Addendum to the
Natura Impact Statement

NISA
North Irish Sea Array

Volume 2: Appendices

Appendix A19
Offshore Ornithology Collision Risk Modelling Assessment

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North Irish Sea Array Windfarm Ltd

Offshore Ornithology Collision Risk Modelling Assessment

North Irish Sea Array Offshore Wind Farm

www.gobeconsultants.com

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Acronyms

Term	Definition
CI	Confidence Intervals
CRM	Collision Risk Modelling
DAS	Digital Aerial Survey
ECC	Export Cable Corridor
HAT	Highest Astronomical Tide
LCI	Lower Confidence Interval
LOD	Limit of Deviation
MAC	Maritime Area of Consent
NAF	Nocturnal Activity Factors
NPWS	National Parks and Wildlife Service
NWIS	North West Irish Sea
OSP	Offshore Substation Platform
OWF	Offshore Windfarm
PFI	Projected Footprint of Infrastructure
RFI	Request for Further Information
RPM	Revolutions per Minute
SD	Standard Deviation
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
UCI	Upper Confidence Interval
WTG	Wind Turbine Generator

1 Introduction

1.1.1 North Irish Sea Array Windfarm Ltd (NISA, hereafter referred to as 'the Developer') has been considering the Request for Further Information (RFI) issued by An Bord Pleanála (now An Coimisiún Pleanála) as well as the third-party submissions received following public consultation. At An Coimisiún Pleanála's behest, the Developer has also continued to consult with stakeholders in respect of the 2024 planning application throughout 2024-2026. The Developer has refined elements of the design to respond to the third-party submissions, the continued public and stakeholder consultation and the RFI. Amendments are therefore required to Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment of the 2024 Nature Impact Statement (NIS). Full details of consultation undertaken can be found in Appendix A2 of the SISAA.

1.1.2 For the purposes of clarity, this document shall be read in conjunction with Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment submitted as part of the 2024 NIS.

1.1.3 Any cross reference to a chapter, section, table, image, figure or appendix within this document is to another location within the Addendum to the NIS unless explicitly stated otherwise. Any cross reference to anything included in the 2024 NIS will be clearly labelled as such.

1.1.4 Text in bold is only used throughout this document to indicate where changes are required, and why they are required. Text in italics is text from a section of the 2024 NIS which is deleted, or quotations from other documents (as explicitly stated). Replacement text is in normal font.

1.1.5 Tables which have been updated from the 2024 NIS, or entirely new tables, have been included in the Addendum to the NIS. These can be identified by the "A" prefix in the caption. Any changes within an updated table, in comparison to tables within the 2024 NIS, are indicated by grey shading in the relevant cell, column or row, as necessary.

1.1.6 The sections relevant to Appendix A19 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment in the RFI are included below.

RFI Section	RFI	Relevance to Chapter
1 (b)	The scientific information provided as part of the planning application documentation should be based on up-to-date survey reports and data. Accordingly, the applicant is requested to confirm/provide justification/verification that the information submitted in support of the planning application remains relevant and appropriate at the point of submitting further information or to update same as required.	The timeframes associated with the RFI have required a review of the datasets used in the 2024 to ensure that any necessary updates to the baseline environment are captured. The introduction of the Projected Footprint of Infrastructure (PFI)[1] has established a new baseline for the ornithology assessments. The PFI represents the overlap of Project Options 1 and 2, including the Limit of Deviation (LOD). As a result, updated density estimates for this area have been modelled for use in the Collision Risk Model (CRM). In addition, 12 further months of Digital Aerial Surveys (DAS) were completed across the full North West Irish Sea (NWIS) SPA, providing more recent data on the distribution and abundance of birds between September 2024 and August 2025. This data has been combined with the original 29 months of DAS data collected in the Maritime Area of Consent (MAC) to produce an updated baseline of 41 months' data.
1 (c)	The applicant is requested to confirm whether any on-going or additional surveying has been carried out since the application was lodged and, if so, the applicant is invited to submit any further survey data results and analysis and update the planning application documentation, as appropriate.	Additional ornithological surveys have been undertaken since submission of the Application. These additional surveys are described in Section 15.2.5 of Chapter 15: Offshore Ornithology.
8 c) iv	It is noted that Roseate Tern flight height data and its analysis were not presented in the Johnston et al. (2014a-b) paper referenced in Appendix 18. The DAU in their observation recommends that clarification be sought as to the sources of the precise parameters for	Considering the lack of flight height data for Roseate Terns in Johnston et al. (2014), data for Common terns were used. Common terns represent the most appropriate and precautionary species proxy, with the

[1] The PFI represents a defined ornithology study sub-area within the overall array area, where all permanent offshore array infrastructure will be located. The PFI has been developed following design refinements to minimise spatial overlap with sensitive receptors and occupies just 57.7 km², representing 2.5% of the NWIS cSPA.

	Roseate Tern flight behaviour used in the CRM as well as a statement regarding the robustness of such data. The applicant is requested to address this issue.	greatest time spent at collision risk height of the tern species included in Johnston et al. (2014) (addressed in *Seabird flight heights*, page 20).
8 c) v	The Board notes that Natural England have accepted a 70% reduction in Northern Gannet collision mortality estimates to account for macro-avoidance for other offshore wind farm developments, such as Hornsea 4. However, given the proximity of the proposed development to the coast and to the nearest breeding colony at Ireland's Eye (c. 15km away), a more precautionary approach is recommended. The applicant is requested to revise the approach taken in relation to Northern Gannet collision estimates so they are not reduced by 70% to account for macro-avoidance.	The Developer acknowledges the board's concern over the use of a 70% reduction in gannet collisions due to macro-avoidance behaviour. Gannet collisions are therefore presented both with and without macro-avoidance on an annual and monthly basis (Table A4.12 and Table A4.13) (addressed in *Avoidance rates*, page 14).

Further comments relevant to Appendix A19 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment are detailed below.

Source	Comment	Relevance to Chapter
NPWS Comments on EIAR (Comment 2.3.4)	The CRM analysis presented in Appendix 18 used species-specific mean nocturnal activity levels used in the models (see Table 2-6). For all tern species modelled a value of zero was used. This runs contrary to the fact that terns can migrate during the night e.g. Roseate Tern, (Gochfeld, M. and J. Burger, 2020); and Sandwich and Common Tern (Ward, 2000).	The Developer acknowledges NPWS' concern and has therefore updated the nocturnal activity values for tern species from 0 to 0.25 to better reflect available evidence (addressed in *Nocturnal activity*, page 18).

1.1 Project Background

1.1.1 There are no changes to this section. Refer to Section 1.1 of Appendix 18 of the 2024 NIS.

1.2 Collision Risk Modelling

1.2.1 The key change in this section is the exclusion of commic terns from the modelling. Updated abundance calculations were carried out since the RFI due to the introduction of the Projected Footprint of Infrastructure (PFI), and additional site-specific DAS monitoring of the NWIS SPA (hereafter referred to as 'NWIS DAS') , in response to RFI 1 (b). During this process commic terns were apportioned to species level prior to the collision risk modelling being undertaken. As a result, the densities of common tern and Arctic tern used in the CRM already include birds that were not identified to species level. The following paragraph of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted:

- *The CRM assessment was undertaken for 13 key seabird species[2]. These species were included for assessment due to their abundance within the array area based on digital aerial surveys (DAS) collected for the proposed development, and due to their sensitivity to collision risk (e.g. Bradbury et al., 2014). These include:*
  - *Kittiwake, Rissa tridactyla;*
  - *Black-headed gull, Chroicocephalus ridibundus;*
  - *Common gull, Larus canus;*
  - *Great black-backed gull, Larus marinus;*
  - *Herring gull, Larus argentatus;*
  - *Lesser black-backed gull, Larus fuscus;*
  - *Roseate tern, Sterna dougallii;*
  - *Common tern, Sterna hirundo;*
  - *Arctic tern, Sterna paradisaea;*
  - *Commic tern (Common and arctic tern);*
  - *Manx shearwater, Puffinus puffinus;*
  - *Fulmar, Fulmarus glacialis; and*
  - *Gannet, Morus bassanus.*

1.2.2 And be replaced with:

[2] Noting that commic tern is not a species but the group assigned to birds which could not be distinguished between common and Arctic tern during DAS data collection.

- The CRM assessment was undertaken for 12 key seabird species. These species were included for assessment due to their abundance within the array area based on updated DAS data that combines the 29-month period used in the CRM Report (MAC DAS) with an additional 12 months of DAS conducted between September 2024 and August 2025 (NWIS DAS), and due to their sensitivity to collision risk (e.g. Bradbury et al., 2014). Commic terns were apportioned to either common or arctic tern based on the proportion of each species recorded in the relevant area[1]. These include:
    - Kittiwake, Rissa tridactyla;
    - Black-headed gull, Chroicocephalus ridibundus;
    - Common gull, Larus canus;
    - Great black-backed gull, Larus marinus;
    - Herring gull, Larus argentatus;
    - Lesser black-backed gull, Larus fuscus;
    - Roseate tern, Sterna dougallii;
    - Common tern, Sterna hirundo;
    - Arctic tern, Sterna paradisaea;
    - Manx shearwater, Puffinus puffinus;
    - Fulmar, Fulmarus glacialis; and
    - Gannet, Morus bassanus.

There are no further changes to this section. Refer to Section 1.2 of the 2024 Collision Risk Modelling Assessment.

2 Methodology

2.1 Guidance and Models

2.1.1 In response to RFI Section 1 (b), the key change in this section is the use of the more recent Collision Risk Modelling guidance from JNCC. As the collision risk modelling has been updated to incorporate the PFI and revised site-specific survey data, it was considered most appropriate to use the latest available guidance. As a result of updated guidance, the information presented in Appendix 14 is now outdated. The following paragraph of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted:

- *The methodology for assessing collision effects is based on available evidence and consultation with other East Coast Phase One Irish projects[3] (see agreed methodology in Appendix 14: Method Statement - Offshore Wind Ornithology Assessment for East Coast Phase 1 Projects).*

2.1.2 And be replaced with:

- The methodology for assessing collision effects is based on available evidence and the most recent guidance produced by the joint SNCBs (JNCC *et al.*, 2024).

2.1.3 In addition, the following paragraph of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted due to updated guidance and the release of an updated version of the sCRM tool:

- *As there is no specific Irish guidance for CRM at this time, the Proposed Development refers to the sCRM, recommended by both Natural England and NatureScot for use in CRM assessments. There is also a 2022 update of the shiny tool which is currently endorsed by NatureScot but not Natural England (NatureScot, 2023). Therefore, the original sCRM tool has been used in this assessment.*

2.1.4 And be replaced with:

- As there is no specific Irish guidance for CRM at this time, the Proposed Development refers to the sCRM, recommended by the joint SNCBs (*JNCC et al.*, 2024) for use in CRM assessments. The latest version of the sCRM shiny app tool was used for CRM (sCRM 0.2.1).

2.1.5 There are no other changes to this section. Refer to 2.1 of Appendix 18 of the 2024 NIS.

2.2 CRM Input Parameters

2.2.1 The key change for this section is deletion of the paragraph relating to comic tern, because they are no longer relevant for the modelling. This is because updated apportioning of birds to species level occurred within the updated abundance estimate calculations. Updated abundance calculations were carried out since the RFI due to the introduction of the PFI, and additional site-specific monitoring of the NWIS SPA, in response to RFI Section 1 (b). The following paragraph of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted and not replaced:

- *In addition, commic tern (a term used to represent both common or arctic tern that could not be identified to species level) were included as a separate species within this report. The impacts on these species have then been apportioned to each species, as deemed appropriate, within the Offshore and Intertidal Ornithology Chapter. The majority of parameters used in the assessment are identical for these two species (with the exception of body length and wingspan). Parameters used within the CRM for commic tern were based on those for common tern, since this species was recorded far more frequently than Arctic tern (11 common terns recorded in the array area, versus 2 Arctic terns) as outlined below.*

Turbine parameters

2.2.2 Design refinements to the proposed development were made to respond to the RFI (see Appendix A7: Design Refinements). This resulted in an update to WTG layout for Project Option 2 and a subsequent reduction in the number of turbines within the restricted airspace zone from 13 to eight. The update means more turbines within Project Option 2 will have a higher air gap, changing the risk of collision and necessitating an update to the CRM. Therefore, the following paragraph of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted:

- *The WTG specifications used within the CRM are shown in Table 2-1 and Table 2-2. These values are based on the project options with the greatest magnitude of impact, as described in Volume 2, Chapter 6: Project Description. For rotation speed and pitch, mean values and standard deviation were included in the model. The parameters used in calculating the mean estimates of collision rates are also presented in Table 2-1.*

2.2.3 And be replaced with:

- The WTG specifications used within the CRM are shown in Table A2-1 and Table 2-2 (of the 2024 NIS). These values are based on the project option with the greatest magnitude of impact. WTG parameters have been updated from those presented in the CRM Report to reflect a change in the distribution of turbines proposed for Project Option 2. Rotation speed and pitch, mean values and standard deviation were included in the model. For precaution the mean pitch value was entered as 5.6°, which in reality represents the maximum pitch and therefore results in the highest predicted impact. The parameters used in calculating the mean estimates of collision rates are also presented in Table A2-1.

2.2.4 In addition, the following paragraph of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted since it refers to the outdated number of turbines with the reduced tip height:

- *For Project Option 2, parameters are split into 2a and 2b. This is due to a reduction in tip height for 13 turbines in because of an aviation restricted zone overlapping the array area. Impacts for 2a and 2b were modelled separately and added together to give a total impact for Project Option 2.*

2.2.5 **And be replaced with:**

- For Project Option 2, parameters are split into 2a and 2b. This is due to a reduction in tip height for eight turbines because of an aviation restricted zone overlapping the array area. Impacts for 2a and 2b were modelled separately and added together to give a total impact for Project Option 2.

2.2.6 **In addition, Table 2-1 of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted since it refers to the outdated number of turbines in Option 2b, and replaced with the following Table A2-1:**

Table A2-1: Turbine parameters used for the two project options in all CRM scenarios (replaces Table 2-1 of Appendix 18 of the 2024 NIS).

Parameter	Project Option 1	Project Option 2a	Project Option 2b
No. WTGs	49	27	8
Latitude (°N)	53.7		
Width of array (km)	17.8		
Tidal offset (m)	2.71		
No. Blades	3		
Rotor radius (m)	125	138	
Max Chord (m)	7	7.5	
Average RPM (+/- SD)	8.3 (±1.45)	7.5 (±1.45)	
Average Pitch (°) (SD)	5.6 (0.5)		
Tip Clearance Highest Astronomical Tide (HAT) (m)	34.44	34.44	29.44

Avoidance rates

2.2.7 **In response to RFI Section 1 (b), the key change in this section is the use of the more recent Collision Risk Modelling guidance from JNCC. As the collision risk modelling has been updated to incorporate the PFI and the new NWIS DAS survey data, it was considered most appropriate to use the latest available guidance. The following paragraph of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted:**

- *The avoidance rates used in CRM for each species, presented in Table 2-3, were agreed on through consultation with other Phase 1 Irish projects (see Appendix 14: Method Statement - Offshore Wind Ornithology Assessment for East Coast Phase 1 Projects and in line with the latest interim guidance from Natural England (Natural England, 2022)). The avoidance rates recommended by Natural England (used in CRM here) are based upon the most recent evidence (Cook, 2021) and a re-analysis of avoidance rates (Ozsanlev-Harris et al., 2022). Furthermore, the avoidance rates are precautionary with the findings reported in the AOWFL (2023) study, during which collision risk was very low and no collisions or narrow escapes were observed.*

2.2.8 And be replaced with:

- Avoidance rates are a key parameter in the CRM, they take into consideration that birds will undertake avoidance behaviour in response to the presence of a windfarm to prevent collision. This can occur at three scales (Cook *et al.,* 2014); micro-avoidance (avoiding individual turbine blades); meso-avoidance (avoiding whole wind turbines, not just the rotor-swept area) and macro-avoidance (avoiding the whole wind farm array area and buffer). This adjustment is required since baseline survey data are collected before turbines are present. The avoidance rates used in CRM for each species, presented in Table A2-3, follow those presented by Ozsanlav-Harris *et al.* (2022) in-line with guidance from the joint SNCBs (Statutory Nature Conservation Body; JNCC *et al.*, 2024). The only changes to the avoidance rates presented in the CRM Report have been to the standard deviations for Black-headed gull, Herring gull and Lesser Black-backed gull, bringing them in line with guidance.

2.2.9 In addition, the following paragraph of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted since it doesn't address the new approach to the application of macro-avoidance for gannet collision in response to RFI 8 (c):

- *There is strong evidence of macro-avoidance with gannets and offshore windfarms (Garthe et al., 2017a; Garthe et al., 2017b; Skov et al., 2018; Pavat et al., 2023) with avoidance rates used in CRM likely to be highly precautionary which can result in overestimation of collision mortality (Garthe et al., 2017b). The CRM results are presented with a macro-avoidance rate of 70% applied to the gannet collision mortalities (Table 3.1).*

2.2.10 And be replaced with:

- There is strong evidence of macro-avoidance with gannets and offshore windfarms (Garthe *et al.,* 2017a; Garthe *et al.,* 2017b; Skov *et al.,* 2018; Pavat *et al.,* 2023) with avoidance rates used in CRM likely to be highly precautionary which can result in overestimation of collision mortality (Garthe *et al.,* 2017b). Noting NPWS' concern over the application of macro-avoidance, the CRM results are presented both with and without the macro-avoidance rate of 70% applied to the gannet collision mortalities (Table A2-2).

2.2.11 In addition, Table 2-3 of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted and replaced with Table A2-2 below. This is because it doesn't fully align with the most recent guidance from the joint SNCBs and includes commic terns which have not been included in the updated assessment:

Table A2-2: Species-specific mean avoidance rates and associated standard deviation (SD) used in the CRM (replaces Table 2-3 of Appendix 18 of the 2024 NIS).

Species	Avoidance rates Mean (SD)
Kittiwake	0.993 (0.0003)
Black-headed gull	0.995 (0.0003)
Common gull	0.995 (0.0003)
Great black-backed gull	0.994 (0.0004)
Herring gull	0.994 (0.0004)
Lesser black-backed gull	0.994 (0.0004)
Roseate tern	0.991 (0.0004)
Common tern	0.991 (0.0004)
Arctic tern	0.991 (0.0004)
Manx shearwater	0.98 (0)
Fulmar	0.98 (0)
Gannet	0.993 (0.0003)

Density of birds in flight

2.2.12 **In response to RFI Section 1 (b), the key change in this section is the use of the bootstrapping method for species densities in line with recent Collision Risk Modelling guidance from JNCC. The change from the use of monthly mean densities was included in the updated CRM assessment. The following paragraph of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted:**

- *The monthly density estimates were extracted from site specific digital aerial survey (DAS) data. A summary of estimates is presented in Table 2-4. A single monthly density estimate was absent for January 2021, therefore the density estimates for that species during the same month in 2022 was used in the assessment. Months during which no birds of a particular species were present were recorded as 0. The standard deviation (SD) was calculated for each month using the "rule of thumb" that one SD is approximately one quarter of the range, where the range was estimated as the difference between the highest upper confidence limit and the smallest lower confidence limit.*

2.2.13 **And be replaced with:**

- The monthly mean density estimates were extracted from site specific DAS data. The density estimates used in the assessment are derived from updated DAS data that combines the 29-month period used in the CRM Report (MAC DAS) with an additional 12 months of DAS conducted between September 2024 and August 2025 (NWIS DAS).
- The density estimates were bootstrapped to produce 1000 samples for each month, in line with the preferred method proposed by the joint SNCBs (JNCC *et al.*, 2024). A single monthly density estimate was absent for January 2021, therefore the density estimates for that species during the same month in 2022 was used in the assessment. Months during which no birds of a particular species were present were recorded as 0.

Species biometrics

2.2.14 **In response to RFI Section 1 (b), the key change in this section is the update to species biometrics in line with the most recent guidance from the joint SNCBs (JNCC *et al.* 2024). Species biometrics for some species have changed and clarification is now provided for the biometrics used for any species not included in the guidance. The following paragraph of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted:**

- *The species-specific biometric input parameters used in the CRM are provided in Table 2-5. The biometrics for all species (body length and wingspan) were taken as presented in Natural England's most recent guidance (Natural England, 2022), on the basis of the biometric data from Snow and Perrins (1987). These rates were agreed through consultation with other Phase 1 Irish projects (see agreed methodology in Phase 1 Irish Projects Methodology Note).*

2.2.15 **And be replaced with:**

- The species-specific biometric input parameters used in the CRM are provided in Table A2-3. The biometrics for all species (body length and wingspan) were taken as presented in the most recent guidance from the joint SNCBs (JNCC *et al.*, 2024), using the biometric data from Snow and Perrins (1998). Any species values not included in this guidance were determined using expert judgement of built-in values from the sCRM tool and from Robinson (2005) as originally agreed on through consultation with other Phase 1 Irish projects (Appendix 14: Method Statement – Offshore Wind Ornithology Assessment for East Coast Phase One Project of the 2024 NIS (hereafter referred to as 'East Coast Phase 1 Irish Project Methodology Note')).

2.2.16 **In addition, the following table of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted and replaced with Table A2-3, since it doesn't fully align with the most recent guidance from the joint SNCBs and includes commic terns which have not been included in the updated assessment:**

Table A2-3 Seabird species biometrics and associated Standard Deviations (SD) for the eight species (replaces Table 2-5 of Appendix 18 of the 2024 NIS).

Species	Body length (SD) (m)	Wingspan (SD) (m)
Kittiwake	0.39 (0.005)	1.08 (0.0625)
Black-headed gull	0.36 (0)	1.05 (0)
Common gull	0.41 (0.005)	1.2 (0.05)
Great black-backed gull	0.71 (0.035)	1.58 (0.0375)
Herring gull	0.60 (0.0225)	1.44 (0.03)
Lesser black-backed gull	0.58 (0.03)	1.42 (0.0375)
Roseate tern	0.36 (0)	0.76 (0)
Common tern	0.33 (0)	0.88 (0)
Arctic tern	0.33 (0)	0.88 (0)
Manx shearwater	0.34 (0)	0.83 (0)
Fulmar	0.45 (0)	1.07 (0)
Gannet	0.94 (0.0325)	1.72 (0.0375)

Nocturnal activity

2.2.17 In response to RFI Section 1 (b), the main change in this section is the update to nocturnal activity in line with the most recent joint SNCB guidance. NPWS also noted the absence of a nocturnal activity factor for terns in their EIAR comments (Section 2.3.4). Therefore, nocturnal activity values for some species have been revised, and clarification is now provided on the biometrics used for any species not covered by the guidance. The following paragraph of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted:

- *To enable collision risk during the night to be included within the CRM model, Nocturnal Activity Factors (NAF) are applied in the CRM. NAF allows for daytime activity derived from survey data, to be extrapolated to include activity at night. The nighttime activity of seabird species has been estimated based on existing evidence from tracking data. The rates used are based on the most recent guidance provided by Natural England (2022), which are evidenced from the most robust scientific research and expert judgement (Garthe and Hüppop, 2004; Furness et al., 2018).*

2.2.18 And be replaced with:

- To enable collision risk during the night to be accounted for within the CRM model, Nocturnal Activity Factors (NAF) are applied in the CRM. NAF allows for daytime activity derived from survey data, to be extrapolated to include activity at night. The nighttime activity of seabird species has been estimated based on existing evidence from tracking data. The rates used are based on the most recent guidance provided by the joint SNCBs (JNCC *et al.*, 2024), which are evidenced from the most robust scientific research and expert judgement (Garthe and Hüppop, 2004; Cook *et al.* 2023).

2.2.19 In addition, the following paragraph of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted since it doesn't refer to the most recent guidance from the joint SNCBs and doesn't address NPWS' Comment 2.3.4 regarding Natura Impact Statement (NIS) Appendix 18 that used the same CRM parameterisation as Appendix 18 of the 2024 NIS:

- *The species-specific NAF used in the CRM assessment are presented in Table 2-6 and are based on available evidence and as agreed on through consultation with other Phase 1 Irish projects (see agreed methodology in the East Coast Phase 1 Irish Projects Methodology Note). The mean NAF values were all derived from Garthe and Hüppop (2004) except for gannet NAF which was taken from Furness et al., (2018), as per the most recent Natural England guidance (Natural England, 2022).*

2.2.20 And be replaced with:

- The species-specific NAF used in the CRM assessment are presented in Table A2-4 and are based on joint SNCB guidance (JNCC *et al.*, 2024). The mean NAF values were all derived from Garthe and Hüppop (2004) except for gannet and kittiwake which were taken from Cook *et al.* (2023) in-line with joint SNCB guidance (JNCC *et al.* 2024), and lesser black-backed gull which was aligned with herring gull and great black-backed gull as a precautionary approach. In response to NPWS' concern over tern NAFs, these have been updated to means of 0.25.

2.2.21 **In addition, Table 2-6 of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted, and will be replaced with Table A2-4 since it doesn't refer to the most recent guidance from the joint SNCBs and doesn't outline changes in species' NAF:**

Table A2-4 Species-specific mean nocturnal activity levels used in the CRM (replaces Table 2-6 of Appendix 18 of the 2024 NIS).

Species	Mean (SD)
Kittiwake	0.4 (0.12)
Black-headed gull	0.375 (0.0637)
Common gull	0.25 (0)
Great black-backed gull	0.375 (0.0637)
Herring gull	0.375 (0.0637)
Lesser black-backed gull	0.375 (0.0637)
Roseate tern	0.25 (0)
Common tern	0.25 (0)
Arctic tern	0.25 (0)
Manx shearwater	0.5 (0)
Fulmar	0.75 (0)
Gannet	0.14 (0.1)

Seabird flight speeds

2.2.22 **In response to RFI Section 1 (b), the key change in this section is the update to nocturnal activity in line with the most recent guidance from the joint SNCBs. Nocturnal activity for some species have changed and clarification is now provided for the biometrics used for any species not included in the guidance. The following paragraph of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted:**

- *Species-specific flight speeds used in the CRM assessment are presented in Table A2-5. Flight speeds were taken from Pennycuick (1987) for gannet and Alerstam et al. (1997) for all other species, as per the latest interim guidance from Natural England (Natural England, 2022) and NatureScot (NatureScot, 2023) and were agreed on through consultation with other Phase 1 Irish projects (see agreed methodology in the East Coast Phase 1 Irish Projects Methodology Note).*

2.2.23 **And be replaced with:**

- Species-specific flight speeds used in the CRM assessment are presented in Table A2-5. Flight speeds were taken from Pennycuick (1987) for gannet and Alerstam *et al.* (1997) for all other species, as per the latest guidance from the joint SNCBs (JNCC *et al.*, 2024). Any species values not included in this guidance were determined using expert judgement of built-in values from the sCRM tool and from Robinson (2005) as originally agreed through consultation with other Phase 1 Irish projects (East Coast Phase 1 Irish Project Methodology Note).

2.2.24 **In addition, Table 2-7 of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted and will be replaced with Table A2-5.**

Table A2-5: Mean flight speeds and associated standard deviation (SD) for the species included in CRM assessment (replaces Table 2-7 of Appendix 18 of the 2024 NIS).

Species	Flight speeds (SD) (ms^{-1})
Kittiwake	13.1 (0.40)
Black-headed gull	11.9 (0)
Common gull	13.4 (0)
Great black-backed gull	13.7 (1.20)
Herring gull	12.8 (1.80)
Lesser black-backed gull	13.1 (1.90)
Roseate tern	10.5 (0)
Common tern	10.5 (0)
Arctic tern	10.5 (0)
Manx shearwater	9.4 (0)
Fulmar	13.0 (0)
Gannet	14.9 (0)

Seabird flight heights

2.2.25 **The key change in this section is the addition of the following paragraph in response to the RFI 8 (c):**

2.2.26 The absence of generic flight height data for roseate terns from Johnston *et al.* (2014) meant that data for common terns was used as a precautionary approach considering the species' increased time spent at collision risk height compared to other relevant tern species (e.g. Arctic tern) (Johnston *et al.*, 2014). For example, Arctic terns spend 0.141% of their time above 40 m, compared with 0.536% for common terns, based on Johnston *et al.* (2014).

2.2.27 **There are no other changes to this section. Refer to 2.2 of Appendix 18 of the 2024 NIS.**

3 Results

3.1.1 **A full range of changes has been made to this section due to the updates described in Section 1.1. These arise from the updates described in the introduction and methodology, primarily (1) the introduction of the PFI and (2) the addition of new NWISDAS data collected across the NWIS SPA. As a result, the baseline (monthly average density in the PFI) has been updated since the 2024 NIS. The Results section of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment is therefore entirely new, with all values updated accordingly.**

3.1.2 This section presents the outputs from the CRM analysis for each seabird species. A summary of the results for each species is presented in Table A3-1, presenting the annual mean for each species and the lower (2.5%) and upper (97.5%) confidence intervals (CI).

3.1.3 **In addition, Table 3-1 of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted and be replaced with Table A3-1, since it doesn't contain the updated CRM outputs:**

Table A3.1: Summary of annual collision estimates following the project approach for Band Option 2 based on both Project Options (replaces Table 3-1 of Appendix 18 of the 2024 NIS).

Band Option 2	Annual collision estimate		
Species	Mean	LCI	UCI
Project Option 1			
Kittiwake	17.89	0.24	77.83
Black-headed gull	0.03	0.00	0.26
Common gull	3.01	0.00	12.59
Great black-backed gull	13.38	0.00	53.93
Herring gull	42.35	0.92	191.65
Lesser black-backed gull	1.01	0.00	8.76
Roseate tern	1.15	0.00	6.39
Common tern	0.61	0.00	4.03
Arctic tern	0.25	0.00	2.25
Manx shearwater	0.00	0.00	0.00
Fulmar	0.02	0.00	0.35
Gannet (Without Macro-Avoidance)	3.71	0.02	18.47
Gannet (With Macro-Avoidance)	1.11	0.01	5.54
Project Option 2			
Kittiwake	15.99	0.25	69.51
Black-headed gull	0.02	0.00	0.17
Common gull	2.57	0.00	10.49
Great black-backed gull	10.38	0.00	40.92
Herring gull	33.86	0.85	150.89
Lesser black-backed gull	0.80	0.00	6.32
Roseate tern	0.98	0.00	5.78
Common tern	0.59	0.00	3.72
Arctic tern	0.30	0.00	2.60
Manx shearwater	0.00	0.00	0.00
Fulmar	0.02	0.00	0.28
Gannet (Without Macro-Avoidance)	3.04	0.03	15.26
Gannet (With Macro-Avoidance)	0.91	0.01	4.58

3.1 Kittiwake

3.1.1 There are no changes to this section. Refer to Section 3.1 of Appendix 18 of the 2024 NIS.

Project Option 1

3.1.2 **As a result of the introduction of the PFI and the addition of the NWIS DAS data, and in response to RFI Section 1 (b), section 3.1.2 will be deleted and replaced with the following:**

3.1.3 The kittiwake collision rate for Band Option 2 estimated a mean of 17.89 annual collisions (based on the Project Option 1), with the LCI and UCI ranging from 0.24 to 77.83 annual collisions. The monthly distribution of collision estimates for kittiwake are displayed in Figure A3.1.

3.1.4 **In addition Figure 3.1 of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted and be replaced with Figure A3.1, which contains the updated CRM outputs:**

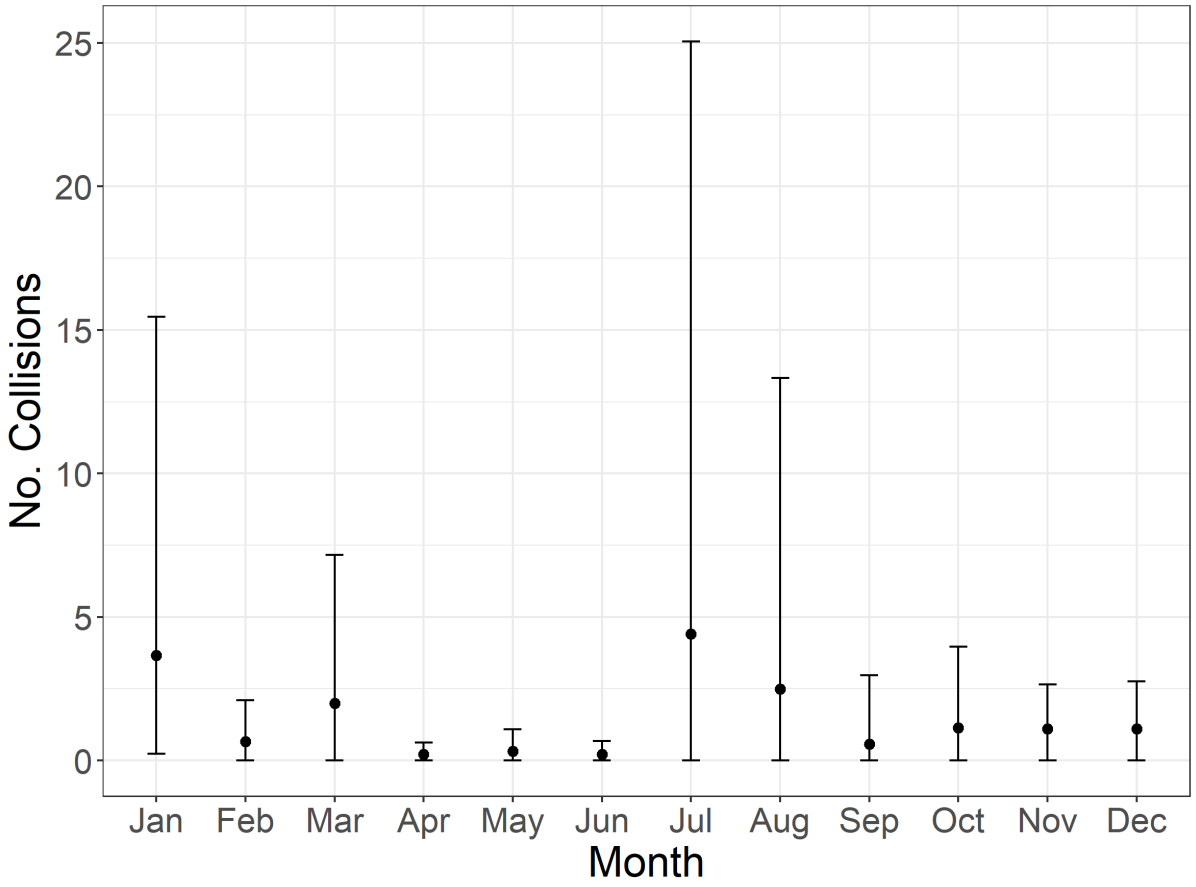

Figure A3.1: Mean monthly collisions predicted for kittiwake for Project Option 1 Band Option 2. Error bars display the upper and lower confidence intervals of monthly collision (replaces Figure 3.1 of Appendix 18 of the 2024 NIS).

3.1.5 As a result of the introduction of the PFI and the addition of the NWIS DAS data , and in response to RFI Section 1 (b), section 3.1.3 will be deleted and replaced with the following:

3.1.6 The kittiwake collision rate for Band Option 2 estimates a mean of 15.99 annual collisions (based on Project Option 2), with the LCI and UCI ranging from 0.25 to 69.51 annual collisions.

3.1.7 There are no further changes to this section.

3.2 Black-headed gull

3.2.1 There are no changes to this section. Refer to Section 3.2 of Appendix 18 of the 2024 NIS.

Project Option 1

3.2.2 **As a result of the introduction of the PFI and the addition of NWIS DAS data, and in response to RFI Section 1 (b), section 3.2.2 will be deleted and replaced with the following:**

3.2.3 The black-headed gull collision rate for Band Option 2 estimated a mean of 0.03 annual collisions (based on Project Option 1), with the LCI and UCI ranging from 0.00 to 0.26 annual collisions. The monthly distribution of collision estimates for black-headed gull are displayed in Figure A3.2.

3.2.4 **In addition, Figure 3.2 of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted and be replaced with Figure A3.2, which contains the updated CRM outputs.**

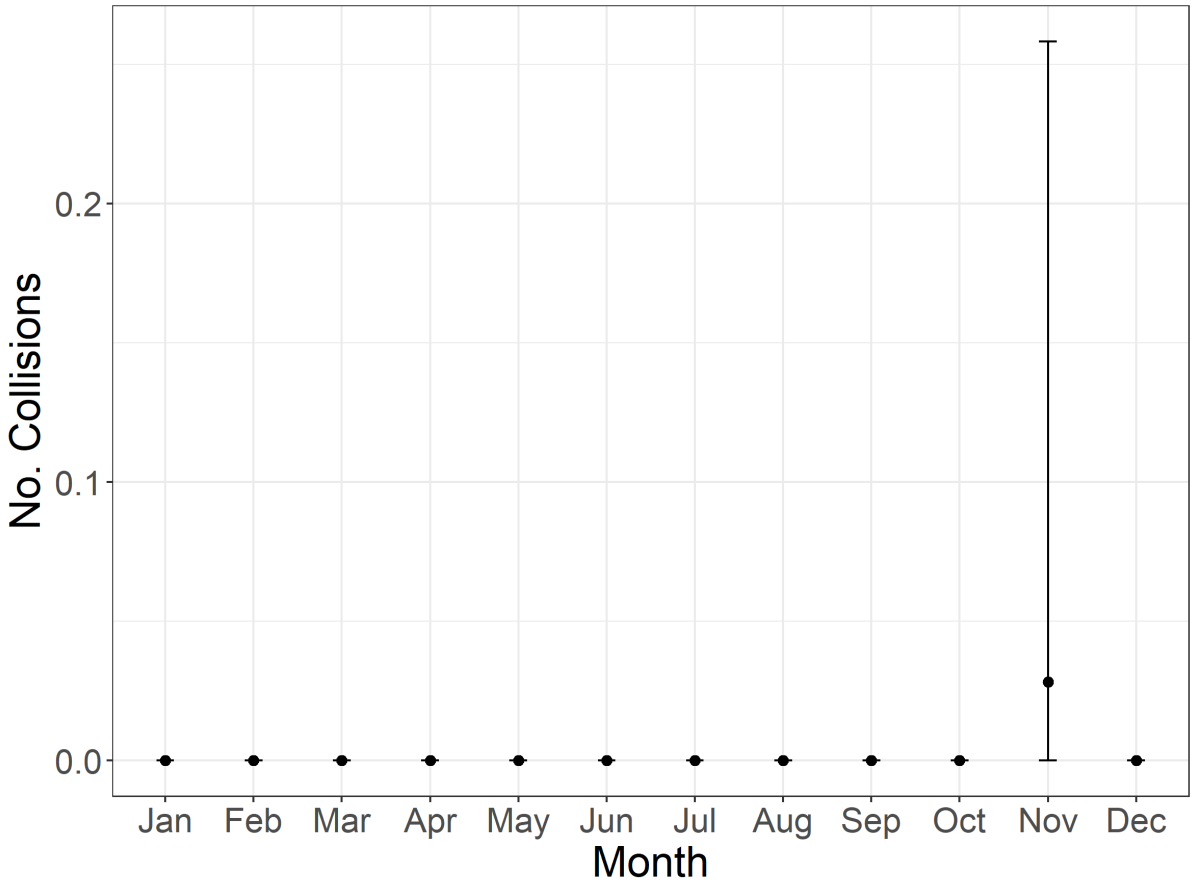

Figure A3.2: Mean monthly collisions predicted for black-headed gull for Project Option 1 Band Option 2. Error bars display the upper and lower confidence intervals of monthly collision (replaces Figure 3.2 of Appendix 18 of the 2024 NIS).

3.2.5 **As a result of the introduction of the PFI and the addition of NWIS DAS data, and in response to RFI Section 1 (b), section 3.2.3 will be deleted and replaced with the following:**

3.2.6 The black-headed gull collision rate for Band Option 2 estimated a mean of 0.02 annual collisions (based on Project Option 2), with the LCI and UCI ranging from 0.00 to 0.17 annual collisions.

3.2.7 **There are no further changes to this section. Refer to Section 3.2 of Appendix 18 of the 2024 NIS**.

3.3 Common gull

3.3.1 There are no changes to this section. Refer to Section 3.3 of Appendix 18 of the 2024 NIS.

Project Option 1

3.3.2 **As a result of the introduction of the PFI and the NWIS DAS data , and in response to RFI Section 1 (b), section 3.3.2 will be deleted and replaced with the following:**

3.3.3 The common gull collision rate for Band Option 2 estimated a mean of 3.01 annual collisions (based on Project Option 1), with the LCI and UCI ranging from 0.00 to 12.59 annual collisions. The monthly distribution of collision estimates for common gull are displayed in Figure A3.3.

3.3.4 **In addition Figure 3.3 of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted and be replaced with Figure A3.3, since it doesn't contain the updated CRM outputs.**

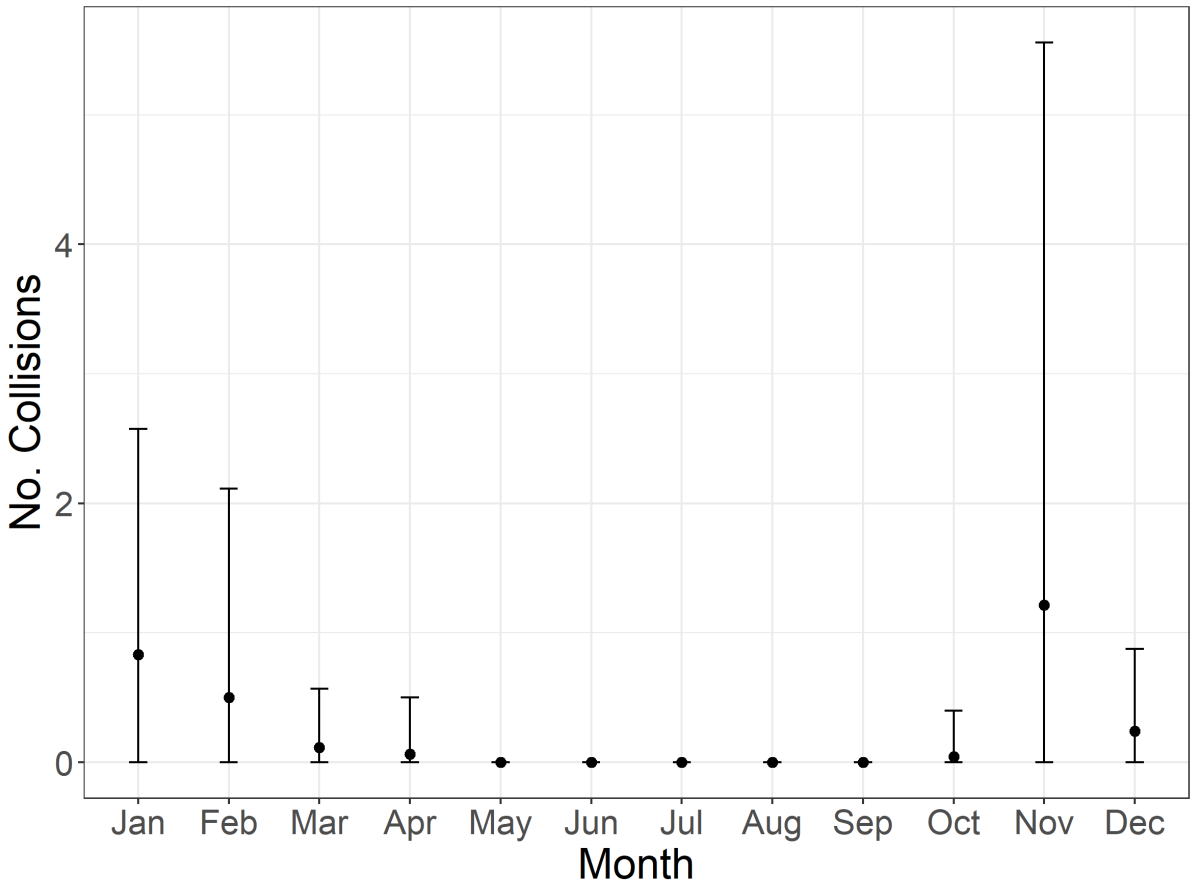

Figure A3.3: Mean monthly collisions predicted for common gull for Project Option 1 Band Option 2. Error bars display the upper and lower confidence intervals of monthly collisions (replaces Figure 3.3 of Appendix 18 of the 2024 NIS)

3.3.5 **As a result of the introduction of the PFI and the addition of NWIS DAS data, and in response to RFI Section 1 (b), section 3.3.3 will be deleted and replaced with the following:**

3.3.6 The common gull collision rate for Band Option 2 estimated a mean of 2.57 annual collisions (based on Project Option 2), with the LCI and UCI ranging from 0.00 to 10.49 annual collisions.

3.3.7 **There are no further changes to this section. Refer to Section 3.3 of Appendix 18 of the 2024 NIS.**

3.4 Great black-backed gull

3.4.1 There are no changes to this section. Refer to Section 3.4 of Appendix 18 of the 2024 NIS.

Project Option 1

3.4.2 **As a result of the introduction of the PFI and the addition of NWIS DAS data, and in response to RFI Section 1 (b), section 3.4.2 will be deleted and replaced with the following:**

3.4.3 The great black-backed gull collision rate for Band Option 2 estimates a mean of 13.38 annual collisions (based on Project Option 1), with the LCI and UCI ranging from 0.00 to 53.93 annual collisions. The monthly distribution of collision estimates for great black-backed gull are displayed in Figure A3.4.

3.4.4 **In addition Figure 3.4 of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted and be replaced with Figure A3.4, which contains the updated CRM outputs.**

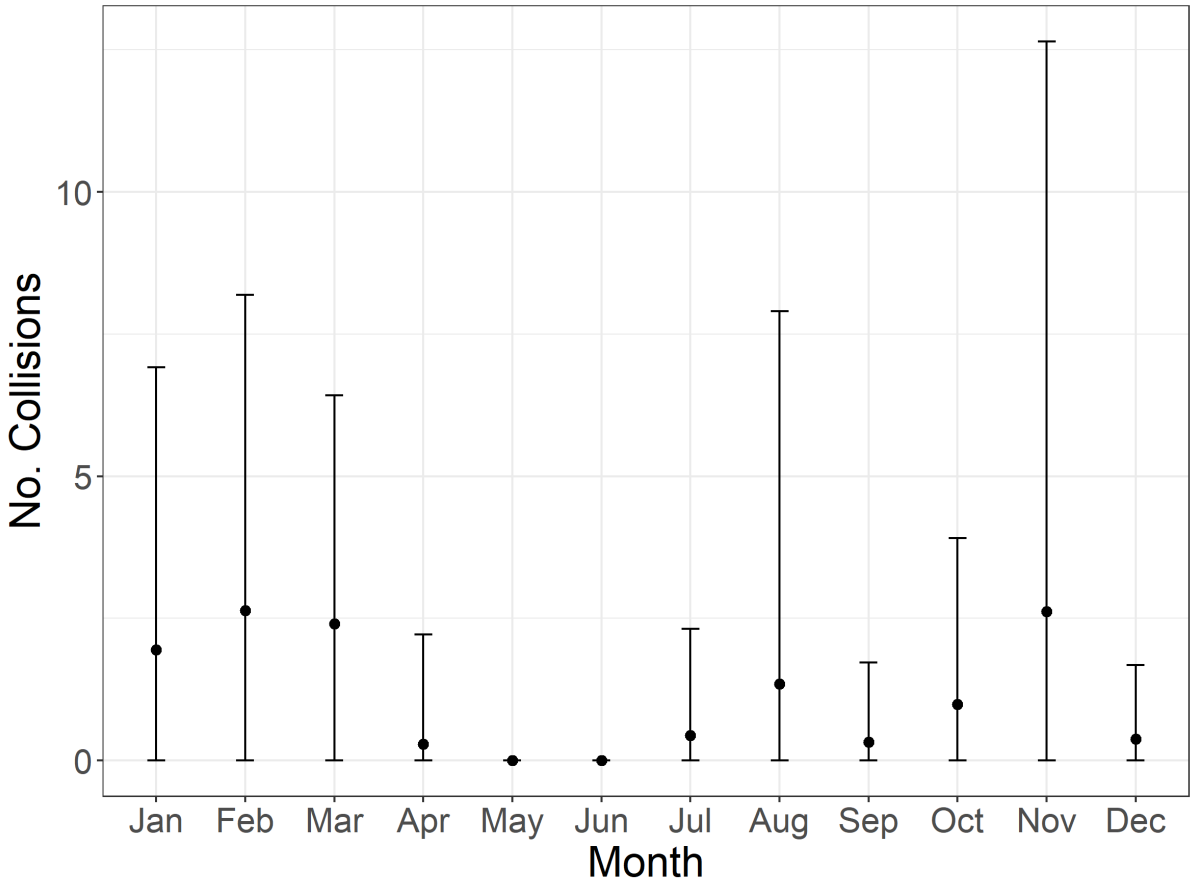

Figure A3.4: Mean monthly collisions predicted for great black-backed gull for Project Option 1 Band Option 2. Error bars display the upper and lower confidence intervals of monthly collision (replaces Figure 3.4 of Appendix 18 of the 2024 NIS).

3.4.5 **As a result of the introduction of the PFI and the addition of NWIS DAS data , and in response to RFI Section 1 (b), section 3.4.3 will be deleted and replaced with the following:**

3.4.6 The great black-backed gull collision rate for Band Option 2 estimates a mean of 10.38 annual collisions (based on Project Option 2), with the LCI and UCI ranging from 0.00 to 40.92 annual collisions.

3.4.7 **There are no further changes to this section. Refer to Section 3.4 of Appendix 18 of the 2024 NIS.**

3.5 Herring gull

3.5.1 There are no changes to this section. Refer to Section 3.5 of Appendix 18 of the 2024 NIS.

Project Option 1

3.5.2 **As a result of the introduction of the PFI and the addition of NWIS DAS data, and in response to RFI Section 1 (b), section 3.5.2 will be deleted and replaced with the following:**

3.5.3 The herring gull collision rate for Band Option 2 estimated a mean of 42.35 annual collisions (based on Project Option 1), with the LCI and UCI ranging from 0.92 to 191.65 annual collisions. The monthly distribution of collision estimates for herring gull are displayed in Figure A3.5.

3.5.4 **In addition Figure 3.5 of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted and be replaced with Figure A3.5, since it doesn't contain the updated CRM outputs.**

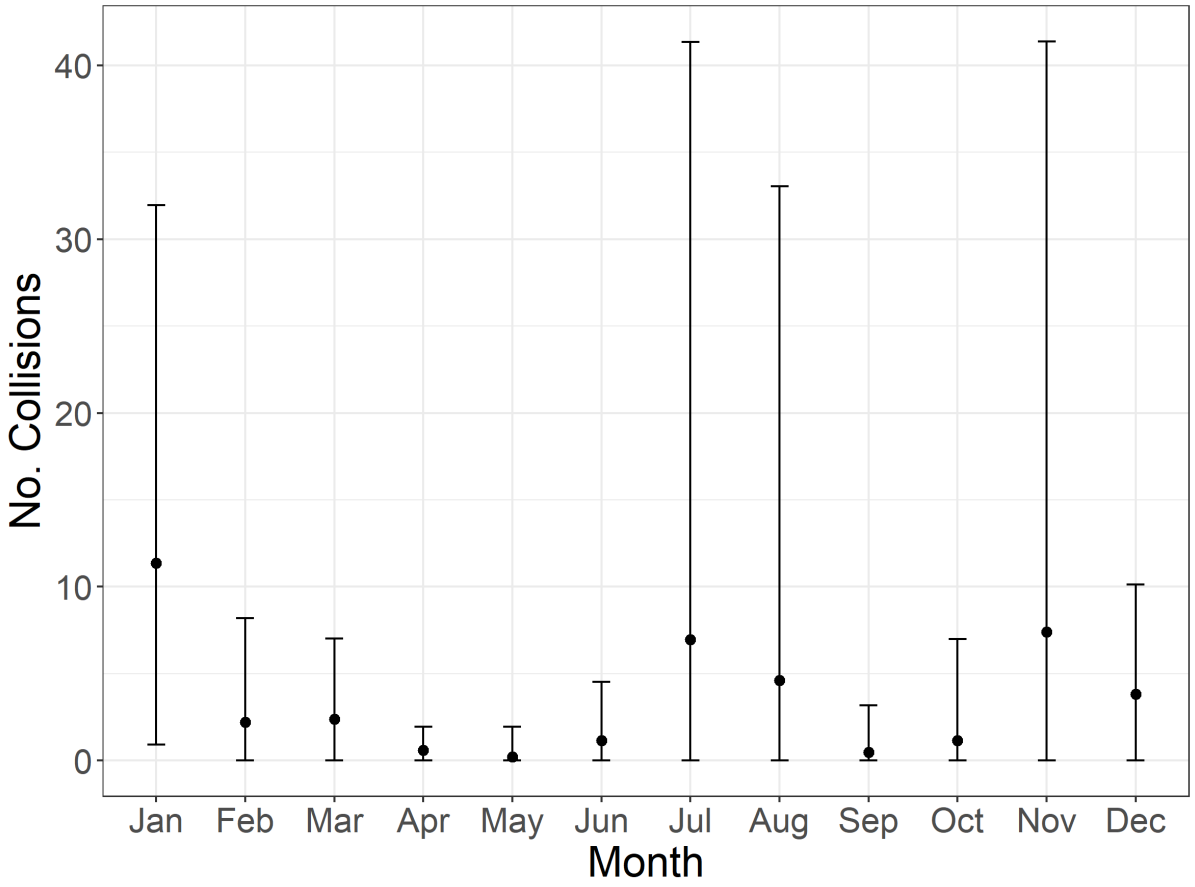

Figure A3.5: Mean monthly collisions predicted for herring gull for Project Option 1 Band Option 2. Error bars display the upper and lower confidence intervals of monthly collision (replaces Figure 3.5 of Appendix 18 of the 2024 NIS).

3.5.5 **As a result of the introduction of the PFI and the addition of NWIS DAS data, and in response to RFI Section 1 (b), section 3.5.3 will be deleted and replaced with the following:**

3.5.6 The herring gull collision rate for Band Option 2 estimated a mean of 33.86 annual collisions (based on Project Option 2), with the LCI and UCI ranging from 0.85 to 150.89 annual collisions.

3.5.7 **There are no further changes to this section. Refer to Section 3.5 of Appendix 18 of the 2024 NIS.**

3.6 Lesser black-backed gull

3.6.1 There are no changes to this section. Refer to Section 3.6 of Appendix 18 of the 2024 NIS.

Project Option 1

3.6.2 **As a result of the introduction of the PFI and the NWIS DAS data , and in response to RFI Section 1 (b), section 3.6.2 will be deleted and replaced with the following:**

3.6.3 The lesser black-backed gull collision rate for Band Option 2 estimated a mean of 1.01 annual collisions (based on Project Option 1), with the LCI and UCI ranging from 0.00 to 8.76 annual collisions. The monthly distribution of collision estimates for lesser black-backed gull are displayed in Figure A3.6.

3.6.4 **In addition Figure 3.6 of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted and be replaced with Figure A3.6, since it doesn't contain the updated CRM outputs.**

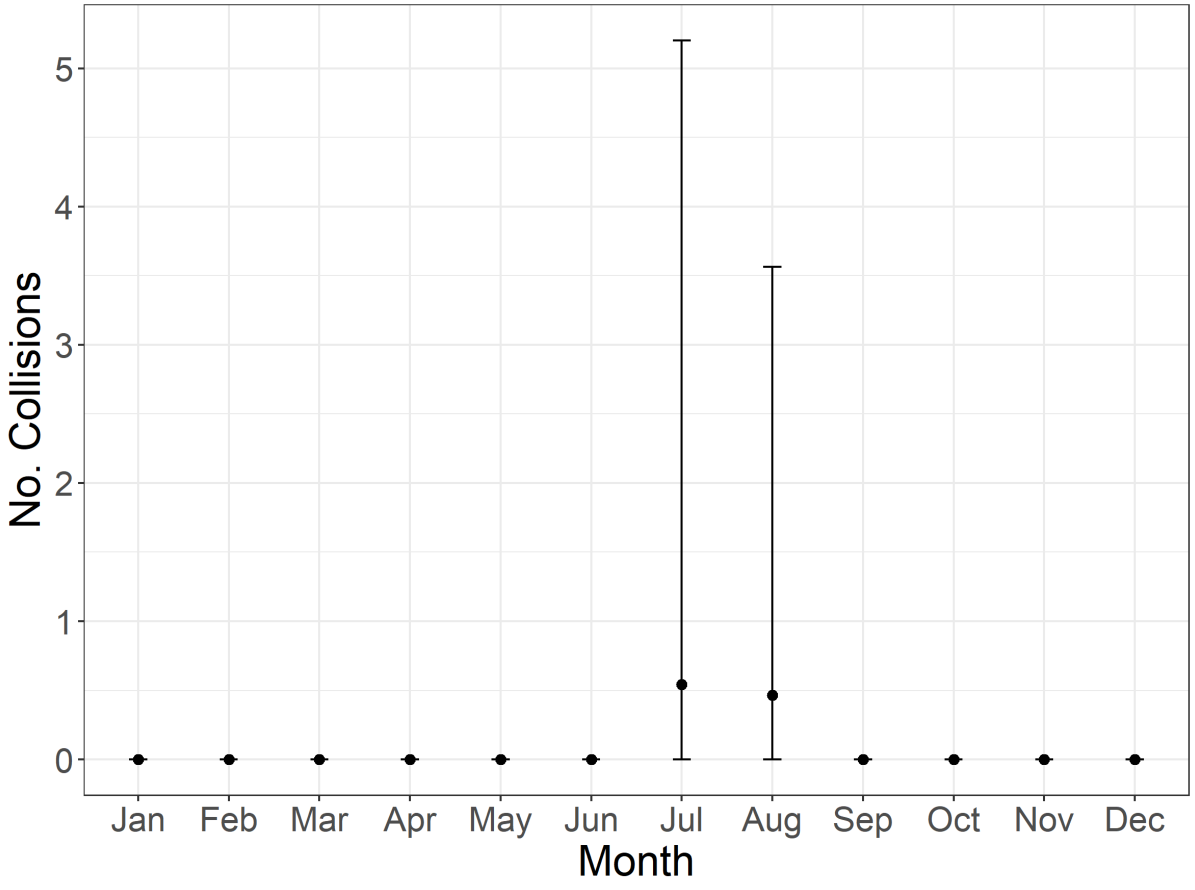

Figure A3.6: Mean monthly collisions predicted for lesser black-backed gull for Project Option 1 Band Option 2. Error bars display the upper and lower confidence intervals of monthly collisions (replaces Figure 3.6 of Appendix 18 of the 2024 NIS).

3.6.5 **As a result of the introduction of the PFI and the addition of NWIS DAS data, and in response to RFI Section 1 (b), section 3.6.3 will be deleted and replaced with the following:**

3.6.6 The lesser black-backed gull collision rate for Band Option 2 estimated a mean of 0.80 annual collisions (based on Project Option 2), with the LCI and UCI ranging from 0.00 to 6.32 annual collisions.

3.6.7 **There are no further changes to this section. Refer to Section 3.6 of Appendix 18 of the 2024 NIS.**

3.7 Roseate tern

3.7.1 There are no changes to this section. Refer to Section 3.7 of Appendix 18 of the 2024 NIS.

Project Option 1

3.7.2 **As a result of the introduction of the PFI and the addition of NWIS DAS data, and in response to RFI Section 1 (b), section 3.7.2 will be deleted and replaced with the following:**

3.7.3 The roseate tern collision rate for Band Option 2 estimated a mean of 1.15 annual collisions (based on Project Option 1), with the LCI and UCI ranging from 0.00 to 6.39 annual collisions. The monthly distribution of collision estimates for roseate tern are displayed in Figure A3.7.

3.7.4 **In addition Figure 3.7 of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted and be replaced with Figure A3.7, which contains the updated CRM outputs.**

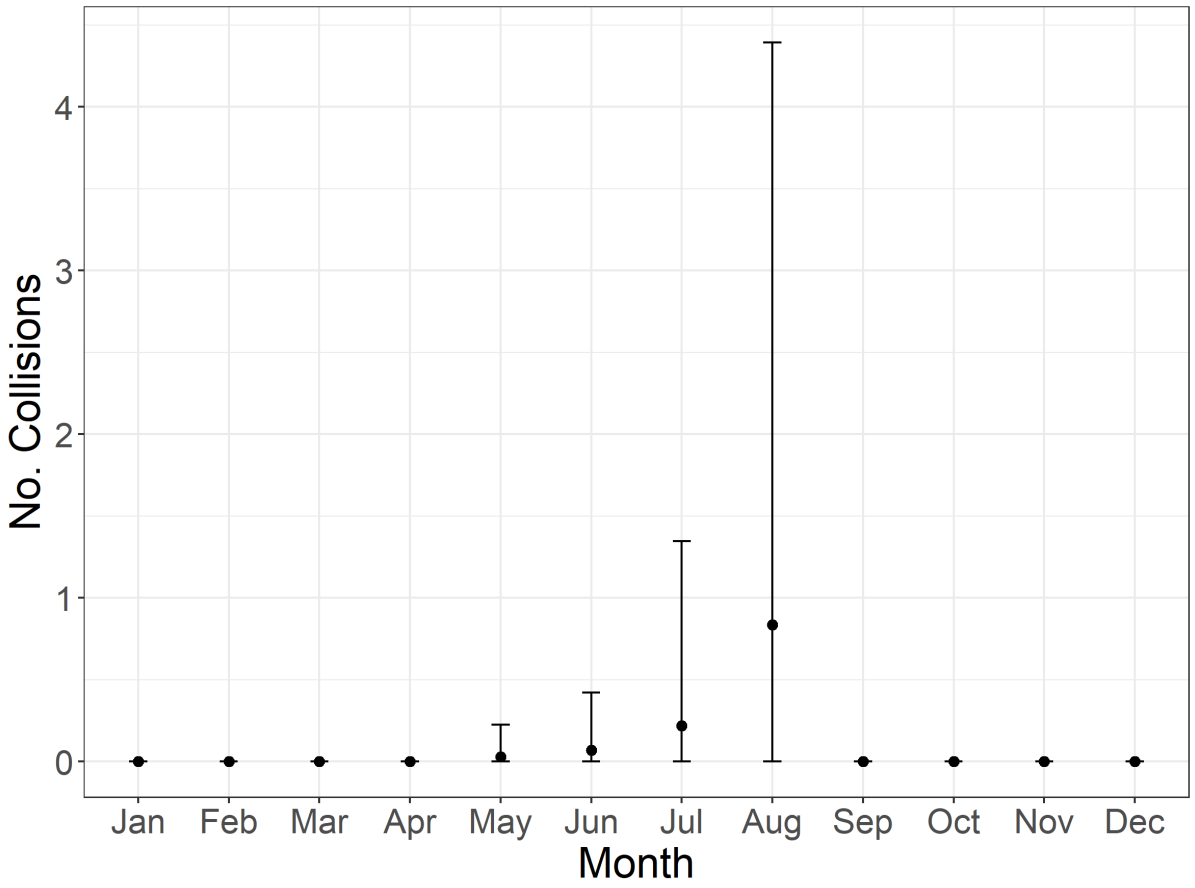

Figure A3.7: Mean monthly collisions predicted for roseate tern for Project Option 1 Band Option 2. Error bars display the upper and lower confidence intervals of monthly collisions (replaces Figure 3.7 of Appendix 18 of the 2024 NIS).

3.7.5 **As a result of the introduction of the PFI and the addition of NWIS DAS data, and in response to RFI Section 1 (b), section 3.7.3 will be deleted and replaced with the following:**

3.7.6 The roseate collision rate for Band Option 2 estimated a mean of 0.98 annual collisions (based on Project Option 2), with the LCI and UCI ranging from 0.00 to 5.78 annual collisions.

3.7.7 **There are no further changes to this section. Refer to Section 3.7 of Appendix 18 of the 2024 NIS.**

3.8 Common tern

3.8.1 There are no changes to this section. Refer to Section 3.8 of Appendix 18 of the 2024 NIS.

Project Option 1

3.8.2 **As a result of the introduction of the PFI and the addition of NWIS DAS data , and in response to RFI Section 1 (b), section 3.8.2 will be deleted and replaced with the following:**

3.8.3 The common tern collision rate for Band Option 2 estimated a mean of 0.61 annual collisions (based on Project Option 1), with the LCI and UCI ranging from 0.00 to 4.03 annual collisions. The monthly distribution of collision estimates for common tern are displayed in Figure A3.8.

3.8.4 **In addition Figure 3.8 of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted and be replaced with Figure A3.8, which contains the updated CRM outputs.**

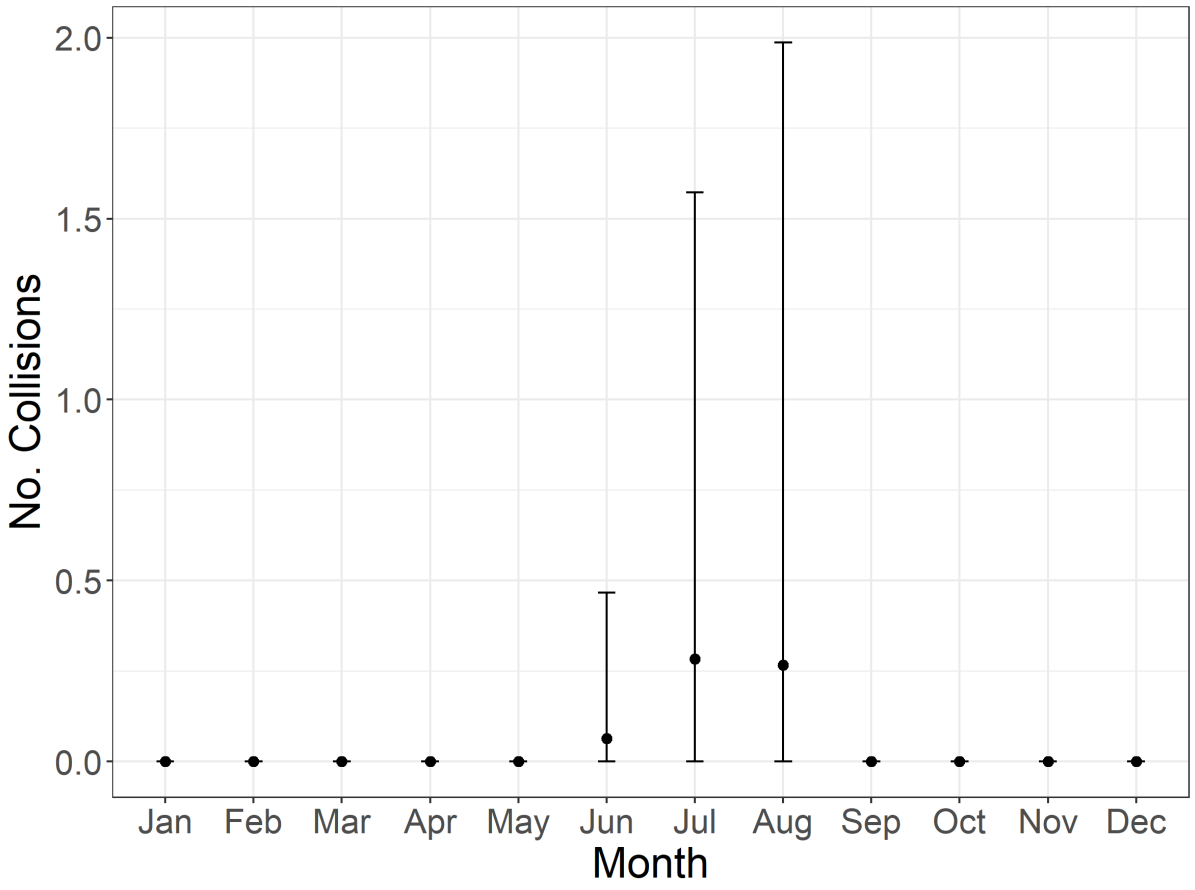

Figure A3.8: Mean monthly collisions predicted for common tern for Project Option 1 Band Option 2. Error bars display the upper and lower confidence intervals of monthly collisions (replaces Figure 3.8 of Appendix 18 of the 2024 NIS).

3.8.5 **As a result of the introduction of the PFI and the addition of NWIS DAS data , and in response to RFI Section 1 (b), section 3.8.3 will be deleted and replaced with the following:**

3.8.6 The common tern collision rate for Band Option 2 estimated a mean of 0.59 annual collisions (based on Project Option 2), with the LCI and UCI ranging from 0.00 to 3.72 annual collisions.

3.8.7 **There are no further changes to this section. Refer to Section 3.8 of Appendix 18 of the 2024 NIS.**

3.9 Arctic tern

3.9.1 There are no changes to this section. Refer to Section 3.9 of Appendix 18 of the 2024 NIS.

Project Option 1

3.9.2 **As a result of the introduction of the PFI and the addition of NWIS DAS data , and in response to RFI Section 1 (b), section 3.9.2 will be deleted and replaced with the following:**

3.9.3 The Arctic tern collision rate for Band Option 2 estimated a mean of 0.25 annual collisions (based on Project Option 1), with the LCI and UCI ranging from 0.00 to 2.25 annual collisions.

3.9.4 **In addition Figure 3.9 of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted and be replaced with Figure A3.9, which contains the updated CRM outputs.**

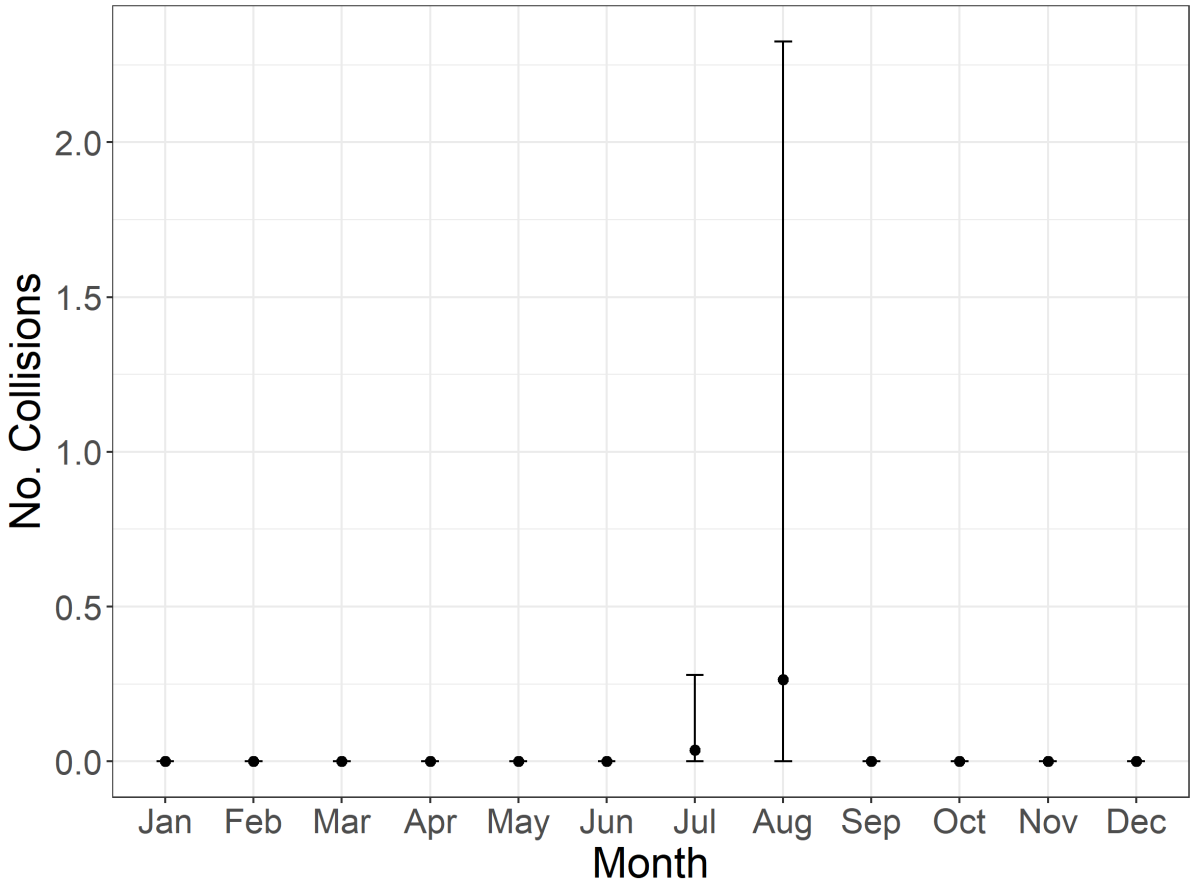

Figure A3.9: Mean monthly collisions predicted for arctic tern for Project Option 2 Band Option 2. Error bars display the upper and lower confidence intervals of monthly collision (replaces Figure 3.9 of Appendix 18 of the 2024 NIS).

3.9.5 **As a result of the introduction of the PFI and the addition of NWIS DAS data , and in response to RFI Section 1 (b), section 3.9.3 will be deleted and replaced with the following:**

3.9.6 The Arctic tern collision rate for Band Option 2 estimated a mean of 0.30 annual collisions (based on Project Option 2), with the LCI and UCI ranging from 0.00 to 2.60 annual collisions. The monthly distribution of collision estimates for Arctic tern are displayed in Figure A3.9: Mean monthly collisions predicted for arctic tern for Project Option 2 Band Option 2. Error bars display the upper and lower confidence intervals of monthly collision (replaces Figure 3.9 of Appendix 18 of the 2024 NIS).

3.9.7 **There are no further changes to this section. Refer to Section 3.9 of Appendix 18 of the 2024 NIS.**

3.10 Commic tern

3.10.1 As highlighted in Section 1.2, comic terns are excluded from the modelling, this is because commic terns were apportioned to species level prior to the collision risk modelling being undertaken. As a result, the densities of common tern and Arctic tern used in the CRM already include birds that were not identified to species level. As a result, Section 3.10 can now be deleted and is not replaced.

3.10.2 There are no further changes to this section. Refer to Section 3.9 of Appendix 18 of the 2024 NIS.

3.11 Manx shearwater

3.11.1 There are no changes to the sections on Manx shearwater as no collisions were predicted with the updated CRM parameters and NWIS DAS data. Refer to Section 3.11 of Appendix 18 of the 2024 NIS.

3.12 Fulmar

3.12.1 There are no changes to this section. Refer to Section 3.12 of Appendix 18 of the 2024 NIS.

Project Option 1

3.12.2 **As a result of the introduction of the PFI and the addition of baseline data collection across the NWIS SPA, and in response to RFI Section 1 (b), section 3.12.2 will be deleted and replaced with the following:**

3.12.3 The fulmar collision rate for Band Option 2 estimated a mean of 0.02 annual collisions (based on Project Option 1), with the LCI and UCI ranging from 0.00 to 0.35 annual collisions. The monthly distribution of collision estimates for fulmar are displayed in Figure A3.10.

3.12.4 **In addition Figure 3.11 of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted and be replaced with Figure A3.11, which contains the updated CRM outputs.**

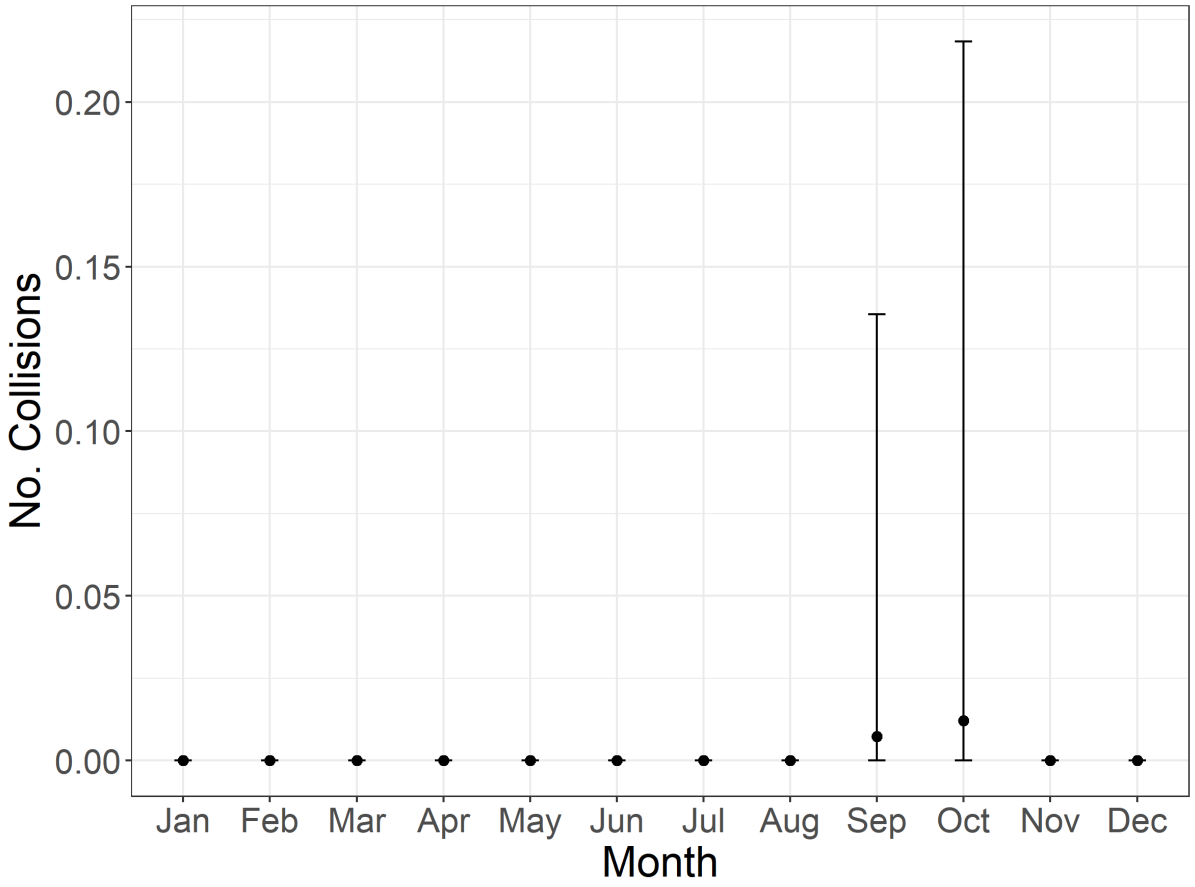

Figure A3.10: Mean monthly collisions predicted for fulmar for Project Option 1 Band Option 2. Error bars display the upper and lower confidence intervals of monthly collision (replaces Figure 3.11 of Appendix 18 of the 2024 NIS).

3.12.5 **As a result of the introduction of the PFI and the NWIS DAS data , and in response to RFI Section 1 (b), section 3.12.3 will be deleted and replaced with the following:**

3.12.6 The fulmar collision rate for Band Option 2 estimated a mean of 0.02 annual collisions (based on Project Option 2), with the LCI and UCI ranging from 0.00 to 0.28 annual collisions.

3.12.7 **There are no further changes to this section. Refer to Section 3.12 of Appendix 18 of the 2024 NIS.**

3.13 Gannet

3.13.1 There are no changes to this section. Refer to Section 3.13 of Appendix 18 of the 2024 NIS.

Project Option 1

3.13.2 **As a result of the introduction of the PFI and the addition of NWIS DAS data, and in response to RFI Section 1 (b), section 3.13.2 will be deleted and replaced with the following:**

3.13.3 The gannet collision rate for Band Option 2 estimated a mean of 3.71 annual collisions (based on Project Option 1 without macro-avoidance), with the LCI and UCI ranging from 0.02 to 18.47 annual collisions. The monthly distribution of collision estimates for gannet without macro-avoidance are displayed in Figure A3.11.

3.13.4 **In addition Figure 3.12 of Appendix 18 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment shall be deleted and be replaced with Figure A3.12, which contains the updated CRM outputs.**

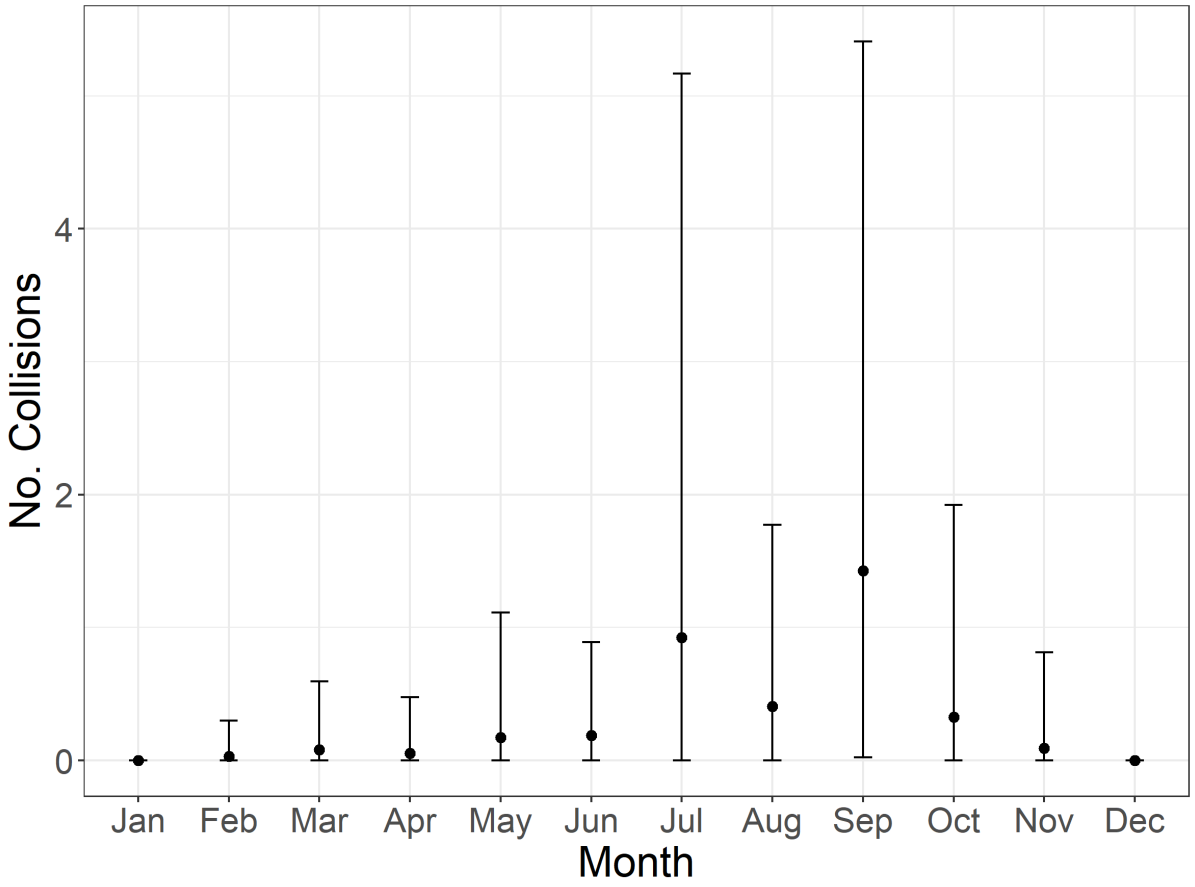

Figure A3.11: Mean monthly collisions predicted for gannet without macro-avoidance applied for Project Option 1 Band Option 2. Error bars display the upper and lower confidence intervals of monthly collision (replaces Figure 3.12 of Appendix 18 of the 2024 NIS).

3.13.5 **As a result of the introduction of the PFI and the addition of NWIS DAS data, and in response to RFI Section 1 (b), section 3.13.3 will be deleted and replaced with the following:**

3.13.6 The gannet collision rate for Band Option 2 estimated a mean of 3.04 annual collisions (based on Project Option 2 without macro-avoidance), with the LCI and UCI ranging from 0.03 to 15.26 annual collisions.

4 References

As a result of RFI Section 1 (b), the following references have been added:

Cook, A.S.C.P, Thaxter, C.B., Davies, J., Green, R.M.W., Wischnewski, S. and Boersch-Supan. P. (2023) Understanding seabird behaviour at sea part 2: improved estimates of collision risk model parameters. Report to Scottish Government.

JNCC, Natural England, Natural Resources Wales, NatureScot. (2024) Joint advice from the Statutory Nature Conservation Bodies (SNCBs) regarding bird collision risk modelling for offshore wind developments. JNCC, Peterborough. Available at: https://jncc.gov.uk/resources/f7892820-0f84-4e96-9eff-168f93bd343d

Robinson, R.A. (2005). BirdFacts: profiles of birds occurring in Britain & Ireland. BTO, Thetford (http://www.bto.org/birdfacts, accessed on 12 January 2021).

Snow, D.W. and Perrins, C.M. (1998) The Birds of the Western Palearctic. Non-Passerines. Oxford: Oxford University Press.

There are no further changes to this section. Refer to Section 4 of Appendix 18 of the 2024 NIS.

Appendix A: Monthly Collision Estimates for Each Species

Due to the updated collision risk modelling results the Tables 4-1 to 4-13 shall be deleted and replaced with Tables A4-1 to Tables A4-13.

Table A4.1: Kittiwake monthly collision estimates.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project Option 1												
Mean	3.67	0.66	2.00	0.21	0.31	0.21	4.41	2.48	0.56	1.15	1.11	1.11
LCI	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UCI	15.46	2.09	7.16	0.62	1.09	0.69	25.05	13.32	2.97	3.97	2.66	2.76
Project Option 2												
Mean	3.16	0.60	1.66	0.19	0.27	0.18	4.19	2.24	0.51	1.00	0.98	0.99
LCI	0.20	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
UCI	13.09	1.92	6.18	0.57	1.01	0.55	23.85	11.49	2.55	3.43	2.42	2.47

Table A4.2: Black-headed gull monthly collision estimates.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project Option 1												
Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00
Project Option 2												
Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00

Table A4.3: Common gull monthly collision estimates.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project Option 1												
Mean	0.83	0.50	0.11	0.06	0.00	0.00	0.00	0.00	0.00	0.04	1.22	0.24
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UCI	2.57	2.12	0.57	0.50	0.00	0.00	0.00	0.00	0.00	0.40	5.56	0.88
Project Option 2												
Mean	0.69	0.43	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.04	1.06	0.19
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UCI	2.09	1.71	0.47	0.39	0.00	0.00	0.00	0.00	0.00	0.34	4.75	0.75

Table A4.4: Great black-backed gull monthly collision estimates.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project Option 1												
Mean	1.95	2.64	2.41	0.29	0.00	0.00	0.44	1.35	0.33	0.99	2.62	0.37
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UCI	6.92	8.19	6.42	2.22	0.00	0.00	2.32	7.91	1.73	3.91	12.65	1.68
Project Option 2												
Mean	1.50	2.06	1.84	0.23	0.00	0.00	0.35	1.11	0.25	0.79	1.97	0.29

LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UCI	4.86	6.30	4.69	1.83	0.00	0.00	1.95	6.04	1.34	3.00	9.65	1.26

Table A4.5: Herring gull monthly collision estimates.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project Option 1												
Mean	11.37	2.21	2.37	0.59	0.20	1.15	6.97	4.62	0.48	1.16	7.40	3.83
LCI	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UCI	31.96	8.20	7.01	1.95	1.95	4.52	41.34	33.05	3.18	6.99	41.38	10.12
Project Option 2												
Mean	9.56	1.76	1.91	0.43	0.17	0.95	5.34	3.97	0.39	0.94	5.55	2.90
LCI	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UCI	25.99	7.00	5.17	1.48	1.46	3.93	30.21	29.06	2.62	5.26	30.86	7.84

Table A4.6: Lesser black-backed gull monthly collision estimates.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project Option 1												
Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.47	0.00	0.00	0.00	0.00
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UCI	0.00	0.00	0.00	0.00	0.00	0.00	5.20	3.56	0.00	0.00	0.00	0.00
Project Option 2												
Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.39	0.00	0.00	0.00	0.00
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UCI	0.00	0.00	0.00	0.00	0.00	0.00	3.64	2.68	0.00	0.00	0.00	0.00

Table A4.7: Roseate tern monthly collision estimates.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project Option 1												
Mean	0.00	0.00	0.00	0.00	0.03	0.07	0.22	0.84	0.00	0.00	0.00	0.00
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UCI	0.00	0.00	0.00	0.00	0.23	0.42	1.35	4.39	0.00	0.00	0.00	0.00
Project Option 2												
Mean	0.00	0.00	0.00	0.00	0.03	0.06	0.19	0.70	0.00	0.00	0.00	0.00
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UCI	0.00	0.00	0.00	0.00	0.21	0.41	1.21	3.95	0.00	0.00	0.00	0.00

Table A4.8: Common tern monthly collision estimates.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project Option 1												
Mean	0.00	0.00	0.00	0.00	0.00	0.06	0.28	0.27	0.00	0.00	0.00	0.00
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UCI	0.00	0.00	0.00	0.00	0.00	0.47	1.57	1.99	0.00	0.00	0.00	0.00
Project Option 2												
Mean	0.00	0.00	0.00	0.00	0.00	0.05	0.27	0.26	0.00	0.00	0.00	0.00
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

UCI	0.00	0.00	0.00	0.00	0.00	0.39	1.45	1.88	0.00	0.00	0.00	0.00

Table A4.9: Arctic tern monthly collision estimates.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project Option 1												
Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.21	0.00	0.00	0.00	0.00
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UCI	0.00	0.00	0.00	0.00	0.00	0.00	0.31	1.95	0.00	0.00	0.00	0.00
Project Option 2												
Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.26	0.00	0.00	0.00	0.00
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UCI	0.00	0.00	0.00	0.00	0.00	0.00	0.28	2.33	0.00	0.00	0.00	0.00

Table A4.10: Manx shearwater monthly collision estimates.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project Option 1												
Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Project Option 2												
Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table A4.11: Fulmar monthly collision estimates.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project Option 1												
Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.22	0.00	0.00
Project Option 2												
Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.17	0.00	0.00

Table A4.12: Gannet monthly collision estimates without macro-avoidance.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project Option 1												
Mean	0.00	0.03	0.08	0.05	0.17	0.19	0.93	0.41	1.43	0.33	0.09	0.00
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
UCI	0.00	0.30	0.59	0.48	1.11	0.89	5.17	1.77	5.41	1.92	0.81	0.00
Project Option 2												
Mean	0.00	0.03	0.07	0.04	0.14	0.16	0.79	0.33	1.16	0.25	0.08	0.00
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
UCI	0.00	0.23	0.49	0.32	0.83	0.74	4.36	1.44	4.33	1.86	0.65	0.00

Table A4.13: Gannet monthly collision estimates with macro-avoidance.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Project Option 1												
Mean	0.00	0.01	0.02	0.02	0.05	0.06	0.28	0.12	0.43	0.10	0.03	0.00
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
UCI	0.00	0.09	0.18	0.14	0.33	0.27	1.55	0.53	1.62	0.58	0.24	0.00
Project Option 2												
Mean	0.00	0.01	0.02	0.01	0.04	0.05	0.24	0.10	0.35	0.08	0.02	0.00
LCI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
UCI	0.00	0.07	0.15	0.10	0.25	0.22	1.31	0.43	1.30	0.56	0.20	0.00

There are no further changes to this section. Refer to Section 4 of Appendix 18 of the 2024 NIS.

GoBe Consultants Ltd
Suites B2 & C2, Higher Mill
Higher Mill Lane
Buckfastleigh
Devon
TQ11 0EN

www.gobeconsultants.com