Partners in UK offshore wind

MORGAN OFFSHORE WIND PROJECT GENERATION ASSETS

Preliminary Environmental Information Report

Volume 4, annex 10.5: Offshore ornithology apportioning assessment

Image of an offshore wind farm

April 2023
FINAL

Partners in UK offshore wind

Document status

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Glossary

Term	Meaning
Apparently Occupied Nests	A census method in the Seabird Monitoring Programme, where the colony count is expressed with nests as the unit. To get to individual birds, this number must be multiplied by two.
Apportioning	A method that assigns unknown entities to known entities based on weighing factors. In this report, it refers to birds of unknown origin within the study area that are assigned to colonies based on distance to colony and colony size.
Biologically Defined Minimum Population Scale	Minimum regional population size of a particular bird species at a certain time of year, defined for a range of species in Furness (2015).
Mean High Water Springs	Average height throughout the year of two successive high waters, during a 24-hour period in each month when the range of the tide is at its greatest.
Ornithology	Ornithology is a branch of zoology that concerns the study of birds.
Seabird Monitoring Programme	The SMP is an ongoing annual monitoring programme, established in 1986, of 25 species of seabird that breed regularly in Britain and Ireland.
Special Protection Area	A designation under the European Union Directive on the Conservation of Wild Birds, under which countries have a duty to safeguard the habitats of migratory birds and certain particularly threatened birds.

Acronyms

Term	Meaning
AON	Apparently Occupied Nests (bird census)
BDMPS	Biologically Defined Minimum Population Scale
IND	Number of individuals (bird census)
MHWS	Mean High Water Springs
SMP	Seabird Monitoring Programme
NS	NatureScot
SPA	Special Protection Area

Units

Unit	Description
km	Kilometres
m	Metres
nm	Nautical miles

1 OFFSHORE ORNITHOLOGY APPORTIONING TECHNICAL REPORT

1.1 Introduction

1.1.1 Background

1.1.1.1 When assessing the impact of a proposed offshore wind farm, it is crucial to determine the impact that such development will have on breeding seabird populations. Seabirds nest in colonies of variable sizes around the UK coastline (Mitchell *et al*., 2004) and most species have large foraging ranges at sea (Woodward *et al.,* 2019). Establishing the connectivity between marine renewable sites and colonies, which are often protected as Special Protected Areas (SPAs), is a key element of the assessment of impact. A theoretical approach has been developed by NatureScot (NS, 2018) to determine the proportion of birds from SPA sites which use proposed development areas. The tools allow the user to 'apportion' the impact of a marine renewable site to multiple SPAs.

1.1.1.2 This technical report presents the apportioning method and apportions the potential impacts of the Morgan Offshore Wind Project Generation Assets (hereafter referred to as the Morgan Generation Assets) on SPAs that support qualifying species deemed to be adversely impacted by the Morgan Generation Assets. It utilizes outcomes from other reports, including in volume 4, annex 10.2: Offshore ornithology displacement technical report and volume 4, annex 10.3: Offshore ornithology non-migratory seabird collision risk assessment of the Preliminary Environmental Information Report (PEIR). Apportioning has been done for: common guillemot *Uria aalge*, razorbill *Alca torda*, northern gannet *Morrus bassanus*, black-legged kittiwake *Rissa tridactyla*, herring gull *Larus argentatus*, lesser black-backed gull *Larus fuscus* and great black-backed gull *Larus marinus*. Justification for the inclusion and exclusion of species is provided in section 1.2.2.

1.1.1.3 For this report, 12 months of digital aerial survey data were available to assess mortality from displacement and collision risk. For the Environmental Statement 24 months of digital aerial survey data will be included in the assessment.

1.1.2 Aim of report

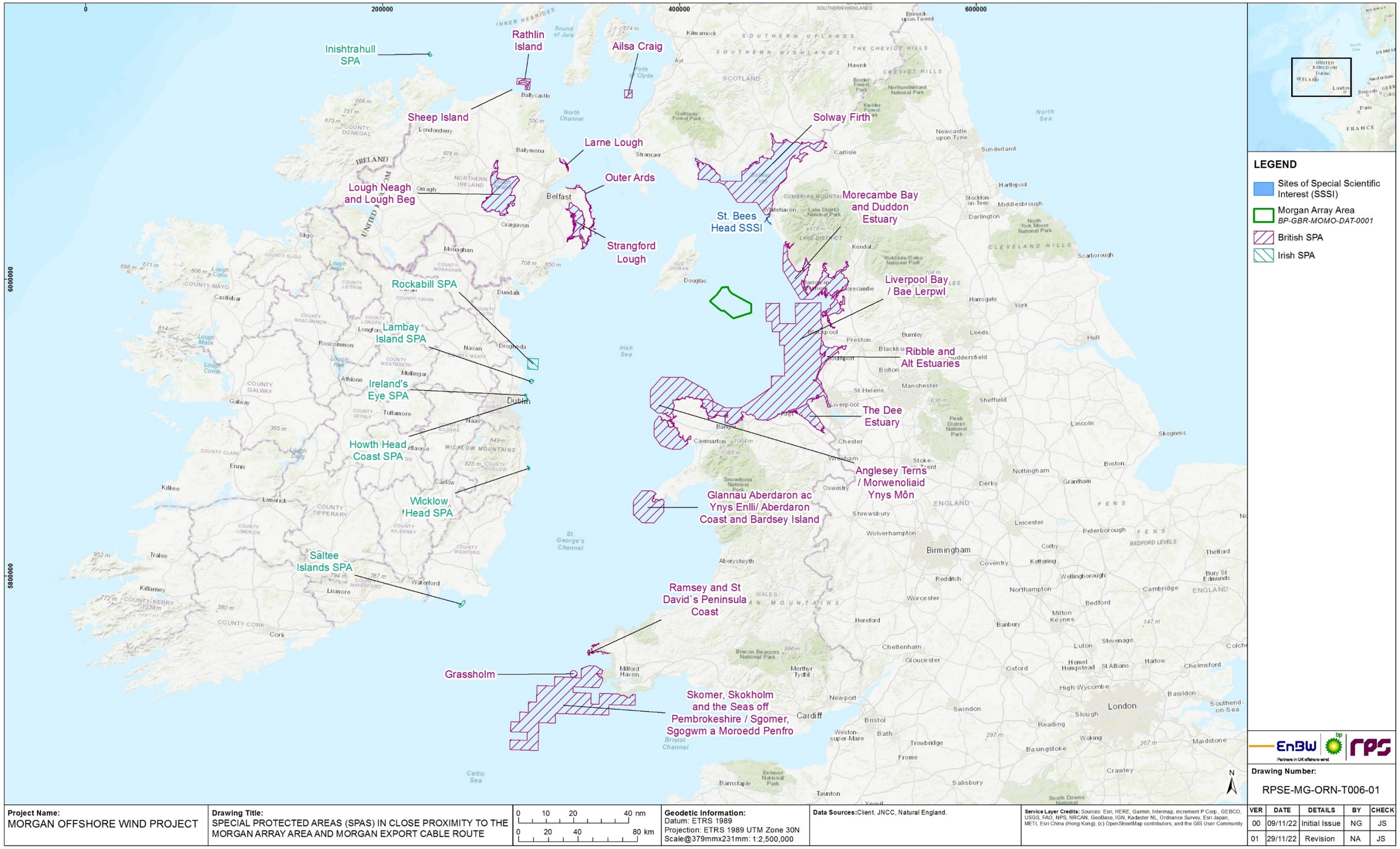
1.1.2.1 The primary purpose of this technical report is to apportion predicted mortalities from collisions and displacement due to the Morgan Generation Assets to seabird colonies designated as SPAs (i.e. qualifying as an individual species and/or assemblage of species).

1.1.2.2 Collision risk is an impact associated with the operation of wind turbines and their associated offshore structures. For this report, the impacts of collision risk were therefore assessed for the Morgan Array Area only. With regards to displacement, the report incorporated the Morgan Array Area plus 2km.

1.1.3 Study area

1.1.3.1 The Morgan Array Area is located in the east Irish Sea, approximately 22.3km (12nm) from the Isle of Man and 36.2km (19.5nm) from the northwest coast of England (when measured from Mean High Water Springs (MHWS). The Morgan Array Area is 322.25km^2 in size.

1.1.3.2 The study area for the Morgan Generation Assets apportioning assessment encompasses all SPA and non-SPA colonies within foraging range of the Morgan Array Area (Figure 1.1). Details on how mortalities from collision risk and displacement are apportioned to the SPA colonies are outlined below.



Project Name: MORGAN OFFSHORE WIND PROJECT	**Drawing Title:** SPECIAL PROTECTED AREAS (SPAS) IN CLOSE PROXIMITY TO THE MORGAN ARRAY AREA AND MORGAN EXPORT CABLE ROUTE	0 10 20 40 nm 0 20 40 80 km	**Geodetic Information:** Datum: ETRS 1989 Projection: ETRS 1989 UTM Zone 30N Scale@379mmx231mm: 1:2,500,000	**Data Sources:** Client. JNCC, Natural England.	**Service Layer Credits:** Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community	**Drawing Number:** RPSE-MG-ORN-T006-01			

VER	DATE	DETAILS	BY	CHECK
00	09/11/22	Initial Issue	NG	JS
01	29/11/22	Revision	NA	JS

Figure 1.1: SPAs included in the apportioning assessment in relation to the Morgan Generation Assets.

1.2 Methodology

1.2.1.1 Apportioning undertaken for the Morgan Generation Assets is based on the NatureScot 'theoretical approach' method for the breeding season (NS, 2018). Apportioning during the non-breeding season utilises the Biologically Defined Minimum Population Scales (BDMPS) approach developed by Furness (2015).

1.2.1.2 For apportioning impacts that may occur in the breeding season to seabird species from SPAs within foraging range of the Morgan Generation Assets, a two-step approach outlined in the NatureScot method is as follows:

1. To apportion impacts between SPA and non-SPA breeding colonies within foraging range of the wind farm. This is done using the most recent counts available for each colony
2. The impacts assigned to the SPA component are further apportioned between the individual SPAs within foraging range. This is done by using the Seabird 2000 counts as a reference point.

1.2.1.3 In this report, the choice was made to base the apportioning on the most recent counts, given that many colony counts have been updated since the NatureScot method was published. Colony counts were extracted from the Seabird Monitoring Programme (SMP) online database (https://app.bto.org/seabirds/public/index.jsp).

1.2.2 Screening species for assessment

1.2.2.1 Species were first screened to check whether any impacts were expected based on the collision risk and displacement analyses. The modelled expected mortality of collision risk and displacement are summarised in Table 1.1. These estimates were directly derived from volume 4, annex 10.2: Offshore ornithology displacement technical report and volume 4, annex 10.3: Offshore ornithology non-migratory seabird collision risk assessment of the PEIR.

1.2.2.2 Three species were not assessed based on this initial screening. Atlantic puffin *Fratercula arctica* was screened out due to the species occurrence in low numbers in the Morgan Array Area plus 2km. The highest increase in baseline mortality observed in the displacement report was therefore negligible, ranging from 0.000% to 0.004% (collision risk is not assessed for Atlantic puffin due to its low flight height). Northern fulmar *Fulmarus glacialis* was screened out, because its expected annual collision risk was 0.35 birds (northern fulmar is not considered sensitive to displacement), which is negligible. Last, Manx shearwater *Puffinus puffinus* was screened out, because its expected annual collision risk was zero birds. Moreover, Manx shearwater is considered to have a low sensitivity to displacement, with an expected increase in baseline mortality ranging from a negligible 0.001% to 0.015%. As a precautionary step, the species mentioned in the introduction were screened in, even when the impacts were low.

1.2.3 Seasonality and regional populations

1.2.3.1 Bio-seasons used within the assessment were defined according to the breeding, non-breeding and migratory periods (autumn and spring migration) based on Furness (2015) (Table 1.2). Colour-coding has been used to define the four main bio-seasons presented in Table 1.2.

Table 1.1 Modelled expected mortality estimates across species and seasons from collision risk and displacement.

Species	Season	Mortality collisions	Mortality displacement	Mortality combined
Guillemot	Breeding	-	15 to 343	15 to 343
	Non-breeding	-	12 to 287	12 to 287
Razorbill	Pre-breeding	-	0 to 7	0 to 7
	Breeding	-	0 to 5	0 to 5
	Post-breeding	-	0 to 4	0 to 4
	Non-breeding	-	0 to 9	0 to 9
Gannet	Pre-breeding	0 to 1	0 to 4	0 to 5
	Breeding	0 to 4	1 to 15	1 to 19
	Post-breeding	0 to 1	1 to 15	1 to 16
Kittiwake	Pre-breeding	8 to 20	2 to 45	10 to 65
	Breeding	3 to 9	1 to 32	4 to 41
	Post-breeding	13 to 33	5 to 113	18 to 146
Herring gull	Breeding	1 to 7	-	1 to 7
	Non-breeding	4 to 19	-	4 to 19
Lesser black-backed gull	Pre-breeding	0 to 0	-	0 to 0
	Breeding	0 to 0	-	0 to 0
	Post-breeding	0 to 2	-	0 to 2
	Non-breeding	0 to 1	-	0 to 1
Great black-backed gull	Breeding	1 to 6	-	1 to 6
	Non-breeding	0 to 1	-	0 to 1

Table 1.2: Seasonal definitions as the basis for assessment, from Furness (2015).

Species	Pre-Breeding Season/spring migration	Breeding season	Post Breeding Season/autumn migration	Non-breeding/winter season
Common guillemot	n/a	March to July	n/a	August to February
Razorbill	January to March	April to July	August to October	November to December
Northern gannet	December to March	March to September	September to November	n/a
Black-legged kittiwake	January to April	April to August	August to December	n/a

Species	Pre-Breeding Season/spring migration	Breeding season	Post Breeding Season/autumn migration	Non-breeding/winter season
Herring gull	n/a	March to August	n/a	September to February
Lesser black-backed gull	March to April	April to August	August to October	November to February
Great black-backed gull	n/a	Late March to August	n/a	September to March

1.2.4 Age composition

1.2.4.1 Specific additional mortalities for a set of impact scenarios representing bird deaths due to wind turbine collisions and habitat displacement effects, or their combined effect, were provided for two population groups based on age-class breeding ability: adults (i.e. breeding age-classes) and sub-adults (i.e. immature age-classes). Demographic rates from Horswill and Robinson (2015) were used to calculate the expected stable proportions in each age class for each species during the breeding season.

1.2.4.2 Non-breeding age class proportions were taken from Furness (2015).

Table 1.3: Age class percentages used in apportioning impacts. For breeding, the percentages of adults plus immatures add up to 100%. The sabbatical percentage is used as a modifier for the adult population.

Species	Season	Adult %	Immatures %	Sabbaticals %
Common guillemot	Breeding	55.7%	44.3%	7%
	Non-breeding	57%	43%	-
Razorbill	Breeding	61.0%	39.0%	7%
	Non-breeding	57%	43%	-
Northern gannet	Breeding	54.9%	45.1%	10%
	Non-breeding	59%	41%	-
Black-legged kittiwake	Breeding	49.6%	50.4%	10%
	Non-breeding	53%	47%	-
Herring gull	Breeding	38.4%	61.6%	35%
	Non-breeding	48%	52%	-
Lesser black-backed gull	Breeding	50.9%	49.1%	35%
	Non-breeding	60%	40%	-
Great black-backed gull	Breeding	38.1%	61.9%	10%
	Non-breeding	44%	56%	-

1.2.5 Species and age specific annual mortality

1.2.5.1 To express impacts from collisions and displacement, the impacts need to be compared to baseline mortalities of those specific species. The annual survival estimates of adults and immatures have been taken from Horswill and Robinson (2015), which provides age specific mortality estimates. To get an overall immature survival estimate, age specific mortalities were fed into a simple population model to derive relative proportions of each age class, which leads to the mortality proportions presented in Table 1.4.

Table 1.4: Species and age specific survival and mortality estimates, from Horswill and Robinson (2015).

Species	Adult survival	Adult mortality	Immature survival	Immature mortality
Common guillemot	0.939	0.061	0.763	0.237
Razorbill	0.895	0.105	0.718	0.282
Northern gannet	0.919	0.081	0.684	0.316
Black-legged kittiwake	0.854	0.146	0.832	0.168
Herring gull	0.834	0.166	0.824	0.176
Lesser black-backed gull	0.885	0.115	0.867	0.133
Great black-backed gull	0.930	0.070	0.888	0.112

1.2.6 Apportioning of impacts during the breeding period

1.2.6.1 Following NatureScot guidance (NS, 2018), impacts were apportioned between SPA and non-SPA breeding colonies within each species' mean-maximum (Woodward *et al*., 2019) foraging range and the development site using the 'theoretical approach'. The method makes use of the following parameters:

- Colony size (all colony sizes must be expressed as the same unit (e.g. individuals))
- Distance of colony from development site (using geometric centres for both)
- Sea area (the extent of open sea within Woodward *et al*. (2019) foraging range).

1.2.6.2 This was first done using the Seabird 2000 colony counts (Mitchell *et al*., 2004) which follows the Seagreen Alpha and Bravo ((hereafter known as Seagreen) method (Seagreen, 2018), providing a common reference point as many non-SPA breeding colonies have not been counted since.

1.2.6.3 Using the centroid for the Morgan Array Area, a buffer zone was created which equated to the species' mean-maximum foraging range plus one standard deviation. The distance between the Morgan Array Area centroid and each SPA and non-SPA colony within each species' foraging range at sea was then calculated. Using the most recent colony counts from the SMP online database, impacts assigned to the SPA

component was further apportioned to obtain each SPAs updated weighting estimate. The calculation to calculate apportion weights was:

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

1.2.6.4 Once the colony weights were calculated, the expected mortality from collisions and displacement were apportioned to the different colonies. The number of adults and immatures per colony was then calculated using published ratios in Furness (2015). For each of these age groups, the baseline mortality was then calculated by multiplying the mortality estimates per species and age group (Table 1.4) by the colony size of that age group.

1.2.6.5 The baseline mortality numbers are presented in each species-specific section.

Sabbaticals

1.2.6.6 Every breeding season, a proportion of adult birds will be taking a sabbatical from breeding. Therefore, these birds need to be removed from assessment as overestimation of potential effects to SPA populations would occur if sabbatical impacts were not removed. The proportion of adults taking sabbatical from breeding each year for each species are also presented within Table 1.3 (sabbatical rates taken from Seagreen, 2018). These sabbatical percentages are applied to impacts assigned to adult birds only after age-class apportioning among juveniles and adults.

1.2.7 Apportioning of impacts during the non-breeding period

1.2.7.1 To apportion non-breeding season effects from the proposed development sites between relevant SPAs, the contribution of adult and immature birds from an individual SPA as a proportion of the BDMPS defined in Furness (2015) was utilised.

1.2.7.2 Modelled estimates of the numbers of immatures per breeding individual, BDMPS population size and proportion of adults and immatures were used to calculate the contribution of individuals from SPAs in the UK Western waters to the estimated nonbreeding BDMPS population.

1.3 Results

1.3.1.1 Based upon calculations undertaken by the approach described above, the apportionment estimates for each of the key seabird species at each of the SPAs with connectivity to the Morgan Array Area plus 2km buffer are presented below. Ranges presented can be large due to the matrix approach used for displacement, the upper range of which can be considered a maximum design scenario. Generally, it is observed that colonies may have a high weighing factor, but that the impact is small. This has to do with colony size, as distance to colony will already have been accounted for in calculating the weighing factor. The highest impact is generally observed on small colonies (because any additional mortality will have a higher proportional impact on small colonies than on large colonies) that are close to the Morgan Generation Assets.

1.3.2 Common guillemot

SPA weighted proportions

1.3.2.1 SPA colonies included based on foraging distance, distance to the Morgan Array Area centroid, and the resulting SPA weighted proportions of this species are given in Table 1.5 and Table 1.6, with the highest weighing factor assigned to St Bee's Head.

Table 1.5: Breeding common guillemot colony weighing factors used for apportioning SPA impacts of displacement (IND = individuals).

1 Colonies that make up the non-SPA total are presented in table A.1 of Appendix A.

SPA name	Bird count (adjusted for IND)	Distance to Morgan Array Area (km)	SPA weight (based on distance^2)	Proportional SPA weight
St Bee's Head	23,451	54.5	0.65	0.40
Porth Llanlleiana to Porth Eilian	7,437	72.6	0.08	0.05
Great Orme and Little Orme	4,531	81.8	0.04	0.03
Puffin Island	5,119	81.8	0.05	0.03
Balcary Point	856	88.0	0.01	0.01
South Stack	10,605	91.8	0.07	0.04
Lambay Island	80,377	140.5	0.29	0.18
Mynydd Cilan, Trwyn y Wylfa ac Ynysoedd Sant Tudwal	4,657	140.7	0.01	0.01
Ireland's Eye	5,909	148.8	0.02	0.01
Howth village	1,167	149.9	0.00	0.00
Aberdaron Coast and Bardsey Island SPA	3,787	152.6	0.01	0.01
Non-SPA Total[1]	34,327	98.6	0.40	0.24

Table 1.6: Non-breeding common guillemot colony weighing factors used for apportioning SPA impacts of displacement (UK Western region).

Age	Season	Colony	Total number of SPA birds	Proportion SPA birds in area	SPA birds in region	Total birds BDMPS	Proportion SPA/BDMPS
Adult	Non-breeding	UK Western non-designated SPA colonies	147,896	0.95	140,501	656,156	0.2141
Immature	Non-breeding	UK Western non-designated SPA colonies	130,148	0.9	117,133	483,064	0.2425

Apportioned breeding impacts

1.3.2.2 Apportioned mortality for adult common guillemot during the breeding season is presented in Table 1.7, and ranged from 0.020% to 4.929%. The highest SPA increases in baseline mortality were found to be on: St Bee's Head, Balcary Point, Great Orme and Little Orme, Porth Llanlleiana to Porth Eilian, and Puffin Island.

Table 1.7: Breeding common guillemot apportioned SPA mortality due to displacement (Sa = sabbatical, Ad = adult, Im = immature).

SPA	Mortality from displacement			Baseline mortality	Increase in baseline mortality %		
	Sa	Ad	Im	Ad	Im	Ad	Im
Aberdaron Coast and Bardsey Island SPA	0.0 to 0.1	0.0 to 1.0	0.0 to 0.9	231	714	0.020% to 0.450%	0.005 % to 0.124 %
Balcary Point	0.0 to 0.1	0.0 to 1.0	0.0 to 0.9	52	161	0.083% to 1.907%	0.023 % to 0.528 %
Great Orme and Little Orme	0.0 to 0.4	0.2 to 4.9	0.2 to 4.2	276	854	0.077% to 1.771%	0.021 % to 0.490 %
Howth village	0.0 to 0.0	0.0 to 0.4	0.0 to 0.3	71	220	0.025% to 0.565%	0.007 % to 0.156 %
Ireland's Eye	0.0 to 0.2	0.1 to 2.1	0.1 to 1.8	360	1,114	0.025% to 0.579%	0.007 % to 0.160 %
Lambay Island	0.1 to 2.4	1.4 to 31.7	1.2 to 27.1	4,903	15,155	0.028% to 0.647%	0.008 % to 0.179 %
Mynydd Cilan, Trwyn y Wylfa ac Ynysoedd Sant Tudwal	0.0 to 0.1	0.1 to 1.6	0.1 to 1.3	284	878	0.024% to 0.546%	0.007 % to 0.151 %
Porth Llanlleiana to Porth Eilian	0.0 to 0.6	0.4 to 8.6	0.3 to 7.3	454	1,402	0.083% to 1.887%	0.023 % to 0.522 %
Puffin Island	0.0 to 0.4	0.2 to 5.1	0.2 to 4.4	312	965	0.072% to 1.643%	0.020 % to 0.455 %
South Stack	0.0 to 0.6	0.3 to 7.5	0.3 to 6.4	647	2,000	0.051% to 1.164%	0.014 % to 0.322 %
St Bee's Head	0.2 to 5.3	3.1 to 70.5	2.6 to 60.3	1,431	4,422	0.216% to 4.929%	0.060 % to 1.364 %
Non-SPA Total	0.1 to 3.3	1.9 to 43.2	1.6 to 37.0	2,094	6,472	0.090% to 2.065%	0.025 % to 0.571 %

Apportioned non-breeding impacts

1.3.2.3 Apportioned mortality for common guillemot during the non-breeding season is presented in Table 1.7, and ranges from 0.005% to 0.388%. Increases in baseline mortality during the non-breeding season are minimal.

Table 1.8: Non-breeding common guillemot apportioned expected SPA mortality due to displacement (based on Furness *et al*. 2015).

Age	Season	Colony	BDMPS	Baseline Mortality	Mortality increase	
					Number	Percentage
Adult	Non-breeding	UK Western non-designated SPA colonies	656,156	9,022	1.5 to 35.0	0.016% to 0.388%
Immature	Non-breeding	UK Western non-designated SPA colonies	483,064	30,855	1.3 to 29.9	0.004% to 0.097%

1.3.3 Razorbill

SPA weighted proportions

1.3.3.1 SPA colonies included based on foraging distance, distance to the Morgan Array Area centroid, and the resulting SPA weighted proportions of this species are given in Table 1.9 and Table 1.10, with the highest weighing factor assigned to Lambay Island SPA.

Table 1.9: Razorbill colony weighing factors used for apportioning SPA impacts of displacement (IND = individuals).

1 Colonies that make up the non-SPA total are presented in table A.2 of Appendix A.

SPA name	Bird count (adjusted for IND)	Distance to Morgan Array Area (km)	SPA weight (based on distance^{2})	Proportional SPA weight
St Bee's Head and Town	126	59.5	0.02	0.02
Porth Llanlleiana to Porth Eilian	612	72.6	0.05	0.05
Rigg Bay + Cruggleton	0	80.8	0.00	0.00
Great Orme and Little Orme	397	81.8	0.03	0.03
Point Lynas to Trwyn Du	19	81.8	0.00	0.00
Puffin Island	913	81.8	0.06	0.07
South Stack	1,847	91.8	0.10	0.10
Lambay Island	9,853	140.5	0.25	0.26
Lleyn Peninsula	437	141.3	0.01	0.01
Ireland's Eye	2,144	148.8	0.05	0.05
Howth Village	374	149.9	0.01	0.01
Aberdaron Coast and Bardsey Island SPA	5,138	152.6	0.09	0.10
Non-SPA Total[1]	2,115	95.8	0.29	0.30

Table 1.10: Non-breeding razorbill colony weighing factors used for apportioning SPA impacts of displacement (UK Western region).

Age	Season	Colony	Total number of SPA birds	Proportion SPA birds in area	SPA birds in region	Total birds BDMPS	Proportion SPA/BDMPS
Adult	Pre- and post-breeding	Ireland	12,371	0.10	1,237	316,928	0.0039
		UK western non-designated SPA colonies	9,487	0.98	9,297	316,928	0.0293
	Non-breeding	Ireland	12,371	0.10	1,237	179,183	0.0069
		UK western non-designated SPA colonies	9,487	0.30	2,846	179,183	0.0159
Immature	Pre- and post-breeding	Ireland	9,278	0.10	928	289,986	0.0032
		UK western non-designated SPA colonies	7,115	0.90	6,404	289,986	0.0221
	Non-breeding	Ireland	9,278	0.10	928	289,986	0.0032
		UK western non-designated SPA colonies	7,115	0.10	712	289,986	0.0025

Apportioned breeding impacts

1.3.3.2 Apportioned mortality for razorbill during the breeding season is presented in Table 1.11, and ranged from 0.000% to 0.450%. The highest increase in baseline mortality was found to be on St Bee's Head, which is close to the Morgan Array Area. In contrast, despite Lambay Island having a high weighing factor (Table 1.9), increases in baseline mortality were limited due to it having a large colony.

Table 1.11: Breeding razorbill apportioned expected SPA mortality due to displacement (Sa = sabbatical, Ad = adult, Im = immature).

SPA	Mortality from displacement			Baseline mortality		Increase in baseline mortality %	
	Sa	Ad	Im	Ad	Im	Ad	Im
Aberdaron Coast and Bardsey Island SPA	0.0 to 0.0	0.0 to 0.3	0.0 to 0.2	539	926	0.004% to 0.051%	0.002% to 0.021%
Great Orme and Little Orme	0.0 to 0.0	0.0 to 0.1	0.0 to 0.1	44	75	0.016% to 0.197%	0.006% to 0.079%
Howth Village	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	41	70	0.005% to 0.060%	0.002% to 0.024%
Ireland's Eye	0.0 to 0.0	0.0 to 0.1	0.0 to 0.1	235	404	0.005% to 0.062%	0.002% to 0.025%
Lambay Island	0.0 to 0.1	0.1 to 0.7	0.0 to 0.5	1,081	1,855	0.006% to 0.069%	0.002% to 0.028%
Lleyn Peninsula	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	48	82	0.005% to 0.059%	0.002% to 0.024%
Point Lynas to Trwyn Du	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	2	4	0.015% to 0.185%	0.006% to 0.074%
Porth Llanlleiana to Porth Eilian	0.0 to 0.0	0.0 to 0.2	0.0 to 0.1	67	115	0.018% to 0.227%	0.007% to 0.091%

SPA	Mortality from displacement Sa	Ad	Im	Baseline mortality Ad	Im	Increase in baseline mortality % Ad	Im
Puffin Island	0.0 to 0.0	0.0 to 0.2	0.0 to 0.1	100	172	0.015% to 0.188%	0.006% to 0.075%
Rigg Bay + Cruggleton	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	0	0	0.000% to 0.000%	0.000% to 0.000%
South Stack	0.0 to 0.0	0.0 to 0.3	0.0 to 0.2	203	348	0.011% to 0.139%	0.004% to 0.056%
St Bee's Head and Town	0.0 to 0.0	0.0 to 0.1	0.0 to 0.0	14	24	0.036% to 0.450%	0.014% to 0.180%
Non-SPA Total	0.0 to 0.1	0.1 to 0.8	0.0 to 0.6	222	381	0.030% to 0.380%	0.012% to 0.152%

Apportioned non-breeding impacts

1.3.3.3 Apportioned mortality for razorbill during the non-breeding season is presented in Table 1.12, and ranges from 0.000% to 0.018%. Increases in baseline mortality during the non-breeding season were minimal.

Table 1.12: Non-breeding razorbill apportioned expected SPA mortality due to collisions and displacement (based on Furness *et al*. 2015).

Age	Season	Colony	BDMPS	Baseline Mortality	Mortality increase Number	Percentage
Adult	Pre- and post-breeding	Ireland	316,928	1,299	0.0 to 0.0	0.000% to 0.002%
		UK western non-designated SPA colonies	316,928	996	0.0 to 0.2	0.000% to 0.018%
	Non-breeding	Ireland	179,183	1,299	0.0 to 0.0	0.000% to 0.003%
		UK western non-designated SPA colonies	179,183	996	0.0 to 0.1	0.000% to 0.008%
Immature	Pre- and post-breeding	Ireland	289,986	2,616	0.0 to 0.0	0.000% to 0.001%
		UK western non-designated SPA colonies	289,986	2,006	0.0 to 0.1	0.000% to 0.005%
	Non-breeding	Ireland	162,239	2,616	0.0 to 0.0	0.000% to 0.001%
		UK western non-designated SPA colonies	162,239	2,006	0.0 to 0.0	0.000% to 0.001%

1.3.4 Northern gannet

SPA weighted proportions

1.3.4.1 SPA colonies included based on foraging distance, distance to the Morgan Array Area centroid, and the resulting SPA weighted proportions of this species are given in Table 1.13 and Table 1.14, with the highest weighing factor assigned to Ailsa Craig, followed by Grassholm.

Table 1.13: Northern gannet colony weighing factors used for apportioning SPA impacts of collision risk and displacement (AON = Apparently Occupied Nests).

1 Colonies that make up the non-SPA total are presented in table A.3 of Appendix A.

SPA name	Bird count (adjusted for AON)	Distance to Morgan Array Area (km)	SPA weight (based on distance^2)	Proportional SPA weight
Ireland's Eye	700	148.8	0.01	0.01
Ailsa Craig	66,452	149.2	0.75	0.59
Great Saltee	9,444	273.7	0.03	0.02
Grassholm	72,022	274.7	0.26	0.21
Non-SPA Total[1]	4,752	79.1	0.21	0.17

Table 1.14: Non-breeding northern gannet colony weighing factors used for apportioning SPA impacts of collision risk and displacement (UK Western region)

Age	Season	Colony	Total number of SPA birds	Proportion SPA birds in area	SPA birds in region	Total birds BDMPS	Proportion SPA/BDMPS
Adult	Post-breeding	Ailsa Craig	66,452	1.00	66,452	318,001	0.2090
		Ireland	10,144	0.20	2,029	318,001	0.0064
		Grassholm	72,022	1.00	72,022	318,001	0.2265
	Pre-breeding	Ailsa Craig	66,452	1.00	66,452	391,540	0.1697
		Ireland	10,144	0.30	3,043	391,540	0.0078
		Grassholm	72,022	1.00	72,022	391,540	0.1839

Age	Season	Colony	Total number of SPA birds	Proportion SPA birds in area	SPA birds in region	Total birds BDMPS	Proportion SPA/BDMPS
Immature	Post-breeding	Ailsa Craig	53,826	0.80	43,061	227,953	0.1889
		Ireland	8,217	0.30	2,465	227,953	0.0108
		Grassholm	58,338	0.80	46,670	227,953	0.2047
	Pre-breeding	Ailsa Craig	53,826	0.80	43,061	270,348	0.1593
		Ireland	8,217	0.30	2,465	270,348	0.0091
		Grassholm	58,338	0.80	46,670	270,348	0.1726

Apportioned breeding impacts

1.3.4.2 Apportioned mortality for northern gannet during the breeding season is presented in Table 1.15, and ranges from 0.002% to 0.406%. The highest increase in baseline mortality in a single location was found to be on Ireland's Eye, despite it having a low weighing factor. This is due to it only having a small colony (Table 1.13).

Table 1.15: Breeding northern gannet apportioned expected SPA mortality due to collision risk and displacement (Sa = sabbatical, Ad = adult, Im = immature.)

SPA	Mortality from collisions and displacement			Baseline mortality		Increase in baseline mortality %	
	Sa	Ad	Im	Ad	Im	Ad	Im
Ailsa Craig	0.1 to 1.1	0.4 to 5.6	0.4 to 5.1	5,383	17,252	0.008% to 0.104%	0.002% to 0.030%
Grassholm	0.0 to 0.4	0.1 to 2.0	0.1 to 1.8	5,834	18,698	0.002% to 0.034%	0.001% to 0.010%
Great Saltee	0.0 to 0.0	0.0 to 0.2	0.0 to 0.2	765	2,452	0.002% to 0.030%	0.001% to 0.009%
Ireland's Eye	0.0 to 0.0	0.0 to 0.1	0.0 to 0.1	57	182	0.008% to 0.110%	0.002% to 0.031%
Non-SPA Total	0.0 to 0.3	0.1 to 1.6	0.1 to 1.4	385	1,234	0.030% to 0.406%	0.009% to 0.116%

Apportioned non-breeding impacts

1.3.4.3 Apportioned increases in baseline mortality for northern gannet during the non-breeding season are presented in Table 1.16, and ranges from 0.000% to 0.036%.

Table 1.16: Non-breeding northern gannet apportioned expected SPA mortality due to collision risk and displacement (based on Furness *et al*. 2015)1

Age	Season	Colony	BDMPS	Baseline Mortality	Mortality increase	
					Number	Percentage
Adult	Post-breeding	Ailsa Craig	318,001	5,383	0.1 to 1.9	0.003% to 0.036%
		Ireland	318,001	822	0.0 to 0.1	0.001% to 0.007%
		Grassholm	318,001	5,834	0.1 to 2.1	0.003% to 0.036%
	Pre-breeding	Ailsa Craig	391,540	5,383	0.0 to 0.5	0.000% to 0.009%
		Ireland	391,540	822	0.0 to 0.0	0.000% to 0.003%
		Grassholm	391,540	5,834	0.0 to 0.5	0.000% to 0.009%
Immature	Post-breeding	Ailsa Craig	227,953	17,011	0.1 to 1.2	0.001% to 0.007%
		Ireland	227,953	2,597	0.0 to 0.1	0.000% to 0.003%
		Grassholm	227,953	18,437	0.1 to 1.3	0.001% to 0.007%
	Pre-breeding	Ailsa Craig	270,348	17,011	0.0 to 0.3	0.000% to 0.002%
		Ireland	270,348	2,597	0.0 to 0.0	0.000% to 0.001%
		Grassholm	270,348	18,437	0.0 to 0.3	0.000% to 0.002%

1.3.5 Black-legged kittiwake

SPA weighted proportions

1.3.5.1 SPA colonies included based on foraging distance, distance to the Morgan Array Area centroid, and the resulting SPA weighted proportions of this species are given in Table 1.7 and Table 1.8, with the highest weighing factor assigned to Rathlin Island.

Table 1.17: Black-legged kittiwake colony weighing factors used for apportioning SPA impacts of collision risk and displacement.

1 Colonies that make up the non-SPA total are presented in table A.4 of Appendix A.

SPA name	Bird count (adjusted for AON)	Distance to Morgan Array Area (km)	SPA weight (based on distance^2)	Proportional SPA weight
St Bee's Head and Town	1,618	59.50	0.24	0.12
Point Lynas to Trwyn Du	312	74.13	0.03	0.02
Porth Llanlleiana to Porth Eilian	104	74.13	0.01	0.01
Great Orme and Little Orme	1,750	81.78	0.16	0.08
Puffin Island	406	81.82	0.04	0.02
Lambay Island	6,640	140.53	0.16	0.08
Mynydd Cilan	676	140.69	0.02	0.01
Ireland's Eye	3,220	148.78	0.07	0.03
Ailsa Craig	980	149.24	0.02	0.01
Howth village	6,162	149.94	0.13	0.07
Aberdaron Coast and Bardsey Island SPA	242	152.65	0.01	0.00
Wicklow Head	1,414	176.01	0.02	0.01
Rathlin Island	27,534	197.09	0.31	0.15
Inishtrahull Island	14	254.54	0.00	0.00
Ramsay and St davids Peninsula Coast	166	256.13	0.00	0.00
North Colonsay and Western Cliffs SPA	6,318	265.27	0.05	0.02
Skomer, Skokholm and the Seas off Pembrokeshire	2,878	269.88	0.02	0.01
Bae Caerfyrddin	22	271.45	0.00	0.00
Saltee island	1,690	273.72	0.01	0.00
Grassholm	60	274.73	0.00	0.00
Horn Head	4,084	282.89	0.03	0.01
Non-SPA Total[1]	19,714	189.36	0.70	0.34

Table 1.18: Non-breeding black-legged kittiwake colony weighing factors for apportioning SPA impacts of collision risk and displacement (UK Western region).

Age	Season	Colony	Total number of SPA birds	Proportion SPA birds in area	SPA birds in region	Total birds BDMPS	Proportion SPA/BDMPS
Adult	Post-breeding	Ailsa Craig	980	0.6	588	498,970	0.0012
		Rathlin island	27,534	0.6	16,520	498,970	0.0331
		Ireland	23,210	0.5	11,605	498,970	0.0233
		UK Western non-designated SPA colonies	12,948	0.6	7,769	498,970	0.0156
	Pre-breeding	Ailsa Craig	980	0.8	784	375,711	0.0021
		Rathlin island	27,534	0.8	22,027	375,711	0.0586
		Ireland	23,210	0.3	6,963	375,711	0.0185
		UK Western non-designated SPA colonies	12,948	0.8	10,358	375,711	0.0276
Immature	Post-breeding	Ailsa Craig	862	0.4	345	412,615	0.0008
		Rathlin island	24,230	0.4	9,692	412,615	0.0235
		Ireland	20,425	0.3	6,127	412,615	0.0149
		UK Western non-designated SPA colonies	11,394	0.4	4,558	412,615	0.0110
	Pre-breeding	Ailsa Craig	862	0.4	345	315,815	0.0011
		Rathlin island	24,230	0.4	9,692	315,815	0.0307
		Ireland	20,425	0.2	4,085	315,815	0.0129
		UK Western non-designated SPA colonies	11,394	0.4	4,558	315,815	0.0144

Apportioned breeding impacts

1.3.5.2 Apportioned mortality for black-legged kittiwake during the breeding season is presented in Table 1.19, and ranges from 0.003% to 0.668%. The highest impact in a single location was found to be on Point Lynas to Trwyn Du, which did not have the highest weighing factor. However, its kittiwake population is limited compared to the colonies with high weighing factors (Table 1.17).

Table 1.19: Breeding black-legged kittiwake apportioned SPA mortality due to collision risk and displacement (Sa = sabbatical, Ad = adult, Im = immature).

SPA	Mortality from collisions and displacement			Baseline mortality		Increase in baseline mortality %	
	Sa	Ad	Im	Ad	Im	Ad	Im
Aberdaron Coast and Bardsey Island SPA	0.0 to 0.0	0.0 to 0.1	0.0 to 0.1	35	41	0.013% to 0.148%	0.012% to 0.143%
Ailsa Craig	0.0 to 0.0	0.0 to 0.2	0.0 to 0.2	143	167	0.011% to 0.130%	0.011% to 0.126%
Bae Caerfyrddin	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	3	4	0.003% to 0.032%	0.003% to 0.031%
Grassholm	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	9	10	0.003% to 0.033%	0.003% to 0.032%
Great Orme and Little Orme	0.0 to 0.2	0.1 to 1.4	0.1 to 1.6	256	298	0.047% to 0.542%	0.045% to 0.524%
Horn Head	0.0 to 0.0	0.0 to 0.3	0.0 to 0.3	596	696	0.004% to 0.045%	0.004% to 0.043%
Howth village	0.0 to 0.1	0.1 to 1.2	0.1 to 1.3	900	1,051	0.011% to 0.132%	0.011% to 0.127%
Inishtrahull Island	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	2	2	0.003% to 0.035%	0.003% to 0.034%
Ireland's Eye	0.0 to 0.1	0.1 to 0.6	0.1 to 0.7	470	549	0.011% to 0.134%	0.011% to 0.129%
North Colonsay and Western Cliffs SPA	0.0 to 0.0	0.0 to 0.4	0.0 to 0.5	922	1,077	0.004% to 0.045%	0.004% to 0.043%
Lambay Island	0.0 to 0.2	0.1 to 1.5	0.1 to 1.7	969	1,132	0.013% to 0.152%	0.013% to 0.147%
Mynydd Cilan	0.0 to 0.0	0.0 to 0.2	0.0 to 0.2	99	115	0.015% to 0.180%	0.015% to 0.174%
Point Lynas to Trwyn Du	0.0 to 0.0	0.0 to 0.3	0.0 to 0.3	46	53	0.057% to 0.668%	0.056% to 0.646%
Porth Llanlleiana to Porth Eilian	0.0 to 0.0	0.0 to 0.1	0.0 to 0.1	15	18	0.057% to 0.667%	0.055% to 0.645%
Puffin Island	0.0 to 0.0	0.0 to 0.3	0.0 to 0.4	59	69	0.047% to 0.546%	0.045% to 0.528%
Ramsay and St davids Peninsula Coast	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	24	28	0.003% to 0.038%	0.003% to 0.037%
Rathlin Island	0.0 to 0.3	0.2 to 2.8	0.3 to 3.1	4,020	4,695	0.006% to 0.069%	0.006% to 0.067%
Saltee island	0.0 to 0.0	0.0 to 0.1	0.0 to 0.1	247	288	0.003% to 0.031%	0.003% to 0.030%
Skomer, Skokholm and the Seas off Pembrokeshire	0.0 to 0.0	0.0 to 0.2	0.0 to 0.2	420	491	0.004% to 0.047%	0.004% to 0.046%
St Bee's Head and Town	0.0 to 0.2	0.2 to 2.2	0.2 to 2.4	236	276	0.078% to 0.912%	0.076% to 0.881%
Wicklow Head	0.0 to 0.0	0.0 to 0.2	0.0 to 0.2	206	241	0.008% to 0.096%	0.008% to 0.093%
Non-SPA Total	0.1 to 0.7	0.5 to 6.3	0.6 to 7.1	2,878	3,362	0.019% to 0.217%	0.018% to 0.210%

Apportioned non-breeding impacts

1.3.5.3 Apportioned mortality for black-legged kittiwake during the non-breeding season is presented in Table 1.20, and ranges from 0.002% to 0.064%. Increases in baseline mortality during the non-breeding season are therefore negligible.

Table 1.20: Non-breeding black-legged kittiwake apportioned SPA mortality due to collision risk and displacement (based on Furness *et al*. 2015).

Age	Season	Colony	BDMPS	Baseline Mortality	Mortality increase	
					Number	Percentage
Adult	Post-breeding	Ailsa Craig	498,970	143	0.01 to 0.09	0.008% to 0.064%
		Rathlin island	498,970	4,020	0.31 to 2.56	0.008% to 0.064%
		Ireland	498,970	3,389	0.22 to 1.80	0.006% to 0.053%
		UK Western non-designated SPA colonies	498,970	1,635	0.13 to 1.04	0.008% to 0.064%
	Pre-breeding	Ailsa Craig	375,711	143	0.01 to 0.07	0.007% to 0.050%
		Rathlin island	375,711	4,020	0.30 to 2.03	0.007% to 0.050%
		Ireland	375,711	3,389	0.10 to 0.64	0.003% to 0.019%
		UK Western non-designated SPA colonies	375,711	1,635	0.12 to 0.83	0.007% to 0.050%
Immature	Post-breeding	Ailsa Craig	412,615	145	0.01 to 0.06	0.005% to 0.040%
		Rathlin island	412,615	4,066	0.20 to 1.61	0.005% to 0.040%

Age	Season	Colony	BDMPS	Baseline Mortality	Mortality increase	
					Number	Percentage
		Ireland	412,615	3,428	0.12 to 1.02	0.004% to 0.030%
		UK Western non-designated SPA colonies	412,615	1,654	0.08 to 0.66	0.005% to 0.040%
	Pre-breeding	Ailsa Craig	315,815	145	0.00 to 0.03	0.003% to 0.023%
		Rathlin island	315,815	4,066	0.14 to 0.94	0.003% to 0.023%
		Ireland	315,815	3,428	0.06 to 0.40	0.002% to 0.012%
		UK Western non-designated SPA colonies	315,815	1,654	0.06 to 0.38	0.003% to 0.023%

1.3.6 Herring gull

SPA weighted proportions

1.3.6.1 SPA colonies included based on foraging distance, distance to the Morgan Array Area centroid, and the resulting SPA weighted proportions of this species are given in Table 1.21 and Table 1.22, with the highest weighing factor assigned to Morecambe Bay and Duddon Estuary SPA and Ribble and Alt Estuaries.

Table 1.21: Herring gull colony weighing factors used for apportioning impacts of collision risk.

1 Colonies that make up the non-SPA total are presented in table A.5 of Appendix A.

SPA name	Bird count (adjusted for AON)	Distance to Morgan Array Area (km)	SPA weight (based on distance^2)	Proportional SPA weight
Morecambe Bay and Duddon Estuary SPA	900	54.2	0.11	0.11
Anglesey Terns/Morwenoliaid Ynys Môn	2,472	77.8	0.08	0.08
Puffin Island SPA	944	81.8	0.03	0.04
Llawndy	14	82.0	0.00	0.00
Ribble and Alt Estuaries	1,710	84.5	0.11	0.11
Non-SPA Total[1]	**8,352**	**69.5**	**0.65**	**0.66**

Table 1.22: Non-breeding herring gull colony weighing factors used for apportioning SPA impacts of collision risk (UK Western region).

Age	Season	Colony	Total number of SPA birds	Proportion SPA birds in area	SPA birds in region	Total birds BDMPS	Proportion SPA/BDMPS
Adult	Non-breeding	Morecambe Bay	900	0.8	720	87,134	0.0083
		UK West non-designated SPA colonies	5,140	0.8	4,112	87,134	0.0472
Immature	Non-breeding	Morecambe Bay	981	0.7	687	86,165	0.0080
		UK Western non-designated SPA colonies	5,603	0.7	3,922	86,165	0.0455

Apportioned breeding impacts

1.3.6.2 Apportioned mortality for herring gull during the breeding season is presented in Table 1.23, and ranges from 0.003% to 0.195%. The highest increase in baseline mortality in a single location was found to be on Morecambe Bay and Duddon Estuary SPA (Table 1.21).

Table 1.23: Breeding herring gull apportioned expected SPA mortality due to collision risk (Sa = sabbatical, Ad = adult, Im = immature).

SPA	Mortality from collisions			Baseline mortality		Increase in baseline mortality %	
	Sa	Ad	Im	Ad	Im	Ad	Im
Morecambe Bay and Duddon Estuary SPA	0.0 to 0.3	0.0 to 0.2	0.0 to 0.5	149	254	0.011% to 0.134%	0.016% to 0.195%
Ribble and Alt Estuaries	0.0 to 0.3	0.0 to 0.2	0.0 to 0.5	284	482	0.006% to 0.072%	0.009% to 0.105%
Llawndy	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	2	4	0.006% to 0.075%	0.009% to 0.109%
Puffin Island SPA	0.0 to 0.1	0.0 to 0.1	0.0 to 0.2	157	266	0.003% to 0.041%	0.005% to 0.060%
Anglesey Terns/Morwenoliaid Ynys Môn	0.0 to 0.2	0.0 to 0.1	0.0 to 0.4	410	697	0.003% to 0.036%	0.004% to 0.053%
Non-SPA Total	0.1 to 1.7	0.1 to 1.2	0.2 to 3.0	1,386	2,355	0.007% to 0.087%	0.010% to 0.126%

Apportioned non-breeding impacts

1.3.6.3 Apportioned mortality for herring gull during the non-breeding season is presented in Table 1.20, and ranges from 0.008% to 0.052%. Increases in baseline mortality during the non-breeding season are low for this species.

Table 1.24: Non-breeding herring gull apportioned expected SPA mortality due to collision risk (based on Furness *et al.* 2015).

Age	Season	Colony	BDMPS	Baseline Mortality	Mortality increase	
					Number	Percentage
Adult	Non-breeding	Morecambe Bay	87,134	149	0.0 to 0.1	0.009% to 0.052%
		UK Western non-designated SPA colonies	87,134	853	0.1 to 0.4	0.010% to 0.052%
Immature	Non-breeding	Morecambe Bay	86,165	172	0.0 to 0.1	0.008% to 0.043%
		UK Western non-designated SPA colonies	86,165	985	0.1 to 0.4	0.008% to 0.043%

1.3.7 Lesser black-backed gull

SPA weighted proportions

1.3.7.1 SPA colonies included based on foraging distance, distance to the Morgan Array Area centroid, and the resulting SPA weighted proportions of this species are given in Table 1.25 and Table 1.26, with the highest weighing factor assigned to Ribble and Alt Estuaries, followed by Puffin Island.

Table 1.25: Lesser black-backed gull colony weighing factors used for apportioning impacts of collision risk.

1 Colonies that make up the non-SPA total are presented in table A.6 of Appendix A.

SPA name	Bird count (adjusted for AON)	Distance to Morgan Array Area (km)	SPA weight (based on distance^2)	Proportional SPA weight
Morecambe Bay and Duddon Estuary SPA	826	64.3	0.11	0.05
Anglesey Terns/Morwenoliaid Ynys Môn SPA	230	77.8	0.02	0.01
Puffin Island SPA	1,052	81.8	0.09	0.04
Ribble and Alt Estuaries SPA	8,978	85.0	0.72	0.33
Strangford Lough SPA	632	110.3	0.03	0.01
Copeland Islands SPA	2,556	117.3	0.10	0.04
Lambay Island	952	140.5	0.03	0.01
Ireland's Eye	10	148.8	0.00	0.00
Ailsa Craig SPA	378	149.2	0.01	0.00
Glannau Aberdaron ac Ynys Enlli/Aberdaron Coast and Bardsey Island	328	152.6	0.01	0.00
Dalkey Island SPA	72	157.9	0.00	0.00
Lough Neagh and Lough Beg SPA	1,744	165.4	0.03	0.01
Rathlin Island SPA	1,038	195.8	0.01	0.01
Sheep Island SPA	176	198.1	0.00	0.00
Skerries Island SPA	2	210.0	0.00	0.00
Non-SPA Total	16,570	121.5	1.02	0.47

Table 1.26: Non-breeding lesser black-backed gull colony weighing factors used for apportioning SPA impacts of collision risk (UK Western region).

Age	Season	Colony	Total number of SPA birds	Proportion SPA birds in area	SPA birds in region	Total birds BDMPS	Proportion SPA/BDMPS
Adult	Post-breeding	Ailsa Craig	378	0.5	189	110,708	0.0017
		Morecambe Bay	826	0.5	413	110,708	0.0037
		Rathlin Island	1,038	0.5	519	110,708	0.0047
		Ribble and Alt estuaries	8,978	0.5	4,489	110,708	0.0405
		Ireland	962	0.4	385	110,708	0.0035
		UK Western non-designated SPA colonies	6,792	0.5	3,396	110,708	0.0307
	Pre-breeding	Ailsa Craig	378	0.5	189	110,708	0.0017
		Morecambe Bay	826	0.5	413	110,708	0.0037
		Rathlin Island	1,038	0.5	519	110,708	0.0047
		Ribble and Alt estuaries	8,978	0.5	4,489	110,708	0.0405
		Ireland	962	0.4	385	110,708	0.0035
		UK Western non-designated SPA colonies	6,792	0.5	3,396	110,708	0.0307
	Non-breeding	Ailsa Craig	378	0.2	76	36,029	0.0021
		Morecambe Bay	826	0.2	165	36,029	0.0046
		Rathlin Island	1,038	0.2	208	36,029	0.0058
		Ribble and Alt estuaries	8,978	0.2	1,796	36,029	0.0498
		Ireland	962	0.2	192	36,029	0.0053

Age	Season	Colony	Total number of SPA birds	Proportion SPA birds in area	SPA birds in region	Total birds BDMPS	Proportion SPA/BDMPS
		UK Western non-designated SPA colonies	6,792	0.2	1,358	36,029	0.0377
Immature	Post-breeding	Ailsa Craig	257	0.4	103	52,596	0.0020
		Morecambe Bay	562	0.4	225	52,596	0.0043
		Rathlin Island	706	0.4	282	52,596	0.0054
		Ribble and Alt estuaries	6,105	0.4	2,442	52,596	0.0464
		Ireland	654	0.2	131	52,596	0.0025
		UK Western non-designated SPA colonies	4,619	0.4	1,847	52,596	0.0351
	Pre-breeding	Ailsa Craig	257	0.4	103	52,596	0.0020
		Morecambe Bay	562	0.4	225	52,596	0.0043
		Rathlin Island	706	0.4	282	52,596	0.0054
		Ribble and Alt estuaries	6,105	0.4	2,442	52,596	0.0464
		Ireland	654	0.2	131	52,596	0.0025
		UK Western non-designated SPA colonies	4,619	0.4	1,847	52,596	0.0351
	Non-breeding	Ailsa Craig	257	0.05	13	5,130	0.0025
		Morecambe Bay	562	0.05	28	5,130	0.0055
		Rathlin Island	706	0.05	35	5,130	0.0069
		Ribble and Alt estuaries	6,105	0.05	305	5,130	0.0595
		Ireland	654	0.05	33	5,130	0.0064
		UK Western non-designated SPA colonies	4,619	0.05	231	5,130	0.0450

Apportioned breeding impacts

1.3.7.2 Apportioned mortality for lesser black-backed gull during the breeding season is presented in Table 1.27 , and ranges from 0.000% to 0.000%.

Table 1.27: Breeding lesser black-backed gull apportioned SPA mortality due to collision risk (Sa = sabbatical, Ad = adult, Im = immature).

SPA	Mortality from collisions			Baseline mortality		Increase in baseline mortality %	
	Sa	Ad	Im	Ad	Im	Ad	Im
Ailsa Craig SPA	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	43	49	0.000% to 0.000%	0.000% to 0.000%
Anglesey Terns/Morwenoliaid Ynys Môn SPA	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	26	30	0.000% to 0.000%	0.000% to 0.000%
Copeland Islands SPA	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	294	329	0.000% to 0.000%	0.000% to 0.000%
Dalkey Island SPA	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	8	9	0.000% to 0.000%	0.000% to 0.000%
Glannau Aberdaron ac Ynys Enlli/Aberdaron Coast and Bardsey Island	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	38	42	0.000% to 0.000%	0.000% to 0.000%
Ireland's Eye	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	1	1	0.000% to 0.000%	0.000% to 0.000%
Lambay Island	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	109	122	0.000% to 0.000%	0.000% to 0.000%
Lough Neagh and Lough Beg SPA	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	201	224	0.000% to 0.000%	0.000% to 0.000%
Morecambe Bay and Duddon Estuary SPA	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	95	106	0.000% to 0.000%	0.000% to 0.000%
Puffin Island SPA	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	121	135	0.000% to 0.000%	0.000% to 0.000%
Rathlin Island SPA	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	119	134	0.000% to 0.000%	0.000% to 0.000%
Ribble and Alt Estuaries SPA	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	1,032	1,155	0.000% to 0.000%	0.000% to 0.000%
Sheep Island SPA	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	20	23	0.000% to 0.000%	0.000% to 0.000%
Skerries Island SPA	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	0	0	0.000% to 0.000%	0.000% to 0.000%
Strangford Lough SPA	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	73	81	0.000% to 0.000%	0.000% to 0.000%
Non-SPA Total	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	1,906	2,131	0.000% to 0.000%	0.000% to 0.000%

Apportioned non-breeding impacts

1.3.7.3 Apportioned mortality for lesser black-backed gull during the non-breeding season is presented in Table 1.28, and ranges from 0.000% to 0.004%. Increases in baseline mortality during the non-breeding season are negligible for this species.

Table 1.28: Non-breeding lesser black-backed gull apportioned expected SPA mortality due to collision risk (based on Furness *et al*. 2015).

Age	Season	Colony	BDMPS	Baseline Mortality	Mortality increase	
					Number	Percentage
Adult	Post-breeding	Ailsa Craig	110,708	43	0.0 to 0.0	0.000% to 0.004%
		Morecambe Bay	110,708	95	0.0 to 0.0	0.000% to 0.004%
		Rathlin Island	110,708	119	0.0 to 0.0	0.000% to 0.004%
		Ribble and Alt estuaries	110,708	1,032	0.0 to 0.0	0.000% to 0.004%
		Ireland	110,708	111	0.0 to 0.0	0.000% to 0.004%
		UK Western non-designated SPA colonies	110,708	781	0.0 to 0.0	0.000% to 0.004%
	Pre-breeding	Ailsa Craig	110,708	43	0.0 to 0.0	0.000% to 0.000%
		Morecambe Bay	110,708	95	0.0 to 0.0	0.000% to 0.000%
		Rathlin Island	110,708	119	0.0 to 0.0	0.000% to 0.000%
		Ribble and Alt estuaries	110,708	1,032	0.0 to 0.0	0.000% to 0.000%
		Ireland	110,708	111	0.0 to 0.0	0.000% to 0.000%
		UK Western non-designated SPA colonies	110,708	781	0.0 to 0.0	0.000% to 0.000%
	Non-breeding	Ailsa Craig	36,029	43	0.0 to 0.0	0.000% to 0.004%
		Morecambe Bay	36,029	95	0.0 to 0.0	0.000% to 0.004%
		Rathlin Island	36,029	119	0.0 to 0.0	0.000% to 0.004%
		Ribble and Alt estuaries	36,029	1,032	0.0 to 0.0	0.000% to 0.004%
		Ireland	36,029	111	0.0 to 0.0	0.000% to 0.004%
		UK Western non-designated SPA colonies	36,029	781	0.0 to 0.0	0.000% to 0.004%
Immature	Post-breeding	Ailsa Craig	52,596	34	0.0 to 0.0	0.000% to 0.004%
		Morecambe Bay	52,596	75	0.0 to 0.0	0.000% to 0.004%
		Rathlin Island	52,596	94	0.0 to 0.0	0.000% to 0.004%
		Ribble and Alt estuaries	52,596	814	0.0 to 0.0	0.000% to 0.004%
		Ireland	52,596	87	0.0 to 0.0	0.000% to 0.002%
		UK Western non-designated SPA colonies	52,596	616	0.0 to 0.0	0.000% to 0.004%
	Pre-breeding	Ailsa Craig	52,596	34	0.0 to 0.0	0.000% to 0.000%
		Morecambe Bay	52,596	75	0.0 to 0.0	0.000% to 0.000%
		Rathlin Island	52,596	94	0.0 to 0.0	0.000% to 0.000%
		Ribble and Alt estuaries	52,596	814	0.0 to 0.0	0.000% to 0.000%
		Ireland	52,596	87	0.0 to 0.0	0.000% to 0.000%
		UK Western non-designated SPA colonies	52,596	616	0.0 to 0.0	0.000% to 0.000%
	Non-breeding	Ailsa Craig	5,130	34	0.0 to 0.0	0.000% to 0.004%
		Morecambe Bay	5,130	75	0.0 to 0.0	0.000% to 0.004%
		Rathlin Island	5,130	94	0.0 to 0.0	0.000% to 0.004%
		Ribble and Alt estuaries	5,130	814	0.0 to 0.0	0.000% to 0.004%
		Ireland	5,130	87	0.0 to 0.0	0.000% to 0.004%
		UK Western non-designated SPA colonies	5,130	616	0.0 to 0.0	0.000% to 0.004%

1.3.8 Great black-backed gull

SPA weighted proportions

1.3.8.1 SPA colonies included based on foraging distance, distance to the Morgan Array Area centroid, and the resulting SPA weighted proportions of this species are given in Table 1.29 and Table 1.30, with the highest weighing factor assigned to Morecambe Bay and Duddon Estuary SPA.

Table 1.29: Great black-backed gull colony weighing factors used for apportioning impacts of collision risk.

1 Colonies that make up the non-SPA total are presented in table A.7 of Appendix A.

SPA name	Bird count (adjusted for IND)	Distance to Morgan Array Area (km)	SPA weight (based on distance^2)	Proportional SPA weight
Morecambe Bay and Duddon Estuary SPA	98	64.3	0.33	0.40
Glannau Ynys Gybi/HHoly Island Coast	12	70.0	0.01	0.01
Puffin Island SPA	214	81.8	0.24	0.29
Ribble and Alt Estuaries SPA	34	84.5	0.06	0.08
Anglesey Terns/Morwenoliaid Ynys Môn SPA	54	86.6	0.04	0.04
Non-SPA Total	182	62.4	0.14	0.17

Table 1.30: Non-breeding great black-backed gull colony weighing factors used for apportioning SPA impacts of collision risk (UK Western region).

Age	Season	Colony	Total number of SPA birds	Proportion SPA birds in area	SPA birds in region	Total birds BDMPS	Proportion SPA/BDMPS
Adult	Non-breeding	UK Western non-designated SPA colonies	412	0.7	288	14,238	0.0203
Immature	Non-breeding	UK Western non-designated SPA colonies	449	0.5	225	20,142	0.0111

Apportioned breeding impacts

1.3.8.2 Apportioned mortality for great black-backed gull during the breeding season is presented in Table 1.31, and ranges from 0.231% to 11.202%. The highest impact in a single location was found to be on Morecambe Bay and Duddon Estuary SPA. Impacts for some locations are above the 1% threshold.

Table 1.31: Breeding great black-backed gull apportioned expected SPA mortality due to collision risk (Sa = sabbatical, Ad = adult, Im = immature).

SPA	Mortality from collisions			Baseline mortality		Increase in baseline mortality %	
	Sa	Ad	Im	Ad	Im	Ad	Im
Anglesey Terns/Morwenoliaid Ynys Môn SPA	0.0 to 0.0	0.0 to 0.1	0.0 to 0.1	4	10	0.231% to 2.157%	0.161% to 1.498%
Glannau Ynys Gybi/Holy Island Coast	0.0 to 0.0	0.0 to 0.0	0.0 to 0.0	1	2	0.302% to 2.819%	0.210% to 1.957%
Morecambe Bay and Duddon Estuary SPA	0.0 to 0.2	0.1 to 0.8	0.1 to 1.4	7	18	1.200% to 11.202%	0.833% to 7.779%
Puffin Island SPA	0.0 to 0.2	0.1 to 0.6	0.1 to 1.0	15	39	0.404% to 3.775%	0.281% to 2.622%
Ribble and Alt Estuaries SPA	0.0 to 0.0	0.0 to 0.1	0.0 to 0.3	2	6	0.667% to 6.228%	0.463% to 4.325%
Non-SPA Total	0.0 to 0.1	0.0 to 0.3	0.1 to 0.6	13	33	0.280% to 2.613%	0.194% to 1.814%

Apportioned non-breeding impacts

1.3.8.3 Apportioned mortality for great black-backed gull during the non-breeding season is presented in Table 1.28, and ranges from 0.003% to 0.040%. Increases in baseline mortality during the non-breeding season are low.

Table 1.32: Non-breeding great black-backed gull apportioned expected SPA mortality due to collision risk (based on Furness *et al*. 2015).

Age	Season	Colony	BDMPS	Baseline Mortality	Mortality increase	
					Number	Percentage
Adult	Non-breeding	UK Western non-designated SPA colonies	14,238	29	0.0 to 0.0	0.009% to 0.040%
Immature	Non-breeding	UK Western non-designated SPA colonies	20,142	50	0.0 to 0.0	0.003% to 0.013%

1.4 Conclusion

1.4.1.1 The results from this apportioning assessment for each species (common guillemot, razorbill, northern gannet, black-legged kittiwake, herring gull, lesser black-backed gull and great black-backed gull) and their respective bio-seasons highlight that none of the increases in baseline mortality caused by the Morgan Generation Assets exceeds the 1% threshold in the context of the entire BDMPS population. However, some individual SPA colonies for some species experience increases in baseline

mortality that exceed the 1% threshold at the upper end of the range of possible impacts.

1.4.1.2 To understand how these colonies may be affected, as part of the Information to Support the Appropriate Assessment (ISAA) report, these colonies require further assessment in a PVA, which has been undertaken in volume 4, annex 10.6: Offshore Ornithology CEA PVA Technical Report of the PEIR.

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Appendix A: Regional Populations

A.1 Breeding season

Table A. 1: Common guillemot breeding colonies within the mean-max plus one standard deviation foraging ranges of the Morgan Array Area and regional population (individuals: IND) used to assess displacement during the breeding season.

Colonies	Qualifying species	Master site in SMP	Count (IND)	Last counted
SPA	NO	Aberdaron Coast and Bardsey Island SPA	2,826	2019
SPA	NO	Balcary Point	639	2019
SPA	NO	Great Orme and Little Orme	3,381	2022
SPA	YES	Howth village	871	2015
SPA	YES	Ireland's Eye	4,410	2015
SPA	YES	Lambay Island	59,983	2015
SPA	NO	Mynydd Cilan, Trwyn y Wylfa ac Ynysoedd Sant Tudwal	3475	2016
SPA	NO	Porth Llanlleiana to Porth Eilian	5,550	2016
SPA	NO	Puffin Island	3,820	2021
SPA	NO	South Stack	7,914	2021
MCZ	NO	St Bee's Head	17,501	2021
NON-SPA	NO	Coastal Gwynedd	14,116	2021
NON-SPA	NO	Isle of Man	5,219	2017
NON-SPA	NO	Larne Lough to Portmuck	2,617	2017
NON-SPA	NO	Meikle Ross and Little Ross	27	2018
NON-SPA	NO	Monrieth Cliffs and Scar Rocks	350	2016
NON-SPA	NO	Muck Island	2,782	2020
NON-SPA	NO	Mull of Galloway	277	2019
NON-SPA	NO	Port Mona, Devil's Bridge, Laggantalluch Head	229	2021

Table A. 2: Razorbill breeding colonies within the mean-max plus one standard deviation foraging ranges of the Morgan Array Area and regional population (individuals: IND) used to assess displacement during the breeding season.

Colonies	Qualifying species	Master site in SMP	Count (IND)	Last counted
SPA	NO	Aberdaron Coast and Bardsey Island SPA	3,834	2019
SPA	NO	Great Orme and Little Orme	296	2022
SPA	YES	Howth Village	279	2015
SPA	YES	Ireland's Eye	1,600	2015
SPA	YES	Lambay Island	7,353	2015
SPA	NO	Lleyn Peninsula	326	2021
SPA	NO	Point Lynas to Trwyn Du	14	2016
SPA	NO	Porth Llanlleiana to Porth Eilian	457	2016
SPA	NO	Puffin Island	681	2021
SPA	NO	Rigg Bay + Cruggleton	0	2020
SPA	NO	South Stack	1,378	2021
MCZ	YES	St Bee's Head and Town	94	2021
NON-SPA	NO	Balcary Point	91	2019
NON-SPA	NO	Bray	150	2010
NON-SPA	NO	Coastal Gwynedd	557	2021
NON-SPA	NO	Isle of Man	696	2017
NON-SPA	NO	Meikle Ross and Little Ross	3	2018
NON-SPA	NO	Monreith Cliffs and Scar Rocks	0	2018
NON-SPA	NO	Mull of Galloway	44	2019
NON-SPA	NO	Port Mona, Devil's Bridge, Laggantalluch Head	37	2021

Table A. 3: Northern gannet breeding colonies within the mean-max plus on standard deviation foraging ranges of the Morgan Array Area and regional population (apparently occupied nests: AON)used to assess displacement during the breeding season.

Colonies	Qualifying species	Master site in SMP	Count (AON)	Last counted
SPA	YES	Ailsa Craig	33,226	2014
SPA	YES	Grassholm	36,011	2015
SPA	YES	Great Saltee	4,722	2013
SPA	YES	Ireland's Eye	350	2015
NON-SPA	NO	Monreith Cliffs and Scar Rocks	2,376	2014

Table A. 4: Black-legged kittiwake breeding colonies within the mean-max plus on standard deviation foraging ranges of the Morgan Array Area and regional population (apparently occupied nests: AON) used to assess displacement during the breeding season.

Colonies	Qualifying species	Master site in SMP	Count (AON)	Last counted
SPA	NO	Aberdaron Coast and Bardsey Island SPA	121	2019
SPA	YES	Ailsa Craig	490	2021
SPA	NO	Bae Caerfyrddin	11	2018
SPA	NO	Grassholm	30	2018
SPA	NO	Horn Head	2,042	2015
SPA	YES	Howth village	3,081	2015
SPA	YES	Inishtrahull Island	7	2016
SPA	YES	Ireland's Eye	1,610	2015
SPA	YES	North Colonsay and Western Cliffs SPA	3,159	2018
SPA	YES	Lambay Island	3,320	2015
SPA	NO	Mynydd Cilan	338	2016
SPA	NO	Point Lynas to Trwyn Du	156	2016
SPA	NO	Porth Llanlleiana to Porth Eilian	52	2016
SPA	NO	Puffin Island	203	2021
SPA	YES	Ramsay and St davids Peninsula Coast	83	2019
SPA	NO	Rathlin Island	13,767	2021
SPA	YES	Saltee island	845	2013
SPA	NO	Skomer, Skokholm and the Seas off Pembrokeshire	1,439	2021
MCZ	NO	St Bee's Head and Town	809	2021
SPA	NO	Wicklow Head	707	2022
NON-SPA	NO	Bray	1,473	2010
NON-SPA	NO	Caldey Island	271	2021
NON-SPA	NO	Causeway Coast	1,197	2021
NON-SPA	NO	Creadan Head to Foilakipeen	26	2018
NON-SPA	NO	Downhill	92	2015
NON-SPA	NO	Dunmore East to Red Head	442	2014
NON-SPA	NO	Giants Causeway Coast	13	2000
NON-SPA	NO	Great Orme and Little Orme	875	2022
NON-SPA	NO	Islay - East	59	2021
NON-SPA	NO	Islay - West	246	2019
NON-SPA	NO	Isle of Man	685	2017

Colonies	Qualifying species	Master site in SMP	Count (AON)	Last counted
NON-SPA	NO	Larne Lough to Portmuck	1,145	2019
NON-SPA	NO	Lleyn Peninsula	614	2021
NON-SPA	NO	Malin Peninsula	65	2018
NON-SPA	NO	Maggy's Leap	656	2019
NON-SPA	NO	Monreith Cliffs and Scar Rocks	19	2018
NON-SPA	NO	Morecambe Central Gas Platform	556	2020
NON-SPA	NO	Muck Island	519	2019
NON-SPA	NO	Mull of Galloway	447	2019
NON-SPA	NO	Mumbles Head	90	2018
NON-SPA	NO	New Quay to Lochtyn	332	2018
NON-SPA	NO	North Antrim Coast	332	2018
NON-SPA	NO	Port Mona, Devils Bridge, Laggantalluch Head	25	2021
NON-SPA	NO	Portally to Benlea Head	100	2018
NON-SPA	NO	Sanda Islands - Kintyre	33	2019
NON-SPA	NO	Skerry Island	76	2000
NON-SPA	NO	Tory Island and Bloody Foreland	344	2015

Table A. 5: Herring Gull breeding colonies within the mean-max plus one standard deviation foraging ranges of the Morgan Array Area and regional population (apparently occupied nests: AON) used to assess displacement during the breeding season.

Colonies	Qualifying species	Master site in SMP	Count (AON)	Last counted
SPA	YES	Anglesey Terns/Morwenoliaid Ynys Môn	1,236	2019
SPA	NO	Llawndy	7	2001
SPA	NO	Morecambe Bay and Duddon Estuary SPA	450	2018
SPA	NO	Puffin Island SPA	472	2017
SPA	NO	Ribble and Alt Estuaries	855	2021
NON-SPA	NO	Barlocco	43	2021
NON-SPA	NO	Barrow-In-Furness	518	2021
NON-SPA	NO	Blackpool	40	2019
NON-SPA	NO	Fleetwood	44	2001
NON-SPA	NO	Haverigg and Millom	190	2019
NON-SPA	NO	Heysham Power Station	30	2019
NON-SPA	NO	Inland Gwynedd	595	2000
NON-SPA	NO	Isle of man	1,209	2018

Colonies	Qualifying species	Master site in SMP	Count (AON)	Last counted
NON-SPA	NO	Maryport	121	2017
NON-SPA	NO	Meikle Ross and Little Ross	136	2013
NON-SPA	NO	Monreith Cliffs and Scar Rock	57	2018
NON-SPA	NO	Morecambe	1	2021
NON-SPA	NO	Salterhall Quarry	105	2000
NON-SPA	NO	Sellafield	150	2018
NON-SPA	NO	Sheddock Cliffs - Burrow Head	159	2020
NON-SPA	NO	St Bee's Head and Town	108	2020
NON-SPA	NO	Whitehaven (Buildings)	527	2021
NON-SPA	NO	Workington	143	2018

Table A. 6: Lesser black-backed gull breeding colonies within the mean-max plus one standard deviation foraging ranges of the Morgan Array Area and regional population (apparently occupied nests: AON) used to assess displacement during the breeding season.

Colonies	Qualifying species	Master site in SMP	Count (AON)	Last counted
SPA	YES	Ailsa Craig SPA	189	2019
SPA	NO	Anglesey Terns/Morwenoliaid Ynys Môn SPA	115	2019
SPA	NO	Copeland Islands SPA	1,278	2019
SPA	NO	Dalkey Island SPA	36	2016
SPA	NO	Glannau Aberdaron ac Ynys Enlli/Aberdaron Coast and Bardsey Island	164	2019
SPA	YES	Ireland's Eye	5	2015
SPA	YES	Lambay Island	476	2010
SPA	NO	Lough Neagh and Lough Beg SPA	872	2021
SPA	YES	Morecambe Bay and Duddon Estuary SPA	413	2018
SPA	NO	Puffin Island SPA	526	2017
SPA	YES	Rathlin Island SPA	519	2021
SPA	YES	Ribble and Alt Estuaries SPA	4,489	2021
SPA	NO	Sheep Island SPA	88	2021
SPA	NO	Skerries Island SPA	1	2010
SPA	NO	Strangford Lough SPA	316	2019
NON-SPA	NO	Aberdaron Coast not in SPA	10	2016
NON-SPA	NO	Almorness Point	373	2016
NON-SPA	NO	Antrim Town	600	2016

Colonies	Qualifying species	Master site in SMP	Count (AON)	Last counted
NON-SPA	NO	Arran	250	2016
NON-SPA	NO	Askam-in-Furness	42	2019
NON-SPA	NO	Bangor and Caernarfon	17	2019
NON-SPA	NO	Barrow-in-Furness	1,560	2019
NON-SPA	NO	Belfast	85	2019
NON-SPA	NO	Blackpool	5	2001
NON-SPA	NO	Cardigan Island and Mwnt to Carreg Lydan	326	2019
NON-SPA	NO	Carlisle	20	2013
NON-SPA	NO	Carstairs Junction	40	2002
NON-SPA	NO	Causeway Coast	7	2021
NON-SPA	NO	Cleator Moor	8	2013
NON-SPA	NO	Denbeighshire Lakes	18	2016
NON-SPA	NO	Derwent Water	6	2019
NON-SPA	NO	Dublin City Centre, Skerries and Balbriggan	10	2002
NON-SPA	NO	East Island (Isle of Man)	17	2017
NON-SPA	NO	Fleet Bay	8	2018
NON-SPA	NO	Fleetwood	9	2019
NON-SPA	NO	Greenside Quarry, Kendal	2	2021
NON-SPA	NO	Gun's Island - Northern Island	10	2022
NON-SPA	NO	Haverigg and Millom	77	2019
NON-SPA	NO	Haweswater RSPB	35	2018
NON-SPA	NO	Heysham Power Station	35	2000
NON-SPA	NO	Holy Island	1	2021
NON-SPA	NO	Horse Island	901	2017
NON-SPA	NO	Inchmarnock Island, Bute	200	2017
NON-SPA	NO	Inland Gwynedd	95	2019
NON-SPA	NO	Islay - East (Port Askaig to Bowmore)	10	2018
NON-SPA	NO	Lady Isle	246	2018
NON-SPA	NO	Little Cumbrae	1,200	1999
NON-SPA	NO	Llanddulas Quarries	4	2017
NON-SPA	NO	Loch Ryan	4	2021
NON-SPA	NO	Manchester ship canal	50	2022
NON-SPA	NO	Maryport	95	2013
NON-SPA	NO	Monaghan Lakes	7	2000

Colonies	Qualifying species	Master site in SMP	Count (AON)	Last counted
NON-SPA	NO	N.Yorks Inland Gulls	186	2018
NON-SPA	NO	Newport to Poppit	40	2018
NON-SPA	NO	North Island (Isle of Man)	21	2017
NON-SPA	NO	Penrith	114	2019
NON-SPA	NO	Prestatyn	3	2019
NON-SPA	NO	Rhyl	4	2019
NON-SPA	NO	Salterhall Quarry	18	2018
NON-SPA	NO	Sanda Islands - Kintyre	23	2019
NON-SPA	NO	Seaforth Nature Reserve and Liverpool City	33	2019
NON-SPA	NO	Sellafield	150	2009
NON-SPA	NO	Skerry Islands	269	2010
NON-SPA	NO	South Island (Isle of Man)	36	2017
NON-SPA	NO	South Solway	780	2019
NON-SPA	NO	Starling Knowe to Downan Point	3	2018
NON-SPA	NO	Strumble Head - Aberbach	51	2018
NON-SPA	NO	Strumble Head - Pwll Deri	15	2018
NON-SPA	NO	Strumble Head to Fishguard to Newport	4	2018
NON-SPA	NO	Talla Res.	37	2018
NON-SPA	NO	The Maiden	7	2000
NON-SPA	NO	Walney Urban Gulls	11	2019
NON-SPA	NO	West Island (Isle of Man)	4	2017
NON-SPA	NO	Whitehaven (Buildings)	53	2018
NON-SPA	NO	Wigtown Bay Merse and Baldoon	2	2021
NON-SPA	NO	Windermere	6	2009
NON-SPA	NO	Workington	32	2009

Table A. 7: Great black-backed gull breeding colonies within the mean-max plus one standard deviation foraging ranges of the Morgan Array Area and regional population (apparently occupied nests: AON) used to assess displacement during the breeding season.

Colonies	Qualifying species	Master site in SMP	Count (AON)	Last counted
SPA	NO	Anglesey Terns/Morwenoliaid Ynys Môn SPA	27	2019
SPA	NO	Glannau Ynys Gybi/Holy Island Coast	6	2016
SPA	NO	Morecambe Bay and Duddon Estuary SPA	49	2020
SPA	NO	Puffin Island SPA	107	2017
SPA	NO	Ribble and Alt Estuaries SPA	17	2021
NON-SPA	NO	Barrow-In-Furness	3	2010
NON-SPA	NO	Fleetwood	2	2019
NON-SPA	NO	Inland Gwynedd	1	2018
NON-SPA	NO	Isle of Man	85	2017