Dogger Bank Project – PM575-PMS-054-001
Non-Material Change Application: Appendix 1 Ornithological Technical Report

Validity area: Dogger Bank Project / Offshore

ASSURANCE OF CONTENT

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Executive Summary

Dogger Bank Creyke Beck A & B are two offshore wind farms which were consented in 2015 under the Dogger Bank Creyke Beck Offshore Wind Farm Order 2015 (the DCO). In respect of both Dogger Bank Creyke Beck A & B, the DCO prescribes a number of parameters including maximum number of turbines, overall generating capacity, rotor diameter, total rotor-swept area, maximum tip height and lower tip height; these are set out in detail in section 2 of this report.

Since the DCO was granted, advancements in technology mean that larger turbines have become available which would require a limited number of changes to the consented parameters. As a result, the Project Team is seeking to make a non-material change to the DCO. In relation to ornithology, the key parameter change would be to increase the maximum permitted rotor diameter from up to 215m to up to 280m. No other change is required to the consented physical parameters of the turbines.

The effect of the proposed change could be to permit a smaller number of larger rotor turbines than is currently permitted. This is because the (unchanged) total swept area constrains the total number of turbines which can be installed: this is the key parameter. Currently the maximum number of turbines (with a rotor diameter of 215m) which can be installed utilising the full consented swept area is 119, the proposed rotor increase would reduce this number to 70 (with a rotor diameter of 280m).

The existing environmental statement assesses four potential impacts on ornithology: disturbance and displacement; barrier effects; habitat loss and change; and collision impacts. For every one of these, this report demonstrates that the worst case scenario as originally assessed would remain unchanged. In other words the increase in rotor diameter does not affect or alter the ornithology assessments already carried out.

It is recognised that of these four ornithology impacts, collision impacts are potentially the most sensitive to changes to the turbine parameters. Therefore, this report has a particular focus on collision impacts.

The 'worst case' identified for the existing ornithology assessments in relation to collision impact, was the largest number of smallest rotor diameter turbines which could be accommodated within the maximum swept area – this is 200 turbines with a 167m rotor diameter (which would be the maximum rotor diameter to deliver 200 turbines within the total rotor swept area). It was therefore anticipated that fewer, larger turbines would not affect the worst case assessed in the existing ornithology assessment, and indeed would result in lower collision estimates.

To confirm that the proposed rotor increase would reduce modelled collision impacts, collision risk modelling was carried out on a 'like for like' basis with the existing assessment that informed the environmental statement (i.e. using the same Band collision risk model options and avoidance rates and keeping all data the same as that underpinning the DCO, except the revised turbine parameters). Two sensitive species: northern gannet and black-legged kittiwake were re-modelled in full. Using 'like for like' collision risk modelling and the revised turbine parameters the predicted collision estimates for both species decreased. This confirmed that the use of fewer, larger turbines would reduce collision impacts compared to those predicted in the existing assessment for the project alone and cumulatively with all other projects. As a result of fewer collisions in total, effects on European sites would also be reduced.

In summary, this report confirms that the impact of the proposed changes for ornithology is that there are no new or materially different likely significant effects compared to the existing scheme. Using larger, fewer turbines results in a reduction in collision risk. The conclusions of the existing ES that ornithology impacts are not significant for the project alone and cumulatively with other projects are not affected. Similarly, the conclusions of the Department of Energy and Climate Change (DECC) Habitats Regulations Assessment (HRA) (DECC 2015) (the DECC HRA) of no adverse effects on the integrity of any European site arising from the project alone and in-combination with all other sites are not affected. The worst case position remains the same and no further assessment is required for ornithology in support of the proposed changes to the DCO.

It is therefore concluded that the proposed changes would not give rise to any new or materially different likely significant effects on any receptor and that the conclusions of the ES and the DECC HRA are not affected. Therefore, it is appropriate for the application to amend the maximum rotor diameter to be consented as an NMC to the DCO.

1 Introduction

Dogger Bank Creyke Beck A and B are two offshore wind farms, consented in 2015, located in the North Sea approximately 130km from the East Yorkshire coast (herein referred to as the Project(s)). The Projects were originally developed by Forewind, a consortium comprising SSE, Equinor (formerly Statoil), Innogy (formerly RWE) and Statkraft. Following the grant of The Dogger Bank Creyke Beck Offshore Wind Farm 2015 (the DCO) these Projects were split between the parent companies.

A Joint Venture between SSE and Equinor, known as 'The Dogger Bank Offshore Wind Project' (herein referred to as the Project Team), has now been set up to deliver the development of the Projects

The Creyke Beck project will comprise two offshore wind farms each with an installed capacity of up to 1.2 gigawatts (GW):

- Dogger Bank Creyke Beck A is in the southern corner of the former Dogger Bank Zone. It covers 515km^2 and is 131km from shore at its closest point;
- Dogger Bank Creyke Beck B is on the western edge of the former Dogger Bank Zone. It covers 599km^2 and is also 131km from shore at its closest point.

In the three years since the DCO was granted there have been a number of advancements in technology that would make the wind farm more efficient and cost effective. These advances are based on the size of wind turbine generators that are available, or that are likely to become available during the course of the development programme. As some of these would require a limited number of changes to the consented parameters, the Project Team is looking to make a non-material change (NMC) to the DCO to enable the most efficient and cost-effective Projects to be constructed.

This technical report describes how the proposed amendments would affect the ornithology assessment presented in the ES and its associated documents (Forewind, 2013a, b, c, 2014) and the DECC HRA (DECC, 2015).

2 Proposed Amendment

The proposed amendment for larger sized wind turbines requires an increase to the consented parameters for rotor diameter, monopile diameter and hammer energy whilst leaving all other DCO parameters unchanged including site boundary, total generating capacity and rotor swept area (Table 1).

Of these, only rotor diameter has the potential to affect the ornithology assessment. Review and re-modelling has been undertaken using the updated turbine parameters shown in Table 2 compared to the parameters as consented. This has been undertaken for the proposed increase in rotor diameter to up to 280m, as well as for an intermediary rotor diameter of 250m (further details in Section 4). This is because 280m would be the maximum rotor diameter, and so it would remain possible to construct turbines with a rotor diameter of less than 280m.

Table 1: Proposed consent amendments

Parameter	Consented Envelope[1]	Proposed Amendment
Capacity	Up to 1.2GW per project	No change
Number of turbines	Up to 200 turbines per project	No change
Rotor diameter	Up to 215m	Up to 280m
Blade tip height	Up to 315m above highest astronomical tide (HAT)	No change
Lower tip height	26m or greater above HAT	No change
Total rotor-swept area	Up to 4.35km^2	No change
Monopile diameter	Up to 10m	Up to 12m
Hammer energy	3,000kJ	Up to 4,000kJ

Table 2: Turbine parameters as consented and as used for revised collision risk modelling

Parameter	Existing WCS[1] parameters assessed	Revised parameters assessed: 280m rotor diameter	Revised parameters assessed: 250m rotor diameter
Number of turbines	200	70	88
Rotor diameter (m)	167*	280	250
Hub height (m above HAT)	109.5	166	151
Lower tip height (m above HAT)	26	26	26
Blades (no.)	3	3	3
Rotor speed (rpm)	8.84	9	11
Blade width (m)	5.5	10	10
Pitch (degrees)	10	10	10
Total Rotor swept area (km^2)	4.35	4.35	4.35
Maximum permitted capacity (GW)	1.2	1.2	1.2

[1]WCS = Worst case scenario taken from ES Chapter 11 Technical Appendix A Table 4.17
* A rotor diameter of up to 215m was consented but 167m constitutes the WCS.

It should be noted that the Projects would be constrained by the rotor swept area as consented, and this represents the key constraint. Therefore, when considering the revised turbine size the maximum number of turbines which could be deployed with a 280m rotor diameter would be 70 per Project. Generally, the use of fewer, larger turbines

[1] Applies in each case to both the DCO and the deemed marine licences for each generation asset (Project A and Project B).

was expected to decrease impacts on birds but review, and re-modelling where necessary, was required to establish that this was the case.

The Project Team may still deliver a 200 turbine scheme (using turbines with a rotor diameter of 167m), and whilst the maximum number of turbines that could be delivered with a 280m rotor diameter would be 70 the Project Team needs to retain the flexibility within the existing DCO alongside the increased rotor diameter.

3 Focus of the Assessment

The ornithology chapter of the ES and its supporting technical appendix identified a list of 12 sensitive receptors. They were, in alphabetical order: Arctic skua *Stercorarius parasiticus*, Atlantic puffin *Fratercula arctica*, black-legged kittiwake *Rissa tridactyla*, common guillemot *Uria aalge*, great black-backed gull *Larus marinus*, great skua *Stercorarius skua*, lesser black-backed gull *Larus fuscus*, little auk *Alle*, northern fulmar *Fulmarus glacialis*, northern gannet *Morus bassanus*, razorbill *Alca torda* and white-billed diver *Gavia adamsii*. They were assessed against each of the following impacts.

- Disturbance and displacement during construction, operation and decommissioning;
- Barrier effects during operation;
- Habitat loss and change during construction, operation and decommissioning; and
- Collision risk during operation.

Cumulative impacts were assessed in three formats:

- Creyke Beck A & B together;
- Creyke Beck A & B together with Teesside A & Teesside B (now Sofia); and
- Creyke Beck A & B and all other projects.

For every one of the impacts listed above, this report demonstrates that the worst case scenario as originally assessed would remain unchanged. A summary of reasons is given below for disturbance and displacement, barrier effects and habitat loss and change but beyond that, these impacts are not considered further in this report. It is recognised that of these four ornithology impacts, collision impacts are potentially the most sensitive to changes to the turbine parameters. Therefore, this impact is re-assessed in full.

This technical report confirms that the impacts of the amended Project would be the same as or less than those of the original proposal and therefore the conclusions of the ES that ornithology impacts are not significant for the project alone and cumulatively with other projects remain valid. Similarly, the conclusions of the DECC HRA of no adverse effects on the integrity of any European site arising from the Project alone and in-combination with all other sites remain unchanged. The worst case position remains the same.

3.1 Disturbance and Displacement

During construction and decommissioning, disturbance and displacement of seabirds may be caused by the construction of the wind turbines, cable-laying and the associated marine traffic, noise and vibration. During operation birds may avoid the area due to the long-term presence of moving wind turbines and regular traffic of maintenance vessels.

The original assessment was based on the population size of each of the 12 species in the wind farm and buffer areas and their sensitivity to this effect. For all species the impacts were assessed as between no impact and minor adverse at the level of the Creyke Beck Projects alone and when considered cumulatively with all other projects.

The proposed amendment will not affect the total area of the wind farms therefore estimates of the size of the populations affected will remain unchanged. However, the potential reduction in turbine number from 200 to 70 machines per project would reduce the physical space occupied within the red line boundary and potentially reduce construction and maintenance vessel traffic compared to the worst case scenario of the consented project. This means that the impacts would be no greater than the WCS assessed previously. The conclusions of the ES therefore remain unchanged. This also applies to the conclusions of the DECC HRA which recorded no adverse effects on the integrity of any European sites and their associated species arising from disturbance and displacement. As a result, this impact is screened out of further assessment in this report.

3.2 Barrier Effects

Operational wind farms may act as a barrier to breeding birds commuting between breeding sites and offshore feeding areas and birds on migration. This could result in elevated energetic costs potentially leading to increased mortality.

The ES assessed effects on the 12 sensitive receptors, paying specific attention to the five that are breeding species associated with colonies within maximum foraging range of the Creyke Beck sites (Thaxter *et al.* 2012). Effects were also assessed on 46 terrestrial or waterbird species whose migration routes could pass through Creyke Beck on spring or autumn passage.

The maximum impact identified for any species for the Creyke Beck projects alone or cumulatively with all other projects was minor adverse.

The WCS assessed in the ES was 200 turbines with a maximum blade tip height of 315m. The proposed amendment could reduce the number of turbines to as few as 70 with no increase in tip height. For these reasons there would be no change to the WCS assessed in the ES and its conclusions therefore remain unchanged. This also applies to the conclusions of the DECC HRA which recorded no adverse effects on the integrity of any European sites and their associated species as a result of this impact. As a result, barrier effects are not considered further in this report.

3.3 Habitat Loss and Change

Habitat loss could directly affect the resource available to foraging seabirds and was assessed based on the area of seabed lost to the turbine foundations and scour protection, the WCS being 200 gravity-based structures. Cable installation and protection will also result in some habitat loss though, in areas where the cable can be buried, the habitat is expected to return to its natural condition over time.

Habitat change may occur due to construction effects such as suspension and deposition of sediments, underwater noise, electro-magnetic fields and the introduction of new habitats. This is most likely to have an indirect effect on seabirds by affecting their prey species. The WCS for this aspect of the impact was assessed based on 200 jacket foundations with pin piles.

The original assessment concluded that, for all sensitive receptors, the impact would be a maximum of minor adverse at the level of the Creyke Beck projects alone and when considered cumulatively with all other projects. As the WCS remains unchanged by the proposed amendment the conclusions of the ES remain unchanged. This also applies to the conclusions of the DECC HRA and their associated species. This impact is therefore not considered further in this report.

3.4 Collision Risk

Collision is a risk for species flying in the rotor swept area of the operational wind farm where they could potentially collide with the turbine blades. It is quantified using the industry-standard Band (2012) collision risk model (CRM). This combines parameters based on seabird density and biometrics with those of the proposed wind turbines at a specific site to calculate the number of potential collisions. Initially it assumes that birds do not attempt to avoid the turbines. In reality, birds may avoid the whole wind farm, the turbine locations or the blade itself so the final stage of the calculation is to apply an avoidance rate. These are generally stipulated by the Statutory Nature Conservation Bodies (SNCBs).

It is recognised that of the four ornithology impacts, collision impacts are potentially the most sensitive to changes to the turbine parameters. For this reason, the impact has been re-modelled as described below.

4 Methodology for Collision Risk Assessment

4.1 Species for Assessment

The ES identified 12 sensitive receptors. However, because as a 'rule of thumb', the use of fewer, larger turbines generally reduces collision risk, each species was screened to determine the need for re-modelling using the following criteria.

As in the ES, species with an insufficient population at collision risk height were excluded from CRM. This applied to white-billed diver.

For all remaining 11 species, the maximum collision impact predicted by the ES from the Creyke Beck project alone and cumulatively with the Teesside projects was minor adverse. For seven species this remained true when considered cumulatively with all other projects. They were: Arctic skua, Atlantic puffin, common guillemot, great skua, little auk, northern fulmar and razorbill. These seven species were screened out of further assessment as collision effects were not expected to increase as a result of the Project amendment.

For the remaining four species, the ES predicted that the effects of Creyke Beck cumulatively with all other projects might rise to moderate adverse for:

- national populations of great black-backed gull and lesser black-backed gull; and
- designated site populations of black-legged kittiwake, great black-backed gull and northern gannet.

During the Examination process, the Natural England Supplementary Ornithological Expert Report (NE 2014) concluded that for great black-backed gull and lesser black-backed gull collision impacts at national and biogeographic scale were of minor significance in EIA terms for the project alone and cumulatively with all other projects. Great black-backed gull was not assessed in the DECC HRA owing to the project's distance from the nearest breeding seabird SPA at East Caithness Cliffs. For lesser black-backed gull it was concluded that there would be no adverse effect on the integrity of the Forth Islands SPA because Creyke Beck is beyond the maximum foraging range of breeding birds from this colony and less than one collision was apportioned to it in the non-breeding season. Based on these conclusions lesser black-backed gull and great black-backed gull were also screened out of further consideration in this report.

The two remaining species, northern gannet and black-legged kittiwake were assessed in full although the DECC HRA ultimately recorded no adverse effect on integrity for any European site.

4.2 CRM Methodology

This report has carried out collision risk modelling following the same methodology used in the ES, hereafter referred to as the 'like for like' methodology. This was based on the Band (2012) CRM.

There are two different versions of the model: basic and extended. The basic model assumes that the birds at rotor height are uniformly distributed across the rotor. The proportion of birds may be site-specific e.g. observed from boat-based surveys (Option 1) or generic (Option 2). Generic values are derived from standardised distributions based on data from a number of sites. In the ES and associated documents, these values were taken from Cook *et al.* (2012). The extended version assumes that flights are spread unevenly across the rotor according to the generic distributions described above (Option 3) or site-specific flight height distributions derived from boat-based observations (Option 4). These distributions generally indicate that highest bird densities occur closer to the sea surface and, as collision risk increases towards the nacelle, collision numbers predicted by the extended model tend to be much lower than those using the basic model.

The ES and its associated documents (Forewind 2013a, b, c, 2014) presented collision estimates for Options 1, 2 and 3 but based the assessment on Option 3. However, NE, JNCC and RSPB did not agree with all aspects of this approach.

It should be noted that during the application and determination period for the original Creyke Beck project, evidence on flight heights, model options and avoidance rates was emerging. However, the project's examination was completed before the publication of the Marine Scotland avoidance rate report (Cook *et al.* 2014) and the current SNCB guidance (SNCB 2014) which arose from it. This became available during the period when the Appropriate Assessment was being drafted as acknowledged in the DECC HRA.

In this context the Secretary of State considered the representations of the Applicant, NE, JNCC and RSPB together with the recommendations of the Examining Authority and concluded that the option and avoidance rate used as a basis for the discussion of effects in the HRA should be: for northern gannet, Band CRM Option 1 and a 99% avoidance rate and for black-legged kittiwake Option 3 and a 98% avoidance rate.

Having carefully considered the above, it was decided to retain the approach of the DECC HRA so that comparisons could easily be made between the collision estimates for the original and amended Project. In this report, the results are therefore presented and discussed based on the options and avoidance rates on which the DCO was based (DECC 2015).

For the same reasons, methods of apportioning effects to designated sites and discussion of cumulative effects are also based on the ES and DECC HRA although they too have been modified since the DCO was awarded.

This 'like for like' approach was discussed and agreed at a meeting with Natural England on 11 April 2018.

All input data for CRM were therefore extracted from the ES without modification apart from the proposed amendments to turbine parameters (Table 2).

4.3 Bird Parameters

Mean monthly densities of northern gannet and black-legged kittiwake in flight for Creyke Beck A & B are shown in Table 3. Originally, these values were provided with 90% confidence intervals, however, the mean value was used in the determination and that is therefore the value presented here.

Bird biometric data are shown in Table 4. Flight height distributions for use with Option 3 were taken from Cook *et al.* (2012) for consistency with the original modelling.

Table 3: Mean monthly densities for birds in flight at Creyke Beck A & B (Source: ES Chapter 11 Appendix A Tables 4.14 a, b and 4.15 a, b)

Species	Project	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Northern gannet	CBA	0.055	0.075	0.145	0.025	0.04	0.06	0.08	0.09	0.075	0.425	0.14	0.055
	CBB	0.075	0.1	0.195	0.03	0.05	0.075	0.105	0.11	0.09	0.595	0.195	0.075
Black-legged Kittiwake	CBA	1.105	1.485	2.255	1.28	1.66	1.59	1.15	0.695	0.425	0.82	0.665	0.665
	CBB	1.51	2.01	3.04	1.7	2.2	2.11	1.52	0.925	0.565	1.115	0.915	0.915

Table 4: Bird biometric data (Source: ES Chapter 11 Appendix A Table 4.16)

Species	Body length (m)	Wingspan (m)	Flight speed (m/s)	Nocturnal activity factor	Flight	Proportion at CRH (observed)	Prop above 20m (modelled)	Prop at CRH (modelled)
Northern gannet	0.94	1.72	14.9	0.25 (2)	Flap	0.16	0.10 (0-0.21)	0.03 (0-0.12)
Black-legged kittiwake	0.39	1.08	13.1	0.5 (3)	Flap	0.2	0.16 (0.08-0.24)	0.08 (0.03-0.13)

4.4 Site Parameters

The monthly percentage of time when the turbines are expected to operate is shown in Table 5. The tidal offset used was 2.5m. This figure was back-calculated from the original CRM results as it was not stated in the ES.

Table 5: Monthly operational time (%) for the Creyke Beck projects (Source: ES Chapter 11 Appendix A Table 4.18)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Operational time (%)	97	96	96	94	93	92	92	92	94	96	97	96

4.5 Avoidance Rates and Final Collision Estimates

Results for the relevant versions of the Band CRM were calculated using avoidance rates of 98%, 98.9% and 99%. Estimates were made separately for each site and the numbers combined.

It should be noted that collision estimates have been made for turbines with the largest rotor diameter of 280m so that they can be compared to the worst case scenario of the original assessment where the rotor diameter was 167m. Additional modelling demonstrates that any turbine with an intermediate rotor diameter i.e. between 280m and 167m, will give collision estimates which are intermediate to those given here because the number of turbines will remain constrained by the key consent parameter, the total rotor swept area of $4.35km^2$. The results of modelling a 250m rotor diameter with blade width 10m and a rotation speed of 11rpm (see Table 2) are also presented below to demonstrate these results. At this rotor diameter the maximum number of turbines that could be installed is 88.

5 Outcomes of the Assessment

The format of the results and the options and avoidance rates reproduced in the tables below follow the presentation used in the DECC HRA. This combined the collision estimates for Creyke Beck A & B. The revised estimates are provided separately for each wind farm and then combined to allow comparison with the HRA.

5.1 Northern Gannet

The collision estimates for the revised projects are shown in Table 6 and Table 7 with those of the DECC HRA for comparison. The DECC HRA, described the basic model results as 'Option 1/2'. However, re-calculation of the original values showed that they were in fact based on Option 1.

Table 6: Annual northern gannet collision estimates for Creyke Beck A & B consented and revised projects calculated 'like for like' with the original consent based on a 280m rotor diameter

NORTHERN GANNET	CRM Option and avoidance rate					
Project	Option 1			Option 3		
	98%	98.90%	99%	98%	98.90%	99%
Consented: Creyke Beck A & B[1]	397	218.8	**199**	120	60	30
Revised: Creyke Beck A	106	58	53	4	2	2
Revised: Creyke Beck B	142	78	71	6	3	3
Revised: Creyke Beck A & B	248	136	124	10	5	5

[1] Figures taken from Table 5, DECC HRA (2015). Bold text = consented value.

Table 7: *Annual northern gannet collision estimates for Creyke Beck A & B consented and revised projects calculated 'like for like' with the original consent based on a 250m rotor diameter*

NORTHERN GANNET	CRM Option and avoidance rate					
Project	Option 1			Option 3		
	98%	98.90%	99%	98%	98.90%	99%
Consented: Creyke Beck A & B[1]	397	218.8	**199**	120	60	30
Revised: Creyke Beck A	140	77	70	5	3	2
Revised: Creyke Beck B	187	103	93	8	5	4
Revised: Creyke Beck A & B	327	180	163	13	8	6

The collision estimates derived using the revised turbine parameters show that under all scenarios, collisions are reduced from those which were consented. For the specific scenario discussed in the DECC HRA, namely Option 1 and a 99% avoidance rate, collisions are reduced from 199 to 124 individuals or 163 individuals based on a 280m and 250m rotor diameter respectively.

The DECC HRA apportioned the northern gannet collisions from the combined Creyke Beck A & B sites to two European sites: Flamborough and Filey Coast pSPA, incorporating Flamborough Head and Bempton Cliffs SPA and Forth Islands (FoI) SPA (Table 8).

Using the same apportioning rate as the ES, the revised Projects would exert a reduced effect on northern gannet at both SPAs and the in-combination effects would be reduced accordingly. This means that the conclusions of the

DECC HRA are maintained i.e. that the collision risk for northern gannet from the project alone and in combination with other projects will not have an adverse effect upon the integrity of any European site.

Table 8: Total northern gannet collision estimates for Creyke Beck A & B based on Option 1 and 99% avoidance rate and apportioned to European sites based on a 280m rotor diameter

NORTHERN GANNET	CBA & B	FFC pSPA	FoI SPA
Consented project[1]	199	5	<1
Revised project	124	3.1	<1

[1] Figures taken from Table 5 and text of DECC HRA (2015)

5.2 Black-legged Kittiwake

The collision estimates for the revised Projects are shown in Table 9 with those of the DECC HRA for comparison. They show that under all scenarios, collisions are reduced below the consented thresholds. For the specific scenario discussed in the DECC HRA, namely Option 3 and a 98% avoidance rate, collisions are reduced from 217 to 80 individuals or 138 individuals based on a 280m and 250m rotor diameter respectively.

Table 9: Annual black-legged kittiwake collision estimates for Creyke Beck A & B consented and revised projects calculated using parameters 'like for like' with the original consent based on a 280m rotor diameter.

BLACK-LEGGED KITTIWAKE	CRM Option and avoidance rate					
	Option 2			**Option 3**		
	98%	**98.90%**	**99%**	**98%**	**98.90%**	**99%**
Consented Creyke Beck A & B[1]	1307	N/A	654	**217**	N/A	109
Revised Creyke Beck A	289	159	145	34	19	17
Revised Creyke Beck B	388	213	194	46	25	23
Revised Creyke Beck A & B	677	372	339	80	44	40

[1] Figures taken from Table 7, DECC HRA (2015). Bold text = consented value.

Table 10: Annual black-legged kittiwake collision estimates for Creyke Beck A & B consented and revised projects calculated using parameters 'like for like' with the original consent based on a 250m rotor diameter.

BLACK-LEGGED KITTIWAKE	CRM Option and avoidance rate					
	Option 2			**Option 3**		
	98%	**98.90%**	**99%**	**98%**	**98.90%**	**99%**
Consented Creyke Beck A & B[1]	1307	N/A	654	**217**	N/A	109
Revised Creyke Beck A	381	209	190	59	33	30
Revised Creyke Beck B	511	281	255	79	44	40
Revised Creyke Beck A & B	892	490	445	138	77	70

The DECC HRA named three European sites where potential for LSE arising from collision on breeding black-legged kittiwake could not be excluded. They were Flamborough and Filey Coast pSPA incorporating Flamborough Head and Bempton Cliffs SPA, and Farne Islands (FaI) SPA.

NE and RSPB did not agree with some of the parameters, including Option 3, on which the original apportioning (Table 11) was based and the HRA outlines these issues. However, following further assessment NE accepted that there would be '*no adverse effect from the project alone under all scenarios and at all avoidance rates*' and also *'in combination under all scenarios*'. The HRA also noted a number of precautionary assumptions that had been made in the assessment including that at 130km distant, Creyke Beck was beyond the published maximum foraging range (120km – Thaxter *et al.* 2012) of breeding birds from the closest breeding colony at Flamborough and Filey Coast pSPA.

Using the same apportioning rate as in the ES, the revised Projects would exert a reduced effect on black-legged kittiwake at both SPAs considered and the in-combination effects would be reduced accordingly. This means that the conclusions of the DECC HRA are maintained i.e. that the collision risk for black-legged kittiwake from the project alone and in combination with other projects will not have an adverse effect upon the integrity of any European site.

Table 11: Total black-legged kittiwake collision estimates for Creyke Beck A & B based on Option 3 and 98% avoidance rate and apportioned to European sites

BLACK-LEGGED KITTIWAKE	CBA & B	FFC pSPA	Fal SPA
Consented project[1]	217	109	<5
Revised project	80	40.2	<3

[1] Figures taken from Table 7 and 13 of DECC HRA (2015)

6 Conclusions

This ornithological technical report has reviewed and re-modelled the impacts on birds which could arise from the proposed amendments to the Creyke Beck Projects on a like for like basis with the modelling that informed the ES, DECC HRA and the grant of the DCO.

For disturbance and displacement, barrier effects and habitat loss and change, the worst case scenario assessed in the ES would remain unchanged by the proposed amendments and they were therefore screened out of further assessment. Collision risk was re-modelled as it is potentially the most sensitive to changes in turbine size.

As deployment of fewer larger turbines was expected to reduce collision estimates, screening of information presented in the ES and in the DECC HRA meant that ten of the 12 sensitive receptors required no further collision assessment. They were: Arctic skua, Atlantic puffin, common guillemot, great black-backed gull, great skua, lesser black-backed gull, little auk, northern fulmar, razorbill and white-billed diver. This was because effects were deemed to be a maximum of minor adverse from the project alone or cumulatively with other projects and were therefore not significant, and there would be no adverse effects on the integrity of any European site as a result of collision impacts on these species.

For northern gannet and black-legged kittiwake, collision risk modelling carried out on a ‘like for like’ basis with the modelling that informed the ES, DECC HRA and the grant of the DCO showed that for both species, the use of fewer larger turbines would reduce collision estimates from the project alone and cumulatively with other projects. Consequently, effects on European sites were also reduced.

It is therefore concluded that, as for all other ornithology impacts, the worst case scenario for collision risk as assessed in the ES i.e. 200 turbines with a rotor diameter of 167m, would not be changed by the proposed amendments to the Projects. This means that the conclusions of the ES and its associated documents are not affected and that the recommendations of the Examining Authority and the conclusions of the DECC HRA which underpin the DCO, therefore are not affected and that the worst case scenario in respect of collision risk is as assessed within the ES. In summary, no further assessment is required for ornithology in support of the proposed amendment to the DCO.

No further assessment is required for ornithology in support of the proposed changes to the DCO. It is therefore concluded that the proposed changes would not give rise to any new or materially different likely significant effects on any receptor and that the conclusions of the ES and the DECC HRA are not affected. Therefore, it is appropriate for the application to amend the maximum rotor diameter be consented as an NMC to the DCO.

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