Technical Appendix 11.4: Displacement.

MachairWind Offshore Ornithology

ScottishPower Renewables (SPR)

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Rev 1	29 September 2025	NG	BF	ES
Rev 2	26 February 2026	NG	MA	ES
Rev 3	13 March 2026	MT	MA	ES

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1.0 Introduction

1.1 Project Summary

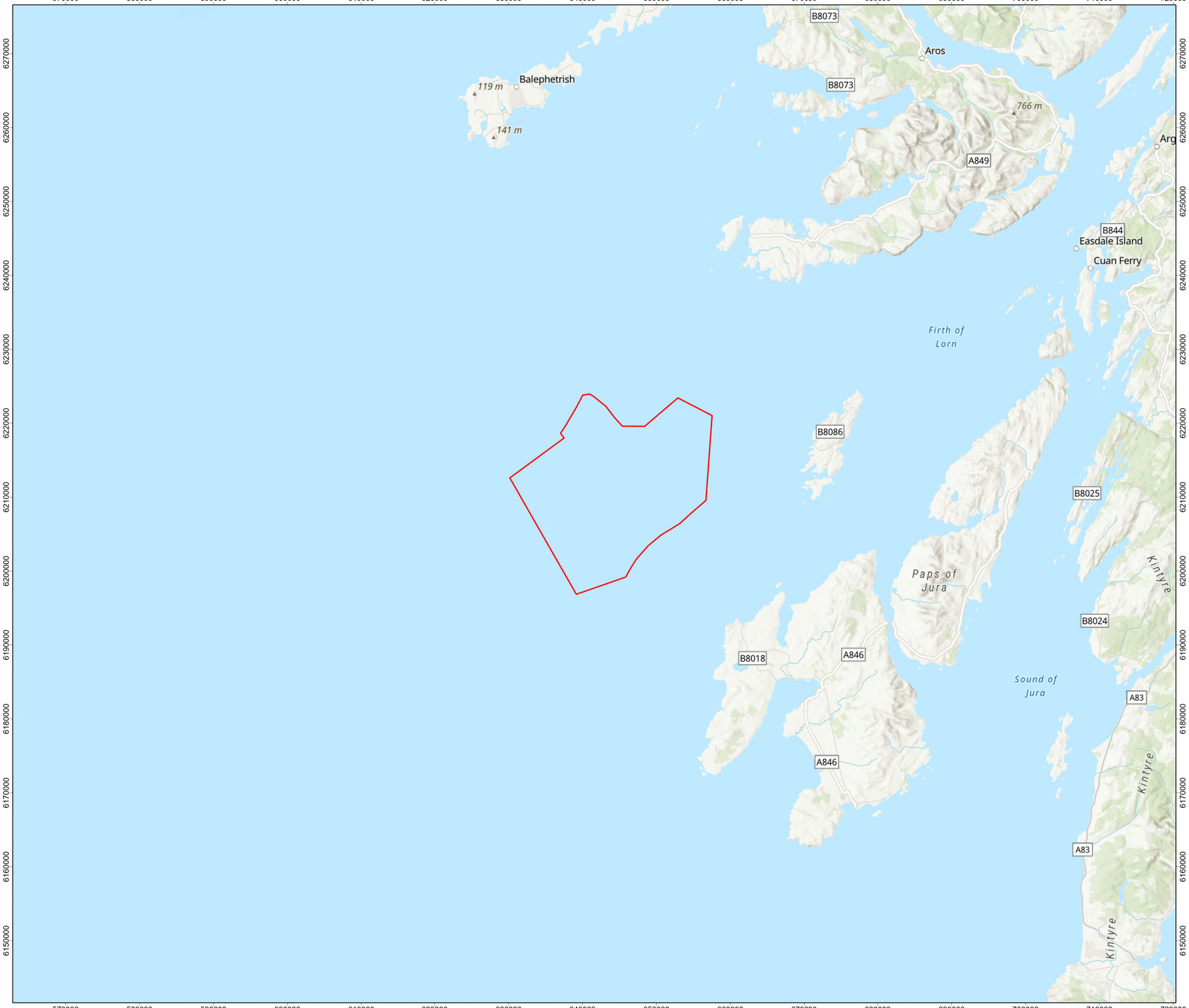
1. Machairwind Limited ('the Applicant') is proposing the development of the MachairWind Windfarm ('the Project'), an Offshore Windfarm , located off the west coast of Scotland approximately 15 kilometres (km) to the northwest of Islay and approximately 12.4 km west of Colonsay at the closest points (**Figure 1**).

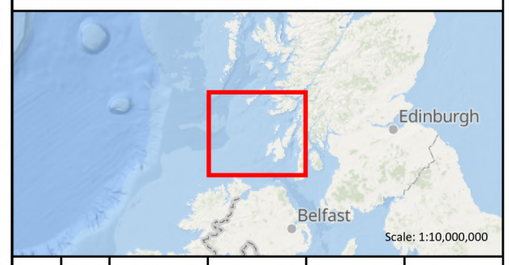
2. The Offshore Project will comprise up to 144 wind turbine generators (WTGs) with fixed-bottom foundations. The area within which the WTGs and associated infrastructure will be located is the Windfarm Development Area (WDA). The WDA covers an area of 448 km^2.

1.2 Purpose of this Report

3. This **Technical Appendix 11.4: Displacement** report provides information on the quantitative approach used for predicting displacement mortality that could occur in the WDA plus 2 km buffer (for all species except divers and seaducks) or the WDA plus 4 km buffer (divers and seaduck species) during Project operation. This information is used in the impact assessments presented in **Chapter 11 Offshore Ornithology** of the Environmental Impact Assessment Report (EIAR) and the Report to Inform Appropriate Assessment (RIAA).

4. Displacement mortality estimates were generated using 30 Digital Aerial Survey (DAS) samples (one sample is composed of one complete DAS survey per month, for survey details refer to **Technical Appendix 11.2: Baseline Site Characterisation**). This technical appendix presents the seasonal and annual estimated displacement mortality, used in the subsequent stages of the impact assessments, for great northern diver, kittiwake, Arctic tern, common tern, guillemot, razorbill, puffin, fulmar and gannet.





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DRAWING TITLE	**MachairWind** **Windfarm Development Area**		

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Name: MachairWind Windfarm Development Area

2.0 Methods

2.1 Species Assessed for Displacement

5. Species selected for the displacement assessment included those that met the following criteria:

    - Species recorded regularly within the WDA plus a 2 km buffer (for all species except divers and seaducks) or the WDA plus a 4 km buffer (for diver and seaduck species only) in 30 DAS samples (i.e. a total of 10 or more birds recorded across 30 DAS samples) between March 2021 to September 2023; and,
    - Species considered susceptible to disturbance (i.e. have medium or high 'Disturbance Sensitivity' and 'Habitat Specialisation' scores as assessed by Bradbury et al., 2014 (expanded from Furness et al., 2013), summarised by SNCB, 2022a and b).

6. The following nine species were recorded during digital aerial surveys for the Project and were identified as being at risk of displacement during Project operation:

    - Great northern diver (*Gavia immer*);
    - Kittiwake (*Rissa tridactyla*);
    - Arctic tern (*Sterna paradisaea*);
    - Common tern (*Sterna hirundo*);
    - Guillemot (*Uria aalge*);
    - Razorbill (*Alca torda*);
    - Puffin (*Fratercula arctica*);
    - Fulmar (*Fulmarus glacialis*); and,
    - Gannet (*Morus bassanus*).

7. European storm petrel and Manx shearwater were recorded within the WDA plus a 2 km buffer, but these species are not considered to be sensitive to displacement (Furness et al., 2013) and were therefore not included in the quantitative displacement assessment. These two species were assessed using a semi-quantitative approach in the RIAA and the EIAR.

2.2 Approach

2.2.1 Overview

8. NatureScot, in Guidance Note 6[1], conclude that distributional responses (i.e. displacement and barrier effects) and collision risk are the primary impact pathways for marine birds at offshore windfarms.

9. Furness et al., (2013) defines displacement as 'a reduced number of birds occurring within or immediately adjacent to an offshore windfarm', due to the presence of WTGs and/or other offshore infrastructure. This could result in birds no longer being able to use their preferred foraging area, having to forage elsewhere which could be sub-optimal and/or potentially having increased inter- and intra- specific competition.

[1] NatureScot Guidance Note 6 (version 1 updated January 2023): https://www.nature.scot/doc/guidance-note-6-guidance-support-offshore-wind-applications-marine-ornithology-impact-pathways

10. Birds that would have previously flown through the area prior to construction of the offshore windfarm and which either stop short or detour around a development, are subject to barrier effects (SNCB, 2022a). For the purposes of assessment, it is usually not possible to distinguish between displacement and barrier effects (e.g., to determine if individual birds may have intended to travel to, or beyond an offshore windfarm, even when tracking data are available).

11. Both displacement and barrier effects result in a change in a bird's behaviour in response to the presence of an offshore windfarm. If a reduction in foraging efficiency (reduced daily energy intake) and/or increased energetic cost of foraging occurs (increased daily energy expenditure), this could lead to demographic consequences. Body condition will decline, ultimately leading to a reduction in reproductive success (e.g. failure to provision chicks, electing to take a year off breeding) and even death.

12. NatureScot provide guidance on how to assess displacement in their Guidance Note 8[2]. This guidance advises to assess displacement using both a matrix approach based on the Joint SNCB Interim Displacement Advice Note produced by the Statutory Nature Conservation Bodies (SNCB, 2022a) and, for the very limited number of species where it is possible, and for the breeding season only, using the SeabORD tool (Searle et al., 2018).

13. The displacement matrix approach was used to estimate potential displacement mortality arising from operation of the Project as agreed with NatureScot at the Expert Topic Group meeting 4 (ETG 4, 2 December 2025). The displacement matrix approach assumes a proportion of birds using the offshore windfarm development area prior to construction will be displaced following construction. A proportion of displaced birds are then assumed to suffer mortality as a consequence of displacement.

14. The SeabORD approach was not used to estimate potential displacement mortality as agreed with NatureScot at the Expert Topic Group meeting 4 (ETG 4, 2 December 2025). The SeabORD approach is a complex spatially-explicit individual-based energetics model that relies on a large number of parameters to determine foraging decisions of breeding birds, energy intake and expenditure, and consequent demographic consequences for a breeding population of seabirds, when displaced. For many seabird species the input data needed for SeabORD are not available, but for all species the model still requires an input of a highly uncertain displacement rate, as with the Matrix approach. As of 24 September 2025, NatureScot are advising that SeabORD should not be used to estimate potential displacement mortality due to technical issues with running the model. Consequently, displacement mortality was estimated using only the displacement matrix approach.

2.2.2 Matrix approach

15. Following NatureScot Guidance Note 8[2] and the matrix approach set out in the Joint SNCB Interim Displacement Advice Note (SNCB, 2022a), displacement matrices were produced for each of the nine species (**Section 3.1**), using the following species-specific parameters:

- Spatial extent (**Section 2.2.3**) – the distance from the edge of WDA that displacement impacts are considered likely to affect the species, i.e. zone of influence;
- Seasons (**Section 2.2.4**) – breeding and non-breeding seasons assessment of displacement mortality;

[2] NatureScot Guidance Note 8 (version 1 updated January 2023): Guidance Note 8: Guidance to support Offshore Wind Applications: Marine Ornithology Advice for assessing the distributional responses, displacement and barrier effects of Marine birds | NatureScot

- Mean Seasonal Peak abundance (MSP; **Section 2.2.5**) – the peak abundance recorded in each season, averaged across multiple years, calculated following advice in NatureScot Guidance Note 8[2] and agreed with NatureScot at the Expert Topic Group meeting 4 (ETG 4, 2 December 2025|);
- Displacement rate – the percentage of the MSP abundance assumed to be displaced from the impacted area (refer to **Section 2.2.6**); and
- Displacement mortality rate – the percentage of displaced birds suffering mortality (refer to **Section 2.2.6**).

2.2.3 Spatial Extent

16. Following NatureScot 2023 Guidance Note 8[2] and the Joint SNCB Interim Displacement Advice Note (2022a and b), displacement matrices were produced using each species' abundance within the WDA plus 2 km buffer, except great northern diver for which a 4 km buffer was applied.

2.2.4 Seasons

17. Displacement mortality was estimated for each species in each season (using the definitions provided in NatureScot 2023 Guidance Note 9[3]) and assessed against the relevant BDMPS (Biologically Defined Minimum Population Scales) population estimates (Furness, 2015). The seasons to use for each species are summarised in **Table 1**. Annual total displacement is estimated by summing estimates across all seasons.

18. NatureScot Guidance Note 9[3] states that great northern divers are not present in significant numbers in Scottish marine areas during the breeding season, therefore displacement mortality was not assessed for this species during the breeding season.

19. While the NatureScot Guidance Note 9[3] states that Arctic terns and common terns do not occur in significant numbers in Scottish marine areas outside the breeding season, Furness (2015) defines spring and autumn migration BDMPS seasons and provides associated population estimates for these species. Therefore, migration season assessment has also been provided for these tern species.

Table 1: Definitions of breeding and non-breeding seasons according to NatureScot Guidance Note 9[3] and BDMPS seasons according to Furness (2015).

Species	NatureScot seasons (Guidance Note 9)		BDMPS Seasons (Furness, 2015)		
	Breeding season	Non-breeding season	Spring migration	Autumn migration	Winter
*Great northern diver	N/A	October to mid-May	Single non-breeding season September-May		
Kittiwake	Mid-April to August	September to mid-April	January to April	August to December	N/A
**Arctic tern	May to August	N/A	Late April to May	July to early September	N/A
**Common tern	May to mid-September	N/A	April to May	late July to early September	N/A

[3] NatureScot Guidance Note 9 (version 2 October 2020): Guidance note - Seasonal definitions for birds in the Scottish Marine Environment.pdf

Species	NatureScot seasons (Guidance Note 9)		BDMPS Seasons (Furness, 2015)		
	Breeding season	Non-breeding season	Spring migration	Autumn migration	Winter
Guillemot	April to mid-August	mid-August to March	single non-breeding season August to February		
Razorbill	April to mid-August	mid-August to March	January to March	August to October	November to December
Puffin	April to mid-August	mid-August to March	single non-breeding season mid-August to March		
Fulmar	April to mid-September	mid-September to March	December to March	September to October	November
Gannet	Mid-March to September	October to mid-March	December to March	September to November	N/A

* NatureScot Guidance Note 9[3] states that great northern divers are not present in significant numbers in Scottish marine areas during the breeding season.

**NatureScot Guidance Note 9[3] states that Arctic terns and common terns are not present in significant numbers in Scottish marine areas during the non-breeding season.

2.2.5 Mean Seasonal Peak Abundance

20. As advised in NatureScot Guidance Note 8[2], MSP abundance estimates were used in the displacement matrices. MSP abundances were calculated from abundance estimates generated from 30 Digital Aerial Survey (DAS) samples listed in **Table 2**. The DAS samples were selected from Project DAS surveys and Third-Party DAS surveys, refer to **Technical Appendix 11.2: Baseline Site Characterisation** for an explanation of survey areas.

21. It was agreed with NatureScot to use 30 selected DAS samples to ensure complete breeding and non-breeding seasons from which to select a peak abundance (NatureScot letter dated 7 August 2025). The use of 30 months of DAS data meant that for each species there were survey data available for two complete breeding and non-breeding seasons. Note that as there was no Project or Third-Party DAS survey data available in June 2022, MSP estimates were not calculated for the breeding season in 2022 for any species (**Table 2**), this approach was discussed and agreed with NatureScot at the Expert Topic Group meeting 4 (ETG 4, 2 December 2025). Consequently for Arctic tern and common tern, as MSP was not estimated for the breeding season in 2022, MSP was also not estimated for the spring migration and autumn migration seasons in 2022 (spring and autumn migration MSP values were calculated from abundance data in 2021 and 2023, **Table 5** and **Table 6**).

22. MSPs were calculated as the average of the peak abundance for each complete season. Abundance estimates used to calculate MSPs for each species are presented in **Table 3** to **Table 11**. For a full presentation of abundance estimates recorded in the WDA, WDA plus 2 km and WDA plus 4 km for all species in all 30 DAS samples, refer to **Annex 11.2K: Abundance estimates per survey of sitting and flying birds**. When a month was split between breeding and non-breeding seasons, as defined in the NatureScot 2023 Guidance Note 9[3], the abundance in that month was used to calculate the peak in both seasonal periods.

23. For kittiwake, Arctic tern, common tern, guillemot, razorbill and puffin, unidentified birds recorded in non-species-specific categories during digital aerial surveys (e.g. ‘small gull’, ‘commic tern’, ‘auk species’ or ‘large auk’) have been apportioned to a species based on the relative abundance ratios of identified species within the category (i.e. kittiwake, Arctic tern, common tern, guillemot, razorbill or puffin).

24. Two unidentified diver species were recorded in the WDA plus 4 km buffer in the first DAS sample (Third-party survey 6, 21st March 2021, refer to **Annex 11.2K: Abundance estimates per survey of sitting and flying birds**), however these were not apportioned to diver species due to the small sample sizes of positively and unidentified divers in that survey. This did not affect the displacement assessment since DAS sample 1 was not used to calculate MSP for great northern diver (**Table 2** and **Table 3**). Refer to **Technical Appendix 11.2: Baseline Site Characterisation** for details of species apportioning.

25. Guillemot, razorbill and puffin abundance estimates of birds on the water were adjusted for availability bias to account for birds likely to be under water when images were captured (using correction rates advised by NatureScot). This correction was not possible for great northern diver as there are no recommended correction factors for this species. While this may result in slight under-estimates of abundance and hence displacement mortality, the species’ abundance in the WDA plus 4 km buffer was very low, therefore this is considered likely to have had little effect. **Technical Appendix 11.2: Baseline Site Characterisation** provides details of how auk abundances were adjusted for availability bias.

Table 2: Digital aerial surveys (DAS; Project or Third-party) used to calculate Mean Seasonal Peak (MSP). NatureScot defined breeding and non-breeding seasons for each species are highlighted*

Survey date	DAS (survey number)	Bird species**								
		ND	KI	AE	CN	GU	RA	PU	F.	GX
21st March 2021	Third-party (6)									
20th April 2021	Project (1)									
11th May 2021	Project (2)									
12th June 2021	Project (3)									
6th July 2021	Project (4)									
14th August 2021	Project (5)									
29th September 2021	Project (6)									
22nd October 2021	Project (7)									
23rd November 2021	Project (8)									
15th December 2021	Third-party (15)									
20th January 2022	Project (9)									
1st & 4th March 2021 (proxy sample for February 2022)	Third-party (5)									
28th March 2022	Project (11)									
24th April 2022	Project (12)									
May 28th 2022	Project (13)									
***June 2022	No survey									
27th July 2022	Project (15)									
21st August 2022	Project (16)									
13th September 2022	Project (17)									
4th November 2022 (proxy sample for October 2022)	Project (18)									
22nd November 2022	Project (19)									
2nd December 2022	Project (20)									
28th January 2023	Project (22)									
24th February 2023	Project (23)									
19th & 23rd March 2023	Project (24)									
22nd April 2023	Project (25)									
13th May 2023	Project (26)									
7th June 2023	Project (27)									
21st July 2023	Project (28)									
16th August 2023	Project (29)									
6th September 2023	Project (30)									

*NatureScot defined Seasons[3]: breeding only, non-breeding only, breeding or non-breeding, excluded from MSP
**Bird species: ND = Great northern diver, KI = Kittiwake, AE = Arctic tern, CN = Common tern, GU = Guillemot, RA = Razorbill, PU = Puffin, F. = Fulmar, GX = Gannet
*** No DAS survey data available in June 2022; 2022 breeding season months not used to calculate MSP.

2.2.5.1 Great northern diver

Table 3: Great northern diver abundance estimates of all birds recorded in flight and on the sea in the WDA plus 4 km buffer. Large bold numbers were used to calculate Mean Seasonal Peak (MSP) abundance for each season.

Survey date*	Great northern diver abundance estimate in the WDA plus 4 km buffer
	Non-breeding season (NatureScot)
21st March 2021	7.1
20th April 2021	6.3
11th May 2021	6.4
12th June 2021	0
6th July 2021	0
14th August 2021	0
29th September 2021	0
22nd October 2021	0
23rd November 2021	0
15th December 2021	7.2
20th January 2022	0
1st & 4th March 2021 (proxy sample for February 2022)	7.2
28th March 2022	6.6
24th April 2022	0
May 28th 2022	**12.7**
27th July 2022	0
21st August 2022	0
13th September 2022	0
4th November 2022 (proxy sample for October 2022)	5.8
22nd November 2022	19.2
2nd December 2022	0
28th January 2023	0
24th February 2023	0
19th plus 23rd March 2023	6.4
22nd April 2023	0.0
13th May 2023	**19.6**
7th June 2023	6.5
21st July 2023	0
16th August 2023	0
6th September 2023	0
MSP	**16.2**

*Greyed out DAS months were not used to calculate MSP.

2.2.5.2 Kittiwake

Table 4: Kittiwake abundance estimates of all birds recorded in flight and on the sea in the WDA plus 2 km buffer. Large bold numbers were used to calculate Mean Seasonal Peak (MSP) abundance for each season.

Survey date*	Kittiwake abundance estimate** in the WDA plus 2 km buffer			
	Breeding season (NatureScot)	Non-breeding season (NatureScot)	Spring migration (BDMPS)	Autumn migration (BDMPS)
21st March 2021	417.0			
20th April 2021	174.7			
11th May 2021	**1188.9**			
12th June 2021	477.2			
6th July 2021	533.3			
14th August 2021	335.3			335.3
29th September 2021		287.3		287.3
22nd October 2021		1070.0		1070.0
23rd November 2021		**7752.7**		**7752.7**
15th December 2021		6782.3		6782.3
20th January 2022		568.2	568.2	
1st plus 4th March 2021 (proxy sample for February 2022)		185.3	185.3	
28th March 2022		563.6	563.6	
24th April 2022		3496.7	**3496.7**	
May 28th 2022	1337.1			
27th July 2022	3859.6			
21st August 2022				35.8
13th September 2022		17.7		17.7
4th November 2022 (proxy sample for October 2022)		**3556.1**		**3556.1**
22nd November 2022		2550.7		2550.7
2nd December 2022		1601.2		1601.2
28th January 2023		1554.7	1554.7	
24th February 2023		3480.4	**3480.4**	
19th plus 23rd March 2023		996.6	996.6	
***22nd April 2023	890.3	890.3	890.3	
13th May 2023	552.8			
7th June 2023	**1253.1**			
21st July 2023	519.8			
16th August 2023	12.5			
6th September 2023	80.7			
MSP	**1221.0**	**5654.4**	**3488.6**	**5654.4**

*Greyed out DAS months were not used to calculate MSP.
**Corrected for apportioning of unidentified birds.
***April is a split month and could be used to calculate MSP for both breeding and non-breeding seasons.

2.2.5.3 Arctic tern

Table 5: Arctic tern abundance estimates of all birds recorded in flight and on the sea in the WDA plus 2 km buffer. Large bold numbers were used to calculate Mean Seasonal Peak (MSP) abundance for each season.

Survey date*	Arctic tern abundance estimate** in the WDA plus 2 km buffer		
	Breeding season (NatureScot)	Spring migration (BDMPS)	Autumn migration (BDMPS)
21st March 2021	0		
20th April 2021		0	
11th May 2021	**120.7**	**120.7**	
12th June 2021	0		
6th July 2021	0		0
14th August 2021	14.6		**14.6**
29th September 2021			12.0
22nd October 2021	0		
23rd November 2021	0		
15th December 2021	0		
20th January 2022	0		
1st plus 4th March 2021 (proxy sample for February 2022)	0		
28th March 2022	0		
24th April 2022	9.0		
May 28th 2022	6.0		
27th July 2022	84.7		
21st August 2022	298.6		
13th September 2022	0		
4th November 2022 (proxy sample for October 2022)	0		
22nd November 2022	0		
2nd December 2022	0		
28th January 2023	0		
24th February 2023	0		
19th plus 23rd March 2023	0		
22nd April 2023		0	
13th May 2023	**62.1**	**62.1**	
7th June 2023	6.2		
21st July 2023	55.7		**55.7**
16th August 2023	31.3		31.3
6th September 2023			0
MSP	**91.4**	**91.4**	**35.2**

*Greyed out DAS months were not used to calculate MSP.
**Corrected for apportioning of unidentified birds.

2.2.5.4 Common tern

Table 6: Common tern abundance estimates of all birds recorded in flight and on the sea in the WDA plus 2 km buffer. Large bold numbers were used to calculate Mean Seasonal Peak (MSP) abundance for each season.

Survey date*	Common tern abundance estimate** in the WDA plus 2 km buffer		
	Breeding season (NatureScot)	Spring migration (BDMPS)	Autumn migration (BDMPS)
21st March 2021	0		
20th April 2021		0	
11th May 2021	0	0	
12th June 2021	0		
6th July 2021	0		0
14th August 2021	**125.6**		**125.6**
29th September 2021	12.0		12.0
22nd October 2021	0		
23rd November 2021	0		
15th December 2021	0		
20th January 2022	0		
1st plus 4th March 2021 (proxy sample for February 2022)	0		
28th March 2022	0		
24th April 2022	9.0		
May 28th 2022	0		
27th July 2022	18.1		
21st August 2022	0		
13th September 2022	0		
4th November 2022 (proxy sample for October 2022)	0		
22nd November 2022	0		
2nd December 2022	0		
28th January 2023	0		
24th February 2023	0		
19th plus 23rd March 2023	0		
22nd April 2023		0	
13th May 2023	0	0	
7th June 2023	0		
21st July 2023	0		0
16th August 2023	0		0
6th September 2023	0		0
MSP	**62.8**	**0.0**	**62.8**

*Greyed out DAS months were not used to calculate MSP.
**Corrected for apportioning of unidentified birds.

2.2.5.5 Guillemot

Table 7: Guillemot abundance estimates of all birds recorded in flight and on the sea in the WDA plus 2 km buffer. Large bold numbers were used to calculate Mean Seasonal Peak (MSP) abundance for each season.

Survey date*	Guillemot abundance estimate** in the WDA plus 2 km buffer	
	Breeding season (NatureScot)	Non-breeding season (NatureScot)
21st March 2021	18258.3	
20th April 2021	8446.3	
11th May 2021	**14957.5**	
12th June 2021	6490.9	
6th July 2021	13796.1	
***14th August 2021	3305.0	3305.0
29th September 2021		1648.4
22nd October 2021		1916.6
23rd November 2021		9424.8
15th December 2021		14984.7
20th January 2022		6441.0
1st plus 4th March 2021 (proxy sample for February 2022)		3450.2
28th March 2022		**33381.8**
24th April 2022	34384.9	
May 28th 2022	3791.8	
27th July 2022	31740.6	
21st August 2022		3551.7
13th September 2022		1234.0
4th November 2022 (proxy sample for October 2022)		4910.2
22nd November 2022		10893.3
2nd December 2022		4352.5
28th January 2023		12913.1
24th February 2023		**23681.1**
19th plus 23rd March 2023		14220.9
22nd April 2023	14517.2	
13th May 2023	19259.5	
7th June 2023	22811.0	
21st July 2023	**39233.2**	
16th August 2023	3441.2	
6th September 2023	3860.3	
MSP	**27095.4**	**28531.5**

*Greyed out DAS months were not used to calculate MSP.
**Corrected for apportioning of unidentified birds and corrected for availability bias.
***August is a split month and could be used to calculate MSP for both breeding and non-breeding seasons

2.2.5.6 Razorbill

Table 8: Razorbill abundance estimates of all birds recorded in flight and on the sea in the WDA plus 2 km buffer. Large bold numbers were used to calculate Mean Seasonal Peak (MSP) abundance for each season.

Survey date*	Razorbill abundance estimate** in the WDA plus 2 km buffer				
	Breeding season (NatureScot)	Non-breeding season (NatureScot)	Spring migration (BDMPS)	Autumn migration (BDMPS)	Winter (BDMPS)
21st March 2021	9898.2				
20th April 2021	213.7				
11th May 2021	**360.6**				
12th June 2021	283.8				
6th July 2021	354.0				
***14th August 2021	164.5	164.5		164.5	
29th September 2021		363.4		**363.4**	
22nd October 2021		81.3		81.3	
23rd November 2021		6470.1			**6470.1**
15th December 2021		1298.8			1298.8
20th January 2022		1275.6	1275.6		
1st plus 4th March 2021 (proxy sample for February 2022)		2338.2	2338.2		
28th March 2022		**7242.8**	**7242.8**		
24th April 2022	376.6				
May 28th 2022	120.3				
27th July 2022	6266.1				
21st August 2022		507.8		507.8	
13th September 2022		360.8		360.8	
4th November 2022 (proxy sample for October 2022)		5821.4		**5821.4**	
22nd November 2022		1532.1			1532.1
2nd December 2022		3926.4			**3926.4**
28th January 2023		426.1	426.1		
24th February 2023		299.8	299.8		
19th plus 23rd March 2023		**6659.9**	**6659.9**		
22nd April 2023	254.0				
13th May 2023	1861.4				
7th June 2023	582.0				
21st July 2023	**4911.5**				
16th August 2023	388.6				
6th September 2023	327.5				
MSP	**2636.1**	**6951.4**	**6951.4**	**3092.4**	**5198.3**

*Greyed out DAS months were not used to calculate MSP.
**Corrected for apportioning of unidentified birds and corrected for availability bias.
***August is a split month and could be used to calculate MSP for both breeding and non-breeding seasons.

2.2.5.7 Puffin

Table 9: Puffin abundance estimates of all birds recorded in flight and on the sea in the WDA plus 2 km buffer. Large bold numbers were used to calculate Mean Seasonal Peak (MSP) abundance for each season.

Survey date*	Puffin abundance estimate** in the WDA plus 2 km buffer	
	Breeding season (NatureScot)	Non-breeding season (NatureScot)
21st March 2021	31.7	
20th April 2021	14.1	
11th May 2021	28.1	
12th June 2021	**290.0**	
6th July 2021	21.4	
***14th August 2021	262.2	**262.2**
29th September 2021		7.4
22nd October 2021		7.2
23rd November 2021		0
15th December 2021		0
20th January 2022		0
1st plus 4th March 2021 (proxy sample for February 2022)		0
28th March 2022		73.4
24th April 2022	56.2	
May 28th 2022	70.1	
27th July 2022	8781.3	
21st August 2022		**2122.3**
13th September 2022		278.4
4th November 2022 (proxy sample for October 2022)		0
22nd November 2022		7.1
2nd December 2022		28.4
28th January 2023		0
24th February 2023		27.8
19th plus 23rd March 2023		64.4
22nd April 2023	36.3	
13th May 2023	218.3	
7th June 2023	689.3	
21st July 2023	**1653.3**	
16th August 2023	556.7	
6th September 2023	262.6	
MSP	**971.7**	**1192.4**

*Greyed out DAS months were not used to calculate MSP.
**Corrected for apportioning of unidentified birds and corrected for availability bias.
***August is a split month and could be used to calculate MSP for both breeding and non-breeding seasons.

2.2.5.8 Fulmar

Table 10: Fulmar abundance estimates of all birds recorded in flight and on the sea in the WDA plus 2 km buffer. Large bold numbers were used to calculate Mean Seasonal Peak (MSP) abundance for each season.

Survey date*	Fulmar abundance estimate in the WDA plus 2 km buffer				
	Breeding season (NatureScot)	Non-breeding season (NatureScot)	Spring migration (BDMPS)	Autumn migration (BDMPS)	Winter (BDMPS)
21st March 2021	60.5				
20th April 2021	6.0				
11th May 2021	54.3				
12th June 2021	6.1				
6th July 2021	36.4				
14th August 2021	**97.5**				
**29th September 2021	12.0	12.0		12.0	
22nd October 2021		12.2		**12.2**	
23rd November 2021		86.9			**86.9**
15th December 2021		81.2	81.2		
20th January 2022		**202.9**	**202.9**		
1st & 4th March 2021 (proxy sample for February 2022)		27.4	27.4		
28th March 2022		25.0	25.0		
24th April 2022	12.0				
May 28th 2022	0				
27th July 2022	121.0				
21st August 2022	41.8				
13th September 2022		88.7		88.7	
4th November 2022 (proxy sample for October 2022)		**98.2**		**98.2**	
22nd November 2022		18.2			**18.2**
2nd December 2022		12.1	12.1		
28th January 2023		42.5	42.5		
24th February 2023		0	0		
19th & 23rd March 2023		73.4	**73.4**		
22nd April 2023	12.5				
13th May 2023	49.7				
7th June 2023	43.2				
21st July 2023	**68.1**				
16th August 2023	43.8				
6th September 2023	6.2				
MSP	**82.8**	**150.6**	**138.2**	**55.2**	**52.6**

*Greyed out DAS months were not used to calculate MSP.
**September is a split month and could be used to calculate MSP for both breeding and non-breeding seasons

2.2.5.9 Gannet

Table 11: Gannet abundance estimates of all birds recorded in flight and on the sea in the WDA plus 2 km buffer. Large bold numbers were used to calculate Mean Seasonal Peak (MSP) abundance for each season.

Survey date*	Gannet abundance estimate in the WDA plus 2 km buffer			
	Breeding season (NatureScot)	Non-breeding season (NatureScot)	Spring migration (BDMPS)	Autumn migration (BDMPS)
21st March 2021	20.2			
20th April 2021	78.3			
11th May 2021	156.9			
12th June 2021	128.5			
6th July 2021	**460.6**			
14th August 2021	207.3			
29th September 2021	125.7			**125.7**
22nd October 2021		36.5		36.5
23rd November 2021		93.1		93.1
15th December 2021		20.3	20.3	
20th January 2022		0	0	
1st & 4th March 2021 (proxy sample for February 2022)		0	0	
28th March 2022		**93.9**	**93.9**	
24th April 2022	607.9			
May 28th 2022	689.6			
27th July 2022	54.4			
21st August 2022	238.9			
13th September 2022				**177.5**
4th November 2022 (proxy sample for October 2022)		141.8		141.8
22nd November 2022		12.1		12.1
2nd December 2022		6.1	6.1	
28th January 2023		18.2	18.2	
24th February 2023		**184.8**	**184.8**	
**19th & 23rd March 2023	110.1	110.1	110.1	
22nd April 2023	112.1			
13th May 2023	68.3			
7th June 2023	370.4			
21st July 2023	74.3			
16th August 2023	156.5			
6th September 2023	**384.7**			
MSP	**422.7**	**139.4**	**139.4**	**151.6**

*Greyed out DAS months were not used to calculate MSP.
**March is a split month and could be used to calculate MSP for both breeding and non-breeding seasons

2.2.6 Displacement and Mortality Rates

26. Matrices for each species present the full range of potential displacement (0-100%) and mortality impacts (0-100%) in each species-specific season (NatureScot Guidance Note 8[2] and the Joint SNCB Interim Displacement Advice Note (2022a)), with highlighted values to indicate the ranges advised for assessment. Displacement and mortality rates for kittiwake, guillemot, razorbill, puffin and gannet followed NatureScot Guidance Note 8[2] (**Table 12**). Rates for fulmar, Arctic tern and common tern were based on disturbance-sensitivity indices as assessed by Bradbury et al., (2014) and for Arctic tern and fulmar the rates used in the West of Orkney Offshore Windfarm application[4] were used (as agreed with NatureScot at the Expert Topic Group meeting 4, 2 December 2025).

27. Rates for great northern diver were based on disturbance-sensitivity indices as assessed by Bradbury et al., (2014) and on red-throated diver guidance in the joint SNCB advice (SNCB, 2022b). The Joint SNCB advice for red-throated divers is that displacement within an offshore windfarm footprint may be close to 100% and varies between 55% and 95% in the 4 km buffer (SNCB, 2022a). Great northern divers are considered to be less sensitive to disturbance during the non-breeding season than red-throated divers (Goodship and Furness, 2022), therefore rates of displacement of between 50% and 80% and mortality of 5% were considered appropriate.

28. As advised in the Joint SNCB Interim Displacement Advice Note (2022a), within the displacement matrices the ‘upper’ and ‘lower’ displacement and mortality rates were highlighted dark green with rates surrounding these coloured light green to indicate the uncertainty around these figures (**Section 3.0**).

Table 12: Displacement and mortality rates used for the displacement assessment.

Species	Displacement Rate	Mortality Rate – Breeding Season	Mortality Rate – Non-breeding season
Great northern diver	50% to 80%	N/A	5%
Kittiwake	30%	1% and 3%	1% and 3%
Arctic tern	30% to 50%	3%	3%
Common tern	30% to 50%	3%	3%
Guillemot	60%	3% and 5%	1% and 3%
Razorbill	60%	3% and 5%	1% and 3%
Puffin	60%	3% and 5%	1% and 3%
Fulmar	20%	1% and 3%	1% and 3%
Gannet	70%	1% and 3%	1% and 3%

[4] Offshore Environmental Impact Assessment Report - Additional Information - West of Orkney Windfarm - West of Hoy, Orkney | marine.gov.scot

3.0 Results

3.1 Individual Species Accounts using Displacement Matrices

29. The displacement matrices presented in **Section 3.1.1** to **Section 3.1.9** below provide, for each species and season, the estimated mortality of birds predicted to occur due to displacement, as determined by the assumed rates of displacement and mortality, as specified in **Table 12**.

30. The outputs highlighted in dark green are those based on the displacement and mortality rates in **Table 12**. Outputs highlighted in light green indicate uncertainty around the assumed displacement and mortality rates, as advised by the SNCB (2022a).

31. A summary of seasonal displacement mortality as well as the annual displacement mortality (calculated as breeding season displacement plus BDMPS season displacement) for each species is provided in **Section 3.2**.

3.1.1 Great Northern Diver

32. Great northern diver seasonal displacement mortality predicted within the WDA plus 4 km buffer is presented in **Table 13**. The upper displacement rates (80% displacement and 5% mortality) predicted a displacement mortality of less than one great northern diver (0.6 bird) in the WDA plus 4 km buffer during the non-breeding season. Note that displacement mortality for great northern diver is assessed under EIA (refer to **Chapter 11 Offshore Ornithology** of the EIAR) not under the Habitats Regulations Appraisal in the RIAA due to Likely Significant Effects being screened out for this species (refer to **HRA Screening Report**).

3.1.1.1 Great northern diver – Non-breeding season

Table 13: Potential great northern diver mortality following displacement from the WDA plus 4 km buffer in the non-breeding season based on MSP of 16.2 birds.

Lower = 50% displacement and 5% mortality. Upper = 80% displacement and 5% mortality

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2
	2%	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3
	3%	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5
	4%	0.0	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.5	0.6	0.6
	5%	0.0	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.8
	10%	0.0	0.2	0.3	0.5	0.6	0.8	1.0	1.1	1.3	1.5	1.6
	15%	0.0	0.2	0.5	0.7	1.0	1.2	1.5	1.7	1.9	2.2	2.4
	20%	0.0	0.3	0.6	1.0	1.3	1.6	1.9	2.3	2.6	2.9	3.2
	30%	0.0	0.5	1.0	1.5	1.9	2.4	2.9	3.4	3.9	4.4	4.8
	40%	0.0	0.6	1.3	1.9	2.6	3.2	3.9	4.5	5.2	5.8	6.5
	50%	0.0	0.8	1.6	2.4	3.2	4.0	4.8	5.7	6.5	7.3	8.1
	60%	0.0	1.0	1.9	2.9	3.9	4.8	5.8	6.8	7.8	8.7	9.7
	70%	0.0	1.1	2.3	3.4	4.5	5.7	6.8	7.9	9.0	10.2	11.3
	80%	0.0	1.3	2.6	3.9	5.2	6.5	7.8	9.0	10.3	11.6	12.9
	90%	0.0	1.5	2.9	4.4	5.8	7.3	8.7	10.2	11.6	13.1	14.5
	100%	0.0	1.6	3.2	4.8	6.5	8.1	9.7	11.3	12.9	14.5	16.2

3.1.2 Kittiwake

33. Kittiwake seasonal displacement mortalities predicted within the WDA plus 2 km buffer are presented in **Table 14** to **Table 17**. The upper displacement rates (30% displacement and 3% mortality) predicted mortalities of 11.0 in the breeding season, 50.9 in the autumn migration period and 31.4 in the spring migration period, an annual total of 93.3. The nonbreeding period as a whole matched the autumn prediction (50.9).

3.1.2.1 Kittiwake - Breeding Season

Table 14: Potential kittiwake mortality following displacement from the WDA plus 2 km buffer in the breeding season based on MSP of 1,221 birds.

Lower = 30% displacement and 1% mortality. Upper = 30% displacement and 3% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	1.2	2.4	3.7	4.9	6.1	7.3	8.5	9.8	11.0	12.2
2%	0.0	2.4	4.9	7.3	9.8	12.2	14.7	17.1	19.5	22.0	24.4
3%	0.0	3.7	7.3	11.0	14.7	18.3	22.0	25.6	29.3	33.0	36.6
4%	0.0	4.9	9.8	14.7	19.5	24.4	29.3	34.2	39.1	44.0	48.8
5%	0.0	6.1	12.2	18.3	24.4	30.5	36.6	42.7	48.8	54.9	61.1
10%	0.0	12.2	24.4	36.6	48.8	61.1	73.3	85.5	97.7	109.9	122.1
15%	0.0	18.3	36.6	54.9	73.3	91.6	109.9	128.2	146.5	164.8	183.2
20%	0.0	24.4	48.8	73.3	97.7	122.1	146.5	170.9	195.4	219.8	244.2
30%	0.0	36.6	73.3	109.9	146.5	183.2	219.8	256.4	293.0	329.7	366.3
40%	0.0	48.8	97.7	146.5	195.4	244.2	293.0	341.9	390.7	439.6	488.4
50%	0.0	61.1	122.1	183.2	244.2	305.3	366.3	427.4	488.4	549.5	610.5
60%	0.0	73.3	146.5	219.8	293.0	366.3	439.6	512.8	586.1	659.3	732.6
70%	0.0	85.5	170.9	256.4	341.9	427.4	512.8	598.3	683.8	769.2	854.7
80%	0.0	97.7	195.4	293.0	390.7	488.4	586.1	683.8	781.4	879.1	976.8
90%	0.0	109.9	219.8	329.7	439.6	549.5	659.3	769.2	879.1	989.0	1098.9
100%	0.0	122.1	244.2	366.3	488.4	610.5	732.6	854.7	976.8	1098.9	1221.0

3.1.2.2 Kittiwake – Non-breeding Season

Table 15: Potential kittiwake mortality following displacement from the WDA plus 2 km buffer in the non-breeding season based on MSP of 5,654.4 birds.

Lower = 30% displacement and 1% mortality. Upper = 30% displacement and 3% mortality

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0.0	5.7	11.3	17.0	22.6	28.3	33.9	39.6	45.2	50.9	56.5
	2%	0.0	11.3	22.6	33.9	45.2	56.5	67.9	79.2	90.5	101.8	113.1
	3%	0.0	17.0	33.9	50.9	67.9	84.8	101.8	118.7	135.7	152.7	169.6
	4%	0.0	22.6	45.2	67.9	90.5	113.1	135.7	158.3	180.9	203.6	226.2
	5%	0.0	28.3	56.5	84.8	113.1	141.4	169.6	197.9	226.2	254.4	282.7
	10%	0.0	56.5	113.1	169.6	226.2	282.7	339.3	395.8	452.4	508.9	565.4
	15%	0.0	84.8	169.6	254.4	339.3	424.1	508.9	593.7	678.5	763.3	848.2
	20%	0.0	113.1	226.2	339.3	452.4	565.4	678.5	791.6	904.7	1017.8	1130.9
	30%	0.0	169.6	339.3	508.9	678.5	848.2	1017.8	1187.4	1357.1	1526.7	1696.3
	40%	0.0	226.2	452.4	678.5	904.7	1130.9	1357.1	1583.2	1809.4	2035.6	2261.8
	50%	0.0	282.7	565.4	848.2	1130.9	1413.6	1696.3	1979.0	2261.8	2544.5	2827.2
	60%	0.0	339.3	678.5	1017.8	1357.1	1696.3	2035.6	2374.8	2714.1	3053.4	3392.6
	70%	0.0	395.8	791.6	1187.4	1583.2	1979.0	2374.8	2770.7	3166.5	3562.3	3958.1
	80%	0.0	452.4	904.7	1357.1	1809.4	2261.8	2714.1	3166.5	3618.8	4071.2	4523.5
	90%	0.0	508.9	1017.8	1526.7	2035.6	2544.5	3053.4	3562.3	4071.2	4580.1	5089.0
	100%	0.0	565.4	1130.9	1696.3	2261.8	2827.2	3392.6	3958.1	4523.5	5089.0	5654.4

3.1.2.3 Kittiwake – Spring Migration

Table 16: Potential kittiwake mortality following displacement from the WDA plus 2 km buffer in the spring migration season based on MSP of 3,488.6 birds.

Lower = 30% displacement and 1% mortality. Upper = 30% displacement and 3% mortality

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0.0	3.5	7.0	10.5	14.0	17.4	20.9	24.4	27.9	31.4	34.9
	2%	0.0	7.0	14.0	20.9	27.9	34.9	41.9	48.8	55.8	62.8	69.8
	3%	0.0	10.5	20.9	31.4	41.9	52.3	62.8	73.3	83.7	94.2	104.7
	4%	0.0	14.0	27.9	41.9	55.8	69.8	83.7	97.7	111.6	125.6	139.5
	5%	0.0	17.4	34.9	52.3	69.8	87.2	104.7	122.1	139.5	157.0	174.4
	10%	0.0	34.9	69.8	104.7	139.5	174.4	209.3	244.2	279.1	314.0	348.9
	15%	0.0	52.3	104.7	157.0	209.3	261.6	314.0	366.3	418.6	471.0	523.3
	20%	0.0	69.8	139.5	209.3	279.1	348.9	418.6	488.4	558.2	627.9	697.7
	30%	0.0	104.7	209.3	314.0	418.6	523.3	627.9	732.6	837.3	941.9	1046.6
	40%	0.0	139.5	279.1	418.6	558.2	697.7	837.3	976.8	1116.3	1255.9	1395.4
	50%	0.0	174.4	348.9	523.3	697.7	872.1	1046.6	1221.0	1395.4	1569.8	1744.3
	60%	0.0	209.3	418.6	627.9	837.3	1046.6	1255.9	1465.2	1674.5	1883.8	2093.1
	70%	0.0	244.2	488.4	732.6	976.8	1221.0	1465.2	1709.4	1953.6	2197.8	2442.0
	80%	0.0	279.1	558.2	837.3	1116.3	1395.4	1674.5	1953.6	2232.7	2511.8	2790.8
	90%	0.0	314.0	627.9	941.9	1255.9	1569.8	1883.8	2197.8	2511.8	2825.7	3139.7
	100%	0.0	348.9	697.7	1046.6	1395.4	1744.3	2093.1	2442.0	2790.8	3139.7	3488.6

3.1.2.4 Kittiwake – Autumn Migration

Table 17: Potential kittiwake mortality following displacement from the WDA plus 2 km buffer in the autumn migration season based on MSP of 5,654.4 birds.
Lower = 30% displacement and 1% mortality. Upper = 30% displacement and 3% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	5.7	11.3	17.0	22.6	28.3	33.9	39.6	45.2	50.9	56.5
2%	0.0	11.3	22.6	33.9	45.2	56.5	67.9	79.2	90.5	101.8	113.1
3%	0.0	17.0	33.9	50.9	67.9	84.8	101.8	118.7	135.7	152.7	169.6
4%	0.0	22.6	45.2	67.9	90.5	113.1	135.7	158.3	180.9	203.6	226.2
5%	0.0	28.3	56.5	84.8	113.1	141.4	169.6	197.9	226.2	254.4	282.7
10%	0.0	56.5	113.1	169.6	226.2	282.7	339.3	395.8	452.4	508.9	565.4
15%	0.0	84.8	169.6	254.4	339.3	424.1	508.9	593.7	678.5	763.3	848.2
20%	0.0	113.1	226.2	339.3	452.4	565.4	678.5	791.6	904.7	1017.8	1130.9
30%	0.0	169.6	339.3	508.9	678.5	848.2	1017.8	1187.4	1357.1	1526.7	1696.3
40%	0.0	226.2	452.4	678.5	904.7	1130.9	1357.1	1583.2	1809.4	2035.6	2261.8
50%	0.0	282.7	565.4	848.2	1130.9	1413.6	1696.3	1979.0	2261.8	2544.5	2827.2
60%	0.0	339.3	678.5	1017.8	1357.1	1696.3	2035.6	2374.8	2714.1	3053.4	3392.6
70%	0.0	395.8	791.6	1187.4	1583.2	1979.0	2374.8	2770.7	3166.5	3562.3	3958.1
80%	0.0	452.4	904.7	1357.1	1809.4	2261.8	2714.1	3166.5	3618.8	4071.2	4523.5
90%	0.0	508.9	1017.8	1526.7	2035.6	2544.5	3053.4	3562.3	4071.2	4580.1	5089.0
100%	0.0	565.4	1130.9	1696.3	2261.8	2827.2	3392.6	3958.1	4523.5	5089.0	5654.4

3.1.3 Arctic tern

34. Arctic tern seasonal displacement mortalities predicted within the WDA plus 2 km buffer are presented in **Table 18** to **Table 20**. The upper displacement rates (50% displacement and 3% mortality) predicted mortalities of 1.4 in the breeding season, 1.4 in the spring migration period (note these were based on the same peak value across both seasons) and 0.5 in the autumn migration period, an annual total of 3.3.

3.1.3.1 Arctic tern - Breeding Season

Table 18: Potential Arctic tern mortality following displacement from the WDA plus 2 km buffer in the breeding season based on MSP of 91.4 birds.

Lower = 30% displacement and 3% mortality. Upper = 50% displacement and 3% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	0.1	0.2	0.3	0.4	0.5	0.5	0.6	0.7	0.8	0.9
2%	0.0	0.2	0.4	0.5	0.7	0.9	1.1	1.3	1.5	1.6	1.8
3%	0.0	0.3	0.5	0.8	1.1	1.4	1.6	1.9	2.2	2.5	2.7
4%	0.0	0.4	0.7	1.1	1.5	1.8	2.2	2.6	2.9	3.3	3.7
5%	0.0	0.5	0.9	1.4	1.8	2.3	2.7	3.2	3.7	4.1	4.6
10%	0.0	0.9	1.8	2.7	3.7	4.6	5.5	6.4	7.3	8.2	9.1
15%	0.0	1.4	2.7	4.1	5.5	6.9	8.2	9.6	11.0	12.3	13.7
20%	0.0	1.8	3.7	5.5	7.3	9.1	11.0	12.8	14.6	16.5	18.3
30%	0.0	2.7	5.5	8.2	11.0	13.7	16.5	19.2	21.9	24.7	27.4
40%	0.0	3.7	7.3	11.0	14.6	18.3	21.9	25.6	29.2	32.9	36.6
50%	0.0	4.6	9.1	13.7	18.3	22.9	27.4	32.0	36.6	41.1	45.7
60%	0.0	5.5	11.0	16.5	21.9	27.4	32.9	38.4	43.9	49.4	54.8
70%	0.0	6.4	12.8	19.2	25.6	32.0	38.4	44.8	51.2	57.6	64.0
80%	0.0	7.3	14.6	21.9	29.2	36.6	43.9	51.2	58.5	65.8	73.1
90%	0.0	8.2	16.5	24.7	32.9	41.1	49.4	57.6	65.8	74.0	82.3
100%	0.0	9.1	18.3	27.4	36.6	45.7	54.8	64.0	73.1	82.3	91.4

3.1.3.2 Arctic tern – Spring migration

Table 19: Potential Arctic tern mortality following displacement from the WDA plus 2 km buffer in the spring migration season based on MSP of 91.4 birds.

Lower = 30% displacement and 3% mortality. Upper = 50% displacement and 3% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	0.1	0.2	0.3	0.4	0.5	0.5	0.6	0.7	0.8	0.9
2%	0.0	0.2	0.4	0.5	0.7	0.9	1.1	1.3	1.5	1.6	1.8
3%	0.0	0.3	0.5	0.8	1.1	1.4	1.6	1.9	2.2	2.5	2.7
4%	0.0	0.4	0.7	1.1	1.5	1.8	2.2	2.6	2.9	3.3	3.7
5%	0.0	0.5	0.9	1.4	1.8	2.3	2.7	3.2	3.7	4.1	4.6
10%	0.0	0.9	1.8	2.7	3.7	4.6	5.5	6.4	7.3	8.2	9.1
15%	0.0	1.4	2.7	4.1	5.5	6.9	8.2	9.6	11.0	12.3	13.7
20%	0.0	1.8	3.7	5.5	7.3	9.1	11.0	12.8	14.6	16.5	18.3
30%	0.0	2.7	5.5	8.2	11.0	13.7	16.5	19.2	21.9	24.7	27.4
40%	0.0	3.7	7.3	11.0	14.6	18.3	21.9	25.6	29.2	32.9	36.6
50%	0.0	4.6	9.1	13.7	18.3	22.9	27.4	32.0	36.6	41.1	45.7
60%	0.0	5.5	11.0	16.5	21.9	27.4	32.9	38.4	43.9	49.4	54.8
70%	0.0	6.4	12.8	19.2	25.6	32.0	38.4	44.8	51.2	57.6	64.0
80%	0.0	7.3	14.6	21.9	29.2	36.6	43.9	51.2	58.5	65.8	73.1
90%	0.0	8.2	16.5	24.7	32.9	41.1	49.4	57.6	65.8	74.0	82.3
100%	0.0	9.1	18.3	27.4	36.6	45.7	54.8	64.0	73.1	82.3	91.4

3.1.3.3 Arctic tern – Autumn Migration

Table 20: Potential Arctic tern mortality following displacement from the WDA plus 2 km buffer in the autumn migration season based on MSP of 35.2 birds.

Lower = 30% displacement and 3% mortality. Upper = 50% displacement and 3% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4
2%	0.0	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.6	0.7
3%	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.1
4%	0.0	0.1	0.3	0.4	0.6	0.7	0.8	1.0	1.1	1.3	1.4
5%	0.0	0.2	0.4	0.5	0.7	0.9	1.1	1.2	1.4	1.6	1.8
10%	0.0	0.4	0.7	1.1	1.4	1.8	2.1	2.5	2.8	3.2	3.5
15%	0.0	0.5	1.1	1.6	2.1	2.6	3.2	3.7	4.2	4.7	5.3
20%	0.0	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3	7.0
30%	0.0	1.1	2.1	3.2	4.2	5.3	6.3	7.4	8.4	9.5	10.5
40%	0.0	1.4	2.8	4.2	5.6	7.0	8.4	9.8	11.2	12.7	14.1
50%	0.0	1.8	3.5	5.3	7.0	8.8	10.5	12.3	14.1	15.8	17.6
60%	0.0	2.1	4.2	6.3	8.4	10.5	12.7	14.8	16.9	19.0	21.1
70%	0.0	2.5	4.9	7.4	9.8	12.3	14.8	17.2	19.7	22.1	24.6
80%	0.0	2.8	5.6	8.4	11.2	14.1	16.9	19.7	22.5	25.3	28.1
90%	0.0	3.2	6.3	9.5	12.7	15.8	19.0	22.1	25.3	28.5	31.6
100%	0.0	3.5	7.0	10.5	14.1	17.6	21.1	24.6	28.1	31.6	35.2

3.1.4 Common tern

35. Common tern seasonal displacement mortalities predicted within the WDA plus 2 km buffer are presented in **Table 21** and **Table 22** (no common terns were recorded in spring so there was no predicted mortality in that season; **Table 6**). The upper displacement rates (50% displacement and 3% mortality) predicted mortalities of 0.9 in the breeding season and 0.9 in the autumn migration period, although these were based on the same months in each case. The annual total, albeit based on summing the prediction in the same months, was 1.8.

3.1.4.1 Common tern - Breeding Season

Table 21: Potential common tern mortality following displacement from the WDA plus 2 km buffer in the breeding season based on MSP of 62.8 birds.

Lower = 30% displacement and 3% mortality. Upper = 50% displacement and 3% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	0.1	0.1	0.2	0.3	0.3	0.4	0.4	0.5	0.6	0.6
2%	0.0	0.1	0.3	0.4	0.5	0.6	0.8	0.9	1.0	1.1	1.3
3%	0.0	0.2	0.4	0.6	0.8	0.9	1.1	1.3	1.5	1.7	1.9
4%	0.0	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.0	2.3	2.5
5%	0.0	0.3	0.6	0.9	1.3	1.6	1.9	2.2	2.5	2.8	3.1
10%	0.0	0.6	1.3	1.9	2.5	3.1	3.8	4.4	5.0	5.7	6.3
15%	0.0	0.9	1.9	2.8	3.8	4.7	5.7	6.6	7.5	8.5	9.4
20%	0.0	1.3	2.5	3.8	5.0	6.3	7.5	8.8	10.0	11.3	12.6
30%	0.0	1.9	3.8	5.7	7.5	9.4	11.3	13.2	15.1	17.0	18.8
40%	0.0	2.5	5.0	7.5	10.0	12.6	15.1	17.6	20.1	22.6	25.1
50%	0.0	3.1	6.3	9.4	12.6	15.7	18.8	22.0	25.1	28.3	31.4
60%	0.0	3.8	7.5	11.3	15.1	18.8	22.6	26.4	30.1	33.9	37.7
70%	0.0	4.4	8.8	13.2	17.6	22.0	26.4	30.8	35.2	39.6	44.0
80%	0.0	5.0	10.0	15.1	20.1	25.1	30.1	35.2	40.2	45.2	50.2
90%	0.0	5.7	11.3	17.0	22.6	28.3	33.9	39.6	45.2	50.9	56.5
100%	0.0	6.3	12.6	18.8	25.1	31.4	37.7	44.0	50.2	56.5	62.8

3.1.4.2 Common tern – Autumn Migration

Table 22: Potential common tern mortality following displacement from the WDA plus 2 km buffer in the autumn migration season based on MSP of 62.8 birds.

Lower = 30% displacement and 3% mortality. Upper = 50% displacement and 3% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	0.1	0.1	0.2	0.3	0.3	0.4	0.4	0.5	0.6	0.6
2%	0.0	0.1	0.3	0.4	0.5	0.6	0.8	0.9	1.0	1.1	1.3
3%	0.0	0.2	0.4	0.6	0.8	0.9	1.1	1.3	1.5	1.7	1.9
4%	0.0	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.0	2.3	2.5
5%	0.0	0.3	0.6	0.9	1.3	1.6	1.9	2.2	2.5	2.8	3.1
10%	0.0	0.6	1.3	1.9	2.5	3.1	3.8	4.4	5.0	5.7	6.3
15%	0.0	0.9	1.9	2.8	3.8	4.7	5.7	6.6	7.5	8.5	9.4
20%	0.0	1.3	2.5	3.8	5.0	6.3	7.5	8.8	10.0	11.3	12.6
30%	0.0	1.9	3.8	5.7	7.5	9.4	11.3	13.2	15.1	17.0	18.8
40%	0.0	2.5	5.0	7.5	10.0	12.6	15.1	17.6	20.1	22.6	25.1
50%	0.0	3.1	6.3	9.4	12.6	15.7	18.8	22.0	25.1	28.3	31.4
60%	0.0	3.8	7.5	11.3	15.1	18.8	22.6	26.4	30.1	33.9	37.7
70%	0.0	4.4	8.8	13.2	17.6	22.0	26.4	30.8	35.2	39.6	44.0
80%	0.0	5.0	10.0	15.1	20.1	25.1	30.1	35.2	40.2	45.2	50.2
90%	0.0	5.7	11.3	17.0	22.6	28.3	33.9	39.6	45.2	50.9	56.5
100%	0.0	6.3	12.6	18.8	25.1	31.4	37.7	44.0	50.2	56.5	62.8

3.1.5 Guillemot

36. Guillemot seasonal displacement mortalities predicted within the WDA plus 2 km buffer are presented in **Table 23** to **Table 24**. The upper displacement rate in the breeding season (60% displacement and 5% mortality) predicted a mortality of 812.9 guillemots. During the non-breeding season, the upper displacement rate (60% displacement and 3% mortality) predicted a mortality of 513.6 birds, an annual total of 1,326.5.

3.1.5.1 Guillemot - Breeding Season

Table 23: Potential guillemot mortality following displacement from the WDA plus 2 km buffer in the breeding season based on MSP of 27,095.4 birds.

Lower = 60% displacement and 3% mortality. Upper = 60% displacement and 5% mortality

MORTALITY	DISPLACEMENT										
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0.5%	0.0	0.0	0.0	0.0	0.0	67.7	81.3	94.8	0.0	0.0	0.0
1%	0.0	27.1	54.2	81.3	108.4	135.5	162.6	189.7	216.8	243.9	271.0
2%	0.0	54.2	108.4	162.6	216.8	271.0	325.1	379.3	433.5	487.7	541.9
3%	0.0	81.3	162.6	243.9	325.1	406.4	487.7	569.0	650.3	731.6	812.9
4%	0.0	108.4	216.8	325.1	433.5	541.9	650.3	758.7	867.1	975.4	1083.8
5%	0.0	135.5	271.0	406.4	541.9	677.4	812.9	948.3	1083.8	1219.3	1354.8
10%	0.0	271.0	541.9	812.9	1083.8	1354.8	1625.7	1896.7	2167.6	2438.6	2709.5
15%	0.0	406.4	812.9	1219.3	1625.7	2032.2	2438.6	2845.0	3251.4	3657.9	4064.3
20%	0.0	541.9	1083.8	1625.7	2167.6	2709.5	3251.4	3793.3	4335.3	4877.2	5419.1
30%	0.0	812.9	1625.7	2438.6	3251.4	4064.3	4877.2	5690.0	6502.9	7315.7	8128.6
40%	0.0	1083.8	2167.6	3251.4	4335.3	5419.1	6502.9	7586.7	8670.5	9754.3	10838.1
50%	0.0	1354.8	2709.5	4064.3	5419.1	6773.8	8128.6	9483.4	10838.1	12192.9	13547.7
60%	0.0	1625.7	3251.4	4877.2	6502.9	8128.6	9754.3	11380.0	13005.8	14631.5	16257.2
70%	0.0	1896.7	3793.3	5690.0	7586.7	9483.4	11380.0	13276.7	15173.4	17070.1	18966.7
80%	0.0	2167.6	4335.3	6502.9	8670.5	10838.1	13005.8	15173.4	17341.0	19508.7	21676.3
90%	0.0	2438.6	4877.2	7315.7	9754.3	12192.9	14631.5	17070.1	19508.7	21947.2	24385.8
100%	0.0	2709.5	5419.1	8128.6	10838.1	13547.7	16257.2	18966.7	21676.3	24385.8	27095.4

3.1.5.2 Guillemot - Non-breeding Season

Table 24: Potential guillemot mortality following displacement from the WDA plus 2 km buffer in the non-breeding season based on MSP of 28,531.5 birds.

Lower = 60% displacement and 1% mortality. Upper = 60% displacement and 3% mortality

MORTALITY	DISPLACEMENT 0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0.5%	0.0	14.3	28.5	42.8	57.1	71.3	85.6	99.9	114.1	128.4	142.7
1%	0.0	28.5	57.1	85.6	114.1	142.7	171.2	199.7	228.3	256.8	285.3
2%	0.0	57.1	114.1	171.2	228.3	285.3	342.4	399.4	456.5	513.6	570.6
3%	0.0	85.6	171.2	256.8	342.4	428.0	513.6	599.2	684.8	770.3	855.9
4%	0.0	114.1	228.3	342.4	456.5	570.6	684.8	798.9	913.0	1027.1	1141.3
5%	0.0	142.7	285.3	428.0	570.6	713.3	855.9	998.6	1141.3	1283.9	1426.6
10%	0.0	285.3	570.6	855.9	1141.3	1426.6	1711.9	1997.2	2282.5	2567.8	2853.1
15%	0.0	428.0	855.9	1283.9	1711.9	2139.9	2567.8	2995.8	3423.8	3851.7	4279.7
20%	0.0	570.6	1141.3	1711.9	2282.5	2853.1	3423.8	3994.4	4565.0	5135.7	5706.3
30%	0.0	855.9	1711.9	2567.8	3423.8	4279.7	5135.7	5991.6	6847.5	7703.5	8559.4
40%	0.0	1141.3	2282.5	3423.8	4565.0	5706.3	6847.5	7988.8	9130.1	10271.3	11412.6
50%	0.0	1426.6	2853.1	4279.7	5706.3	7132.9	8559.4	9986.0	11412.6	12839.2	14265.7
60%	0.0	1711.9	3423.8	5135.7	6847.5	8559.4	10271.3	11983.2	13695.1	15407.0	17118.9
70%	0.0	1997.2	3994.4	5991.6	7988.8	9986.0	11983.2	13980.4	15977.6	17974.8	19972.0
80%	0.0	2282.5	4565.0	6847.5	9130.1	11412.6	13695.1	15977.6	18260.1	20542.6	22825.2
90%	0.0	2567.8	5135.7	7703.5	10271.3	12839.2	15407.0	17974.8	20542.6	23110.5	25678.3
100%	0.0	2853.1	5706.3	8559.4	11412.6	14265.7	17118.9	19972.0	22825.2	25678.3	28531.5

3.1.6 Razorbill

37. Razorbill seasonal displacement mortalities predicted within the WDA plus 2 km buffer are presented in **Table 25** to **Table 29**. The breeding season upper displacement rate (60% displacement and 5% mortality) predicted mortality of 79.1 razorbills. The upper displacement rates during the nonbreeding seasons (60% displacement and 3% mortality) predicted 55.7 mortalities in the autumn period, 125.1 in the spring migration period and 93.6 in the mid-winter period, with an annual total of 353.5. The nonbreeding season mortality as a whole (which comprises the autumn, mid-winter and spring periods) was 125.1.

3.1.6.1 Razorbill - Breeding Season

Table 25: Potential razorbill mortality following displacement from the WDA plus 2 km buffer in the breeding season based on MSP of 2,636.1 birds.

Lower = 60% displacement and 3% mortality. Upper = 60% displacement and 5% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0.5%	0.0	1.3	2.6	4.0	5.3	6.6	7.9	9.2	10.5	11.9	13.2
1%	0.0	2.6	5.3	7.9	10.5	13.2	15.8	18.5	21.1	23.7	26.4
2%	0.0	5.3	10.5	15.8	21.1	26.4	31.6	36.9	42.2	47.4	52.7
3%	0.0	7.9	15.8	23.7	31.6	39.5	47.4	55.4	63.3	71.2	79.1
4%	0.0	10.5	21.1	31.6	42.2	52.7	63.3	73.8	84.4	94.9	105.4
5%	0.0	13.2	26.4	39.5	52.7	65.9	79.1	92.3	105.4	118.6	131.8
10%	0.0	26.4	52.7	79.1	105.4	131.8	158.2	184.5	210.9	237.2	263.6
15%	0.0	39.5	79.1	118.6	158.2	197.7	237.2	276.8	316.3	355.9	395.4
20%	0.0	52.7	105.4	158.2	210.9	263.6	316.3	369.0	421.8	474.5	527.2
30%	0.0	79.1	158.2	237.2	316.3	395.4	474.5	553.6	632.7	711.7	790.8
40%	0.0	105.4	210.9	316.3	421.8	527.2	632.7	738.1	843.5	949.0	1054.4
50%	0.0	131.8	263.6	395.4	527.2	659.0	790.8	922.6	1054.4	1186.2	1318.0
60%	0.0	158.2	316.3	474.5	632.7	790.8	949.0	1107.1	1265.3	1423.5	1581.6
70%	0.0	184.5	369.0	553.6	738.1	922.6	1107.1	1291.7	1476.2	1660.7	1845.2
80%	0.0	210.9	421.8	632.7	843.5	1054.4	1265.3	1476.2	1687.1	1898.0	2108.8
90%	0.0	237.2	474.5	711.7	949.0	1186.2	1423.5	1660.7	1898.0	2135.2	2372.4
100%	0.0	263.6	527.2	790.8	1054.4	1318.0	1581.6	1845.2	2108.8	2372.4	2636.1

3.1.6.2 Razorbill - Non-breeding Season

Table 26: Potential razorbill mortality following displacement from the WDA plus 2 km buffer in the non-breeding season based on MSP of 6,951.4 birds.

Lower = 60% displacement and 1% mortality. Upper = 60% displacement and 3% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0.5%	0.0	3.5	7.0	10.4	13.9	17.4	20.9	24.3	27.8	31.3	34.8
1%	0.0	7.0	13.9	20.9	27.8	34.8	41.7	48.7	55.6	62.6	69.5
2%	0.0	13.9	27.8	41.7	55.6	69.5	83.4	97.3	111.2	125.1	139.0
3%	0.0	20.9	41.7	62.6	83.4	104.3	125.1	146.0	166.8	187.7	208.5
4%	0.0	27.8	55.6	83.4	111.2	139.0	166.8	194.6	222.4	250.2	278.1
5%	0.0	34.8	69.5	104.3	139.0	173.8	208.5	243.3	278.1	312.8	347.6
10%	0.0	69.5	139.0	208.5	278.1	347.6	417.1	486.6	556.1	625.6	695.1
15%	0.0	104.3	208.5	312.8	417.1	521.4	625.6	729.9	834.2	938.4	1042.7
20%	0.0	139.0	278.1	417.1	556.1	695.1	834.2	973.2	1112.2	1251.2	1390.3
30%	0.0	208.5	417.1	625.6	834.2	1042.7	1251.2	1459.8	1668.3	1876.9	2085.4
40%	0.0	278.1	556.1	834.2	1112.2	1390.3	1668.3	1946.4	2224.4	2502.5	2780.5
50%	0.0	347.6	695.1	1042.7	1390.3	1737.8	2085.4	2433.0	2780.5	3128.1	3475.7
60%	0.0	417.1	834.2	1251.2	1668.3	2085.4	2502.5	2919.6	3336.6	3753.7	4170.8
70%	0.0	486.6	973.2	1459.8	1946.4	2433.0	2919.6	3406.2	3892.8	4379.4	4865.9
80%	0.0	556.1	1112.2	1668.3	2224.4	2780.5	3336.6	3892.8	4448.9	5005.0	5561.1
90%	0.0	625.6	1251.2	1876.9	2502.5	3128.1	3753.7	4379.4	5005.0	5630.6	6256.2
100%	0.0	695.1	1390.3	2085.4	2780.5	3475.7	4170.8	4865.9	5561.1	6256.2	6951.4

3.1.6.3 Razorbill – Spring Migration

Table 27: Potential razorbill mortality following displacement from the WDA plus 2 km buffer in the spring migration season based on MSP of 6,951.4 birds.

Lower = 60% displacement and 1% mortality. Upper = 60% displacement and 3% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	7.0	13.9	20.9	27.8	34.8	41.7	48.7	55.6	62.6	69.5
2%	0.0	13.9	27.8	41.7	55.6	69.5	83.4	97.3	111.2	125.1	139.0
3%	0.0	20.9	41.7	62.6	83.4	104.3	125.1	146.0	166.8	187.7	208.5
4%	0.0	27.8	55.6	83.4	111.2	139.0	166.8	194.6	222.4	250.2	278.1
5%	0.0	34.8	69.5	104.3	139.0	173.8	208.5	243.3	278.1	312.8	347.6
10%	0.0	69.5	139.0	208.5	278.1	347.6	417.1	486.6	556.1	625.6	695.1
15%	0.0	104.3	208.5	312.8	417.1	521.4	625.6	729.9	834.2	938.4	1042.7
20%	0.0	139.0	278.1	417.1	556.1	695.1	834.2	973.2	1112.2	1251.2	1390.3
30%	0.0	208.5	417.1	625.6	834.2	1042.7	1251.2	1459.8	1668.3	1876.9	2085.4
40%	0.0	278.1	556.1	834.2	1112.2	1390.3	1668.3	1946.4	2224.4	2502.5	2780.5
50%	0.0	347.6	695.1	1042.7	1390.3	1737.8	2085.4	2433.0	2780.5	3128.1	3475.7
60%	0.0	417.1	834.2	1251.2	1668.3	2085.4	2502.5	2919.6	3336.6	3753.7	4170.8
70%	0.0	486.6	973.2	1459.8	1946.4	2433.0	2919.6	3406.2	3892.8	4379.4	4865.9
80%	0.0	556.1	1112.2	1668.3	2224.4	2780.5	3336.6	3892.8	4448.9	5005.0	5561.1
90%	0.0	625.6	1251.2	1876.9	2502.5	3128.1	3753.7	4379.4	5005.0	5630.6	6256.2
100%	0.0	695.1	1390.3	2085.4	2780.5	3475.7	4170.8	4865.9	5561.1	6256.2	6951.4

3.1.6.4 Razorbill – Autumn Migration

Table 28: Potential razorbill mortality following displacement from the WDA plus 2 km buffer in the autumn migration season based on MSP of 3,092.4 birds.

Lower = 60% displacement and 1% mortality. Upper = 60% displacement and 3% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	3.1	6.2	9.3	12.4	15.5	18.6	21.6	24.7	27.8	30.9
2%	0.0	6.2	12.4	18.6	24.7	30.9	37.1	43.3	49.5	55.7	61.8
3%	0.0	9.3	18.6	27.8	37.1	46.4	55.7	64.9	74.2	83.5	92.8
4%	0.0	12.4	24.7	37.1	49.5	61.8	74.2	86.6	99.0	111.3	123.7
5%	0.0	15.5	30.9	46.4	61.8	77.3	92.8	108.2	123.7	139.2	154.6
10%	0.0	30.9	61.8	92.8	123.7	154.6	185.5	216.5	247.4	278.3	309.2
15%	0.0	46.4	92.8	139.2	185.5	231.9	278.3	324.7	371.1	417.5	463.9
20%	0.0	61.8	123.7	185.5	247.4	309.2	371.1	432.9	494.8	556.6	618.5
30%	0.0	92.8	185.5	278.3	371.1	463.9	556.6	649.4	742.2	834.9	927.7
40%	0.0	123.7	247.4	371.1	494.8	618.5	742.2	865.9	989.6	1113.3	1237.0
50%	0.0	154.6	309.2	463.9	618.5	773.1	927.7	1082.3	1237.0	1391.6	1546.2
60%	0.0	185.5	371.1	556.6	742.2	927.7	1113.3	1298.8	1484.4	1669.9	1855.4
70%	0.0	216.5	432.9	649.4	865.9	1082.3	1298.8	1515.3	1731.7	1948.2	2164.7
80%	0.0	247.4	494.8	742.2	989.6	1237.0	1484.4	1731.7	1979.1	2226.5	2473.9
90%	0.0	278.3	556.6	834.9	1113.3	1391.6	1669.9	1948.2	2226.5	2504.8	2783.2
100%	0.0	309.2	618.5	927.7	1237.0	1546.2	1855.4	2164.7	2473.9	2783.2	3092.4

3.1.6.5 Razorbill – Winter

Table 29: Potential razorbill mortality following displacement from the WDA plus 2 km buffer in the winter season based on MSP of 5,198.3 birds.

Lower = 60% displacement and 1% mortality. Upper = 60% displacement and 3% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	5.2	10.4	15.6	20.8	26.0	31.2	36.4	41.6	46.8	52.0
2%	0.0	10.4	20.8	31.2	41.6	52.0	62.4	72.8	83.2	93.6	104.0
3%	0.0	15.6	31.2	46.8	62.4	78.0	93.6	109.2	124.8	140.4	155.9
4%	0.0	20.8	41.6	62.4	83.2	104.0	124.8	145.6	166.3	187.1	207.9
5%	0.0	26.0	52.0	78.0	104.0	130.0	155.9	181.9	207.9	233.9	259.9
10%	0.0	52.0	104.0	155.9	207.9	259.9	311.9	363.9	415.9	467.8	519.8
15%	0.0	78.0	155.9	233.9	311.9	389.9	467.8	545.8	623.8	701.8	779.7
20%	0.0	104.0	207.9	311.9	415.9	519.8	623.8	727.8	831.7	935.7	1039.7
30%	0.0	155.9	311.9	467.8	623.8	779.7	935.7	1091.6	1247.6	1403.5	1559.5
40%	0.0	207.9	415.9	623.8	831.7	1039.7	1247.6	1455.5	1663.4	1871.4	2079.3
50%	0.0	259.9	519.8	779.7	1039.7	1299.6	1559.5	1819.4	2079.3	2339.2	2599.1
60%	0.0	311.9	623.8	935.7	1247.6	1559.5	1871.4	2183.3	2495.2	2807.1	3119.0
70%	0.0	363.9	727.8	1091.6	1455.5	1819.4	2183.3	2547.1	2911.0	3274.9	3638.8
80%	0.0	415.9	831.7	1247.6	1663.4	2079.3	2495.2	2911.0	3326.9	3742.7	4158.6
90%	0.0	467.8	935.7	1403.5	1871.4	2339.2	2807.1	3274.9	3742.7	4210.6	4678.4
100%	0.0	519.8	1039.7	1559.5	2079.3	2599.1	3119.0	3638.8	4158.6	4678.4	5198.3

3.1.7 Puffin

38. Puffin seasonal displacement mortalities predicted within the WDA plus 2 km buffer are presented in **Table 30** and **Table 31**. The upper displacement rate in the breeding season (60% displacement and 5% mortality) predicted a mortality of 29.1 puffins. During the non-breeding season, the upper displacement rate (60% displacement and 3% mortality) predicted a mortality of 21.5 birds, an annual sum of 50.6.

3.1.7.1 Puffin - Breeding Season

Table 30: Potential puffin mortality following displacement from the WDA plus 2 km buffer in the breeding season based on MSP of 971.7 birds.

Lower = 60% displacement and 3% mortality. Upper = 60% displacement and 5% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	1.0	1.9	2.9	3.9	4.9	5.8	6.8	7.8	8.7	9.7
2%	0.0	1.9	3.9	5.8	7.8	9.7	11.7	13.6	15.5	17.5	19.4
3%	0.0	2.9	5.8	8.7	11.7	14.6	17.5	20.4	23.3	26.2	29.1
4%	0.0	3.9	7.8	11.7	15.5	19.4	23.3	27.2	31.1	35.0	38.9
5%	0.0	4.9	9.7	14.6	19.4	24.3	29.1	34.0	38.9	43.7	48.6
10%	0.0	9.7	19.4	29.1	38.9	48.6	58.3	68.0	77.7	87.4	97.2
15%	0.0	14.6	29.1	43.7	58.3	72.9	87.4	102.0	116.6	131.2	145.7
20%	0.0	19.4	38.9	58.3	77.7	97.2	116.6	136.0	155.5	174.9	194.3
30%	0.0	29.1	58.3	87.4	116.6	145.7	174.9	204.0	233.2	262.3	291.5
40%	0.0	38.9	77.7	116.6	155.5	194.3	233.2	272.1	310.9	349.8	388.7
50%	0.0	48.6	97.2	145.7	194.3	242.9	291.5	340.1	388.7	437.2	485.8
60%	0.0	58.3	116.6	174.9	233.2	291.5	349.8	408.1	466.4	524.7	583.0
70%	0.0	68.0	136.0	204.0	272.1	340.1	408.1	476.1	544.1	612.1	680.2
80%	0.0	77.7	155.5	233.2	310.9	388.7	466.4	544.1	621.9	699.6	777.3
90%	0.0	87.4	174.9	262.3	349.8	437.2	524.7	612.1	699.6	787.0	874.5
100%	0.0	97.2	194.3	291.5	388.7	485.8	583.0	680.2	777.3	874.5	971.7

3.1.7.2 Puffin - Non-breeding Season

Table 31: Potential puffin mortality following displacement from the WDA plus 2 km buffer in the non-breeding season based on MSP of 1,192.4 birds.

Lower = 60% displacement and 1% mortality. Upper = 60% displacement and 3% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	1.2	2.4	3.6	4.8	6.0	7.2	8.3	9.5	10.7	11.9
2%	0.0	2.4	4.8	7.2	9.5	11.9	14.3	16.7	19.1	21.5	23.8
3%	0.0	3.6	7.2	10.7	14.3	17.9	21.5	25.0	28.6	32.2	35.8
4%	0.0	4.8	9.5	14.3	19.1	23.8	28.6	33.4	38.2	42.9	47.7
5%	0.0	6.0	11.9	17.9	23.8	29.8	35.8	41.7	47.7	53.7	59.6
10%	0.0	11.9	23.8	35.8	47.7	59.6	71.5	83.5	95.4	107.3	119.2
15%	0.0	17.9	35.8	53.7	71.5	89.4	107.3	125.2	143.1	161.0	178.9
20%	0.0	23.8	47.7	71.5	95.4	119.2	143.1	166.9	190.8	214.6	238.5
30%	0.0	35.8	71.5	107.3	143.1	178.9	214.6	250.4	286.2	321.9	357.7
40%	0.0	47.7	95.4	143.1	190.8	238.5	286.2	333.9	381.6	429.3	477.0
50%	0.0	59.6	119.2	178.9	238.5	298.1	357.7	417.3	477.0	536.6	596.2
60%	0.0	71.5	143.1	214.6	286.2	357.7	429.3	500.8	572.4	643.9	715.4
70%	0.0	83.5	166.9	250.4	333.9	417.3	500.8	584.3	667.7	751.2	834.7
80%	0.0	95.4	190.8	286.2	381.6	477.0	572.4	667.7	763.1	858.5	953.9
90%	0.0	107.3	214.6	321.9	429.3	536.6	643.9	751.2	858.5	965.8	1073.2
100%	0.0	119.2	238.5	357.7	477.0	596.2	715.4	834.7	953.9	1073.2	1192.4

3.1.8 Fulmar

39. Fulmar seasonal displacement mortalities predicted within the WDA plus 2 km buffer are presented in **Table 32** to **Table 36**. The upper displacement rates (20% displacement and 3% mortality) predicted a mortality of 0.5 in the breeding season, 0.3 in the autumn period, 0.3 in the mid-winter period and 0.8 in the spring period, with an annual total of 1.9. The nonbreeding season mortality as a whole (which comprises autumn, mid-winter and spring periods) was 0.9.

3.1.8.1 Fulmar - Breeding Season

Table 32: Potential fulmar mortality following displacement from the WDA plus 2 km buffer in the breeding season based on MSP of 82.8 birds.

Lower = 20% displacement and 1% mortality. Upper = 20% displacement and 3% mortality

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0.0	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.7	0.8
	2%	0.0	0.2	0.3	0.5	0.7	0.8	1.0	1.2	1.3	1.5	1.7
	3%	0.0	0.2	0.5	0.7	1.0	1.2	1.5	1.7	2.0	2.2	2.5
	4%	0.0	0.3	0.7	1.0	1.3	1.7	2.0	2.3	2.6	3.0	3.3
	5%	0.0	0.4	0.8	1.2	1.7	2.1	2.5	2.9	3.3	3.7	4.1
	10%	0.0	0.8	1.7	2.5	3.3	4.1	5.0	5.8	6.6	7.5	8.3
	15%	0.0	1.2	2.5	3.7	5.0	6.2	7.5	8.7	9.9	11.2	12.4
	20%	0.0	1.7	3.3	5.0	6.6	8.3	9.9	11.6	13.2	14.9	16.6
	30%	0.0	2.5	5.0	7.5	9.9	12.4	14.9	17.4	19.9	22.4	24.8
	40%	0.0	3.3	6.6	9.9	13.2	16.6	19.9	23.2	26.5	29.8	33.1
	50%	0.0	4.1	8.3	12.4	16.6	20.7	24.8	29.0	33.1	37.3	41.4
	60%	0.0	5.0	9.9	14.9	19.9	24.8	29.8	34.8	39.7	44.7	49.7
	70%	0.0	5.8	11.6	17.4	23.2	29.0	34.8	40.6	46.4	52.2	58.0
	80%	0.0	6.6	13.2	19.9	26.5	33.1	39.7	46.4	53.0	59.6	66.2
	90%	0.0	7.5	14.9	22.4	29.8	37.3	44.7	52.2	59.6	67.1	74.5
	100%	0.0	8.3	16.6	24.8	33.1	41.4	49.7	58.0	66.2	74.5	82.8

3.1.8.2 Fulmar - Non-breeding Season

Table 33: Potential fulmar mortality following displacement from the WDA plus 2 km buffer in the non-breeding season based on MSP of 150.6 birds.

Lower = 20% displacement and 1% mortality. Upper = 20% displacement and 3% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	1.5
2%	0.0	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0
3%	0.0	0.5	0.9	1.4	1.8	2.3	2.7	3.2	3.6	4.1	4.5
4%	0.0	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0
5%	0.0	0.8	1.5	2.3	3.0	3.8	4.5	5.3	6.0	6.8	7.5
10%	0.0	1.5	3.0	4.5	6.0	7.5	9.0	10.5	12.0	13.5	15.1
15%	0.0	2.3	4.5	6.8	9.0	11.3	13.5	15.8	18.1	20.3	22.6
20%	0.0	3.0	6.0	9.0	12.0	15.1	18.1	21.1	24.1	27.1	30.1
30%	0.0	4.5	9.0	13.5	18.1	22.6	27.1	31.6	36.1	40.6	45.2
40%	0.0	6.0	12.0	18.1	24.1	30.1	36.1	42.2	48.2	54.2	60.2
50%	0.0	7.5	15.1	22.6	30.1	37.6	45.2	52.7	60.2	67.7	75.3
60%	0.0	9.0	18.1	27.1	36.1	45.2	54.2	63.2	72.3	81.3	90.3
70%	0.0	10.5	21.1	31.6	42.2	52.7	63.2	73.8	84.3	94.8	105.4
80%	0.0	12.0	24.1	36.1	48.2	60.2	72.3	84.3	96.4	108.4	120.4
90%	0.0	13.5	27.1	40.6	54.2	67.7	81.3	94.8	108.4	121.9	135.5
100%	0.0	15.1	30.1	45.2	60.2	75.3	90.3	105.4	120.4	135.5	150.6

3.1.8.3 Fulmar – Spring migration

Table 34: Potential fulmar mortality following displacement from the WDA plus 2 km buffer in the spring migration season based on MSP of 138.2 birds.

Lower = 20% displacement and 1% mortality. Upper = 20% displacement and 3% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	0.1	0.3	0.4	0.6	0.7	0.8	1.0	1.1	1.2	1.4
2%	0.0	0.3	0.6	0.8	1.1	1.4	1.7	1.9	2.2	2.5	2.8
3%	0.0	0.4	0.8	1.2	1.7	2.1	2.5	2.9	3.3	3.7	4.1
4%	0.0	0.6	1.1	1.7	2.2	2.8	3.3	3.9	4.4	5.0	5.5
5%	0.0	0.7	1.4	2.1	2.8	3.5	4.1	4.8	5.5	6.2	6.9
10%	0.0	1.4	2.8	4.1	5.5	6.9	8.3	9.7	11.1	12.4	13.8
15%	0.0	2.1	4.1	6.2	8.3	10.4	12.4	14.5	16.6	18.7	20.7
20%	0.0	2.8	5.5	8.3	11.1	13.8	16.6	19.3	22.1	24.9	27.6
30%	0.0	4.1	8.3	12.4	16.6	20.7	24.9	29.0	33.2	37.3	41.4
40%	0.0	5.5	11.1	16.6	22.1	27.6	33.2	38.7	44.2	49.7	55.3
50%	0.0	6.9	13.8	20.7	27.6	34.5	41.4	48.4	55.3	62.2	69.1
60%	0.0	8.3	16.6	24.9	33.2	41.4	49.7	58.0	66.3	74.6	82.9
70%	0.0	9.7	19.3	29.0	38.7	48.4	58.0	67.7	77.4	87.0	96.7
80%	0.0	11.1	22.1	33.2	44.2	55.3	66.3	77.4	88.4	99.5	110.5
90%	0.0	12.4	24.9	37.3	49.7	62.2	74.6	87.0	99.5	111.9	124.3
100%	0.0	13.8	27.6	41.4	55.3	69.1	82.9	96.7	110.5	124.3	138.2

3.1.8.4 Fulmar – Autumn Migration

Table 35: Potential fulmar mortality following displacement from the WDA plus 2 km buffer in the autumn migration season based on MSP of 55.2 birds.

Lower = 20% displacement and 1% mortality. Upper = 20% displacement and 3% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.6
2%	0.0	0.1	0.2	0.3	0.4	0.6	0.7	0.8	0.9	1.0	1.1
3%	0.0	0.2	0.3	0.5	0.7	0.8	1.0	1.2	1.3	1.5	1.7
4%	0.0	0.2	0.4	0.7	0.9	1.1	1.3	1.5	1.8	2.0	2.2
5%	0.0	0.3	0.6	0.8	1.1	1.4	1.7	1.9	2.2	2.5	2.8
10%	0.0	0.6	1.1	1.7	2.2	2.8	3.3	3.9	4.4	5.0	5.5
15%	0.0	0.8	1.7	2.5	3.3	4.1	5.0	5.8	6.6	7.5	8.3
20%	0.0	1.1	2.2	3.3	4.4	5.5	6.6	7.7	8.8	9.9	11.0
30%	0.0	1.7	3.3	5.0	6.6	8.3	9.9	11.6	13.2	14.9	16.6
40%	0.0	2.2	4.4	6.6	8.8	11.0	13.2	15.5	17.7	19.9	22.1
50%	0.0	2.8	5.5	8.3	11.0	13.8	16.6	19.3	22.1	24.8	27.6
60%	0.0	3.3	6.6	9.9	13.2	16.6	19.9	23.2	26.5	29.8	33.1
70%	0.0	3.9	7.7	11.6	15.5	19.3	23.2	27.0	30.9	34.8	38.6
80%	0.0	4.4	8.8	13.2	17.7	22.1	26.5	30.9	35.3	39.7	44.2
90%	0.0	5.0	9.9	14.9	19.9	24.8	29.8	34.8	39.7	44.7	49.7
100%	0.0	5.5	11.0	16.6	22.1	27.6	33.1	38.6	44.2	49.7	55.2

3.1.8.5 Fulmar – Winter

Table 36: Potential fulmar mortality following displacement from the WDA plus 2 km buffer in the winter season based on MSP of 52.6 birds.

Lower = 20% displacement and 1% mortality. Upper = 20% displacement and 3% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5
2%	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.1
3%	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.3	1.4	1.6
4%	0.0	0.2	0.4	0.6	0.8	1.1	1.3	1.5	1.7	1.9	2.1
5%	0.0	0.3	0.5	0.8	1.1	1.3	1.6	1.8	2.1	2.4	2.6
10%	0.0	0.5	1.1	1.6	2.1	2.6	3.2	3.7	4.2	4.7	5.3
15%	0.0	0.8	1.6	2.4	3.2	3.9	4.7	5.5	6.3	7.1	7.9
20%	0.0	1.1	2.1	3.2	4.2	5.3	6.3	7.4	8.4	9.5	10.5
30%	0.0	1.6	3.2	4.7	6.3	7.9	9.5	11.0	12.6	14.2	15.8
40%	0.0	2.1	4.2	6.3	8.4	10.5	12.6	14.7	16.8	18.9	21.0
50%	0.0	2.6	5.3	7.9	10.5	13.1	15.8	18.4	21.0	23.6	26.3
60%	0.0	3.2	6.3	9.5	12.6	15.8	18.9	22.1	25.2	28.4	31.5
70%	0.0	3.7	7.4	11.0	14.7	18.4	22.1	25.7	29.4	33.1	36.8
80%	0.0	4.2	8.4	12.6	16.8	21.0	25.2	29.4	33.6	37.8	42.0
90%	0.0	4.7	9.5	14.2	18.9	23.6	28.4	33.1	37.8	42.6	47.3
100%	0.0	5.3	10.5	15.8	21.0	26.3	31.5	36.8	42.0	47.3	52.6

3.1.9 Gannet

40. Gannet seasonal displacement mortalities predicted within the WDA plus 2 km buffer are presented in **Table 37** to **Table 40**. The upper displacement rates (70% displacement and 3% mortality) predicted a mortality of 8.9 gannets during the breeding season, 3.2 during the autumn migration period and 2.9 during the spring migration period, an annual total of 15.0. The nonbreeding season mortality as a whole (which comprises the autumn and spring periods) was 2.9.

3.1.9.1 Gannet – Breeding Season

Table 37: Potential gannet mortality following displacement from the WDA plus 2 km buffer in the breeding season based on MSP of 422.7 birds.

Lower = 70% displacement and 1% mortality. Upper = 70% displacement and 3% mortality.

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	0.4	0.8	1.3	1.7	2.1	2.5	3.0	3.4	3.8	4.2
2%	0.0	0.8	1.7	**2.5**	3.4	4.2	5.1	5.9	6.8	7.6	8.5
3%	0.0	1.3	2.5	3.8	5.1	6.3	7.6	8.9	10.1	11.4	12.7
4%	0.0	1.7	3.4	5.1	6.8	8.5	10.1	11.8	13.5	15.2	16.9
5%	0.0	2.1	4.2	6.3	8.5	10.6	12.7	14.8	16.9	19.0	21.1
10%	0.0	4.2	8.5	12.7	16.9	21.1	25.4	29.6	33.8	38.0	42.3
15%	0.0	6.3	12.7	19.0	25.4	31.7	38.0	44.4	50.7	57.1	63.4
20%	0.0	8.5	16.9	25.4	33.8	42.3	50.7	59.2	67.6	76.1	84.5
30%	0.0	12.7	25.4	38.0	50.7	63.4	76.1	88.8	101.4	114.1	126.8
40%	0.0	16.9	33.8	50.7	67.6	84.5	101.4	118.3	135.2	152.2	169.1
50%	0.0	21.1	42.3	63.4	84.5	105.7	126.8	147.9	169.1	190.2	211.3
60%	0.0	25.4	50.7	76.1	101.4	126.8	152.2	177.5	202.9	228.2	253.6
70%	0.0	29.6	59.2	88.8	118.3	147.9	177.5	207.1	236.7	266.3	295.9
80%	0.0	33.8	67.6	101.4	135.2	169.1	202.9	236.7	270.5	304.3	338.1
90%	0.0	38.0	76.1	114.1	152.2	190.2	228.2	266.3	304.3	342.3	380.4
100%	0.0	42.3	84.5	126.8	169.1	211.3	253.6	295.9	338.1	380.4	422.7

3.1.9.2 Gannet – Non-breeding Season

Table 38: Potential gannet mortality following displacement from the WDA plus 2 km buffer in the non-breeding season based on MSP of 139.4 birds.

Lower = 70% displacement and 1% mortality. Upper = 70% displacement and 3% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	0.1	0.3	0.4	0.6	0.7	0.8	1.0	1.1	1.3	1.4
2%	0.0	0.3	0.6	**0.8**	1.1	1.4	1.7	2.0	2.2	2.5	2.8
3%	0.0	0.4	0.8	1.3	1.7	2.1	2.5	2.9	3.3	3.8	4.2
4%	0.0	0.6	1.1	1.7	2.2	2.8	3.3	3.9	4.5	5.0	5.6
5%	0.0	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3	7.0
10%	0.0	1.4	2.8	4.2	5.6	7.0	8.4	9.8	11.1	12.5	13.9
15%	0.0	2.1	4.2	6.3	8.4	10.5	12.5	14.6	16.7	18.8	20.9
20%	0.0	2.8	5.6	8.4	11.1	13.9	16.7	19.5	22.3	25.1	27.9
30%	0.0	4.2	8.4	12.5	16.7	20.9	25.1	29.3	33.4	37.6	41.8
40%	0.0	5.6	11.1	16.7	22.3	27.9	33.4	39.0	44.6	50.2	55.7
50%	0.0	7.0	13.9	20.9	27.9	34.8	41.8	48.8	55.7	62.7	69.7
60%	0.0	8.4	16.7	25.1	33.4	41.8	50.2	58.5	66.9	75.2	83.6
70%	0.0	9.8	19.5	29.3	39.0	48.8	58.5	68.3	78.0	87.8	97.5
80%	0.0	11.1	22.3	33.4	44.6	55.7	66.9	78.0	89.2	100.3	111.5
90%	0.0	12.5	25.1	37.6	50.2	62.7	75.2	87.8	100.3	112.9	125.4
100%	0.0	13.9	27.9	41.8	55.7	69.7	83.6	97.5	111.5	125.4	139.4

3.1.9.3 Gannet – Spring Migration

Table 39: Potential gannet mortality following displacement from the WDA plus 2 km buffer in the spring migration season based on MSP of 139.4 birds.

Lower = 70% displacement and 1% mortality. Upper = 70% displacement and 3% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	0.1	0.3	0.4	0.6	0.7	0.8	1.0	1.1	1.3	1.4
2%	0.0	0.3	0.6	0.8	1.1	1.4	1.7	2.0	2.2	2.5	2.8
3%	0.0	0.4	0.8	1.3	1.7	2.1	2.5	2.9	3.3	3.8	4.2
4%	0.0	0.6	1.1	1.7	2.2	2.8	3.3	3.9	4.5	5.0	5.6
5%	0.0	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3	7.0
10%	0.0	1.4	2.8	4.2	5.6	7.0	8.4	9.8	11.1	12.5	13.9
15%	0.0	2.1	4.2	6.3	8.4	10.5	12.5	14.6	16.7	18.8	20.9
20%	0.0	2.8	5.6	8.4	11.1	13.9	16.7	19.5	22.3	25.1	27.9
30%	0.0	4.2	8.4	12.5	16.7	20.9	25.1	29.3	33.4	37.6	41.8
40%	0.0	5.6	11.1	16.7	22.3	27.9	33.4	39.0	44.6	50.2	55.7
50%	0.0	7.0	13.9	20.9	27.9	34.8	41.8	48.8	55.7	62.7	69.7
60%	0.0	8.4	16.7	25.1	33.4	41.8	50.2	58.5	66.9	75.2	83.6
70%	0.0	9.8	19.5	29.3	39.0	48.8	58.5	68.3	78.0	87.8	97.5
80%	0.0	11.1	22.3	33.4	44.6	55.7	66.9	78.0	89.2	100.3	111.5
90%	0.0	12.5	25.1	37.6	50.2	62.7	75.2	87.8	100.3	112.9	125.4
100%	0.0	13.9	27.9	41.8	55.7	69.7	83.6	97.5	111.5	125.4	139.4

3.1.9.4 Gannet – Autumn Migration

Table 40: Potential gannet mortality following displacement from the WDA plus 2 km buffer in the autumn migration season based on MSP of 151.6 birds.

Lower = 70% displacement and 1% mortality. Upper = 70% displacement and 3% mortality

MORTALITY \ DISPLACEMENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1%	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	1.5
2%	0.0	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0
3%	0.0	0.5	0.9	1.4	1.8	2.3	2.7	3.2	3.6	4.1	4.5
4%	0.0	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.9	5.5	6.1
5%	0.0	0.8	1.5	2.3	3.0	3.8	4.5	5.3	6.1	6.8	7.6
10%	0.0	1.5	3.0	4.5	6.1	7.6	9.1	10.6	12.1	13.6	15.2
15%	0.0	2.3	4.5	6.8	9.1	11.4	13.6	15.9	18.2	20.5	22.7
20%	0.0	3.0	6.1	9.1	12.1	15.2	18.2	21.2	24.3	27.3	30.3
30%	0.0	4.5	9.1	13.6	18.2	22.7	27.3	31.8	36.4	40.9	45.5
40%	0.0	6.1	12.1	18.2	24.3	30.3	36.4	42.4	48.5	54.6	60.6
50%	0.0	7.6	15.2	22.7	30.3	37.9	45.5	53.1	60.6	68.2	75.8
60%	0.0	9.1	18.2	27.3	36.4	45.5	54.6	63.7	72.8	81.9	91.0
70%	0.0	10.6	21.2	31.8	42.4	53.1	63.7	74.3	84.9	95.5	106.1
80%	0.0	12.1	24.3	36.4	48.5	60.6	72.8	84.9	97.0	109.2	121.3
90%	0.0	13.6	27.3	40.9	54.6	68.2	81.9	95.5	109.2	122.8	136.4
100%	0.0	15.2	30.3	45.5	60.6	75.8	91.0	106.1	121.3	136.4	151.6

3.2 Summary of Displacement Mortalities

41. A summary of predicted seabird displacement mortality for each species and season using species appropriate buffers is presented in **Table 41**. These estimates of displacement mortality have been used in the assessments presented in **Chapter 11 Offshore Ornithology** of the EIAR and the RIAA.

Table 41: Summary of predicted seasonal displacement mortalities for LOWER and UPPER displacement/mortality rates. Annual totals are the sum of the breeding and the BDMPS season estimates.

Species (area)	Season	Predicted Impact (individuals)	
		Lower mortality rate	Upper mortality rate
Great northern diver (WDA and 4 km buffer)	Breeding season	0.0	0.0
	Non-breeding season	0.4	0.6
	Annual total	**0.4**	**0.6**
Kittiwake (WDA and 2 km buffer)	Breeding season	3.7	11.0
	Spring Migration	10.5	31.4
	Autumn Migration	17.0	50.9
	Annual total	**31.2**	**93.3**
Arctic tern	Breeding season	0.8	1.4
	Spring Migration	0.8	1.4

Species (area)	Season	Predicted Impact (individuals)	
		Lower mortality rate	Upper mortality rate
(WDA and 2 km buffer)	Autumn Migration	0.3	0.5
	Annual total	**1.9**	**3.3**
Common tern (WDA and 2 km buffer)	Breeding season	0.6	0.9
	Spring Migration	0.0	0.0
	Autumn Migration	0.6	0.9
	Annual total	**1.2**	**1.8**
Guillemot (WDA and 2 km buffer)	Breeding season	487.7	812.9
	Non-breeding season	171.2	513.6
	Annual total	**658.9**	**1326.5**
Razorbill (WDA and 2 km buffer)	Breeding season	47.4	79.1
	Spring Migration	41.7	125.1
	Autumn Migration	18.6	55.7
	Winter	31.2	93.6
	Annual total	**138.9**	**353.5**
Puffin (WDA and 2 km buffer)	Breeding season	17.5	29.1
	Non-breeding season	7.2	21.5
	Annual total	**24.7**	**50.6**
Fulmar (WDA and 2 km buffer)	Breeding season	0.2	0.5
	Spring Migration	0.3	0.8
	Autumn Migration	0.1	0.3
	Winter	0.1	0.3
	Annual total	**0.7**	**1.9**
Gannet (WDA and 2 km buffer)	Breeding season	3.0	8.9
	Spring Migration	1.0	2.9
	Autumn Migration	1.1	3.2
	Annual total	**5.1**	**15.0**

4.0 References

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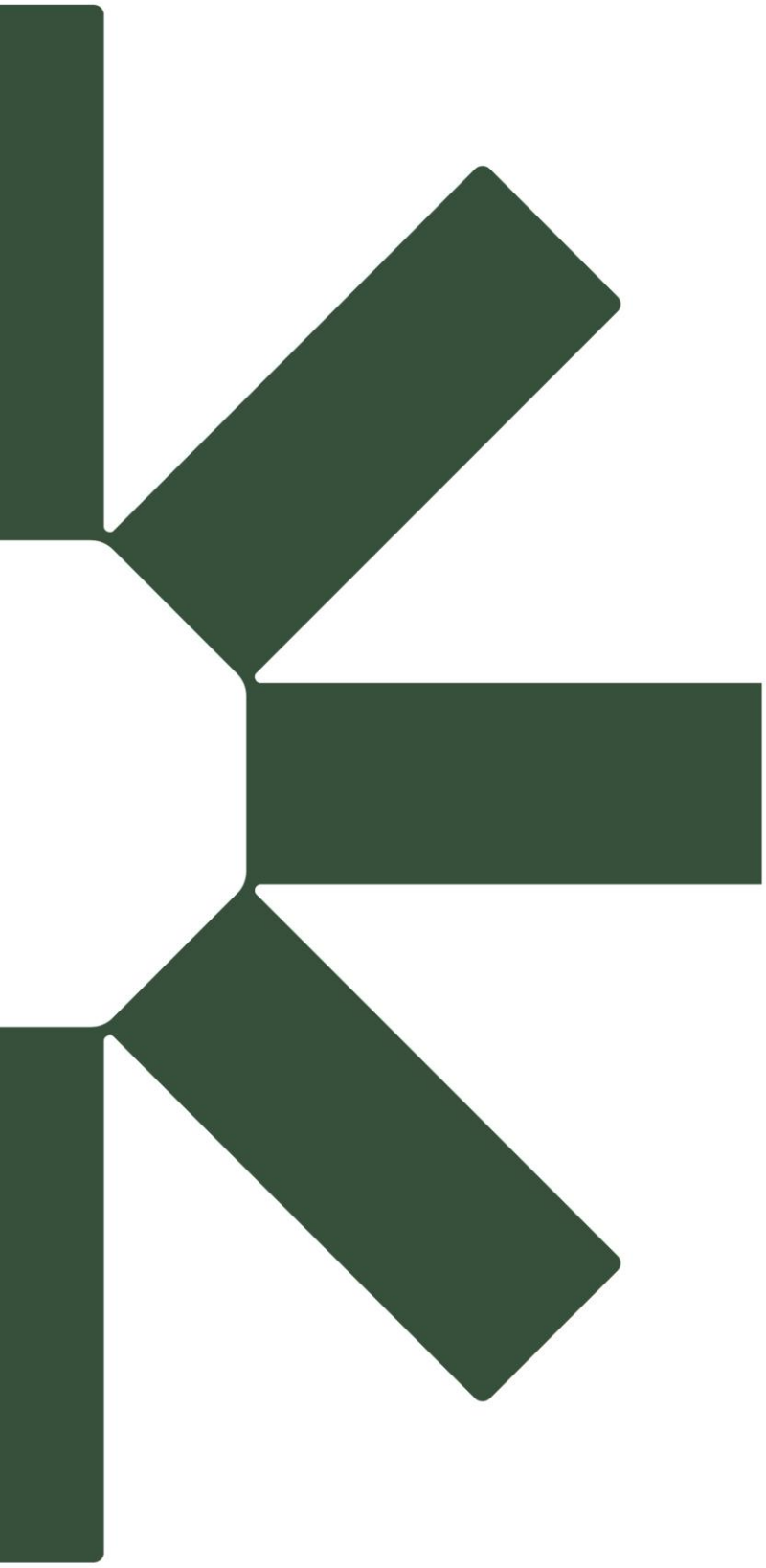

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