impact on bats, due to the low levels of bat activity recorded at Kish lighthouse which is over 11 km offshore. This activity only occurred during nights with favourable weather conditions. There are no impacts to foraging or roosting activities identified – the only impacts identified are the potential for migrating species having collision or barrow trauma mortality. These impacts are identified to be low as there were extremely low levels of bat activity in the marine space.

7.15.10 The other Phase 1 projects identified may introduce collision risk for foraging bats if placed within 7 km of the shoreline – this is due to the core sustenance zone which is known for the Irish bat species as stated in the Collins 2023 guidelines – however, as no effects are identified in this regard relative to this project – there are no cumulative impacts identified.

7.15.11 With respect to migratory routes and associated impacts, these projects may have higher rates of migratory activity – which could result in displacement. Bats may potentially move away from the other Phase 1 projects into a collision risk area for the Dublin Array project. Considering the following distances between the Phase 1 projects and the Dublin Array array area, it is not considered likely that any displacement effect will result in a significant increase in collision risk at the Dublin Array project. Therefore, the cumulative impacts are not identified to be significant.

- Codling Wind Park: 2.5 km;
- North Irish Sea Array: 21.6 km;
- Arklow Bank and Arklow Bank Phase 1: 25.8 km and 37.7 km respectively; and
- Oriel Offshore Wind Farm: 64.7 km.

7.15.12 Studies have shown that bats can be displaced by wind turbines, with displacement distances varying by species and environmental conditions. For example, a systematic review of 84 peer-reviewed studies found that bats were displaced on average up to 1 km in 21 out of 29 cases (Tolvanen, A et al., 2023). This suggests that the displacement distance for bats is relatively short, and the likelihood of bats being displaced from one wind farm into the collision risk area of another, especially over distances greater than 2 km, is low.

7.15.13 Additionally, the specific distances between the Dublin Array and other Phase 1 projects (ranging from 2.5 km to 64.7 km) are significantly greater than the average displacement distance observed in studies. Therefore, it is unlikely that displacement from these projects would result in a significant increase in collision risk at the Dublin Array project.

7.16 Interactions of the environmental factors

7.16.1 As the impact on bats from the offshore wind farm are considered negligible, it is considered that even if multiple impacts from the construction, operation or maintenance of the wind farm were to occur, then the outcome would remain below the threshold of significance. Bats as a species roost and breed on land, only occasionally foraging over the sea as evidenced in the baseline studies. It is important to note that Leisler bats in Ireland have shown a 5% p.a. increase with 112,800 being the current lower end of the estimated national population (Roche and Langton, 2024). The total number of bat records (which does not equate to individual bat counts) expressed as a percentage of the national population is 0.002%. This is identified to be negligible. Therefore, impacts offshore, even cumulatively, would be unlikely to have a significant impact on Ireland's resident bat populations.

7.17 Transboundary statement

7.17.1 The impacts from all sources for Dublin Array are considered negligible. However, Impact 4 has the potential to cause transboundary effects due to the potential for species migration. The impacts identified in this EIAR are specifically related to the status of Leisler's bat in Ireland. According to the 2017 National Bat Monitoring Programme conducted by the Bat Conservation Trust for the State of the UK's Bats, there was insufficient data to identify meaningful trends for Leisler's bats. Similarly, the Article 17 report for Wales stated:

'A reliable trend cannot be drawn for Wales due to insufficient available data.'

7.17.2 As a result, the implications of the proposed project on the Welsh population remain unclear. However, it is assumed that the data from Ireland would reflect a similar magnitude of proportional representation in Wales. Given the very low number of records in Ireland, it is concluded that any potential transboundary effects in Wales would likely be negligible.

7.17.3 Therefore, transboundary cumulative effects for bats are excluded from further assessment.

7.19 Summary of effects

7.19.1 A summary of the effects assessment is presented in Table 21.

Table 21 Summary of effects

Description of effect	Effect	Possible mitigation measures	Residual effect
Construction			
Impact 1	Disturbance (noise, light, movement) could occur if bats are roosting on partially constructed offshore structures.	Not Applicable – effect assessed as negligible; no additional mitigation required	No ecologically significant adverse residual effects
Impact 2	Disturbance while in flight (noise and light) could occur if wind farm construction occurs between sun set and sun rise, and bats are foraging/migrating offshore.	Not Applicable – effect assessed as negligible; no additional mitigation required	No ecologically significant adverse residual effects
Operation and maintenance			
Impact 3	If suitable roosting features are present, disturbance during maintenance activities may occur if bats are roosting on structures.	Not Applicable – effect assessed as negligible; no additional mitigation required	No ecologically significant adverse residual effects
Impact 4	Collision or barotrauma because of bats flying within the rotor swept path of the active wind farm.	Not Applicable – effect assessed as negligible; no additional mitigation required	No ecologically significant adverse residual effects
Impact 5	Potential for limited impacts due to wind turbine lights. These would be offshore but may attract foraging bats at night.	Not Applicable – effect assessed as negligible; no additional mitigation required	No ecologically significant adverse residual effects
Impact 6	Accidental provision of roosting or foraging resource due to wind turbine placement, may facilitate migration or provide additional foraging resource.	Not Applicable – effect assessed as negligible; no additional mitigation required	No ecologically significant adverse residual effects
Decommissioning			
Impact 7	If suitable roosting features are present, disturbance during decommissioning activities may occur if bats are roosting on structures.	Not Applicable – effect assessed as negligible; no additional mitigation required	No ecologically significant adverse residual effects

Description of effect	Effect	Possible mitigation measures	Residual effect
Impact 8	If accidental provision of roosting or foraging resource due to wind turbine placement, may facilitate migration or provide additional foraging resource did occur during the operational phase, decommissioning will remove this.	Not Applicable – effect assessed as negligible; no additional mitigation required	No ecologically significant adverse residual effects
Cumulative effects			
Impact 9	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 wind farms across an area used for foraging and migration.	Not Applicable – effect assessed as negligible; no additional mitigation required	No ecologically significant adverse residual effects
Transboundary			
No Effects identified	The only effects identified are potential impacts to migrating bats – however, low numbers of records were identified therefore the magnitude of impact is identified to be negligible in an Irish context – considering the population trends. It is anticipated that impacts to the Welsh population of Leisler's is likely to be consistent given the extremely low number of individuals identified - this is not identified to have significant impacts.7.16.1		

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Annex A Legislation and policy context

Policy/ legislation/ publisher	Name/reference/key provisions	What is covered/section where provision is addressed
Statutory		
Legislation		
European Union	EU Habitats Directive (92/43/EEC)	The Habitats Directive requires all Member States to designate special areas of conservation (SACs) for the habitats of species listed in Annex II of the Directive, of which only one bat species in Ireland (Lesser horseshoe bat (*Rhinolophus hipposideros*)) is listed. There are 42 SACs designated for Lesser Horseshoe bat (NPWS, 2024), none of which are located within the ZoI of the Dublin Array. The Directive further establishes a strict protection regime for species listed in Annex IV. All bat species are Annex IV species, and therefore all bats in Ireland are subject to the strict protection regime.
Government of Ireland	Planning and Development Act 2000, as amended	For development that requires permission under the Planning Act, the Appropriate Assessment procedures under Article 6(3) and 6(4) of the Habitats Directive are set out in Part XAB of the Planning Act.
Government of Ireland	Wildlife Acts 1976 - 2024	The Wildlife Act, 1976, the Wildlife Amendment Act 2000, and the Wildlife Amendment Act 2023, are the principal Acts providing for the protection of wildlife and the control of certain activities, at a national law level. The Wildlife Amendment Act 2023 requires public authorities to have regard to the National Biodiversity Action Plan when carrying out their statutory functions.
Government of Ireland	European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No.477/2011) as amended	For species that are subject to the strict protection regime under Article 12 of the Habitats Directive, Regulation 51 of the Habitats Regulations makes it an offence to breach the strict protection of species under that Regulation, unless a derogation has been obtained under Regulation 54 of the Habitats Regulations.
Planning Policy and Development Control		
NPWS, 2023	Ireland's 4th National Biodiversity Action Plan	Objective 1 – Adopt a Whole of Government, Whole of Society Approach to Biodiversity. Objective 2 – Meet Urgent Conservation and Restoration Needs. Objective 3 – Secure Nature's

Policy/ legislation/ publisher	Name/reference/key provisions	What is covered/section where provision is addressed
		Contribution to People. Objective 4 – Enhance the Evidence Base for Action on Biodiversity. Objective 5 – Strengthen Ireland's Contribution to International Biodiversity Initiatives. This chapter aligns with Ireland's 4th National Biodiversity Action Plan (NBAP) 2023–2030, EU directives and international best practices. The assessment incorporates stakeholder consultation (section 7.3) and scientific evidence (section 7.4). Dublin Array contributes to renewable energy targets while ensuring bat conservation is considered. The assessment incorporates the latest research and monitoring to improve understanding of offshore bat activity.
Department of Housing, Local Government and Heritage, 2021	National Marine Planning Framework (NMPF), 2021	Biodiversity Policy 1 Proposals incorporating features that enhance or facilitate species adaptation or migration, or natural native habitat connectivity will be supported, subject to the outcome of statutory environmental assessment processes and subsequent decision by the competent authority (CA), and where they contribute to the policies and objectives of this NMPF. Proposals that may have significant adverse impacts on species adaptation or migration, or on natural native habitat connectivity must demonstrate that they will, in order of preference and in accordance with legal requirements: a) avoid, b) minimise, or c) mitigate significant adverse impacts on species adaptation or migration, or on natural native habitat connectivity. Biodiversity Policy 4 Proposals must demonstrate that they will, in order of preference and in accordance with legal requirements: a) avoid, b) minimise, or c) mitigate significant disturbance to, or displacement of, highly mobile species. The assessment considers potential effects on offshore bat migration and habitat connectivity. Biodiversity protection is integrated into project planning, aligning with NMPF objectives while supporting Ireland's renewable energy and conservation commitments (see PART 1B Planning Report).

Policy/ legislation/ publisher	Name/reference/key provisions	What is covered/section where provision is addressed
NPWS, 2008	All-Ireland Species Action Plan – Bats	Maintain the populations and present range of all bat species in Ireland. The EIAR chapter on bats in the offshore environment aligns with the All-Ireland Species Action Plan – Bats (2008) by contributing to the understanding of offshore bat activity. The assessment follows a precautionary, evidence-based approach, incorporating the latest research and survey data to enhance knowledge of bat ecology in marine environments. This supports the plan's broader objectives of improving data availability, informing conservation efforts, and integrating bat considerations into decision-making. The approach ensures that the assessment is consistent with national bat conservation priorities while aligning with Ireland's renewable energy goals.
NPWS, 2009	Threat Response Plan: Vesper bat NPWS (2009) Threat Response Plan: Vesper bats (2009-2011). National Parks & Wildlife Service, Department of the Environment, Heritage & Local Government, Dublin.	This is a high-level overview of the processes for bat protection in Ireland and very general threat information for each species. The Threat Response Plan: Vesper Bat (2009-2011) was reviewed and considered as part of the assessment.
Guidelines and technical standards		
NPWS (2022)	Bat Mitigation Guidelines for Ireland – V2 (Irish Wildlife Manual No. 134)	Best practice guidelines for how to mitigate against possible negative impacts of development on bats. The Bat Mitigation Guidelines for Ireland – V2 (2022) were reviewed and considered during the assessment process to ensure that potential impacts on bat species are addressed in line with best practice mitigation strategies, as outlined in the guidelines.
Bat Conservation Ireland (2012)	Wind Turbine/Wind Farm Development Bat Survey Guidelines, Version 2.8	The Wind Turbine/Wind Farm Development Bat Survey Guidelines (2012), prepared by Bat Conservation Ireland, provide advice to the wind energy industry, ecologists, and relevant authorities on the survey work needed to assess bat use of areas proposed for wind energy development. These guidelines were reviewed and considered during the assessment to ensure that appropriate survey methodologies and best practices were followed.

Policy/ legislation/ publisher	Name/reference/key provisions	What is covered/section where provision is addressed
EUROBATS (2014)	Guidelines for Consideration of Bats in Wind farm Projects	The EUROBATS (2014) Guidelines for Consideration of Bats in Wind Farm Projects provide guidance on assessing potential impacts of wind turbines on bats and on the planning, construction, and operation of wind turbines in line with the ecological needs of bat populations. These guidelines were reviewed and considered during the assessment process.
DECC, 2018	Guidance on Marine Baseline Ecological Assessments and Monitoring Activities Part 1	The DECC (2018) Guidance on Marine Baseline Ecological Assessments and Monitoring Activities provides specific advice for marine renewables on data design, acquisition, and the use of existing data sources. This guidance was reviewed and considered during the assessment.
DECC, 2018	Guidance on Marine Baseline Ecological Assessments and Monitoring Activities Part 2	The DECC (2018) Guidance on Marine Baseline Ecological Assessments and Monitoring Activities (Part 2) provides specific advice for marine renewables on the design and acquisition of data, as well as the use of existing data sources. This guidance was reviewed and considered during the assessment.
NatureScot, 2021	Bats and Onshore Wind Turbines: Survey Assessment and Mitigation. Scottish Natural Heritage, Natural England, Natural Resources Wales, Renewable UK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter and Bat Conservation Trust (BCT)	Although this is not specific guidance for the Republic of Ireland (ROI), these guidelines are widely accepted for onshore wind developments within the ROI, alongside the Northern Ireland guidelines. They provide updated best practices for developers and planners to ensure that onshore wind energy developments pose minimal risk to bats.
Chartered Institute of Ecology and Environmental Management (CIEEM), 2018, updated 2022	Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine.	This presents the best practice Environmental Impact Assessment (EIA) guidance for biodiversity assessment.
Chartered Institute of Ecology and Environmental Management (CIEEM), 2022	Bat Mitigation Guidelines: a guide to impact assessment, mitigation and compensation for developments affecting bats.	The guidelines form an invaluable compilation of the current state of knowledge at the time of publication and provide a beneficial tool kit for shaping mitigation plans.

Policy/ legislation/ publisher	Name/reference/key provisions	What is covered/section where provision is addressed
	Reason, P.F. and Wray, S. (2023). UK Bat Mitigation Guidelines: a guide to impact assessment, mitigation and compensation for developments affecting bats. Version 1.1. Chartered Institute of Ecology and Environmental Management, Ampfield.	
Aeronautical Services Advisory Memorandum (ASAM)	No 018 Issue 2, Guidance Material on Off-shore Wind Farms	This guidance material sets out certain minimum requirements for the lighting, marking, radar enhancing and supply of information for promulgation to ensure the conspicuity of offshore wind farm machines and associated structures. At the time of writing ASAM No. 018, January 2015 requires all significant peripheral structures to display white flashing lights; we note however that amended guidance may bring IAA requirements in line with other European and neighbouring states which require red aviation lights. It is not currently clear which lighting solution will be used; therefore, both are assessed in this report.

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