Hornsea Offshore Wind Farm

Project Two

# Kittiwake Clarification: in response to EOO16

**Appendix EE to the Response submitted for Deadline IV**

**Application Reference: EN010053**

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Appendix EE of the Applicant's response to Deadline IV – Kittiwake Clarification: in response to EOO16

**Magnitude of impact**

**Alone**

The Applicant predicts that the Project alone will lead to 6.2 kittiwake collisions per annum. Natural England (and RSPB) estimate this to be 134 collisions per annum.

The Applicant maintains that Natural England (and the RSPB) over-estimate the potential collision mortality arising from the Project alone, due to the following overly-precautionary assumptions:

1. That the proportion of "adult type" birds recorded at the Project site that are, in fact, likely to be breeding adult birds associated with the breeding colony of the FH&BC SPA / FFC pSPA is 94%. The Applicant argues that this is incorrect for 2 primary reasons:
    a. "Adult type" birds recorded during the boat-based survey programme include sub-adult and hence non-breeding age classes that could not be discriminated on the basis of plumage features. It is possible to identify 1st year birds (and these were aged accordingly during surveys), but not 2nd and 3rd year immature birds (which were categorised with other adults).
    b. It is unlikely that all adult birds of breeding age observed at the Project site, which is 95 km from the colony would, in any case, be breeding birds associated with the colony. It is likely that a proportion of these birds will be non-breeding adults.

The Applicant has estimated the likely proportion of adults at the Project site using a recent published age structure for the North Sea kittiwake population (Furness, 2015). This approach indicates that adults of breeding age comprise 38% of the population, the remainder being immature and juvenile birds. Natural England argue that this age structure applies to the non-breeding season, but our position is that the basic age structure of the population persists throughout the year and is equally applicable to the breeding season as it is the non-breeding season.

The inclusion of April as part of the breeding season and, therefore, the assumption that 94% of adult birds observed at the Project site are breeding birds associated with the FH&BC SPA / FFC pSPA. Whilst the Applicant does not dispute there is breeding activity at the colony as early as April, this does not necessarily translate into the presence of those breeding adults at the Project site. It is the Applicant's position that a large proportion of adults at offshore locations, such as the Project site, during April will still be composed of migrating birds. Consequently, for the purposes of assessment, the Applicant assumes a lower proportion of collisions predicted for the Project during the month of April should be apportioned to the breeding colony. This proportion is assumed to be the same as that calculated for the pre-breeding season, i.e. 8.4% (See Appendix N of the Applicant's response to Deadline IIA).

2. The approach to collision risk modelling, which in turn involves:

a. A reliance only on the outputs of Option 2 of the Band (2012) collision risk model. The Applicant argues, for the reasons stated in detail in their response to the first set of Ex. A questions (EOO4) that it is appropriate to use the Extended version of the model and that, as site specific data on flight heights are available, that this leads to the application of Option 4. Natural England rejects the use of this option on the grounds that the method used to derive a flight height distribution for this site, is non-standard and unreliable. One symptom, Natural England claim, is the very high proportion of kittiwake that were recorded below potential collision height (PCH), particularly when compared to the generic flight heights presented in Johnston *et al*. (2014). The Applicant rejects these arguments because:
    i. The method used to record flight heights is reasonable and in–keeping with approaches used elsewhere. Appendix 1 indicates the flight height bands used for recording purposes at other offshore wind farms and demonstrates that those used at the Project are not atypical.
    ii. The method used to interpolate data recorded in 5m bands is transparent and logical. It is also precautionary as it assumes equal distribution of birds within any band, whereas it is well established that seabirds are skewed toward lower altitudes. The Applicant has investigated the effect of undertaking this interpolation at a coarser level, i.e. aggregating the raw data into 10m height bands, rather than 5m height bands, and then interpolating to 1m intervals. This treatment makes no material difference to the predicted collision rate which suggests that concerns about the ability of observers to record to 5m accuracy are unfounded.
    iii. The proportion of birds recorded at PCH is low, but not exceptionally so. The data informing the calculations in Johnston et al. (2014) are drawn from mainly inshore wind farm sites and are not considered representative of the wide range of offshore conditions that are likely to exist in UK waters. Figure 1 compares the proportions of kittiwake recorded at PCH for a range of offshore wind farm sites, including others in offshore locations (see Appendix DD - Kittiwake Collision Risk: Review of Core Assumptions). It can be seen that whilst the proportion of birds recorded at PCH is low, and lower than the range predicted in Johnston et al. (2014), it falls well within the range seen at other sites.

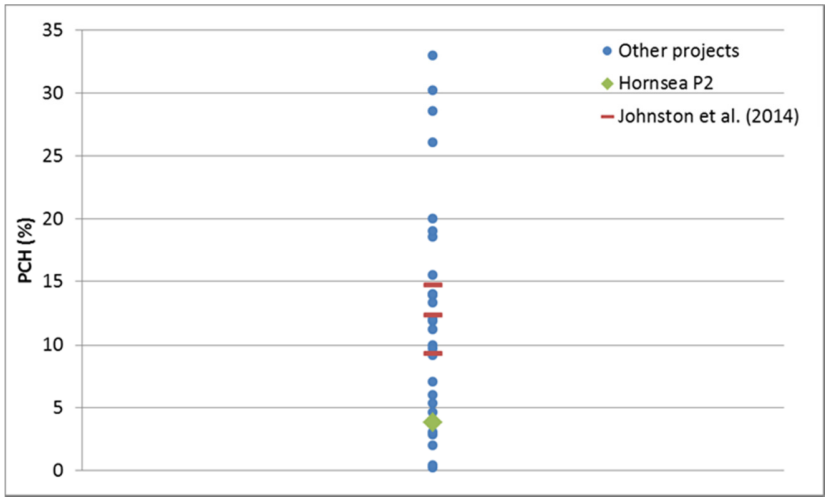


**Figure 1. Proportions of kittiwakes recorded at Potential Collision Height (PCH) (as % of all kittiwakes recorded at the site)**

b. Use of an avoidance rate (with the Basic version of the model) of 98.9%. Natural England's position on the use of avoidance rates is apparently informed by a recent study commissioned by Marine Scotland and undertaken by the British Trust for Ornithology (Cook et al., 2014). In that report a specific avoidance rate was recommended for kittiwake for use with the basic version of the model, this being 99.2%. This value was recommended by the expert authors on the basis that kittiwake are similar in behaviour to other "small gulls". Natural England elect, however, to use the more precautionary avoidance rate of 98.9% that was calculated when data for all gull species was considered. The key reasons for this approach appears to be that the small gull rate is largely informed by species (such as black-headed gull and common gull) which have a less pelagic distribution compared to kittiwake. Natural England consider that kittiwake would be less likely to show flight behaviour consistent with the "small gull" avoidance rate in an offshore setting. The Applicant disagrees with this logic, in the first instance kittiwake is clearly a small gull in terms of, for example, its physical dimensions and flight speed and, therefore, in terms of its agility in flight. Second, to the extent that any difference in behaviour in pelagic settings is expected, this is likely to lead to *higher* rates of avoidance. For example, MacArthur Green 2013 (Appendix Z of the Applicant's response to Deadline I), point out that in open, offshore settings, there is evidence that macro-avoidance rates will be higher than those in more visually obstructed onshore settings.

c. Natural England further reject the use of the Extended version of the collision risk model due to the unavailability of an avoidance rate for kittiwake for use in that version. Natural England take this position on the basis that the authors of the Marine Scotland (Cook et al., 2014) report

were unable to recommend a rate for this species. This is, however, different from saying that there is no rate that can be used. The Applicant points, in the absence of a recommended rate by Cook et al., 2014, to the report jointly prepared by SMartWind and Forewind (see Appendix Z of the Applicant's response to Deadline I) which recommended the use of a minimum rate of 98% with the Extended version of the model.

**In combination**

The Applicant predicts that the Project, in-combination with other projects will lead to 145.8 kittiwake collisions per annum. Natural England estimate this to be 503.1 collisions per annum.

The Applicant maintains that Natural England over-estimate the potential collision mortality arising from the project in-combination, due to the following overly-precautionary assumptions:

1. Similar reasons above when applied to other projects. The precautionary assumptions made by Natural England compound when aggregated across multiple projects.
2. The criteria used to select other projects is inconsistent, with some projects included that are beyond the known foraging range of kittiwake.
3. Apportioning of a high proportion of the adult birds observed at wind farms that are at the limit of the known foraging range of kittiwake or which have limited connectivity to the FH&BC SPA / FFC pSPA.
4. Failure to normalise the predictions for some sites to take account of the reduced collision rates that can be expected from sites where the built capacity is less than that which was assessed and/or where the predicted of collision rates was based on assumptions that are now known to be excessively precautionary.

**Population implications**

The Applicant maintains that its predicted impacts (alone and in-combination) will not lead to an adverse effect on the integrity of either the FH&BC SPA nor the FFC pSPA. This conclusion is reached on the basis of the outputs of Population Viability Modelling (Appendix M of the Applicant's response to Deadline IIA). The Applicant is further of the opinion that, notwithstanding, the over-estimation of collision mortality by Natural England, the PVA model outputs do not indicate an adverse effect even at those elevated collision rates.

Natural England argue that the density independent version of the model should be used, which they state predicts a reduction in growth rate of 0.58% and a population that would (at 25 years) be 13% lower than it would otherwise have been in the absence of that additional mortality. They further argue that these predicted changes should be viewed in the light of the status of the breeding population, which they are argue is declining and a conservation objective for the FFC pSPA which is likely to be to restore the population (although it is unclear to what level). To support this they point to:

1. A long-term decline of the breeding colony at Bempton Cliffs, it was estimated in 1987 that the breeding colony comprised 83,700 pairs.

2. Declines in the Filey populations that will be included in the FFC pSPA (but were not included in the FH&BC SPA). Evidence for this decline is included in the submission made by Natural England at Deadline III (Appendix 2, Figure 1).

The Applicant disputes both of these points.

First, the 1987 population estimate is strongly contested by some biologists, including the work of John Coulson in his book The Kittiwake (Coulson, 2011). In his book Dr Coulson casts major doubt over some of the numbers of pairs reported for the Flamborough colony. The reported number of pairs fluctuated from 30,800 (1969), to 83,000 (1979), to 83,700 (1986) to 42, 659 (2000); the latter figure suggesting a dramatic mortality or emigration. Dr Coulson concludes …

*"After careful consideration and search for more information, I now believe that the 1979 figure supplied was the actual numbers of adult kittiwakes at these colonies (i.e. double the number of pairs), and there were never anything like 83,000 pairs there at any time - thus reducing the numbers to about 41,500 pairs in 1979 and 1986. These numbers are much more consistent with the overall trends in kittiwake numbers in north-east England and would not require the huge increase, followed by a major decrease, neither of which is supported by an independent observer who recorded little change over this period."*

Second, the information included in Appendix 2 of Natural England's response to Deadline III, Figure 1 is highly misleading. It is our understanding that the trends shown in Figures 1b – 1e are not specific to the colonies indicated, but rather are simply transposed from 1a, which represents a more general UK population index. There is no reason to assume, based on the data presented, that the populations at Bempton Cliffs, nor Filey 1, 2 and 3, have tracked this index in the way shown. In fact, in figures 1b – 1e, the index has had to be "fitted" to accommodate those site-specific data.

If the disputed data from 1987 are excluded, the data on the breeding colonies at Bempton and Filey less clearly indicate a supposed decline (Figures 2 and 3) and, rather, follow the pattern suggested by MacArthur Green (2015) (Appendix M of the Applicant's response to Deadline IIA):

*Although there is some uncertainty about how the kittiwake population at Bempton has changed since the 1970s (http://jncc.defra.gov.uk/page-2889), it seems likely that the population has remained around 40,000 pairs for much of that time. This is close to the maximum size for colonies of this species, suggesting strong competition for resources and colony size limitation by density-dependence (Jovani et al. 2012). This would suggest that the population has been regulated at this size (i.e. the population has been at the carrying capacity of the environment for all of this time). This being the case the density dependent model would be expected to be the more reliable model on which to base predictions.*

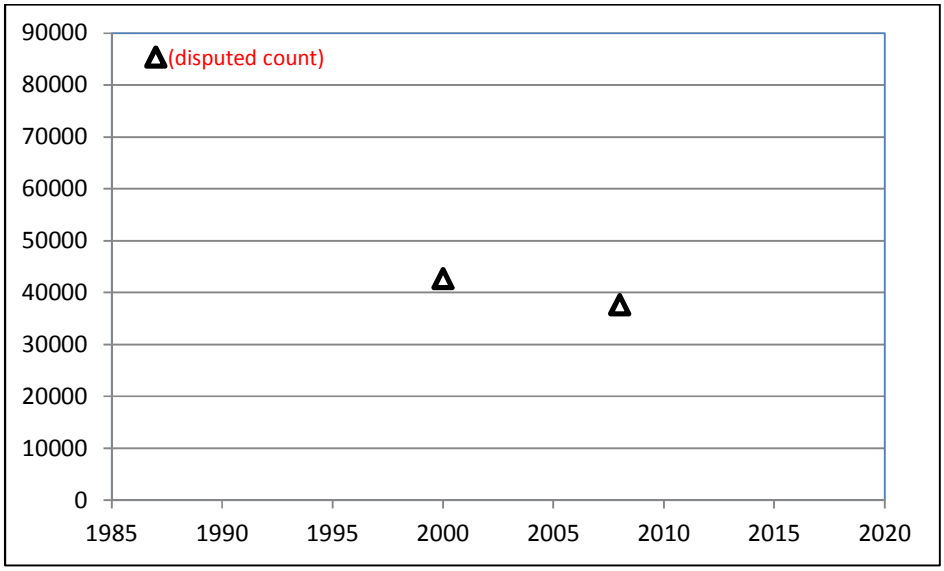


**Figure 2. Counts of kittiwake Apparently Occupied Nests (AON) at Bempton Cliffs. Source: JNCC**

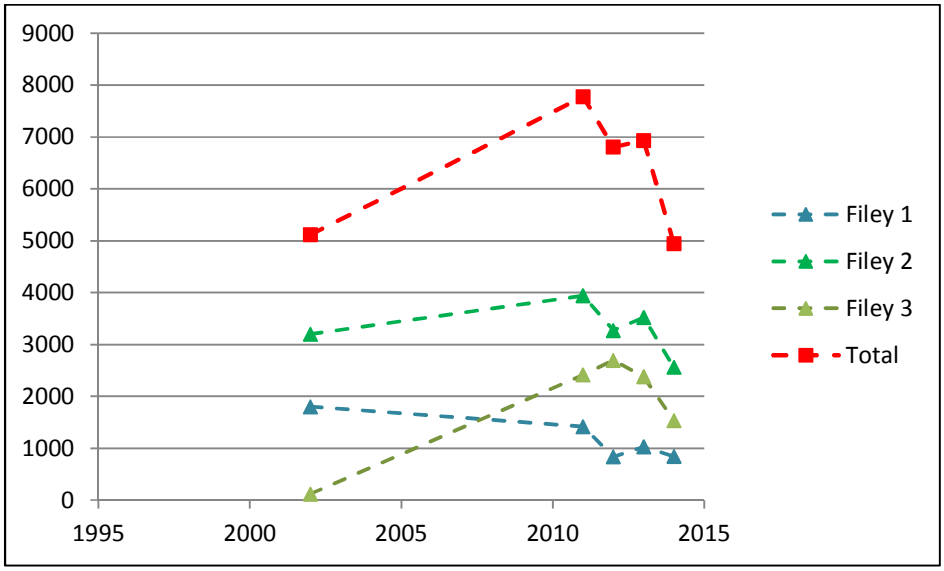


**Figure 3. Counts of kittiwake Apparently Occupied Nests (AON) at Filey count areas. Source: JNCC**

On this basis the Applicant points to the output of the density dependent version of the model which indicates that the change in predicted growth rate for the Project alone will be reduced by significantly less than 0.02% and the impacted median population size after 25 years will be more than 99.8% of that which is predicted to occur in the absence of any additional mortality. The equivalent values for in-combination impacts are -0.03%

and 98.8% respectively. It should be noted that these changes do not necessarily imply that the population will decline, the model is predicting the differences between impacted and unimpacted scenarios. So, for a population that is growing, the model in indicates that growth will not be significantly impeded. For a population that can be considered to be stable, the model indicates that the population will, after 25 years, not be significantly different to that which would have occurred in the absence of any impact, taking into account the natural variability in the population. A prediction that a particular population may be smaller with the wind farm than without provides no information about whether or not the population is actually likely to be larger or smaller than its current size. In the context of the SPA conservation objective 'to maintain or enhance the qualifying populations' this measure alone therefore provides no means to determine the likelihood of an adverse effect on integrity.

The Applicant further argues that this version of the model does not predict an adverse effect arising from Natural England's worst case in-combination position of approximately 500 birds per annum, for which the equivalent values are -0.13% and 95.7%.

It is noted that in previous applications for offshore wind farms, Natural England has advised that impacts of this magnitude would be tolerable by the breeding kittiwake population of FH&BC SPA / FFC pSPA. For example, it was advised:

- In Natural England's response to Deadline V for Hornsea Project 1 they state " Natural England clarified that it had previously been satisfied by the use of PBR but as the Applicant had provided supplementary PVA outputs, Natural England, as an evidence based organisation, must look at what is presented before it. The results of the PVA work undertaken by the Applicant (Appendix X of the Applicant's submission at Deadline 4) agree broadly with the results of the PBR". Noting that Natural England's position at for Hornsea Project One was an f value of 0.1 resulting in a PBR figure of 512 birds.
- Dogger Bank Creyke Beck, Table 2 of Natural England's submission at Deadline IV "In PVA models submitted for the Hornsea OWF Project One, a value of 500 was suggested to be a suitable lower limit at which to conclude no AEOI"
- Dogger Bank Teesside (Natural England's submission at Deadline V, November 2014), Table 2.1 states 207 adults is less than the value of 500 adults at which a precautionary density-independent PVA model suggests the population would still have a >95% probability of continued growth. A density-dependent model predicts a more stable population and an additional mortality of 500 birds does not increase the probability of population decline significantly
- The Secretary of State's decision for Navitus Bay states "Natural England advised (REP-3696) that 500 adult kittiwake is the value at which a precautionary density-independent PVA model suggests the Flamborough kittiwake population would still have a >95% probability of continued growth. A density-dependent model predicts a more stable population and an additional mortality of 500 birds does not increase the probability of population decline significantly. Natural England advises (REP-3696) that a PBR model threshold of 573 adult kittiwakes, using an f value of 0.1, was also appropriate".

It is unclear to the Applicant why a different position is being now advised for this application. Population modelling relied upon in those cases (including PVA and PBR) did not predict a significantly different outcome when additional mortality of approximately 500 individuals was assumed.

**Conclusion**

It is the Applicant's position that there is no indication of an adverse effect on the kittiwake population of the FH&BC SPA / FFC pSPA alone or in-combination with other plans and projects.

**Appendix 1. Flight recording bands used in boat-based surveys at offshore wind farms**

| Project | Survey period | Surveyor | Flight height bands applied |
|---|---|---|---|
| Aberdeen | February 2007 - April 2008 | n/a | 0-2 m, 2-10 m, 10-25 m, 25-50 m, 50-100 m, 100-200 m, > 200 m |
| Atlantic Array | April 2009 – March 2011 | ECON | < 20 m, 20-120 m, > 120 m |
| Beatrice | October 2009 – September 2011 | IECS | < 20 m, 20-150 m, 150-200 m, > 200 m |
| Blyth Demonstration | July 2010 – November 2011 | n/a | Below 10 m heights estimated to 1 m bands; between 10-20 m heights estimated to 2 m bands; between 20-50 m heights estimated to 5 m bands; above 50 m heights estimated to 10 m bands |
| Burbo Bank Extension | April 2011 – September 2011 | CMACS | 0-30 m, 31-140 m > 140 m |
| Dogger Bank projects (Creyke Beck and Teesside A & B) | January 2010 – January 2012 | Gardline | Varied over time: Feb-Nov 2010: 0-20 m, 20-180 m, >180 m; Dec 2010-Feb 2011 – addition of 20-25 m band; Feb 2011-onwards: addition of 25-50 m band |
| Galloper | 2008 – 2010 | ESS | Nearest 5 m band from 5-40 m, nearest 10 m band from 40-100 m |
| Gwynt y Môr | February 2003 – March 2005 | n/a | < 1 m, 1-20 m, > 20m |
| Hornsea Project One | March 2010 – February 2012 | Cork Ecology | Nearest 5 m band |
| Inch Cape | September 2010 – September 2012 | Natural Power | 5 m bands up to 50 m, 10 m bands up to 100 m, 50 m bands above 100 m |
| London Array | October 2002 – March 2005 | | Below 10 m heights estimated to 1 m bands; between 10-20 m heights estimated to 2 m bands; between 20-50 m heights |

| | | | |
|---|---|---|---|
| | | | estimated to 5 m bands; above 50 m heights estimated to 10 m bands |
| Moray | April 2010 – March 2012 | Natural Power | < 5 m, 5-10 m, 10-20 m, 20-200 m, 200-300 m, > 300 m |
| Navitus Bay | December 2009 – November 2011 | ESS | Nearest 5 m band |
| Neart na Gaoithe | November 2009 – October 2011 | Cork Ecology | Nearest 5 m bands below lower rotor height (22.5 m) and above 22.5 m |
| Ormonde | May 2004 – April 2005 | n/a | Below 10 m heights estimated to 1 m bands; between 10-20 m heights estimated to 2 m bands; between 20-50 m heights estimated to 5 m bands; above 50 m heights estimated to 10 m bands |
| Race Bank | December 2005 – November 2007 | n/a | 0 m, 0-20 m, 20-120 m, >120 m |
| Rampion | Two years from March 2010 | ESS | 0-2 m, 2-10 m, 10-25 m, 25-50 m, 50-100 m, 100-200 m, >200 m |
| Seagreen Alpha and Bravo | December 2009 – November 2011 | ECON | < 20 m, 20-120 m, > 120 m |
| Sheringham Shoal | March 2004 – February 2006 | n/a | 0-20 m, 20-100 m, 100-250 m, >250 m |
| Triton Knoll | January 2008 – December 2009 | ECON | 0 m, 20 m, 20-120 m, >120 m |
| Walney 1 & 2 | May 2004 – September 2005 | n/a | < 5 m, 5-15 m, 15-100 m, > 100 m |
| Walney Extension | June 2011 – November 2012 | CMACS | Initial surveys: 0-30 m, 30-140 m, > 140 m<br>March 2012 onwards: 0-22m, 22-30 m, 30-222 m, > 222 m |
| Westermost Rough | August 2004 – July 2006 | IECS | 0-2 m, 2-10 m, 10-15 m, 15-25 m, 25-50 m, 100-200 m, > 200 m |