CALEDONIA
Offshore Wind Farm

Code: UKCAL-CWF-CON-EIA-APL-00001-A017

Application Document 13

Appendix 13-1 Caledonia North Apportioning Technical Note

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Application Document 13 Appendix 13-1 Caledonia North Apportioning Technical Note

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Table of Contents

List of Figures

List of Tables

Acronyms and Abbreviations

BTO	British Trust for Ornithology
BDMPS	Biologically Defined Minimum Population Scales
HRA	Habitats Regulations Appraisal
JNCC	Joint Nature Conservation Committee
MMFR	Mean Max Foraging Range
MS-LOT	Marine Scotland Licensing Operations Team
MSS	Marine Scotland Science
OWF	Offshore Wind Farm
RIAA	Report to Inform Appropriate Assessment
SD	Standard Deviation
SMP	Seabird Monitoring Programme
SPA	Special Protection Area

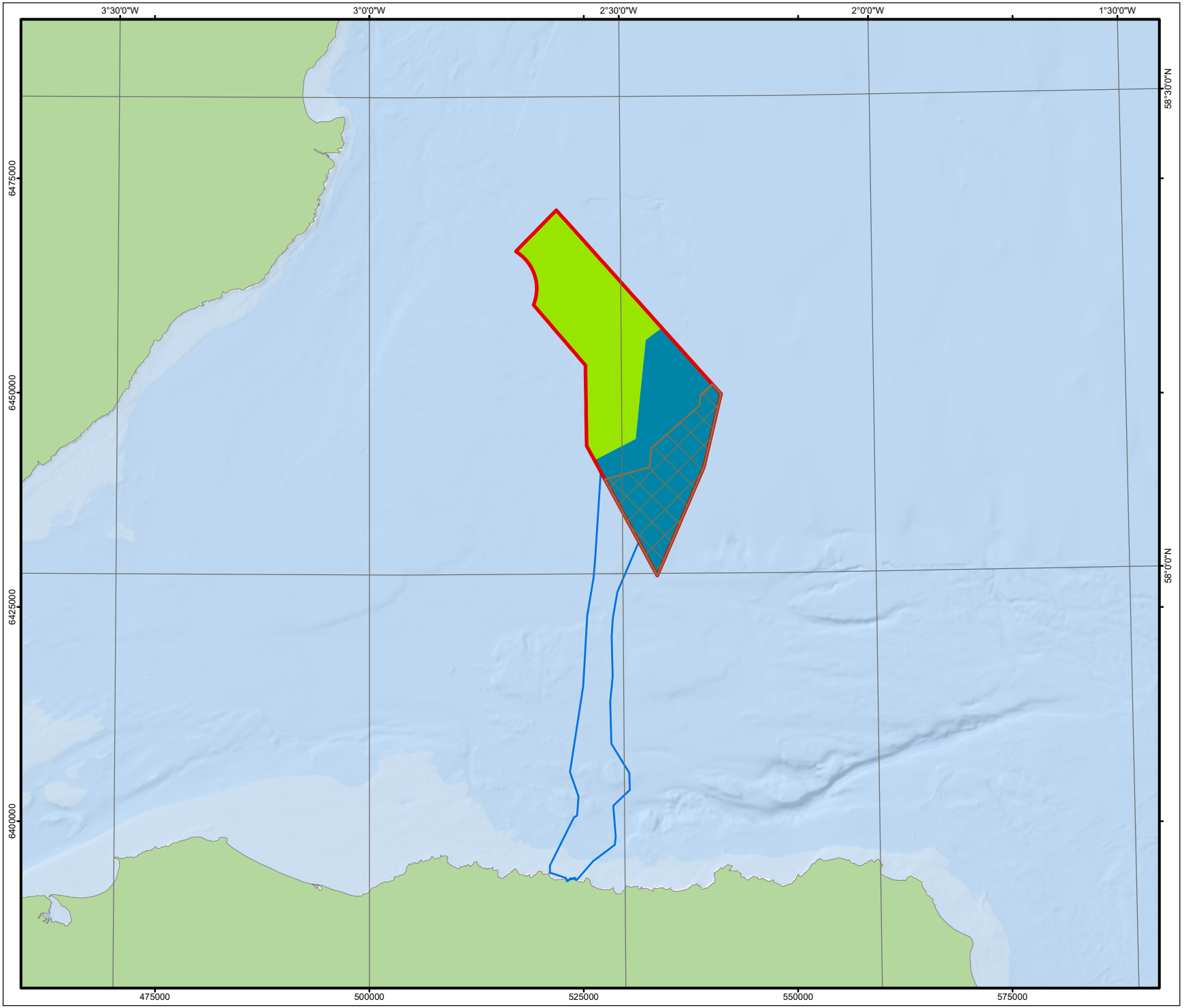
1 Introduction

1.1.1.1 This appendix provides information on the seasonal apportioning of seabirds for the array area of the Proposed Development (Offshore), referred to as the Caledonia Offshore Wind Farm (OWF), located in the Moray Firth, Scotland. This document has been prepared specifically to inform the consent application for Caledonia North and includes designated colonies, specifically those associated with Special Protection Areas (SPAs) and Ramsar sites, and non-designated colonies. The information provided supports the Caledonia North Report to Inform Appropriate Assessment (RIAA) (Application Document 13).

1.1.1.2 The Proposed Development (Offshore) will be developed in two phases (see Volume 1, Chapter 5: Proposed Development Phasing), referred to as Caledonia North and Caledonia South (see Figure 1-1). The Array Areas of the two phases are referred to as the Caledonia North Site and the Caledonia South Site. It is assumed that construction of the two application areas could be progressed in either order (e.g., Caledonia North constructed in the first phase, then Caledonia South in the second phase, or vice-versa) or at the same time.

1.1.1.3 Apportioning is the process by which the predicted impacts of the Proposed Development (Offshore) are allocated in a justifiable way to individual colonies (especially designated sites, where population maintenance may be a key conservation objective), as well as more widely across regional or national populations.

1.1.1.4 The approach by which collision and distributional response mortalities are apportioned to relevant sites is detailed within this appendix.



Caledonia OWF
Caledonia North Array Area
Caledonia South Array Area
Proposed Floating Area
Offshore Export Cable Corridor

0 5 10 15 20 km

REV	DATE	DOC STATUS	ORIGIN	REVIEW	APP
01	19/09/2024	Approved	EV	BB	DH

CALEDONIA Offshore Wind Farm

GoBe APEMGroup

CONTRACTOR DRAWING NO	CONTRACTOR REV
UKCAL1_GO_WNF_ORN_MAP_00151	01

GEODETIC PARAMETERS
WGS 84 / UTM zone 30N (EPSG: 32630)

DRAWING TITLE

Figure 1-1: Location of the Caledonia OWF, Caledonia North and Caledonia South, and Offshore Export Cable Corridor

STATUS	SCALE
Approved	1:600,000

DRAWING NUMBER	SHEET NO	REV
N/A	01 of 01	N/A

2 Methods

2.1.1.1 The NatureScot Guidance Note 10 regarding apportioning impacts to breeding seabird colonies is not currently available as part of the NatureScot (2023[1]) guidance. As such, the assessment presented within this Technical Note is primarily based on the NatureScot Interim Apportioning Guidance (NatureScot, 2018[2]) as advised by NatureScot (07 March 2024).

2.1.1.2 It is important to note that although the Proposed Development (Offshore) will be developed in two phases (Caledonia North and Caledonia South), all apportioning distances are identical to those used within the assessment for the Caledonia Offshore Wind Farm (OWF) (i.e., the array area of the Proposed Development (Offshore)) as any difference between the two application areas would result in extremely small differences in the outputs of apportioning.

2.2 Species and Relevant Colonies

2.2.1.1 Table 2-1 presents the seabird species for which apportioning was required based on the screening conclusions of the Proposed Development (Offshore), alongside the relevant impact pathway assessed for each species.

Table 2-1: Species and impacts for which apportioning was undertaken.

Species	Scientific Names	Nature of Impact
Kittiwake	*Rissa tridactyla*	Collision and distributional responses
Great black-backed gull	*Larus marinus*	Collision
Herring gull	*Larus argentatus*	Collision
Great skua	*Stercorarius skua*	Collision
Guillemot	*Uria aalge*	Distributional responses
Razorbill	*Alca torda*	Distributional responses
Puffin	*Fratercula arctica*	Distributional responses
Gannet	*Morus bassanus*	Collision and distributional responses

2.2.1.2 The species identified in Table 2-1 are protected as features of breeding designated colonies. It is noted that all designated sites screened in for assessment are SPAs, as such no Ramsar Sites are included within this appendix. Each bird has been apportioned to the designated sites within species-specific breeding season foraging ranges from the Caledonia OWF, defined as the mean max foraging range (MMFR) plus 1 standard deviation (SD) presented in Woodward *et al.* (2019[3]) (Table 2-2). It should be noted that the Interim Guidance from NatureScot (2018[2]) calls for the use of MMFR presented in Thaxter *et al.* (2012[4]); however, this has been superseded by Woodward *et al.* (2019[3]).

Table 2-2: Species specific foraging ranges as per Woodward *et al*. (2019[3]).

Species	Mean Max (km)	1 SD (km)	Total (km)
Kittiwake	156.1	144.5	300.6
Great black-backed gull	73.0	-	73.0
Herring gull	58.8	26.8	85.6
Great skua	443.3	487.9	931.2
Guillemot	73.2 (55.5)*	80.5 (39.7)*	153.7 (95.2)*
Razorbill	88.7 (73.8)*	75.9 (48.4)*	164.6 (122.2)*
Puffin	137.1	128.3	265.4
Gannet**	315.2	194.2	509.4

* Distances in brackets exclude data from Fair Isle where foraging range may have been unusually high as a result of reduced prey availability during the study year (Woodward *et al.,* 2019[3]). These foraging ranges were used for sites south of the Pentland Firth for guillemot and razorbill as per the NatureScot Guidance Note 3 (NatureScot, 2023[1]).

** In line with NatureScot Guidance Note 3 (NatureScot, 2023[1]), site specific maximum foraging ranges were used to screen in connectivity to Forth Islands SPA, Grassholm SPA and St Kilda SPA. Forth Islands SPA and St Kilda SPA were within site specific maximum foraging ranges. As such Forth Islands has been assessed for gannet; however, St Kilda SPA was screened out due to the lack of expected connectivity when considering tracking data and literature evidence (as outlined within Application Document 13: Caledonia North Report to Inform Appropriate Assessment).

2.2.1.3 A list of designated sites within MMFR + 1SD of the Proposed Development (Offshore) were identified within the HRA Screening Report (Application Document 12). This list was used to identify the sites considered in the apportioning assessment presented in this appendix. Table 2-3 provides the full list of designated sites and qualifying interests considered for apportioning.

2.2.1.4 The colony counts for all designated and non-designated sites within foraging range (see Table 2-2) were derived from the British Trust for Ornithology (BTO) Seabird Monitoring Programme (SMP) database. Colony counts are recorded as individuals, apparently occupied nests or apparently occupied sites; all counts recorded as apparently occupied nests or apparently occupied sites were treated as equivalent to pairs and were doubled to give the count as individuals. For guillemot and razorbill, a correction factor of x 1.34 was applied (Harris *et al*., 2015[5]) to SMP counts to give total adult breeding numbers. Where sites are made up of multiple sub-sites, the most recent available counts were added together, in this case, a range of years is presented within Table 2-3 below.

Table 2-3: Designated colonies (feature or assemblage) identified for apportioning based on breeding season foraging range and/or connectivity during the non-breeding season, where distance to designated colonies has been measured from the centre of the Caledonia OWF to the centre of the designated colony.

Designated Site	Species	Foraging Range (km) (MMFR + 1SD)	Distance to Designated Site (km)	Count of Breeding Adults (individuals)	Year(s) of Count
East Caithness Cliffs SPA***	Kittiwake	300.6	51.4	48,920	2016
	Great black-backed gull*	73.0		532	2016
	Herring gull	85.6		6,534	2016
	Guillemot	153.7 (95.2)		199,992 (149,248)	2016
	Razorbill	164.6 (122.2)		40,256 (30,042)	2016
North Caithness Cliffs SPA	Kittiwake*	300.6	89.4	16,424	2015-2023
	Guillemot	153.7 (95.2)		62,599 (46,716)	2015-2023
	Razorbill*	164.6 (122.2)		13,384 (9,988)	2015-2023
	Puffin*	265.4		3,011	2016-2023
Troup, Pennan and Lion's Heads SPA	Kittiwake*	300.6	59.8	27,344	2017-2023
	Herring gull*	85.6		1,106	2017-2023
	Guillemot	153.7 (95.2)		47,719 (35,611)	2017-2023
	Razorbill*	164.6 (122.2)		8,801 (6,568)	2017-2023
Copinsay SPA	Kittiwake*	300.6	80.9	592	2023

Designated Site	Species	Foraging Range (km) (MMFR + 1SD)	Distance to Designated Site (km)	Count of Breeding Adults (individuals)	Year(s) of Count
	Guillemot*	153.7 (95.2)		10,967 (8,184)	2015-2023
	Great black-backed gull**	73.0		98	2023
Hoy SPA	Kittiwake	300.6	94.1	608	2016-2017
	Great skua	931.2		994	2018-2023
	Guillemot*	153.7 (95.2)		16,345 (12,198)	2016-2017
	Puffin*	265.4		361	2016-2017
	Great black-backed gull**	73.0		10	2023
Buchan Ness to Collieston Coast SPA	Kittiwake*	300.6	102.4	27,094	2023
Rousay SPA	Kittiwake*	300.6	123.0	962	2016-2021
	Guillemot*	153.7 (95.2)		7,921 (5,911)	2016-2018
Marwick Head SPA	Kittiwake*	300.6	117.3	2,878	2023
	Guillemot	153.7 (95.2)		12,800 (9,522)	2023
Calf of Eday SPA	Kittiwake*	300.6	119.9	290	2018
	Guillemot*	153.7 (95.2)		7,402 (5,524)	2018

Designated Site	Species	Foraging Range (km) (MMFR + 1SD)	Distance to Designated Site (km)	Count of Breeding Adults (individuals)	Year(s) of Count
West Westray SPA	Kittiwake*	300.6	131.7	4,838	2017-2023
	Guillemot	153.7 (95.2)		40,673 (30,353)	2017-2023
	Razorbill*	164.6 (122.2)		2,857 (2,132)	2017-2023
Fowlsheugh SPA	Kittiwake	300.6	161.3	40,156	2018-2023
	Razorbill**	164.6 (122.2)		17,770 (13,261)	2023
Cape Wrath SPA	Kittiwake*	300.6	175.3	6,616	2023
	Puffin*	265.4		214	2017-2023
Sule Skerry and Sule Stack SPA	Puffin	265.4	154.8	95,484	2018
	Gannet	509.4		18,130	2013-2018
Fair Isle SPA	Kittiwake*	300.6	160.6	896	2021
	Great skua*	931.2		306	2023
	Razorbill*	164.6 (122.2)		2,580 (1,925)	2021
	Puffin*	265.4		6,666	2015
	Gannet*	509.4		9,654	2023
Sumburgh Head SPA	Kittiwake*	300.6	202.4	636	2021-2023
Foula SPA	Kittiwake*	300.6	222.5	1,021	2021

Designated Site	Species	Foraging Range (km) (MMFR + 1SD)	Distance to Designated Site (km)	Count of Breeding Adults (individuals)	Year(s) of Count
	Great skua	931.2		616	2023
	Puffin	265.4		6,351	2016
North Rona and Sula Sgeir SPA	Kittiwake*	300.6	242.6	1,424	2021
	Puffin*	265.4		2,834	2021
	Gannet	509.4		28,495	2023
Forth Islands SPA****	Kittiwake*	300.6	268.7	13,078	2023-2024
	Gannet (Latest count SMP)	509.4		150,518	2014
	Gannet (Forth Islands SPA updated count; Harris *et al*., 2023[6]; Wanless *et al*., 2023[7])	509.4		162,000	2021
	Razorbill**	164.6 (122.2)		8,186 (6,109)	2023-2024
Noss SPA	Kittiwake*	300.6	237.6	172	2023
	Great skua	931.2		138	2023
	Puffin*	265.4		545	2023
	Gannet	509.4		24,670	2023
St Abb's Head to Fast Castle SPA	Kittiwake*	300.6	272.2	9,158	2023

Designated Site	Species	Foraging Range (km) (MMFR + 1SD)	Distance to Designated Site (km)	Count of Breeding Adults (individuals)	Year(s) of Count
Ronas–Hill - North Roe and Tingon SPA	Great skua	931.2	281.4	212	2017-2023
Fetlar SPA	Great skua	931.2	290.5	626	2017-2023
Hermaness, Saxa Vord and Valla Field SPA	Kittiwake**	300.6	324.9	154	2023
	Great skua	931.2		448	2023
	Gannet	509.4		37,478	2023
Handa SPA	Kittiwake	300.6	207.5	9,178	2023
	Great skua	931.2		168	2023
Shiant Isles SPA	Kittiwake	300.6	293.5	2,318	2015-2023
St Kilda	Great skua	931.2	408.8	56	2019
Farne Islands SPA	Kittiwake**	300.6	300.9	7,166	2023
Flamborough and Filey Coast SPA	Gannet**	509.4	483.5	30,466	2023

* Species which are part of an assemblage feature only.

** Species assessed for the non-breeding season only as described within Application Document 13: Caledonia North Report to Inform Appropriate Assessment.

*** Counts from Swann (2016[8]).

**** For the Forth Islands SPA, two assessments are presented for gannet. One using the latest SMP count and one using an updated Forth Islands SPA count. The Forth Islands SPA updated count takes into account the 2021 estimated Bass Rock drone count of 81,000

Designated Site	Species	Foraging Range (km) (MMFR + 1SD)	Distance to Designated Site (km)	Count of Breeding Adults (individuals)	Year(s) of Count
AOS (Harris *et al*., 2023[6]; Wanless *et al*., 2023[7]). Further information regarding this approach is outlined within Application Document 13: Caledonia North Report to Inform Appropriate Assessment. Note, foraging ranges presented in "()" exclude data from Fair Isle where foraging range may have been unusually high (Woodward *et al*., 2019[3]). These foraging ranges were used for sites south of the Pentland Firth for guillemot and razorbill. Note, counts for guillemot and razorbill apply Harris *et al*. (2015[5]) correction factor x 1.34 for total adult breeding numbers, SMP counts are shown in "()".					

2.3 Definitions of Seasons

2.3.1.1 During the breeding season birds are strongly associated with their nesting sites, engaging in nesting, egg-laying, incubation, and provisioning young. Outside of the non-breeding season birds are more widely distributed and their association with their colonies diminishes. This period encompasses the brief "pre-breeding" seasons defined in the NatureScot (2020[9]) guidance. The defined breeding seasons for all species were derived from the NatureScot (2020[9]) guidance (see Table 2-4).

2.3.1.2 Apportioning outside the breeding season relies on information from Biologically Defined Minimum Population Scales (BDMPS) (Furness, 2015[10]). Furness (2015[10]) identifies autumn passage, spring passage and winter periods within the non-breeding season for kittiwake, gannet, razorbill and great skua, as such apportioning weightings were derived for these periods using the period within which the mean peak was recorded for each species. The non-breeding defined seasons used within apportioning for kittiwake, razorbill, gannet and great skua are presented in Table 2-4. The Furness (2015[10]) seasons were foreshortened to reduce overlap with the NatureScot breeding season definitions to avoid overestimating seasonal mortality estimates.

Table 2-4: Defined seasons in the Scottish Marine Environment used in the assessment for key species (NatureScot, 2020[9]).

Species	Breeding Season	Non-breeding Season
Kittiwake	Mid-April to August	September to Early April
Great black-backed gull	April to August	September to March
Herring gull	April to August	September to March
Great skua	Mid-April to Mid-September	Mid-September to Mid-April
Common guillemot	April to mid-August	Late August to March
Razorbill	April to mid-August	Late August to March
Puffin	April to Mid- August	Late August to March
Gannet	Mid-March to September	October to Early-March

2.4 Apportioning Methods

2.4.1 Overview

2.4.1.1 The weightings obtained from the apportioning were used to allocate seasonal mortality estimates for each species by age class to seabird colonies.

2.4.2 Breeding Season

2.4.2.1 The assessment presented within this Technical Note is primarily based on the NatureScot Interim Guidance (NatureScot, 2018[2]) regarding apportioning impacts to breeding seabird colonies. Further analysis using the Marine Scotland Science (MSS) apportioning tool (Butler *et al*., 2020[11]) was requested within the Scoping Opinion (Volume 7, Appendix 3). However, the MSS apportioning tool is not ready for use and has not been shared with the Caledonia project team and has therefore not been used within this assessment. This was discussed and agreed with NatureScot during consultation (09 May 2024).

2.4.2.2 During the breeding season there is potential not only for breeding adult birds within foraging range of the project to have connectivity but also juvenile, immature and sabbatical birds which are not associated with any given colony. The first step in the apportionment process is therefore to calculate the proportion of breeding adult birds for which the project may impact.

2.4.2.3 The proportion of juvenile and immature birds comparatively to the number of breeding adults which may be connected to the project can typically be calculated using the age ratios from the digital aerial surveys or from using generalised stable age structure data. In relation to the use of age ratios from the digital aerial survey data, there are a number of key issues with accurately identifying age of key seabirds as detailed below.

2.4.2.4 For kittiwakes only first winter juvenile birds are readily distinguishable from other age categories, due to the distinct 'W pattern' across the wings and black tail-band (Svensson *et al*., 2009[12]). This pattern, however, is lost by the time a kittiwake reaches its second winter moult, whereby the bird is indistinguishable from an adult bird. As presented in Coulson (2011[13]), the modal age of kittiwakes first breeding is four years old, although the age of first breeding has been documented as late as 10 years old. This clearly shows that by simply applying the assumption that all adult plumage birds are breeding adults, as would be the case when using site-specific survey data, it is highly likely to overestimate the proportion of breeding adult birds with the Caledonia OWF.

2.4.2.5 For guillemot, razorbill and puffin only first winter juvenile birds are readily distinguishable from other age categories, with the distinguishing feature of

juveniles being their size in comparison to the adult males in attendance of the chicks. After their first winter immature auks are indistinguishable from breeding adult birds. The average breeding age for guillemot, razorbill and puffin is six, five and five years old (Horswill and Robinson, 2015[14]) respectively. Therefore, the treatment that all 'adult type' appearance birds are breeding adults, as would be the case when using site-specific survey data, it is highly likely to overestimate the proportion of breeding adult birds with the project area.

2.4.2.6 In relation to gannet, with juvenile (first calendar year birds) plumage being primarily grey/brown in colour with a lack of a distinct yellow head (Svensson *et al*., 2009[12]) this makes them distinctly different to adult birds. For second calendar year birds, the grey-brown plumage on the head, underparts, uppertail-coverts and usually some of the lesser wing uppertail-coverts becomes white (Svensson *et al*., 2009[12]), makes this age category readily distinguishable from adult birds. For third calendar year birds most tail-feathers and secondaries are usually black intermixed with white feathers, whilst the remaining body and head largely resemble the plumage of an adult bird, although these birds are still readily identifiable from adult birds, depending on the quality of the survey data and behaviour of the bird recorded (e.g., banking birds) might be difficult to observe and therefore this age category may be less regularly distinguished from adult birds. For fourth calendar year birds only the central tail-feathers and the odd scattered secondaries remain black, the rest of the bird's plumage resembles that of an adult bird, depending on the quality of the survey data and behaviour of the bird recorded (e.g., banking birds) might be difficult to observe and therefore this age category may be less regularly distinguished from adult birds. From fourth calendar year onwards the plumage of gannets remains indistinguishable, with the average age of first breeding at five years old. There is therefore potential to overestimate the proportion of breeding adult birds with the project area when using site-specific survey data.

2.4.2.7 Furthermore, not all adult birds within the Caledonia OWF can be classified as breeding birds. This is evidenced from adult sabbatical birds free roaming the North Sea whilst taking a break from breeding activities (Marine Scotland, 2017[15]). A sabbatical rate of 10% for gannet and kittiwake populations and 7% for auk species was advocated by Marine Scotland based on expert opinion for inclusion within other Scottish projects such as Moray West and other Forth and Tay projects, and therefore has been applied to assessments for the Caledonia OWF also. Sabbatical rates for great black-backed gull, herring gull and great skua were derived from Horswill and Robinson (2015[14]).

2.4.2.8 The data presented in Furness (2015[10]) are considered to provide a more accurate representation of population age structure than site-specific survey data for reasons set out above. Furthermore, Furness (2015[10])

draws upon a wide number of data sources gathered across multiple years in order to model population age structure, thus reducing the potential for any bias associated with the snapshot nature of site-based surveys. A summary of the adult/immature age ratio for key seabirds is provided in Table 2-5.

Table 2-5: Proportion of adult, immature and sabbatical birds included within the apportionment process.

Species	Adult/Immature Ratio	Sabbatical Rate	Total Breeding Adult Rate
Kittiwake	53% / 47%	10%	47.70%
Herring gull	48% / 52%	35%	31.20%
Great black-backed gull	44% / 56%	35%	28.60%
Great skua	63% / 37%	8.9%	57.39%
Guillemot	57% / 43%	7%	53.01%
Razorbill	57% / 43%	7%	53.01%
Puffin	55% / 45%	7%	51.15%
Gannet	55% / 45%	10%	49.50%

2.4.2.9 Once the number of breeding adults potentially impacted has been calculated, the next step is to apportion impacts from the Caledonia OWF to each specific breeding colony with potential connectivity. This was undertaken following NatureScot's (2018[2]) interim guidance. The methodology calculates a proportional weighting for each colony based on the following three weighting factors:

- The population size of each colony (individuals);
- The distance from the center of the proposed array area to the center of the colony; and
- The available sea area within MMFR + 1SD of the colony, expressed as a proportion of total potential area.

2.4.2.10 These weighting factors are combined to form the following equation:

$$Weight = \left(\frac{Colony\ Population}{Sum\ of\ Populations}\right) \times \left(\frac{Sum\ of\ Distance^2}{Colony\ Distance^2}\right) \times \left(\frac{\frac{1}{Colony\ Sea\ Proportion}}{Sum\ of\ \frac{1}{Sea\ Proportions}}\right)$$

2.4.2.11 The population estimates at the relevant designated sites included in the calculation are detailed Table 2-3. Population estimates at additional colonies and non-designated sites are presented within Application

Document 13, Appendix 13-1, Annex 1: Apportioning Results. These counts were obtained from the BTO SMP database, with the exception of counts made of East Caithness Cliffs SPA. For the East Caithness Cliffs SPA, counts from Swann (2016[8]) were used due to discrepancies noted between this report and the SMP, this is in line with consultation responses received for Green Volt OWF (Royal HaskoningDHV, 2023[16]). Colony count data older than 2015 was not used when calculating population estimates for all species except for gannet for which 2013 counts were used for Foula SPA, St Kilda SPA and Sule Stack (Sule Skerry and Sule Stack SPA).

2.4.2.12 Foraging ranges are based on at sea distances taking into account land barriers to movements for species which are known to avoid commuting over land.

2.4.2.13 Distances between colonies and the Caledonia OWF, and the percentage of area at sea for each colony, were calculated in QGIS. As per the NatureScot (2018[2]) Interim Guidance, the distance of the colony was measured as the distance from the geometric centre of the Caledonia OWF to the geometric centre of the colony, taking the shortest at sea distance route possible to identify colonies for inclusion within assessments. When undertaking apportioning, colonies with multiple sites were treated separately and the geometric centre of each site within the colony was used. Sea area was calculated by buffering the colony centroid by the seabirds MMFR + 1SD then removing all area over land and areas where seabirds are unlikely to forage such as estuaries.

2.4.3 Non-breeding Season

2.4.3.1 Outside of the breeding season, many seabirds disperse more widely and/or migrate to different regions; as such, a lower proportion of seabird can be attributed to their breeding colonies.

2.4.3.2 The BDMPS abundances were used to apportion all non-breeding birds to breeding colonies for all species, with the exception of guillemot (Furness, 2015[10]). The BDMPS and associated abundance estimates presented in Furness (2015[10]) are based upon data on demography, migration and modelled population age structure from the UK and overseas. For most species, the relevant BDMPS region for the Caledonia OWF is the UK North Sea and Channel waters, with the exception of kittiwake and great black-backed gull for which the UK North Sea waters is the most relevant BDMPS region.

2.4.3.3 For guillemot, apportioning for the non-breeding season was based on the breeding population found within the MMFR + 1SD of the Caledonia OWF. This is in line with the approach outlined in the NatureScot Guidance Note 3 (NatureScot, 2023[1]), based on recent geolocator studies presented in Buckingham *et al.* (2022[17]).

3 Results

3.1 Breeding season

3.1.1 Overview

3.1.1.1 The apportioning weightings of predicted impacts from the Caledonia OWF for all designated site qualifying features screened in for assessment are provided within this section for the breeding season (Table 3-1 to Table 3-8). Full lists of colonies and non-designated sites are provided in Application Document 13, Appendix 13-1, Annex 1: Apportioning Results.

3.1.2 Kittiwake

3.1.2.1 The weightings for apportioning breeding season kittiwake to designated sites within MMFR+1SD of the Caledonia OWF are provided in Table 3-1. These weightings were used to apportion the potential number of kittiwake distributional response (Volume 7B, Appendix 6-2: Offshore Ornithology Distributional Responses Technical Report) and collision (Volume 7B, Appendix 6-3: Offshore Ornithology Collision Risk Modelling Technical Report) mortalities during the breeding season to each of the designated sites.

Table 3-1: Kittiwake breeding season (Mid-April to August) apportioning weightings to designated sites.

Site Name	SMP Database Counts (Individuals)	Distance to Caledonia OWF (km)	1/Proportion of Foraging Range at Sea	Resulting Weight	Proportional Weight
East Caithness Cliffs SPA*	48,920	51.5	0.02	3.068	0.513
North Caithness Cliffs SPA	16,424	55.3 – 113.4	0.20	0.344	0.058
Troup, Pennan and Lion's Heads SPA	27,344	59.4 – 62.2	0.09	1.258	0.210
Copinsay SPA	592	80.7	0.01	0.012	0.002
Hoy SPA	608	82.8 – 100.4	0.09	0.011	0.002
Buchan Ness to Collieston Coast SPA	27,094	103.7	0.02	0.418	0.070

Site Name	SMP Database Counts (Individuals)	Distance to Caledonia OWF (km)	1/Proportion of Foraging Range at Sea	Resulting Weight	Proportional Weight
Rousay SPA	962	120.2 – 126.4	0.11	0.008	0.001
Marwick Head SPA	2,878	117.6	0.01	0.027	0.005
Calf of Eday SPA	290	119.3 – 298.2	0.04	0.003	<0.001
West Westray SPA	4,838	129.4 – 135.1	0.05	0.035	0.006
Fowlsheugh SPA	40,156	159.3 – 163.1	0.07	0.307	0.051
Cape Wrath SPA	6,616	167.6 – 182.3	0.34	0.031	0.005
Fair Isle SPA	896	161.0	0.01	0.004	0.001
Sumburgh Head SPA	636	201.9 – 205.7	0.04	0.002	<0.001
Foula SPA	1,021	222.5	0.01	0.002	<0.001
North Rona and Sula Sgeir SPA	1,424	234.5 – 252.7	0.02	0.003	0.001
Forth Islands SPA	13,078	248.3 – 266.2	0.15	0.053	0.009
Noss SPA	172	239.5	0.01	<0.001	<0.001
St Abb's Head to Fast Castle SPA	9,158	271.7 – 273.2	0.09	0.029	0.005
Handa SPA	9,178	209.6	0.01	0.031	0.005
Shiant Isles SPA	2,318	289.5 – 293.0	0.07	0.004	0.001
Additional colonies and non-designated sites	28,898	48.30 – 299.88	2.86	0.329	0.055

Site Name	SMP Database Counts (Individuals)	Distance to Caledonia OWF (km)	1/Proportion of Foraging Range at Sea	Resulting Weight	Proportional Weight
Note the residual weight assigned to non-SPA colonies are presented here as an overall total. Further breakdown of these sites is provided in Application Document 13, Appendix 13-1, Annex 1: Apportioning Results. * Counts from Swann (2016[8]).					

3.1.3 Great Black-Backed Gull

3.1.3.1 The weightings for apportioning breeding season great black-backed gull to designated sites within MMFR+1SD of the Caledonia OWF are provided in Table 3-2. These weightings were used to apportion the potential number of great black-backed gull collision (Volume 7B, Appendix 6-3: Offshore Ornithology Collision Risk Modelling Technical Report) mortalities during the breeding season to each of the designated sites.

Table 3-2: Great black-backed gull breeding season (April to August) apportioning weightings to designated sites.

Site Name	SMP Database Counts (Individuals)	Distance to Caledonia OWF (km)	1/Proportion of Foraging Range at Sea	Resulting Weight	Proportional Weight
East Caithness Cliffs SPA*	532	51.3	0.02	1.033	0.801
Additional colonies and non-designated sites	263	44.70 – 72.99	0.564	0.256	0.199
Note the residual weight assigned to non-SPA colonies are presented here as an overall total. Further breakdown of these sites is provided in Application Document 13, Appendix 13-1, Annex 1: Apportioning Results. * Counts from Swann (2016[8]).					

3.1.4 Herring Gull

3.1.4.1 The weightings for apportioning breeding season herring gull to designated sites within MMFR+1SD of the Caledonia OWF are provided in Table 3-3. These weightings were used to apportion the potential number of herring gull collision (Volume 7B, Appendix 6-3: Offshore Ornithology Collision Risk Modelling Technical Report) mortalities during the breeding season to each of the designated sites.

Table 3-3: Herring gull breeding season (April to August) apportioning weightings to designated sites.

Site Name	SMP Database Counts (Individuals)	Distance to Caledonia OWF (km)	1/Proportion of Foraging Range at Sea	Resulting Weight	Proportional Weight
East Caithness Cliffs SPA*	6,534	51.4	0.02	1.035	0.581
Troup, Pennan and Lion's Heads SPA	1,106	59.4 – 62.2	0.11	0.106	0.059
Additional colonies and non-designated sites	6,025	44.70 – 113.24	1.58	0.640	0.359
Note the residual weight assigned to non-SPA colonies are presented here as an overall total. Further breakdown of these sites is provided in Application Document 13, Appendix 13-1, Annex 1: Apportioning Results. * Counts from Swann (2016[8]).					

3.1.5 Great Skua

The weightings for apportioning breeding season great skua to designated sites within MMFR+1SD of the Caledonia OWF are provided in Table 3-4. These weightings were used to apportion the potential number of great skua collision (Volume 7B, Appendix 6-3: Offshore Ornithology Collision Risk Modelling Technical Report) mortalities during the breeding season to each of the designated sites.

Table 3-4: Great skua breeding season (Mid-April to Mid-September) apportioning weightings to designated sites.

Site Name	SMP Database Counts (Individuals)	Distance to Caledonia OWF (km)	1/Proportion of Foraging Range at Sea	Resulting Weight	Proportional Weight
Hoy SPA	994	80.5 - 102.3	1.53	0.876	0.392
Fair Isle SPA	306	161.0	0.01	0.087	0.039
Foula SPA	616	222.5	0.01	0.090	0.041
Noss SPA	160	239.5	0.01	0.020	0.009
Ronas–Hill - North Roe and Tingon SPA	212	273.5- 296.1	0.46	0.019	0.009
Fetlar SPA	660	285.3 - 298.2	0.41	0.055	0.025
Hermaness, Saxa Vord and Valla Field SPA	448	311.9- 319.5	0.02	0.031	0.014
Handa SPA	168	209.6	0.01	0.029	0.013
St. Kilda SPA	56	402.7 - 410.3	0.02	0.003	0.001
Additional colonies and non-designated sites	4,856	48.13 – 681.92	10.38	1.134	0.457
Note the residual weight assigned to non-SPA colonies are presented here as an overall total. Further breakdown of these sites is provided in Application Document 13, Appendix 13-1, Annex 1: Apportioning Results.					

3.1.6 Guillemot

3.1.6.1 The weightings for apportioning breeding season guillemot to designated sites within MMFR+1SD of the Caledonia OWF are provided in Table 3-5. These weightings were used to apportion the potential number of guillemot distributional response (Volume 7B, Appendix 6-2: Offshore Ornithology Distributional Responses Technical Report) mortalities during the breeding season to each of the designated sites.

Table 3-5: Guillemot breeding season (April to mid-August) apportioning weightings to designated sites.

Site Name	SMP Database Counts (Individuals)	Breeding Individuals*	Distance to Caledonia OWF (km)	1/Proportion of Foraging Range at Sea	Resulting Weight	Proportional Weight
East Caithness Cliffs SPA**	149,248	199,992	50.9	0.02	2.652	0.735
North Caithness Cliffs SPA	46,716	62,599	55.3 – 93.8	0.16	0.295	0.082
Troup, Pennan and Lion's Heads SPA	35,611	47,719	59.4 – 61.8	0.08	0.370	0.102
Copinsay SPA	8,184	10,967	80.7 – 81.8	0.03	0.035	0.010
Hoy SPA	12,198	16,345	88.5 – 100.7	0.14	0.046	0.013
Rousay SPA	5,911	7,921	120.2 – 126.4	0.11	0.010	0.003
Marwick Head SPA	9,552	12,800	117.6	0.01	0.019	0.005
Calf of Eday SPA	5,524	7,402	117.9 – 122.3	0.08	0.010	0.003
West Westray SPA	30,353	40,673	129.4 - 135.1	0.04	0.046	0.013
Additional colonies and non-designated sites	18,923	19,144	44.70 – 138.08	0.57	0.127	0.034

Note, the residual weight assigned to non-SPA colonies are presented here as an overall total. Further breakdown of these sites is provided in Application Document 13, Appendix 13-1, Annex 1: Apportioning Results.

* Applying Harris *et al*. (2015[5]) correction factor x 1.34 for total adult breeding numbers.

** Counts from Swann (2016[88]).

3.1.7 Razorbill

3.1.7.1 The weightings for apportioning breeding season razorbill to designated sites within MMFR+1SD of the Caledonia OWF are provided in Table 3-6. These weightings were used to apportion the potential number of razorbill distributional response (Volume 7B, Appendix 6-2: Offshore Ornithology Distributional Responses Technical Report) mortalities during the breeding season to each of the designated sites.

Table 3-6: Razorbill breeding season (April to mid-August) apportioning weightings to designated sites.

Site Name	SMP Database Counts (Individuals)	Breeding Individuals*	Distance to Caledonia OWF (km)	1/Proportion of Foraging Range at Sea	Resulting Weight	Proportional Weight
East Caithness Cliffs SPA**	30,042	40,256	68.13	0.03	1.568	0.685
North Caithness Cliffs SPA	9,988	13,384	55.3 – 113.4	0.27	0.241	0.105
Troup, Pennan and Lion's Heads SPA	6,568	8,801	59.4 – 62.2	0.10	0.256	0.112
West Westray SPA	2,132	2,857	129.4 – 135.1	0.06	0.012	0.005
Fair Isle SPA	1,925	2,580	161.0	0.01	0.007	0.003
Additional colonies and non-designated sites	15,112	20,250	46.01 – 79.47	1.57	0.21	0.09

Note the residual weight assigned to non-SPA colonies are presented here as an overall total. Further breakdown of these sites is provided in Application Document 13, Appendix 13-1, Annex 1: Apportioning Results.

* Applying Harris *et al*. (2015[5]) correction factor x 1.34 for total adult breeding numbers.

** Counts from Swann (2016[8]).

3.1.8 Puffin

3.1.8.1 The weightings for apportioning breeding season puffin to designated sites within MMFR+1SD of the Caledonia OWF are provided in Table 3-7. These weightings were used to apportion the potential number of puffin distributional response (Volume 7B, Appendix 6-2: Offshore Ornithology Distributional Responses Technical Report) mortalities during the breeding season to each of the designated sites.

Table 3-7: Puffin breeding season (April to Mid- August) apportioning weightings to designated sites.

Site Name	SMP Database Counts (Individuals)	Distance to Caledonia OWF (km)	1/Proportion of Foraging Range at Sea	Resulting Weight	Proportional Weight
North Caithness Cliffs SPA	3,011	55.3 – 115.0	0.26	0.065	0.052
Hoy SPA	361	82.8 – 100.7	0.08	0.009	0.007
Cape Wrath SPA	214	166.9 – 182.3	0.35	0.001	0.001
Sule Skerry and Sule Stack SPA	95,484	154.43	0.01	0.734	0.581
Fair Isle SPA	6,666	161.0	0.02	0.042	0.033
Foula SPA	6,351	222.5	0.01	0.020	0.016
North Rona and Sula Sgeir SPA	2,834	234.5 – 252.7	0.01	0.009	0.007
Noss SPA	545	239.5	0.01	0.001	0.001
Additional colonies and non-designated sites	12,907	41.67 – 284.71	3.05	0.371	0.293
Note, the residual weight assigned to non-SPA colonies are presented here as an overall total. Further breakdown of these sites is provided in Application Document 13, Appendix 13-1, Annex 1: Apportioning Results.					

3.1.9 Gannet

3.1.9.1 The weightings for apportioning breeding season gannet to designated sites within MMFR+1SD of the Caledonia OWF are given in Table 3-8. These weightings were used to apportion the potential number of gannet distributional response (Volume 7B, Appendix 6-2: Offshore Ornithology Distributional Responses Technical Report) and collision (Volume 7B, Appendix 6-3: Offshore Ornithology Collision Risk Modelling Technical Report) mortalities to each of the designated sites.

Table 3-8: Gannet breeding season (Mid-March to September) apportioning weightings to designated sites.

Site Name	SMP Database Counts (Individuals)	Distance to Caledonia OWF (km)	1/Proportion of Foraging Range at Sea	Resulting Weight	Proportional Weight
Sule Skerry and Sule Stack SPA	18,130	154.4-155.5	0.02	0.140	0.077
Fair Isle SPA	9,654	161.0	0.01	0.067	0.037
North Rona and Sula Sgeir SPA	28,495	252.7	0.31	0.083	0.045
Forth Islands SPA (Latest count SMP)	150,518	261.6	0.02	0.746	0.408
Forth Islands SPA (Updated count, Harris *et al.*, 2023[6]; Wanless *et al.*, 2023[7])	162,000	261.6	0.02	0.775	0.425
Noss SPA	24,670	239.5	0.01	0.076	0.042
Hermaness, Saxa Vord and Valla Field SPA	37,478	325.0	0.01	0.061	0.033
Additional colonies and non-designated sites	46,410	59.58 - 273.24	0.09	0.656	0.359
Note, the residual weight assigned to non-SPA colonies are presented here as an overall total. Further breakdown of these sites is provided in Application Document 13, Appendix 13-1, Annex 1: Apportioning Results. For the Forth Islands SPA, two assessments are presented for gannet. One using the latest SMP count and one using an updated Forth Islands SPA count. The Forth Islands SPA updated count takes into account the 2021 estimated Bass Rock drone count of 81,000 AOS (Harris *et al.*, 2023[6]; Wanless *et al.*, 2023[7]). Further information regarding this approach is outlined within the Caledonia North RIAA (Application Document 13). Note, the apportionment of all other sites has been based on the latest Forth Islands SPA SMP count.					

3.2 Non-breeding season

3.2.1 Overview

3.2.1.1 The apportioning weightings of predicted impacts from the Caledonia OWF for all designated site qualifying features screened in for assessment are provided within this section for the non-breeding season (Table 3-9 to Table 3-20).

3.2.2 Kittiwake

3.2.2.1 The non-breeding defined seasons for kittiwake were based on Furness (2015[10]), which were modified to align with the NatureScot (2020[9]) breeding season periods (Table 2-4).

3.2.2.2 The weightings for apportioning non-breeding season kittiwake to designated sites are provided in Table 3-9 for autumn migration (September to December), and for spring migration (January to Early-April) and were based on the UK North Sea BDMPS abundance data. These weightings were used to apportion the potential numbers of non-breeding kittiwake distributional response (Volume 7B, Appendix 6-2: Offshore Ornithology Distributional Responses Technical Report) and collision (Volume 7B, Appendix 6-3: Offshore Ornithology Collision Risk Modelling Technical Report) mortalities during the non-breeding season to each of the designated sites.

Table 3-9: Kittiwake apportionment of adult mortality within the UK North Sea BDMPS during the non-breeding season (Autumn migration: September to December; Spring migration: January to Early-April).

Site Name	UK North Sea Adults Associated with the SPA	Autumn Migration		Spring Migration	
		UK North Sea Total Birds	Proportional Weighting	UK North Sea Total Birds	Proportional Weighting
East Caithness Cliffs SPA	48,492	829,937	0.058	627,816	0.077
North Caithness Cliffs SPA	12,180	829,937	0.015	627,816	0.019
Troup, Pennan and Lion's Heads SPA	17,875	829,937	0.022	627,816	0.028
Copinsay SPA	799	829,937	0.001	627,816	0.001
Hoy SPA	476	829,937	0.001	627,816	0.001
Buchan Ness to Collieston Coast SPA	15,050	829,937	0.018	627,816	0.024
Rousay SPA	2,117	829,937	0.003	627,816	0.003
Marwick Head SPA	631	829,937	0.001	627,816	0.001
Calf of Eday SPA	896	829,937	0.001	627,816	0.001
West Westray SPA	14,466	829,937	0.017	627,816	0.023
Fowlsheugh SPA	11,204	829,937	0.013	627,816	0.018
Cape Wrath SPA	207	829,937	0.000	627,816	0.000
Fair Isle SPA	925	829,937	0.001	627,816	0.001
Sumburgh Head SPA	252	829,937	0.000	627,816	0.000
Foula SPA	392	829,937	0.000	627,816	0.001

Site Name	UK North Sea Adults Associated with the SPA	Autumn Migration		Spring Migration	
		UK North Sea Total Birds	Proportional Weighting	UK North Sea Total Birds	Proportional Weighting
North Rona and Sula Sgeir SPA	25	829,937	0.000	627,816	0.000
Forth Islands SPA	3,720	829,937	0.004	627,816	0.006
Noss SPA	608	829,937	0.001	627,816	0.001
St Abb's Head to Fast Castle SPA	4,084	829,937	0.005	627,816	0.007
Handa SPA	37	829,937	0.000	627,816	0.000
Shiant Isles SPA	11	829,937	0.000	627,816	0.000
Farne Islands SPA	4,132	829,937	0.005	627,816	0.007
Hermaness, Saxa Vord and Valla Field SPA	469	829,937	0.000	627,816	0.000

3.2.3 Great Black-Backed Gull

3.2.3.1 The non-breeding defined seasons for great black-backed gull were based on NatureScot (2020[9]) guidance (Table 2-4).

3.2.3.2 The weightings for apportioning non-breeding season great black-backed gull to designated sites are provided in Table 3-10 for non-breeding season (September to March) and were based on the UK North Sea BDMPS abundance data. These weightings were used to apportion the potential numbers of non-breeding great black-backed gull collision (Volume 7B, Appendix 6-3: Offshore Ornithology Collision Risk Modelling Technical Report) mortalities during the non-breeding season to each of the designated sites.

Table 3-10: Great black-backed gull apportionment of adult mortality within the UK North Sea BDMPS during the non-breeding season (September to March).

Site Name	UK North Sea Adults Associated with the SPA	Non-breeding Season	
		UK North Sea Total Birds	Proportional Weighting
Copinsay SPA	436	91,399	0.005
East Caithness Cliffs SPA	350	91,399	0.004
Hoy SPA	120	91,399	0.001

3.2.4 Herring Gull

3.2.4.1 The non-breeding defined seasons for herring gull were based on NatureScot (2020[9]) guidance (Table 2-4).

3.2.4.2 The weightings for apportioning non-breeding season herring gull to designated sites are provided in Table 3-11 for non-breeding season (September to March), and were based on the UK North Sea and Channel waters BDMPS abundance data. These weightings were used to apportion the potential numbers of non-breeding herring gull collision (Volume 7B, Appendix 6-3: Offshore Ornithology Collision Risk Modelling Technical Report) mortalities during the non-breeding season to each of the designated sites.

Table 3-11: Herring gull apportionment of adult mortality within a regional population during the non-breeding season (September to March).

Site Name	UK North Sea and Channel Waters Adults Associated with the SPA	Non-breeding Season	
		UK North Sea Total Birds	Proportional Weighting
East Caithness Cliffs SPA	6,718	466,511	0.014
Troup, Pennan and Lion's Heads SPA	3,162	466,511	0.007

3.2.5 Great Skua

3.2.5.1 The non-breeding defined seasons for great skua were based on Furness (2015[10]), which were modified to align with the NatureScot (2020[9]) breeding season periods (Table 2-4).

3.2.5.2 The weightings for apportioning non-breeding season great skua to designated sites are provided in Table 3-12 for autumn migration (Mid-September to October), Table 3-13 for winter (November to February) and Table 3-14 for spring migration (March to Mid-April), and were based on the UK North Sea and Channel waters BDMPS abundance data. These weightings were used to apportion the potential numbers of non-breeding great skua collision (Volume 7B, Appendix 6-3: Offshore Ornithology Collision Risk Modelling Technical Report) mortalities during the non-breeding season to each of the designated sites.

Table 3-12: Great skua apportionment of adult mortality within a regional population during the non-breeding season (Autumn migration: Mid-September to October).

Site Name	UK North Sea and Channel Waters Adults Associated with the SPA	Autumn Migration	
		UK North Sea Total Birds	Proportional Weighting
Hoy SPA	1,615	19,556	0.083
Fair Isle SPA	319	19,556	0.016
Foula SPA	1,988	19,556	0.102
Noss SPA	558	19,556	0.029
Ronas–Hill - North Roe and Tingon SPA	227	19,556	0.012
Fetlar SPA	468	19,556	0.025
Hermaness, Saxa Vord and Valla Field SPA	1,175	19,556	0.060
Handa SPA	0	19,556	0.000
St. Kilda SPA	0	19,556	0.000

Table 3-13: Great skua apportionment of adult mortality within a regional population during the non-breeding season (Winter: November to February).

Site Name	UK North Sea and Channel Waters Adults Associated with the SPA	Winter	
		UK North Sea Total Birds	Proportional Weighting
Hoy SPA	0	143	0.000
Fair Isle SPA	0	143	0.000
Foula SPA	0	143	0.000
Noss SPA	0	143	0.000
Ronas–Hill - North Roe and Tingon SPA	0	143	0.000
Fetlar SPA	0	143	0.000
Hermaness, Saxa Vord and Valla Field SPA	0	143	0.000
Handa SPA	0	143	0.000
St. Kilda SPA	0	143	0.000

Table 3-14: Great skua apportionment of adult mortality within a regional population during the non-breeding season (Spring migration: March to Mid-April).

Site Name	UK North Sea and Channel Waters Adults Associated with the SPA	Spring Migration	
		UK North Sea Total Birds	Proportional Weighting
Hoy SPA	808	8,485	0.095
Fair Isle SPA	160	8,485	0.019
Foula SPA	994	8,485	0.117
Noss SPA	279	8,485	0.033
Ronas–Hill - North Roe and Tingon SPA	113	8,485	0.013
Fetlar SPA	351	8,485	0.041
Hermaness, Saxa Vord and Valla Field SPA	587	8,485	0.069
Handa SPA	0	8,485	0.000
St. Kilda SPA	0	8,485	0.000

3.2.6 Guillemot

3.2.6.1 The non-breeding defined seasons for guillemot were based on NatureScot (2020[9]) guidance (Table 2-4).

3.2.6.2 The weightings for apportioning non-breeding season guillemot to designated sites are provided in Table 3-15 for non-breeding season (Mid-August to March) and were based on the UK North Sea and Channel waters BDMPS abundance data. These weightings were used to apportion the potential numbers of non-breeding guillemot distributional response (Volume 7B, Appendix 6-2: Offshore Ornithology Distributional Responses Technical Report) mortalities during the non-breeding season to each of the designated sites.

Table 3-15: Guillemot apportionment of adult mortality within a regional population during the non-breeding season (Mid-August to March).

Site Name	UK North Sea and Channel Waters Adults Associated with the SPA	Non-breeding Season	
		UK North Sea Total Birds	Proportional Weighting
East Caithness Cliffs SPA	149,100	1,617,306	0.092
North Caithness Cliffs SPA	65,800	1,617,306	0.041
Troup, Pennan and Lion's Heads SPA	15,313	1,617,306	0.009
Copinsay SPA	7,850	1,617,306	0.005
Hoy SPA	8,820	1,617,306	0.005
Rousay SPA	8,680	1,617,306	0.005
Marwick Head SPA	15,536	1,617,306	0.010
Calf of Eday SPA	8,820	1,617,306	0.005
West Westray SPA	47,460	1,617,306	0.029

3.2.7 Razorbill

3.2.7.1 The non-breeding defined seasons for razorbill were based on Furness (2015[10]), which were modified to align with the NatureScot (2020[9]) breeding season periods (Table 2-4).

3.2.7.2 The weightings for apportioning non-breeding season razorbill to designated sites are provided Table 3-16 autumn/spring migrations (Mid-August to October; January to March), and Table 3-17 for winter (November to December), and were based on the UK North Sea and Channel waters BDMPS abundance data. These weightings were used to apportion the potential numbers of non-breeding razorbill distributional response (Volume 7B, Appendix 6-2: Offshore Ornithology Distributional Responses Technical Report) mortalities during the non-breeding season to each of the designated sites.

Table 3-16: Razorbill apportionment of adult mortality within a regional population during the non-breeding season (Autumn/Spring migrations: Mid-August to October; January to March).

Site Name	UK North Sea and Channel Waters Adults Associated with the SPA	Autumn/Spring Migration	
		UK North Sea Total Birds	Proportional Weighting
East Caithness Cliffs SPA	25,000	591,874	0.042
Forth Islands SPA	5,250	591,874	0.009
Fowlsheugh SPA	7,048	591,874	0.012
North Caithness Cliffs SPA	3,230	591,874	0.005
Troup, Pennan and Lion's Heads SPA	3,486	591,874	0.006
West Westray SPA	1,045	591,874	0.002
Fair Isle SPA	1,738	591,874	0.003

Table 3-17: Razorbill apportionment of adult mortality within a regional population during the non-breeding season (Winter: November to December).

Site Name	UK North Sea and Channel Waters Adults Associated with the SPA	Winter	
		UK North Sea Total Birds	Proportional Weighting
East Caithness Cliffs SPA	7,500	218,622	0.034
Forth Islands SPA	1,575	218,622	0.009
Fowlsheugh SPA	2,114	218,622	0.012
North Caithness Cliffs SPA	1,020	218,622	0.005
Troup, Pennan and Lion's Heads SPA	1,046	218,622	0.005
West Westray SPA	330	218,622	0.002
Fair Isle SPA	549	218,622	0.003

3.2.8 Puffin

3.2.8.1 The non-breeding defined seasons for puffin were based on NatureScot (2020[9]) guidance (Table 2-4).

3.2.8.2 The weightings for apportioning non-breeding season puffin to designated sites are provided in Table 3-18 for non-breeding season (Mid-August to March) and were based on the UK North Sea and Channel waters BDMPS abundance data. These weightings were used to apportion the potential numbers of non-breeding puffin distributional response (Volume 7B, Appendix 6-2: Offshore Ornithology Distributional Responses Technical Report) mortalities during the non-breeding season to each of the designated sites.

Table 3-18: Puffin apportionment of adult mortality within a regional population during the non-breeding season (Mid-August to March).

Site Name	UK North Sea and Channel Waters Adults Associated with the SPA	Non-breeding Season	
		UK North Sea Total Birds	Proportional Weighting
North Caithness Cliffs SPA	293	231,957	0.001
Hoy SPA	1,050	231,957	0.005
Cape Wrath SPA	3	231,957	0.000
Sule Skerry and Sule Stack SPA	119	231,957	0.001
Fair Isle SPA	3,212	231,957	0.014
Foula SPA	6,750	231,957	0.029
North Rona and Sula Sgeir SPA	11	231,957	0.000
Noss SPA	241	231,957	0.001

3.2.9 Gannet

3.2.9.1 The non-breeding defined seasons for gannet were based on Furness (2015[10]), which were modified to align with the NatureScot (2020[9]) breeding season periods (Table 2-4).

3.2.9.2 The weightings for apportioning non-breeding season gannet to designated sites are provided Table 3-19 autumn migration (October to November) and Table 3-20 for spring migration (December to Early-March), and were based on the UK North Sea and Channel waters BDMPS abundance data. These weightings were used to apportion the potential numbers of non-breeding gannet distributional response (Volume 7B, Appendix 6-2: Offshore Ornithology Distributional Responses Technical Report) and collision (Volume 7B, Appendix 6-3: Offshore Ornithology Collision Risk Modelling Technical Report) mortalities during the non-breeding season to each of the designated sites.

Table 3-19. Gannet apportionment of adult mortality within a regional population during the non-breeding season (Autumn migration: October to November).

Site Name	UK North Sea and Channel Waters Adults Associated with the SPA	Autumn Migration	
		UK North Sea Total Birds	Proportional Weighting
Sule Skerry and Sule Stack SPA	935	456,298	0.002
Fair Isle SPA	6,278	456,298	0.014
North Rona and Sula Sgeir SPA	1,845	456,298	0.004
Forth Islands SPA	110,964	456,298	0.243
Noss SPA	15,627	456,298	0.034
Hermaness, Saxa Vord and Valla Field SPA	38,965	456,298	0.085
Flamborough and Filey Coast SPA	22,122	456,298	0.048

Table 3-20: Gannet apportionment of adult mortality within a regional population during the non-breeding season (Spring migration: December to Early-March).

Site Name	UK North Sea and Channel Waters Adults Associated with the SPA	Spring Migration	
		UK North Sea Total Birds	Proportional Weighting
Sule Skerry and Sule Stack SPA	0	248,385	0.000
Fair Isle SPA	5,494	248,385	0.022
North Rona and Sula Sgeir SPA	0	248,385	0.000
Forth Islands SPA	77,675	248,385	0.313
Noss SPA	13,674	248,385	0.055
Hermaness, Saxa Vord and Valla Field SPA	34,094	248,385	0.137
Flamborough and Filey Coast SPA	15,485	248,385	0.062

4 Conclusion

4.1.1.1 This appendix provides details regarding the approach by which potential collision and distributional response mortalities were apportioned to designated and non-designated colonies to inform the RIAA (Application Document 13) for the Proposed Development (Offshore), specifically Caledonia North.

4.1.1.2 Apportioning has been undertaken using NatureScot (2018[2]) guidance for the following species:

- Kittiwake;
- Herring gull;
- Great skua;
- Guillemot;
- Razorbill;
- Puffin; and
- Gannet.

4.1.1.3 The weightings which have been used to apportion predicted impacts from the Caledonia OWF for all qualifying features screened in for assessment are provided within this Section 3.1 for the breeding season (Table 3-1 to Table 3-8) and Section 3.2 for the non-breeding season (Table 3-9 to Table 3-20). Full lists of colonies and non-designated sites (during the breeding season) are provided in Application Document 13, Appendix 13-1, Annex 1: Apportioning Results.

5 References

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