

East Anglia TWO and East Anglia ONE North Offshore Windfarms

Updated Offshore Ornithology Cumulative and In-Combination Collision Risk and Displacement Assessment

Applicants: East Anglia TWO Limited / East Anglia ONE North Limited
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Glossary of Acronyms

AOE	Alde-Ore Estuary
CRM	Collision Risk Model
DEP	Dudgeon Offshore Windfarm Extension Project
FFC	Flamborough and Filey Coast
GBBG	Great Black-Backed Gull
HRA	Habitats Regulations Assessment
NMC	Non-material change
SEP	Sheringham Shoal Offshore Windfarm Extension Project
SoS	Secretary of State
SPA	Special Protection Area

Glossary of Terminology

The Applicants	East Anglia TWO Limited / East Anglia ONE North Limited
East Anglia ONE North project	The proposed project consisting of up to 67 wind turbines, up to four offshore electrical platforms, up to one construction, operation and maintenance platform, inter-array cables, platform link cables, up to one operational meteorological mast, up to two offshore export cables, fibre optic cables, landfall infrastructure, onshore cables and ducts, onshore substation, and National Grid infrastructure.
East Anglia ONE North windfarm site	The offshore area within which wind turbines and offshore platforms will be located.
East Anglia TWO project	The proposed project consisting of up to 75 wind turbines, up to four offshore electrical platforms, up to one construction, operation and maintenance platform, inter-array cables, platform link cables, up to one operational meteorological mast, up to two offshore export cables, fibre optic cables, landfall infrastructure, onshore cables and ducts, onshore substation, and National Grid infrastructure.
East Anglia TWO windfarm site	The offshore area within which wind turbines and offshore platforms will be located.

1 Introduction

1. East Anglia TWO Limited and East Anglia ONE North Limited (the Applicants) are seeking consent for the East Anglia TWO Offshore Windfarm and the East Anglia ONE North Offshore Windfarm (the Projects) respectively.
2. This document is provided in response to part 6 of the Secretary of State for Business, Energy & Industrial Strategy (SoS) letter (2nd November 2021) to provide an updated Offshore Ornithology Cumulative and In-Combination Collision Risk and Displacement assessment for each of the Projects, which addresses discrepancies identified by Natural England within their Deadline 13 response (REP13-048). This document is an update to the version submitted by the Applicants at Deadline 13 (REP13-019).

2 Updates

3. The following updates have been made to the cumulative and in-combination collision risk tables within **section 4** in order to address the discrepancies identified by Natural England:
 - **Table 4** has been updated to include a figure of 28 herring gull collisions per annum for the East Anglia ONE offshore windfarm (which is now in operation) reflecting its 750MW consented design parameters as at July 2021... As discussed further under **paragraph 6** below, on the 24th September 2021, the SoS granted a non-material change (NMC) application for East Anglia ONE¹ which amended the consent to the as-built design parameters (and thus reducing collision mortalities on kittiwake, gannet and lesser black-backed gull, see **paragraph 7**). However, in the interests of working from a common understanding of the cumulative and in-combination collision mortality totals, the Applicants have not made changes to reflect the granting of the East Anglia ONE NMC. The Applicants have discussed this approach with Natural England and the Applicants understand that Natural England are comfortable with the figures presented in this document.
 - **Table 5** has been updated to correct the Hornsea Four great black-backed gull (GBBG) per annum collision figure to 16.6.

¹ Department for Business, Energy and Industrial Strategy (BEIS) (2021), Application For A Non-Material Change To The East Anglia ONE (Offshore Wind Farm) Order 2014 (SI No. 2014/1599). Available at: [REDACTED]

4. Within REP13-048, Natural England also highlighted a discrepancy between their gannet displacement abundance total and the Applicants', amounting to three extra birds. This related to the Hornsea Project Three displacement abundance estimate in the spring migration season (as noted by Natural England in REP12-090) and was addressed by the Applicants in REP13-019. Therefore, there is no requirement to further update these figures. However, for ease of reference, the gannet displacement abundance table (**Table 6**), together with tables for all other species, have been provided within this document. Therefore, for the avoidance of doubt, only the herring gull (**Table 4**) and the GBBG (**Table 5**) figures have been amended from the version (REP13-019) submitted by the Applicant at Deadline 13.

3 Assessment Conclusions

5. Notwithstanding the potential addition of Hornsea Project Four and the Sheringham and Dudgeon Extensions to the cumulative and in-combination totals, the Applicants maintain that given the many layers of precaution within the assessments, the changes described within this cumulative and in-combination collision risk update do not alter the conclusions of negligible to minor adverse significance (for the EIA) and no Adverse Effects on Integrity (for the HRA) within the assessments submitted (**Chapter 12 Offshore Ornithology** (APP-060) and the **Information to Support Appropriate Assessment Report** (APP-043)).
6. Project-alone collision mortalities for both Projects are already small when compared to other projects of a similar scale. These numbers have been further reduced from those submitted with the Projects' DCO applications following the increase in draught height for the Projects (as discussed in **Offshore Ornithology Cumulative and In Combination Collision Risk Update - Rev-01** (REP1-047)).
7. Furthermore, on the 24th September the SoS granted a NMC application for East Anglia ONE. The changes to the windfarm design, reflecting the as-built windfarm, have very substantially reduced the predicted collision impacts, for example by up to 85% for kittiwake, 76% for gannet and 62% for lesser black-backed gull². In terms of the predicted mortalities of these species attributed to SPA populations, the mortality of Flamborough and Filey Coast SPA gannets would be reduced by 7.7 individuals and kittiwake by 10.2, and Alde-Ore Estuary SPA lesser black-backed gull by 2.3. These reductions would therefore offset almost 30% of the Projects' gannet mortality (7.7 of 26.3), all of the lesser black-

² East Anglia ONE Limited (2021). East Anglia ONE DCO Non-Material Change. Available at:

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backed gull mortality (2.3 compared to 1.9) and over 7 times the kittiwake mortality (10.2 compared to 1.5). However, as this change was not requested by the SoS and in the interests of working from a common understanding of the cumulative and in-combination collision mortality totals, the Applicant has not made changes to this document to reflect the granting of the East Anglia ONE NMC.

4 Updated Cumulative and In-Combination Collision Risk and Displacement Abundance Tables

8. This update follows a similar approach to the Deadline 13 update, whereby the Applicants have included summary rows which include all projects previously agreed at Deadline 8 of the Norfolk Boreas examination (which is the agreed position with Natural England), with the inclusion of Hornsea Project Three (using Natural England agreed figures). The projects for which preliminary environmental information reporting (PEIR) is available (Dudgeon Extension and Sheringham Extension (DEP and SEP)) and Hornsea Project Four (recently accepted for examination)³ are then included individually and altogether in a grand total for all windfarms in the tables.
9. It should be noted that for Hornsea Four, the figures are those presented in their PEIR (as per REP13-019), because an update to the Hornsea Project 4 application figures was not requested by the SoS. In addition, it is recognised that the figures for Hornsea Project Four may change during the course of that project's examination. However, it should be noted that in all cases the collision and displacement risks presented in the Hornsea Project Four final application are lower than the preceding PEIR values. Therefore, the cumulative and in-combination totals presented below all represent worst case, precautionary estimates.
10. The amendments made are highlighted by yellow cells in the tables below.

³ [REDACTED]
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4.1 Gannet

Table 1 Updated gannet cumulative and in-combination collision risk

Tier	Windfarm	Breeding season		Autumn migration		Spring migration		Annual	
		Total	FFC SPA	Total	FFC SPA	Total	FFC SPA	Total	FFC SPA
1	Beatrice Demonstrator	0.6	0	0.9	0.04	0.7	0.05	2.2	0.1
1	Greater Gabbard	14	0	8.8	0.42	4.8	0.3	27.5	0.7
1	Gunfleet Sands	-	-	-	-	-	-	-	-
1	Kentish Flats	1.4	0	0.8	0.04	1.1	0.07	3.3	0.1
1	Kentish Flats Extension	-	-	-	-	-	-	-	-
1	Lincs	2.1	2.1	1.3	0.06	1.7	0.1	5	2.3
1	London Array	2.3	0	1.4	0.07	1.8	0.11	5.5	0.2
1	Lynn and Inner Dowsing	0.2	0.2	0.1	0.01	0.2	0.01	0.5	0.2
1	Scroby Sands	-	-	-	-	-	-	-	-
1	Sheringham Shoal	14.1	14.1	3.5	0.17	0	0	17.6	14.3
1	Teesside	4.9	2.4	1.7	0.08	0	0	6.7	2.5
1	Thanet	1.1	0	0	0	0	0	1.1	0
1	Humber Gateway	1.9	1.9	1.1	0.05	1.5	0.09	4.5	2
1	Westermost Rough	0.2	0.2	0.1	0.01	0.2	0.01	0.5	0.2
1	Hywind	5.6	0	0.8	0.04	0.8	0.05	7.2	0.1
2	Kincardine	3	0	0	0	0	0	3	0
2	Beatrice	37.4	0	48.8	2.34	9.5	0.59	95.7	2.9
2	Dudgeon	22.3	22.3	38.9	1.87	19.1	1.18	80.3	25.3
2	Galloper	18.1	0	30.9	1.48	12.6	0.78	61.6	2.3
2	Race Bank	33.7	33.7	11.7	0.56	4.1	0.25	49.5	34.5
2	Rampion	36.2	0	63.5	3.05	2.1	0.13	101.8	3.2
2	Hornsea Project One	11.5	11.5	32	1.54	22.5	1.4	66	14.4
3	Blyth Demonstration Project	3.5	0	2.1	0.1	2.8	0.17	8.4	0.3

Tier	Windfarm	Breeding season		Autumn migration		Spring migration		Annual	
		Total	FFC SPA	Total	FFC SPA	Total	FFC SPA	Total	FFC SPA
3	Dogger Bank Creyke Beck Projects A and B	81.1	40.6	83.5	4	54.4	3.4	219	47.9
3	East Anglia ONE	3.4	3.4	131	6.3	6.3	0.4	141	10.1
3	European Offshore Wind Deployment Centre	4.2	0	5.1	0.25	0.1	0	9.3	0.3
3	Firth of Forth Alpha and Bravo	800.8	0	49.3	2.37	65.8	4.08	915.9	6.4
3	Inch Cape	336.9	0	29.2	1.4	5.2	0.32	371.3	1.7
3	Methil	6	0	0	0	0	0	6	0
3	Moray Firth (EDA)	80.6	0	35.4	1.7	8.9	0.55	124.9	2.3
3	Neart na Gaoithe	143	0	47	2.26	23	1.43	213	3.7
3	Dogger Bank Teesside Projects A and B	14.8	7.4	10.1	0.49	10.8	0.67	35.7	8.5
3	Triton Knoll	26.8	26.8	64.1	3.08	30.1	1.87	121	31.7
3	Hornsea Project Two	7	7	14	0.67	6	0.37	27	8
3	East Anglia THREE	6.1	6.1	33.3	1.6	9.6	0.6	49	8.3
3	Hornsea Project Three	10	6	5	0	4	0	19	7
4	Norfolk Vanguard	8.2	8.2	18.6	0.89	5.3	0.33	32.1	9.4
3	Moray West	10	0	2	0.1	1	0.06	13	0.2
4	Norfolk Boreas	14.1	14.2	12.7	0.61	3.9	0.24	30.7	15.1
4	East Anglia TWO	12.5	12.5	23.1	1.1	4	0.2	39.6	13.8
4	East Anglia ONE North	12.4	12.4	11	0.52	1.1	0.07	24.5	13
	Total (all projects above)	1792.0	233.0	822.8	39.3	325.0	19.9	2939.9	293.0
5	<i>DEP and SEP (PEIR)</i>	3.96	3.96	6.43	0.31	0.36	0.02	10.75	4.29
5	<i>Hornsea 4 (PEIR)</i>	43.3	43.3	9.9	0.48	8.1	0.5	61.3	44.3
	Total with Hornsea Project 4, DEP and SEP (all projects)	1839.3	280.3	839.1	40.1	333.5	20.4	3012.0	341.6

4.2 Kittiwake

Table 2 Updated kittiwake cumulative and in-combination collision risk

Tier	Windfarm	Breeding season		Autumn migration		Spring migration		Annual	
		Total	FFC SPA	Total	FFC SPA	Total	FFC SPA	Total	FFC SPA
1	Beatrice Demonstrator	0	0	2.1	0.1	1.7	0.1	3.8	0.2
1	Greater Gabbard	1.1	0	15	0.8	11.4	0.8	27.5	1.6
1	Gunfleet Sands	-	-	-	-	-	-	-	
1	Kentish Flats	0	0	0.9	0.1	0.7	0.1	1.6	0.1
1	Kentish Flats Extension	0	0	0	0	2.7	0.2	2.7	0.2
1	Lincs	0.7	0.7	1.2	0.1	0.7	0.1	2.6	0.8
1	London Array	1.4	0	2.3	0.1	1.8	0.1	5.5	0.3
1	Lynn and Inner Dowsing	-	-	-	-	-	-	-	
1	Scroby Sands	-	-	-	-	-	-	-	
1	Sheringham Shoal	-	-	-	-	-	-	-	
1	Teesside	38.4	0	24	1.3	2.5	0.2	64.9	1.5
1	Thanet	0.2	0	0.5	0	0.4	0	1.1	0.1
1	Humber Gateway	1.9	1.9	3.2	0.2	1.9	0.1	7	2.2
1	Westermest Rough	0.1	0.1	0.2	0	0.1	0	0.5	0.1
1	Hywind	16.6	0	0.9	0.1	0.9	0.1	18.3	0.1
2	Kincardine	22	0	9	0.5	1	0.1	32	0.6
2	Beatrice	94.7	0	10.7	0.6	39.8	2.9	145.2	3.5
2	Dudgeon	-	-	-	-	-	-	-	
2	Galloper	6.3	0	27.8	1.5	31.8	2.3	65.9	3.8
2	Race Bank	1.9	1.9	23.9	1.3	5.6	0.4	31.4	3.6
2	Rampion	54.4	0	37.4	2	29.7	2.1	121.5	4.2
2	Hornsea Project One	44	36.5	55.9	3	20.9	1.5	120.8	41
3	Blyth Demonstration Project	1.7	0	2.3	0.1	1.4	0.1	5.4	0.2

Tier	Windfarm	Breeding season		Autumn migration		Spring migration		Annual	
		Total	FFC SPA	Total	FFC SPA	Total	FFC SPA	Total	FFC SPA
3	Dogger Bank Creyke Beck Projects A and B	288.6	55.8	135	7.3	295.4	21.3	719	84.3
3	East Anglia ONE	1.8	0	160.4	8.7	46.8	3.4	209	12
3	European Offshore Wind Deployment Centre	11.8	0	5.8	0.3	1.1	0.1	18.7	0.4
3	Firth of Forth Alpha and Bravo	153.1	0	313.1	16.9	247.6	17.8	713.8	34.7
3	Inch Cape	13.1	0	224.8	12.1	63.5	4.6	301.4	16.7
3	Methil	0.4	0	0	0	0	0	0.4	0
3	Moray Firth (EDA)	43.6	0	2	0.1	19.3	1.4	64.9	1.5
3	Nearr na Gaoithe	32.9	0	56.1	3	4.4	0.3	93.4	3.4
3	Dogger Bank Teesside Projects A and B	136.9	26.4	90.7	4.9	216.9	15.6	444.5	46.9
3	Triton Knoll	24.6	24.6	139	7.5	45.4	3.3	209	35.4
3	Hornsea Project Two	16	13.3	9	0.5	3	0.2	28	14
3	East Anglia THREE	6.1	0	69	3.7	37.6	2.7	112.7	6.4
3	Hornsea Project Three ⁴	77	0 (72)	38	0 (2)	8	0 (1)	123	0 (75)
4	Norfolk Vanguard	21.8	18.7	16.4	0.9	19.3	1.4	57.5	21
3	Moray West	79	0	24	1.3	7	0.5	110	1.8
4	Norfolk Boreas	13.3	11.4	32.2	1.7	11.9	0.9	57.5	14
4	East Anglia TWO	29.5	0	5.4	0.3	7.4	0.5	42.3	0.8
4	East Anglia ONE North	40.4	0	8.1	0.43	3.5	0.25	52	0.7
	Total (all projects above)	1275.3	191.3	1546.3	81.4	1193.1	85.5	4014.8	358.1

⁴ Note that the contribution from Hornsea Project Three to the FFC SPA has been removed on the assumption that these collisions will be fully compensated for by the project. The pre-compensation estimates are provided in parentheses.

Tier	Windfarm	Breeding season		Autumn migration		Spring migration		Annual	
		Total	FFC SPA	Total	FFC SPA	Total	FFC SPA	Total	FFC SPA
5	Hornsea 4 (PEIR)	153.3	153.3	34.7	1.9	9.9	0.7	197.9	155.9
5	DEP and SEP (PEIR)	18.13	18.13	10.46	0.56	2.2	0.16	30.79	18.85
	Total with Hornsea Project 4, DEP and SEP (all projects)	1446.7	362.7	1591.5	83.9	1205.2	86.3	4243.5	532.9

4.3 Lesser Black-Backed Gull

Table 3 Updated lesser black-backed gull cumulative and in-combination collision risk

Tier	Windfarm	Breeding season		Nonbreeding season		Annual	
		Total	AOE SPA	Total	AOE SPA	Total	AOE SPA (nonbreeding season apportioned plus breeding season for wind farms <141km)*
1	Beatrice Demonstrator	-	-	-	-	-	-
1	Greater Gabbard	12.4	8	49.6	2	62	10
1	Gunfleet Sands	1	0.3	0	0	1	0.3
1	Kentish Flats	-	-	-	-	-	-
1	Kentish Flats Extension	0.3	0.1	1.3	0.1	1.6	0.2
1	Lincs	1.7		6.8	0.3	8.5	0.3
1	London Array	-	-	-	-	-	-
1	Lynn and Inner Dowsing	-	-	-	-	-	-
1	Scroby Sands	-	-	-	-	-	-
1	Sheringham Shoal	1.7	0.3	6.6	0.3	8.3	0.6
1	Teesside	0		0	0	0	0
1	Thanet	3.2	1.4	12.8	0.5	16	1.9
1	Humber Gateway	0.3		1.1	0	1.4	0
1	Westermest Rough	0.1		0.3	0	0.4	0
1	Hywind	0		0	0	0	0
2	Kincardine	0		0	0	0	0
2	Beatrice	0		0	0	0	0
2	Dudgeon	7.7	1.1	30.6	1.2	38.3	2.3

Tier	Windfarm	Breeding season		Nonbreeding season		Annual	
		Total	AOE SPA	Total	AOE SPA	Total	AOE SPA (nonbreeding season apportioned plus breeding season for wind farms <141km)*
2	Galloper	27.8	18	111	4.4	138.8	22.4
2	Race Bank	43.2		10.8	0.4	54	0.4
2	Rampion	1.6		6.3	0.3	7.9	0.3
2	Hornsea Project One	4.4		17.4	0.7	21.8	0.7
3	Blyth Demonstration Project	0		0	0	0	0
3	Dogger Bank Creyke Beck Projects A and B	2.6		10.4	0.4	13	0.4
3	East Anglia ONE	5.9	2.2	33.8	1.4	39.7	3.6
3	European Offshore Wind Deployment Centre	0		0	0	0	0
3	Firth of Forth Alpha and Bravo	2.1		8.4	0.3	10.5	0.3
3	Inch Cape	0		0	0	0	0
3	Methil	0.5		0	0	0.5	0
3	Moray Firth (EDA)	0		0	0	0	0
3	Neart na Gaoithe	0.3		1.2	0	1.5	0
3	Dogger Bank Teesside Projects A and B	2.4		9.6	0.4	12	0.4
3	Triton Knoll	7.4		29.6	1.2	37	1.2
3	Hornsea Project Two	2		2	0.1	4	0.1
3	East Anglia THREE	1.8	0.4	8.2	0.3	10	0.7

Tier	Windfarm	Breeding season		Nonbreeding season		Annual	
		Total	AOE SPA	Total	AOE SPA	Total	AOE SPA (nonbreeding season apportioned plus breeding season for wind farms <141km)*
4	Norfolk Vanguard	8.4	2.5	3.6	0.1	12	2.6
3	Hornsea Project Three	8		1	0	9	0
3	Moray West	0		0	0	0	0
4	Norfolk Boreas	6.2	1.9	8.1	0.2	14.3	2.1
4	East Anglia TWO	4.2	1.6	0.5	0	4.7	1.6
4	East Anglia ONE North	0.9	0.2	0.6	0.1	1.5	0.3
	Total (all projects above)	158.1	38	371.6	14.7	529.7	52.7
5	<i>Hornsea 4 (PEIR)</i>	<i>1.9</i>	<i>1.9</i>	<i>1.9</i>	<i>1.9</i>	<i>1.9</i>	<i>1.9</i>
5	<i>DEP and SEP (PEIR)</i>	<i>0.85</i>	<i>0.85</i>	<i>0.85</i>	<i>0.85</i>	<i>0.85</i>	<i>0.85</i>
	Total with Hornsea Project 4, DEP and SEP (all projects)	160.9	40.8	374.4	17.5	532.5	55.5

* The apportioning of lesser black-backed gull collisions to the Alde Ore Estuary SPA from breeding colonies in Norfolk and Suffolk uses the connectivity rates estimated in the Table 1 of the **Cumulative and In-Combination Collision Risk Update** submitted to the Projects' Examinations at Deadline 1 (REP1-047).

4.4 Herring gull

Table 4 Herring gull cumulative collision risk

Tier	Windfarm	Breeding season	Nonbreeding season	Annual
1	Beatrice Demonstrator	0		0
1	Greater Gabbard	0		0
1	Gunfleet Sands	-	-	-
1	Kentish Flats	0	0	0
1	Kentish Flats Extension	0.5	1.7	2.2
1	Lincs	0		0
1	London Array	-	-	-
1	Lynn and Inner Dowsing	0		0
1	Scroby Sands	-	-	-
1	Sheringham Shoal	0		0
1	Teesside	8.7	34.5	43.2
1	Thanet	4.9	19.6	24.5
1	Humber Gateway	0.4	1.1	1.5
1	Westermost Rough	0.1	0	0.1
1	Hywind	0.6	7.8	8.4
2	Kincardine	1	0	1
2	Beatrice	49.4	197.4	246.8
2	Dudgeon	-	-	-
2	Galloper	27.2		27.2
2	Race Bank	0		0
2	Rampion	155		155
2	Hornsea Project One	2.9	11.6	14.5
3	Blyth Demonstration Project	0.5	2.2	2.7
3	Dogger Bank Creyke Beck Projects A and B	0		0
3	East Anglia ONE	0	28	28

Tier	Windfarm	Breeding season	Nonbreeding season	Annual
3	European Offshore Wind Deployment Centre	4.8		4.8
3	Firth of Forth Alpha and Bravo	10	21	31
3	Inch Cape	0	13.5	13.5
3	Methil	5.8	3.7	9.5
3	Moray Firth (EDA)	52		52
3	Neart na Gaoithe	5	12.5	17.5
3	Dogger Bank Teesside Projects A and B	0		0
3	Triton Knoll	0		0
3	Hornsea Project Two	23.8		23.8
3	East Anglia THREE	0	23	23
3	Hornsea Project Three	1	4	5
4	Norfolk Vanguard	0.4	7.1	7.5
3	Moray West	12	1	13
4	Norfolk Boreas	1.5	5.4	6.9
4	East Anglia TWO	0	0.5	0.5
4	East Anglia ONE North	0	0	0
	Total (all projects above)	367.5	395.6	763.1
5	<i>Hornsea 4 (PEIR)</i>	1.8	0.8	2.6
5	<i>DEP and SEP (PEIR)</i>	0.25	0	0.25
	Total with Hornsea Project 4, DEP and SEP (all projects)	369.6	396.4	766.0

4.5 Great black-backed gull

Table 5 Great black-backed gull cumulative collision risk

Tier	Windfarm	Breeding season	Nonbreeding season	Annual
1	Beatrice Demonstrator	0	0	0
1	Greater Gabbard	15	60	75
1	Gunfleet Sands	-	-	-
1	Kentish Flats	-	-	-
1	Kentish Flats Extension	0.1	0.2	0.3
1	Lincs	0	0	0
1	London Array	-	-	-
1	Lynn and Inner Dowsing	0	0	0
1	Scroby Sands	-	-	-
1	Sheringham Shoal	0	0	0
1	Teesside	8.7	34.8	43.6
1	Thanet	0.1	0.4	0.5
1	Humber Gateway	1.3	5.1	6.3
1	Westermest Rough	0	0	0.1
1	Hywind	0.3	4.5	4.8
2	Kincardine	0	0	0
2	Beatrice	30.2	120.8	151
2	Dudgeon	0	0	0
2	Galloper	4.5	18	22.5
2	Race Bank	0	0	0
2	Rampion	5.2	20.8	26
2	Hornsea Project One	17.2	68.6	85.8
3	Blyth Demonstration Project	1.3	5.1	6.3
3	Dogger Bank Croyke Beck Projects A and B	5.8	23.3	29.1
3	East Anglia ONE	0	46	46

Tier	Windfarm	Breeding season	Nonbreeding season	Annual
3	European Offshore Wind Deployment Centre	0.6	2.4	3
3	Firth of Forth Alpha and Bravo	13.4	53.4	66.8
3	Inch Cape	0	36.8	36.8
3	Methil	0.8	0.8	1.6
3	Moray Firth (EDA)	9.5	25.5	35
3	Nearr na Gaoithe	0.9	3.6	4.5
3	Dogger Bank Teesside Projects A and B	6.4	25.5	31.9
3	Triton Knoll	24.4	97.6	122
3	Hornsea Project Two	3	20	23
3	East Anglia THREE	4.6	34.4	39
3	Hornsea Project Three	8	28	36
4	Norfolk Vanguard	4.5	21.5	26
3	Moray West	4	5	9
4	Norfolk Boreas	6.9	28.7	35.6
4	East Anglia TWO	3.5	3.4	6.9
4	East Anglia ONE North	3.7	1.2	5
	Total (all projects above)	183.9	795.4	979.4
5	<i>Hornsea 4 (PEIR)</i>	3	13.6	16.6
5	<i>DEP and SEP (PEIR)</i>	6.8	0.3	7.1
	Total with Hornsea Project 4, DEP and SEP (all projects)	193.7	809.3	1003.1

4.6 Gannet

Table 6 Gannet cumulative and in-combination displacement abundance

Tier	Wind farm	Breeding season		Autumn migration		Spring migration		Annual	
		Total	FFC SPA	Total	FFC SPA	Total	FFC SPA	Total	FFC SPA
1	Beatrice Demonstrator	-	-	-	-	-	-	-	-
1	Greater Gabbard	252	0	69	3.3	105	6.5	426	9.8
1	Gunfleet Sands	0	0	12	0.6	9	0.6	21	1.2
1	Kentish Flats	-	-	-	-	-	-	-	-
1	Kentish Flats Extension	0	0	13	0.6	0	0	13	0.6
1	Lincs	-	-	-	-	-	-	-	-
1	London Array	-	-	-	-	-	-	-	-
1	Scroby Sands	-	-	-	-	-	-	-	-
1	Sheringham Shoal	47	47	31	1.5	2	0.1	80	48.6
1	Teesside	1	0.5	0	0	0	0	1	0.5
1	Thanet	-	-	-	-	-	-	-	-
1	Humber Gateway	-	-	-	-	-	-	-	-
1	Westermost Rough	-	-	-	-	-	-	-	-
1	Hywind	10	0	0	0	4	0.2	14	0.2

Tier	Wind farm	Breeding season		Autumn migration		Spring migration		Annual	
		Total	FFC SPA	Total	FFC SPA	Total	FFC SPA	Total	FFC SPA
1	Kincardine	120	0	0	0	0	0	120	0
2	Beatrice	151	0	0	0	0	0	151	0
2	Dudgeon	53	53	25	1.2	11	0.7	89	54.9
2	Gallopier	360	0	907	43.5	276	17.1	1543	60.6
2	Race Bank	92	92	32	1.5	29	1.8	153	95.3
2	Rampion	0	0	590	28.3	0	0	590	28.3
2	Hornsea Project One	671	671	694	33.3	250	15.5	1615	719.8
2	Blyth Demonstration Project	-	-	-	-	-	-	-	-
3	Dogger Bank Creyke Beck Projects A and B	1155	577.5	2048	98.3	394	24.4	3597	700.2
3	East Anglia ONE	161	161	3638	174.6	76	4.7	3875	340.3
3	European Offshore Wind Deployment Centre	35	0	5	0.2	0	0	40	0.2
3	Firth of Forth Alpha and Bravo	2956	0	664	31.9	332	20.6	3952	52.5
3	Inch Cape	2398	0	703	33.7	212	13.1	3313	46.8
3	Methil	23	0	0	0	0	0	23	0
3	Moray Firth (EDA)	564	0	292	14	27	1.7	883	15.7

Tier	Wind farm	Breeding season		Autumn migration		Spring migration		Annual	
		Total	FFC SPA	Total	FFC SPA	Total	FFC SPA	Total	FFC SPA
3	Neart na Gaoithe	1987	0	552	26.5	281	17.4	2820	43.9
3	Dogger Bank Teesside Projects A and B	2250	1125	887	42.6	464	28.8	3601	1196.4
3	Triton Knoll	211	211	15	0.7	24	1.5	250	213.2
3	Hornsea Project Two	457	457	1140	54.7	124	7.7	1721	519.4
3	East Anglia THREE	412	412	1269	60.9	524	32.5	2205	505.4
3	Hornsea Project Three	1333	844	984	47	524	32.5	2841	924
4	Norfolk Vanguard	271	271	2453	117.7	437	27.1	3161	415.8
3	Moray West	2827	0	439	21.1	144	8.9	3410	30
4	Norfolk Boreas	1229	1229	1723	82.7	526	32.6	3478	1344.3
4	East Anglia TWO	192	192	891	42.8	192	11.9	1275	246.7
4	East Anglia ONE North	149	149	468	22.5	44	2.7	661	174.2
	Total (all projects above)	20367	6492	20544	985.7	5011	310.6	45922	7788.3
5	<i>Hornsea 4 (PEIR)</i>	<i>1892</i>	<i>1892</i>	<i>1192</i>	<i>57.2</i>	<i>659</i>	<i>40.9</i>	<i>3743</i>	<i>1990.1</i>
5	<i>DEP and SEP (PEIR)</i>	<i>401</i>	<i>401</i>	<i>638</i>	<i>30</i>	<i>47</i>	<i>3</i>	<i>1086</i>	<i>434</i>
	Total with Hornsea Project 4, DEP and SEP (all projects)	22660	8785	22374	1072.9	5717	354.5	50751	10212.4

4.7 Guillemot

Table 7 Guillemot cumulative and in-combination displacement abundance

Tier	Windfarm	Breeding season		Nonbreeding season		Annual	
		Total	FFC SPA	Total	FFC SPA	Total	FFC SPA
1	Beatrice Demonstrator	No estimate available					
1	Gunfleet Sands	0	0	363	16	363	16
1	Kentish Flats	0	0	3	0.1	3	0.1
1	Kentish Flats Extension	0	0	4	0.2	4	
1	Greater Gabbard	345	0	548	24.1	893	24.1
1	Lincs & LID	582	0	814	35.8	1396	35.8
1	London Array	192	0	377	16.6	569	16.6
1	Scroby Sands	No estimate available					
1	Sheringham Shoal	390	0	715	31.5	1105	31.5
1	Teesside	267	267	901	39.6	1168	306.6
1	Thanet	18	0	124	5.5	142	5.5
1	Humber Gateway	99	99	138	6.1	237	105.1
1	Westermest Rough	347	347	486	21.4	833	368.4
1	Hywind	249	0	2136	94	2385	94
1	Kincardine	632	0	0	0	632	0

Tier	Windfarm	Breeding season		Nonbreeding season		Annual	
		Total	FFC SPA	Total	FFC SPA	Total	FFC SPA
1	Beatrice	13610	0	2755	121.2	16365	121.2
1	Dudgeon	334	0	542	23.8	876	23.8
1	Galloper	305	0	593	26.1	898	26.1
1	Race Bank	361	0	708	31.2	1069	31.2
1	Rampion	10887	0	15536	683.6	26423	683.6
1	Hornsea Project One	9836	4554.1	8097	356.3	17933	4910.4
1	Blyth Demonstration Project	1220	0	1321	58.1	2541	58.1
1	East Anglia ONE	274	0	640	28.2	914	28.2
1	European Offshore Wind Deployment Centre	547	0	225	9.9	772	9.9
2	Dogger Bank Creyke Beck A	5407	1892.5	6142	270.2	11549	2162.7
2	Dogger Bank Creyke Beck B	9479	3317.7	10621	467.3	20100	3785
2	Firth of Forth Alpha	13606	0	4688	206.3	18294	206.3
2	Firth of Forth Bravo	11118	0	4112	180.9	15230	180.9
2	Inch Cape	4371	0	3177	139.8	7548	139.8
2	Methil	25	0	0	0	25	0
2	Moray Firth (EDA)	9820	0	547	24.1	10367	24.1

Updated Offshore Ornithology Cumulative and In-Combination Assessment

Tier	Windfarm	Breeding season		Nonbreeding season		Annual	
		Total	FFC SPA	Total	FFC SPA	Total	FFC SPA
2	Neart na Gaoithe	1755	0	3761	165.5	5516	165.5
2	Dogger Bank Teesside A	3283	1149.1	2268	99.8	5551	1248.9
2	Dogger Bank Teesside B	5211	1823.9	3701	162.8	8912	1986.7
2	Triton Knoll	425	425	746	32.8	1171	457.8
2	Hornsea Project Two	7735	3581.3	13164	579.2	20899	4160.5
3	East Anglia THREE	1744	0	2859	125.8	4603	125.8
3	Hornsea Project Three	13374	0	17772	782	31146	782
4	Norfolk Vanguard	4320	0	4776	210.2	9096	210.2
3	Moray West	24426	0	38174	1679.7	62600	1679.7
4	Norfolk Boreas	7767	0	13777	606.2	21544	606.2
4	East Anglia TWO	2077	0	1675	73.7	3752	73.7
4	East Anglia ONE North	4183	0	1888	83.1	6071	83.1
	Total (all projects above)	170621	17456.6	170874	7518.7	341495	24975.1
5	<i>Hornsea 4 (PEIR)</i>	15245	15245	69555	3060.4	84800	18305.4
5	<i>DEP and SEP (PEIR)</i>	3576	0	8671	382	12247	382

Tier	Windfarm	Breeding season		Nonbreeding season		Annual	
		Total	FFC SPA	Total	FFC SPA	Total	FFC SPA
	Total with Hornsea Project 4, DEP and SEP (all projects)	189442	32701.6	249100	10961.1	438542	43662.5

4.8 Razorbill

Table 8 Razorbill cumulative and in-combination displacement abundance.

Tier	Windfarm	Breeding season		Autumn migration		Nonbreeding season		Spring migration		Annual	
		Total	FFC SPA	Total	FFC SPA	Total	FFC SPA	Total	FFC SPA	Total	FFC SPA
1	Beatrice Demonstrator	No estimate available									
1	Gunfleet Sands	0	0	0	0	30	0.8	0	0	30	1
1	Kentish Flats	No estimate available									
1	Kentish Flats Extension	No estimate available									
1	Greater Gabbard	0	0	0	0	387	10.5	84	2.8	471	13
1	Lincs & LID	45	0	34	1.1	22	0.6	34	1.1	134	3
1	London Array	14	0	20	0.7	14	0.4	20	0.7	68	2
1	Scroby Sands	No estimate available									
1	Sheringham Shoal	106	0	1343	45.7	211	5.7	30	1	1690	52
1	Teesside	16	0	61	2.1	2	0.1	20	0.7	99	3
1	Thanet	3	0	0	0	14	0.4	21	0.7	37	1
1	Humber Gateway	27	0	20	0.7	13	0.4	20	0.7	80	2
1	Westermest Rough	91	91	121	4.1	152	4.1	91	3.1	455	102

Updated Offshore Ornithology Cumulative and In-Combination Assessment

Tier	Windfarm	Breeding season		Autumn migration		Nonbreeding season		Spring migration		Annual	
		Total	FFC SPA	Total	FFC SPA	Total	FFC SPA	Total	FFC SPA	Total	FFC SPA
1	Hywind	30	0	719	24.4	10	0.3			759	25
1	Kincardine	22	0		0		0			22	0
1	Beatrice	873	0	833	28.3	555	15	833	28.3	3094	72
1	Dudgeon	256	0	346	11.8	745	20.1	346	11.8	1693	44
1	Galloper	44	0	43	1.5	106	2.8	394	13.4	587	18
1	Race Bank	28	0	42	1.4	28	0.8	42	1.4	140	4
1	Rampion	630	0	66	2.2	1244	33.6	3327	113.1	5267	149
1	Hornsea Project One	1109	534.5	4812	163.6	1518	41	1803	61.3	9242	800
1	Blyth Demonstration Project	121	0	91	3.1	61	1.6	91	3.1	364	8
1	Dogger Bank Creyke Beck A	1250	375	1576	53.6	1728	46.7	4149	141.1	8703	616
1	Dogger Bank Creyke Beck B	1538	461.4	2097	71.3	2143	57.9	5119	174	10897	765
2	East Anglia ONE	16	0	26	0.9	155	4.2	336	11.4	533	17

Tier	Windfarm	Breeding season		Autumn migration		Nonbreeding season		Spring migration		Annual	
		Total	FFC SPA	Total	FFC SPA	Total	FFC SPA	Total	FFC SPA	Total	FFC SPA
2	European Offshore Wind Deployment Centre	161	0	64	2.2	7	0.2	26	0.9	258	3
2	Firth of Forth Alpha	5876	0			1103	29.8			6979	30
2	Firth of Forth Bravo	3698	0			1272	34.3			4970	34
2	Inch Cape	1436	0	2870	97.6	651	17.6			4957	115
2	Methil	4	0	0	0	0	0	0	0	4	0
2	Moray Firth (EDA)	2423	0	1103	37.5	30	0.8	168	5.7	3724	44
2	Neart na Gaoithe	331	0	5492	186.7	508	13.7			6331	200
2	Dogger Bank Teesside A	834	250.2	310	10.6	959	25.9	1919	65.2	4022	352
2	Dogger Bank Teesside B	1153	345.9	592	20.1	1426	38.5	2953	100.4	6125	505
2	Triton Knoll	40	0	254	8.6	855	23.1	117	4	1265	36
2	Hornsea Project Two	2511	1210.3	4221	143.5	720	19.4	1668	56.7	9119	1430
3	East Anglia THREE	1807	0	1122	38.1	1499	40.5	1524	51.8	5952	130
3	Hornsea Project Three	630	0	2020	69	3649	99	2105	72	8404	240
4	Norfolk Vanguard	879	0	866	29.5	839	22.7	924	31.4	3508	84

Updated Offshore Ornithology Cumulative and In-Combination Assessment

Tier	Windfarm	Breeding season		Autumn migration		Nonbreeding season		Spring migration		Annual	
		Total	FFC SPA	Total	FFC SPA	Total	FFC SPA	Total	FFC SPA	Total	FFC SPA
3	Moray West	2808	0	3544	120.5	184	5	3585	121.9	10121	247
4	Norfolk Boreas	630	0	263	8.9	1065	28.8	345	11.7	2303	49
4	East Anglia TWO	281	0	44.1	1.5	136.4	3.7	230	7.8	692	13
4	East Anglia ONE North	403	0	85	2.9	54	1.5	207	7	749	11
	Total (all projects above)	32124	3268.3	35100.1	1193.7	24095.4	651.5	32531	1106.2	123848	6220
5	<i>Hornsea 4 (PEIR)</i>	<i>580</i>	<i>580</i>	<i>5960</i>	<i>202.6</i>	<i>685</i>	<i>18.5</i>	<i>1361</i>	<i>46.3</i>	<i>8586</i>	<i>847.4</i>
5	<i>DEP and SEP (PEIR)</i>	<i>1064</i>	<i>0</i>	<i>4295</i>	<i>146</i>	<i>1310</i>	<i>35</i>	<i>420</i>	<i>14</i>	<i>7089</i>	<i>195</i>
	Total with Hornsea Project Four, DEP and SEP (all projects)	33768	3848.3	45355.1	1542.3	26090.4	705	34312	1166.5	139523	7262.4