NORTH FALLS

Offshore Wind Farm

Habitats Regulations Assessment

Updated Offshore Ornithology In-Combination Tables

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Glossary of Acronyms

AOE	Alde-Ore Estuary
DCO	Development Consent Order
DEP	Dudgeon Extension Project
DESNZ	Department for Energy Security & Net Zero
FCC	Flamborough and Filey Coast
HP4	Hornsea Project Four
OWF	Offshore Wind Farm
SEP	Sheringham Shoal Extension Project
R2	Rampion 2
SPA	Special Protection Area
RIAA	Report to Inform an Appropriate Assessment
UK	United Kingdom

Glossary of Terminology

Array Area	The offshore wind farm area, within which the wind turbine generators, array cables, platform interconnector cable, offshore substation platform(s) and/or offshore converter platform will be located.
Offshore Substation Platform(s)	Fixed structure(s) located within the array area, containing HVAC electrical equipment to aggregate the power from the wind turbine generators and increase the voltage to a more suitable level for export to shore via offshore export cables.
The Applicant	North Falls Offshore Wind Farm Limited (NFOW)
The Project Or 'North Falls'	North Falls Offshore Wind Farm, including all onshore and offshore infrastructure.
wind turbine generator (WTG)	Power generating device that is driven by the kinetic energy of the wind

1 Introduction

1. This document updates the in combination effect tables presented in the North Falls offshore ornithology Report to Inform an Appropriate Assessment (RIAA) Part 4 **[APP178]**, for the following Special Protection Areas (SPAs) and qualifying bird species:

   - Gannet: predicted collisions apportioned to the breeding population at the Flamborough and Filey Coast (FFC) SPA,
   - Kittiwake: predicted collisions apportioned to the breeding population at the FFC SPA,
   - Lesser black-backed gull: predicted collisions apportioned to the breeding population at the Alde-Ore Estuary (AOE) SPA,
   - Gannet: number of birds at risk of displacement apportioned to the breeding population FFC SPA,
   - Guillemot: number of birds at risk of displacement apportioned to the breeding population FFC SPA, and
   - Razorbill: number of birds at risk of displacement apportioned to the breeding population FFC SPA.

2. These updates are provided in response to Natural England comments at deadline 5, in Appendix F5, Natural England's Offshore Ornithology Advice on the Applicants Deadline 3 documents **[REP5-107]** and Appendix K5, Natural England's Risk and Issues Log **[REP5-109]**.

3. In the tables below, values which have been updated from the RIAA Part 4 **[APP-178]** are highlighted in green (and any amendments to correct errors in yellow).

2 In combination collision risk

2.1 Gannet

4. The in-combination collision mortality estimates for gannets from FFC SPA are presented in **Table 2.1**. These have been updated from those presented in Table 4.35 of the RIAA **[APP-178]**. The changes relate primarily to updates to collision avoidance rates used to estimate the unapportioned collision mortality (SNCBs, 2024), as set out in Section 2.1 of Updated Information for Offshore Ornithology Cumulative Effects Assessment **[REP3-040]**. In addition, updated data for some projects has been presented, where this has become available.

5. Based on the updated estimates, the total predicted annual collision mortality for breeding adult gannets from the FFC SPA is 75 individuals (Table 2.1), compared with 70 individuals in the RIAA (Table 4.35 **[APP-178]**). North Falls contributes 0.5 birds to this total, or 0.7%. The predicted in-combination mortality would increase the baseline adult mortality rate of the FFC SPA breeding adult gannet population by 3.2% (based on a population size of 28,358 breeding adults and a baseline annual adult mortality rate of 8.1%, Horswill and Robinson 2015), a very small change from the 3.1% increase predicted in the RIAA (paragraph 352, **[APP-178]**).

Table 2.1 Seasonal and annual collision risk estimates of gannets at North Falls and other OWFs included in the in-combination assessment; and apportionment (breeding adult birds) to the FFC SPA. This table updates Table 4.35 in the RIAA (APP-178}, Part 4, Ref. 7.1.4.

Tier	OWF	Seasonal estimated collision mortality[1]							
		Breeding		Autumn Migration		Spring Migration		Annual	
		Totals	FFC	Totals	FFC	Totals	FFC	Totals	FFC
1	Beatrice	7.9	0.0	10.2	0.5	2.0	0.1	20.1	0.6
1	Beatrice Demonstrator	0.2	0.0	0.3	0.0	0.2	0.0	0.7	0.0
1	Blyth Demonstration	0.7	0.0	0.4	0.0	0.6	0.0	1.8	0.1
1	Dudgeon	4.7	4.7	8.2	0.4	4.0	0.2	16.9	5.3
1	East Anglia ONE	0.7	0.7	27.5	1.3	1.3	0.1	29.5	2.1
1	EOWDC (Aberdeen)	0.9	0.0	1.1	0.1	0.0	0.0	2.0	0.1
1	Galloper	3.8	0.0	6.5	0.3	2.6	0.2	12.9	0.5
1	Greater Gabbard	2.9	0.0	1.8	0.1	1.0	0.1	5.8	0.2
1	Gunfleet Sands	n/a							
1	Hornsea Project One	2.4	2.4	6.7	0.3	4.7	0.3	13.9	3.0
1	Hornsea Project Two	1.5	1.5	2.9	0.1	1.3	0.1	5.7	1.7
1	Humber Gateway	0.4	0.4	0.2	0.0	0.3	0.0	0.9	0.4
1	Hywind	1.2	0.0	0.2	0.0	0.2	0.0	1.5	0.0
1	Kentish Flats	0.3	0.0	0.2	0.0	0.2	0.0	0.7	0.0
1	Kentish Flats Extension	n/a							
1	Kincardine	0.6	0.0	0.0	0.0	0.0	0.0	0.6	0.0
1	Lincs	0.4	0.4	0.3	0.0	0.4	0.0	1.1	0.5

Tier	OWF	Seasonal estimated collision mortality[1]							
		Breeding		Autumn Migration		Spring Migration		Annual	
		Totals	FFC	Totals	FFC	Totals	FFC	Totals	FFC
1	London Array	0.5	0.0	0.3	0.0	0.4	0.0	1.2	0.0
1	Lynn and Inner Dowsing	0.1	0.1	0.0	0.0	0.1	0.0	0.2	0.1
1	Methil	1.8	0.0	0.0	0.0	0.0	0.0	1.8	0.0
1	Moray Firth East	16.9	0.0	7.4	0.4	1.9	0.1	26.2	0.5
1	Race Bank	7.1	7.1	2.5	0.1	0.9	0.1	10.4	7.2
1	Rampion	7.6	0.0	13.3	0.6	0.4	0.0	21.4	0.7
1	Scroby Sands	n/a							
1	Sheringham Shoal	3.0	3.0	0.7	0.0	0.0	0.0	3.7	3.0
1	Teesside	1.0	0.5	0.4	0.0	0.0	0.0	1.4	0.5
1	Thanet	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.0
1	Triton Knoll	5.6	5.6	13.5	0.6	6.3	0.4	25.4	6.7
1	Westermost Rough	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
2	Dogger Bank (formerly Creyke Beck) A and B	17.0	8.5	17.5	0.8	11.4	0.7	46.0	10.1
2	Dogger Bank C and Sofia (formerly Teesside A and B)	3.1	1.6	2.1	0.1	2.3	0.1	7.5	1.8
2	Moray West	2.1	0.0	0.4	0.0	0.2	0.0	2.7	0.0
2	Neart na Gaoithe[2]	18.6	0.0	1.5	0.1	1.4	0.1	21.5	0.2
2	Seagreen Alpha and Bravo[3]	62.1	0.0	3.0	0.1	1.5	0.1	66.6	0.2
3	East Anglia ONE North	2.6	2.6	2.3	0.1	0.2	0.0	5.1	2.7
3	East Anglia THREE	1.3	1.3	7.0	0.3	2.0	0.1	10.3	1.7

Tier	OWF	Seasonal estimated collision mortality[1]							
		Breeding		Autumn Migration		Spring Migration		Annual	
		Totals	FFC	Totals	FFC	Totals	FFC	Totals	FFC
3	East Anglia TWO	2.6	2.6	4.9	0.2	0.8	0.1	8.3	2.9
3	Green Volt[4]	4.4	0.1	0.2	0.0	0.7	0.0	5.3	0.1
3	Hornsea Project Three	2.1	1.4	1.1	0.1	0.8	0.1	4.0	1.5
3	Hornsea Project Four	3.3	3.2	1.1	0.1	0.3	0.0	4.7	3.2
3	Inch Cape[5]	22.7	0.0	1.1	0.1	0.8	0.1	24.6	0.1
3	Norfolk Boreas	3.0	3.0	2.7	0.1	0.8	0.1	6.4	3.1
3	Norfolk Vanguard	1.7	1.7	3.9	0.2	1.1	0.1	6.7	2.0
3	Rampion 2[6]	2.9	0	1.4	0.1	0.6	0.0	5.0	0.1
3	SEP&DEP	0.4	0.3	0.6	0.0	0.0	0.0	1.0	0.3
4	Berwick Bank[7]	29.1	0.3	2.7	0.1	0.5	0.0	32.2	0.5
4	Dogger Bank South[8]	8.5	8.5	3.8	0.2	0.3	0.02	12.6	8.7
4	Five Estuaries[9]	2.0	1.2	2.3	0.1	0.2	0.0	4.6	1.4
4	Outer Dowsing[10]	1.2	1.0	0.4	0	0.1	0	1.6	1.1
4	West of Orkney[11]	10.4	0	2.3	0.1	0.6	0.0	13.3	0.1
	North Falls[12]	0.6	0.4	0.9	0.0	0.6	0.0	2.1	0.5
TOTALS (all tiers)		**274**	**64**	**168**	**8**	**56**	**4**	**493**	**75**
Previous total (all tiers) from the North Falls RIAA		**274**	**59**	**165**	**8**	**55**	**3**	**494**	**70**

1. Numbers and breeding season apportioning based on Royal HaskoningDHV (2023a) and updated for Offshore Wind Farms (OWFs) where new information has become available, see footnotes below. Numbers in table rounded to 1 decimal place but totals are based on unrounded numbers. 2. EDF Renewables (2019). 3. Seagreen (2022). 4. APEM (2023). 5. ICOL (2018). 6. GoBe (2024a,b). 7. Pelagica and Cork Ecology (2022), HiDef (2022a), Royal HaskoningDHV (2022a), (Developer Approach). 8. RWE (2025a,b), 100%

Tier	OWF	Seasonal estimated collision mortality[1]							
		Breeding		Autumn Migration		Spring Migration		Annual	
		Totals	FFC	Totals	FFC	Totals	FFC	Totals	FFC
apportionment to SPA during breeding season. 9. GoBe (2024c,d). 10. GoBe (2024e), GoBe and SLR (2025). 11. MacArthur Green (2024a). 12.Table 4.35 of North Falls RIAA [APP-178]. Where avoidance rates for original collision risk estimates for a given OWF were known, values have been adjusted to SNCB (2024) recommended rates (to 0.9923 (±0.0001) for the deterministic Band (2012) model and 0.9929 (±0.0003) for the stochastic (MacGregor et al., 2018 or Caneco et al., 2022) model, see Updated Information for Offshore Ornithology Cumulative Effects Assessment [REP3-040]). During autumn and spring migration apportioning is based on the Flamborough and Filey Coast SPA population as a proportion of the UK North Sea BDMPS, respectively 0.048 and 0.062 (Furness 2015). Breeding season apportioning of the Flamborough and Filey Coast population for North Falls is as described in the RIAA, Part 4, [APP-174] Section 4.4.4.4.2.1. Unless specific references are given, for other OWFs breeding season apportioning is as presented at Deadline 8 of the Development Consent Order (DCO) Examination for the Sheringham Shoal Extension Project (SEP) and Dudgeon Extension Project (DEP) project (Royal HaskoningDHV 2023a).								

2.2 Kittiwake

6. The in-combination collision mortality estimates for kittiwakes from FFC SPA are presented in **Table 2.2**. These have been updated from those presented in Table 4.39 of the RIAA **[APP-178]**. The changes relate primarily to updated data for some projects, where this has become available, and in some cases associated revisions to the breeding season apportioning rates, as well as updates to collision avoidance rates used to estimate the unapportioned collision mortality (as set out in Section 2.2 of Updated Information for Offshore Ornithology Cumulative Effects Assessment **[REP3-040]**).

7. Based on the updated estimates, the total predicted in combination annual collision mortality for breeding adult kittiwakes from the FFC SPA is 599 individuals (Table 2.2), compared with the previous total of 443 individuals ([APP-178] Table 4.35). North Falls contributes 0.7 birds to the revised total, or 0.1%.

8. Excluding predicted collision mortality from OWFs which have been consented subject to compensation measures for kittiwake, the total predicted in combination collision mortality is 451 individuals per annum from the FFC breeding population. This assumes that compensation measures for each OWF will produce sufficient additional adult birds to offset the predicted mortality.

9. Based on respective annual totals of 599 and 451 collisions to the adult kittiwake population at the FFC SPA, the predicted in-combination mortality would increase the baseline adult mortality rate of the FFC SPA breeding adult kittiwake population by 4.6% and 3.5%. This is based on a population of 89,148 breeding adults and a baseline annual adult mortality rate of 0.146 (**[APP-178]** paragraph 403). This compares with previous predicted increases in mortality rate of 3.4% (in combination total of 443 collisions per annum, including OWFs consented with compensation for kittiwake at the FFC) and 2.3% (in combination total of 305 collisions per annum, excluding OWFs consented with compensation for kittiwake at the FFC) in the RIAA (**[APP-178]** paragraph 403).

Table 2.2 In combination collision risk for kittiwake at the Flamborough and Filey Coast SPA. This table updates Table 4.39 in the Report to Inform Appropriate Assessment (RIAA), Part 4, Ref. 7.1.4 [APP-178].

Tier	OWF	Predicted number of collisions (in total (adjusted for latest Natural England advice on avoidance rates) and apportioned to SPA[1])								Consented subject to compensation for kittiwake at FFC SPA
		Breeding		Autumn Migration		Spring Migration		Annual		
		Totals	SPA	Totals	SPA	Totals	SPA	Totals	SPA	
1	Beatrice	66.3	0.0	7.5	0.4	27.9	2.0	101.6	2.4	No
1	Beatrice Demonstrator	0.0	0.0	2.0	0.1	1.6	0.1	3.7	0.2	No
1	Blyth Demonstration	1.2	0.0	1.6	0.1	1.0	0.1	3.8	0.2	No
1	Dudgeon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No
1	East Anglia ONE	1.3	0.0	112.3	6.1	32.8	2.4	146.3	8.4	No
1	EOWDC (Aberdeen)	8.3	0.0	4.1	0.2	0.8	0.1	13.1	0.3	No
1	Galloper	4.4	0.0	19.5	1.1	22.3	1.6	46.1	2.7	No
1	Greater Gabbard	0.8	0.0	10.5	0.6	8.0	0.6	19.3	1.1	No
1	Gunfleet Sands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No
1	Hornsea Project One	30.8	25.5	39.1	2.1	14.6	1.1	84.6	28.7	No
1	Hornsea Project Two	11.2	9.4	6.3	0.3	2.1	0.2	19.6	9.9	No
1	Humber Gateway	1.8	1.8	2.2	0.1	1.3	0.1	5.3	2.0	No
1	Hywind	11.6	0.0	0.6	0.0	0.6	0.0	12.8	0.1	No
1	Kentish Flats	0.0	0.0	0.6	0.0	0.5	0.0	1.1	0.1	No
1	Kentish Flats Extension	0.0	0.0	0.0	0.0	2.7	0.2	2.7	0.2	No
1	Kincardine	15.4	0.0	6.3	0.3	0.7	0.1	22.4	0.4	No
1	Lincs	0.6	0.6	0.8	0.0	0.5	0.0	2.0	0.7	No
1	London Array	1.0	0.0	1.6	0.1	1.3	0.1	3.9	0.2	No
1	Lynn and Inner Dowsing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No
1	Methil	0.4	0.0	0.0	0.0	0.0	0.0	0.4	0.0	No

Tier	OWF	Predicted number of collisions (in total (adjusted for latest Natural England advice on avoidance rates) and apportioned to SPA[1])								Consented subject to compensation for kittiwake at FFC SPA
		Breeding		Autumn Migration		Spring Migration		Annual		
		Totals	SPA	Totals	SPA	Totals	SPA	Totals	SPA	
1	Moray East	30.5	0.0	1.4	0.1	13.5	1.0	45.4	1.0	No
1	Race Bank	1.3	1.3	16.7	0.9	3.9	0.3	22.0	2.5	No
1	Rampion	38.1	0.0	26.2	1.4	20.8	1.5	85.1	2.9	No
1	Scroby Sands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No
1	Sheringham Shoal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No
1	Teesside	26.9	26.9	16.8	0.9	1.8	0.1	45.4	27.9	No
1	Thanet	0.1	0.0	0.4	0.0	0.3	0.0	0.8	0.0	No
1	Triton Knoll	17.2	17.2	97.3	5.3	31.8	2.3	146.3	24.8	No
1	Westermost Rough	0.1	0.1	0.1	0.0	0.1	0.0	0.4	0.2	No
2	Dogger Bank A and B	202.0	39.1	94.5	5.1	206.8	14.9	503.3	59.1	No
2	Dogger Bank C and Sofia	95.8	18.5	63.5	3.4	151.8	10.9	311.2	32.8	No
2	Moray West	55.3	0.0	16.8	0.9	4.9	0.4	77.0	1.3	No
2	Neart na Gaoithe	6.0	0.0	11.8	0.6	1.2	0.1	18.9	0.7	No
2	Seagreen Alpha and Bravo[2]	119.8	0.0	99.6	5.4	23.5	1.7	242.9	7.1	No
3	East Anglia ONE North	28.3	14.1	5.7	0.3	2.5	0.2	36.4	14.6	Yes
3	East Anglia THREE	4.3	2.1	48.3	2.6	26.3	1.9	78.9	6.6	No
3	East Anglia TWO	20.7	10.3	3.8	0.2	5.2	0.4	29.6	10.9	Yes
3	Green Volt[3]	5.3	0.0	5.5	0.3	3.3	0.2	14.1	0.5	No
3	Hornsea Project Three	53.9	53.9	26.6	1.4	5.6	0.4	86.1	55.7	Yes
3	Hornsea Project Four	52.2	49.3	9.7	0.5	3.2	0.2	65.1	50.0	Yes

Tier	OWF	Predicted number of collisions (in total (adjusted for latest Natural England advice on avoidance rates) and apportioned to SPA[1])								Consented subject to compensation for kittiwake at FFC SPA
		Breeding		Autumn Migration		Spring Migration		Annual		
		Totals	SPA	Totals	SPA	Totals	SPA	Totals	SPA	
3	Inch Cape	28.0	0.0	18.2	1.0	4.2	0.3	50.4	1.3	No
3	Norfolk Boreas	9.3	2.4	22.5	1.2	8.3	0.6	40.3	4.2	Yes
3	Norfolk Vanguard	15.3	2.6	11.5	0.6	13.5	1.0	40.3	4.2	Yes
3	Rampion 2[4]	1.2	0.0	9.9	0.5	17.5	1.3	28.7	1.8	Yes
3	SEP&DEP	6.9	5.8	4.1	0.2	0.9	0.1	11.8	6.1	Yes
4	Berwick Bank[5]	298.2	0.3	108.5	5.9	72.8	5.2	479.5	11.4	n/a
4	Dogger Bank South[6]	193.9	187.3	80.5	4.3	29.9	2.2	304.2	193.8	n/a
4	Five Estuaries[7]	12.1	0.0	8.0	0.4	5.6	0.4	25.7	0.8	n/a
4	Outer Dowsing[8]	27.2	15.5	3.0	0.2	2.9	0.2	33.2	15.9	n/a
4	West of Orkney[9]	17.6	0.0	16.1	0.9	21.6	1.6	55.3	2.4	n/a
	North Falls[10]	8.6	0.0	3.6	0.2	7.7	0.6	20.0	0.7	n/a
TOTAL including sites consented with compensation measures		**1,531**	**484**	**1,046**	**57**	**810**	**58**	**3,386**	**599**	
Previous total including sites consented with compensation measures, North Falls RIAA Part 4 [APP-178], Table 4.39								**3,362[11]**	**443**	
TOTAL excluding sites consented with compensation measures		**1,343**	**346**	**952**	**51**	**753**	**54**	**3,048**	**451**	
Previous total excluding sites consented with compensation measures, North Falls RIAA Part 4 [APP-178] Table 4.39									**305**	

1. The seasonal and total numbers of collisions for each OWF were derived from those presented at Deadline 8 of the DCO Examination for the SEP&DEP project (Royal HaskoningDHV 2023a), except for sites as listed in footnotes. 2. Seagreen (2022). 3. APEM (2023), note seasonal totals have been updated from [REP3-040]. 4. GoBe (2024a). 5. Pelagica and Cork Ecology (2022), Royal HaskoningDHV (2022). 6. RWE (2025a,b). 7. GoBe (2024c,d). 8. GoBe (2024e), GoBe and SLR (2025). 9. MacArthur Green (2024a). 10. RIAA Part 4 [APP-178] Table 4.28, Maximum rotor diameter (MaRD) scenario, adjusted for avoidance rate. 11. The annual total of predicted collisions at all OWFs included in the in-combination assessment has been amended to correct an error in the total given in [APP-178], Table 4.39. The total for birds apportioned to the FFC SPA in that table is correct.

Tier	OWF	Predicted number of collisions (in total (adjusted for latest Natural England advice on avoidance rates) and apportioned to SPA[1])								Consented subject to compensation for kittiwake at FFC SPA
		Breeding		Autumn Migration		Spring Migration		Annual		
		Totals	SPA	Totals	SPA	Totals	SPA	Totals	SPA	
Where avoidance rates for original collision risk estimates for a given OWF were known, values have been adjusted to SNCB (2024) recommended rates (to 0.9923 (±0.0001) for the deterministic Band (2012) model and 0.9929 (±0.0003) for the stochastic (MacGregor *et al*., 2018 or Caneco *et al*., 2022) model, see Updated Information for Offshore Ornithology Cumulative Effects Assessment [REP3-040]). During autumn and spring migration apportioning is based on the Flamborough and Filey Coast SPA population as a proportion of the UK North Sea BDMPS, respectively 0.054 and 0.072 (Furness 2015). Breeding season apportioning of the Flamborough and Filey Coast population for North Falls is as described in the RIAA, Part 4, [APP-178] Section 4.4.4.5.2.1. Unless specific references are given, for other OWFs breeding season apportioning is as presented at Deadline 8 of the DCO Examination for the SEP&DE project (Royal HaskoningDHV 2023a).									

2.3 Lesser black-backed gull

10. The in-combination collision mortality estimates for lesser black-backed gulls from AOE SPA are presented in **Table 2.3**. These have been updated from those presented in the RIAA (**[APP-178]** Table 4.24). The changes relate primarily to changes to the seasonal apportioning for some OWFs and updates to collision avoidance rates used to estimate the unapportioned collision mortality, as set out in Section 2.3 of Updated Information for Offshore Ornithology Cumulative Effects Assessment **[REP3-040]**. In addition, updated data for some projects has been presented, where this has become available. The footnotes in **Table 2.3** provide further information on these changes, as appropriate.

11. Based on the updated estimates, the total predicted annual collision mortality for breeding adult lesser black-backed gulls from the AOE SPA is 66 individuals including the Natural England approach to apportioning for Five Estuaries, and 61 individuals based on the Applicant approach (**Table 2.3**), compared with the previous estimate of 64 individuals (**[APP-178]** Table 4.24) (see Table 2.3, note 9 for an explanation of the difference between the Natural England and Applicant approaches for Five Estuaries). North Falls contributes 2.3 birds to the updated totals, or 3.5-3.8%. The predicted in-combination mortality would increase the baseline adult mortality rate of the AOE SPA breeding population by 15.2-16.5% (based on a population size of 3498 breeding adults (1749 pairs, **[REP1-058]** paragraph 15) and a baseline annual adult mortality rate of 0.115, Horswill and Robinson 2015). This compares with a predicted 15.9% increase[1] based on the predicted annual adult mortality of 64 in the RIAA (**[APP-178]**, Table 4.23).

12. Four OWFs have been consented subject to compensation measures for lesser black-backed gull at the AOE SPA (**Table 2.3)**. Assuming that compensation measures for each OWF will produce sufficient additional adult birds to offset the predicted mortality, then the predicted collisions for compensated OWFs can be deleted from the in combination total. This gives annual totals of 60 adult collisions based on the Natural England approach to apportioning at Five Estuaries, and 55 based on the Five Estuaries Applicant approach. The respective predicted increases in baseline mortality of the AOE SPA breeding population are 15% and 13.7%. The total in combination collisions for OWFs excluding compensated sites in the previous in combination assessment was 58 (**[APP-178]** Table 4.24), equivalent to a 14.4% increase in baseline mortality.

[1] Note that in the North Falls RIAA, a population of 1880 breeding pairs or 3,760 breeding adult lesser black-backed gulls at the AOE SPA was used as a reference for calculation of increases to baseline mortality ([APP-178], paragraph 183). Following Natural England's Relevant Representations, the baseline population reference has been revised to 1749 pairs or 3498 breeding adults ([REP1-058] paragraph 15). The latter reference population is used for all in combination totals in this document, including the totals from the RIAA, so the percentage increases in baseline mortality are different to those given in the RIAA.

Table 2.3 In combination collision risk for lesser black-backed gull collisions at the Alde-Ore Estuary (AOE) SPA. This table updates Table 4.24 in the Report to Inform Appropriate Assessment, Part 4, Ref. 7.1.4 [APP-178].

Tier	OWF	Overlap with foraging range from AOE[1]			Predicted number of collisions[2] (in total and apportioned to SPA[3])						Consented subject to compensation at AOE
		MMFR + 1SD (236km)	Mean max (127km)	AOE Breeding proportion	Breeding		Non-breeding		Annual		
					Totals	SPA	Totals	SPA	Totals	SPA	
1	Beatrice Demonstrator	No	No		0	0	0	0	0	0	No
1	Beatrice	No	No		0	0	0	0	0	0	No
1	Blyth Demonstration	No	No		0	0	0	0	0	0	No
1	Dudgeon	Yes	Yes	0.15	9.9	1.5	39.2	0.5	49.0	1.9	No
1	East Anglia ONE	Yes	Yes	0.37	7.6	2.8	43.3	0.5	50.8	3.3	No
1	EOWDC (Aberdeen)	No	No		0	0	0	0	0	0	No
1	Galloper	Yes	Yes	0.65	35.6	23.1	142.1	1.7	177.7	24.8	No
1	Greater Gabbard	Yes	Yes	0.65	15.9	10.3	63.5	0.8	79.4	11.1	No
1	Gunfleet Sands	Yes	Yes	0.35	1.0	0.4	0.0	0	1.0	0.4	No
1	Hornsea Project One	Yes	No		5.6	0	22.3	0.3	27.9	0.3	No
1	Hornsea Project Two	Yes	No		2.6	0	2.6	0	5.1	0	No
1	Humber Gateway	Yes	No		0.4	0	1.4	0	1.8	0	No
1	Hywind	No	No		0	0	0	0	0	0	No
1	Kentish Flats	Yes	Yes	0.38	0.4	0.1	1.7	0	2.0	0.2	No
1	Kentish Flats Extension	Yes	Yes	0.38	0.3	0.1	1.3	0	1.6	0.1	No
1	Kincardine	No	No		0	0	0	0	0	0	No

Tier	OWF	Overlap with foraging range from AOE[1]			Predicted number of collisions[2] (in total and apportioned to SPA[3])						Consented subject to compensation at AOE
		MMFR + 1SD (236km)	Mean max (127km)	AOE Breeding proportion	Breeding		Non-breeding		Annual		
					Totals	SPA	Totals	SPA	Totals	SPA	
1	Lincs	Yes	(Yes)		2.2	0	8.7	0.1	10.9	0.1	No
1	London Array	Yes	Yes	0.46	0	0	0	0	0	0	No
1	Lynn and Inner Dowsing	Yes	(No)		0	0	0	0	0	0	No
1	Methil	No	No		0.5	0	0	0	0.5	0	No
1	Moray East	No	No		0	0	0	0	0	0	No
1	Race Bank	Yes	(yes)		55.3	0	13.8	0.2	69.1	0.2	No
1	Rampion	Yes	No	-	2.0	0	8.1	0.1	10.1	0.1	No
1	Scroby Sands	Yes	Yes	0.01	0	0	0	0	0	0	No
1	Sheringham Shoal	Yes	Yes	0.15	2.2	0.3	8.4	0.1	10.6	0.4	No
1	Teesside	No	No	-	0	0	0	0	0	0	No
1	Thanet	Yes	Yes	0.43	4.1	1.8	16.4	0.2	20.5	2.0	No
1	Triton Knoll	Yes	No	-	9.5	0	37.9	0.5	47.4	0.5	No
1	Westermost Rough	Yes	No	-	0.1	0	0.4	0	0.5	0	No
2	Dogger Bank A and B	No	No	-	3.3	0	13.3	0.2	16.6	0.2	No
2	Dogger Bank C and Sofia	No	No	-	3.1	0	12.3	0.1	15.4	0.1	No
2	Moray West	No	No	-	0	0	0	0	0	0	No
2	Neart na Gaoithe	No	No	-	1.3	0	0	0	1.3	0	No

Tier	OWF	Overlap with foraging range from AOE[1]			Predicted number of collisions[2] (in total and apportioned to SPA[3])						Consented subject to compensation at AOE
		MMFR + 1SD (236km)	Mean max (127km)	AOE Breeding proportion	Breeding		Non-breeding		Annual		
					Totals	SPA	Totals	SPA	Totals	SPA	
2	Seagreen Alpha and Bravo	No	No	-	2.7	0	10.8	0.1	13.4	0.1	No
3	East Anglia ONE North	Yes	Yes	0.24	1.2	0.3	0.8	0	1.9	0.3	Yes
3	East Anglia THREE	Yes	Yes	0.24	2.3	0.6	10.5	0.1	12.8	0.7	No
3	East Anglia TWO	Yes	Yes	0.39	5.4	2.1	0.6	0	6.0	2.1	Yes
3	Green Volt	No	No	-	0	0	0	0	0	0	No
3	Hornsea Project Three	Yes	No	-	10.2	0	1.3	0	11.5	0	No
3	Hornsea Project Four	Yes	No	-	1.1	0	0	0	1.1	0	No
3	Inch Cape	No	No	-	0	0	0	0	0	0	No
3	Norfolk Boreas	Yes	Yes	0.21	7.9	1.7	10.4	0.1	18.3	1.8	Yes
3	Norfolk Vanguard	Yes	Yes	0.17	10.8	1.8	4.6	0.1	15.4	1.9	Yes
3	Rampion 2[4]	Yes	No	-	1.5	0	2.9	0	4.4	0	No
3	Sheringham Shoal and Dudgeon Extensions	Yes	Yes	0.12	2.0	0.3	0.3	0	2.3	0.3	No
4	Berwick Bank[5]	No	No	-	7.7	0	0	0	7.7	0	N/A
4	Dogger Bank South[6]	No	No	-	1.2	0	0	0	1.2	0	N/A
4	Outer Dowsing[7]	Yes	No	0.10	1.5	0.2	0.3	0	1.9	0.2	N/A
4	West of Orkney[8]	No	No	-	0	0	0	0	0	0	N/A
4	*Five Estuaries, Applicant*[9]	*Yes*	*Yes*	*0.16*	*35.1*	*5.5*	*5.5*	*0.2*	*40.6*	*5.7*	N/A

Tier	OWF	Overlap with foraging range from AOE[1]			Predicted number of collisions[2] (in total and apportioned to SPA[3])						Consented subject to compensation at AOE
		MMFR + 1SD (236km)	Mean max (127km)	AOE Breeding proportion	Breeding		Non-breeding		Annual		
					Totals	SPA	Totals	SPA	Totals	SPA	
4	*Five Estuaries, NE*[9]	*Yes*	*Yes*	*0.32*	*35.1*	*11.1*	*5.5*	*0.1*	*40.6*	*11.2*	N/A
	North Falls	Yes	Yes	0.35	6.4	2.3	2.0	0	8.4	2.3	N/A
TOTALS (all tiers), Natural England approach, Five Estuaries					**260**	**61**	**486**	**6**	**746**	**66**	
TOTALS (all tiers), Applicant approach, Five Estuaries					**260**	**55**	**485**	**6**	**746**	**61**	
Previous totals (all tiers) from North Falls RIAA					**265**	**58**	**486**	**6**	**751**	**64**	
TOTALS (all tiers), excluding sites consented with compensation (Five Estuaries, NE approach)										**60**	
TOTALS (all tiers), excluding sites consented with compensation (Five Estuaries, Applicant approach)										**55**	
Previous total excluding sites consented with compensation measures, North Falls RIAA										**58**	

1. Foraging ranges from Woodward *et al.* (2019); brackets indicate where an OWF is only just within or outside a given distance, e.g. at 124.4km from the SPA, Race Bank is only just within mean max foraging range (127km) of AOE. 2. Source references for seasonal collision predictions are as Appendix 13.3 [APP104] except where footnoted (see below) and have been adjusted to reflect the latest SNCB (2024) advice on avoidance rates. 3. Breeding season apportioning of the AOE population for North Falls is as described in the Lesser Black-backed Gull compensation document (Revision 2 [REP6-011/012] (clean/tracked), Section 4). This has been updated from the apportioning in Section 4.4.2.5.2.1 of the RIAA [APP-178], based on revised breeding season apportioning for North Falls as described in [REP1-058] and a small change in the recommended avoidance rate to align with the SNCB (2024) advice. For all OWFs in Tiers 1-3, where a value is given for breeding season apportioning to the AOE SPA, this is taken from MacArthur Green and Royal HaskoningDHV (2020), except for SEPDEP where the breeding season apportioning is taken from Royal HaskoningDHV 2023a; and for OWFs in Tier 4, seasonal estimates and breeding season apportioning (where relevant) are based on information in the most recently available EIA and/or RIAA for a given OWF (see notes below) or the distance to the AOE SPA. During the non-breeding season apportioning is based on the AOE SPA population as a proportion of the UK North Sea and Channel BDMPS (Furness 2015) (weighted value for autumn migration, winter and spring migration, see [APP-178], paragraph 220). 4.Gobe (2024a). 5. HiDef (2022a). 6. RWE (2025a). 7. GoBe (2024e), Gobe and SLR (2025). 8. MacArthur Green (2024b). 9. GoBe (2024c,d). The Applicant apportions 0.39 of the breeding season collisions to adult birds based on Furness (2015) and a sabbatical rate of 0.35 and further assumes 40% adults are from the AOE SPA; the non-breeding season is divided into autumn migration, winter and spring migration with apportioning rates of 3.33% during the migration periods and 4.92% in the winter. Under the Natural England approach it is assumed that 79% of breeding collisions involve adult birds (from adult proportions based on Digital Aerial Survey images) and 40% of adults are from the AOE SPA; during the non-breeding season a weighted apportioning has been applied for Five Estuaries, based on the approach described in the North Falls RIAA [APP-178] based on Furness (2015).

3 In combination displacement

3.1 Gannet

13. The in-combination population estimates for gannets from the FFC SPA at risk of displacement are presented in **Table 3.1**. These have been updated from those presented in Table 4.32 of the RIAA **[APP-178]**. The changes relate primarily to updated data for some projects included in the in-combination assessment, as documented Section 3.1 of Updated Information for Offshore Ornithology Cumulative Effects Assessment **[REP3-040]**. The footnotes in **Table 3.1** provide further information on these updates, as appropriate.

14. An in-combination displacement matrix for gannets at the FFC SPA is presented in Table 3.2, with equivalent estimates of increase in baseline mortality in Table 3.3.

15. The estimated annual total of breeding adult gannets from the FFC SPA present and at risk of displacement from all OWFs within the UK North Sea BDMPS combined is 11,784 (**Table 3.1**). Of this total, North Falls contributes 0.7% (80 birds). Using displacement rates of 60% to 80% and a mortality rate of 1% of displaced birds, between 71 and 94 breeding adults from the FFC SPA population are predicted to die each year (**Table 3.2**). The estimated increase in mortality of FFC SPA breeding gannets due to in-combination displacement impacts (**Table 3.3**) is between 3.1% and 4.1% (based on a population size of 28,358 breeding adults and a baseline annual adult mortality rate of 8.1%, Horswill and Robinson 2015).

16. These estimates update those presented in the RIAA, which reported an in-combination total of 10,530 breeding adult gannets from the FFC at risk of displacement, with 63-84 individuals per year predicted to suffer mortality from displacement, equivalent to a 2.8% - 3.7% increase in baseline mortality (**[APP-178]**, section 4.4.4.4.3.2.1).

Table 3.1 Seasonal and annual population estimates of gannets at risk of displacement at North Falls and other OWFs included in the in-combination assessment; and apportionment (breeding adult birds) to the FFC SPA. This table updates Table 4.32 in the RIAA, Part 4, Ref. 7.1.4 [APP-178].

Tier	OWF	Seasonal Population at Risk of Displacement[1]							
		Breeding		Autumn Migration		Spring Migration		Annual	
		Totals	FFC	Totals	FFC	Totals	FFC	Totals	FFC
1	Beatrice	151	0	0	0	0	0	151	0.0
1	Beatrice Demonstrator	n/a							
1	Blyth Demonstration	n/a							
1	Dudgeon	53	53	25	1	11	1	89	54.9
1	East Anglia ONE	161	161	3,638	175	76	5	3,875	340.3
1	EOWDC (Aberdeen)	35	0	5	0.2	0	0	40	0.2
1	Galloper	360	0	907	44	276	17	1,543	60.6
1	Greater Gabbard	252	0	69	3	105	7	426	9.8
1	Gunfleet Sands	0	0	12	1	9	1	21	1.1
1	Hornsea Project One	671	671	694	33	250	16	1,615	719.8
1	Hornsea Project Two	457	457	1,140	55	124	8	1,721	519.4
1	Humber Gateway	n/a							
1	Hywind	10	0	0	0	4	0.2	14	0.2
1	Kentish Flats	n/a							
1	Kentish Flats Extension	0	0	13	1	0	0	13	0.6
1	Kincardine	120	0	0	0	0	0	120	0.0
1	Lincs, Lynn and Inner Dowsing	n/a							

Tier	OWF	Seasonal Population at Risk of Displacement[1]							
		Breeding		Autumn Migration		Spring Migration		Annual	
		Totals	FFC	Totals	FFC	Totals	FFC	Totals	FFC
1	London Array	n/a							
1	Methil	23	0	0	0	0	0	23	0.0
1	Moray Firth East	564	0	292	14	27	2	883	15.7
1	Race Bank	92	92	32	2	29	2	153	95.3
1	Rampion	0	0	590	28	0	0	590	28.3
1	Scroby Sands	n/a							
1	Sheringham Shoal	47	47	31	1	2	0.1	80	48.6
1	Teesside	1	0.5	0	0	0	0	1	0.5
1	Thanet	n/a							
1	Triton Knoll	211	211	15	1	24	1	250	213.2
1	Westermost Rough	n/a							
2	Dogger Bank (formerly Creyke Beck) A and B	1,155	578	2048	98	394	24	3,597	700.2
2	Dogger Bank C (formerly Teesside A) and Sofia (formerly Teesside B)	2,250	1,125	887	43	464	29	3,601	1,196.3
2	Moray West	2,827	0	439	21	144	9	3,410	30.0
2	Neart na Gaoithe	1,987	0	552	26	281	17	2,820	43.9
2	Firth of Forth (Seagreen) Alpha and Bravo	2,956	0	664	32	332	21	3,952	52.5
3	East Anglia ONE North	149	149	468	22	44	3	661	174.2
3	East Anglia THREE	412	412	1,269	61	524	32	2,205	505.4

Tier	OWF	Seasonal Population at Risk of Displacement[1]							
		Breeding		Autumn Migration		Spring Migration		Annual	
		Totals	FFC	Totals	FFC	Totals	FFC	Totals	FFC
3	East Anglia TWO	192	192	891	43	192	12	1,275	246.7
3	Hornsea Project Three	1,333	844	984	47	524	32	2,841	923.7
3	Hornsea Project Four	976	883	790	38	401	25	2,167	945.9
3	Inch Cape	2,398	0	703	34	212	13	3,313	46.9
3	Norfolk Boreas	1,229	1,229	1,723	83	526	33	3,478	1,344.3
3	Norfolk Vanguard	271	271	2,453	118	437	27	3,161	415.8
3	Green Volt[2]	198	4	24	1	102	9	324	14.4
3	Rampion 2[3]	111	0	102	5	123	8	336	12.5
3	SEP&DEP	440	337	638	31	58	4	1136	371.6
4	Berwick Bank[4]	4735	55	1500	72	269	17	6504	143.5
4	Dogger Bank South[5]	1,560	1,560	1,574	76	161	10	3,295	1645.8
4	Five Estuaries[6]	233	141	640	35	67	5	940	181.0
4	Outer Dowsing[7]	554	499	496	24	69	4	1,119	526.9
4	West of Orkney[8]	852	0	1,368	66	140	9	2,359	74.3
	North Falls[10]	69	48	287	14	290	18	646	79.6
TOTALS (all tiers)		**30,095**	**10,020**	**27,962**	**1,346**	**6,691**	**418**	**64,748**	**11,784**
Previous total (all tiers) from Appendix 13.3		**29,894**	**8,834**	**26,877**	**1,290**	**6,535**	**406**	**63,304**	**10,530**

1. Seasonal and annual populations of gannets within the OWF array and buffer (2km in most cases, but the buffer zones included in this assessment varied between 0-4km depending on the data available) and the numbers apportioned to the FFC SPA. Numbers and breeding season apportioning based on Royal HaskoningDHV (2023a) and updated

Tier	OWF	Seasonal Population at Risk of Displacement[1]							
		Breeding		Autumn Migration		Spring Migration		Annual	
		Totals	FFC	Totals	FFC	Totals	FFC	Totals	FFC
for OWFs where new information has become available, see footnotes below: 2. APEM (2022). 3. GoBe (2024a). 4. Royal HaskoningDHV (2022a). 5. RWE (2025b). 6. GoBe (2024c, d). 7. GoBe and SLR (2025). 8. MacArthur Green (2024c); 10. Table 4.27 of North Falls RIAA [APP-178].									

Table 3.2 In-combination displacement matrix for gannet at the FFC SPA. The cells show the number of predicted bird mortalities (to the nearest integer) per annum at given rates of displacement and mortality. Grey cells identify the range of displacement and mortality rates considered in the assessment. Red text identifies values of predicted mortality which represent a 1% or more increase in the population mortality rate (with reference to Table 3.3 below). This table updates Table 4.33 in the RIAA, Part 4, Ref. 7.1.4 [APP-178].

Mean		Mortality										
Displacement		1%	2%	3%	4%	5%	10%	20%	30%	50%	80%	100%
	10%	12	24	35	47	59	118	236	354	589	943	1178
	20%	21	42	64	85	106	212	424	636	1061	1697	2121
	30%	35	71	106	141	177	354	707	1061	1768	2828	3535
	40%	47	94	141	189	236	471	943	1414	2357	3771	4714
	50%	59	118	177	236	295	589	1178	1768	2946	4714	5892
	60%	71	141	212	283	354	707	1414	2121	3535	5656	7071
	70%	82	165	247	330	412	825	1650	2475	4125	6599	8249
	80%	94	189	283	377	471	943	1885	2828	4714	7542	9427
	90%	106	212	318	424	530	1061	2121	3182	5303	8485	10606
	100%	118	236	354	471	589	1178	2357	3535	5892	9427	11784

Table 3.3 In-combination displacement matrix for gannet at the FFC SPA. The cells show the % increase in the mortality rate of the SPA population associated with the number of predicted bird mortalities per annum at given rates of displacement and mortality given in Table 3.2 (above). This table updates Table 4.34 in the RIAA, Part 4, Ref. 7.1.4 [APP-178].

Mean		Mortality										
Displacement		1%	2%	3%	4%	5%	10%	20%	30%	50%	80%	100%
	10%	0.5%	1.0%	1.5%	2.1%	2.6%	5.1%	10.3%	15.4%	25.7%	41.0%	51.3%
	20%	0.9%	1.8%	2.8%	3.7%	4.6%	9.2%	18.5%	27.7%	46.2%	73.9%	92.3%
	30%	1.5%	3.1%	4.6%	6.2%	7.7%	15.4%	30.8%	46.2%	77.0%	123.1%	153.9%
	40%	2.1%	4.1%	6.2%	8.2%	10.3%	20.5%	41.0%	61.6%	102.6%	164.2%	205.2%
	50%	2.6%	5.1%	7.7%	10.3%	12.8%	25.7%	51.3%	77.0%	128.3%	205.2%	256.5%
	60%	3.1%	6.2%	9.2%	12.3%	15.4%	30.8%	61.6%	92.3%	153.9%	246.3%	307.8%
	70%	3.6%	7.2%	10.8%	14.4%	18.0%	35.9%	71.8%	107.7%	179.6%	287.3%	359.1%
	80%	4.1%	8.2%	12.3%	16.4%	20.5%	41.0%	82.1%	123.1%	205.2%	328.3%	410.4%
	90%	4.6%	9.2%	13.9%	18.5%	23.1%	46.2%	92.3%	138.5%	230.9%	369.4%	461.7%
	100%	5.1%	10.3%	15.4%	20.5%	25.7%	51.3%	102.6%	153.9%	256.5%	410.4%	513.0%

3.2 Guillemot

17. The in-combination population estimates for guillemots from FFC SPA at risk of displacement are presented in **Table 3.4**. These have been updated from those presented in Section 4.4.4.6.3.2 of the RIAA **[APP-178]**. The changes relate to updated data that has become available for some projects included in the in-combination assessment (as documented in Section 3.2 of Updated Information for Offshore Ornithology Cumulative Effects Assessment **[REP3-040]**), and also the inclusion of an additional 'chick rearing/moult' season that Natural England has advised should be applied to some OWF projects, The footnotes in **Table 3.2** provide further information on these changes, as appropriate.

18. Annual totals for the estimated number of guillemots from the FFC SPA breeding population at risk of displacement are presented for four scenarios: based on the Applicant and Natural England approaches to apportioning for Outer Dowsing, including and excluding totals from OWFs consented subject to compensation measures for guillemot at the FFC SPA (Hornsea Project Four (HP4), Rampion 2 and SEP&DEP,**Table 3.4)**. Scenarios excluding consented OWFs with compensation measures for guillemot are presented on the basis that compensation measures will produce sufficient additional adult birds to offset the predicted mortality, and therefore these OWFs will not contribute to the in combination totals. In consenting R2 (Department for Energy Security & Net Zero (DESNZ) 2025) the Secretary of State noted the advice from NE that there is a high degree of uncertainty over whether the guillemot compensation from HP4 will be adequately achieved, and thus their concern relating to the exclusion of Hornsea Four values from the in-combination assessment; the Secretary of State, however, was content that the guillemot compensation from HP4 will be achieved and, therefore, with adopting values that exclude HP4.

19. In combination displacement matrices for the FFC breeding population of guillemots for the four scenarios above are included in **Table 3.5** through **Table 3.12**. These show the number of predicted mortalities per year based on a range of displacement rates and mortality of displaced birds (**Table 3.5**, **Table 3.7**, **Table 3.9** and **Table 3.11**) and the equivalent predicted increases in the baseline mortality rate of the FFC SPA population (**Table 3.6**, **Table 3.8**, **Table 3.10** and **Table 3.12**).

20. Predicted increases in the baseline mortality rate of the breeding guillemot population at the FFC SPA under the four scenarios identified above (Paragraph 18) are given in **Table 3.13**. Based on the Applicant approach of 50% displacement and 1% mortality of displaced birds, the predicted increases in baseline mortality rate range from 3.5% to 6.1%. Based on the Natural England approach of 70% displacement and 2% mortality, the predicted increases in baseline mortality range from 9.9% to 17.1%. These compare with predicted increases in baseline mortality of 2.8% to 4.6% for the Applicant approach, and 7.9% to 12.8% for the Natural England approach, in the RIAA (**[APP-178]**, Table 4.49).

Table 3.4 Seasonal and annual population estimates of guillemots at North Falls and other OWFs included in the in-combination assessment; and breeding adult birds apportioned to FFC SPA. This table updates Table 4.44 in the Report to Inform Appropriate Assessment, Part 4, Ref. 7.1.4 [APP-178].

Tier	OWF	Distance from FFC (km)	Number of guillemots at risk of displacement[1]								Consented subject to compensa-tion for guillemot at FFC
			Breeding		Chick rearing/ moult		Non-Breeding		Annual		
			Total	FFC	Total	FFC	Total	FFC	Totals[2]	FFC	
1	Beatrice	464.1	13,610	0	n/a	n/a	2,755	121	16,365	121	-
1	Beatrice Demonstrator	460.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-
1	Blyth Demonstration	116.7	1,220	0	n/a	n/a	1,321	58	2,541	58	-
1	Dudgeon	126.3	334	0	n/a	n/a	542	24	876	24	-
1	East Anglia ONE	260.5	274	0	n/a	n/a	640	28	914	28	-
1	EOWDC (Aberdeen)	343.9	547	0	n/a	n/a	225	10	772	10	-
1	Galloper	270.5	305	0	n/a	n/a	593	26	898	26	-
1	Greater Gabbard	270.7	345	0	n/a	n/a	548	24	893	24	-
1	Gunfleet Sands	274.5	0	0	n/a	n/a	363	16	363	16	-
1	Hornsea Project One	114.0	9,836	4,554	n/a	n/a	8,097	357	17,933	4,911	-
1	Hornsea Project Two	97.7	7,735	3,581	n/a	n/a	13,164	581	20,899	4,162	-
1	Humber Gateway	52.1	99	99	n/a	n/a	138	6	237	105	-
1	Hywind	362.2	249	0	n/a	n/a	2,136	94	2,385	94	-
1	Kentish Flats and Extension	300.9	0	0	n/a	n/a	7	0	7	0	-
1	Kincardine	316.8	632	0	n/a	n/a	0	0	632	0	-
1	Lincs and Lynn and Inner Dowsing	100.4	582	0	n/a	n/a	814	36	1,396	36	-

Tier	OWF	Distance from FFC (km)	Number of guillemots at risk of displacement[1]								Consented subject to compensa-tion for guillemot at FFC
			Breeding		Chick rearing/ moult		Non-Breeding		Annual		
			Total	FFC	Total	FFC	Total	FFC	Totals[2]	FFC	
1	London Array	285.8	192	0	n/a	n/a	377	17	569	17	-
1	Methil	271.7	25	0	n/a	n/a	0	0	25	0	-
1	Moray Firth East	453.1	9,820	0	n/a	n/a	547	24	10,367	24	-
1	Race Bank	100.7	361	0	n/a	n/a	708	31	1,069	31	-
1	Rampion	375.8	10,887	0	n/a	n/a	15,536	685	26,423	685	-
1	Scroby Sands	200.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-
1	Sheringham Shoal	126.9	390	0	n/a	n/a	715	32	1,105	32	-
1	Teesside	63.5	267	267	n/a	n/a	901	40	1,168	307	-
1	Thanet	313.4	18	0	n/a	n/a	124	5	142	5	-
1	Triton Knoll	80.9	425	425	n/a	n/a	746	33	1,171	458	-
1	Westermost Rough	31.4	347	347	n/a	n/a	486	21	833	368	-
2	Dogger Bank (formerly Creyke Beck) A and B	128.6	14,886	5,210	n/a	n/a	16,763	739	31,649	5,949	-
2	Dogger Bank C (formerly Teesside A) and Sofia (formerly Teesside B)	162.5	8,494	2,973	n/a	n/a	5,969	263	14,463	3,236	-
2	Moray West	453.1	24,426	0	n/a	n/a	38,174	1,683	62,600	1,683	-
2	Neart na Gaoithe	246.3	1,755	0	n/a	n/a	3,761	166	5,516	166	-
2	Seagreen (Forth) Alpha and Bravo	263.2	24,724	0	n/a	n/a	8,800	388	33,524	388	-

Tier	OWF	Distance from FFC (km)	Number of guillemots at risk of displacement[1]								Consented subject to compensa-tion for guillemot at FFC
			Breeding		Chick rearing/ moult		Non-Breeding		Annual		
			Total	FFC	Total	FFC	Total	FFC	Totals[2]	FFC	
3	East Anglia ONE North	246.8	4,183	0	n/a	n/a	1,888	83	6,071	83	-
3	East Anglia THREE	239.2	1,744	0	n/a	n/a	2,859	126	4,603	126	-
3	East Anglia TWO	253.8	2,077	0	n/a	n/a	1,675	74	3,752	74	-
3	Green Volt[3]	324.9	4,429	0	n/a	n/a	16,105	710	20,534	710	-
3	Hornsea Project Three[4]	147.3	13,374	0	n/a	n/a	17,772	784	31,146	784	-
3	Hornsea Project Four[5]	63.0	9,382	9,382	36,965	22,179	16,962	748	46,347	32,309	Yes
3	Inch Cape	266.1	4,371	0	n/a	n/a	3,177	140	7,548	140	-
3	Norfolk Boreas	217.0	7,767	0	n/a	n/a	13,777	608	21,544	608	-
3	Norfolk Vanguard	202.9	4,320	0	n/a	n/a	4,776	211	9,096	211	-
3	Rampion 2[6]	376.4	134	0	n/a	n/a	5,723	252	5,857	252	Yes
3	SEP&DEP	115.5	4,934	0	n/a	n/a	15,972	704	20,906	704	Yes
4	Berwick Bank[7]	211.6	74,154	0	n/a	n/a	44,171	1,948	118,325	1,948	-
4	Dogger Bank South[8]	103.0	17,814	17,814	20,176	13,760	22,447	990	40,261	32,564	-
4	Five Estuaries[9]	275.5	1,201	0	n/a	n/a	3,698	163	4,899	163	-
4	*Outer Dowsing (applicant approach)[10]*	*92.9*	*11,364*	*3,239*	*n/a*	*n/a*	*9,066*	*400*	*20,430*	*3,639*	-
	Outer Dowsing (NE approach)[10]		*11,364*	*11,364*	*9,066*	*6,210*	*4,279*	*189*	*24,709*	*17,763*	
4	West of Orkney[11]	556.7	7,973	0	n/a	n/a	4,393	194	12,365	194	-

Tier	OWF	Distance from FFC (km)	Number of guillemots at risk of displacement[1]								Consented subject to compensa-tion for guillemot at FFC
			Breeding		Chick rearing/ moult		Non-Breeding		Annual		
			Total	FFC	Total	FFC	Total	FFC	Totals[2]	FFC	
	North Falls	288.5	866	0	n/a	n/a	5,365	237	6,231	237	-
Totals based on Outer Dowsing Applicant's approach, all project tiers											
All sites			**302,871**	**47,891**	**57,142**	**35,939**	**314,776**	**13,882**	**617,647**	**97,712**	
Excluding compensated sites – HP4, SEP&DEP, R2			**288,421**	**38,509**	**20,176**	**13,760**	**276,119**	**12,177**	**564,540**	**64,446**	
Totals based on Outer Dowsing NE approach, all project tiers											
All sites			**302,871**	**56,016**	**66,208**	**42,150**	**309,989**	**13,671**	**612,860**	**111,836**	
Excluding compensated sites – HP4, SEP&DEP, R2			**288,421**	**46,634**	**29,242**	**19,971**	**271,332**	**11,966**	**564,540**	**78,571**	
Previous total (HP4 consented NE 'bespoke approach)			**288,631**	**46,150**	**n/a**	**22,179**	**369,681**	**15,396**	**658,312**	**83,725**	
Previous total (excluding compensated site HP4)			**279,249**	**36,788**	**n/a**	**0**	**332,716**	**14,648**	**611,965**	**51,416**	

Notes:

1. The preferred standard area is the OWF plus a 2km buffer (SNCB 2017), however the buffer zones included in this assessment varied between 0-4km depending on the data available. Seasonal and annual totals of guillemots at risk of displacement and apportioning to the FFC follow those of (Royal HaskoningDHV 2022b, 2023a), except where footnoted (see also Updated Information for Offshore Ornithology Cumulative Effects Assessment, **Document Reference: 9.29 [REP3-040]**).
2. For sites where an additional chick rearing / moult season has been identified, the annual seasonal totals for the BDMPS (not apportioned to FFC) are made up of the breeding season plus the larger of either value from chick rearing / moult period or the non-breeding period. As the additional season was identified in relation to the FFC SPA, rather than the BDMPS, the basing the annual totals on two rather than three season aims to make them comparable with the annual totals for other OWFs where the additional season has not been identified.
3. Total seasonal population estimates from APEM (2022a). It has been assumed that no birds would be apportioned to FFC SPA during the breeding season (project is beyond MMFR +1SD from FFC), and 4.41% apportioned during the non-breeding season.
4. With respect to apportioning to the FFC SPA, the East Anglia ONE North /East Anglia TWO Deadline 11 Offshore Ornithology Cumulative and In-Combination Collision Risk and Displacement Update (MacArthur Green and Royal HaskoningDHV 2021) and Hornsea Project 4 Deadline 6 (APEM and Gobe, 2022) revised totals for Hornsea Project Three and identified 64% of the guillemots present during the breeding season as being apportioned to the FFC SPA (i.e. 8,502 birds). However, given the site is beyond MMFR = 1SD

Tier	OWF	Distance from FFC (km)	Number of guillemots at risk of displacement[1]								Consented subject to compensa-tion for guillemot at FFC
			Breeding		Chick rearing/ moult		Non-Breeding		Annual		
			Total	FFC	Total	FFC	Total	FFC	Totals[2]	FFC	

for guillemot (95.4km, Woodward *et al.,* 2019), it was determined that adult guillemot from the SPA were not present on the project array area during the breeding season and the apportionment estimates refers instead to immature birds associated with the SPA population (see NIRAS 2019, 2021). Thus, no adult birds from Hornsea Three are apportioned to the SPA during the breeding season.

5. Three approaches for HP4 are given in the RIAA [APP-178], Table 4.44. It is understood that the consent for this project (12 July 2023) was based on the NE bespoke approach to seasonal apportioning (DESNZ, 2023), so values from this approach are included here.
6. GoBe (2024a,b).
7. Seasonal population estimates from Pelagica and Cork Ecology (2022), Royal HaskoningDHV (2022a). It has been assumed that no birds would be apportioned to FFC SPA during the breeding season (project is beyond MMFR + 1SD from FFC), and 4.41% apportioned during the non-breeding season.
8. RWE (2025b), 100% apportioning to FFC during the breeding season.
9. GoBe (2024 c,d).
10. GoBe (2025), GoBe and SLR (2025), model-based estimated. The Applicant approach to apportioning is based on two seasons, a breeding and non-breeding season; during the breeding season 57% of birds at Outer Dowsing are assumed to be adults, and 50% of those adults from the FFC SPA breeding population, during the non-breeding season 4.41% of birds are assumed to be adults from the FFC SPA breeding population, based on the appendices to Furness (2015), Under the Natural England approach 100% of the breeding season population is assumed to be adults from the FFC SPA; due to the proximity of Outer Dowsing to the FFC SPA, the first two months of the non-breeding season (August and September) are separated into a post-breeding chick-rearing moult season, during which a bespoke adult apportioning rate for the FFC of 68.5% is applied; for the remainder of the non-breeding season, an apportioning rate of 4.41% is applied for adults from the FFC SPA, based on the appendices to Furness (2015).
11. Total seasonal population estimates from MacArthur Green (2024c). It has been assumed that no birds would be apportioned to FFC SPA during the breeding season (project is beyond MMFR +1SD, and 4.41% apportioned during the non-breeding season.

Table 3.5 In-combination displacement matrix for adult guillemots from the FFC SPA breeding population, Applicant approach to apportioning for Outer Dowsing, including compensated sites. The cells show the number of predicted bird mortalities (to the nearest integer) per annum at given rates of displacement and mortality. Grey cells identify the range of displacement and mortality rates considered in the assessment. Red text indicates values of predicted mortality representing a 1% or more increase in the baseline mortality rate with reference to Table 3.6.

Mean		Mortality										
Displacement		1%	2%	3%	4%	5%	10%	20%	30%	50%	80%	100%
	10%	98	195	293	391	489	977	1954	2931	4886	7817	9771
	20%	195	391	586	782	977	1954	3908	5863	9771	15634	19542
	30%	293	586	879	1173	1466	2931	5863	8794	14657	23451	29314
	40%	391	782	1173	1563	1954	3908	7817	11725	19542	31268	39085
	50%	489	977	1466	1954	2443	4886	9771	14657	24428	39085	48856
	60%	586	1173	1759	2345	2931	5863	11725	17588	29314	46902	58627
	70%	684	1368	2052	2736	3420	6840	13680	20519	34199	54719	68398
	80%	782	1563	2345	3127	3908	7817	15634	23451	39085	62536	78170
	90%	879	1759	2638	3518	4397	8794	17588	26382	43970	70353	87941
	100%	977	1954	2931	3908	4886	9771	19542	29314	48856	78170	97712

Table 3.6 In-combination displacement matrix for adult guillemots from the FFC SPA breeding population, Applicant approach to apportioning for Outer Dowsing, including compensated sites. The cells show the % increase in the mortality rate of the SPA population (based on a total population of 149,978 breeding adults and a baseline annual mortality of 6.1% (Horswill and Robinson 2015) associated with the number of predicted bird mortalities per annum at given rates of displacement and mortality. Grey cells identify the range of displacement and mortality rates considered in the assessment.

Mean		Mortality										
Displacement		1%	2%	3%	4%	5%	10%	20%	30%	50%	80%	100%
	10%	1.1%	2.1%	3.2%	4.3%	5.3%	10.7%	21.4%	32.0%	53.4%	85.4%	106.8%
	20%	2.1%	4.3%	6.4%	8.5%	10.7%	21.4%	42.7%	64.1%	106.8%	171%	214%
	30%	3.2%	6.4%	9.6%	12.8%	16.0%	32.0%	64.1%	96.1%	160%	256%	320%
	40%	4.3%	8.5%	12.8%	17.1%	21.4%	42.7%	85.4%	128%	214%	342%	427%
	50%	5.3%	10.7%	16.0%	21.4%	26.7%	53.4%	106.8%	160%	267%	427%	534%
	60%	6.4%	12.8%	19.2%	25.6%	32.0%	64.1%	128%	192%	320%	513%	641%
	70%	7.5%	15.0%	22.4%	29.9%	37.4%	74.8%	150%	224%	374%	598%	748%
	80%	8.5%	17.1%	25.6%	34.2%	42.7%	85.4%	171%	256%	427%	684%	854%
	90%	9.6%	19.2%	28.8%	38.4%	48.1%	96.1%	192%	288%	481%	769%	961%
	100%	10.7%	21.4%	32.0%	42.7%	53.4%	106.8%	214%	320%	534%	854%	1068%

Table 3.7 In-combination displacement matrix for adult guillemots from the FFC SPA breeding population, Applicant approach to apportioning for Outer Dowsing, excluding compensated sites. The cells show the number of predicted bird mortalities (to the nearest integer) per annum at given rates of displacement and mortality. Grey cells identify the range of displacement and mortality rates considered in the assessment. Red text indicates where a given value of predicted mortality represents an increase of 1% or more in the baseline mortality rate with reference to Table 3.8.

Mean		Mortality										
Displacement		1%	2%	3%	4%	5%	10%	20%	30%	50%	80%	100%
	10%	64	129	193	258	322	644	1289	1933	3222	5156	6445
	20%	129	258	387	516	644	1289	2578	3867	6445	10311	12889
	30%	193	387	580	773	967	1933	3867	5800	9667	15467	19334
	40%	258	516	773	1031	1289	2578	5156	7734	12889	20623	25779
	50%	322	644	967	1289	1611	3222	6445	9667	16112	25779	32223
	60%	387	773	1160	1547	1933	3867	7734	11600	19334	30934	38668
	70%	451	902	1353	1804	2256	4511	9022	13534	22556	36090	45112
	80%	516	1031	1547	2062	2578	5156	10311	15467	25779	41246	51557
	90%	580	1160	1740	2320	2900	5800	11600	17400	29001	46401	58002
	100%	644	1289	1933	2578	3222	6445	12889	19334	32223	51557	64446

Table 3.8 In-combination displacement matrix for adult guillemots from the FFC SPA breeding population, Applicant approach to apportioning for Outer Dowsing, excluding compensated sites. The cells show the % increase in the mortality rate of the SPA population (based on a total population of 149,978 breeding adults and a baseline annual mortality of 6.1% (Horswill and Robinson 2015) associated with the number of predicted bird mortalities per annum at given rates of displacement and mortality. Grey cells identify the range of displacement and mortality rates considered in the assessment.

Mean		Mortality										
Displacement		1%	2%	3%	4%	5%	10%	20%	30%	50%	80%	100%
	10%	0.7%	1.4%	2.1%	2.8%	3.5%	7.0%	14.1%	21.1%	35.2%	56.4%	70.4%
	20%	1.4%	2.8%	4.2%	5.6%	7.0%	14.1%	28.2%	42.3%	70.4%	113%	141%
	30%	2.1%	4.2%	6.3%	8.5%	10.6%	21.1%	42.3%	63.4%	106%	169%	211%
	40%	2.8%	5.6%	8.5%	11.3%	14.1%	28.2%	56.4%	85%	141%	225%	282%
	50%	3.5%	7.0%	10.6%	14.1%	17.6%	35.2%	70.4%	106%	176%	282%	352%
	60%	4.2%	8.5%	12.7%	16.9%	21.1%	42.3%	85%	127%	211%	338%	423%
	70%	4.9%	9.9%	14.8%	19.7%	24.7%	49.3%	99%	148%	247%	394%	493%
	80%	5.6%	11.3%	16.9%	22.5%	28.2%	56.4%	113%	169%	282%	451%	564%
	90%	6.3%	12.7%	19.0%	25.4%	31.7%	63.4%	127%	190%	317%	507%	634%
	100%	7.0%	14.1%	21.1%	28.2%	35.2%	70.4%	141%	211%	352%	564%	704%

Table 3.9 In-combination displacement matrix for adult guillemots from the FFC SPA breeding population, NE approach to apportioning for Outer Dowsing, including compensated sites. The cells show the number of predicted bird mortalities (to the nearest integer) per annum at given rates of displacement and mortality. Grey cells identify the range of displacement and mortality rates considered in the assessment. Red text indicates values of predicted mortality representing a 1% or more increase in the baseline mortality rate with reference to Table 3.10.

Mean		Mortality										
Displacement		1%	2%	3%	4%	5%	10%	20%	30%	50%	80%	100%
	10%	112	224	336	447	559	1118	2237	3355	5592	8947	11184
	20%	224	447	671	895	1118	2237	4473	6710	11184	17894	22367
	30%	336	671	1007	1342	1678	3355	6710	10065	16775	26841	33551
	40%	447	895	1342	1789	2237	4473	8947	13420	22367	35788	44734
	50%	559	1118	1678	2237	2796	5592	11184	16775	27959	44734	55918
	60%	671	1342	2013	2684	3355	6710	13420	20131	33551	53681	67102
	70%	783	1566	2349	3131	3914	7829	15657	23486	39143	62628	78285
	80%	895	1789	2684	3579	4473	8947	17894	26841	44734	71575	89469
	90%	1007	2013	3020	4026	5033	10065	20131	30196	50326	80522	100653
	100%	1118	2237	3355	4473	5592	11184	22367	33551	55918	89469	111836

Table 3.10 In-combination displacement matrix for adult guillemots from the FFC SPA breeding population, NE apportioning for Outer Dowsing, including compensated sites. The cells show the % increase in the mortality rate of the SPA population (based on a total population of 149,978 breeding adults and a baseline annual mortality of 6.1% (Horswill and Robinson 2015) associated with the number of predicted bird mortalities per annum at given rates of displacement and mortality. Grey cells identify the range of displacement and mortality rates considered in the assessment.

Mean		Mortality										
Displacement		1%	2%	3%	4%	5%	10%	20%	30%	50%	80%	100%
	10%	1.2%	2.4%	3.7%	4.9%	6.1%	12.2%	24.4%	36.7%	61.1%	97.8%	122.2%
	20%	2.4%	4.9%	7.3%	9.8%	12.2%	24.4%	48.9%	73.3%	122.2%	196%	244%
	30%	3.7%	7.3%	11.0%	14.7%	18.3%	36.7%	73.3%	110.0%	183%	293%	367%
	40%	4.9%	9.8%	14.7%	19.6%	24.4%	48.9%	97.8%	147%	244%	391%	489%
	50%	6.1%	12.2%	18.3%	24.4%	30.6%	61.1%	122.2%	183%	306%	489%	611%
	60%	7.3%	14.7%	22.0%	29.3%	36.7%	73.3%	147%	220%	367%	587%	733%
	70%	8.6%	17.1%	25.7%	34.2%	42.8%	85.6%	171%	257%	428%	685%	856%
	80%	9.8%	19.6%	29.3%	39.1%	48.9%	97.8%	196%	293%	489%	782%	978%
	90%	11.0%	22.0%	33.0%	44.0%	55.0%	110.0%	220%	330%	550%	880%	1100%
	100%	12.2%	24.4%	36.7%	48.9%	61.1%	122.2%	244%	367%	611%	978%	1222%

Table 3.11 In-combination displacement matrix for adult guillemots from the FFC SPA breeding population, NE apportioning for Outer Dowsing, excluding compensated sites. The cells show the number of predicted bird mortalities (to the nearest integer) per annum at given rates of displacement and mortality. Grey cells identify the range of displacement and mortality rates considered in the assessment. Red text indicates where a given value of predicted mortality represents an increase of 1% or more in the baseline mortality rate with reference to Table 3.12.

Mean		Mortality										
Displacement		1%	2%	3%	4%	5%	10%	20%	30%	50%	80%	100%
	10%	79	157	236	314	393	786	1571	2357	3929	6286	7857
	20%	157	314	471	629	786	1571	3143	4714	7857	12571	15714
	30%	236	471	707	943	1179	2357	4714	7071	11786	18857	23571
	40%	314	629	943	1257	1571	3143	6286	9428	15714	25143	31428
	50%	393	786	1179	1571	1964	3929	7857	11786	19643	31428	39285
	60%	471	943	1414	1886	2357	4714	9428	14143	23571	37714	47142
	70%	550	1100	1650	2200	2750	5500	11000	16500	27500	44000	54999
	80%	629	1257	1886	2514	3143	6286	12571	18857	31428	50285	62857
	90%	707	1414	2121	2829	3536	7071	14143	21214	35357	56571	70714
	100%	786	1571	2357	3143	3929	7857	15714	23571	39285	62857	78571

Table 3.12 In-combination displacement matrix for adult guillemots from the FFC SPA breeding population, NE apportioning for Outer Dowsing, excluding compensated sites. The cells show the % increase in the mortality rate of the SPA population (based on a total population of 149,978 breeding adults and a baseline annual mortality of 6.1% (Horswill and Robinson 2015)) associated with the number of predicted bird mortalities per annum at given rates of displacement and mortality. Grey cells identify the range of displacement and mortality rates considered in the assessment.

Mean		Mortality										
Displacement		1%	2%	3%	4%	5%	10%	20%	30%	50%	80%	100%
	10%	0.9%	1.7%	2.6%	3.4%	4.3%	8.6%	17.2%	25.8%	42.9%	68.7%	85.9%
	20%	1.7%	3.4%	5.2%	6.9%	8.6%	17.2%	34.4%	51.5%	85.9%	137%	172%
	30%	2.6%	5.2%	7.7%	10.3%	12.9%	25.8%	51.5%	77.3%	129%	206%	258%
	40%	3.4%	6.9%	10.3%	13.7%	17.2%	34.4%	68.7%	103%	172%	275%	344%
	50%	4.3%	8.6%	12.9%	17.2%	21.5%	42.9%	85.9%	129%	215%	344%	429%
	60%	5.2%	10.3%	15.5%	20.6%	25.8%	51.5%	103%	155%	258%	412%	515%
	70%	6.0%	12.0%	18.0%	24.0%	30.1%	60.1%	120%	180%	301%	481%	601%
	80%	6.9%	13.7%	20.6%	27.5%	34.4%	68.7%	137%	206%	344%	550%	687%
	90%	7.7%	15.5%	23.2%	30.9%	38.6%	77.3%	155%	232%	386%	618%	773%
	100%	8.6%	17.2%	25.8%	34.4%	42.9%	85.9%	172%	258%	429%	687%	859%

Table 3.13 Predicted mortalities of adult guillemots from the FFC SPA breeding population and % increases in baseline mortality rate for different in combination scenarios. (Updates Table 4.49 in the Report to Inform Appropriate Assessment, Part 4, Ref. 7.1.4 [APP-178]).

Scenario / Displacement and mortality rates	Annual predicted mortality, no. guillemots	% increase in baseline mortality rate of FFC breeding adult population[1]
In-combination, Outer Dowsing Applicant Approach including compensated sites (HP4, SEP&DEP, R2)		
50% displacement, 1% mortality	489	5.3%
70% displacement, 2% mortality	1,368	15.0%
In-combination, Outer Dowsing Applicant Approach, excluding compensated sites		
50% displacement, 1% mortality	322	3.5%
70% displacement, 2% mortality	902	9.9%
In-combination, Outer Dowsing NE Approach, including compensated sites		
50% displacement, 1% mortality	559	6.1%
70% displacement, 2% mortality	1,566	17.1%
In-combination, Outer Dowsing NE Approach, excluding compensated sites		
50% displacement, 1% mortality	393	4.3%
70% displacement, 2% mortality	1,100	12.0%
Previous values (RIAA [APP-178] Table 4.49)		
In combination (NE bespoke approach to seasonal apportioning for HP4)[2]		
50% displacement, 1% mortality	419	4.6%
70% displacement, 2% mortality	1,172	12.8%
In combination, excluding compensated sites (HP4, NE bespoke approach)		
50% displacement, 1% mortality	257	2.8%
70% displacement, 2% mortality	720	7.9%

1. Based on a population size of 149,978 breeding adults and an adult baseline annual mortality rate of 6.1%, Horswill and Robinson 2015).

2. The Secretary of State is understood to have consented HP4 based on the Natural England approach to seasonal apportioning to the FFC SPA.

3.3 Razorbill

21. The in-combination population estimates for razorbills from FFC SPA at risk of displacement are presented in **Table 3.15**. These have been updated from those presented in the RIAA (**[APP-178]**, Table 4.54**)**. The changes relate to available updated data for some projects included in the in-combination assessment (as documented in Section 3.3 of Updated Information for Offshore Ornithology Cumulative Effects Assessment **[REP3-040]**), and also increases in the seasonal apportioning of razorbills to the FFC SPA during the breeding and post-breeding or Autumn migration seasons for some OWFs**.** The footnotes in **Table 3.15** provide further information on these changes, as appropriate.

22. Annual totals for the estimated number of razorbills from the FFC SPA breeding population at risk of displacement are presented for two scenarios based on different approaches for Outer Dowsing: a total of 22,994 individuals based on the Outer Dowsing Applicant approach to apportioning, and 25,821 individuals based on the Natural England approach to apportioning for Outer Dowsing (**Table 3.15**, note 7 explains the different approaches). These totals both represent an increase compared to the previous in combination total (RIAA **[APP-178]**, Table 4.54) of 16,811 individuals from the FFC breeding population at risk of displacement per annum.

23. In combination displacement matrices for the FFC breeding population of razorbills are included in **Table 3.16** through **Table 3.19**. These show the number of predicted mortalities per year based on a range of displacement rates and mortality of displaced birds (**Table 3.16** and **Table 3.18**) and the equivalent predicted increases in the baseline mortality rate of the FFC SPA population (**Table 3.17** and **Table 3.19**).

24. Under the Applicant (North Falls) approach of 50% displacement and 1% mortality of displaced birds, the predicted annual in combination displacement mortality per year for the FFC breeding population of razorbills is 115 individuals based on the Applicant approach to apportioning at Outer Dowsing, and 129 individuals based on the Natural England advised apportioning for Outer Dowsing. The respective predicted increases in the baseline mortality rate of the FFC SPA breeding population are 1.8% and 2.0%.

25. Under the Natural England approach of 70% displacement and 2% mortality of displaced birds, the predicted annual in combination displacement mortality per year for the FFC breeding population of razorbills is 323 individuals based on the Outer Dowsing Applicant approach to apportioning, and 362 individuals based on the Natural England apportioning. The respective predicted increases in the baseline mortality rate of the FFC SPA breeding population are 5.0% and 5.6%.

26. These compare with predicted annual in combination mortalities to the FFC SPA breeding population of razorbills, based on the in combination totals in the RIAA (**[APP-178]**, Table 4.57) of 84 at 50% displacement and 1% mortality, and 235 at 70% displacement and 2% mortality, respectively equivalent to increases of 1.3% and 3.7% in the baseline mortality.

Table 3.14 Seasonal and annual population estimates of razorbills at North Falls and other OWFs included in the in-combination assessment; and apportionment to the FFC SPA (breeding adult population). This table updates Table 4.54 in the RIAA, Part 4, Ref. 7.1.4 [APP-178].

Tier	OWF	Number of razorbills at risk of displacement[1]									
		Breeding		Autumn Migration		Non-Breeding		Spring Migration		Annual	
		Total	FFC	Total	FFC	Total	FFC	Total	FFC	Total	FFC
1	Beatrice	873	0	833	28	555	15	833	28	3,094	72
1	Beatrice Demonstrator	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Blyth Demonstration	121	0	91	3	61	2	91	3	364	8
1	Dudgeon	256	0	346	12	745	20	346	12	1,694	44
1	East Anglia ONE	16	0	26	1	155	4	336	11	533	16
1	EOWDC (Aberdeen)	161	0	64	2	7	0	26	1	258	3
1	Galloper	44	0	43	1	106	3	394	13	587	18
1	Greater Gabbard	0	0	0	0	387	10	84	3	471	13
1	Gunfleet Sands	0	0	0	0	30	1	0	0	30	1
1	Hornsea Project One	1,109	535	4,812	164	1,518	41	1,803	61	9,242	800
1	Hornsea Project Two	2,511	1,210	4,221	143	720	19	1,668	57	9,119	1,430
1	Humber Gateway	27	0	20	1	13	0	20	1	80	2
1	Hywind	30	0	719	24	10	0	0	0	759	25
1	Kentish Flats and Extension	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Kincardine	22	0	0	0	0	0	0	0	22	0
1	Lincs, Lynn and Inner Dowsing	45	0	34	1	22	1	34	1	134	3
1	London Array	14	0	20	1	14	0	20	1	68	2

Tier	OWF	Number of razorbills at risk of displacement[1]									
		Breeding		Autumn Migration		Non-Breeding		Spring Migration		Annual	
		Total	FFC	Total	FFC	Total	FFC	Total	FFC	Total	FFC
1	Methil	4	0	0	0	0	0	0	0	4	0
1	Moray Firth East	2,423	0	1,103	37	30	1	168	6	3,724	44
1	Race Bank	28	0	42	1	28	1	42	1	140	4
1	Rampion	630	0	66	2	1,244	34	3,327	113	5,267	149
1	Scroby Sands	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	Sheringham Shoal	106	0	1,343	46	211	6	30	1	1,691	52
1	Teesside	16	0	62	2	2	0	20	1	99	3
1	Thanet	3	0	0	0	14	0	21	1	38	1
1	Triton Knoll	40	0	254	9	855	23	117	4	1,265	36
1	Westermost Rough	91	91	121	4	152	4	91	3	455	102
2	Dogger Bank (formerly Creyke Beck) A and B	2,788	836	3,673	125	3,871	105	9,268	315	19,600	1,381
2	Dogger Bank C (formerly Teesside A) and Sofia (formerly Teesside B)	1,987	596	902	31	2,385	64	4,872	166	10,147	857
2	Moray West	2,808	0	3,544	120	184	5	3,585	122	10,121	247
2	Neart na Gaoithe	331	0	5,492	187	508	14	0	0	6,331	200
2	Seagreen (Forth) Alpha and Bravo	9,574	0	0	0	2,375	64	0	0	11,949	64
3	East Anglia ONE North	403	0	85	3	54	1	207	7	749	11
3	East Anglia THREE	1,807	0	1,122	38	1,499	40	1,524	52	5,952	130

Tier	OWF	Number of razorbills at risk of displacement[1]									
		Breeding		Autumn Migration		Non-Breeding		Spring Migration		Annual	
		Total	FFC	Total	FFC	Total	FFC	Total	FFC	Total	FFC
3	East Anglia TWO	281	0	44	1	136	4	230	8	691	13
3	Green Volt[2]	457	0	56	2	15	0	28	1	556	3
3	Hornsea Project Three	630	0	2,020	69	3,649	99	2,105	72	8,404	239
3	Hornsea Project Four (NE bespoke apportioning approach)[3]	386	386	4,311	2,845	455	12	449	15	5,601	3,259
3	Inch Cape	1,436	0	2,870	98	651	18	n/a	n/a	4,957	115
3	Norfolk Boreas	630	0	263	9	1,065	29	345	12	2,303	49
3	Norfolk Vanguard	879	0	866	29	839	23	924	31	3,508	84
3	Rampion 2[4]	32	0	26	1	1,193	32	6,303	214	7,554	247
3	SEP&DEP	4,500	311	1,239	42	464	13	1,531	52	7,734	417
4	Berwick Bank[5]	4,040	0	8,849	301	1,399	38	7,480	254	21,768	593
4	Dogger Bank South[6]	2,836	2,836	9,573	6,694	8,443	228	8,033	273	28,884	10,031
4	Five Estuaries[7]	90	0	284	10	1,046	28	756	26	2,177	63
4	*Outer Dowsing[8] (Applicant approach)*	*3,159*	*1,801*	*2,185*	*74*	*1,779*	*49*	*5,134*	*174*	*12,257*	*2,097*
	Outer Dowsing[8] (NE approach)	*3,159*	*3,159*	*2,185*	*1,543*	*1,779*	*49*	*5,134*	*174*	*12,257*	*4,924*
4	West of Orkney[9]	141	0	112	4	19	1	132	4	405	9
	North Falls[10]	104	0	248	8	1,781	48	1,741	59	3,874	116
Total, Outer Dowsing Applicant approach		**47,869**	**8,601**	**61,982**	**11,174**	**40,689**	**1,099**	**64,118**	**2,179**	**214,659**	**23,053**

Tier	OWF	Number of razorbills at risk of displacement[1]									
		Breeding		Autumn Migration		Non-Breeding		Spring Migration		Annual	
		Total	FFC	Total	FFC	Total	FFC	Total	FFC	Total	FFC
Totals, Outer Dowsing NE approach		47,869	9,960	61,982	12,643	40,689	1,099	64,118	2,179	214,659	25,880
Previous total (all tiers, HP4 NE 'bespoke' approach) from North Falls RIAA		49,090	9,038	57,118	4,640	38,221	968	63,741	2,166	208,169	16,811

Notes:

1. The preferred standard area is the OWF plus a 2km buffer (SNCB 2017), however the buffer zones included in this assessment varied between 0-4km depending on the data available. OWF seasonal and annual totals of razorbill at risk of displacement and apportioned to FFC follow those of Royal HaskoningDHV (2022b), except where footnoted (see also Updated Information for Offshore Ornithology Cumulative Effects Assessment, Document Reference: 9.29 [REP3-040])

2. Total seasonal population estimates from APEM (2022b). It has been assumed that no birds would be apportioned to FFC SPA during the breeding season (project is beyond MMFR +1SD from FFC), 3.4% apportioned during the autumn and spring migration periods, and 2.7% during the winter period.

3. In the RIAA [APP-178], Table 4.54, three sets of values for HP4 were presented. One value is given here as HP4 is now consented (DESNZ, 2023). The Project is understood to have been consented based on the NE bespoke approach to seasonal apportioning for the FFC SPA, which is presented here. Under this approach, 100% of birds are apportioned to the FFC SPA during the breeding season, 66% during the autumn migration / chick rearing/moult period, 2.74% in the non-breeding/ winter period and 3.38% in the spring migration.

4. GoBe (2024a,b); no birds apportioned to FFC SPA during the breeding season (project is beyond mean maximum foraging range +1SD), 3.4% apportioned during the autumn and spring migration periods, and 2.7% during the winter period.

5. Seasonal population estimates from Pelagica and Cork Ecology (2022), Royal HaskoningDHV (2022a). It has been assumed that no birds would be apportioned to FFC SPA during the breeding season (project is beyond MMFR + 1SD from FFC), 3.4% apportioned during the autumn and spring migration periods, and 2.7% during the winter period.

6. RWE (2025b).

7. GoBe (2024c,d).

8. GoBe (2025), GoBe and SLR (2025). Two sets of values are presented. Under the Outer Dowsing Applicant approach, 57% apportioning to the FFC SPA population is applied during the breeding season and 3.4% during the autumn migration period, the latter based on the appendices to Furness (2015). Due to the proximity to the FFC SPA, the Natural England advised bespoke approach is 100% apportioning to the FFC SPA population during the breeding season, and 70.6% during the post-breeding autumn migration period; apportioning of 2.7% is applied during the winter period and 3.4% during the spring migration, both based on the appendices to Furness (2015).

9. Seasonal population estimates from MacArthur Green (2024c). It has been assumed that no birds would be apportioned to FFC SPA during the breeding season (project is beyond MMFR +1SD, 3.4% apportioned during the autumn and spring migration periods, and 2.7% during the winter period.

10. RIAA, Part 4 [APP-178], Table 4.51.

Table 3.15 In-combination displacement matrix for adult razorbills from the FFC SPA breeding population, Outer Dowsing Applicant approach. The cells show the number of predicted bird mortalities (to the nearest integer) per annum at given rates of displacement and mortality. Grey cells identify the range of displacement and mortality rates considered in the assessment. Red text indicates where a given value of predicted mortality represents an increase of 1% or more in the baseline mortality rate with reference to Table 3.17.

Mean	Mortality										
Displacement		1%	2%	3%	4%	5%	10%	20%	30%	50%	80%	100%
	10%	23	46	69	92	115	231	461	692	1153	1844	2305
	20%	46	92	138	184	231	461	922	1383	2305	3689	4611
	30%	69	138	207	277	346	692	1383	2075	3458	5533	6916
	40%	92	184	277	369	461	922	1844	2766	4611	7377	9221
	50%	115	231	346	461	576	1153	2305	3458	5763	9221	11527
	60%	138	277	415	553	692	1383	2766	4150	6916	11066	13832
	70%	161	323	484	645	807	1614	3227	4841	8069	12910	16137
	80%	184	369	553	738	922	1844	3689	5533	9221	14754	18443
	90%	207	415	622	830	1037	2075	4150	6224	10374	16598	20748
	100%	231	461	692	922	1153	2305	4611	6916	11527	18443	23053

Table 3.16 In-combination displacement matrix for adult razorbills from the FFC SPA breeding population, Outer Dowsing Applicant approach. The cells show the % increase in the mortality rate of the SPA population (based on a total population of 61,345 breeding adults (RIAA [APP-178}, paragraph 459) and a baseline annual mortality of 10.5% (Horswill and Robinson 2015) associated with the number of predicted bird mortalities per annum at given rates of displacement and mortality. Grey cells identify the range of displacement and mortality rates considered in the assessment.

Mean	Mortality										
Displacement		1%	2%	3%	4%	5%	10%	20%	30%	50%	80%	100%
	10%	0.4%	0.7%	1.1%	1.4%	1.8%	3.6%	7.2%	10.7%	17.9%	28.6%	36%
	20%	0.7%	1.4%	2.1%	2.9%	3.6%	7.2%	14.3%	21.5%	35.8%	57%	72%
	30%	1.1%	2.1%	3.2%	4.3%	5.4%	10.7%	21.5%	32.2%	54%	86%	107%
	40%	1.4%	2.9%	4.3%	5.7%	7.2%	14.3%	28.6%	43%	72%	115%	143%
	50%	1.8%	3.6%	5.4%	7.2%	8.9%	17.9%	35.8%	54%	89%	143%	179%
	60%	2.1%	4.3%	6.4%	8.6%	10.7%	21.5%	43%	64%	107%	172%	215%
	70%	2.5%	5.0%	7.5%	10.0%	12.5%	25.1%	50%	75%	125%	200%	251%
	80%	2.9%	5.7%	8.6%	11.5%	14.3%	28.6%	57%	86%	143%	229%	286%
	90%	3.2%	6.4%	9.7%	12.9%	16.1%	32.2%	64%	97%	161%	258%	322%
	100%	3.6%	7.2%	10.7%	14.3%	17.9%	35.8%	72%	107%	179%	286%	358%

Table 3.17 In-combination displacement matrix for adult razorbills from the FFC SPA breeding population, Outer Dowsing NE approach. The cells show the number of predicted bird mortalities (to the nearest integer) per annum at given rates of displacement and mortality. Grey cells identify the range of displacement and mortality rates considered in the assessment. Red text indicates where a given value of predicted mortality represents an increase of 1% or more in the baseline mortality rate with reference to Table 3.19.

Mean	Mortality										
Displacement		1%	2%	3%	4%	5%	10%	20%	30%	50%	80%	100%
	10%	26	52	78	104	129	259	518	776	1294	2070	2588
	20%	52	104	155	207	259	518	1035	1553	2588	4141	5176
	30%	78	155	233	311	388	776	1553	2329	3882	6211	7764
	40%	104	207	311	414	518	1035	2070	3106	5176	8282	10352
	50%	129	259	388	518	647	1294	2588	3882	6470	10352	12940
	60%	155	311	466	621	776	1553	3106	4658	7764	12423	15528
	70%	181	362	543	725	906	1812	3623	5435	9058	14493	18116
	80%	207	414	621	828	1035	2070	4141	6211	10352	16563	20704
	90%	233	466	699	932	1165	2329	4658	6988	11646	18634	23292
	100%	259	518	776	1035	1294	2588	5176	7764	12940	20704	25880

Table 3.18 In-combination displacement matrix for adult razorbills from the FFC SPA breeding population, Outer Dowsing NE approach. The cells show the % increase in the mortality rate of the SPA population (based on a total population of 61,345 breeding adults (RIAA [APP-178], paragraph 459) and a baseline annual mortality of 10.5% (Horswill and Robinson 2015) associated with the number of predicted bird mortalities per annum at given rates of displacement and mortality. Grey cells identify the range of displacement and mortality rates considered in the assessment.

Mean	Mortality										
Displacement		1%	2%	3%	4%	5%	10%	20%	30%	50%	80%	100%
	10%	0.4%	0.8%	1.2%	1.6%	2.0%	4.0%	8.0%	12.1%	20.1%	32.1%	40.2%
	20%	0.8%	1.6%	2.4%	3.2%	4.0%	8.0%	16.1%	24.1%	40.2%	64%	80%
	30%	1.2%	2.4%	3.6%	4.8%	6.0%	12.1%	24.1%	36.2%	60%	96%	121%
	40%	1.6%	3.2%	4.8%	6.4%	8.0%	16.1%	32.1%	48%	80%	129%	161%
	50%	2.0%	4.0%	6.0%	8.0%	10.0%	20.1%	40.2%	60%	100%	161%	201%
	60%	2.4%	4.8%	7.2%	9.6%	12.1%	24.1%	48%	72%	121%	193%	241%
	70%	2.8%	5.6%	8.4%	11.3%	14.1%	28.1%	56%	84%	141%	225%	281%
	80%	3.2%	6.4%	9.6%	12.9%	16.1%	32.1%	64%	96%	161%	257%	321%
	90%	3.6%	7.2%	10.8%	14.5%	18.1%	36.2%	72%	108%	181%	289%	362%
	100%	4.0%	8.0%	12.1%	16.1%	20.1%	40.2%	80%	121%	201%	321%	402%

4 Combined collision risk and displacement

4.1 Gannet

27. The in-combination mortality values for displacement and collision risk combined) for gannet at FFC SPA are shown in **Table 4.1**. The updated total of predicted annual mortalities due is 157 adults per year from the FFC breeding population, equivalent to a 6.8% increase in the baseline mortality rate. This compares with the previous total (**[APP-178]**, Table 4.36) of 144 mortalities per year and a predicted increase of 6.3% in the baseline mortality rate.

Table 4.1 Predicted annual in-combination displacement and collision mortality for the breeding adult gannet population at the FFC SPA and the equivalent increase to the baseline morality of the population. Update to Table 4.36 in the RIAA, Part 4, Ref. 7.1.4 [APP-178].

Source	Annual displacement mortality[1]	Annual collision mortality	Annual displacement and collision mortality	% annual mortality increase[2]
Updated values (this document)	82	75	157	6.8%
Previous ([APP-178] Table 4.36)	74	70	144	6.3%

[1] Assumes 70% displacement and 1% mortality rate of displaced birds.

[2] Background annual mortality of FFC SPA 2,297 birds, assuming reference population of 28,358 birds and adult mortality of 8.1% (Horswill and Robinson, 2015)

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