West of Orkney Windfarm

Offshore Ornithology Additional Information

Appendix 5 - HRA: Apportioning Technical Report

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Document Quality Record

Version	Status	Person Responsible	Date
0.1	Draft	Dr Mark Trinder	10/06/2024
0.2	Reviewed	Dr Sue O'Brien	11/06/2024
0.3	Updated	Dr Mark Trinder	13/06/2024
1	Internal Approval	Dr Sue O'Brien	19/06/2024
1.1	Client review	Glen Tyler, Jack Farnham, Liz Foubister, Scott McCallum	25/06/2024
1.2	Updated following client review	Dr Sue O'Brien	28/06/2024
1.3	Review	Dr Mark Trinder	19/07/2024
1.4	Review	Dr Mark Trinder	25/07/2024
2	Internal Approval	Dr Mark Trinder	20/08/2024

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1   INTRODUCTION

1.1   Project summary

1.   Offshore Wind Power Limited (OWPL) ('the Applicant') is proposing the development of the West of Orkney Windfarm ('the Project'), an Offshore Wind Farm (OWF), located at least 23 kilometres (km) from the north coast of Scotland and 28 km from the west coast of Hoy, Orkney (**Figure 1-1**).
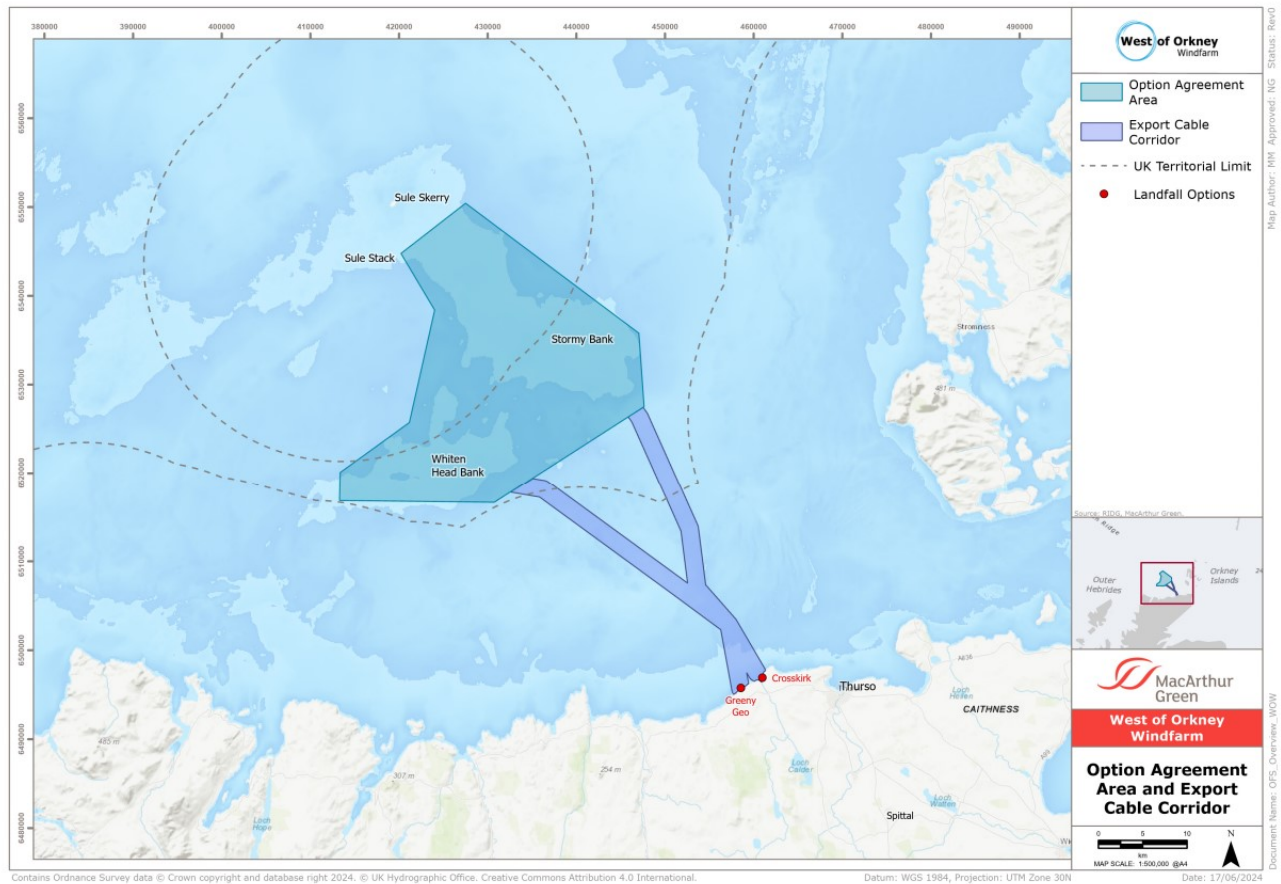
Figure 1-1. Map showing location of the West of Orkney Windfarm Option Agreement Area (OAA) and Export Cable Corridor (ECC) which together, comprise the Offshore Project Area.

2.   The Offshore Project will comprise up to 125 wind turbine generators (WTGs) with fixed-bottom foundations and up to five Offshore Substation Platforms (OSPs). The area within which the WTGs, OSPs and associated infrastructure will be located is the Option Agreement Area (OAA). The OAA covers an area of 657 km^2. The export cables will be located within the Export Cable Corridor (ECC), with landfall options at Greeny Geo and/or Crosskirk in Caithness (**Figure 1-1**). The OAA and ECC together comprise the offshore Project area.

3.   The Applicant submitted an application for consent under Section 36 of the Electricity Act 1989 and Marine Licences under Part 4 of the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 to Scottish Ministers in September 2023 for the offshore components of the Project seaward of Mean High Water Springs (MHWS).

4.   In accordance with relevant EIA Regulations[1], an Offshore Environmental Impact Assessment (EIA) Report was submitted to Marine Directorate – Licensing Operations Team (MD-LOT) as part of the Applicant's consent application (the 'Offshore EIA Report'). A Report to Information Appropriate Assessment (RIAA) was also submitted as part of the Offshore Application to provide the Competent Authority (MD-LOT) with the information required to assist them in undertaking an Appropriate Assessment (AA) for the offshore Project as required under the Conservation (Natural Habitats & c.) Regulations 1994 (as amended), the Conservation of Marine Habitats and Species Regulations 2017 and The Conservation of Habitats and Species Regulations 2017 (as amended) (hereafter referred to as the 'Habitats Regulations').

5.   Following the review of the Applicant's application, and upon receipt of representations from consultees, MD-LOT issued a request for Additional Information on offshore ornithology. This report is part of the Ornithology Additional Information (OAI).

1.2   Relationship between the original application and the OAI

6.   The Ornithology Additional Information (OAI) (see **Introduction to the Additional Ornithology Information** for structure of OAI and list of all reports) includes:

- an **Addendum to the Offshore EIA Report** in the form of a revised EIA chapter for Offshore and Intertidal Ornithology. All ornithology information in this report should be read in place of information in the original EIA chapter;

- an **Addendum to the RIAA**. All ornithology information in this report should be read in place of information in the original RIAA (with the exception of information on pre-application consultation);

- a set of nine technical appendices. This **Appendix 5 – HRA: Apportioning Technical Report** is one of the nine technical appendices. These reports entirely replace the original Supporting Study 12: Offshore Ornithology Technical Supporting Study.

7.   NatureScot's pre- and post-application Project-specific advice and online guidance notes[2] were followed throughout the OAI. To demonstrate this, reference to NatureScot's guidance and advice is made throughout the OAI, either in the text or in separate text boxes.

1.3   Purpose of this Report

8.   HRA requires assessing the potential for Project impacts to undermine the conservation objectives of Special Protection Areas (SPA). To do this, the estimated collision and displacement mortality that could occur during Project operation, was apportioned to SPA populations. Collision and displacement mortality were estimated for the Project (see **Appendix 3 - EIA and HRA: Collision Risk Modelling Technical Report** and **Appendix 4 - EIA and HRA: Displacement Technical Report** for details). This **Appendix 5 – HRA: Apportioning Technical Report** describes the methods used to apportion estimated mortalities to SPA

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[1] *The relevant EIA Regulations include the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017, and the Marine Works (Environmental Impact Assessment) Regulations 2007.*

[2] Guidance Note 1: Guidance to support Offshore Wind Applications: Marine Ornithology - Overview | NatureScot

populations and presents each SPA population's 'apportioning weighting', i.e. the proportion of Project mortality that each SPA population could experience.

9.   This report presents the apportioning weightings for each SPA population but the apportioned mortalities are presented in Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts. The consequences of this additional mortality on the SPA population were then assessed using PVA methods, as described in Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts. A summary of methods and key results are presented in the Addendum to the RIAA, with mortalities and population response to that mortality considered in detail for each SPA, as well as a conclusion on the potential for that mortality to affect the site's conservation objectives, i.e. to cause an adverse effect on Site Integrity.

10.   Apportioning weightings were calculated for each SPA population for the breeding and non-breeding seasons, for both the Project alone mortality and in-combination with mortality from other OWFs.

11.   The apportioning process is only relevant to HRA as EIA does not require assessment of impacts on individual SPA populations but on regional populations. Therefore, this report is only of relevance to HRA and not EIA.

1.4   Terminology

12.   The following terminology is used in this report:

- Option Agreement Area (OAA): this is the area within which WTGs and other offshore Project infrastructure will be installed;

- Export Cable Corridor (ECC) is the area from the OAA to the landfall site in which the export cable will be placed;

- Offshore Project area comprises the OAA and ECC;

- OAA plus 2 km buffer: This includes a 2 km wide 'zone of influence' around the OAA, allowing for changes in bird behaviour (e.g. disturbance/displacement) in the vicinity of the OAA;

- OAA plus 4 km buffer: the OAA plus 4 km buffer was the area used for characterising baseline seabird numbers and distribution for the Project (see **Appendix 1 - EIA and HRA: Baseline Site Characterisation Technical Report**);

- WTG: Wind Turbine Generator.

1.5 Background

13. Collision mortality from the Project was estimated using the density of birds in flight within the OAA (see **Appendix 3 - EIA and HRA: Collision Risk Modelling Technical Report**). Displacement mortality from the Project was estimated for birds both in flight and sat on the water in the OAA plus a 2 km buffer (the buffer distance as advised by NatureScot in Guidance Note 8[3]) (see **Appendix 4 - EIA and HRA: Displacement Technical Report** for more details).

14. HRA requires assessing whether a proposed plan or project will affect the conservation objectives of European Sites (i.e. for birds, SPAs). To do this, the proportion of birds using the OAA plus 2 km buffer that are from each SPA needs to be calculated. This allows estimation of the number of individuals from each SPA that might suffer collision in the OAA or displacement mortality in the OAA plus 2 km buffer.

15. There are different approaches available for calculating apportioning weightings, e.g. the Marine Scotland Apportioning Tool (Butler, *et al.* 2020). However, for the Project, the method described in NatureScot's online guidance was used: Interim Guidance on apportioning impacts from marine renewable developments to breeding seabird populations in SPAs[4] (NatureScot, 2018). This method was used as it follows NatureScot guidance and is a relatively simple method, reliant on fewer assumptions than some other apportioning methods.

16. For the breeding season, when birds are tied to a nest site and so are centrally-placed foragers, the likelihood of a bird from each SPA using the OAA is estimated as a function of the distance the SPA is from the OAA, the size of the colony and the proportion of the area within the species' foraging range which is sea. From these parameters each SPA is given a weight. The weight for each SPA is divided into the sum of weights for all the SPAs to get the relative weighting, i.e. the sum of relative weightings for all SPAs is 1. Note, only SPAs that are withing foraging range of the OAA plus 2 km buffer are included in this calculation, as birds from SPAS beyond foraging range of the Project are assumed to not occur in the OAA.

17. In the non-breeding season, birds from all colonies (both SPA and non-SPA) will mix together, along with other birds from overseas. Furness (2015) identified Biologically Defined Minimum Population Scales (BDMPS), which is a population size estimate of the number of UK breeding birds plus birds from overseas using a defined marine area (the 'BDMPS region'), e.g. the UK North Sea, in a particular season, such as spring migration.

18. When apportioning predicted collision and displacement impacts from the Project in the non-breeding season, the distance between SPA and OAA is no longer a consideration, as birds are no longer required to regularly return to the colony. Birds from all colonies within a BDMPS region are assumed to mix equally. So the apportioning weighting for each SPA is the number of birds that SPA contributes to the BDMPS population, i.e. the SPA population size divided by the BDMPS population size.

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[3] *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.*

[4] *Interim Guidance on apportioning impacts from marine renewable developments to breeding seabird populations in SPAs | NatureScot.*

19.   A different approach was used for guillemot as they remain close to their breeding colony in the non-breeding season. Instead of using BDMPS regions and populations to inform SPA apportioning weightings, the population scale used was all guillemot colonies within foraging range of the OAA plus 2 km buffer, i.e. a regional population scale. SPA weighting was the relative contribution that each SPA made to this regional population.

20.   HRA also requires consideration of other plans and projects that could affect the conservation objectives of a European Site, in-combination with the Project impacts. For this quantitative assessment, estimated impacts from other OWFs were included in the in-combination assessment.

21.   In the breeding season, for the in-combination assessment, an apportioning weighting was calculated for each OWF and SPA, using the same method as for the Project, i.e. based on colony size, distance each OWF was from each SPA and the proportion of area within foraging of that SPA that was sea.

22.   In the non-breeding season, for the in-combination assessment, an apportioning weighting was calculated in the same way as for the Project. As distance between an OWF and SPA is not a consideration in the non-breeding season, the SPA weighting need only be calculated once for each SPA and can be applied to all OWFs, including the Project.

23.   Apportioning of impacts from the Project and other OWFs, in-combination, gives an estimated mortality at each SPA from:

   • Project breeding season impacts;

   • Project non-breeding season impacts;

   • Other OWFs' breeding season impacts; and

   • Other OWFs' non-breeding season impacts.

24.   These impacts are summed to obtain an estimate of annual mortality for each SPA from the Project alone and in-combination with other OWFs. Information on estimated mortalities at each SPA is provided in the **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** and in the **Addendum to the RIAA**.

2 APPORTIONING METHODS

2.1 Species

25. Estimated collision and displacement mortality, which could occur during Project operation, was apportioned to SPA populations. Collision impacts were calculated for kittiwake, great black-backed gull, Arctic tern, great skua and gannet. Displacement impacts were calculated for kittiwake, Arctic tern, guillemot, razorbill, puffin, fulmar and gannet. However, Arctic tern were screened out due to no SPAs with Arctic tern features being within foraging range of the OAA plus 2 km buffer and no Arctic terns using the OAA during the non-breeding season (see **Appendix 2 - HRA: HRA Screening Technical Report** for more details). Consequently, no HRA was undertaken for Arctic tern and no apportioning weightings were required for Arctic tern features. Note, this species was still assessed under EIA for the Project (see **Addendum to the Offshore EIA Report** for details.)

26. Consequently, estimated collision and displacement mortalities for the following species required apportioning to SPAs:

    - Kittiwake;

    - Great black-backed gull;

    - Great skua;

    - Guillemot;

    - Razorbill;

    - Puffin;

    - Fulmar;

    - Gannet.

27. Previously, NatureScot have not advised that displacement impacts for fulmar should be assessed and so no in-combination information on fulmar impacts were available from other OWF applications. In a consultation meeting (dated 11 June 2024), NatureScot advised that fulmar should be assessed only for project alone breeding and non-breeding season impacts and that there is no requirement for an in-combination assessment for this species.

2.2 Project Alone Breeding Season Apportioning

2.2.1 Apportioning calculation

28. The apportioning weighting assigned to each SPA population, for the breeding season, was calculated using the NatureScot method[5]. Full details of the method are provided in NatureScot's advice note: *Interim Guidance on apportioning impacts from marine renewable developments to breeding seabird populations in SPAs*[6].

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[5] *https://www.nature.scot/doc/interim-guidance-apportioning-impacts-marine-renewable-developments-breeding-seabird-populations#A+theoretical+approach*.

[6] Interim Guidance on apportioning impacts from marine renewable developments to breeding seabird populations in SPAs | NatureScot

29.   This method calculates SPA weights as a function of distance (shortest distance between an SPA's boundary and the OAA plus 2 km buffer), SPA population size (most recent count of numbers of breeding adults) and the proportion of the area within foraging range around the SPA which is sea. Absolute SPA weight was then converted to relative weight by dividing absolute weight for each SPA by the sum of absolute weights for all SPAs:

Individual SPA breeding season apportioning weight = [SPA count / sum (all SPA counts)] x [(sum of all SPA distances^2) / SPA distance^2] x [(1 / SPA proportional sea area) / (sum (1/all SPA proportional areas))]

30.   The information for calculating each SPA's breeding season apportioning weighting was obtained as described below.

2.2.1.1   SPAs to which impacts were apportioned

31.   For the breeding season, the list of SPAs to which impacts needed to be apportioned was defined by theoretical connectivity with the Project. This list of SPAs was established at the HRA Screening stage, i.e. an apportioning weighting was calculated for all SPAs which were screened in for breeding season collision and displacement impacts (see **Appendix 2 - HRA: HRA Screening Technical Report** for more details). During HRA screening, SPAs were screened in on the basis of breeding season foraging ranges, using the mean maximum range plus one standard deviation, as advised by NatureScot in their online Guidance Note 3[7] (**Table 2-1**). Note, that for guillemot and razorbill NatureScot advise use of different foraging range distances for colonies defined as being in the 'Northern Isles'. This includes colonies north of the Pentland Firth (i.e. Sule Skerry and Sule Stack, Orkney, Fair Isle, Shetland) but does not include Sula Sgeir and North Rona.

Table 2-1. Breeding season foraging ranges from NatureScot Guidance Note 3. MM = mean of the maximum foraging range. Max = maximum foraging range. SD = standard deviation.

Species	NatureScot recommended Foraging Range (km)	Metric
Northern fulmar	1200.2	MM+SD
Northern gannet	509.4	MM+SD
Northern gannet (Forth Islands SPA)	590.0	Max
Northern gannet (Grassholm SPA)	516.7	Max
Northern gannet (St Kilda SPA)	709.0	Max
Black-legged kittiwake	300.6	MM+SD
Great black-backed gull	73.0	Max/MM
Common guillemot (except Northern Isles SPAs)	95.2	MM+SD
Common guillemot (all Northern Isles SPAs)	153.7	MM+SD
Razorbill (except Northern Isles SPAs)	122.2	MM+SD
Razorbill (all Northern Isles SPAs)	164.6	MM+SD
Atlantic Puffin	265.4	MM+SD

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[7] *Guidance Note 3: Guidance to support Offshore Wind applications: Marine Birds - Identifying theoretical connectivity with breeding site Special Protection Areas using breeding season foraging ranges | NatureScot.*

32. The list of SPAs within foraging range of the OAA plus 2 km buffer for each species, is given below, under the species-specific information (see **Section 3.1** to **Section 3.8**).

33. Breeding season mortality from the Project was apportioned only to colonies with an SPA classification and not to any non-SPA colonies. This was necessary because Sule Skerry and Sule Stack SPA had a breeding season apportioning weighting of almost 1, due to being in such close proximity to the OAA (see **Section 2.2.1.2.2**). This means, for features of this SPA (guillemot, puffin, gannet), almost all breeding season mortality was apportioned to this SPA. However, this SPA also has other breeding seabirds which are not qualifying features or named components of a seabird assemblage feature at Sule Skerry and Sule Stack SPA, e.g. kittiwake. If mortality was apportioned to non-SPA colonies, as well as SPA colonies, this would mean almost all Project breeding season mortality would be apportioned to Sule Skerry and Sule Stack SPA for all species (whether features or not) and effectively no mortality would be apportioned to any other colonies. In other words, no breeding season mortality for kittiwake, great black-backed gull, razorbill, fulmar or great skua would be apportioned to any SPAs.

34. Furthermore, almost all kittiwakes and razorbills breed at colonies which are classified as SPAs, meaning the lack of apportioning to non-SPA colonies makes very little difference to apportioning of mortality to SPAs. Whilst a smaller proportion of great black-backed gull and fulmar colonies are classified as SPAs, great black-backed gull mortality was low during the breeding season, i.e. apportioning only to SPA colonies will make little difference, compared with apportioning to both SPA and non-SPA colonies. Apportioning fulmar breeding season mortality only to SPA colonies is a precautionary approach, as it will result in a relative increase in the amount of mortality each fulmar SPA receives, compared with if mortality had been apportioned to both SPA and non-SPA colonies. Despite this, mortality on fulmar features at SPAs was low, with no fulmar impacts requiring further assessment with a PVA.

35. NatureScot confirmed they were content with this approach in this particular case, during a consultation meeting (2 July 2024).

NatureScot Consultation Meeting 2 July 2024:

NatureScot acknowledge that breeding season apportioning is complicated for West of Orkney due to the close proximity of the Sule Skerry & Sule Stack SPA, and that by apportioning only to SPA colonies, the impact assessment is more precautionary or makes very little difference to conclusions of the assessment. In this instance, for these reasons, we are content to deviate from our normal advice.

2.2.1.2 Distance from SPA to OWF

2.2.1.2.1 SPA boundary to OWF boundary distances

NatureScot Interim Guidance on apportioning impacts from marine renewable developments to breeding seabird populations in SPAs:

The distance of the colony should be measured as the distance between the geometric centre of the development to the geometric centre of the colony.

NatureScot Consultation Meeting (21 May 2024):

Due to the very close proximity to Sule Skerry & Sule Stack SPA NatureScot advise that apportioning within the breeding season should be based on shortest distance from SPA boundary to OAA + 2 km buffer.

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36. NatureScot's online guidance note, *Interim Guidance on apportioning impacts from marine renewable developments to breeding seabird populations in SPAs*, recommends using the distance between the geometric centre of both SPA and OWF in the apportioning weight calculation. However, NatureScot provided Project-specific advice which advised use of the shortest distance between the boundary of each SPA and the OAA plus 2 km buffer. NatureScot advised that the West of Orkney Windfarm was a special case due to the very close proximity of the Sule Skerry and Sule Stack SPA. The boundary of this SPA is just 1.7 km from the OAA boundary, at its closest point.

37. Consequently, SPA to OWF distance used in the apportioning calculation was the shortest straight line distance, in km, from the closest point of the boundary of the OAA plus 2 km buffer to the closest point of the boundary of each SPA. This was calculated in GIS. The SPA boundary included marine components of SPAs, e.g. where a colony SPA boundary has been extended by 2 km into the marine environment.

2.2.1.2.2 Sule Skerry and Sule Stack SPA distance to OAA

38. As the Sule Stack and Sule Skerry SPA boundary is 1.7 km from the OAA, applying a 2 km buffer to the OAA means that the SPA overlaps with the OAA plus 2 km buffer. The apportioning calculation, as described in NatureScot's *Interim Guidance on apportioning impacts from marine renewable developments to breeding seabird populations in SPAs*[8], does not provide a meaningful apportioning weighting for an SPA when a negative distance or zero value is given for SPA distance. Consequently, NatureScot advised that, for calculating a breeding season apportioning weighting for Sule Skerry and Sule Stack SPA, a distance value of 0.1 km should be used (consultation meeting, 28 May 2024).

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[8] *Interim Guidance on apportioning impacts from marine renewable developments to breeding seabird populations in SPAs | NatureScot.*

2.2.1.2.3 Straight line distances versus at sea distances

39. NatureScot's guidance note, *Interim Guidance on apportioning impacts from marine renewable developments to breeding seabird populations in SPAs*[9], advises use of distances between SPAs and OWF to be 'by sea' distances, rather than straight line distances. Most seabirds rarely fly over land and so a representative distance for a bird flying from its SPA colony would be a route that follows the coastline. However, obtaining 'by sea' distances for the large number of SPA and OWF combinations (approx. 1,500 combinations), for deriving apportioning weightings for in-combination mortality apportioning, is computationally highly demanding and unfeasible. Consequently, straight line distances between OWFs and SPAs were used in the apportioning calculation, rather than 'by sea' distances.

NatureScot Consultation Meeting 2 July 2024:

NatureScot clarified that using straight-line distances will have slightly reduced impacts at SPAs closer to WOW and slightly increased impacts at further way SPAs. While NatureScot advice is to use at sea distances for apportioning, NatureScot are content use of straight line distance, in this instance, as the consequences of using straight-line distances in this case are not significant and do not change conclusions of the impact assessment.

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40. Using straight line distances for apportioning impacts to SPAs will mean that greater mortality is attributed to SPAs which are separated from OWFs by land, than would be the case if 'by sea' distances had been used, e.g. Project impacts attributed to East Caithness Cliffs SPA would be lower if 'by sea' distances were used, instead of straight line distance.

41. For guillemot, puffin and gannet, use of straight line or 'by sea' distances to calculate a breeding season apportioning weighting for each SPA makes no difference, as Sule Skerry and Sule Stack SPA, of which these three species are features, had a breeding season apportioning weighting of almost 1, i.e. all other SPAs had a weighting of almost 0. A review of the other species and SPAs in the assessment revealed that the species and SPAs for which the biggest difference in apportioning estimates would be obtained when using straight-line vs. by sea distance was kittiwake from East Caithness Cliffs SPA, North Caithness Cliffs SPA and Cape Wrath SPA. Of these, only the distance to East Caithness Cliffs SPA is affected, as there is no land between the OAA and either North Caithness Cliffs SPA or Cape Wrath SPA.

42. The consequences of using straight line distance instead of by sea distance for East Caithness Cliffs, on the breeding season apportioning weightings, was investigated. The difference in breeding season apportioning weights for each SPA, due to using a straight line distance instead of a by sea distance, was a reduction in apportioning weight for East Caithness Cliffs SPA and an increase for Cape Wrath SPA and North Caithness Cliffs SPA (see **Table 2-2**).

43. The consequence of using apportioning weights generated using straight line distance, rather than by sea distance, on annual mortality apportioned to each SPA was also investigated. (Note, annual mortality, rather than only breeding season mortality, was used to investigate the consequences of using straight line distance, as this shows all the mortality

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[9] *Interim Guidance on apportioning impacts from marine renewable developments to breeding seabird populations in SPAs | NatureScot.*

which is apportioned to each SPA. Non-breeding season apportioning weightings do not include a distance parameter so non-breeding season weightings did not differ with straight line versus by sea distance.) **Table 2-2** shows that apportioned annual kittiwake mortality at East Caithness Cliffs SPA would decrease by 0.65 birds per annum, if 'by sea' distances were used in the apportioning calculation. By contrast, mortality at North Caithness Cliffs SPA and Cape Wrath SPA would increase by 0.26 and 0.2 bird per annum, respectively. Mortality apportioned to other SPAs changed by only a very small amount, as virtually all breeding season Project mortality is apportioned among these three SPAs.

Table 2-2. Apportioning weightings and kittiwake total annual apportioned mortality, using either a straight-line distance from OAA+2km buffer to the East Caithness Cliffs SPA boundary or a 'by sea' distance

SPA	Apportioning using straight line distance		Apportioning using by sea distance	
	Breeding season SPA apportioning weighting	Total annual mortality (collision + displacement)	Breeding season SPA apportioning weighting	Total annual mortality (collision + displacement)
North Caithness Cliffs	33.6%	5.45	35.6%	5.71
Cape Wrath	24.6%	3.29	26.1%	3.49
East Caithness Cliffs	21.1%	6.70	16.4%	6.05

44. Given these small changes of <1 bird per annum in apportioned mortality, using straight line distances, and the computationally unfeasible task of calculating 1,500 'by sea' distances, the Applicant decided to use straight line distances to calculate breeding season apportioning weights.

2.2.1.3 SPA population size

45. SPA population size used to derive an SPA apportioning weighting was taken from the Seabirds Count census[10] (Burnell *et al.* 2023), revised version (13 December 2023). Counts were adjusted to the number of breeding adults, using the following methods:

- Gannet, kittiwake, great skua, great black-backed gull, fulmar: Apparently Occupied Nest (AON), Apparently Occupied Territory (AOT) or Apparently Occupied Site (AOS) ***** 2 = individuals;

- Guillemot and razorbill: Individuals (IND) ***** 0.67 to give the estimated number of pairs, then ***** 2 = individuals;

- Puffin AOB ***** 2 = individuals.

46. This gave an estimated number of breeding adults for each SPA population.

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[10] *Seabirds Count | JNCC - Adviser to Government on Nature Conservation.*

2.2.1.4   Proportion of area which is sea

47. The 'proportion of area that is sea' was calculated using GIS, with the total area around an SPA defined by the foraging range for each species (**Table 2-1**) from which the relative proportions of land and sea were derived.

2.3   In-combination breeding season apportioning

48. It was necessary to adopt a similar approach to calculate breeding season apportioning weights for other OWFs included in the in-combination assessment as it was not possible to confidently identify the apportioning weightings for other OWFs for all the SPAs in the assessment from publicly available documents (e.g. OWF application documents). Thus, the distance between each SPA and each OWF was determined using datasets obtained from the JNCC website[11] (SPAs), The Crown Estate[12] and Crown Estate Scotland[13] (OWF locations). All datasets were downloaded on 3 June 2024. Using these SPA-to-OWF distances, it was possible to calculate breeding season apportioning weights for all SPAs and OWFs included in the in-combination assessment, in the same manner used for the Project alone breeding season apportioning calculation.

49. Breeding season apportioning weightings were calculated for all SPAs impacted by all OWFs that were also considered in the non-breeding season in-combination assessment. Whilst many of these SPAs were beyond foraging range to the Project, it is necessary to include both breeding and non-breeding season impacts on these SPAs from other OWFs, even if the Project only has connectivity with these SPAs in the non-breeding season.

2.3.1   OWFs included in the in-combination assessment

50. The list of OWFs to include in the in-combination assessment was initially defined as any project that had submitted an application prior to 31 December 2023. Advice was then sought from both NatureScot and MD-LOT on whether the proposed list was complete. MD-LOT advised that, "Having considered the list provided, we identify that consented projects Green Volt and Seagreen Phase 1A, have not been included on the list," (by email, dated 10 June 2024). Following this advice, GreenVolt and Seagreen Phase 1A were added to the list of OWFs for in-combination impact assessment. Additionally, Salamander was also added to the list as another Scottish OWF for which an application had recently been submitted.

51. The full list of the 44 OWF projects included in the in-combination assessment is presented in **Table 2-3**.

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[11] https://hub.jncc.gov.uk/assets/20dbc9b4-ceac-4bf2-8763-4ae387fa88c4
[12] https://opendata-thecrownestate.opendata.arcgis.com/datasets/thecrownestate::wind-site-agreements-england-wales-ni-the-crown-estate/about.
[13] https://crown-estate-scotland-spatial-hub-coregis.hub.arcgis.com/datasets/b9c7d514362f40ceb3fe299b47aeb8b3_0/explore?location=56.656616%2C-2.570552%2C7.55.

Table 2-3. List of Offshore Wind Farms included in the in-combination assessment

Offshore Wind Farm name	
Beatrice OWF	Hywind
Berwick Bank	Inch Cape
Blyth Demonstration	Kentish Flats and Extn
DEP & SEP	Kincardine
Dogger Bank Creyke Beck A & B	Lincs and LID6
Dogger Bank Teesside A * Sofia	London Array
Dudgeon	Methil
East Anglia ONE	Moray East
East Anglia ONE North	Moray West
East Anglia Three	Neart na Gaoithe
East Anglia TWO	Norfolk Boreas
EOWDC	Norfolk Vanguard
Forthwind	Pentland Floating OWF
Galloper	Race Bank
Greater Gabbard	Rampion
Greenvolt	Salamander
Gunfleet Sands	Seagreen A & B
Hornsea Project Four	Sheringham Shoal
Hornsea Project One	Teesside
Hornsea Project Three	Thanet
Hornsea Project Two	Triton Knoll
Humber Gateway	Westermost Rough

2.4 Project alone and in-combination non-breeding season apportioning

52. The same approach to calculating non-breeding season apportioning weightings was used for both the Project and all other OWFs included in the in-combination assessment. This is due to the assumption of equal mixing of birds within a BDMPS region, meaning no SPA-to-OWF distances needed to be considered.

53. The Project sits on the boundary of two BDMPS regions for most species. Consequently, in the non-breeding season, seabirds recorded in the offshore Project area could be from SPAs in either the UK North Sea waters BDMPS ('North Sea') region or the UK Western Waters plus Channel BDMPS ('West Coast') region.

54. To assess non-breeding season impacts, a decision is needed on whether to assume birds travel down the east or west coast of Britain, i.e. whether to use the UK North Sea BDMPS population or Western Waters BDMPS population or both for deriving apportioning weightings. NatureScot advised (consultation meeting of 28 May 2024 and letter dated 3 June 2024) that for the HRA assessment, it should be assumed that all birds migrate via the UK North Sea. This is a simplistic assumption and, in reality, it is likely that some birds migrate via the west coast of the UK. However, this assumption enables a worst case scenario (WCS)

to be assessed for in-combination impacts, due to there being substantially more offshore wind development in the North Sea, compared to off the west coast of Britain.

55. The Furness (2015) BDMPS report includes an appendix which lists all SPAs contributing to a particular BDMPS and the estimated number of adults and immatures that are contributed. Furness (2015) estimated that up to 1% of birds from SPAs on the west coast of Britain could join the UK North Sea BDMPS populations. However, OWF mortality from the Project and OWFs in the UK North Sea was not apportioned to these SPAs as the mortalities apportioned to these west coast SPAs would be trivial due to the very small numbers of birds these SPAs contribute to the UK North Sea population. The exception to this is razorbill, where 10% of razorbills from west coast SPA populations were assumed to winter in the UK North Sea. However, razorbill mortality from the Project alone in the winter season was only 0.3 birds, meaning any mortality apportioned to the west coast SPAs would be trivial.

56. Non-breeding season apportioning weightings were calculated for each SPA, as the proportion of adults that an SPA contributes to the total BDMPS population in that season. This was found by firstly, multiplying the SPA count of breeding adults by the proportion of adults that SPA contributes to that BDMPS to give the absolute number of adults that SPA contributes to the BDMPS. This was then divided by the BDMPS population size to give the relative contribution of adults to the BDMPS. This was taken as the apportionment weighting for each SPA.

57. The tables below (**Section 3**) present non-breeding season apportionment weightings that were calculated as:

Individual SPA non-breeding season apportionment = ([SPA counts (adults)] * [SPA adult proportion]) / [BDMPS population]

58. The SPA count of breeding adults used for calculating the relative proportions was the value provided in the Furness (2015) report, despite these counts being somewhat out of date. This approach was taken to ensure consistent population sizes and proportions were used, on the assumption that the relative contributions each SPA makes to a BDMPS will have remained largely unchanged, despite changes in absolute population sizes over time.

59. The result was a single apportioning weighting for each SPA in each BDMPS season which is applicable to all OWFs, including the Project, in the BDMPS region.

2.4.1   Non-breeding season apportioning weighting for guillemot

60. The exception to this method for the non-breeding season was common guillemot. NatureScot note that recent studies show that guillemots largely remain in the vicinity of their breeding colony in the non-breeding season (Buckingham *et al.* 2022). Consequently, NatureScot advise that the non-breeding season BDMPS for guillemot comprises the breeding population found within the mean max foraging range plus one standard deviation (*MMFR* + 1SD), of the development (NatureScot Guidance Note 8[14]). Furthermore,

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[14] *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.*

NatureScot advises two guillemot foraging ranges, with a different distance for birds from Northern Isles colonies (**Table 2-1**) (see NatureScot Guidance Note 3[15]).

61. The Furness (2015) BDMPS populations comprise both adult and immature birds. For guillemot, the smaller BDMPS needed to also include immature birds. To estimate the immature component of the guillemot BDMPS population, the number of adults at each SPA was divided by the estimated adult proportion of the population. This was obtained from the guillemot stable age structure which found 57% of the population to be adults, as defined in Furness (2015). For example, East Caithness Cliffs SPA had a population of 149,228 breeding adult guillemots when counted during Seabirds Count (Burnell *et al.* 2023). Therefore, the total population size including immatures associated with that SPA, would be 149228 / 0.57 = 261,803 birds. This calculation was undertaken for all SPAs within the guillemot MMFR + 1SD. The guillemot BDMPS was then the sum of all SPA populations including associated immature birds.

62. The apportioning weighting for each SPA was then found by the same method as used for other species, but using the smaller guillemot BDMPS rather than the larger Furness (2015) BDMPS populations that were used for other species.

63. Using this approach for defining the guillemot non-breeding season BDMPS means that each OWF considered in the in-combination assessment, will have its own guillemot non-breeding season BDMPS, based on the SPAs within foraging range from that particular OWF. Therefore, it is necessary to calculate the BDMPS for each of the 44 OWFs included in the in-combination assessment individually, as a different suite of SPAs will be located within foraging range of each OWF. The same approach was used to obtain apportioning weights for all OWFs included in the in-combination assessment. Thus, an OWF-specific guillemot non-breeding season BDMPS was calculated and the contribution from each SPA found, for each of the 44 in-combination OWFs, as described above for the Project.

64. This approach to deriving guillemot SPA in-combination apportioning weights was discussed and agreed with NatureScot (consultation meeting, 11 June 2024).

3 RESULTS

3.1 Gannet

65. The Project breeding season apportioning weights for gannet are presented in **Table 3-1**. The boundary of Sule Skerry and Sule Stack SPA overlaps with the OAA plus 2 km buffer. Consequently, the breeding season apportioning weight for this SPA is 1.0, i.e. all breeding season collision and displacement mortalities in the OAA plus 2 km buffer are assumed to be gannets from Sule Skerry and Sule Stack SPA. This was discussed with NatureScot (consultation meeting 28 May 2024) and NatureScot acknowledged that for any species that is a feature of the Sule Skerry & Sule Stack SPA, effectively all Project alone breeding season impacts are apportioned to this SPA and none to any other SPA.

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[15] *Guidance Note 3: Guidance to support Offshore Wind applications: Marine Birds - Identifying theoretical connectivity with breeding site Special Protection Areas using breeding season foraging ranges | NatureScot.*

66.   The gannet breeding season apportioning weights for all other OWFs included in the in-combination assessment are presented in **Table 3-2.** These were calculated using the same approach as for the Project apportioning weight calculations. This table includes SPAs that are beyond gannet foraging range from the Project, e.g. Flamborough and Filey Coast SPA. Whilst these SPAs will not be included in the breeding season in-combination assessment, they are included in this table as other OWFs' impacts are apportioned to these SPAs, i.e. calculation of apportioning weights for other OWFs must also include these SPAs.

67.   Non-breeding season apportioning weights for all OWFs included in the in-combination assessment for gannet are provided in **Table 3-3**.

Table 3-1. Gannet breeding season apportioning calculations and apportioning weights for the Project. Most recent counts are from Seabirds Count (Burnell _et al._ 2023). Distance is shortest straight line distance from SPA boundary to the OAA plus 2 km buffer (with the exception of Sule Skerry and Sule Stack SPA) (WoW = the Project).

SPA	Most recent count (individuals)	Distance to OAA + 2 km (km)	Proportion of Forage Range as Sea	1/Proportion of Forage Range as Sea	Absolute weight for WoW breeding*	Apportioning weight
Ailsa Craig	66,452	390.2	0.478	2.09	0.481	0.000
Fair Isle	9,942	138.1	0.910	1.10	0.302	0.000
Forth Islands	150,518	300.0	0.616	1.62	1.428	0.000
Hermaness, Saxa Vord and Valla Field	59,142	255.8	0.987	1.01	0.481	0.000
North Rona and Sula Sgeir	24,542	77.7	0.856	1.17	2.499	0.000
Noss	27,530	204.3	0.967	1.03	0.359	0.000
St Kilda	120,580	247.8	0.870	1.15	1.187	0.000
Sule Skerry and Sule Stack	18,130	0.1	0.831	1.20	1147286.6	1.000
Sum	**476,836**	**1614.0**		**10.4**	**1147293.3**	**1.000**

* Absolute weight = (most recent count /sum(most recent counts)) x ((sum distances)2 / distance2) x (1/proportional area/(sum(1/proportional areas))).

Table 3-2. Gannet breeding season apportioning weights for other OWFs included in the in-combination assessment, calculated using the NatureScot method (population sizes and sea proportion as Table 3-1).

Wind Farm	Ailsa Craig	Fair Isle	Flamborough and Filey Coast	Forth Islands	Hermaness, Saxa Vord and Valla Field	North Rona and Sula Sgeir	Noss	St Kilda	Sule Skerry and Sule Stack
PFOWF	0.052	0.025	0.000	0.168	0.041	0.111	0.030	0.096	0.477
BOWL	0.096	0.043	0.018	0.427	0.060	0.068	0.048	0.112	0.128
Moray East	0.098	0.043	0.018	0.458	0.059	0.061	0.047	0.104	0.112
Moray West	0.104	0.034	0.017	0.467	0.052	0.063	0.040	0.114	0.107
Blyth Demonstration	0.119	0.002	0.154	0.719	0.000	0.000	0.000	0.000	0.005
Dogger Bank Creyke Beck A & B	0.121	0.000	0.442	0.437	0.000	0.000	0.000	0.000	0.000
Dogger Bank Teesside A * Sofia	0.150	0.000	0.310	0.540	0.000	0.000	0.000	0.000	0.000
Dudgeon	0.126	0.000	0.565	0.308	0.000	0.000	0.000	0.000	0.000
DEP & SEP	0.117	0.000	0.596	0.287	0.000	0.000	0.000	0.000	0.000
East Anglia ONE	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia ONE North	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia Three	0.000	0.000	0.453	0.547	0.000	0.000	0.000	0.000	0.000
East Anglia TWO	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
EOWDC	0.073	0.007	0.016	0.807	0.017	0.013	0.012	0.039	0.016
Galloper	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
Greater Gabbard	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
Gunfleet Sands	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
Hornsea Project Four	0.063	0.000	0.748	0.189	0.000	0.000	0.000	0.000	0.000
Hornsea Project One	0.117	0.000	0.554	0.330	0.000	0.000	0.000	0.000	0.000
Hornsea Project Two	0.107	0.000	0.584	0.309	0.000	0.000	0.000	0.000	0.000
Hornsea Project Three	0.134	0.000	0.482	0.384	0.000	0.000	0.000	0.000	0.000
Humber Gateway	0.047	0.000	0.837	0.117	0.000	0.000	0.000	0.000	0.000
Hywind	0.084	0.096	0.022	0.425	0.101	0.040	0.093	0.078	0.060

Wind Farm	Ailsa Craig	Fair Isle	Flamborough and Filey Coast	Forth Islands	Hermaness, Saxa Vord and Valla Field	North Rona and Sula Sgeir	Noss	St Kilda	Sule Skerry and Sule Stack
Inch Cape	0.010	0.000	0.002	0.981	0.001	0.001	0.001	0.003	0.001
Kentish Flats and Extn	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
Kincardine	0.058	0.005	0.014	0.861	0.011	0.008	0.007	0.027	0.009
Lincs and LID6	0.110	0.000	0.637	0.253	0.000	0.000	0.000	0.000	0.000
London Array	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
Methil	0.005	0.000	0.001	0.993	0.000	0.000	0.000	0.001	0.000
Neart na Gaoithe	0.002	0.000	0.000	0.996	0.000	0.000	0.000	0.001	0.000
Norfolk Boreas	0.000	0.000	0.472	0.528	0.000	0.000	0.000	0.000	0.000
Norfolk Vanguard	0.000	0.000	0.499	0.501	0.000	0.000	0.000	0.000	0.000
Race Bank	0.106	0.000	0.642	0.252	0.000	0.000	0.000	0.000	0.000
Rampion	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
Seagreen A & B	0.022	0.001	0.006	0.954	0.003	0.002	0.002	0.008	0.002
Sheringham Shoal	0.131	0.000	0.563	0.307	0.000	0.000	0.000	0.000	0.000
Teesside	0.099	0.000	0.544	0.357	0.000	0.000	0.000	0.000	0.000
Thanet	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
Triton Knoll	0.081	0.000	0.716	0.203	0.000	0.000	0.000	0.000	0.000
Westermost Rough	0.021	0.000	0.926	0.054	0.000	0.000	0.000	0.000	0.000
Forthwind	0.004	0.000	0.000	0.994	0.000	0.000	0.000	0.001	0.000
Berwick Bank	0.030	0.001	0.012	0.938	0.003	0.002	0.002	0.009	0.002
Greenvolt	0.096	0.036	0.030	0.587	0.065	0.029	0.050	0.070	0.038
Salamander	0.092	0.021	0.026	0.673	0.041	0.024	0.031	0.062	0.030

Table 3-3. Gannet non-breeding season apportioning calculations and non-breeding apportioning weight for the Project and all in-combination OWFs. BDMPS counts and adult proportions are from Furness (2015) Appendix A.

SPA	SPA count (adults)	BDMPS adult proportion		Apportioning weight*	
		Autumn	**Spring**	**Autumn**	**Spring**
Ailsa Craig	54,260	0.00	0.0	0.000	0.000
Fair Isle	7,848	0.80	0.7	0.014	0.022
Flamborough and Filey Coast	22,122	1.00	0.7	0.048	0.062
Forth Islands	110,964	1.00	0.7	0.243	0.313
Hermaness, Saxa Vord and Valla Field	48,706	0.80	0.7	0.085	0.137
North Rona and Sula Sgeir	18,450	0.10	0.0	0.004	0.000
Noss	19,534	0.80	0.7	0.034	0.055
St Kilda	119,244	0.10	0.0	0.026	0.000
Sule Skerry and Sule Stack	9,350	0.10	0.0	0.002	0.000
BDMPS Autumn	**456,298**				
BDMPS Spring	**248,385**				

* Individual SPA non-breeding season apportioning weight = ([SPA counts (adults)] * [SPA adult proportion]) / [BDMPS population].

3.2   Kittiwake

68.   The Project breeding season apportioning weights for kittiwake are presented in **Table 3-4**.

69.   The kittiwake breeding season apportioning weights for all other OWFs included in the in-combination assessment are presented in **Table 3-5, Table 3-6** and **Table 3-7**. The large number of SPAs with kittiwake as a qualifying feature meant that other OWFs apportioning weights are presented in three tables instead of a single table. SPAs are listed alphabetically across the three tables. These apportioning weights were calculated using the same approach as for the Project apportioning weights. These tables include SPAs that are beyond kittiwake foraging range from the Project, e.g. St Abb's Head to Fast Castle SPA. Whilst these SPAs will not be included in the breeding season in-combination assessment, they are included in this table as other OWFs' impacts are apportioned to these SPAs, i.e. calculation of apportioning weights for other OWFs must also include these SPAs.

70.   Non-breeding season apportioning weights for all OWFs included in the in-combination assessment for kittiwake are provided in **Table 3-8**.

Table 3-4. Kittiwake breeding season apportioning calculations and weights for the Project. Most recent counts are from Seabirds Count (Burnell *et al.* 2023). Distance is shortest straight line distance from SPA boundary to the OAA plus 2 km buffer (WoW = the Project).

SPA	Most recent count (individuals)	Distance to OAA + 2 km (km)	Proportion of Forage Range as Sea	1/Proportion of Forage Range as Sea	Absolute weight for WoW breeding*	Apportioning weight
Buchan Ness to Collieston Coast SPA	22590	197.5	0.724	1.38	1.782	0.0125
Calf of Eday SPA	672	70.3	0.859	1.16	0.352	0.0025
Canna and Sanday SPA	2842	220.0	0.688	1.45	0.190	0.0013
Cape Wrath SPA	7244	23.9	0.807	1.24	35.034	0.2465
Copinsay SPA	1910	65.2	0.834	1.20	1.198	0.0084
East Caithness Cliffs SPA	48958	68.2	0.782	1.28	29.982	0.2109
Fair Isle SPA	896	138.1	0.910	1.10	0.115	0.0008
Flannan Isles SPA	1650	181.9	0.848	1.18	0.131	0.0009
Forth Islands	9084	299.9	0.616	1.62	0.365	0.0026
Foula SPA	850	159.0	0.948	1.05	0.079	0.0006
Fowlsheugh SPA	28078	234.9	0.676	1.48	1.676	0.0118
Handa SPA	7498	54.2	0.793	1.26	7.177	0.0505
Hermaness, Saxa Vord and Valla Field SPA	354	255.8	0.987	1.01	0.012	0.0001
Hoy SPA	532	22.7	0.824	1.21	2.786	0.0196
Marwick Head SPA	1812	33.0	0.840	1.19	4.413	0.0310
Mingulay and Berneray SPA	4176	280.5	0.711	1.41	0.166	0.0012
North Caithness Cliffs SPA	11142	25.2	0.819	1.22	47.759	0.3360
North Rona and Sula Sgeir SPA	1424	77.7	0.856	1.17	0.613	0.0043
Noss SPA	358	204.3	0.967	1.03	0.020	0.0001
Rousay SPA	660	47.3	0.850	1.18	0.772	0.0054
Rum SPA	1400	210.3	0.687	1.46	0.103	0.0007
Shiant Isles SPA	2150	139.7	0.781	1.28	0.314	0.0022
St Kilda SPA	840	247.8	0.870	1.15	0.035	0.0002

SPA	Most recent count (individuals)	Distance to OAA + 2 km (km)	Proportion of Forage Range as Sea	1/Proportion of Forage Range as Sea	Absolute weight for WoW breeding*	Apportioning weight
Sumburgh Head SPA	1932	175.3	0.943	1.06	0.148	0.0010
Troup, Pennan and Lions Head	21232	158.1	0.738	1.06	2.004	0.0141
West Westray SPA	5510	58.2	0.859	1.35	4.907	0.0345
Sum	**185,794**	**3648.9**		**32.2**	**142.1**	**1.0**

* Absolute weight = (most recent count /sum(most recent counts)) x ((sum distances)2 / distance2) x (1/proportional area/(sum(1/proportional areas))).

Table 3-5. (1/3) Kittiwake breeding season apportioning weights for other OWFs included in the in-combination assessment, calculated using the NatureScot method (population sizes and sea proportion as Table 3-4).

Wind Farm	Ailsa Craig	Buchan Ness to Collieston Coast	Calf of Eday	Canna and Sanday	Cape Wrath	Copinsay	East Caithness Cliffs	Fair Isle	Farne Islands	Flamborough and Filey Coast	Flannan Isles	Forth Islands
PFOWF	0.000	0.002	0.000	0.000	0.007	0.001	0.055	0.000	0.000	0.000	0.000	0.000
BOWL	0.000	0.006	0.000	0.000	0.001	0.001	0.941	0.000	0.000	0.000	0.000	0.001
Moray East	0.000	0.022	0.000	0.000	0.003	0.003	0.824	0.000	0.001	0.000	0.000	0.002
Moray West	0.000	0.020	0.000	0.000	0.004	0.002	0.857	0.000	0.001	0.000	0.000	0.002
Blyth Demonstration	0.002	0.025	0.000	0.000	0.000	0.000	0.000	0.000	0.237	0.537	0.000	0.044
Dogger Bank Creyke Beck A & B	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.029	0.931	0.000	0.016
Dogger Bank Teesside A * Sofia	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.046	0.954	0.000	0.000
Dudgeon	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000
DEP & SEP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000
East Anglia ONE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000
East Anglia ONE North	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000
East Anglia Three	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000
East Anglia TWO	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000
EOWDC	0.000	0.890	0.000	0.000	0.000	0.000	0.006	0.000	0.001	0.000	0.000	0.002
Galloper	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000
Greater Gabbard	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000
Gunfleet Sands	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000
Hornsea Project Four	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.986	0.000	0.000
Hornsea Project One	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.984	0.000	0.000
Hornsea Project Two	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.985	0.000	0.000
Hornsea Project Three	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000
Humber Gateway	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.992	0.000	0.000
Hywind	0.000	0.203	0.003	0.000	0.012	0.015	0.333	0.005	0.009	0.000	0.000	0.013

Wind Farm	Ailsa Craig	Buchan Ness to Collieston Coast	Calf of Eday	Canna and Sanday	Cape Wrath	Copinsay	East Caithness Cliffs	Fair Isle	Farne Islands	Flamborough and Filey Coast	Flannan Isles	Forth Islands
Inch Cape	0.001	0.062	0.000	0.001	0.002	0.000	0.024	0.000	0.023	0.029	0.000	0.234
Kentish Flats and Extn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Kincardine	0.000	0.157	0.000	0.000	0.001	0.000	0.013	0.000	0.003	0.000	0.000	0.008
Lincs and LID6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.989	0.000	0.000
London Array	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000
Methil	0.001	0.018	0.000	0.001	0.001	0.000	0.016	0.000	0.016	0.025	0.000	0.777
Neart na Gaoithe	0.000	0.018	0.000	0.000	0.001	0.000	0.010	0.000	0.021	0.018	0.000	0.703
Norfolk Boreas	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000
Norfolk Vanguard	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000
Race Bank	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.989	0.000	0.000
Rampion	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Seagreen A & B	0.000	0.077	0.000	0.001	0.002	0.000	0.022	0.000	0.019	0.028	0.000	0.079
Sheringham Shoal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000
Teesside	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.028	0.927	0.000	0.011
Thanet	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Triton Knoll	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.992	0.000	0.000
Westermost Rough	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.997	0.000	0.000
Forthwind	0.001	0.015	0.000	0.001	0.001	0.000	0.013	0.000	0.014	0.021	0.000	0.808
Berwick Bank	0.001	0.079	0.000	0.001	0.000	0.001	0.031	0.000	0.148	0.080	0.000	0.109
Greenvolt	0.000	0.365	0.001	0.000	0.009	0.006	0.176	0.002	0.014	0.000	0.000	0.020
Salamander	0.000	0.595	0.000	0.000	0.004	0.002	0.074	0.000	0.007	0.000	0.000	0.011

Table 3-6. (2/3) Kittiwake breeding season apportioning weights for other OWFs included in the in-combination assessment, calculated using the NatureScot method (population sizes and sea proportion as Table 3-4).

Wind Farm	Foula	Fowlsheugh	Handa	Hermanes s, Saxa Vord and Valla Field	Hoy	Marwick Head	Mingulay and Berneray	North Caithnes s Cliffs	North Colonsay and Western Cliffs	North Rona and Sula Sgeir	Noss	Rousay
PFOWF	0.000	0.002	0.003	0.000	0.001	0.002	0.000	0.919	0.000	0.000	0.000	0.000
BOWL	0.000	0.004	0.001	0.000	0.000	0.001	0.000	0.030	0.000	0.000	0.000	0.000
Moray East	0.000	0.013	0.003	0.000	0.001	0.001	0.000	0.068	0.001	0.000	0.000	0.000
Moray West	0.000	0.013	0.004	0.000	0.001	0.001	0.000	0.043	0.001	0.000	0.000	0.000
Blyth Demonstration	0.000	0.050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dogger Bank Creyke Beck A & B	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dogger Bank Teesside A * Sofia	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dudgeon	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
DEP & SEP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia ONE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia ONE North	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia Three	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia TWO	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
EOWDC	0.000	0.081	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Galloper	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Greater Gabbard	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gunfleet Sands	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hornsea Project Four	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hornsea Project One	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hornsea Project Two	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hornsea Project Three	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humber Gateway	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hywind	0.001	0.090	0.010	0.000	0.002	0.006	0.000	0.073	0.000	0.001	0.001	0.003

Wind Farm	Foula	Fowlsheugh	Handa	Hermaness, Saxa Vord and Valla Field	Hoy	Marwick Head	Mingulay and Berneray	North Caithness Cliffs	North Colonsay and Western Cliffs	North Rona and Sula Sgeir	Noss	Rousay
Inch Cape	0.000	0.512	0.002	0.000	0.000	0.000	0.000	0.004	0.003	0.000	0.000	0.000
Kentish Flats and Extn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Kincardine	0.000	0.784	0.001	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000
Lincs and LID6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
London Array	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Methil	0.000	0.056	0.001	0.000	0.000	0.000	0.001	0.002	0.004	0.000	0.000	0.000
Neart na Gaoithe	0.000	0.079	0.001	0.000	0.000	0.000	0.000	0.002	0.002	0.000	0.000	0.000
Norfolk Boreas	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Norfolk Vanguard	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Race Bank	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rampion	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Seagreen A & B	0.000	0.690	0.002	0.000	0.000	0.000	0.000	0.004	0.002	0.000	0.000	0.000
Sheringham Shoal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Teesside	0.000	0.015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Thanet	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Triton Knoll	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Westermost Rough	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Forthwind	0.000	0.047	0.001	0.000	0.000	0.000	0.001	0.002	0.003	0.000	0.000	0.000
Berwick Bank	0.000	0.284	0.002	0.000	0.000	0.000	0.000	0.005	0.004	0.000	0.000	0.000
Greenvolt	0.001	0.145	0.008	0.000	0.001	0.003	0.000	0.035	0.000	0.000	0.000	0.001
Salamander	0.000	0.107	0.003	0.000	0.000	0.001	0.000	0.013	0.000	0.000	0.000	0.000

Table 3-7. (3/3) Kittiwake breeding season apportioning weights for other OWFs included in the in-combination assessment, calculated using the NatureScot method (population sizes and sea proportion as Table 3-4).

Wind Farm	Rum SPA	Shiant Isles SPA	St Abbs Head to Fast Castle	St Kilda SPA	Sumburgh Head SPA	Troup, Pennan and Lions Head	West Westray SPA
PFOWF	0.000	0.000	0.000	0.000	0.000	0.003	0.002
BOWL	0.000	0.000	0.001	0.000	0.000	0.011	0.001
Moray East	0.000	0.000	0.002	0.000	0.000	0.050	0.004
Moray West	0.000	0.000	0.002	0.000	0.000	0.044	0.003
Blyth Demonstration	0.000	0.000	0.092	0.000	0.000	0.013	0.000
Dogger Bank Creyke Beck A & B	0.000	0.000	0.024	0.000	0.000	0.000	0.000
Dogger Bank Teesside A * Sofia	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dudgeon	0.000	0.000	0.000	0.000	0.000	0.000	0.000
DEP & SEP	0.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia ONE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia ONE North	0.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia Three	0.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia TWO	0.000	0.000	0.000	0.000	0.000	0.000	0.000
EOWDC	0.000	0.000	0.001	0.000	0.000	0.016	0.000
Galloper	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Greater Gabbard	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gunfleet Sands	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hornsea Project Four	0.000	0.000	0.006	0.000	0.000	0.000	0.000
Hornsea Project One	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hornsea Project Two	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hornsea Project Three	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humber Gateway	0.000	0.000	0.004	0.000	0.000	0.000	0.000
Hywind	0.000	0.002	0.013	0.000	0.005	0.176	0.023
Inch Cape	0.000	0.000	0.081	0.000	0.000	0.021	0.001

Wind Farm	Rum SPA	Shiant Isles SPA	St Abbs Head to Fast Castle	St Kilda SPA	Sumburgh Head SPA	Troup, Pennan and Lions Head	West Westray SPA
Kentish Flats and Extn	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Kincardine	0.000	0.000	0.006	0.000	0.000	0.021	0.001
Lincs and LID6	0.000	0.000	0.000	0.000	0.000	0.000	0.000
London Array	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Methil	0.001	0.000	0.071	0.000	0.000	0.009	0.000
Neart na Gaoithe	0.000	0.000	0.137	0.000	0.000	0.007	0.000
Norfolk Boreas	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Norfolk Vanguard	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Race Bank	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rampion	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Seagreen A & B	0.000	0.000	0.050	0.000	0.000	0.023	0.001
Sheringham Shoal	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Teesside	0.000	0.000	0.018	0.000	0.000	0.000	0.000
Thanet	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Triton Knoll	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Westermost Rough	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Forthwind	0.000	0.000	0.064	0.000	0.000	0.008	0.000
Berwick Bank	0.001	0.000	0.227	0.000	0.000	0.028	0.000
Greenvolt	0.000	0.000	0.019	0.000	0.003	0.179	0.011
Salamander	0.000	0.001	0.010	0.000	0.001	0.166	0.004

Table 3-8. Kittiwake non-breeding season apportioning calculations and non-breeding apportioning weights for the Project and other OWFs included in the in-combination assessment. BDMPS counts and adult proportions are from Furness (2015) Appendix A.

SPA	BDMPS count (adults)	BDMPS adult proportion autumn & spring	Autumn weight*	Spring weight*
Ailsa Craig	978	0.01	0.000	0.000
Buchan Ness to Collieston Coast SPA	25084	0.60	0.018	0.024
Calf of Eday SPA	1494	0.60	0.001	0.001
Canna and Sanday SPA	1640	0.01	0.000	0.000
Cape Wrath SPA	20688	0.01	0.000	0.000
Copinsay SPA	1332	0.60	0.001	0.001
East Caithness Cliffs SPA	80820	0.60	0.058	0.077
Fair Isle SPA	1542	0.60	0.001	0.001
Farne Islands	6886	0.60	0.005	0.007
Flamborough and Filey Coast	75234	0.60	0.054	0.072
Flannan Isles SPA	2784	0.01	0.000	0.000
Forth Islands	6200	0.60	0.004	0.006
Foula SPA	654	0.60	0.000	0.001
Fowlsheugh SPA	18674	0.60	0.014	0.018
Handa SPA	3744	0.01	0.000	0.000
Hermaness, Saxa Vord and Valla Field SPA	782	0.60	0.001	0.001
Hoy SPA	794	0.60	0.001	0.001
Marwick Head SPA	1052	0.60	0.001	0.001
Mingulay and Berneray SPA	4456	0.01	0.000	0.000
North Caithness Cliffs SPA	20300	0.60	0.015	0.019
North Colonsay and Western Cliffs	11126	0.01	0.000	0.000
North Rona and Sula Sgeir SPA	2506	0.01	0.000	0.000
Noss SPA	1014	0.60	0.001	0.001
Rousay SPA	3528	0.60	0.003	0.003

SPA	BDMPS count (adults)	BDMPS adult proportion autumn & spring	Autumn weight*	Spring weight*
Rum SPA	1576	0.01	0.000	0.000
Shiant Isles SPA	1098	0.01	0.000	0.000
St Abbs Head to Fast Castle	6806	0.60	0.005	0.007
St Kilda SPA	1914	0.01	0.000	0.000
Sumburgh Head SPA	420	0.60	0.000	0.000
Troup, Pennan and Lions Head	29792	0.60	0.022	0.028
West Westray SPA	24110	0.60	0.017	0.023
BDMPS Autumn	**829937**	-	-	-
BDMPS Spring	**627816**	-	-	-

* Individual SPA non-breeding season apportioning weight = ([SPA counts (adults)] ***** [SPA adult proportion]) / [BDMPS population]

3.3   Great black-backed gull

71.   The Project breeding season apportioning weights for great black-backed gull are presented in **Table 3-9**.

72.   The great black-backed gull breeding season apportioning weights for all other OWFs included in the in-combination assessment are presented in **Table 3-10**. These were calculated using the same approach as for the Project apportioning weights.

73.   Non-breeding season apportioning weights for all OWFs included in the in-combination assessment for great black-backed gull are provided in **Table 3-11**.

Table 3-9. Great black-backed gull breeding season apportioning calculations and weights for the Project. Most recent counts are from Seabirds Count (Burnell *et al.* 2023). Distance is shortest straight line distance from SPA boundary to the OAA plus 2 km buffer (WoW = the Project).

SPA	Most recent count (individuals)	Distance to WoW (km)	Proportion of Forage Range as Sea	1/Proportion of Forage Range as Sea	Absolute weight for WoW breeding*	Apportioning weight
Calf of Eday SPA	116	70.3	0.942	1.06	0.0835	0.0621
Copinsay SPA	134	65.2	0.883	1.13	0.1197	0.0890
East Caithness Cliffs SPA	532	68.2	0.613	1.63	0.6267	0.4662
Hoy SPA	64	22.7	0.809	1.24	0.5144	0.3826
Sum	**846**	**226.4**		**5.06**	**1.3**	**1.0**

* individual absolute weight = (most recent count /sum(most recent counts)) x ((sum distances)2 / distance2) x (1/proportional area/(sum(1/proportional areas))).

Table 3-10. Great black-backed gull breeding season apportioning weights for other OWFs included in the in-combination assessment, calculated using the NatureScot method (population sizes and sea proportion as Table 3-9).

Wind Farm	Calf of Eday	Copinsay	East Caithness Cliffs	Hoy
PFOWF	0.000	0.112	0.599	0.289
BOWL	0.000	0.095	0.839	0.066
Moray East	0.000	0.006	0.991	0.003
Moray West	0.000	0.000	0.991	0.009
Blyth Demonstration	0.000	0.000	1.000	0.000
Dogger Bank Creyke Beck A & B	0.000	0.000	0.000	0.000
Dogger Bank Teesside A * Sofia	0.000	0.000	0.000	0.000
Dudgeon	0.000	0.000	0.000	0.000
DEP & SEP	0.000	0.000	0.000	0.000
East Anglia ONE	0.000	0.000	0.000	0.000
East Anglia ONE North	0.000	0.000	0.000	0.000
East Anglia Three	0.000	0.000	0.000	0.000
East Anglia TWO	0.000	0.000	0.000	0.000
EOWDC	0.000	0.000	0.000	0.000
Galloper	0.000	0.000	0.000	0.000
Greater Gabbard	0.000	0.000	0.000	0.000
Gunfleet Sands	0.000	0.000	0.000	0.000
Hornsea Project Four	0.000	0.000	0.000	0.000
Hornsea Project One	0.000	0.000	0.000	0.000
Hornsea Project Two	0.000	0.000	0.000	0.000
Hornsea Project Three	0.000	0.000	0.000	0.000
Humber Gateway	0.000	0.000	0.000	0.000
Hywind	0.000	0.000	0.000	0.000
Inch Cape	0.000	0.000	0.000	0.000
Kentish Flats and Extn	0.000	0.000	0.000	0.000

Wind Farm	Calf of Eday	Copinsay	East Caithness Cliffs	Hoy
Kincardine	0.000	0.000	0.000	0.000
Lincs and LID6	0.000	0.000	0.000	0.000
London Array	0.000	0.000	0.000	0.000
Methil	0.000	0.000	0.000	0.000
Neart na Gaoithe	0.000	0.000	0.000	0.000
Norfolk Boreas	0.000	0.000	0.000	0.000
Norfolk Vanguard	0.000	0.000	0.000	0.000
Race Bank	0.000	0.000	0.000	0.000
Rampion	0.000	0.000	0.000	0.000
Seagreen A & B	0.000	0.000	0.000	0.000
Sheringham Shoal	0.000	0.000	0.000	0.000
Teesside	0.000	0.000	0.000	0.000
Thanet	0.000	0.000	0.000	0.000
Triton Knoll	0.000	0.000	0.000	0.000
Westermost Rough	0.000	0.000	0.000	0.000
Forthwind	0.000	0.000	0.000	0.000
Berwick Bank	0.000	0.000	0.000	0.000
Greenvolt	0.000	0.000	0.000	0.000
Salamander	0.000	0.000	0.000	0.000

Table 3-11. Great black-backed gull non-breeding season apportioning calculations and non-breeding apportioning weights for the Project and other OWFs included in the in-combination assessment. BDMPS counts and adult proportions are from Furness (2015) Appendix A.

SPA	BDMPS count (adults)	BDMPS adult proportion non-breeding	Apportioning weight*
Calf of Eday SPA	562	1	0.006
Copinsay SPA	436	1	0.005
East Caithness Cliffs SPA	350	1	0.004
Hoy SPA	120	1	0.001
BDMPS non-breeding	**91399**	-	-

* Individual SPA non-breeding season apportioning weight = ([SPA counts (adults)] * [SPA adult proportion]) / [BDMPS population].

3.4   Guillemot

74.   The Project breeding season apportioning weights for guillemot are presented in **Table 3-12**. The boundary of Sule Skerry and Sule Stack SPA overlaps with the OAA plus 2 km buffer. Consequently, the breeding season apportioning weight for this SPA is 1.0, i.e. all breeding season displacement mortalities in the OAA plus 2 km buffer are assumed to be guillemots from Sule Skerry and Sule Stack SPA. This was discussed with NatureScot (consultation meeting 28 May 2024) and NatureScot acknowledged that for any species that is a feature of the Sule Skerry & Sule Stack SPA, effectively all Project alone breeding season impacts should be apportioned to this SPA and none to any other SPA.

75.   The guillemot breeding season apportioning weights for all other OWFs included in the in-combination assessment are presented in **Table 3-13**. These apportioning weights were calculated using the same approach as for the Project apportioning weights.

76.   All SPAs within foraging range of the Project are presented in **Table 3-12**. However, birds from these SPAs could also be impacted by OWFs further south, outside of the Project foraging range. These OWFs need to be included in the in-combination impact assessment, i.e. all OWFs with connectivity to SPAs within foraging range of the Project were included in the in-combination assessment. Only eight OWFs had connectivity with the same SPAs as the Project: Pentland Floating OWF, Beatrice Offshore Wind Farm, Moray East, Moray West, EOWDC, Hywind, Greenvolt and Salamander.

77.   These OWFs will also impact other SPAs that are beyond the Project foraging range. Whilst these SPAs will not be included in the breeding season in-combination assessment, they are included in this table as other OWFs' impacts are apportioned to these SPAs, i.e. calculation of apportioning weights for other OWFs must also include these SPAs. Six SPAs were within foraging range of the in-combination OWFs listed above: Buchan Ness to Collieston Coast SPA, Forth Islands SPA, Fowlsheugh SPA, St Abb's Head to Fast Castle SPA, Sumburgh Head SPA and Troup, Pennan and Lion's Heads SPA.

78.   Non-breeding season apportioning weights for all OWFs included in the in-combination assessment for guillemot are provided in **Table 3-14**. Each individual OWF included in the in-combination assessment had its own non-breeding season guillemot BDMPS, comprising the sum of both adult and immature birds associated with each SPA within foraging range of that OWF. Apportioning weight was the relative contribution each SPA made to each OWF's BDMPS (see **Section 2.4 Project alone and in-combination non-breeding season apportioning** above for more details).

Table 3-12. Guillemot breeding season apportioning calculations and weights for the Project. Most recent counts are from Seabirds Count (Burnell *et al.* 2023). Distance is shortest straight line distance from SPA boundary to the OAA plus 2 km buffer (with the exception of Sule Skerry and Sule Stack SPA) (WoW = the Project).

SPA	Most recent count (individuals)	Distance to WoW (km)	Proportion of Forage Range as Sea	1/Proportion of Forage Range as Sea	Absolute weight for WoW breeding*	Apportioning weight
Calf of Eday	4681	70.3	0.9117	1.10	0.0734	0.0000
Cape Wrath	51066	23.9	0.6881	1.45	9.2115	0.0001
Copinsay	24762	65.2	0.8630	1.16	0.4773	0.0000
East Caithness Cliffs	199966	68.1	0.5919	1.69	5.1517	0.0000
Fair Isle	24515	138.1	0.9610	1.04	0.0946	0.0000
Handa	73250	54.1	0.6075	1.65	2.9133	0.0000
Hoy	12390	22.7	0.8213	1.22	2.0704	0.0000
Marwick Head	16060	32.9	0.8819	1.13	1.1898	0.0000
North Caithness Cliffs	52123	25.2	0.7686	1.30	7.5517	0.0001
North Rona and Sula Sgeir	10354	77.7	0.8802	1.14	0.1378	0.0000
Rousay	7921	47.3	0.8966	1.12	0.2792	0.0000
Sule Skerry and Sule Stack	12060	0.1	0.8440	1.18	101054.37	0.9997
West Westray	38454	58.2	0.9065	1.10	0.8856	0.0000
Sum	**539,733**	**823.5**		**17.8**	**101,084.4**	**1.0**

* absolute weight = (most recent count /sum(most recent counts)) x ((sum distances)2 / distance2) x (1/proportional area/(sum(1/proportional areas))).

Table 3-13. Guillemot breeding season apportioning weights for other OWFs included in the in-combination assessment, calculated using the NatureScot method (population sizes and sea proportion as Table 3-12).

SPA	Most recent count (individuals)	Proportion of Forage Range as Sea	PFOWF	BOWL	Moray East	Moray West	EOWDC	Hywind	Greenvolt	Salamander
Buchan Ness to Collieston Coast	25,856	0.714	0.000	0.002	0.008	0.007	0.792	0.103	0.231	0.460
Calf of Eday	12,600	0.912	0.000	0.000	0.001	0.000	0.000	0.006	0.000	0.000
Cape Wrath	54,718	0.688	0.012	0.002	0.005	0.006	0.000	0.000	0.000	0.000
Copinsay	11,214	0.863	0.003	0.003	0.008	0.005	0.000	0.054	0.026	0.000
East Caithness Cliffs	213,000	0.592	0.059	0.950	0.861	0.891	0.016	0.517	0.340	0.175
Fair Isle	26,132	0.961	0.000	0.000	0.001	0.000	0.000	0.034	0.000	0.000
Fowlsheugh	60,200	0.564	0.000	0.003	0.010	0.010	0.163	0.000	0.208	0.186
Handa	75,986	0.607	0.008	0.003	0.007	0.009	0.000	0.000	0.000	0.000
Hoy	12,600	0.821	0.007	0.002	0.005	0.004	0.000	0.016	0.000	0.000
Marwick Head	22,194	0.882	0.003	0.001	0.002	0.002	0.000	0.015	0.000	0.000
North Caithness Cliffs	94,000	0.769	0.901	0.028	0.066	0.041	0.000	0.104	0.063	0.029
North Rona and Sula Sgeir	10,000	0.880	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rousay	12,400	0.897	0.001	0.000	0.001	0.001	0.000	0.009	0.000	0.000
Sule Skerry and Sule Stack	15,266	0.844	0.004	0.001	0.002	0.002	0.000	0.000	0.000	0.000
Sumburgh Head	9,524	0.972	0.000	0.004	0.020	0.018	0.016	0.105	0.132	0.150
Troup, Pennan and Lion`s Heads	21,876	0.687	0.001	0.001	0.004	0.003	0.000	0.038	0.000	0.000
West Westray	67,800	0.906	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000
Total	**745,366**		**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**

Table 3-14. Guillemot non-breeding season BDMPS and apportioning weight for the Project and other OWFs included in the non-breeding season in-combination assessment. Each OWF had its own guillemot non-breeding season BDMPS (see Section 2.4.1 for more information). The relative contribution that each SPA makes to each BDMPS was used to calculate the apportioning weight for that particular SPA and OWF combination (WoW = the Project).

Wind Farm	WoW	PFOWF	BOWL	Moray East	Moray West	EOWDC	Hywind	Greenvolt	Salamander
Adult population	527601	527601	424824	464264	439749	164903	223981	96095	164903
Total population (BDMPS)	925616	925616	745306	814499	771490	289304	392949	168588	289304
SPA									
Calf of Eday	0.0051	0.0051	0.0063	0.0057	0.0061	0.0000	0.0119	0.0000	0.0000
Copinsay	0.0268	0.0268	0.0332	0.0304	0.0321	0.0000	0.0630	0.1469	0.0000
Fair Isle	0.0265	0.0265	0.0329	0.0301	0.0000	0.0000	0.0624	0.0000	0.0000
Hoy	0.0134	0.0134	0.0166	0.0152	0.0161	0.0000	0.0315	0.0000	0.0000
Marwick Head	0.0174	0.0174	0.0215	0.0197	0.0208	0.0000	0.0409	0.0000	0.0000
North Rona and Sula Sgeir	0.0112	0.0112	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Rousay	0.0086	0.0086	0.0106	0.0097	0.0103	0.0000	0.0202	0.0000	0.0000
Sule Skerry and Sule Stack	0.0130	0.0130	0.0162	0.0148	0.0156	0.0000	0.0000	0.0000	0.0000
Sumburgh Head	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0607	0.0000	0.0000
West Westray	0.0415	0.0415	0.0516	0.0472	0.0498	0.0000	0.0979	0.0000	0.0000
Buchan Ness to Collieston Coast	0.0000	0.0000	0.0000	0.0484	0.0511	0.1363	0.1004	0.2339	0.1363
Cape Wrath	0.0552	0.0552	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
East Caithness Cliffs	0.2160	0.2160	0.2683	0.2455	0.2592	0.0000	0.0000	0.0000	0.0000
Fowlsheugh	0.0000	0.0000	0.0000	0.0000	0.0000	0.3234	0.0000	0.0000	0.3234
Handa	0.0791	0.0791	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
North Caithness Cliffs	0.0563	0.0563	0.0699	0.0640	0.0676	0.0000	0.0000	0.0000	0.0000
Troup, Pennan and Lion`s Heads	0.0000	0.0000	0.0428	0.0392	0.0413	0.1102	0.0812	0.1892	0.1102

3.5 Razorbill

79. The Project breeding season apportioning weights for razorbill are presented in **Table 3-15**.

80. The razorbill breeding season apportioning weights for all other OWFs included in the in-combination assessment are presented in **Table 3-16** and **Table 3-17.** The large number of SPAs with razorbill as a qualifying feature mean that other OWFs apportioning weights are presented in two tables instead of a single table. SPAs are listed alphabetically across the two tables. These were calculated using the same approach as for the Project apportioning weights.

81. Non-breeding season apportioning weights for all OWFs included in the in-combination assessment for razorbill are provided in **Table 3-18.**

Table 3-15. Razorbill breeding season apportioning calculations and weghts for the Project. Most recent counts are from Seabirds Count (Burnell *et al.* 2023). Distance is straight line distance from SPA boundary to the closest edge of OAA plus 2 km buffer (WoW = the Project).

SPA	Most recent count (individuals)	Distance to WoW (km)	Proportion of Forage Range as Sea	1/Proportion of Forage Range as Sea	Absolute weight for WoW breeding*	Apportioning weight
Cape Wrath SPA	4350	23.9	0.718	1.39	5.669	0.2550
East Caithness Cliffs SPA	40373	68.2	0.610	1.64	7.596	0.3417
Fair Isle SPA	2580	138.1	0.960	1.04	0.075	0.0034
Foula SPA	635	159.0	0.975	1.03	0.0137	0.0006
Handa SPA	10997	54.2	0.644	1.55	3.108	0.1398
North Caithness Cliffs SPA	4796	25.2	0.774	1.29	5.211	0.2344
North Rona and Sula Sgeir SPA	531	77.7	0.869	1.15	0.054	0.0024
West Westray SPA	2893	58.2	0.906	1.10	0.503	0.0226
Sum	**67,154**	**604.4**		**10.2**	**22.2**	**1.0**

* individual absolute weight = (most recent count /sum(most recent counts)) x ((sum distances)2 / distance2) x (1/proportional area/(sum(1/proportional areas))).

Table 3-16. (1/2) Razorbill breeding season apportioning calculations and weights for other OWFs included in the in-combination assessment, calculated using the NatureScot method (population sizes and sea proportion as Table 3-15).

Wind Farm	Cape Wrath	East Caithness Cliffs	Fair Isle	Flamborough and Filey Coast	Flannan Isles	Forth Islands	Foula SP	Fowlsheugh	Handa	Mingulay and Berneray	North Caithness Cliffs	North Rona and Sula Sgeir
Most recent count	4350	40373	2580	37476	1532	7631	635	18844	10997	26787	4796	531
Proportion of Forage Range as Sea	0.718	0.610	0.960	0.583	0.927	0.347	0.975	0.594	0.644	0.903	0.774	0.869
PFOWF	0.010	0.119	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.000	0.855	0.000
BOWL	0.001	0.981	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.000
Moray East	0.002	0.940	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.034	0.000
Moray West	0.003	0.949	0.001	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.020	0.000
Blyth Demonstration	0.000	0.000	0.000	0.837	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dogger Bank Creyke Beck A & B	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dogger Bank Teesside A * Sofia	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dudgeon	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
DEP & SEP	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia ONE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia ONE North	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia Three	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia TWO	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
EOWDC	0.000	0.000	0.000	0.000	0.000	0.040	0.000	0.870	0.000	0.000	0.000	0.000
Galloper	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Greater Gabbard	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gunfleet Sands	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hornsea Project Four	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hornsea Project One	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hornsea Project Two	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hornsea Project Three	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Wind Farm	Cape Wrath	East Caithnes s Cliffs	Fair Isle	Flamborough and Filey Coast	Flannan Isles	Forth Islands	Foula SP	Fowlsheugh	Handa	Mingulay and Berneray	North Caithnes s Cliffs	North Rona and Sula Sgeir
Humber Gateway	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hywind	0.000	0.734	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.069	0.000
Inch Cape	0.000	0.000	0.000	0.000	0.000	0.444	0.000	0.496	0.000	0.000	0.000	0.000
Kentish Flats and Extn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
Kincardine	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.961	0.000	0.000	0.000	0.000
Lincs and LID6	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
London Array	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Methil	0.000	0.000	0.000	0.000	0.000	0.938	0.000	0.034	0.000	0.000	0.000	0.000
Neart na Gaoithe	0.000	0.000	0.000	0.000	0.000	0.893	0.000	0.051	0.000	0.000	0.000	0.000
Norfolk Boreas	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
Norfolk Vanguard	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Race Bank	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rampion	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Seagreen A & B	0.000	0.000	0.000	0.000	0.000	0.173	0.000	0.778	0.000	0.000	0.000	0.000
Sheringham Shoal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Teesside	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Thanet	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Triton Knoll	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Westermost Rough	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Forthwind	0.000	0.000	0.000	0.000	0.000	0.948	0.000	0.028	0.000	0.000	0.000	0.000
Berwick Bank	0.000	0.000	0.000	0.000	0.000	0.332	0.000	0.445	0.000	0.000	0.000	0.000
Greenvolt	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Salamander	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.545	0.000	0.000	0.000	0.000

Table 3-17. (2/2) Razorbill breeding season apportioning calculations and weights for other OWFs included in the in-combination assessment, calculated using the NatureScot method (population sizes and sea proportion as Table 3-15).

Wind Farm	Shiant Isles	St Abbs Head to Fast Castle	St Kilda	Troup, Pennan and Lions Head	West Westray
Most recent count	10759	3928	1099	6054	2893
Proportion of Forage Range as Sea	0.674	0.483	0.952	0.657	0.906
PFOWF	0.000	0.000	0.000	0.000	0.002
BOWL	0.000	0.000	0.000	0.004	0.001
Moray East	0.000	0.000	0.000	0.022	0.002
Moray West	0.000	0.000	0.000	0.019	0.001
Blyth Demonstration	0.000	0.163	0.000	0.000	0.000
Dogger Bank Creyke Beck A & B	0.000	0.000	0.000	0.000	0.000
Dogger Bank Teesside A * Sofia	0.000	0.000	0.000	0.000	0.000
Dudgeon	0.000	0.000	0.000	0.000	0.000
DEP & SEP	0.000	0.000	0.000	0.000	0.000
East Anglia ONE	0.000	0.000	0.000	0.000	0.000
East Anglia ONE North	0.000	0.000	0.000	0.000	0.000
East Anglia Three	0.000	0.000	0.000	0.000	0.000
East Anglia TWO	0.000	0.000	0.000	0.000	0.000
EOWDC	0.000	0.000	0.000	0.091	0.000
Galloper	0.000	0.000	0.000	0.000	0.000
Greater Gabbard	0.000	0.000	0.000	0.000	0.000
Gunfleet Sands	0.000	0.000	0.000	0.000	0.000
Hornsea Project Four	0.000	0.000	0.000	0.000	0.000
Hornsea Project One	0.000	0.000	0.000	0.000	0.000
Hornsea Project Two	0.000	0.000	0.000	0.000	0.000
Hornsea Project Three	0.000	0.000	0.000	0.000	0.000
Humber Gateway	0.000	0.000	0.000	0.000	0.000

Wind Farm	Shiant Isles	St Abbs Head to Fast Castle	St Kilda	Troup, Pennan and Lions Head	West Westray
Hywind	0.000	0.000	0.000	0.150	0.021
Inch Cape	0.000	0.049	0.000	0.011	0.000
Kentish Flats and Extn	0.000	0.000	0.000	0.000	0.000
Kincardine	0.000	0.005	0.000	0.014	0.000
Lincs and LID6	0.000	0.000	0.000	0.000	0.000
London Array	0.000	0.000	0.000	0.000	0.000
Methil	0.000	0.027	0.000	0.000	0.000
Neart na Gaoithe	0.000	0.056	0.000	0.000	0.000
Norfolk Boreas	0.000	0.000	0.000	0.000	0.000
Norfolk Vanguard	0.000	0.000	0.000	0.000	0.000
Race Bank	0.000	0.000	0.000	0.000	0.000
Rampion	0.000	0.000	0.000	0.000	0.000
Seagreen A & B	0.000	0.035	0.000	0.014	0.000
Sheringham Shoal	0.000	0.000	0.000	0.000	0.000
Teesside	0.000	0.000	0.000	0.000	0.000
Thanet	0.000	0.000	0.000	0.000	0.000
Triton Knoll	0.000	0.000	0.000	0.000	0.000
Westermost Rough	0.000	0.000	0.000	0.000	0.000
Forthwind	0.000	0.024	0.000	0.000	0.000
Berwick Bank	0.000	0.222	0.000	0.000	0.000
Greenvolt	0.000	0.000	0.000	1.000	0.000
Salamander	0.000	0.000	0.000	0.455	0.000

Table 3-18. Razorbill non-breeding season apportioning calculations and non-breeding apportioning weights for all in-combination OWFs. BDMPS counts and adult proportions are from Furness (2015) Appendix A.

SPA	BDMPS count (adults)	BDMPS adult proportion autumn & spring	BDMPS adult prop mid winter	Apportioning weight* Autumn/Spring	Winter
Cape Wrath SPA	4180	0.02	0.10	0.000	0.002
East Caithness Cliffs SPA	25000	1.00	0.30	0.042	0.034
Fair Isle SPA	1830	0.95	0.30	0.003	0.003
Flamborough and Filey Coast	20002	1.00	0.30	0.034	0.027
Flannan Isles SPA	2102	0.02	0.10	0.000	0.001
Forth Islands	5250	1.00	0.30	0.009	0.007
Foula SPA	750	0.95	0.30	0.001	0.001
Fowlsheugh SPA	7048	1.00	0.30	0.012	0.010
Handa SPA	10330	0.02	0.10	0.000	0.005
Mingulay and Berneray SPA	20222	0.02	0.10	0.001	0.009
North Caithness Cliffs SPA	3400	0.95	0.30	0.005	0.005
North Rona and Sula Sgeir SPA	2178	0.02	0.10	0.000	0.001
Shiant Isles SPA	8496	0.02	0.10	0.000	0.004
Skomer, Skokholm, Middelholm	12002	0.02	0.05	0.000	0.003
St Abbs Head to Fast Castle	2438	1.00	0.30	0.004	0.003
St Kilda SPA	3400	0.02	0.10	0.000	0.002
Troup, Pennan and Lions Head	3486	1.00	0.30	0.006	0.005
West Westray SPA	1100	0.95	0.30	0.002	0.002
BDMPS Autumn/Spring	**591874**	-	-	-	-
BDMPS Winter	**218622**	-	-	-	-

* non-breeding proportion = (BDMPS SPA count x BDMPS SPA adult proportion) / BDMPS.

3.6 Puffin

82.   The Project breeding season apportioning weights for puffin are presented in **Table 3-19.** The boundary of Sule Skerry and Sule Stack SPA overlaps with the OAA plus 2 km buffer. Consequently, the breeding season apportioning weight for this SPA is 1.0, i.e. all breeding season collision and displacement mortalities in the OAA plus 2 km buffer are assumed to be puffin from Sule Skerry and Sule Stack SPA. This was discussed with NatureScot (consultation meeting 28 May 2024) and NatureScot acknowledged that for any species that is a feature of the Sule Skerry & Sule Stack SPA, effectively all Project breeding season impacts should be apportioned to this SPA and none to any other SPA.

83.   The puffin breeding season apportioning weights for all other OWFs included in the in-combination assessment are presented in **Table 3-20** and **Table 3-21.** The large number of SPAs with puffin as a qualifying feature meant that other OWFs apportioning weights are presented in two tables instead of a single table. SPAs are listed alphabetically across the two tables. These were calculated using the same approach as for the Project apportioning weights.

84.   Non-breeding season apportioning weights for all OWFs included in the in-combination assessment for puffin are provided in **Table 3-22.**

Table 3-19. Puffin breeding season apportioning calculations and apportioning weights for all OWFs (WoW = the Project).

SPA	Most recent count (individuals)	Distance to WoW (km)	Proportion of Forage Range as Sea	1/Proportion of Forage Range as Sea	Absolute weight for WoW breeding*	Apportioning weight
Canna and Sanday	9926	220.0	0.666	1.50	0.0953	0.0000
Cape Wrath	4488	23.9	0.782	1.28	3.1152	0.0000
Fair Isle	13332	138.1	0.921	1.09	0.2349	0.0000
Flannan Isles	98944	181.9	0.852	1.17	1.0866	0.0000
Foula	8468	159.2	0.963	1.04	0.1074	0.0000
Hermaness, Saxa Vord and Valla Field	28750	256.1	0.990	1.01	0.1370	0.0000
Hoy	860	22.7	0.808	1.24	0.6394	0.0000
North Caithness Cliffs	6078	25.2	0.797	1.26	3.7177	0.0000
North Rona and Sula Sgeir	6602	77.7	0.863	1.16	0.3920	0.0000
Noss	2348	204.6	0.977	1.02	0.0178	0.0000
The Shiant Isles	129390	139.7	0.747	1.34	2.7447	0.0000
St Kilda	197586	247.9	0.883	1.13	1.1262	0.0000
Sule Skerry and Sule Stack	95484	0.1	0.820	1.22	3604348.8	1.0000
Sum	**602256**	**1697.1**	**-**	**15.46**	**3604362.2142**	**1.000**

* individual absolute weight = (most recent count /sum(most recent counts)) x ((sum distances)2 / distance2) x (1/proportional area/(sum(1/proportional areas))).

Table 3-20. (1/2) Puffin breeding season apportioning weights for other wind farms included in the in-combination assessment, calculated using the NatureScot method (population sizes and sea proportion as Table 3-19).

Wind Farm	Canna and Sanday SPA	Cape Wrath SPA	Coquet Island SPA	Fair Isle SPA	Farne Islands SPA	Flannan Isles SPA	Forth Islands SPA	Foula SPA	Hermaness, Saxa Vord and Valla Field SPA	Hoy SPA
PFOWF	0.001	0.008	0.000	0.002	0.000	0.010	0.000	0.001	0.000	0.004
BOWL	0.010	0.018	0.000	0.027	0.000	0.066	0.123	0.009	0.000	0.015
Moray East	0.012	0.018	0.000	0.032	0.000	0.000	0.158	0.010	0.000	0.015
Moray West	0.014	0.022	0.000	0.027	0.000	0.083	0.167	0.009	0.000	0.012
Blyth Demonstration	0.000	0.000	0.745	0.000	0.216	0.000	0.039	0.000	0.000	0.000
Dogger Bank Creyke Beck A & B	0.000	0.000	0.390	0.000	0.610	0.000	0.000	0.000	0.000	0.000
Dogger Bank Teesside A * Sofia	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dudgeon	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
DEP & SEP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia ONE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia ONE North	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia Three	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia TWO	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
EOWDC	0.000	0.005	0.086	0.011	0.220	0.000	0.520	0.000	0.000	0.001
Galloper	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Greater Gabbard	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gunfleet Sands	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hornsea Project Four	0.000	0.000	0.412	0.000	0.588	0.000	0.000	0.000	0.000	0.000
Hornsea Project One	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hornsea Project Two	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Wind Farm	Canna and Sanday SPA	Cape Wrath SPA	Coquet Island SPA	Fair Isle SPA	Farne Islands SPA	Flannan Isles SPA	Forth Islands SPA	Foula SPA	Hermaness, Saxa Vord and Valla Field SPA	Hoy SPA
Hornsea Project Three	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humber Gateway	0.000	0.000	0.422	0.000	0.578	0.000	0.000	0.000	0.000	0.000
Hywind	0.000	0.012	0.000	0.113	0.000	0.000	0.229	0.025	0.044	0.007
Inch Cape	0.001	0.000	0.027	0.000	0.089	0.000	0.882	0.000	0.000	0.000
Kentish Flats and Extn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Kincardine	0.000	0.004	0.095	0.000	0.256	0.000	0.636	0.000	0.000	0.001
Lincs and LID6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
London Array	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Methil	0.000	0.000	0.007	0.000	0.021	0.000	0.972	0.000	0.000	0.000
Neart na Gaoithe	0.000	0.000	0.008	0.000	0.029	0.000	0.963	0.000	0.000	0.000
Norfolk Boreas	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Norfolk Vanguard	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Race Bank	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rampion	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Seagreen A & B	0.000	0.000	0.058	0.000	0.188	0.000	0.751	0.000	0.000	0.000
Sheringham Shoal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Teesside	0.000	0.000	0.445	0.000	0.404	0.000	0.152	0.000	0.000	0.000
Thanet	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Triton Knoll	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Westermost Rough	0.000	0.000	0.427	0.000	0.573	0.000	0.000	0.000	0.000	0.000
Forthwind	0.000	0.000	0.006	0.000	0.017	0.000	0.976	0.000	0.000	0.000
Berwick Bank	0.000	0.000	0.102	0.000	0.523	0.000	0.373	0.000	0.000	0.000

Wind Farm	Canna and Sanday SPA	Cape Wrath SPA	Coquet Island SPA	Fair Isle SPA	Farne Islands SPA	Flannan Isles SPA	Forth Islands SPA	Foula SPA	Hermaness, Saxa Vord and Valla Field SPA	Hoy SPA
Greenvolt	0.000	0.010	0.000	0.046	0.247	0.000	0.346	0.014	0.000	0.004
Salamander	0.000	0.010	0.129	0.033	0.306	0.000	0.485	0.000	0.000	0.003

Table 3-21. (2/2) Puffin breeding season apportioning weights for other OWFs included in the in-combination assessment, calculated using the NatureScot method (population sizes and sea proportion as Table 3-19).

Wind Farm	Mingulay and Berneray SPA	North Caithness Cliffs SPA	North Rona and Sula Sgeir SPA	Noss SPA	The Shiant Isles SPA	St Kilda SPA	Sule Skerry and Sule Stack SPA
PFOWF	0.000	0.927	0.000	0.001	0.013	0.033	0.000
BOWL	0.000	0.359	0.000	0.003	0.138	0.232	0.000
Moray East	0.000	0.333	0.000	0.003	0.162	0.256	0.000
Moray West	0.000	0.205	0.000	0.003	0.145	0.314	0.000
Blyth Demonstration	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dogger Bank Creyke Beck A & B	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dogger Bank Teesside A * Sofia	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dudgeon	0.000	0.000	0.000	0.000	0.000	0.000	0.000
DEP & SEP	0.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia ONE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia ONE North	0.000	0.000	0.000	0.000	0.000	0.000	0.000
East Anglia Three	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Wind Farm	Mingulay and Berneray SPA	North Caithness Cliffs SPA	North Rona and Sula Sgeir SPA	Noss SPA	The Shiant Isles SPA	St Kilda SPA	Sule Skerry and Sule Stack SPA
East Anglia TWO	0.000	0.000	0.000	0.000	0.000	0.000	0.000
EOWDC	0.000	0.014	0.000	0.000	0.000	0.144	0.000
Galloper	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Greater Gabbard	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gunfleet Sands	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hornsea Project Four	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hornsea Project One	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hornsea Project Two	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hornsea Project Three	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humber Gateway	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hywind	0.000	0.069	0.000	0.000	0.501	0.000	0.000
Inch Cape	0.000	0.001	0.001	0.000	0.000	0.000	0.000
Kentish Flats and Extn	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Kincardine	0.000	0.009	0.000	0.000	0.000	0.000	0.000
Lincs and LID6	0.000	0.000	0.000	0.000	0.000	0.000	0.000
London Array	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Methil	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Neart na Gaoithe	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Norfolk Boreas	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Norfolk Vanguard	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Race Bank	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rampion	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Seagreen A & B	0.000	0.002	0.001	0.000	0.000	0.000	0.000
Sheringham Shoal	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Teesside	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Thanet	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Wind Farm	Mingulay and Berneray SPA	North Caithness Cliffs SPA	North Rona and Sula Sgeir SPA	Noss SPA	The Shiant Isles SPA	St Kilda SPA	Sule Skerry and Sule Stack SPA
Triton Knoll	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Westermost Rough	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Forthwind	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Berwick Bank	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Greenvolt	0.000	0.035	0.000	0.000	0.298	0.000	0.000
Salamander	0.000	0.034	0.000	0.000	0.000	0.000	0.000

Table 3-22. Puffin non-breeding season apportioning weights for all OWFs. BDMPS counts and non-breeding adult proportions from Furness (2015).

SPA	BDMPS count (adults)	BDMPS adult prop non-breeding	Apportioning weight*
Canna and Sanday	1890	0.00	0.000
Cape Wrath	3204	0.00	0.000
Coquet Island SPA	24688	0.50	0.053
Fair Isle	21412	0.15	0.014
Farne Islands	79924	0.50	0.172
Flannan Isles	31200	0.00	0.000
Forth Islands	124462	0.50	0.268
Foula	45000	0.15	0.029
Hermaness, Saxa Vord and Valla Field	47322	0.15	0.031
Hoy	7000	0.15	0.005
Mingulay and Berneray	6252	0.00	0.000
North Caithness Cliffs	1952	0.15	0.001
North Rona and Sula Sgeir	10884	0.00	0.000
Noss	1604	0.15	0.001
The Shiant Isles	130340	0.00	0.001
St Kilda	284528	0.00	0.001
Sule Skerry and Sule Stack	118942	0.00	0.001
BDMPS Non-breeding	**231,957**	-	-

* non-breeding proportion = (BDMPS SPA count x BDMPS SPA adult proportion) / BDMPS.

3.7 Fulmar

85. The Project breeding season apportioning weights for fulmar are presented in **Table 3-23** and the non-breeding season apportioning weights are provided in **Table 3-24**. No in-combination assessment was undertaken for fulmar as no other OWF has been required to assess fulmar displacement and barrier effects.

Table 3-23. Fulmar breeding season apportioning calculations and weights for the Project. Most recent counts are from Seabirds Count (Burnell *et al.* 2023). Distance is shortest straight line distance from SPA boundary to the OAA plus 2 km (WoW = the Project).

SPA	Most recent count	Distance to WoW (km)	Proportion of Forage Range as Sea	1/Proportion of Forage Range as Sea	Absolute weight for WoW breeding*	Apportioning weight
Buchan Ness to Collieston Coast SPA	1,652	199.4	0.676	1.48	0.0046	0.000
Calf of Eday SPA	4,648	72.4	0.719	1.39	0.0928	0.007
Cape Wrath SPA	2,954	25.8	0.751	1.33	0.4442	0.033
Copinsay SPA	3,236	67.3	0.711	1.41	0.0755	0.006
East Caithness Cliffs SPA	27,928	70.1	0.712	1.40	0.6001	0.044
Fair Isle SPA	64,982	140.2	0.710	1.41	0.3503	0.026
Fetlar	18,354	256.0	0.720	1.39	0.0292	0.002
Flamborough and Filey Coast	1,692	556.6	0.586	1.71	0.0007	0.000
Flannan Isles SPA	6,132	183.9	0.810	1.23	0.0168	0.001
Foula SPA	20,506	161.1	0.725	1.38	0.0819	0.006
Fowlsheugh SPA	1,050	236.8	0.677	1.48	0.0021	0.000
Handa SPA	1,450	56.1	0.755	1.32	0.0459	0.003
Hermaness, Saxa Vord and Valla Field SPA	26,416	257.8	0.719	1.39	0.0416	0.003
Hoy SPA	41,082	24.8	0.720	1.39	6.9750	0.512
Mingulay and Berneray SPA	14,096	282.5	0.797	1.25	0.0167	0.001
North Caithness Cliffs SPA	30,740	27.2	0.718	1.39	4.3532	0.319
North Rona and Sula Sgeir SPA	4,420	79.7	0.784	1.28	0.0668	0.005
Noss SPA	10,184	206.4	0.712	1.40	0.0252	0.002
Rousay SPA	4,384	49.4	0.722	1.38	0.1870	0.014
Shiant Isles SPA	3,012	141.6	0.777	1.29	0.0145	0.001
St Kilda SPA	58,372	249.9	0.825	1.21	0.0852	0.006
Sumburgh Head SPA	11,900	177.4	0.710	1.41	0.0400	0.003
Troup, Pennan and Lions Head	3,788	160.1	0.686	1.46	0.0162	0.001
West Westray SPA	2,428	60.3	0.724	1.38	0.0693	0.005

SPA	Most recent count	Distance to WoW (km)	Proportion of Forage Range as Sea	1/Proportion of Forage Range as Sea	Absolute weight for WoW breeding*	Apportioning weight
Sum	365,406	3742.8		33.16	13.6348	1.0

* individual absolute weight = (most recent count /sum(most recent counts)) x ((sum distances)^2 / distance^2) x (1/proportional area/(sum(1/proportional areas))).

Table 3-24. Fulmar non-breeding season apportioning calculations and weights for the Project. BDMPS counts and non-breeding adult proportions from Furness (2015).

SPA	BDMPS count (Furness 2015)	BDMPS adult prop autumn /spring	BDMPS adult prop winter	Autumn/spring apportioning weight	Winter apportioning weight
Buchan Ness to Collieston Coast SPA	2,734	1.00	0.70	0.003	0.003
Calf of Eday SPA	3,684	0.90	0.70	0.003	0.005
Cape Wrath SPA	4,230	0.00	0.02	0.000	0.000
Copinsay SPA	3,260	0.90	0.70	0.003	0.004
East Caithness Cliffs SPA	28,404	1.00	0.70	0.030	0.035
Fair Isle SPA	59,298	0.90	0.70	0.056	0.073
Fetlar	17,824	0.90	0.70	0.017	0.022
Flamborough and Filey Coast	1,756	1.00	0.70	0.002	0.002
Flannan Isles SPA	14,656	0.00	0.02	0.000	0.001
Foula SPA	39,516	0.90	0.70	0.037	0.049
Fowlsheugh SPA	386	1.00	0.70	0.000	0.000
Handa SPA	3,740	0.00	0.02	0.000	0.000
Hermaness, Saxa Vord and Valla Field SPA	14,000	0.90	0.70	0.013	0.017
Hoy SPA	39,172	0.90	0.70	0.037	0.048
Mingulay and Berneray SPA	18,092	0.00	0.70	0.000	0.022
North Caithness Cliffs SPA	25,800	0.90	0.70	0.024	0.032
North Rona and Sula Sgeir SPA	10,000	0.00	0.70	0.000	0.012
Noss SPA	10,496	0.90	0.70	0.010	0.013
Rousay SPA	2,060	0.90	0.70	0.002	0.003
Shiant Isles SPA	8,774	0.00	0.70	0.000	0.011
St Kilda SPA	66,055	0.00	0.70	0.000	0.081
Sumburgh Head SPA	466	0.90	0.70	0.000	0.001
Troup, Pennan and Lions Head	3,590	1	0.70	0.004	0.004
West Westray SPA	1354	0.90	0.70	0.001	0.002

SPA	BDMPS count (Furness 2015)	BDMPS adult prop autumn /spring	BDMPS adult prop winter	Autumn/spring apportioning weight	Winter apportioning weight
BDMPS				957,502	568,736

3.8   Great skua

86.   The Project breeding season apportioning weights for great skua are presented in **Table 3-25** and the non-breeding season apportioning weights are provided in **Table 3-26.** No quantitative in-combination assessment was undertaken for great skua as other OWFs had no or very few records of great skua in their development area and so their in-combination mortality to SPAs was zero.

Table 3-25. Great skua breeding season apportioning calculations and weights for the Project. Most recent counts are from Seabirds Count (Burnell *et al.* 2023). Distance is straight line distance from SPA boundary to the closest edge of OAA plus 2 km (WoW = the Project).

SPA	Most recent count	Distance to WoW (km)	Proportion of Forage Range as Sea	1/Proportion of Forage Range as Sea	Absolute weight for WoW breeding*	Apportioning weight
Fair Isle SPA	860	140.2	0.710	1.41	0.1214	0.009
Fetlar SPA	1,708	239.0	0.720	1.39	0.0817	0.006
Foula SPA	3,692	161.1	0.725	1.38	0.3862	0.028
Handa SPA	566	56.1	0.755	1.32	0.4687	0.034
Hermaness, Saxa Vord and Valla Field SPA	2,060	257.8	0.719	1.39	0.0849	0.006
Hoy SPA	2,810	24.8	0.720	1.39	12.4893	0.909
Noss SPA	952	206.4	0.712	1.40	0.0618	0.004
St Kilda SPA	422	249.9	0.825	1.21	0.0161	0.001
Ronas Hill	380	217.0	0.724	1.38	0.0219	0.002
Sum	**13,450**	**1552.3**		**12.27**	**13.73**	**1.0**

* individual absolute weight = (most recent count /sum(most recent counts)) x ((sum distances)2 / distance2) x (1/proportional area/(sum(1/proportional areas))).

Table 3-26. Great skua non-breeding season apportioning calculations and weight for the Project. BDMPS counts and non-breeding adult proportions from Furness (2015).

SPA	BDMPS count (Furness 2015)	BDMPS adult prop autumn	BDMPS adult prop winter	BDMPS adult prop spring	Autumn apportioning weight	Winter apportioning weight	Spring apportioning weight
Fair Isle SPA	532	0.60	0.00	0.30	0.016	0.000	0.019
Fetlar	1,170	0.60	0.00	0.30	0.036	0.000	0.041
Foula SPA	3,314	0.60	0.00	0.30	0.102	0.000	0.117
Handa SPA	270	0.00	0.00	0.00	0.000	0.000	0.000
Hermaness, Saxa Vord and Valla Field SPA	1,958	0.60	0.00	0.30	0.060	0.000	0.069
Hoy SPA	2,692	0.60	0.00	0.30	0.083	0.000	0.095
Noss SPA	930	0.60	0.00	0.30	0.029	0.000	0.033
St Kilda SPA	362	0.00	0.00	0.00	0.000	0.000	0.000
Ronas Hill	378	0.60	0.00	0.30	0.012	0.000	0.013
BDMPS					**19,556**	**143**	**8,485**

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