Morecambe Offshore Windfarm: Generation Assets

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Technical Note on the Assessment of Offshore Impacts on Bats over the Irish Sea (Tracked)

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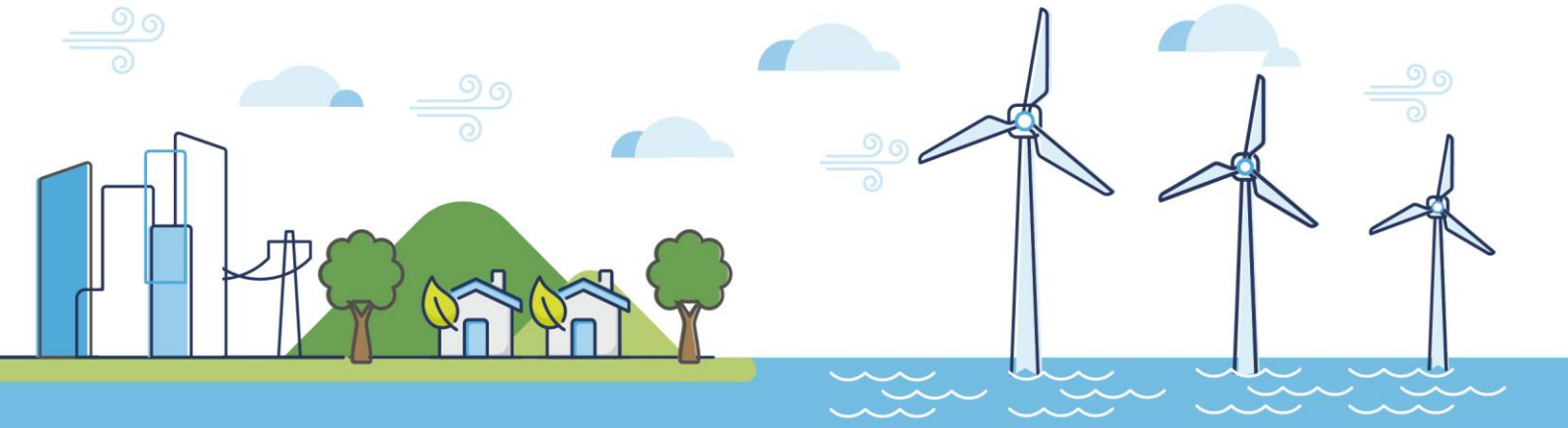

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Contents

Glossary of Acronyms

BCT	Bat Conservation Trust
HRA	Habitats Regulations Assessment
NNPP	National Nathusius' Pipistrelle Project
NPWS	National Parks and Wildlife Service
UK	United Kingdom
EU	European Union
WTGs	Wind Turbine Generators
DBEIS	The Department for Business, Energy and Industrial Strategy
NERC	Natural Environment and Rural Communities Act 2006
SAC	Special Area of Conservation
DCO	Development Consent Order
NISA	North Irish Sea Array
EIAR	Environmental Impact Assessment Report
EOWDC	European Offshore Wind Deployment Centre
AREG	Aberdeen Renewable Energy Group

Glossary of Unit Terms

°C	Degrees Celsius
m	Metres

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1 Introduction

1.1 Purpose of this document

1. This document presents an update to the Habitats Regulations Assessment (HRA) Screening Report (REP3-006) submitted as part of the assessment of the Morecambe Offshore Windfarm Generation Assets on ecological receptors.

2. This has been undertaken at the request of Natural England, who in their comments on Examining Authority's Written Questions (ExQ1) (PD-011), highlighted that there is a potential impact pathway, contrary to conclusions drawn in the HRA Screening Report (REP3-006), between certain bat species known to move between the island of Ireland and the UK mainland and offshore wind turbine generators (WTGs) (1HRA3). Natural England state that it is therefore not possible to screen out impacts to bats altogether, as the extent of these movements are not well understood. In particular, bat species such as Nathusius' pipistrelle *Pipistrellus nathusii*, common noctule *Nyctalus noctula* and Leisler's bat *Nyctalus leisleri* are known to undertake such offshore movements (DBEIS, 2022).

3. The extent to which Nathusius' pipistrelle, common noctule, and Leisler's bats resident on the island of Ireland and the UK mainland migrate across the Irish Sea is currently unknown, however, all of these species are known to migrate over large water bodies and will therefore be the focus of this document.

4. With a growing number of offshore wind projects being proposed within the Irish Sea, it is becoming apparent that the impacts of offshore WTGs and migratory bats need to be investigated further to ensure project and cumulative impacts are avoided.

5. In order to address Natural England's query, this document:

   - Presents the baseline information for bats crossing the Irish Sea, based on a review of available evidence;
   - Identifies the potential impacts on migratory bats and assesses the expected magnitude of effect.

6. No European sites are considered in relation to migratory bats because the species for which sites are designated in the UK are considered to be sedentary. The three migratory species focused on in this document are not listed as species under Annex II of the Habitat Directive and therefore do not require consideration within the HRA.

2 Baseline Information

2.1 Migratory bats and the Irish Sea

7. Currently, there is a paucity of data or published literature evidencing migratory bats across the Irish Sea. Although bats have been recorded offshore in the Irish Sea, there is no evidence of bat migration between Ireland and the UK mainland. As a result of the lack of available information, this report has utilised evidence of migratory bats over the North Sea to inform a general background on migratory bats.

8. Due to various constraints with survey equipment and methodologies, the probability of detecting migratory bats offshore is extremely challenging. Coupled with the high likelihood that any migrating individual bats between Ireland and the UK mainland are likely to be very low in numbers, as indicated by no known mass migration and lack of evidence to date, the possibility of detecting these over such a large expansive area is extremely low.

9. Most of the existing literature on migratory bats over the North Sea focuses Nathusius' pipistrelles and conclude that the migratory corridors are closely associated with coastlines, and change depending on environmental conditions (DBEIS, 2022; Voigt *et al*., 2023). The focus on Nathusius' pipistrelles is reflected in offshore observations of species in the North Sea, as the species accounts for upwards of 76% of observations (out of a total 34 bats observed) at offshore platforms (Boshamer and Bekker, 2008).

10. Passive acoustic monitoring of Nathusius' pipistrelles in the Netherlands found that migratory movements over the North Sea last longer than one night, with day roosting taking place in offshore structures, including offshore wind WTGs (Lagerveld *et al*., 2023). Lagerveld *et al*. (2023) also found routes over the North Sea were only taken by 6 – 10% of Nathusius' pipistrelles recorded, with 69% showing preference for onshore coastal routes. Such data relating to migratory movements across the Irish Sea does not currently exist.

11. Adult male bats are typically sedentary during the spring and autumn migration periods, moving more within their local area. Female bats (adult and juvenile) and juvenile male bats are significantly more likely to undertake migratory flights to their wintering sites with milder climates (Lagerveld *et al*., 2023).

12. Literature has documented the use of tailwinds by migratory common noctules and Nathusius' pipistrelle, this has not however been observed in Leisler's bat (Dechmann *et al*., 2017; Lagerveld *et al*., 2021 & 2024).

13. Other environmental variables that could potentially affect offshore migratory bat activity include:

- Temperature, as bats will not start their migration in temperatures below 7-8°C (Voigt *et al*., 2012);
- Cloud cover (Royal HaskoningDHV, 2024);
- Moonphase and moonlight (Lagerveld *et al*., 2023); and
- Precipitation (Voigt et al., 2012).

14. Overall, existing literature highlights clear data gaps in bat migration and how this interacts with offshore wind farms (BCT, 2025a). Without the underpinning baseline knowledge on the scale of bat migration and movement over the Irish Sea, it is difficult to accurately and proportionally assess impacts on bats offshore. In addition, existing literature suggests the milder winter weather than Europe on the island of Ireland has resulted in Nathusius' pipistrelle to not exhibit migratory behaviours in favour of a more sedentary lifestyle (Russ *et al*., 2001).

2.1.1 Existing data sources

2.1.1.1 Habitats Directive Article 17 Reports

15. Under the EU Directive on the Conservation of Habitats, Flora and Fauna (92/43/EEC) (herein the 'Habitats Directive'), an Article 17 Report is a comprehensive assessment that EU Member States must submit to the European Commission every six years. This report evaluates the conservation status of habitats and species of Community interest, as listed in the Habitat Directive's annexes. The core of the report includes:

- **Conservation Status Assessments**: Evaluations of the status and trends of species populations and habitats, considering factors like range, area, structure, functions, and future prospects;
- **Pressures and Threats**: Information on the main pressures and threats impacting these habitats and species; and
- **Conservation Measures**: Details on the impact of the Natura 2000 network and other conservation measures.

16. The Republic of Ireland's National Parks and Wildlife Service's (NPWS) latest Article 17 Report was written in 2019 and does not include information in regard to common noctules, however, does present information for both Nathusius' pipistrelle and Leisler's bat.

2.1.1.2 Irish Bat Monitoring Programme 2018-2021

17. The Irish Bat Monitoring Programme (Aughney, Roche and Langton, 2022) details onshore data collected via four separate schemes under the management of Bat Conservation Ireland. The data summarised in the report was collected using a variety of methods, namely:

- Full spectrum bat detectors over driven transects;

- Heterodyne detectors over walked transects;
- Dusk emergence surveys of roosting structures;
- Internal surveys of roosting structures during daylight hours; and
- Infrared thermal cameras.

18. The Irish Bat Monitoring Programme did not collect data in regard to common noctules, however, did collect data for both Nathusius' pipistrelle and Leisler's bat.

2.1.1.3 Telemetry data – Motus Wildlife Tracking System

19. The Motus Wildlife Tracking System (2023) (herein referred to as 'Motus') is a project ran by Birds Canada in collaboration with a wide network of organisations and researchers, providing a platform for radio telemetry data from multiple contributing stations across the globe for small flying organisms, including bats. Currently 2,058 Motus receiver stations are active across 34 countries, allowing the tracked migration paths of individuals fitted with radio transmitters on a global scale, including in the Irish Sea and the west coast of the UK mainland.

20. Three Motus receiver stations are currently active on the Isle of Man, which would potentially capture the flight paths of bat species over the Irish Sea.

21. However, the Motus project does not have any telemetry data recorded for both Leisler's and common noctule bats in the UK mainland and the island of Ireland.

2.1.1.4 National Nathusius' Pipistrelle Project

22. The National Nathusius' Pipistrelle Project (NNPP) was carried out by the Bat Conservation Trust (BCT) from 2014 – 2023, and aimed to determine the migratory origins of Nathusius' pipistrelles in Great Britain (BCT, 2023). Survey effort for the NNPP focused on collecting data for the UK mainland and the Channel Islands, thus not including bats present on the island of Ireland.

2.1.2 Bat Species

2.1.2.1 Nathusius' pipistrelle

23. All bats and their roosts are protected in the UK under the provisions of the Wildlife & Countryside Act 1981 (as amended) and the Wildlife (Northern Ireland) Order 1985 (as amended). Nathusius' pipistrelles are not afforded any additional protection or notability above this. As Nathusius' pipistrelles are not an Annex II species, they are not a qualifying feature for designated Special Areas of Conservation (SACs) and do not require consideration in HRA.

24. Approximately 40,000 individual (model bandwidth of 100 – 1,000,000) Nathusius' pipistrelles are predicted to breed in central and eastern Europe between May - July, before migrating over the North Sea to southern and western Europe overwinter, including the Netherlands, Belgium, France and the UK (Limpens *et al*., 2017; Mitchell-Jones *et al*., 1999; Russ *et al*., 2001). Russ *et al*. (2001) also cite Nathusius' pipistrelle migrations in a south easterly direction from Scandinavia to avoid harsh winter conditions, which often also involves coastal or offshore flightpaths. The number of migratory individuals between the island of Ireland and the UK is currently not known nor evidenced in scientific literature. Moreover, Nathusius' pipistrelles are sparsely found throughout the British Isles.

25. The latest Article 17 report (NPWS, 2019) estimates the population of Nathusius' pipistrelle in the Republic of Ireland to be 3,000 – 5,000 individuals. This population range is however based mainly on expert opinion with very limited data.

26. The island of Ireland's location has been described as being in a 'transitional region' for migratory bats, meaning it is suitable for siting wintering, breeding and resident Nathusius' pipistrelles. The first Irish breeding colony of Nathusius' pipistrelle was recorded in May 1997, near Lough Neagh (Russ, O'Neill and Montgomery, 1998). Since this initial discovery, more breeding colonies of the species have been found across Northern Ireland in close proximity to Loughs Neagh and Erne. Migratory individuals returning from the north-east of the species' range supplementing the resident bats during the winter (Russ *et al*., 2000).

27. Nathusius' pipistrelles were infrequently encountered during the Irish Bat Monitoring Programme (Aughney, Roche and Langton, 2022), resulting in substantial uncertainty as to any trends for the species. No conclusions were drawn regarding the species' occurrence and proximity to the coastline of the Irish Sea, or the general distribution of the species across the island of Ireland.

28. No detections of any bat species were recorded at the Motus Stations on the Isle of Man, situated in the Irish Sea. Motus has, however, recorded Nathusius' pipistrelle migrating between the east coast of the UK mainland, over the southern extents of the North Sea, to mainland Europe.

29. The following potential migration pathways carried out by individual Nathusius' pipistrelles were recorded to and from Great Britain in the NNPP dataset:

    - Blagdon, North Somerset to the Netherlands;
    - Latvia to Rye, East Sussex;
    - Lithuania to Oare, Kent;
    - Lithuania to Stodmarsh, Kent;
    - Latvia to Hillingdon, London;
    - Latvia to Maldon, Essex;

- Latvia to Feltham, London;
- Rye, East Sussex to Belgium;
- Druridge Bay, Northumberland to Poland; and
- Hounslow, London to Russia.

30. None of the migratory Nathusius' pipistrelles recoded in the NNPP dataset interacted with the Irish Sea.

2.1.2.2 Common noctule

31. As stated above, all bats and their roosts are protected in the UK under the provisions of the Wildlife & Countryside Act 1981 (as amended) and the Wildlife (Northern Ireland) Order 1985 (as amended). Additionally, common noctule bats are listed as a Section 41 Species of Principle Importance in England under the Natural Environment and Rural Communities (NERC) Act 2006. As common noctules are not an Annex II species, they are not a qualifying feature for designated SACs and do not require consideration in HRA.

32. Common noctules are known to fly over long distances to their feeding sites and have been recorded at offshore WTGs in Sweden (Ahlén et al., 2007) and offshore platforms in the North Sea (Boshammer and Bekker, 2008).

33. It is worth noting that common noctule bats are absent from the island of Ireland, nevertheless, are widespread throughout England (BCT, 2025b). Their absence from the island of Ireland indicates that their migration over the Irish sea is unlikely.

2.1.2.3 Leisler's bat

34. As stated above, all bats and their roosts are protected in the UK under the provisions of the Wildlife & Countryside Act 1981 (as amended) and the Wildlife (Northern Ireland) Order 1985 (as amended). Leisler's bats are not afforded any additional protection or notability above this. As Leisler's bats are not an Annex II species, they are not a qualifying feature for designated SACs and do not require consideration in HRA.

35. Long distance migration undertaken by Leisler's bats in northwestern Europe generally occurs in a south-westerly direction, with individuals recorded migrating between the Iberia Penisula and Germany (Hutterer *et al*. 2005; Ohlendorf *et al*., 2001; Steffen et al. 2007). Other European migratory routes undertaken by individuals have been identified between Italy and Poland, as well as France and the Czech Republic (Dondini *et al.,* 2012; Tájekand and Tájková 2020). Leisler's bats have not been recorded at offshore platforms in the North Sea, but have been recorded on islands bordering the North Sea off the northern coast of the Netherlands and Germany, including Texel, Memmert and Heligoland (Boshammer and Bekker, 2008). Such long distance

migrations have not been recorded in the Irish population of Leisler's bat, as they have instead been found to remain within the same home range during summer and hibernation periods (Shiel, Shiel and Fairley, 1999). Leisler's bats are found throughout the British Isles, except the northern reaches of Scotland. Whilst considered near threatened in the UK mainland, the island of Ireland is thought to be a stronghold for the species.

36. The latest Article 17 report (NPWS, 2019) estimates the population of Leisler's bat in the Republic of Ireland to be 63,000 – 113,000 individuals. This population range is however based mainly on extrapolation from a limited amount of data.

37. Leisler's bats were the third most encountered species during the Irish Bat Monitoring Programme (Aughney, Roche and Langton, 2022), and it was found Leisler's bats had a slight southern bias in their abundance, with higher occurrence rates recorded in the south and east of Ireland. No conclusions were drawn regarding the species' occurrence and proximity to the coastline of the Irish Sea; however this would align with the species' slight preference for the south and east of Ireland.

2.2 Consideration of migratory bats by other offshore wind farms projects in the UK and Republic of Ireland

38. The topic of migratory bats is relatively new in planning and therefore has only been considered by a small number of more recent UK and Republic of Ireland offshore wind farm applications.

39. The below offshore wind farm applications have been considered within this note as they are in the public domain. Other offshore wind farm applications, outside of those outlined below, have not been considered within this note as they were not in the public domain at the time of writing.

2.2.1 The North Irish Sea Array (NISA) Offshore Wind Farm

40. The North Irish Sea Array (NISA) Offshore Wind Farm presented a chapter assessing the potential impacts on offshore bat movements as part of their Environmental Impact Assessment Report (EIAR) (Ove Arup & Partners Ireland Ltd.,2024). Within this EIAR chapter, NISA detailed the findings of field surveys undertaken in 2022 – 2023 based on static detectors deployed at Rockabill island, at headlands of the north Dublin coast (in Skerries and Balbriggan) and on marine vessels.

41. In 2022, both Leisler's bat and Nathusius' pipistrelle were recorded on Rockabill island. Individual passes of Leisler's bat were recorded from April – August, increasing to a total 430 passes September. Two individual passes of Nathusius' pipistrelle were recorded, one each in May and in September. In

2023, similar trends were observed, with a peak in Leisler's bat activity in September (over 300 passes) and two individual passes of Nathusius' pipistrelles (one in June and one in August).

42. Detectors deployed on marine vessels experienced a high level of background noise interference, adding difficulty to the species identification of any potential bat calls. In 2022, two potential bat calls were recorded while at sea – one potential Leisler's bat and one potential *Nyctalus* sp. Due to the high level of uncertainty with the results of the marine vessel surveys, no meaningful conclusions can be drawn from this type of survey for the NISA project.

43. Headland monitoring at Skerries and Balbriggan in 2022 recorded Leisler's bats at all locations where detectors were deployed, with the peak number of passes being in September (308 passes on the 10th, 91 passes on the 11th and 317 on the 12th). No Nathusius' pipistrelles were recorded during the 2022 headland monitoring. Both Leisler's bat and Nathusius' pipistrelle were recorded during the 2023 headland monitoring. The peak in Leisler's activity during the 2023 headland monitoring was in July (688 passes). Peak passes for Nathusius' pipistrelles were recorded in October (251 passes).

44. Due to the timing of peak Leisler's bat activity generally being in September, and the affinity for easterly winds shown by the species, NISA assumed that migratory behaviour may potentially be present in the vicinity of Rockabill and the north Dublin coast (Skerries and Balbriggan). Nathusius' pipistrelle activity was relatively limited; however, it did coincide with the species' known migratory period during the 2023 headlands monitoring. As these conclusions are drawn from only two surveys, there is an inherent lack of evidence, meaning this deduction cannot be approached with confidence. Additionally, bat passes are an index of bat activity rather than a measure of number of individuals in a population. From this survey data, the quantity of migratory bats cannot be determined.

45. The NISA Offshore Wind Farm's EIAR concluded that no significant effects are likely to occur on migratory bats (Ove Arup & Partners Ireland Ltd.,2024).

2.2.2 Oriel Wind Farm

46. The Oriel Wind Farm presented a chapter assessing the potential impacts on bats in the marine environment as part of their EIAR (RPS Group, 2024). Within this EIAR chapter, Oriel Wind Farm detailed the findings of field surveys undertaken in May – August 2022 based on static detectors opportunistically deployed on marine vessels undertaking geophysical surveys.

47. No recordings of bat activity were obtained offshore, however Leisler's bat activity was recorded when the vessel was anchored outside of Dun Laoghaire Harbour in June, July and August. Due to the lack of evidence, no meaningful

conclusions on offshore bat activity can be drawn from Oriel Wind Farm's surveys.

48. Despite not recording bat activity offshore, Oriel Offshore Wind Farm's EIAR, considered to be highly precautionary, concluded that the only significant effects likely to occur on migratory bats are injury and/ or fatality of bats during migration. To mitigate this, an adaptive curtailment strategy and ongoing monitoring will be undertaken (RPS Group, 2024).

2.2.3 Codling Wind Park

49. The Codling Wind Park also presented a chapter assessing the potential impacts on offshore bats as part of their EIAR (Codling Wind Park Ltd., 2024). Within this EIAR chapter, Codling Wind Park detailed the findings of field surveys undertaken in April – November 2022 based on eight static detectors deployed onshore at their two landfall options, four detectors of which were in Ireland and the remaining four were in Wales. The EIAR chapter also considered survey data from the proposed Dublin Array Offshore Wind Farm, where four static detectors were deployed May – November 2021 at Sorrento Point (onshore), Dalkey Island, Muglins Lighthouse and Kish Bank Lighthouse.

50. The Codling Wind Park EIAR used the following parameters to identify periods suitable for supporting offshore bat migration:

- Average overnight temperatures greater than13℃;
- Average wind speed less than 5 m/s;
- Easterly or westerly prevailing overnight wind direction; and
  - Calls occurring more than 103 minutes after sunset or calls within 103 minutes of sunset during winds suitable for outwards migration. The time of 103 minutes was the predicted flight time across the Irish Sea, based on known commuting flight speeds of Kuhl's pipistrelle *Pipistrellus kuhli* in optimum conditions (Grodzinski *et al*., 2009).

51. The 2022 onshore landfall bat surveys recorded a total of 112,585 individual bat passes over the deployment period. This was largely due to the abundance of common pipistrelle and soprano pipistrelle calls (93,251 passes in total, 83% of total bat calls). No common noctules were recorded by these surveys, but 14,988 passes of Leisler's bat were recorded and 122 passes of Nathusius' pipistrelles.

52. Codling Wind Park concluded it was unclear whether bat passes recorded in 2022 were definitively migratory due to their onshore location, and often did not correspond to conditions and timings indicative of migratory behaviour. Thus, the 2022 results may be from onshore commuting or foraging bats. The 2021 Dublin Array Offshore Wind Farm surveys similarly found that the majority of bat passes occurred during periods unsuitable for migration,

suggesting the degree of any migratory movements observed were not at a substantial level.

53. Additionally, as mentioned above, bat passes are an index of bat activity rather than a measure of number of individuals in a population. Therefore, the survey data alone does not quantify the number of migratory bats or distinguish them from foraging/ commuting individuals.

54. Codling Wind Park concluded no significant impacts on offshore bats are anticipated.

2.2.4 Arklow Bank Wind Park

55. The Arklow Bank Wind Park also presented a chapter assessing the potential impacts on offshore bats as part of their EIAR (GoBe Consultants, 2024). Within this EIAR chapter, Arklow Bank Wind Park detailed the findings of field surveys undertaken by deploying static detectors on an offshore monopile (2021 – 2023) and headland surveys (2023).

56. In all three years of offshore monopile survey, only common pipistrelle (two in August 2021, three in October 2022 and two in July 2023) and Leisler's bats (one in July and two in August 2021, two in August 2022 and four in June 2023) were detected.

57. The 2023 headland survey recorded Nathusius' pipistrelle activity between April – October, with peak activity observed in August. Leisler's bat activity varied April – October, with activity peaking in May. Significantly more bat activity was observed onshore during the headland surveys compared to that of the offshore monopile surveys.

58. Due to the location of Arklow Bank Wind Park being relatively close to shore compared to other WTG projects in the Irish Sea (6-15 km off the east coast of Arklow), the only significant residual effect Arklow Bank Wind Park anticipated was WTG collision and barotrauma for foraging, not migrating, offshore bats. However, no additional measures were proposed to mitigate this impact, as this impact has been kept at a significant level in the EIAR due to the lack of evidence to rule it out.

2.2.5 Other projects

59. North Falls Offshore Wind Farm, as part of their Environmental Statement submission, were requested to include consideration of operational impacts of WTGs on Migratory Nathusius' pipistrelles in the southern North Sea (North Fall Offshore Wind Farm Ltd., 2024). North Falls Offshore Wind Farm concluded that no significant effects are likely to occur, due the migratory numbers to the UK mainland being very low.

60. Additionally, in Five Estuaries Offshore Wind Farm's application Development Consent Order (DCO), the Examining Authority (ExA) questioned Natural England on the potential effect of migratory Nathusius' pipistrelles from WTGs. Five Estuaries Offshore Wind Farm's response and position is that contributing to increasing the limited evidence base through monitoring is a proportionate response to the minimal scale of any potential effect (Five Estuaries Wind Farm Ltd., 2025).

61. Migratory bats were considered within the Environmental Statement of the European Offshore Wind Deployment Centre (EOWDC), however no likely significant effects were identified due to the location, Aberdeen Bay, being outside of known migration corridors and flyways (Vattenfall, Technip and AREG, 2011).

3 Potential impacts and magnitude

3.1 Potential pathways of impact during construction and ~~operation~~decommissioning

62. No potential pathways of impact on migratory bats are considered to occur during both the construction and decommissioning phases of the Project.

3.2 Potential pathways of impact during operation

3.2.1 Collisions and mortality

3.2.1.1 Collision modelling

63. There is a risk that migratory bats could physically collide with offshore WTGs, however the degree of risk and likelihood of occurrence is unknown. Migratory offshore Nathusius' pipistrelles have been observed flying at 1-3m over the sea, with deviation from this low altitude being observed when hunting (Ahlén *et al*., 2007). Therefore, Nathusius' pipistrelle flight heights are generally lower than the Project's WTGs rotor swept zone which is 25m above Highest Astronomical Tide. Flight heights of common noctule are more variable, but have been found to be <10m over the Baltic Sea (Ahlén *et al*., 2009), also lower than the Project's WTGs rotor swept zone.

64. Currently there is not a reliable nor practical method for modelling bat collision risk with offshore WTGs. A workshop was held in Utrecht Netherlands to discuss Nathusius' pipistrelle and their associated collision risk with offshore wind farms in the North Sea, which highlighted the following key knowledge gaps hindering the development of reliable collision modelling (Royal HaskoningDHV, 2024):

- **Population**: The population size of offshore migrating and foraging bats is unknown. There is also currently no concise definition as to what encompasses the '*flyway'* population that can be used as the '*reference population'* in impact assessments.
- **Migration**: The exact conditions under which the bats start their migration are widely unknown, as well the percentage of bats out of the overall population that migrate. It is also not known how many bats migrate without the use of echolocation calls, and therefore would not be recorded on acoustic monitoring devices.
- **WTGs**: It is uncertain what WTG design is best to limit bat collisions offshore, and no specific research has been conducted into bat flight height at offshore WTGs.

- **Spatial patterns**: Due to the overall lack of research data, it is uncertain whether there are areas that can be proven to support higher bat densities, or higher collision risks.
- **Monitoring**: The number of collision victims is very hard to determine as affected bats would fall into the water. By focussing monitoring efforts at offshore structures used as resting opportunities, it is likely that the data collected would not be representative of the wider bat population. For example, bats that don't utilise these locations and/or fly at higher altitude will not be recorded.

3.2.1.2 Barotrauma

65. Recent findings indicate that most bat mortalities at offshore wind farms are due to barotrauma, not direct collisions with the WTGs. Barotrauma occurs when bats experience rapid changes in air pressure near the moving blades of WTGs, causing damage to air filled internal organs, such as the lungs (Baerwald *et al*., 2008).

66. Lawson *et al*. (2020) conducted a study aiming to quantify the pressure changes and model flightpaths which could result in bat barotrauma at WTGs. Due to the lack of data on the topic, the study used results to changes in pressure levels that cause barotrauma and mortality in other mammals of similar size, including rats and mice. The study concluded that areas of extreme pressure changes occur close to the surface of WTG blades, requiring bats to take very specific and improbable flight paths that skim the surface of the blades in order to increase their risk of barotrauma and mortality. As a result, Lawson *et al*. (2020) concluded that, if their model of extreme pressure changes on similar animals is representative of bats, it is unlikely that barotrauma is responsible for a significant number of turbine-related bat fatalities.

3.2.2 Congregations around offshore WTGs

67. Studies monitoring migratory bats at offshore wind farms in the North Sea have noted that bats gather around the WTGs to feed on clusters of flying insects or to find shelter (Ahlén *et al*., 2007; Ahlén *et al*., 2009; Hüppop and Hill, 2016). There have also been sightings of Nathusius' pipistrelles roosting in the nacelles of these offshore WTGs (Laegerveld *et al*., 2014; Ahlén *et al*., 2009). The extent to which bats use offshore structures as refuges in the Irish Sea is unclear, and there is little evidence suggesting that migratory flights to access such structures currently exist. Some evidence has found offshore bat presence at lighthouses close to the shore in the Irish Sea, but not WTGs.

3.3 Screening of impacts

68. The potential for likely significant effects is assessed as low, as a result of the following:

- There is no definitive evidence of migratory routes between the island of Ireland and the UK over the Irish Sea, including within the Project's array area;
- Evidence provided by other Irish Sea offshore wind projects in their own respective surveys was not able to provide conclusive evidence of migratory routes or the quantum of bats undertaking migration over the Irish Sea. The little evidence collected by these Projects does not indicate that a significant number of bats fly over the Irish Sea during the respective species' migratory periods. However, the Project acknowledges the inherent difficulty in recorded offshore bat activity;
- Due to the lack of peaks in bat activity recorded by other aforementioned offshore wind farm projects coinciding with peak migratory periods, any migratory bats present offshore are likely in low numbers. Therefore, any mortalities relating to offshore WTGs would not occur at a number significant enough to impact the conservation status of Nathusius' pipistrelle, common noctule or Leisler's bat species; and
- Offshore WTGs and structures have been opportunistically used for foraging and by migratory bats for refuge, however, this is unlikely over the Irish Sea due to its shorter crossing distance and respective ease of access to preferred terrestrial roosting and foraging areas for bats.

69. Cumulative impacts may occur on bat migration with other operational and proposed offshore wind farm projects in the Irish Sea. By introducing more offshore WTGs in the Irish Sea from multiple projects, the risk of collisions and barotrauma incidents inherently increases. The degree of these cumulative impacts is currently unknown and cannot be assessed due to the lack of available evidence. However, whilst unknown, the lack of evidence suggests that the scale of migration over the Irish Sea is likely less than what occurs over the North Sea. Therefore, cumulative impacts are unlikely to be significant.

70. The Project acknowledges that overall, the subject of offshore bats lacks sufficient data and research, which is a key driver to the levels of uncertainty within the topic area. The conclusions above are a result of examining existing evidence available from a range of sources, combined with professional judgement. However, the confidence of these conclusions is inherently low.

71. As a result, the Project maintains its position that bats can be excluded from the HRA Screening Report (REP3-006) and impact assessment, as none of the migratory species identified are qualifying features of any relevant SAC.

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