Hornsea Offshore Wind Farm

Project Two

Kittiwake Collision Risk – Applicant's position at Deadline VI

Appendix F to the Response submitted for Deadline VI

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1 Kittiwake Collision Risk: Applicant's Position

1.1 Introduction

1.1.1 This Note has been prepared in respect of the application for a development consent order (DCO) to the Secretary of State under the Planning Act 2008 ('the Application') by SMart Wind Limited on behalf of Optimus Wind Ltd and Breesea Ltd (the 'Applicant') for the Hornsea Project Two Offshore Wind Farm (the 'Project').

1.1.2 This Note sets out the position of the Applicant with respect to the predicted annual collision mortality arising from the Project (alone and in-combination) that can be attributed to the breeding kittiwake interest feature of the Flamborough Head and Bempton Cliffs (FH&BC) SPA and the Flamborough and Filey Coast (FFC) pSPA.

1.1.3 The predicted collision rates take account of the Applicant's decision to remove the 5 MW turbine option from the design envelope and to raise the minimum hub height to 27.5m above mean sea level (lower rotor tip height of 29.97m LAT).

1.1.4 The Applicant's predicted collision rates are:

- **2.6** collisions per annum for the Project alone; and
- **110** collisions per annum in-combination.

1.1.5 The remainder of this note sets out the key assumptions made by the Applicant in making those predictions.

1.2 Collision risk modelling

1.2.1 It is the Applicant's position that the Extended version of the Band (2012) Model should be used for kittiwake. It is argued that this version of the model is the most sophisticated and provides the most accurate indication of the likely collision risk.

1.2.2 Furthermore, the Applicant argues that the site specific data obtained for the Project clearly and unambiguously indicate that a relatively small proportion of kittiwake observed in flight are at risk of collision due to their low flight height. This proportion (approximately 4.4%, when it assumed that all birds above 22.5 m are at risk of collision) is considerably and significantly less than that indicated in the review study by Johnston *et al*. (2014). The Applicant does not believe that there is any reason to question the accuracy of the recording of seabird flight heights, which were obtained using well established and widely applied boat-based survey methods. In recent submissions the Applicant has further demonstrated that the approach used to define recording heights is not atypical (Deadline IV, Appendix DD) and that the proportion of birds at collision risk, whilst lower than that presented in Johnston *et al*. (2014), is not uniquely or exceptionally so (Deadline IV, Appendix DD).

1.2.3 On this basis the Applicant argues that the application of Option 4 is appropriate as this combines the sophistication of the Extended version of the model with site specific data. To do otherwise risks significantly over-estimating the collision risk.

1.2.4 With respect to avoidance rate, the Applicant argues that the use of 98% with Options 4 is appropriately precautionary based on joint SMart Wind and Forewind paper, submitted by the Applicant as Appendix Z at Deadline I – *Review of Avoidance Rates in Seabirds at Offshore Wind Farms and Applicability of Use in the Band Collision Risk Model*.

1.3 Kittiwake population age structure in the breeding season and apportioning to FFC pSPA

1.3.1 The Applicant's position is that 38% of kittiwake recorded at the Project site during baseline surveys should be considered to be adult breeding birds from the FH&BC SPA / FFC pSPA. The reasons for this are set out in Clarification Notes - Appendix P submitted at Deadline IIa and Appendix DD submitted at Deadline IV. In summary, information presented in Furness (2015), which is used to inform breeding season apportioning, allows the calculation of the population of immature birds present in the North Sea during the non-breeding season and it is considered there is the significant potential to apply these proportions within the breeding season assessment. The use of this approach for kittiwake is considered precautionary as the population of immatures present in the North Sea during the non-breeding season is likely to be lower than that present in the breeding season (Coulson, 1966; Wernham *et al.,* 2002).

1.3.2 The Project site is located approximately 100 km from the breeding colony and whilst tracking data do indicate some connectivity with the Project site it is unlikely that kittiwake would have a strong reliance on the Project site as shown by the limited aggregations that occur. Daunt *et al.* (2002), for example, note that central place foragers, such as seabirds, will have an upper limit associated with potential foraging range, set by time constraints associated with breeding productivity. This upper limit is estimated at 73 km based on the flight speed of kittiwake and time required to catch prey for birds from the Isle of May. Kittiwakes would be unable to consistently travel to the Project site and provide enough food to keep chicks alive. In addition, whilst the FAME data do indicate some connectivity with the colony those data also show that the majority of foraging flights are close to the colony. Data provided by BirdLife (Birdlife International, 2014[1]) suggests that only up to 5% of birds are likely to travel as far as the Project and even then not on a consistent basis.

1.3.3 Nevertheless, kittiwake was recorded relatively abundantly within the Hornsea Subzone 2 with a peak population estimate in excess of 6,100 individuals during the breeding season (Hornsea Subzone 2 + 4 km buffer, July of Year 2). Approximately 22,870 kittiwakes were aged during the breeding season (May – July) of which approximately 95% were recorded as being "adult" birds (Ornithology Technical Report Doc ref No. 7.5.5.1). This implies that either there are a large proportion of non-breeding adult birds also present within the Subzone and/or that recorded "adult" birds include younger birds that cannot be

[1] Seabird.wikispaces.com

distinguished as such in the field. The Applicant argues that both of these should be taken into account.

1.3.4 The identification of kittiwake age classes at sea is difficult and in most cases impossible. Whilst one year old kittiwakes can be easily identified due to differences in plumage, second and third year birds, which have not yet reached the age of first breeding, cannot (Coulson, 2011; Olsen and Larsson, 2003). Further to this, it is not possible to identify adult birds which may be non-breeders from those that are breeding at FFC pSPA.

1.3.5 There is evidence (e.g. Coulson 2011) that potentially large numbers of immature birds are likely to be present in the North Sea with Furness (2015) providing a mechanism for calculating this proportion, based on populations estimated during the non-breeding season. The use of this approach for kittiwake is considered precautionary as the population of immatures present in the North Sea during the non-breeding season is likely to be lower than that present in the breeding season (Coulson, 1966; Wernham *et al.,* 2002). Using this evidence, however, the proportion of adult birds is the value of 38% breeding season apportioning of adult birds is considered to be appropriate.

1.4 Phenology and exclusion of April as a "breeding" month

1.4.1 The breeding season defined for kittiwake in the Offshore Ornithology ES chapter (Doc ref No. 7.2.5) and HRA Report (Doc ref No. 12.6) is May to July. The seasons used for kittiwake were defined based on information in Furness (2015) following consultation with Natural England during Section 42. Furness (2015) is aimed at defining the extent of non-breeding seasons (i.e. for kittiwake the post-breeding and pre-breeding seasons). It is considered that the migration-free breeding season of May to July presented in Furness (2015) more accurately represents the occurrence of kittiwake in offshore areas. The Applicant differs from Natural England in that it focuses on the likely origin of birds at the Project site in determining the appropriate seasonal extents rather than the known presence of a number of adult birds in the vicinity of a colony.

1.4.2 This breeding season extent is similar to that presented in Kober *et al.* (2010) which defines breeding seasons for species within the British Fishery Limit. It is the Applicant's view that the breeding season defined for kittiwake (May to July) represents the core period during which impacts may disproportionately affect the breeding population at Flamborough and Filey Coast pSPA. During this period the foraging range of breeding kittiwake at the colony will be constrained due to the necessity to provision young (Coulson, 2012).

1.4.3 During April a proportion of observed birds will be returning to FFC pSPA, however, a larger proportion will be migrating through the North Sea to colonies further north. Spring migration through UK waters is completed by May (Furness, 2015; Forrester *et al.,* 2007) with migration peaking during March and April. In England, the majority of birds return to breeding colonies between March and April (Brown and Grice, 2005). This would indicate that not all kittiwake would be expected to

be present at the pSPA during March and April and therefore these months are more accurately described as pre-breeding months.

1.4.4 Further to this, it is considered highly unlikely that birds will be attending eggs or provisioning young during April meaning that birds will be less restricted in terms of foraging range. The Applicant notes that this has already been considered and addressed within the apportioning exercise undertaken for kittiwake with the definition of a pre-breeding season which covers January to April. During this period, the population of kittiwake in the North Sea was calculated as 639,742 individuals. This population includes 53,424 breeding adults from the pSPA representing 60% of the total pSPA population. Therefore the apportioning exercise already presented assumes that 60% of the pSPA population is at the colony throughout the pre-breeding season the Applicant considers this a precautionary assumption.

1.5 Projects considered in combination with Project Two

1.5.1 The Applicant has broadly followed the advice given by Natural England with respect to the assessment of projects considered in-combination. Notable differences include:

- Application of Extended Band (2012) Model results where available;
- Where only Basic Band (2012) Model results available, avoidance rate of 99.2% is applied based on Cook *et al.,* (2014); and
- Consideration that Dogger Bank Teesside has no connectivity with the pSPA in the breeding season.

1.5.2 At Deadline IV, the Applicant also presented further information to support a tiered approach to the inclusion of projects based on their 'connectivity' to the breeding colony.

1.5.3 These tiers are defined based on mean-maximum foraging range as defined in Thaxter *et al.* (2012) the degree of connectivity between a project and the pSPA as shown by tracked kittiwakes through the FAME Project. Tiers are defined as follows:

1.5.4 Tier 1: projects falling within Thaxter *et al.* (2012) mean maximum foraging range (60 km). There are two projects (Westermost Rough and Humber Gateway) and these contribute 1.5 collisions in the breeding season.

1.5.5 Tier 2: projects with strong connectivity with FFC pSPA despite being outside of mean-maximum foraging range. These projects comprise Hornsea Project One and the Project and contribute 5.0 collisions in the breeding season.

1.5.6 Tier 3: projects with weak connectivity with FFC pSPA has been established through FAME tracking data. Projects in this tier are Lincs, Race Bank, Triton Knoll and Dogger Bank Creyke Beck Projects A and B. There is some evidence that Tier 3 projects could cause mortality of breeding adult kittiwake during the breeding season, but the contribution to an overall in-combination effect is likely to be low. The inclusion of Dogger Bank Creyke Beck Projects A & B at all within the in

combination assessment is subject to question. (Forewind, 2014) indicate in its Application for these projects that with respect to kittiwake:

"…there are not expected to be any breeding adults present on the wind farms during the breeding season. Birds recorded at this time are therefore assumed to be failed or non-breeders (including immature birds)."

1.5.7 Tier 4: projects are those where no connectivity has been established by FAME data and are also outside of any defined foraging range. Project in this tier are Blyth Demonstration Project, Dogger Bank Teesside Projects A and B, Dudgeon and Teesside (Redcar). There is no evidence that projects in Tier 4 cause any collision mortality of breeding adult birds associated with the FH&BC SPA / FFC pSPA during the breeding season, although they may make some contribution at other times of year.

1.5.8 In addition to collisions occurring in the breeding season, there will be collisions arising during the pre- and post-breeding seasons that are relevant to the pSPA; these are defined according to the BDMPS approach (Furness, 2015).

1.5.9 The Applicant's assumptions and calculations of in-combination effects are summarised in

1.5.10 Table 1.1 below. A total of 110.0 annual collisions are predicted from Hornsea Project Two in combination with other projects in Tiers 1-3. The application of 100% apportioning in the breeding season is likely to be overly precautionary for Tier 3 projects. Data from Triton Knoll suggests that adult bird proportions may be as low as 60% in the breeding season even without the consideration of unidentifiable 3rd and 4th year birds.

1.5.11 The Applicant has noted that Dogger Bank Creyke Beck A and B were consented based on a breeding season apportioning value to the pSPA of 13.9% (DECC, 2015) rather than the 19.3% considered appropriate by Natural England in their submission for Deadline V. The Applicant therefore applies 13.9% to the breeding season mortality from this project, which results in a breeding season prediction of 9.3 collisions.

Table 1.1: Hornsea Project Two kittiwake predicted collision rates in combination with other projects.

Tier	Project	Collisions	Apportioning (%)	Collisions
1	Westermost Rough	0.1	100	0.1
	Humber Gateway	1.4	100	1.4
Tier 1 Subtotal				**1.5**
2	Hornsea Project One	7.4	38	2.8
	Hornsea Project Two	5.7	38	2.2
Tier 2 Subtotal				**5.0**

Tiers 1 & 2				**6.5**
3	Lincs	0.5	100	0.5
	Race Bank	1.3	100	1.3
	Triton Knoll	14.4	100	14.4
	Dogger Bank Creyke Beck Projects A and B	67	13.9	9.3
Tier 3 Subtotal				**25.5**
Breeding Season TOTAL				**32.0**
Pre- and post-breeding				**78.0**
ANNUAL TOTAL				**110.0**

1.6 Population modelling

1.6.1 It is the Applicant's positon that the additional mortality predicted to arise from collision with the Project alone and in-combination with other projects will not adversely affect the breeding kittiwake population of the FH&BC SPA / FFC pSPA for the following reasons:

- The predicted collision rate for the Project alone (2.6) is sufficiently low that the effect can be considered to be indiscernible both alone and in-combination.
- The predicted collision rates for the Project alone and in-combination are both less than a value that is equivalent to 1% of the background annual mortality of the FH&BC SPA / FFC pSPA. This value is 130 birds per annum.
- Population modelling (MacArthur Green Seabird PVA Report, Doc Ref No. REP2A-015) indicates that the breeding kittiwake population of the FH&BC SPA / FFC pSPA can sustain far higher mortality rates than those predicted for the Project alone and in-combination.

1.7 The Applicant's Position on the Implications of Natural England's PVA numbers

1.7.1 It is the Applicant's understanding that Natural England's position is that the Project alone will lead to 49 collisions per annum and, in-combination with other projects, 349 collisions per annum. The Applicant believes this position to be based on a series of over-precautionary assumptions and does not agree with it. Nevertheless, even if those collision rates were accurate, the Applicant believes that they would not lead to an adverse effect on the integrity of the FH&BC SPA / FFC pSPA, for the following reasons:

- A collision rate of 49 (Project alone) represents a magnitude of effect that is less than 1% of the background mortality of the kittiwake population (130 individuals) and is, therefore, insignificant. It is understood that Natural England agrees that there is no indication of an adverse effect on the integrity of the FH&BC SPA / FFC pSPA arising from the Project alone.
- The predicted in-combination collision rate (349) is lower than the predicted in-combination impact of other offshore wind farms in the North Sea on the same population already consented by the Secretary of State on the basis that Natural

England indicated that there would not be an adverse effect on the integrity of the FH&BC SPA / FFC pSPA. The reason that the calculated in-combination collision rate is lower for this Project than for those other projects is due to agreed refinements of their calculated collision rates.

- PVA modelling indicates that the breeding population of the FH&BC SPA / FFC pSPA can sustain these levels of additional mortality. The density dependent version of the model (using demographic data from Horswill & Robinson 2015) indicates, for example, that additional mortality of 350 would result in:
  - A ratio of impacted to unimpacted growth rate (CPGR) of 99.9% (i.e. a reduction of < 0.1%)
  - A ratio of impacted to unimpacted median population size (CPS 25) of 96.7% (i.e. a reduction of 3.3%)

1.8 Conclusions

1.8.1 This note sets out the Applicant's position on the predicted annual kittiwake collision mortality arising from the Project alone and in-combination that can be apportioned to the breeding population of the FH&BC SPA / FFC pSPA.

1.8.2 It is the Applicant's position that the predicted levels of additional annual mortality are sustainable and will not lead to an adverse effect on the integrity of the FH&BC SPA / FFC pSPA.

1.8.3 The Applicant disagrees with Natural England's predicted collision rates, but considers that even if those rates were correct there is still no indication of an adverse effect on the integrity of the FH&BC SPA / FFC pSPA.

1.9 References

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