THE PLANNING ACT 2008

THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

Dogger Bank South Offshore Wind Farm

Appendix G2 to the Natural England Deadline 2 Submission
Natural England's comments and updated advice Offshore Ornithology

For:

The construction and operation of the Dogger Bank South (East and West) Offshore Wind Farm located approximately 100-122km off the Northeast Coast in the Southern North Sea.

Planning Inspectorate Reference EN010125

27th February 2025

Appendix G2 – Natural England's Advice on Offshore Ornithology at Deadline 2

Overview

In formulating these comments, the following documents submitted by the Applicant have been considered in relation to the impacts of Dogger Bank South (East and West) Offshore Wind Farm (DBS OWF) on Offshore Ornithology:

- [PDB-006] 10.18 Response to Natural England's Relevant Representations (Appendix G&H)
- [AS-058] 7.12 ES Chapter 12 - Offshore Ornithology (Revision 2)
- [AS-061] 7.12.12.3 ES Appendix 12-3a-c - Monthly Abundance - All, Sitting, Flying (Revision 2)
- [AS-063] 7.12.12.4 ES Appendix 12-4a-c - Monthly Densities - All, Sitting, Flying (Revision 2)
- [AS-065] 7.12.12.5 ES Appendix 12-5a-c - Seasonal Peak Abundance – All, Sitting, Flying (Revision 2)
- [AS-067] 7.12.12.6 ES Appendix 12-6a-c - Seasonal Peak Density - All, Sitting, Flying (Revision 2)
- [AS-069] 7.12.12.7 ES Appendix 12-7a-c - Survey Abundances - All, Sitting, Flying (Revision 2)
- [AS-071] 7.12.12.8 ES Appendix 12-8a-c - Survey Densities - All, Sitting, Flying (Revision 2)
- [AS-086] 6.1 RIAA HRA Part 4 of 4 – Marine Ornithological Features (Revision 3)
- [AS-118] 10.42 Ornithological Mitigation Option Report (Revision 1)
- [APP-115] 7.12.12.12 Environmental Statement Appendix 12-12 - Seasonal Displacement Matrices Upper Lower C.I. Abundance - Volume 7

1. Natural England's Advice and Recommendations

1.1. Revised ornithology assessment

Natural England acknowledge and welcome the significant efforts made by the Applicant to address concerns raised in our Relevant Representation and provide an assessment that is in line with SNCB advice. We consider that considerable progress has been made across the assessment, as reflected in the number of Green and Yellow rows in our detailed comments, and a large proportion of issues are now resolved. Whilst some outstanding methodological issues remain, which does prevent Natural England providing advice on EIA and HRA conclusions at this time, we consider these issues are easily resolvable within Examination timeframes.

Given the scale of the updates that have been made, Natural England have provided our comments in the same format as our original Relevant and Written Representation. A summary of our outstanding concerns in relation to Offshore Ornithology is set out in Table 1. Our detailed advice and recommendations are presented in Table 2. For clarity, we have

included the point reference values from both our Risk and Issues log ('R&I Ref') and our original Relevant Rep ('Rel Rep Ref') in Table 2 to allow previously raised issues to be tracked.

1.2. Characterisation of Natural England Advice

We note that within the revised assessment and the Applicant's Deadline 2 cover letter [REP2-001], the Applicant continues to refer to Natural England's and wider SNCB advice on both methodology and interpretation of results as "overly precautionary" or not based in evidence, whilst the Applicant's preferred methods and outputs are characterised as "evidence-based". We again highlight that the SNCB approach is no less evidence-led than that of the Applicant. It is simply a different interpretation of the same evidence, and one which takes account of the evidence-poor, high-uncertainty environment within which the assessments are carried out, as well as the requirements of the Habitats Regulations. Ultimately this is a matter of ecological judgment and given Natural England's role as the appropriate national conservation body, considerable weight ought to be given to its advice and there should be cogent and compelling reasons for departing from it.

Natural England note that our current Best Practice Advice remains unchanged, and whilst updates are planned for publication at the end of March, these will not change any aspects currently under contention and no action will be required by projects currently in Examination as regards offshore ornithology. We are concerned that a prolonged debate about the Best Practice Advice could distract the Examination from focussing on the readily addressed outstanding issues with the Applicant's offshore ornithology impact assessment. We also note that whilst agreement between the Applicant and SNCB is desirable, it is not essential provided the Examiners and ultimately the Secretary of State have assessments according to each approach where disagreements exist, so they can take a view on the most appropriate outputs to base their assessments on. Whilst we would like to continue working towards agreement with the Applicant, we consider it unlikely that any further rationale provided on our Best Practice Advice will lead to a material change in the Applicant's position. However, should the Examiners require any further information to inform their understanding, we would be happy to provide this in response to Examiner's Questions.

Table 1 Summary of Key Issues - Offshore Ornithology

NE Ref	Summary of Key Concerns	Natural England's Recommendations to Resolve Issues.	Risk
G1	<u>Consideration of additional mitigation</u> Natural England advised in our Relevant Representations that further consideration should be given to potential measures to reduce impacts, given the scale of the predicted impacts of the projects on seabird features. Based on the current impact assessment, Dogger Bank South is predicted to have the highest impacts on FFC SPA kittiwake of all projects in English waters to date, according to both the Applicant's and Natural England's advised approach. We note that the Applicant has not currently committed to further mitigation measures. Given the large numbers of seabirds recorded in the baseline surveys and the potential levels of connectivity with FFC SPA in particular, we consider this is to be a critical step for Habitats Regulations purposes	Natural England continue to advise that further consideration is given to potential mitigation measures to reduce impacts on seabird features, such as array reductions, changes to design and layout of arrays, or increasing the hub height of turbines.	
G2	<u>In-combination and cumulative assessments</u> Natural England note that the cumulative and in-combination totals presented for several species do not align with the most recently agreed figures as presented at Sheringham & Dudgeon Extensions Projects (SEP & DEP) (Deadline 8). For several species, the cumulative totals also do not match with the unapportioned in-combination totals presented.	Natural England advise that the Applicant review the cumulative and in-combination figures and correct them as necessary.	
G3	<u>Scenarios for displacement impacts on auks in PVAs.</u> Natural England note that the Population Viability Analyses (PVAs) run for impacts on guillemot and razorbill do not include the full range of displacement and mortality rates, as advised by Natural England. We note that the highest combination of rates included is 70% displacement and 2% mortality. Though we recognise that consent decisions to date have been based on 70% displacement and 2% mortality values, and that 70% and 10% represent an extreme worse-	Natural England advise that the PVAs run to assess the predicted impacts of the projects on guillemot and razorbill populations encompass the full range of Natural England's advised displacement and mortality rates, to ensure that the full range of possible impact levels is considered.	

NE Ref	Summary of Key Concerns	Natural England's Recommendations to Resolve Issues.	Risk
	case scenario, the exclusion of the upper end of Natural England's advised range of displacement and mortality rates (70% and 10%) means that the full range of possible impact levels has not been captured by the PVAs undertaken. Further, we note that a PVA has not been run for FFC SPA razorbill for the proposal alone, nor guillemot at the EIA scale, despite the potential impacts exceeding 1% of baseline mortality.		
G4	<u>Cumulative Displacement Impacts on Auks</u> The spatial distribution figures provided in 7.12.12.10 show that high densities of auks (particularly guillemot and razorbill) were recorded in the area between the two arrays, but outside the 2km buffer. It is likely that birds in this area will be vulnerable to cumulative displacement impacts from the arrays on either side. We note that the Applicant has not included an assessment of the cumulative impacts of displacement on auks in the area between the arrays, as previously requested by Natural England.	Natural England continue to advise that the Applicant should provide an assessment of cumulative displacement impacts on auks between the arrays.	
G5	<u>PVA results</u> Natural England note that the results of several of the PVAs undertaken by the Applicant are not as we would expect. For example, the results of some PVAs appear to differ significantly from the results of PVAs run by SEP&DEP for very similar impact values. The details of the PVA parameters used have not been updated to reflect the changes to the impact values in the assessment, which means it therefore has not been possible for Natural England to assess why these differences might have arisen.	Natural England advise that the Applicant check the results of all PVA scenarios run for the assessment. We request that the inputs and outputs for all PVA scenarios are clearly presented so that we can fully understand and assess the specification and parametrisation of the models. We advise that this should include presenting the log files for all PVA scenarios undertaken.	

Table 2 Natural England's Detailed Advice and Recommendations – Offshore Ornithology

Natural England's Key Considerations	Natural England's Advice					
	R&I Ref	**Rel Reps Ref**	**Section Ref**	**Comment**	**Recommendation**	**Risk (RAG)**
Project Parameters - Document(s) Used: [PDB-006] 10.18 Response to Natural England's Relevant Representations (Appendix G&H) [AS-058] 7.12 ES Chapter 12 - Offshore Ornithology (Revision 2) [AS-061] 7.12.12.3 ES Appendix 12-3a-c - Monthly Abundance - All, Sitting, Flying (Revision 2) [AS-063] 7.12.12.4 ES Appendix 12-4a-c - Monthly Densities - All, Sitting, Flying (Revision 2) [AS-065] 7.12.12.5 ES Appendix 12-5a-c - Seasonal Peak Abundance – All, Sitting, Flying (Revision 2) [AS-067] 7.12.12.6 ES Appendix 12-6a-c - Seasonal Peak Density - All, Sitting, Flying (Revision 2) [AS-069] 7.12.12.7 ES Appendix 12-7a-c - Survey Abundances - All, Sitting, Flying (Revision 2) [AS-071] 7.12.12.8 ES Appendix 12-8a-c - Survey Densities - All, Sitting, Flying (Revision 2) [AS-086] 6.1 RIAA HRA Part 4 of 4 – Marine Ornithological Features (Revision 3) [AS-118] 10.42 Ornithological Mitigation Option Report (Revision 1)						
Project Description	H5	G10	7.5 – Table 5-2	The minimum lower blade tip clearance has been provided as 34m to Mean Sea Level (MSL) rather than Highest Astronomical Tide (HAT). Whilst the Applicant has not updated this, we can surmise from the information presented in 10.42 Ornithological Mitigation Option Report [AS-118] that the minimum blade clearance is 32.4m above HAT.	We advise that for consistency with other projects it would be beneficial for the Project Description and/or DCO to be updated to include the value against HAT as well as MSL.	
Natural England's Position on Worst Case Scenario & Analysis, Modelling and Reporting	G1, G5, G6,	G11, G15, G16,	10.18 – Table 2.1.1; 7.12; 7.12.12.3 (2).	<u>Approach to calculating abundances and seasonal peak abundances for the arrays combined.</u> Natural England welcome that the Applicant has updated the abundance and seasonal peak abundance estimates of the arrays	Issue resolved. Natural England will base our conclusions on impacts on these updated values.	

Natural England's Key Considerations	Natural England's Advice					
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			7.12.12.5 (2); 7.12.12.7 (2); 6.1(3)	combined, to reflect the sum of the abundance estimates of each array. Natural England acknowledges that the Applicant considers that their original approach was robust, however we maintain that summing the abundance estimates and displacement impacts of the two arrays is the most appropriate approach and that the Applicant's original approach under-represents impacts and does not reflect the worst-case scenario. We highlight that the Applicant has acknowledged that the arrays should be considered as NSIPs in their own right, and that if separate applications were to be submitted their impacts would be calculated separately and summed.		
Baseline Characterisation - Document(s) Used: [PDB-006] 10.18 Response to Natural England's Relevant Representations (Appendix G&H) [AS-058] 7.12 ES Chapter 12 - Offshore Ornithology (Revision 2) [AS-061] 7.12.12.3 ES Appendix 12-3a-c - Monthly Abundance - All, Sitting, Flying (Revision 2) [AS-063] 7.12.12.4 ES Appendix 12-4a-c - Monthly Densities - All, Sitting, Flying (Revision 2) [AS-065] 7.12.12.5 ES Appendix 12-5a-c - Seasonal Peak Abundance – All, Sitting, Flying (Revision 2) [AS-067] 7.12.12.6 ES Appendix 12-6a-c - Seasonal Peak Density - All, Sitting, Flying (Revision 2) [AS-069] 7.12.12.7 ES Appendix 12-7a-c - Survey Abundances - All, Sitting, Flying (Revision 2) [AS-071] 7.12.12.8 ES Appendix 12-8a-c - Survey Densities - All, Sitting, Flying (Revision 2) [AS-086] 6.1 RIAA HRA Part 4 of 4 – Marine Ornithological Features (Revision 3)					

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Data Gaps	G2, G3	G12, G13	7.12 – section 12.5.2	<u>Representativeness of baseline data</u> Natural England welcomes changes made by the Applicant to contextualise the baseline data (7.12, section 12.5.2) via comparisons of Waggitt et al (2019) and other related Offshore Windfarm datasets. We acknowledge the wide range of densities across these datasets and the absence of a consistent pattern of change between the two years of baseline data collected for Dogger Bank South.	Natural England are broadly satisfied that the baseline has been satisfactorily characterised, though we continue to note that the considerable variation between the two years of baseline data highlights the need for a precautionary approach to the assessment.	
	G4	G14	6.1; 7.12 – para 59; 10.18	<u>Use of additional references on seabird population trends</u> Natural England welcome that the Applicant has included references to the additional sources of information on seabird population trends recommended by Natural England, notably Seabirds Count (Burnell et al 2023) and HPAI impacts (Tremlett et al 2024).	Issue largely resolved. However, we continue to disagree with the Applicant's characterisation of these trends in the RIAA (see R&I log Ref G21).	
Environmental Impact Assessment - Document Used: [PDB-006] 10.18 Response to Natural England's Relevant Representations (Appendix G&H) [AS-058] 7.12 ES Chapter 12 - Offshore Ornithology (Revision 2) [AS-061] 7.12.12.3 ES Appendix 12-3a-c - Monthly Abundance - All, Sitting, Flying (Revision 2) [AS-063] 7.12.12.4 ES Appendix 12-4a-c - Monthly Densities - All, Sitting, Flying (Revision 2) [AS-065] 7.12.12.5 ES Appendix 12-5a-c - Seasonal Peak Abundance – All, Sitting, Flying (Revision 2)						

Natural England's Key Considerations	Natural England's Advice					
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[AS-067] 7.12.12.6 ES Appendix 12-6a-c - Seasonal Peak Density - All, Sitting, Flying (Revision 2) [AS-069] 7.12.12.7 ES Appendix 12-7a-c - Survey Abundances - All, Sitting, Flying (Revision 2) [AS-071] 7.12.12.8 ES Appendix 12-8a-c - Survey Densities - All, Sitting, Flying (Revision 2) [AS-086] 6.1 RIAA HRA Part 4 of 4 – Marine Ornithological Features (Revision 3) [APP-115] 7.12.12.12 ES Appendix 12-12 - Seasonal Displacement Matrices Upper Lower C.I. Abundance - Volume 7						
Identified impacts	G12	G22	7.12; 7.12.12.10; 10.18 – Table 2.1.1	<u>High densities of auks between the two arrays</u> The spatial distribution figures provided in 7.12.12.10 show that high densities of auks (particularly guillemot and razorbill) were recorded in the area between the two arrays, but outside the 2km buffer. Natural England consider it is likely that birds in this area will be vulnerable to cumulative displacement impacts from the arrays on either side and therefore advised that the Applicant should provide an assessment of cumulative displacement impacts on auks between the arrays. We note that this assessment has not been provided, and that the Applicant cites Trinder et al (2024)[1] as evidence that auks are not displaced beyond the 2km buffer.	Natural England maintain our previous advice that further assessment is needed of cumulative displacement impacts on auks between the arrays.	

[1] Trinder, M., O'Brien, S.H. and Deimel, J., (2024). A new method for quantifying redistribution of seabirds within operational offshore wind farms finds no evidence of within-wind farm displacement. *Frontiers in Marine Science*, *11*, p.1235061.

Natural England's Key Considerations	Natural England's Advice					
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				Natural England do not agree that the Trinder et al (2024)[1] paper provides evidence that auks are not displaced by offshore windfarms, as this study focuses on the behaviour of birds within-array (i.e. on the proportion of birds that are not displaced) and does not attempt to quantify a displacement rate for auks with respect to the array and buffer. Natural England highlight the recently published paper by Peschko et al (2024)[2], which demonstrates cumulative displacement impacts on guillemot up to 21km from offshore wind farms. Furthermore, a recent review of the evidence on displacement by offshore wind farms (Lamb et al 2024[3]) found that "*effects of offshore wind energy development on marine birds extend well beyond the immediate surroundings of the wind farms*" and recommended that buffer zones of 4km		

[2] Peschko, V., Schwemmer, H., Mercker, M., Markones, N., Borkenhagen, K. and Garthe, S., 2024. Cumulative effects of offshore wind farms on common guillemots (Uria aalge) in the southern North Sea-climate versus biodiversity?. *Biodiversity and Conservation*, *33*(3), pp.949-970.

[3] Lamb, J., Gulka, J., Adams, E., Cook, A. and Williams, K.A., 2024. A synthetic analysis of post-construction displacement and attraction of marine birds at offshore wind energy installations. *Environmental Impact Assessment Review*, *108*, p.107611.

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				may not be sufficient to detect displacement impacts.		
	G8	G18	7.12 – section 12.9	<u>Decommissioning displacement</u> Natural England acknowledge that the Applicant has considered displacement impacts during decommissioning in Chapter 7.12, Section 12.9. However, these impacts are not specifically quantified, as they have been for construction displacement impacts. While Natural England accept that these figures are not included in operational annual impact assessment figures or PVAs for the project, we note that this is a source of under-precaution in the assessment.	Natural England advise that it would be beneficial for decommissioning impacts to be explicitly quantified in the assessment as for construction impacts.	
Methodology	G9	G19	7.12; 10.18 – Table 2.1.1	<u>EIA baseline mortality rates and reference populations</u> Natural England acknowledge and welcome that the Applicant has updated EIA baseline mortality rates and reference populations to reflect our advice.	Issue resolved. No action needed.	
	G11	G21	7.12	<u>Displacement impacts on arrays combined</u> Natural England welcome that the Applicant has updated the displacement impact	Issue resolved. No action needed.	

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				assessment for the arrays combined to reflect the sum of the impacts of each array. While we note that the Applicant considers their original approach to have been robust, Natural England consider that the updated values more accurately represent impacts of the arrays combined. We note that our conclusions on impacts will be based on these updated values		
	G53	NEW	6.1; 7.12; 7.12.12.12	<u>Presentation of displacement matrices including upper and lower confidence intervals</u> Natural England highlight that whilst the Applicant has updated their displacement assessment for the arrays combined in ES Chapter 12 – Offshore Ornithology (Revision 2) [AS-057], the relevant tables in Appendix 12-12 [APP-115] have not been updated. This means that the displacement matrices including upper and lower confidence intervals for the arrays combined are not presented.	Natural England advise that ES Appendix 12-12 [APP-115] is updated in due course to reflect the updated displacement assessment figures and that all displacement matrices are presented, including for the upper and lower confidence intervals.	
	G15	G25	7.12	<u>Appropriate displacement and mortality rates for auks and characterisation of Natural England's advice</u>	No change. Natural England anticipate that the forthcoming Offshore Renewables	

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				Whilst the Applicant has presented the results of the displacement assessment for auks using Natural England's advised ranges for displacement (30%-70%) and mortality rates (1%-10%), they have consistently advocated for the application of 50% displacement and 1% mortality rates. The Applicant consistently characterises their preferred rates as being more realistic and evidence-based than Natural England's advised range and have used these preferred rates in their assessment of the significance of impacts. We also note that in their response to our Relevant Representations [PDB-006], the Applicant continues to claim that their preferred rates of 50% displacement and 1% mortality are precautionary and cite Trinder et al (2024)[1] as evidence of low levels of displacement of auks. Natural England do not agree that the Trinder et al (2024)[1] paper provides sufficient evidence that auks are not displaced by offshore windfarms, as this study focuses on the behaviour of birds within-array (i.e. on the proportion of birds that are not displaced) and does not attempt to quantify a displacement rate for auks with	Joint Industry Programme (ORJIP) project 'Improving understanding of distributional change for relevant seabird species (ImpUDis)' will provide a comprehensive overview of auk displacement. Until this project returns evidence which can inform displacement rates of auks, Natural England continue to advise the use of the displacement matrix set out in our Best Practice Guidance and will base our conclusions on impacts calculated using these rates.	

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	R&I Ref	**Rel Reps Ref**	**Section Ref**	**Comment**	**Recommendation**	**Risk (RAG)**
				respect to the array and buffer. We also note that the results of a recent review of the evidence on displacement by offshore wind farms (Lamb et al 2024[3]) further supports our position that basing impact assessments on a single rate of 50% displacement is not appropriate.		
	G16	G26	7.12	<u>Gannet collision</u> Natural England welcome that the Applicant has updated their gannet collision risk assessment in accordance with Natural England's advice to include a range of macro-avoidance rates between 65% and 85%. We note that the updated assessment still uses single avoidance rates calculated by the Applicant rather than following Natural England's advice to apply a macro-avoidance rate along with an avoidance rate of 99.3%. However, we note that this will likely not make a material difference to the resulting collisions figures.	Issue resolved. No action needed.	
Cumulative assessment	G17	G27	7.12 - section 12.10.3	<u>Cumulative assessment for impacts on red-throated diver</u>	Natural England recommends that the Applicant revisit the figures presented in their cumulative assessment and clarify how they	

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				Natural England welcome that the Applicant has included a cumulative assessment for impacts on red-throated diver. However, the figures presented in this assessment do not align with the most recently agreed cumulative figures from the SEP&DEP Examination (See Natural England's Response to Deadline 8 [REP8-102][4]). SEP&DEP presented a cumulative displacement impact for red-throated diver of between 32 and 318 birds, representing an increase in BDMPS baseline mortality of 1.10-10.5%. By contrast, the figures presented by the Applicant suggest a maximum of 6.6 birds. We highlight that it has been Natural England's long-standing position that significant adverse effects at the EIA scale could not be ruled out for this species due to cumulative impacts.	have been arrived at. We refer the Applicant to the figures presented during the SEP&DEP examination [[REP8-102][4] as a useful reference point. We advise that these figures should be presented with an appropriate range of mortality rates between 1 and 10% for array displacement, in accordance with Natural England's standard advice.	
	G54	NEW	7.12 – section 12.10; 6.1	<u>Cumulative and in-combination totals</u> Natural England note that the cumulative impact totals presented in 7.12 ES Chapter	Natural England advise the Applicant to check the cumulative and in-combination totals for all species to ensure their accuracy, and to clarify	

[4] EN010109-002129-Natural England - Other- EN010109 441148 SEP DEP Appendix B3 - Natural England's Offshore Ornithology Position (Revision 2) Deadline 8.pdf

Natural England's Key Considerations	Natural England's Advice					
	R&I Ref	**Rel Reps Ref**	**Section Ref**	**Comment**	**Recommendation**	**Risk (RAG)**
				12 [AS-058] and the unapportioned in-combination totals presented in 6.1 RIAA HRA Part 4 of 4 – Marine Ornithological Features (Revision 3) [AS-086] do not always match. For example, the cumulative collision impacts presented for Kittiwake in Table 12-99 of [AS-058] are 5510.7, while the unapportioned in-combination totals presented in Table 9-23 of [AS-086] are 4071. Natural England note that we would expect the unapportioned in-combination totals in the RIAA to be the same as the cumulative totals presented in the ES.	any remaining discrepancies between cumulative and in-combination totals.	
	G55	NEW	7.12 – Sections 12.10.5.3 and 12.10.5.5	<u>Great black-backed gull and lesser black-backed gull cumulative totals</u> The cumulative collision totals presented for great black-backed gull and lesser black-backed gull are lower than the cumulative totals presented at SEP & DEP, despite additional impacts from several projects since the SEP&DEP examination, including those of Dogger Bank South.	Natural England advise that the Applicant check the cumulative collision impacts for great black-backed gull and lesser black-backed gull. We refer the Applicant to the figures presented during the SEP&DEP examination [REP8-102][4] as a useful reference point.	

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				The annual cumulative collision mortality presented by the Applicant for lesser black-backed gull (Table 12-100) is 597.8. The annual cumulative collision mortality presented at SEP & DEP [REP8-102][4] was 640. The annual cumulative collision mortality presented by the Applicant for great black-backed gull (Table 12-102) is 1023.2. The annual cumulative collision mortality presented at SEP & DEP [REP8-102][4] was 1357.		
	G56	NEW	7.12 – Section 12.10	<u>Lack of PVAs for cumulative impact assessments</u> The Applicant has not provided PVAs for cumulative EIA impacts, despite several of these amounting to increases in background mortality rates of over 1%, when assessed according to Natural England's advice. For example, cumulative totals presented for guillemot (7.12, para 766) amount to an increase in background mortality rate of 3.08% when applying a displacement rate of 70% and a mortality rate of 2%.	Natural England advises that the Applicant run PVAs to assess projected impacts on populations wherever cumulative impacts lead to increases in background mortality rate of greater than 1%, when calculated according to Natural England's advice.	

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Have the impacts been avoided/reduced by the use of appropriate mitigation?	G18	G28	7.12	<u>Consideration of additional mitigation</u> See G18 (G63) in HRA comments below.	See G18 (G63) in HRA comments below.	
Assessment Conclusions	G19	G29		Whilst substantial progress has been made, outstanding concerns with aspects of the assessment need addressing before Natural England can advise on the EIA conclusions, including: • Discrepancies in cumulative impact figures • Lack of PVAs to assess cumulative impacts resulting in increases in background mortality rates of more than 1% • Lack of assessment of cumulative displacement impacts on auks between the arrays. We highlight that Natural England considers that impacts on the following species are already significant at an EIA scale in the North Sea: gannet, great black-backed gull, guillemot, kittiwake, razorbill, and red-throated diver, and that this proposal will be making an addition to the cumulative totals.	Natural England advise that cumulative impact figures are checked and refer the Applicant to the figures presented during the SEP &DEP Examination [REP8-102][4]. We advise that PVAs are run wherever cumulative impacts lead to increases in background mortality rate of greater than 1%, when calculated according to Natural England's advice. Natural England advise that the Applicant provide an assessment of cumulative displacement impacts on auks between the arrays.	

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	R&I Ref	**Rel Reps Ref**	**Section Ref**	**Comment**	**Recommendation**	**Risk (RAG)**
HRA - Document Used: [PDB-006] 10.18 Response to Natural England's Relevant Representations (Appendix G&H) [AS-058] 7.12 ES Chapter 12 - Offshore Ornithology (Revision 2) [AS-061] 7.12.12.3 ES Appendix 12-3a-c - Monthly Abundance - All, Sitting, Flying (Revision 2) [AS-063] 7.12.12.4 ES Appendix 12-4a-c - Monthly Densities - All, Sitting, Flying (Revision 2) [AS-065] 7.12.12.5 ES Appendix 12-5a-c - Seasonal Peak Abundance – All, Sitting, Flying (Revision 2) [AS-067] 7.12.12.6 ES Appendix 12-6a-c - Seasonal Peak Density - All, Sitting, Flying (Revision 2) [AS-069] 7.12.12.7 ES Appendix 12-7a-c - Survey Abundances - All, Sitting, Flying (Revision 2) [AS-071] 7.12.12.8 ES Appendix 12-8a-c - Survey Densities - All, Sitting, Flying (Revision 2) [AS-086] 6.1 RIAA HRA Part 4 of 4 – Marine Ornithological Features (Revision 3)						
Assessment	G21, G22, G24	G32, G33, G35	6.1	<u>Calculation of adult baseline mortality of gannet, kittiwake and razorbill at FFC SPA</u> Natural England welcome that the Applicant has updated the adult baseline mortality rates for gannet, kittiwake, and razorbill to reflect our advice. However, we note that the Applicant continues to refer to the Burnell et al (2023) counts as more recent than the Clarkson et al (2022) counts. For example, in Chapter 6.1, paragraph 167, the Applicant states "*Clarkson et al. (2022) reported the 2022 population was 44,574 apparently occupied nests (AON), or 89,148 breeding adults, while Burnell et al. (2023) reported a small increase to 45,504 AON, 91,008 individuals"* and "*Natural England [REP-039] advised that the earlier population estimate should be used".*	Issue largely resolved. However, we advise that the Applicant considers rewording their statements regarding the timelines of the counts presented in Burnell et al (2023) and Clarkson et al (2022), as it is currently misleading in terms of the characterisation of both seabird population trends and Natural England's advice.	

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				While Burnell et al (2023) was published after Clarkson et al (2022), the counts presented in it for FFC SPA were conducted in 2017. The Clarkson et al (2022) counts were made in 2022 and are therefore more recent. The Applicant's statements regarding the timeline of these counts are therefore erroneous, and the 2022 count for Kittiwake, for example, actually represents a small decline when compared with the 2017 count presented in Burnell et al (2023).		
	G23	G34	6.1 – Section 9.6.2.4	<u>Calculation of adult baseline mortality of puffin at FFC SPA</u> Natural England welcome that the Applicant has updated their calculation of adult baseline mortality for puffin at FFC SPA. We note that the Applicant has still not followed our advice to use the most recent count of 3080 individuals, as per Clarkson et al (2022). However, we acknowledge the Applicant's reasoning on the application of a correction factor and consider that the discrepancy is unlikely to lead to a material difference in the impact values.	Issue largely resolved. See G21 above with respect to Burnell et al 2023.	

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				However, we note that the Applicant's statement that the "*most recent SPA estimate, as reported in Burnell et al 2023 is 4279*" is incorrect, as the Clarkson et al (2022) count is more recent than the estimate presented in Burnell et al (2023) (see previous comment).		
	G20	G31	6.1 – Sections 9.6.2.3 and 9.6.2.5	<u>Apportioning of guillemot and razorbill to FFC SPA</u> Natural England acknowledge and welcome that the Applicant has updated their apportioning of guillemot and razorbill impacts to FFC SPA to reflect our advice.	Issue Resolved. No action needed.	
	G23	G34	6.1 – section 9.6.2.4, Table 9-31	<u>Impacts on puffin at FFC SPA</u> Natural England note that there appears to be an error in the calculation of displacement impacts on puffin at FFC SPA. At the apportioning rates stated by the Applicant and at 70% displacement and 10% mortality, the impact on puffin at FFC SPA should be 1.7 birds per year, not 1.4 birds per year as stated by the Applicant (Table 9-31,).	Natural England advises that the Applicant check and correct the figures presented for impacts on puffin at FFC SPA, however we acknowledge this discrepancy is unlikely to lead to a material change in the impact assessment conclusions.	

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	G53	NEW	6.1; 7.12.12.12	<u>Presentation of displacement matrices including upper and lower confidence intervals</u> Natural England note that, while the Applicant has updated their displacement assessment, the relevant tables in Appendix 7.12.12.12 have not been updated and do not contain the apportioned displacement matrices relevant to the RIAA. This means that the displacement matrices for SPA impacts that include upper and lower confidence intervals are not presented.	Natural England advise that Appendix 7.12.12.12 be updated to reflect the updated displacement assessment figures and that all displacement matrices are presented, including for the upper and lower confidence intervals.	
	G31 G32	G42, G43, G44	6.1	<u>PVAs for impacts of the projects alone on guillemot, kittiwake, and gannet at FFC SPA</u> Natural England welcome that the Applicant has undertaken PVAs to assess the impacts of the projects alone on guillemot, kittiwake, and gannet at FFC SPA.	Issue resolved. No action needed.	
	G32	G43	6.1 – section 9.6.2.5	<u>PVA for impacts of the projects alone on razorbill at FFC SPA</u> The Applicant has not carried out a PVA to assess the impacts of the projects alone on razorbill at FFC SPA, despite the predicted increase in background mortality being above 1%, at 2.18% (70% displacement, 2	No change. Natural England maintain our previous advice that a PVA should be run to assess projected impacts of the projects wherever these result in an increase in background mortality greater than 1%, when calculated according to Natural England's advice. We therefore advise that a PVA is run to	

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				% mortality) and 10.9% (70% displacement, 10% mortality). Natural England note that the Applicant has stated (Chapter 6.1, para 311) that a PVA for the projects alone is not required because "*the results of the PVA presented in the in-combination assessment (section 9.6.2.5.5) encompass the worst case prediction above (for 70% displaced and 10% mortality*)". Natural England note that this is not the case, as the PVA presented for the in-combination assessment of impacts on razorbill at FFC SPA (presented in section 9.6.2.5.5) does not encompass the worst case scenario of 70% displacement and 10% mortality, with the highest combination of ratios shown as 70% displacement and 2% mortality (see Table 9-38).(see R&I G43).	assess impacts of the project alone on razorbill at FFC SPA.	
	G26, G43	G37, G56	6.1 – Sections 9.6.2.3, 9.6.2.5 and 9.8.2.2	<u>Displacement and mortality rate range represented in PVAs for impacts on guillemot and razorbill</u> Natural England note that the PVAs run for impacts on guillemot and razorbill do not include the full range of displacement and	Natural England advise that the PVAs run to assess the predicted impacts of the projects on guillemot and razorbill populations encompass the full range of Natural England's advised displacement and mortality	

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				mortality rates, as advised by Natural England. We note that the highest combination of rates included is 70% displacement and 2% mortality. Though we recognise that consent decisions to date have been based on 70% displacement and 2% mortality values, and that 70% and 10% represent an extreme worse-case scenario, the exclusion of the upper end of Natural England's advised range of displacement and mortality rates (70% and 10%) means that the full range of possible impact levels has not been captured by the PVAs undertaken.	rates, to ensure that the full range of possible impact levels is considered.	
	G36	G49	6.1; 7.12.12. 13 – Table 3	<u>PVA starting population for kittiwake at FFC SPA</u> Natural England note that the starting population used for PVAs to assess impacts on kittiwake at FFC SPA is 91,008. We note that the starting population should be the most recent population estimate of 89,148, as given in Clarkson et al (2022), which has been used to calculate baseline mortality rate. See G21, G22, G24 above for comments on timeline of counts.	No change – this has not been addressed in the revised assessment. We maintain our advice that the most recent population estimate for kittiwake at FFC SPA should be used as the starting population for PVAs run for this population.	

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	G57	NEW	6.1; 7.12.12.13	<u>Presentation of PVA inputs and outputs</u> Appendix 7.12.12.13, containing the inputs and outputs of PVAs run for the assessment, has not been updated to reflect the updated impact values in the assessment and the PVA scenarios and results presented in the RIAA. Natural England further note that the PVA scenarios are also not clearly described in this Appendix.	Natural England advise that the inputs and outputs for all PVA scenarios undertaken for the assessment are clearly presented so that we can fully understand and assess the specification and parametrisation of the models. We advise that this should include presenting the log files for all PVA scenarios undertaken. Note that this comment applies to PVAs run to assess impacts of both the projects alone and in-combination with other projects.	
In- combination .	G37	G50		<u>In-combination assessments undertaken</u> Natural England welcomes that the Applicant has provided in-combination assessments for guillemot and puffin at the Farne Islands SPA. However, we have outstanding concerns with some aspects of the assessment methodology.	Issue progressed. See comments below relating to in-combination assessments for auks, e.g. G42.	
	G37	G50	6.1 – paras 84-86	<u>In-combination assessment for red-throated diver at Greater Wash SPA</u> We acknowledge that the Applicant has included an in-combination assessment for red-throated diver in the Greater Wash	Natural England consider that it would be best practice for a more thorough in-combination assessment for impacts on red-throated diver at the Greater Wash SPA to be undertaken. However, due to the low	

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				SPA, however it does not include impacts on this population from other projects.	predicted impact values, we do not consider that this would have a material impact on assessment conclusions.	
	G38	G51	6.1	<u>Projects included in the in-combination assessment</u> Natural England acknowledge and welcome the inclusion of all relevant Tier 4 projects in the in-combination assessments. We note and agree with the Applicant that the totals from Outer Dowsing, Five Estuaries and North Falls are preliminary until final agreements have been reached between these projects and Natural England.	Issue around inclusion of the relevant Tier 4 projects is now resolved. However, we advise the Applicant collaborates with other Round 4 developers to agree on how updated impact values (based on SNCB advice) can be efficiently incorporated as the Examinations of these projects progress, and that the Applicant updates the Examination at an appropriate juncture.	
	G39	G52. G53	6.1	<u>Presentation of 'compensated-for' impacts within in-combination assessment</u> Natural England welcomes the Applicant has presented in-combination totals both including and excluding compensated-for projects	Issue Resolved. No action needed.	
	G58	NEW	6.1 – section 9.6.2.2.5	<u>In-combination totals for kittiwake at FFC SPA</u> Natural England note that the in-combination totals for impacts on kittiwake	Natural England advise that the Applicant check the in-combination figures for kittiwake at FFC SPA and correct these if necessary. We also advise that the Applicant explains	

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				at FFC SPA appear to be lower than we would expect, given the totals presented during the SEP&DEP Examination [REP8-102][4]. We note that the totals presented in Chapter 6.1, Table 9-23 lead to total impacts at SEP&DEP of 373 birds, whilst the in-combination total presented at SEP&DEP was 394.	any remaining discrepancies in their assessment totals.	
	G42	G55	6.1	<u>Presentation of in-combination totals for displacement-affected species</u> The Applicant has presented in-combination totals for displacement-affected species as total and apportioned abundance estimates, which they have then applied displacement and mortality rates to. Natural England note that this approach makes is more difficult to check the appropriate impact figures against those presented by other projects, and that it prevents the Applicant from considering the advice Natural England has given to previous projects on how these impacts should be calculated (e.g. appropriate displacement and mortality rates at Hornsea 4, see comment G59.	Natural England advise the Applicant presents in-combination totals for displacement-affected species according to the agreed impact values for each project (as for in-combination collision assessment), rather than abundance estimates. We refer the Applicant to the most recently agreed in-combination totals provided at SEP&DEP [REP8-102][4].	

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	NA	NEW	6.1	<u>Guillemot abundance at the projects as presented within in-combination assessments</u> The annual abundance total for the projects presented in Table 9-28 is 42,864. This appears to be incorrect, and should be 60,438 (see Chapter 7.12, para 618). However, we acknowledge that the abundance apportioned to FFC SPA in Table 9-28 and used in the assessment for impacts of the project alone and in-combination at FFC SPA appears to be correct.	Natural England advise that the Applicant correct the total annual abundance figure for guillemot in Table 9-28 and check all other guillemot abundance figures within the assessment for accuracy.	
	G59	NEW	6.1	<u>In-combination totals for guillemot and razorbill at FFC SPA</u> The in-combination assessments for guillemot and razorbill at FFC SPA do not take into account the advice provided at SEP&DEP [REP8-102][4], that, while we consider it is reasonable to consider displacement rates of 70% and mortality rates of 2% for in-combination assessments of impacts on auks, we advise that the impacts of Hornsea 4 on FFC SPA populations should be considered at a displacement rate of 70% and a mortality rate of 5%. We note that this would increase	Natural England advise the Applicant to refer to the advice provided to SEP&DEP on the appropriate displacement and mortality rates to be used for the impacts of Hornsea 4 on guillemot and razorbill at FFC SPA and update their in-combination totals accordingly. We refer the Applicant to the agreed in-combination totals at SEP&DEP [REP8-102][4]. We also refer the Applicant to our comment on presentation of in-combination totals for displacement-affected species (G42).	

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				the in-combination impacts on FFC SPA guillemot from 1,541 (Chapter 6.1, para 239) to 2,220, and on FFC SPA razorbill from 343 (Chapter 6.1, para 317) to 412.	Natural England recommend that the impacts of these updated figures are then assessed by PVA.	
	G60	NEW	6.1	<u>PVA results</u> Natural England note that the results of several of the PVAs undertaken by the Applicant are not as we would expect. For example, the PVA results for an impact of 1,541 guillemots at FFC SPA (Table 9-30) result in a mean Counterfactual of Growth Rate (CGR) of 0.9931, which corresponds to a reduction in population growth rate of 0.69%. We note that the SEP & DEP PVA outputs for a similar impact of 1,539 achieved a median CGR of 0.986, which corresponds to a reduction in population growth rate of 1.4%. Similarly, the Applicant's stated PVA results for an impact of 343 razorbill at FFC SPA (Table 9-38) included a mean CGR of 0.9963, which corresponds to a reduction in population growth rate of 0.37%. Again, SEP & DEP outcomes for a similar, and slightly higher, impact of 359, achieved a	Natural England advise that the Applicant check the results of all PVA scenarios run for the assessment and ensure that the inputs and outputs of all scenarios are clearly presented, along with log files.	

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				median CGR of 0.99, corresponding to a reduction in population growth rate of 1%. Natural England note that the differences in these results are considerable, and more than would be expected to result from relatively minor changes to starting population sizes or mean productivity rates. We further note that, as the details of the PVA scenarios run have not been updated in Appendix 7.12.12.13 to reflect the updated impact values or scenarios (see G57), we are unable to check that the models have been appropriately parametrised.		
	G49	G62	6.1; 10.18 – Table 2.1.1	<u>Interpretation of PVA results: impacts of HPAI</u> Natural England note that in their response to our Relevant Representations (10.18, Table 2.1.1), the Applicant has stated that the impacts of HPAI on seabird populations '*have been much less significant than feared'.* Natural England strongly disagree that the impacts of HPAI on seabird populations have not been significant. We note, for	Natural England advise that the Examining Authority consider the uncertainties about the long-term population impacts of HPAI on seabirds when assessing the significance of the results of PVAs.	

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				example, that Tremlett et al (2024) estimated that there had been a 25% decline in UK gannet populations between the last seabird census (Burnell et al 2023) and the summer of 2023. Furthermore, Tremlett et al (2024) estimated that there had been a 20% decline in the English population of guillemots and an 18% decline in the English population of kittiwakes during the same time period. We acknowledge that in our Relevant Representations (G62), we erroneously referred to the latter two declines as being related to UK populations – we further note that the fact that these declines refer to the English populations makes them even more relevant to the projects. Natural England does not consider the scale of these declines to be insignificant. Furthermore, we note that several seabirds could not be assessed as part of the study reported in Tremlett et al (2024), so the impacts of HPAI on these species, which include razorbill and puffin, is unknown. Natural England note that the Applicant has also stated (10.18, Table 2.1.1), that the impacts of HPAI on seabird populations		

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				have '*resulted in temporary impacts on population growth rather than any long-lasting effects'*. Natural England note that the most severe outbreak of HPAI in wild birds ever recorded began in 2021, with severe impacts on seabird populations in 2021, 2022 and 2023. There has therefore not been time to fully assess the long-term impacts of this outbreak on seabird populations, as has been made clear in assessments such as that by Tremlett et al (2024). We note that, at the time of writing, this outbreak continues globally and, in the UK, and future impacts on UK seabird populations cannot be ruled out. Natural England note that the Applicant has stated (10.18, Table 2.1.1) that population-level impacts of HPAI do not need to be considered at FFC SPA. We note that, except for gannet, there have been no colony counts of any seabird species at FFC SPA since 2022. It is therefore impossible to state that there have been no population-level impacts of the disease at the SPA. Furthermore, we note that the resilience of even apparently unaffected colonies is likely to be affected by large		

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				scale mortality in the wider metapopulations.		
	G49	G62	6.1; 10.18-Table 2.1.1; 7.12 – section 12.5.4	<u>Interpretation of PVA results: consideration of realistic assessments of current and future population trends</u> Natural England consider that the Applicant may have misunderstood our Relevant Representations comment (G62) on the incorporation of realistic assessments of current and future seabird population trends, as they state (10.18, Table 2.1.1) that it is '*contradictory for Natural England to advise the Applicants to consider density-dependent effects while also being advised to undertake density-independent PVA*'. Natural England note that we were not advising that density-dependence should be incorporated into PVAs, and that our comment referred to the need to consider realistic future seabird population trends in the interpretation of the significance of the results of PVAs. Natural England note, for example, that recent reductions in productivity rates in guillemot breeding at FFC SPA indicate effects of density dependence, and that there are not an	Natural England advise that the Applicant consider realistic assessments of current and future seabird population trends, considering all relevant evidence, when assessing the significance of the predicted impacts of the projects. We refer the Applicant to the approach taken by SEP&DEP in considering a range of potential future growth rates, and suggest they take a similar approach.	

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				infinite number of suitable breeding ledges for guillemot at FFC SPA. It is therefore inappropriate to assume that past population growth rates will continue over the next 30 years. Natural England note that, in section 12.5.4 of Chapter 7.12, the Applicant addresses the issues of long-term population declines in UK-breeding seabirds, and the likely future effects of climate change on these populations. However, these assessments of likely future trends in seabird populations are not factored into the assessment of the significance of the results of the PVAs.		
Have the impacts been avoided/reduced by the use of appropriate mitigation?	G18	G63	7.12	<u>Consideration of additional mitigation</u> Natural England note that we advised in our Relevant Representations that further consideration should be given to potential measures to reduce impacts, given the scale of the predicted impacts of the projects on seabird features. Hotspot modelling of seabird densities and distributions in the study area may help to identify areas where impacts are particularly high, and that might be suitable for changes to array size or layout to mitigate impacts.	Natural England continue to advise that further consideration is given to potential mitigation measures to reduce impacts on seabird features, such as array reductions, changes to design and layout of arrays, or increasing the hub height of turbines.	

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				Given the large numbers of seabirds recorded in the baseline surveys and the potential levels of connectivity with FFC SPA in particular, we consider this is to be a critical step for Habitats Regulations purposes.		
	G50	G64	7.12 – Table 12-4, para 753; 6.1 – para 82	<u>Embedded mitigation for red-throated diver at the Greater Wash SPA</u> Natural England acknowledge and welcome the additional commitments to the use of existing shipping lanes in order to mitigate impacts on red-throated diver in the Greater Wash SPA. However, we note that the avoidance of cable installation works during the over-wintering period (1st November to 31st March inclusive) has not been included, as previously requested by Natural England.	Natural England advise that the Applicant should commit to avoiding or restricting cable installation works within Greater Wash SPA plus a 2km buffer during the over-wintering period (1st November to 31st March inclusive) to avoid impacts to this species.	
Assessment Conclusions	G51	G65		Natural England note that due to the issues outlined above, most notably with respect to in-combination assessments and PVAs, **we are unable to confirm agreement with the impact values or comment on the assessment conclusions at this time**.	Resolving the issues identified above will allow Natural England to provide our integrity judgements for the proposals alone and in-combination with other plans and projects, noting that for a number of species, the in-combination levels	

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				However, we note that since Hornsea Project Three Natural England's position has been that the in-combination total of collision mortality across consented plans/projects has already exceeded levels which are considered to be of an AEoI to Kittiwake at FFC SPA, and that any additional mortality arising from these proposals would only reinforce this conclusion. We now consider this to also be the case for in-combination impacts on guillemot at FFC SPA (Hornsea 4 onwards). Moreover, we have already advised regulators that we cannot rule out an in-combination AEoI on razorbill from FFC SPA, due to the impacts of North Sea windfarms, and on guillemot and the kittiwake component of the seabird assemblage at the Farne Islands SPA due to the substantial impacts of the Berwick Bank OWF.	are such that we will be unable to rule out adverse effects.	