Beatrice
Offshore Windfarm Ltd

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26/11/2015

BOWL Ref: L000005-LET-289

Dear Nicola,

BOWL Section 36 Consent Condition 5: Great black-backed gull collision risk assessment for the Siemens 7 MW wind turbine at the Beatrice Offshore Wind Farm

MacArthur Green, on behalf of BOWL, have revisited the collision risk estimates presented in the Information to Inform an Appropriate Assessment which formed part of the ES Addendum for the Siemens 7 MW wind turbine described in BOWL's Design Specification and Layout Plan (ref. LF000005-PLN-152 BOWL Development Specification and Layout Plan Rev 02 19-11-15). The purpose of this letter is to demonstrate that the chosen turbine complies with Section 36 consent condition 5 '*to ensure there is no adverse effect on the integrity of the East Caithness Cliffs SPA in relation to great black-backed gulls*'.

BOWL can confirm that the parameters of the Siemens 7MW wind turbine comply with those listed in S36 condition 5, with the exception of the RPM which for the chosen turbine exceeds the max RPM of the worst case scenario assessed in the BOWL ES and ES Addendum, and as set out in S36 condition 5. Consequently BOWL have revisited the Collision Risk Modelling as required by condition 5 in order to demonstrate that the collision mortality does not increase the predicted collision mortality of the East Caithness Cliffs SPA great black-backed gull population.

Methods and Results

The mortality estimates for great black-backed gull have been generated following industry standard methods and applying adjustments agreed with Marine Scotland (4th September 2013 and 23rd October 2013) to estimate the proportion of mortality attributable to the East Caithness Cliffs (ECC) Great black-backed gull SPA population.

The average density of flying Great black-backed gulls estimated from boat based snapshot surveys of the Beatrice study area are provided in Table 1 (these data were collected during the pre-application boat based surveys presented in the ES and ES Addendum and Information to Inform an Appropriate Assessment).

Table 1. Average monthly Great black-backed gull densities (flying birds/km^2) estimated from survey data of the Beatrice wind farm site, data collected between October 2009 and September 2011).												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Great black backed gull	0.398	0.163	0.166	0.118	0.131	0.000	0.186	0.000	0.187	0.000	0.182	0.364

Collision risk modelling parameters (bird biometrics, avoidance rates and nocturnal activity levels), as agreed with Marine Scotland and statutory and non-statutory consultees during the pre-application phase, are provided in Table 2.

Table 2. Bird input parameters for Band 2012[1] collision risk model.	
Parameter	Great black-backed gull
Bird length (m)	0.71
Wing span (m)	1.575
Flight speed (ms^{-1})	13.7
Nocturnal activity level	2
Breeding season months	May-Aug
Avoidance rate	98%

The parameters in tables 1 and 2 were entered in the offshore collision risk model (Band 2012[1]), using option 3 (flight height distribution) to generate estimates of the total collision mortality for each species. Required wind turbine parameters are: rotor diameter, hub height (above mean sea level), max. RPM, max. blade width and max. blade angle (pitch).

The proportion of the total mortality attributable to the ECC SPA populations was calculated using the species specific parameters in Table 3 which were agreed with Marine Scotland ('common currency', 4th September 2013 and 23rd October 2013).

Table 3. Common currency input parameters.	
Parameter	Great black-backed gull
Proportion attributable to ECC SPA in breeding season	0.633
Proportion attributable to ECC SPA in non-breeding season	0.0136
Boat bias	0.5
Adult proportion	0.375
Proportion of adults which breed in any given year	0.65

The method used to estimate mortality of great black-backed gulls attributable to the ECC SPA population from the total mortality is as set out below:

1. Annual mortality is split between breeding season and non-breeding season months;
2. Breeding season mortality is multiplied by proportion of birds present in these months estimated to originate from ECC SPA;

[1] Band (2012). Using a collision risk model to assess bird collision risks for offshore windfarms. Report to The Crown Estate, SOSS-02.

3. Non-breeding season mortality is multiplied by the proportion of birds present in these months estimated to originate from ECC SPA;
4. Mortalities for both periods are multiplied by 0.5 to correct for gull attraction to the survey vessel ('boat-bias'); and,
5. Breeding and non-breeding estimates are summed to give the annual mortality of all age classes attributable to the ECC SPA.

The ECC SPA mortality estimated above includes all age classes of great black-backed gull. If an estimate of the ECC SPA breeding adult mortality is required, the following additional step is applied:

1. Multiplication of the final estimate (step 5) by the adult proportion and the proportion of adults which breed in any given year.

The wind turbine parameters as set out in Section 36 Consent Condition 5, and in the Design Specification and Layout Plan (ref. LF000005-PLN-152 BOWL Development Specification and Layout Plan Rev 02 19-11-15) are provided in Table 4, together with the estimated number of annual collisions of great black-backed gulls which would be attributed to the ECC SPA (following the above methods). Note that the hub heights in Table 4 are measured from Lowest Astronomical Tide (LAT). These are adjusted to height above Mean Sea Level (MSL) prior to collision modelling. This is achieved by subtracting 2.1m from the modelled hub height (i.e. the hub height used in the collision model is 107.6m).

Table 4. Wind turbine parameters as set out in the Beatrice conditions, and for the Siemens 7MW turbine.

Parameter	Beatrice Condition	Siemens 7.0-154
No. turbines (max)	Up to 125	84
Hub height (range, measured from LAT)	104.64 to 115.9 metres	109.7m
Rotor diameter (max)	154 metres	154m
RPM (max)	11	13
Blade width (max)	5 metres	4.98m
Blade pitch (max)	20 degrees	7deg.
ECC SPA great black-backed gull mortality (annual)	**6.96**	**3.23**

Conclusion

As described above, due to the significant reduction in the number of turbines to be installed, a wind farm comprising 84 the Siemens 7.0 MW turbines generates a collision estimate (3.23) which is less than half the maximum (6.96) estimated in the ES and ES Addendum. The proposed wind farm development therefore falls within the range permissible on the basis of allowed impacts on the ECC SPA population of great black-backed gulls. As the purpose of the condition is '*to ensure there is no adverse effect on the integrity of the East Caithness Cliffs SPA in relation to great black-backed gulls*' it is BOWL's view that with the reduced number of wind turbines the Siemens 7 MW turbine complies with the condition.

BOWL would be grateful if MS-LOT could please confirm that based on the information provided above, BOWL complies with S36 Consent condition 5 by installing 84 no. Siemens 7MW turbines.

Yours sincerely,

[redacted]

Jonathan Wilson
Beatrice Offshore Wind Farm
Consenting and Stakeholder Manager