Arklow Bank Wind Park 2

Environmental Impact Assessment Report

Volume III, Appendix 13.1: Offshore and Headland Bat Monitoring

sse Renewables

Arklow Bank Wind Park 2

Offshore and Headland Bat Monitoring

Technical Appendix

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1.0	02/05/2024	Final (External)	Woodrow	GoBe Consultants	Sure Partners Limited

Statement of Authority

Name	Qualifications	Experience
Oisin O'Sullivan	BSc (Hons) Ecology and Environmental Biology	Oisín O'Sullivan is an Ecologist with Woodrow, he co-authored the 2023 technical report and undertook surveys for the project. Oisín has completed a B.Sc. in Ecology and Environmental Biology at University College Cork. His final year thesis involved bat surveys of urban habitats in Cork City. His work as a graduate ecologist with Woodrow was focused on bat data analysis including bat call identification and bat roost/habitat suitability surveys. Oisín has developed a high level of proficiency with Kaleidoscope, Ecobat and BatExplorer, all of which are analysis software used to assess bat calls and activity Since joining Woodrow, Oisín's current work involves coordinating, surveying, analysing data, and writing summary bat activity reports for all onshore wind developments that Woodrow has worked on in the 2021 and 2022 survey seasons. This also involves the use of R to provide data on bat activity relative to weather conditions with the goal of informing curtailment as a mitigation measure. During 2022 Woodrow began undertaking offshore bat surveys including Oisín as a technical lead on these projects. These surveys involve the long-term recording of activity on islands and headlands to record migration events. Oisín is a Qualifying member of CIEEM and holds a license to survey bat roosts from the Department of Culture Heritage and the Gaeltacht and a handling license issued by NPWS.
Patrick Power	BSc Forestry BSc (Hons) in Land Management in Forestry MSc Wildlife Biology and Conservation	Patrick Power is an Assistant Ecologist with Woodrow. He undertook surveys for the project, assisted with data analysis for this project, and co-authored the report. Patrick has completed a BSc in Forestry, BSc (Hons) in Land Management in Forestry with Waterford Institute of Technology. He is currently doing an MSc in Wildlife Biology and Conservation with Edinburgh Napier University. His work as a graduate ecologist with Woodrow is focused on bat data analysis including bat call identification and bat roost/habitat suitability surveys. Patrick has developed a high level of proficiency with Kaleidoscope and BatExplorer, the analysis software used to assess bat calls and activity. Patrick also possesses Reptile, mammal, and habitat surveying skills. Patrick is a student member of CIEEM and currently has a training licence to survey bat roosts from the Department of Culture Heritage and the Gaeltacht.

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Acronyms

Term	Meaning
ABWP1	Arklow Bank Wind Park 1
ABWP2	Arklow Bank Wind Park 2
LAT	lowest astronomical tide
NPWS	National Parks and Wildlife Service

Units

Unit	Description
°C	Degrees Celsius
GB	GigaByte
kHz	kilohertz
km	kilometre
m/s	Meters per second

1 Introduction

1.1 Survey goals

This Technical Appendix is intended to offer guidance on the potential for ecological constraints of bat activity occurring in the Array Area of the proposed Arklow Bank Wind Park 2 (ABWP2). The information contained within this report is intended to summarise the results of monitoring from Spring to Autumn of 2023, consisting of two main survey components:

- Monitoring at an offshore monopile (location displayed in **Figure 13.1.1**);
- Monitoring on headlands inland from the proposed Array Area.

Deployments and maintenance were carried out by marine contractors Alpha Marine under the technical guidance of Oisín O Sullivan and Patrick Power of Woodrow APEM Group.

1.2 Migratory bats in an Irish context

There are two Irish bat species which are known to engage in seasonal long-distance migrations, *Pipistrellus nathusii* (Nathusius' pipistrelle) and *Nyctalus leisleri* (Leisler's bat) (Shiel *et al.* 1999; Collins 2023) occurring mainly in Spring (April-May) and Autumn (August-October). Seasonal migration of Leisler's bats occurs from lowland river basin areas to upland habitats in early spring with the reverse of this occurring in autumn has been observed (Woodrow pers. Observation). There are currently no available public records of these species in an Irish marine environment.

Given data on these species from other European countries such as Poland, France, and the UK it is thought that in these seasonal migration periods, corridors incorporating peninsulas, sea islands, and river basins are used (Ahlén *et al.* 2009; Lundy *et al.* 2010; Ciechanowski *et al.* 2016; Adrian Bicker & BCI 2021; Ongoing data collection project, Charlotte Roemer/CESCO Lab 2021 – 2023 weblinks 1 & 2). In an onshore context, a close relative of the Leisler's bat, *Nyctalus noctula* (common noctule) are documented using tailwinds and high air pressure for European cross continental migrations (Dechmann *et al.* 2017).

The majority of European based literature available on the offshore migration of bats is centred around the North Sea. Analysis of documented reports from offshore platforms in the North Sea between 1988 and 2007 notes five species of European bat species being present; Nathusius' pipistrelle, common noctule, northern bat (*Eptesicus nilssonii*), serotine (*Eptesicus serotinus*), and parti-coloured bat (*Vespertilio murinus*) (Boshamer & Bekker 2008). Activity at these offshore locations is most frequently documented during the spring and autumn migration period. Of these records the only species relevant in an Irish context is the Nathusius' pipistrelle.

Leisler's bats are heavily underrepresented in published material on offshore migrations, despite being well known to engage in migratory behaviour (Shiel *et al.* 1999; Collins *et al.* 2023). Examples of Leisler's bats occurring offshore occur as mostly data poor examples, such as, the 10-year German study in the North Sea (Hüppop & Hill 2016).

2 Policy and Legislation

Bats are protected by law in the Republic of Ireland under the Wildlife Act 1976 and subsequent amendments (2000 and 2010). Under the Wildlife Act, it is an offence to intentionally disturb, injure or kill a bat, or disturb its resting place. National Parks and Wildlife Service (NPWS) (2021a & 2021b) guidelines outline the further legal protection afforded to species listed under Annex IV of the of the Habitats Directive (92/43/EEC), as required by Articles 12, 13 and 16. The Habitats Directive is transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations,

2011-2021 (Habitats Regulations).This legislates for requirements in relation to strict protection of animals listed under Annex IV of the Habitats Directive, which are set out in Regulation 51, with Regulation 54 pertaining to derogation licences, including Regulation 54 A when the Minister is applying for a derogation. All species of Irish bat are listed under Annex IV of the EU Habitats Directive (1992). The system of Strict Protection is applied across the entire natural range of Annex IV species, even outside of protected sites. As set out in Regulation 51, the carrying out of any work with the potential to capture or kill any specimen of a strictly protected species, or to disturb these species, and for which a derogation licence has not been granted, may constitute an offence under Regulation 51 of the Habitats Regulations. Furthermore, any action resulting in damage to, or destruction of, a breeding or resting place of an animal may constitute an offence unless a derogation licence has been granted. This action does not need to be deliberate, i.e., it places onus on demonstrating due diligence.

Ireland has also ratified the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) an international convention instigated to protect migrant species across all European boundaries, which covers certain species of bat. Despite being afforded this level of protection, there is currently no Irish guidance on the surveying of migratory bats in the offshore environment for the development of offshore wind farms.

Offshore surveys are examined in EUROBATS Publication Series No 6 – Guidelines for consideration of bats in wind farm projects Revision 2014, notably covering:

- Considerations of bat sightings (for offshore sites this could include records from oil rigs, lighthouses and other open sea or coastal regions).
- Migration routes over land and offshore should also be considered. Particular consideration should be given to bat migration routes when wind turbines are proposed close to prominent landscape features such as river valleys, upland ridges, upland passes and coastlines.
- Offshore wind turbines should be surveyed in the same manner as land-based turbines. Clearly, this presents more of a challenge than land-based turbines because surveys will have to be undertaken from boats, lighthouses, buoys, etc. Surveys for offshore wind farms should be concentrated in Spring (April-June) and Autumn (August-October/November), unless data (such as bats found on nearby oil rigs, islands, etc.) indicate their presence at any other time of the year.

3 Methodology

3.1 Deployment

3.1.1 Monopile

Static detector surveys were undertaken using Wildlife Acoustics Song Meter 4 Bat Full Spectrum (SM4BAT-FS) detectors. Two detectors were deployed on a monopile, a marine platform *approximately* 8 km offshore of Arklow, Co. Wicklow at the following coordinates: 52.88544136, -5.923436330. The monopile location is displayed in **Figure 13.1.1**. The detectors were powered by external Lithium-ion batteries. The detectors were housed in pelicases modified to allow for power and microphone cables, to prevent excessive fouling from seabirds directly onto detectors and to protect them from the marine environment. These two static detectors were deployed continuously from 06 April to 08 November 2023 with no lapse in recording. One detector was positioned on the northern side of the monopile while the other was placed on the southern side.

The detectors were fitted with two memory cards of between 128 GB and 256 GB each, in anticipation of high levels of noise being recorded due to the marine environment and seabirds using the monopile. The detectors were set with 16 kHz as the minimum frequency trigger for recording, differing from Woodrow's standard methodology for which a minimum trigger of 12 kHz is used. This was done in order to reduce the amount of interfering noise files produced by the seabirds and the marine environment in general, while still recording within the normal echolocation frequencies of relevant species. The detectors were set to a sample rate of 256 kHz (equivalent to a maximum detectable frequency of 128 kHz) to limit the amount of storage space required on memory cards and extend detector battery life. Detector units and batteries were strapped to the floor of the platform, while microphones were mounted on the handrails surrounding the platform, approximately 12 m above lowest astronomical tide (LAT). There was no lapse in offshore recording. Respective pictures for context are shown in **Annex I: Detector Locations**.

3.1.2 Headland Monitoring

Two Wildlife Acoustics SM4BAT-FS detectors with Lithium-ion battery packs were also deployed along the coast to assess if bat activity events at the marine platform coincided with activity changes on the mainland. These detectors were deployed on 06 April and collected on 08 November 2023. One detector was placed on a pine tree in the dunes of Brittas Bay (D.01, Brittas) while the other was deployed at the tip of a headland/small cliff adjacent to improved grassland (D.02, Seabank). The locations of these detectors relative to each other and the offshore monopile can be seen in **Figure 13.1.1**. On the 27 April 2023 both detectors were changed to Elekon Bat Logger C models which allow for daily mobile updates via SIM card and solar powered batteries for targeted and reactionary maintenance should it be required. At the Seabank headland location there were technical issues with both the microphone and SIM card. For this reason, a SM4BAT-FS was also deployed to ensure coverage. The detector at Seabank was interfered with by livestock or members of the public resulting in weather damage internally and the loss of data between 06 April and 27 April 2023. The detector at Seabank also suffered a memory card corruption causing data loss between the 24 May and 04 July 2023. Deployment dates, unit numbers and duration deployed on headlands is shown in **Figure 13.1.2.**

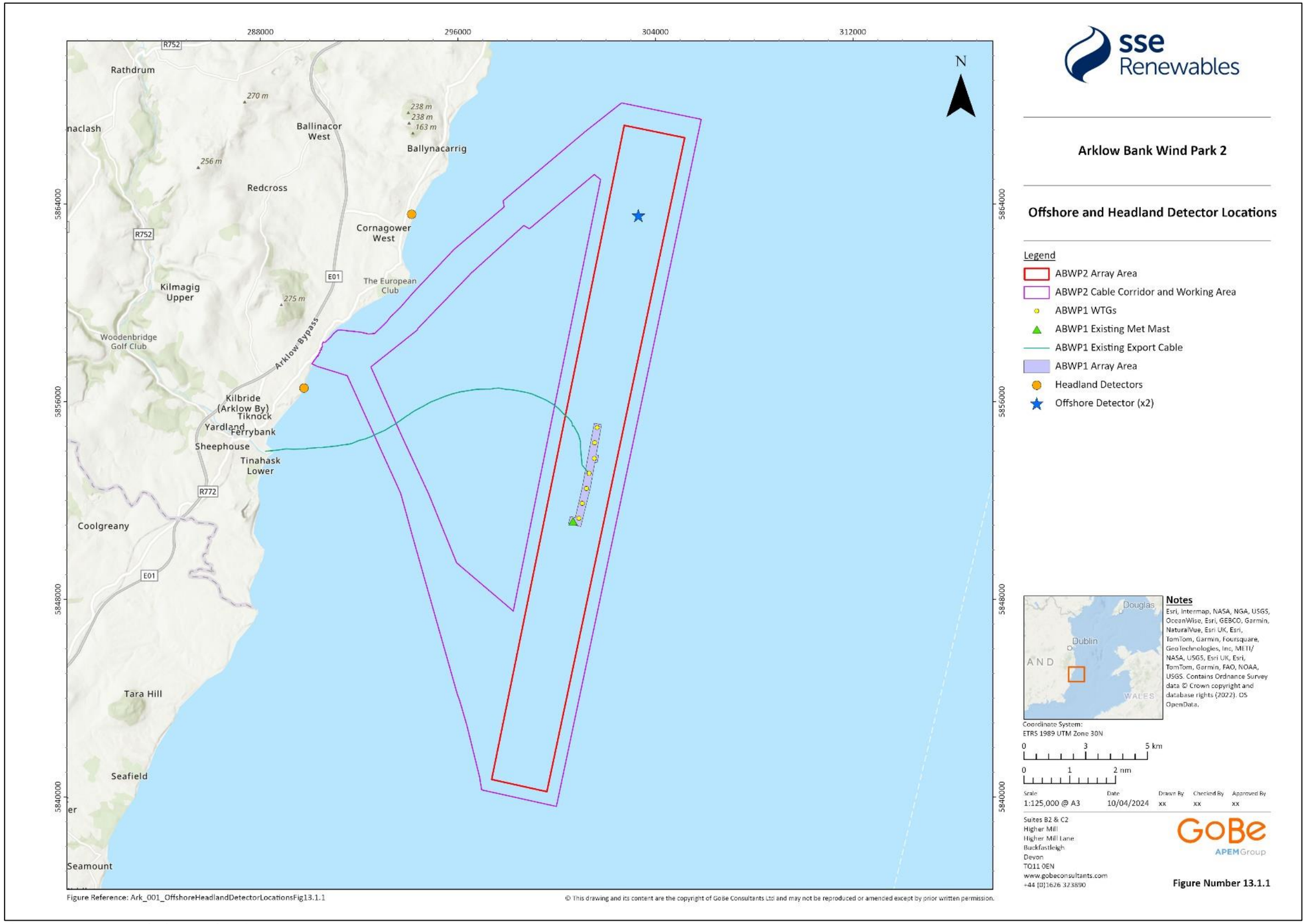

Figure 13.1.1 - Detector deployment locations

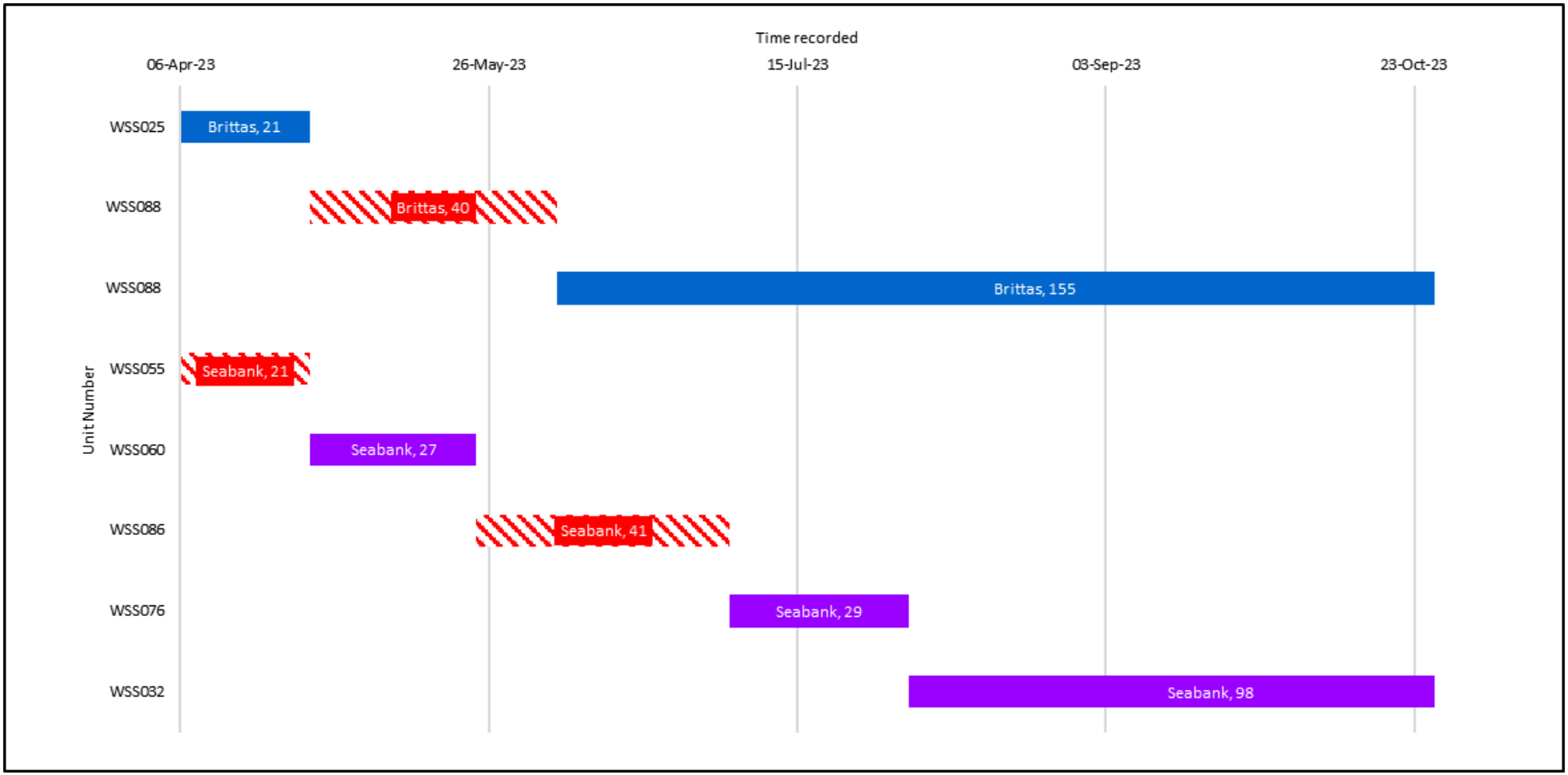

Figure 13.1.2 - Recording durations for headland detectors including periods of data loss in red

3.2 Calibration and testing of recording equipment.

Prior to deployment, comprehensive tests were conducted on all detectors to ensure their proper functionality, accompanied by thorough checks of their settings. The sensitivity of each microphone was rigorously tested both before and after deployment. All testing procedures for both detectors and microphones strictly adhered to the manufacturers' manuals, ensuring adherence to recommended standards. No microphone experienced complete failure, however, the build-up of bird droppings on microphones on the monopile resulted in the partial loss of microphone sensitivity towards the end of the recording period for some deployments. Despite this, it is considered that data was captured effectively on both detectors for the duration of the survey and provides an accurate representation of bat activity at the monopile location as no microphone experienced complete sensitivity loss.

3.3 Maintenance

Memory cards, microphones, and batteries were changed by a member of the marine contractors' crew monthly or as close to a monthly basis as weather would allow. The maintenance schedule is shown in **Table 13.1.1.** There were no recorded breakages or issues with equipment during this period.

Table 13.1.1 - Maintenance schedule for offshore detectors

Visit	Date
Deployment	06 April 2023
Maintenance period 1	09 May-2023
Maintenance period 2	06 June-2023
Maintenance period 3	04 July-2023
Maintenance period 4	02 August-2023
Maintenance period 5	05 September-2023
Maintenance period 6	04 October2023
Collection	08 November2023

3.4 Data Analysis

Sound files were analysed using Kaleidoscope Pro, a specialized bioacoustic software designed for automatic identification of bat species from sound recordings. For the monopile detectors, all identified sound files underwent manual verification by a member of the Woodrow bat ecology team. Concerning the headland detectors, manual verification was conducted only for Nathusius' pipistrelle, while automatic identification was used to classify all triggers with a match ratio >0.50 as a species record. All manual verifications were done with the aid of Russ (2012) and Middleton *et al.* (2014). Bat passes serve as a standard metric for assessing bat activity and species presence (Kerbiriou *et al*., 2019). Here, a bat pass was defined as the detection of one or more bat calls from a single species within a 15 second sound file. If multiple species (or individuals) were recorded within the same sound file, they were separated into distinct bat passes.

For the assessment of passes recorded at the monopile weather, data was gathered from the M2 weather buoy in the Irish Sea and accessed via the marine institute website (Irish Weather Buoy Data)[1]. For assessment of onshore headland detectors weather data was gathered from the Johnstown Castle weather station located in Wexford (MET Éireann Historical Weather Data)[2].

3.5 Limitations

During the surveys, detector WSS055 experienced interference in April, which resulted in 21 nights of data loss at the Brittas Bay headland location. Additionally, a card writing error affected detector WSS088 at Brittas Bay in May, causing a loss of 40 nights during which it didn't record. A microphone failure occurred on detector WSS086 at Seabank headland location, leading to a further loss of 41 nights of data in May and June. However, these detector failures are considered mitigated by the presence of two headland detectors simultaneously recording at either Brittas Bay location or Seabank location. The only period without any headland detector recording was between 24 May and 06 June 2023. The gaps in recording are all presented in **Figure 13.1.2**.

There is an inherent difficulty in recording in the marine environment due to scarce locations for deployment. We had access to a single offshore recording location. Our data offers a snapshot of activity within the Array Area and may not fully describe bat activity in it's entirety across the Proposed Development.

In terms of weather data, the M2 weather buoy is a significant distance from the Array Area (approx. 80 km). However, it was chosen to examine the offshore records as its position in the marine environment is more appropriate than land-based measurements. Johnstown castle is similarly distant from site (approx. 70 km).

4 Results

It is important to note that the accuracy of identification between the headland data and monopile data is not directly comparable in terms of activity levels. This is a result of the automatic identification being used for all species other than Nathusius' pipistrelle. However, the headland data is analysed independently or using offshore species presence as a categorical variable.

4.1 Monopile Results

Two species were recorded during the survey period: Leisler's bat and common pipistrelle. The only passes were recorded during June and July 2023. The times and dates of these passes are presented in **Table 13.1.2**. There was no foraging or social behaviour associated with these passes.

Table 13.1.2 – Bat passes recorded on monopile detectors

Date	Pass Time	Detector	Species
14 June 2023	23:25:58	S4U10807	Leisler's bat
15 June 2023	00:34:02	S4U10807	Leisler's bat
15 June 2023	00:33:54	S4U10807	Leisler's bat
21 June 2023	00:06:50	S4U12586	Leisler's bat
25 July 2023	00:14:35	S4U12586	Common pipistrelle
25 July 2023	00:11:32	S4U10807	Common pipistrelle

[1] Available at: Irish Weather Buoy Network Observations | Marine Institute [Accessed 17 October 2023]
[2] Available at: MET Éireann Historical Weather Data [Accessed 17 October 2023]

The frequency of wind speeds and directions filtered for night time conditions are displayed graphically in **Figure 13.1.3** and numerically in **Table 13.1.3.** The prevailing nightly winds were southerly winds between 4 – 10 m/s consisting of 14% of the conditions during the survey. Overall, 21% of the recorded nightly wind conditions were southerly winds.

Given that the results are data poor, both bat species were grouped together while assessing wind speed and direction associated with passes. Except for a single pass, all bat records occurred during northerly or north easterly winds. The percentage of passes in reference to both wind speed and direction are displayed graphically in **Figure 13.1.4** and numerically in **Table 13.1.4**. Wind conditions for this fall into two categories, having one pass (17%) or two passes (33%). Conditions making up 33% of passes are also the result of the two occurrences when two passes were recorded within an hour (**Table 13.1.2**) Due to the low sample size, these results cannot be used to show a significant influence from wind speed or direction on bat offshore activity, however it is notable that passes did occur in conditions contrasting the prevailing nightly winds.

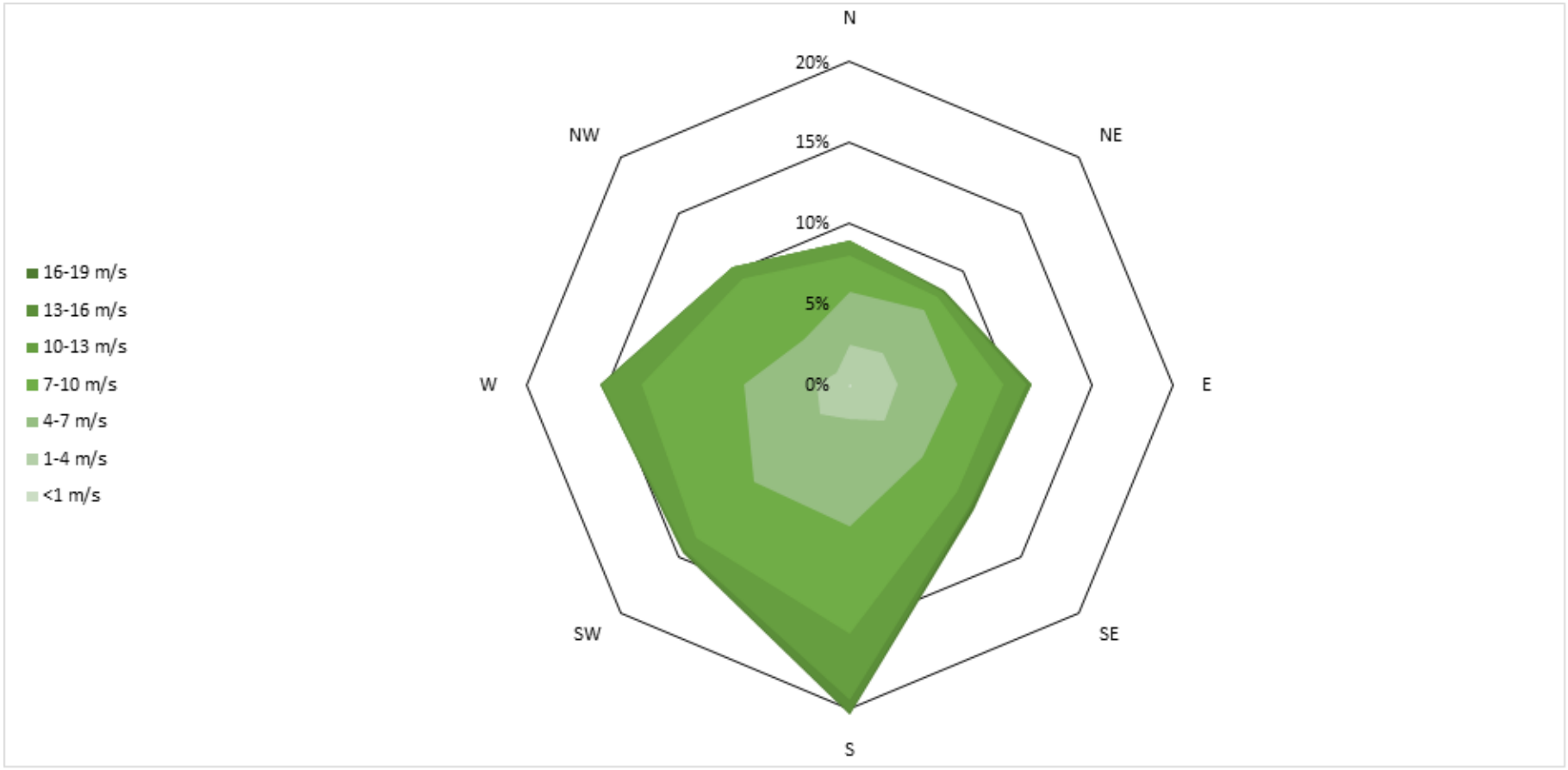

Figure 13.1.3 - Prevailing nightly wind conditions in the Irish sea (M2 weather buoy)

Table 13.1.3 - Prevailing nightly wind conditions in the Irish sea (M2 weather buoy)

Wind speed (m/s)	N	NE	E	SE	S	SW	W	NW	Total
<1	0%	0%	0%	0%	0%	0%	0%	0%	**1%**
1-4	2%	3%	3%	3%	2%	2%	2%	1%	**18%**
4-7	3%	4%	4%	3%	7%	6%	4%	3%	**34%**
7-10	2%	1%	3%	3%	7%	5%	6%	5%	**33%**
10-13	1%	0%	1%	1%	4%	1%	2%	1%	**12%**
13-16	0%	0%	0%	0%	1%	0%	0%	0%	**2%**
16-19	0%	0%	0%	0%	0%	0%	0%	0%	**0%**
Total	**9%**	**8%**	**11%**	**11%**	**20%**	**15%**	**15%**	**10%**	**100%**

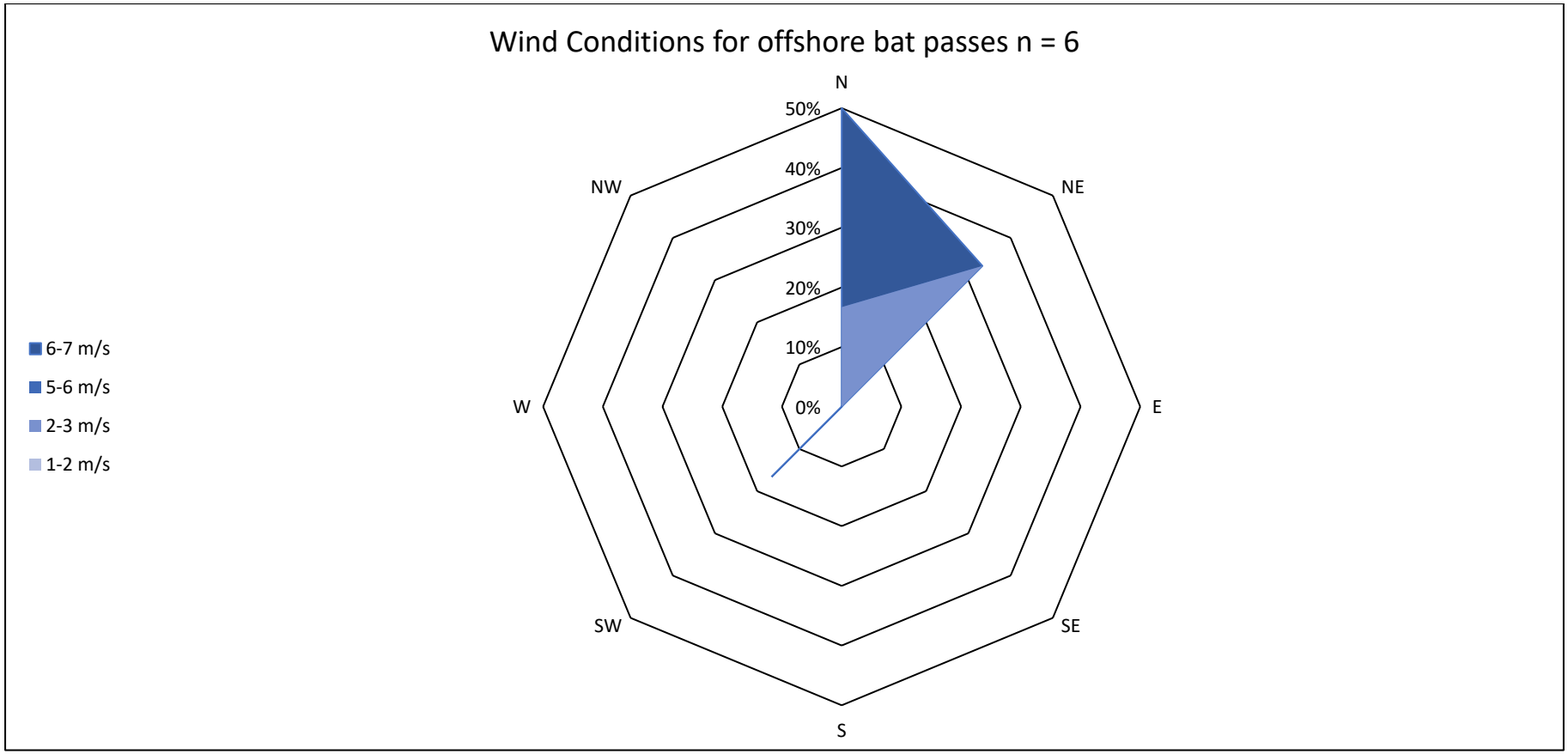

Figure 13.1.4 - Wind conditions coinciding with offshore bat passes.

Table 13.1.4 - Wind conditions recorded in the Irish sea during which bats were recorded at the monopile

Wind speed (m/s)	N	NE	E	SE	S	SW	W	NW	Total
1-2	17%	0%	0%	0%	0%	0%	0%	0%	**17%**
2-3	0%	33%	0%	0%	0%	0%	0%	0%	**33%**
5-6	0%	0%	0%	0%	0%	17%	0%	0%	**17%**
6-7	33%	0%	0%	0%	0%	0%	0%	0%	**33%**
Total	**50%**	**33%**	**0%**	**0%**	**0%**	**17%**	**0%**	**0%**	**100%**

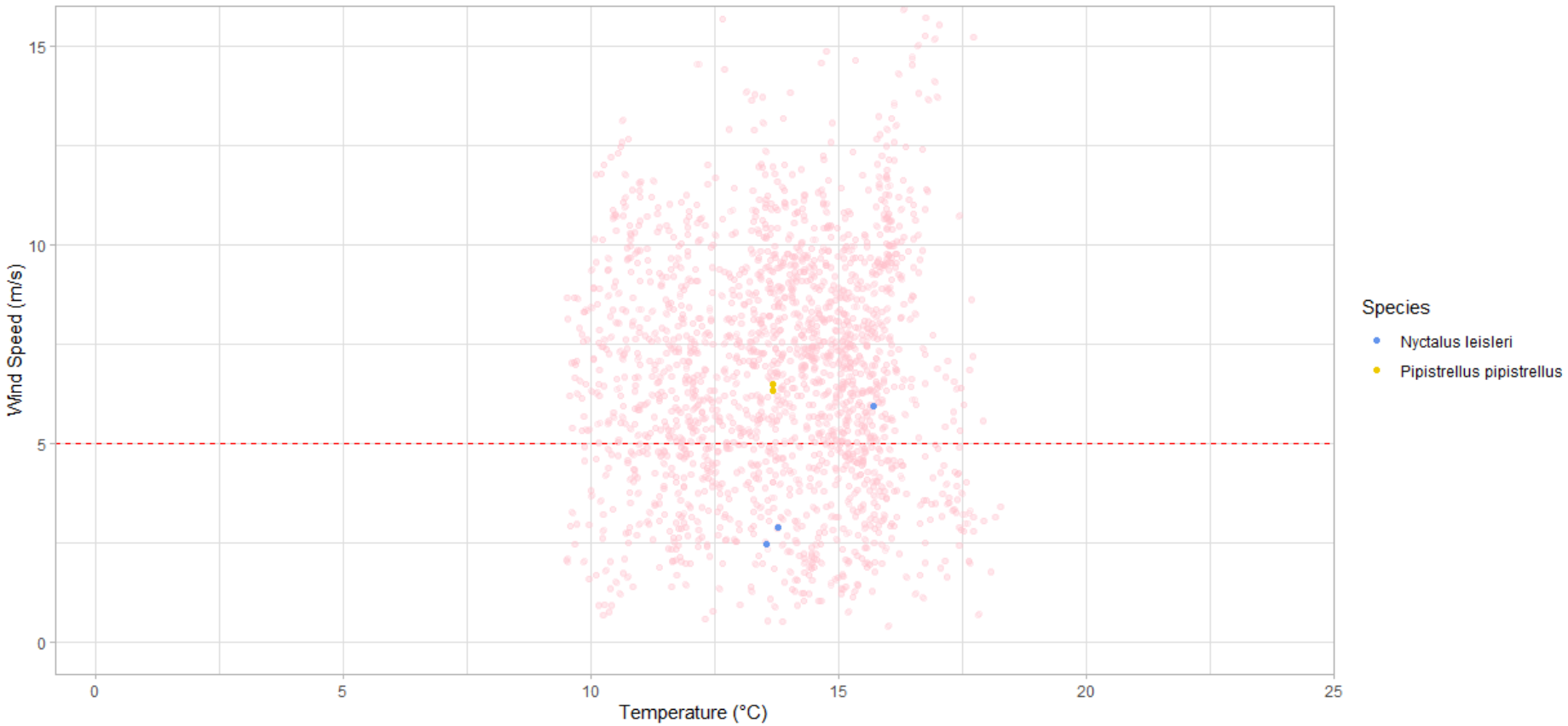

Figure 13.1.5 - Weather conditions recorded (pink) and weather conditions during which bats were active at the offshore locations. The ellipses show where 95% of data for each species lie

4.2 Headland Results

4.2.1 Nathusius' pipistrelle

The highest activity of Nathusius' pipistrelle was recorded in August 2023, peaking on 28 August 2023 with 11 passes at Seabank. From a general view this species activity was more frequent and higher between 24 August and 09 September 2023. However, this occurred against a backdrop of no recordings at the offshore monopile, with only sporadic recordings of a single or two calls between 23 April and 30 July 2023. There were only two passes in October at Brittas with no passes confirmed at Seabank. Despite increased activity during the autumn migratory window, the absence of offshore recorded activity and limited data to date prevent conclusive evidence of migratory behaviour. Detailed data is displayed in **Figure 13.1.6.** The conditions recorded in the absence of bats and those coinciding with bat passes are displayed in **Figure 13.1.8**. For Nathusius pipistrelle activity, 95% of passes occurred below 5 m/s winds and above 7.5 °C.

4.2.2 Leisler's bat

Leisler's bat activity was highest at Seabank in May 2023, peaking on 18 May 2023 with 157 passes. At Brittas Bay, there were two distinct peaks in activity, occurring in April and September 2023. These peaks were recorded on the 22 April, with 118 passes and on 05 September 2023, with 96 passes). The Leisler's bat offshore passes occurred in June which coincide with the highest levels of Leisler's bat activity at Brittas, consisting of 26.04 average bat passes per night relative to a nightly mean of 17.31 passes per night (σ = 22.84) over the entire deployment at Detailed data is presented in **Figure 13.1.6.** October was lower in activity overall and had multiple nights with no bats recorded. However, on 09 October 2023 at Seabank there was 116 passes recorded which is closer to the levels of activity recorded between May and September. The conditions recorded in the absence of bats and those coinciding with bat passes are displayed in **Figure 13.1.8**. Examining Leisler's bat activity, 95% of the passes occurred below approximately 5.5 m/s and also above 7.5 °C.

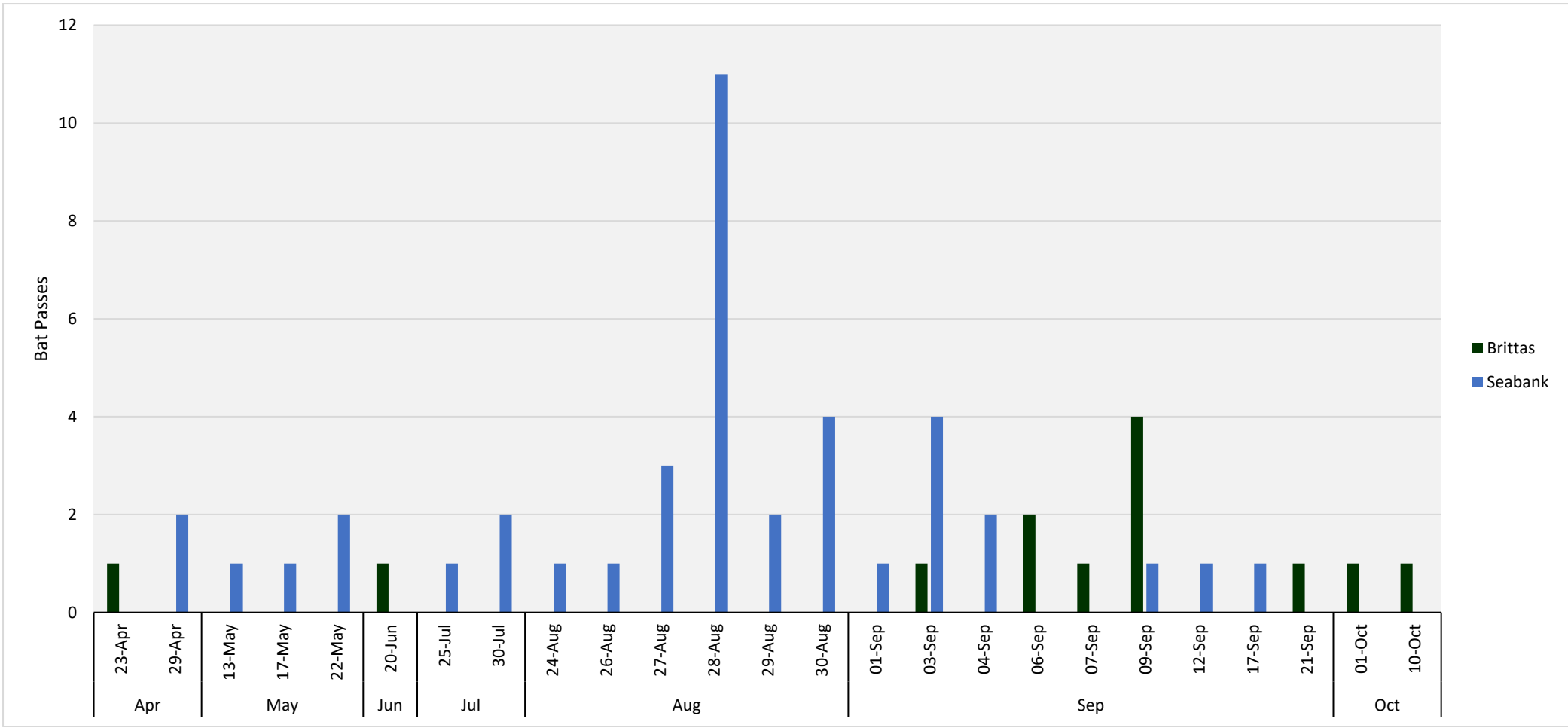

Figure 13.1.6 - Temporal spread of Nathusius' pipistrelle activity during headland deployment dates at both locations

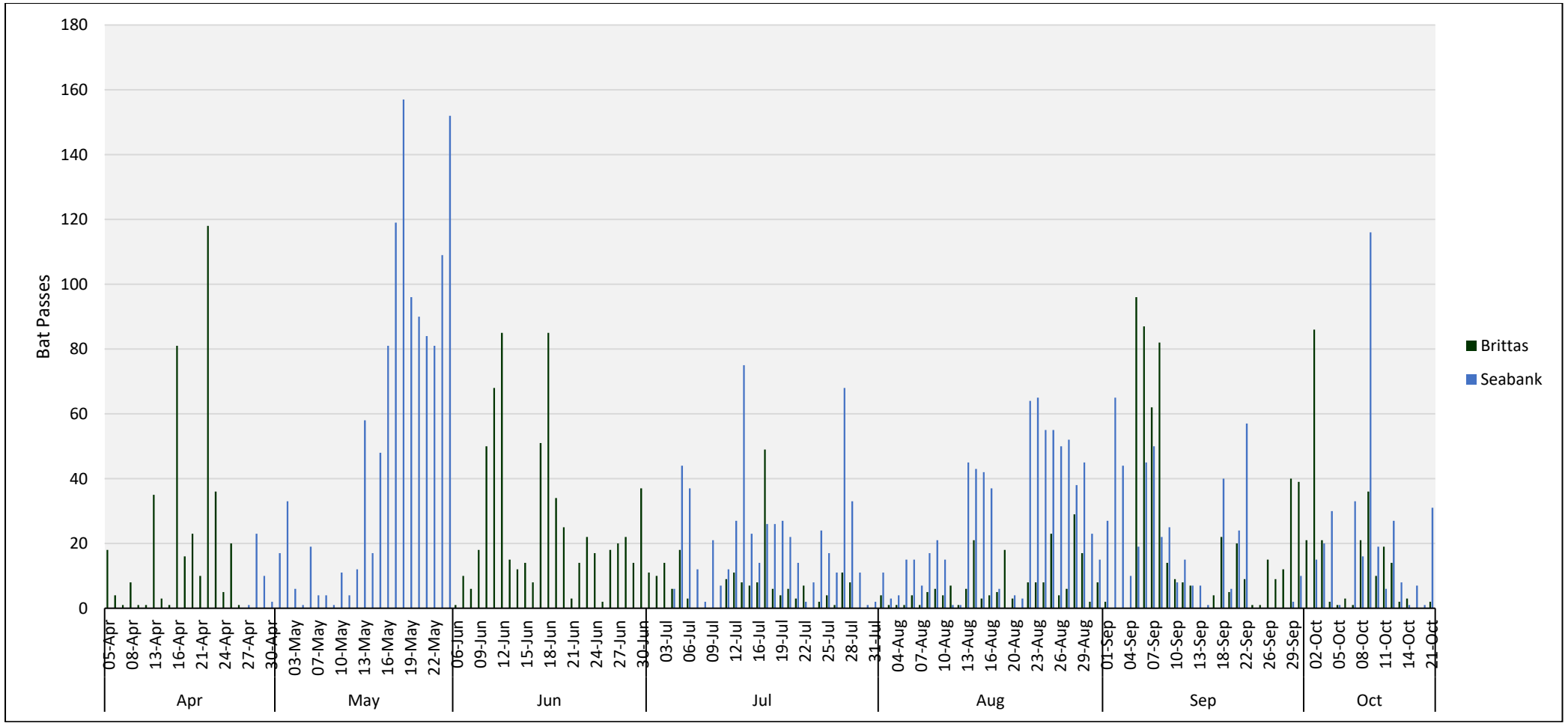

Figure 13.1.7 - Temporal spread of Leisler's bat activity during headland deployment dates at both locations

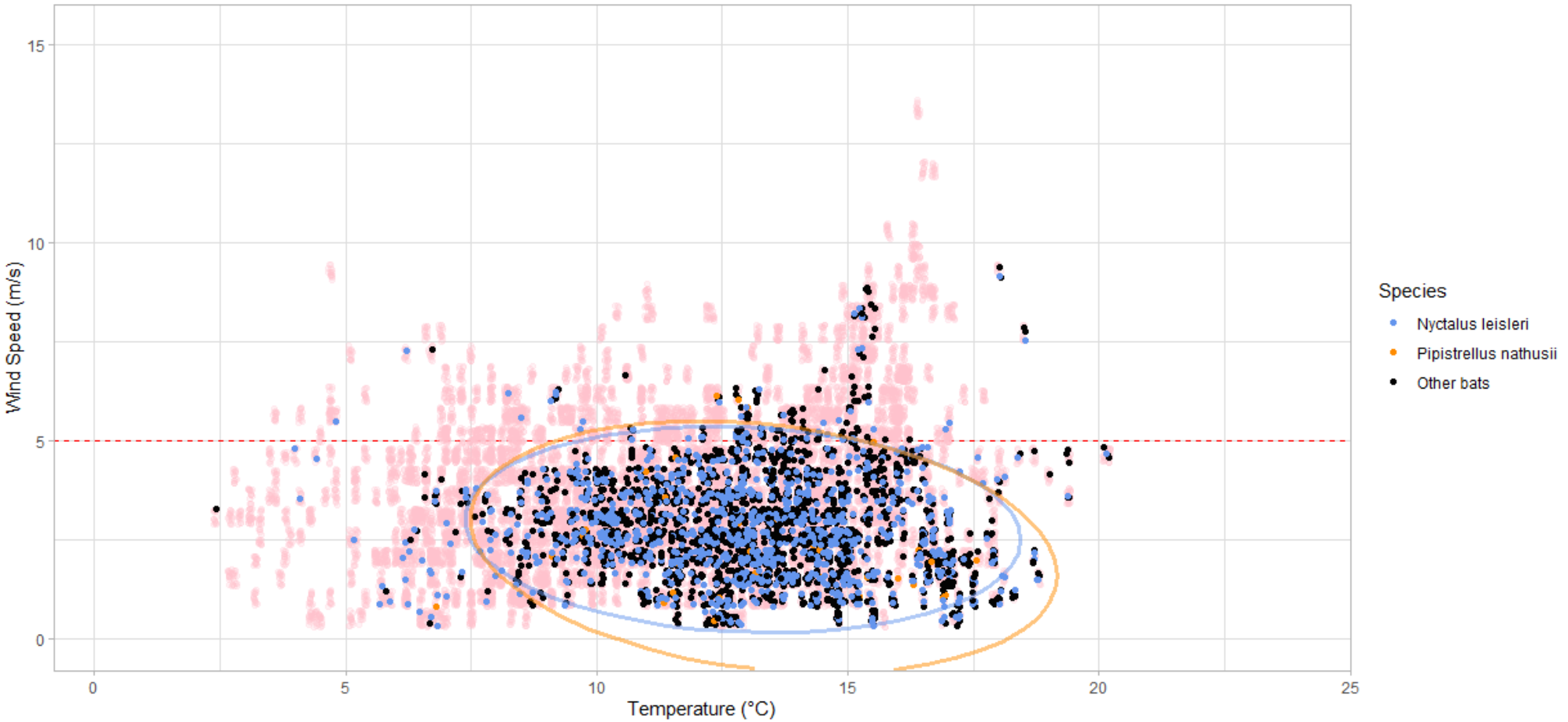

Figure 13.1.8 - Weather conditions recorded (pink) and weather conditions during which bats were active at the headland locations. The ellipses show where 95% of data for each species lie

5 Results Summary and Discussion

During the 2023 survey, a total of 38,132 bat passes were documented. Only six passes (0.0016%) from two species (common pipistrelles and Leisler's bat) were observed at the offshore sampling location (monopile). These six occurrences spanned from 14 June to 25 July 2023, comprising two passes from common pipistrelles and four from Leisler's bats. Common pipistrelles are not known to engage in long distance offshore migrations; however, Leisler's bats possess this capability (Shiel *et al.* 1999). Yet, the activity periods observed for both species at the monopile location do not align with the migration windows known in the European mainland (Shiel *et al.* 1999). As a result, it seems improbable that the bats recorded at the monopile were migrating individuals; instead, their presence likely reflects commuting or exploratory behaviour. Interestingly, headland locations' activity peaks coincided with those bat migration windows, but due to the lack of activity recorded offshore in these periods no conclusions upon overseas migration movements can be drawn from those results. Nevertheless, bats might have adopted routes beyond the detection range of the installed monopile detectors, adding complexity to verifying migration patterns within the area. Therefore, it's important to acknowledge that the limited coverage of the monopile detectors within the proposed Array Area complicates the conclusive exclusion of any potential overseas migration.

Literature has detailed the use of tailwinds by migrating bats (Dechmann *et al.* 2017; Lagerveld *et al.* 2021). While this behaviour has not been specifically confirmed in Leisler's bats, it has been noted in both Nathusius' pipistrelles and common noctules. Given the close relation between Leisler's bats and common noctules (both belonging to the genus Nyctalus), there is an expectation that Leisler's bats might also use tailwinds for migration. Out of the total six passes recorded at the monopile, five passes occurred during northernly or north easterly winds, while only a single pass from a Leisler's bat occurred during south westerly winds. As mentioned in results it is not possible to form a conclusion given how few passes were recorded offshore.

There is a large difference in weather recorded at the locations used for headlands (Johnstown Castle) and offshore (M2 weather buoy) which can be seen comparing **Figure 13.1.5** and **Figure 13.1.8**. Both are considerable distances from the Array Area and headland survey locations <60km. It is considered that though they are far from the bat detectors this difference is representative of the higher wind speeds in the unsheltered marine environments. Half of the bat passes which occurred offshore coincided with conditions above 5 m/s, which is an approximate limit for 95% of bat passes on the headland surveys.

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Annex I: Detector Locations

Monopile

Plate 1 – Monopile structure

Plate 2 – Northern detector location

Plate 3 – Northern detector microphone placement

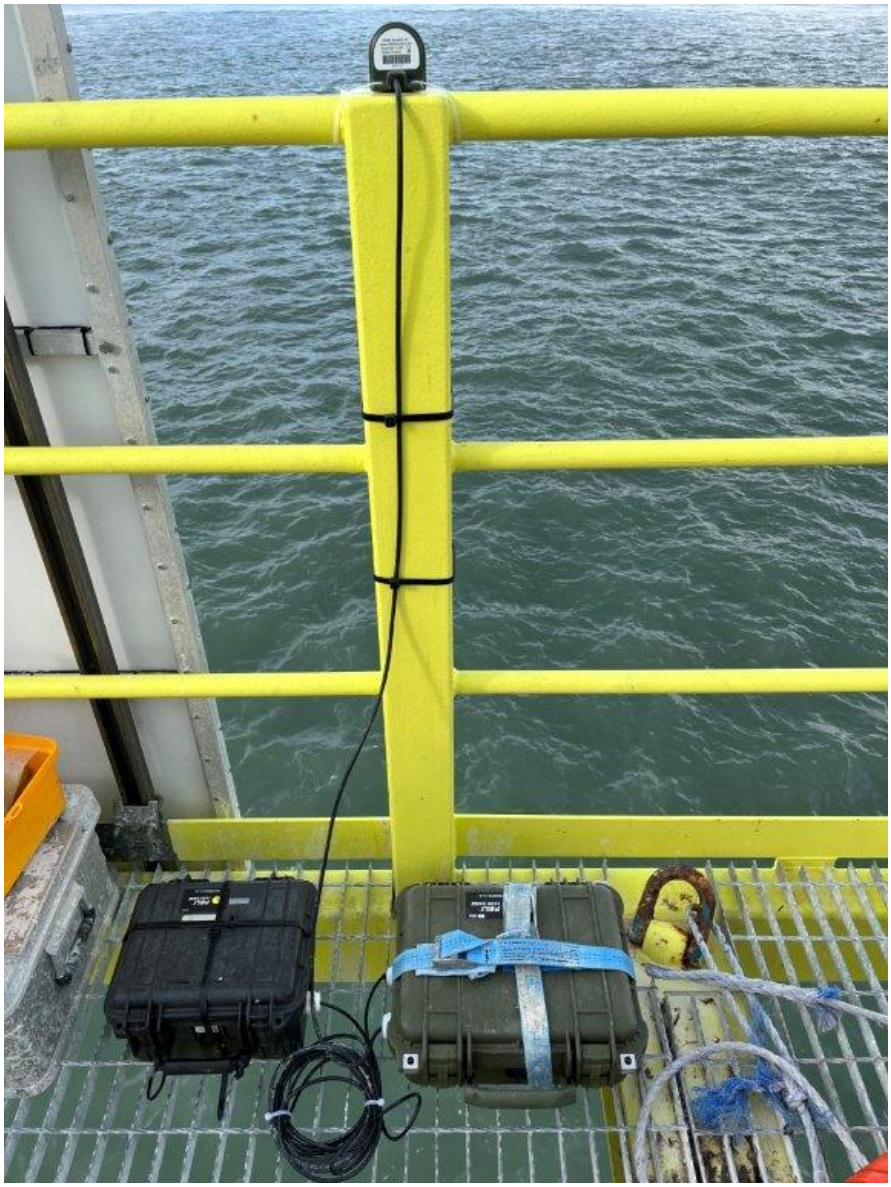

Plate 4 – Southern detector location

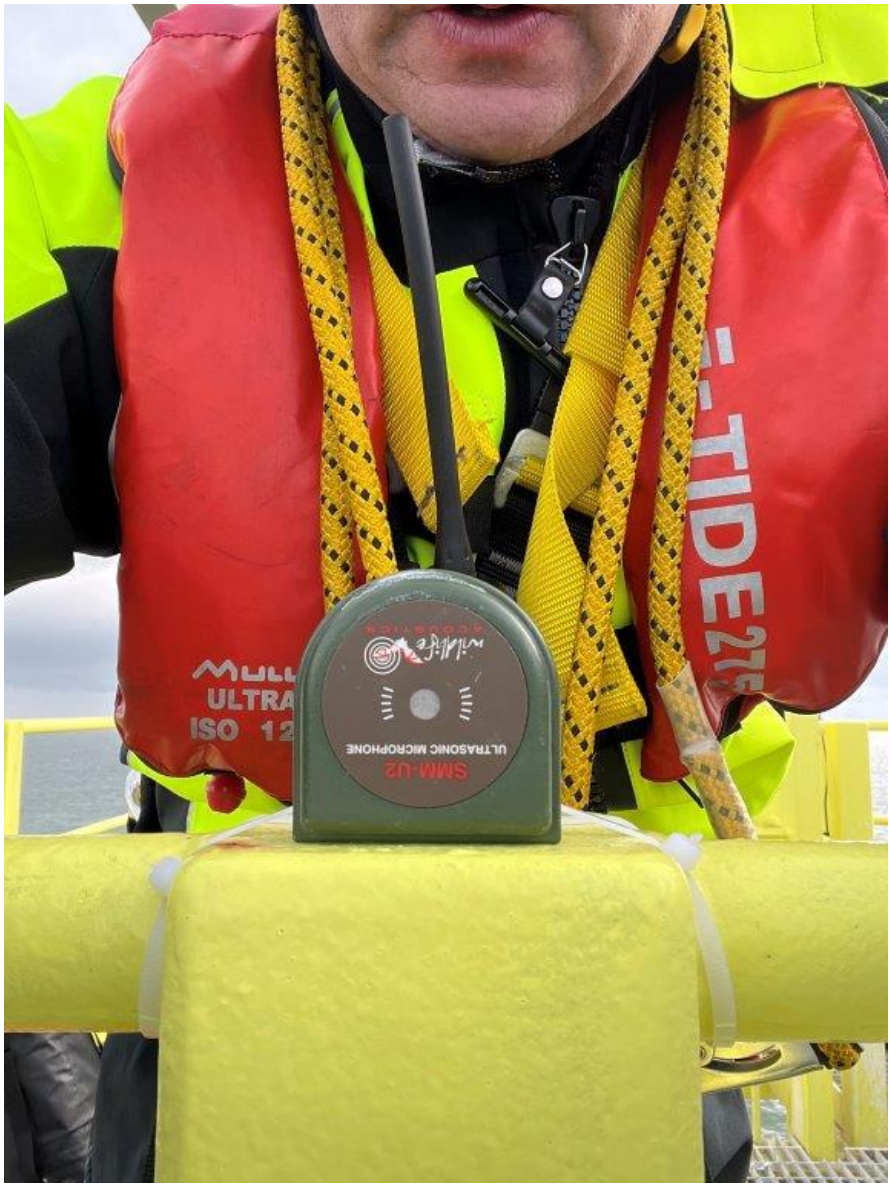

Plate 5 – Southern microphone placement

Headland

Plate 6 – D.01 Brittas Bay headland location, Elekon Bat Logger C set-up

Plate 7 – D.01 Brittas Bay headland location alternate view showing connected solar panel

Plate 8 – Elekon Bat Logger C and SM4 set-up for redundancy WSS076 and WSS086 pictured during July recording period