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The Scottish Government

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ICOL (REVISED DESIGN): REQUEST FOR MSS COMMENTS

Marine Scotland Science has reviewed the submitted documents and has provided the following comments.

Marine Mammals

MSS acknowledges that, for the noise modelling included in the assessment, ADDs (as a form of embedded mitigation) have been incorporated. At Gatecheck MSS highlighted advice provided in the scoping opinion, which was; "ADDs are a mitigation tool, it may be more appropriate to undertake the assessment process without them and then include them as a mitigation at a later stage. This would be the standard approach for EIA and would have the advantage of providing good evidence regarding the efficiency of the proposed mitigation." The rationale to our advice is that, mitigation practices should be implemented based on both the worst case scenario and the current best practices for mitigation. Consequently, MSS remain of the opinion that assessment should have been made without the inclusion of ADDs.

Despite the noise modelling assessment having incorporated ADDs (see Chapter 10 and Appendix 9B), MMS note that ICOL do not intend to use ADDs as a form of mitigation prior to pile driving. MSS acknowledge that ICOL have based their decision to remove ADDs from the embedded mitigation on further modelling, which has been presented in Section 10.5.2, and has concluded that there is little to no difference in the impact on marine mammals when comparing a subset of worst case scenarios with and without an ADD. MSS note that there are contradictory statements in Appendix 9B; the executive summary (9B1.1) states that "The model included the assumption that marine mammals would flee from the pile foundation at the onset of an acoustic deterrent device (ADD) deployed 15 minutes prior to the commencement of a piling soft start". Yet Section 9B.3.8 states "it was assumed that an animal would flee from the pile foundation at the onset of pile driving". For clarity, statements regarding the use of ADDs in the noise modelling should be checked and should be consistent throughout.

MSS welcome the inclusion of the re-analysis of some of the more relevant scenarios regarding the noise modelling assessment using the 1% conversion factor, as opposed to the 0.5% conversion factor on which the assessment is based. MSS maintain their position that there is no robust scientific evidence or support for using the 0.5% conversion factor and that the 1% conversion factor would have been more reflective of the precautionary principle based on the current best scientific evidence.

The contour maps for low and high frequency cetaceans, and for seals indicate that the cumulative PTS zones are larger for 1% than for 0.5%; this is especially true for low frequency cetaceans. However, despite an increase in the number of animals predicted to experience PTS, the percentage of the reference population is still small. Consequently, MSS are content with the conclusion of both ICOL and SNH, that the magnitude of impact is low and the significance of effect from PTS is low for all species and scenarios. MSS draw the same conclusion for the disturbance assessment (as do ICOL and SNH).

MSS agree with the rationale for not re-running iPCOD based on the 1% conversion factor, as opposed to the 0.5% conversion factor on which the assessment is based. Specifically, given the little difference from

amending the model to include a more realistic impact from the AHEP, the inclusion of 2 or 3 additional animals disturbed is extremely unlikely to make a difference to the conclusion of the assessment.

MSS are of the opinion that the inclusion of ADDs in the noise modelling has unnecessarily complicated the interpretation of the assessment and has the potential to cause confusion, particularly given the conclusion of ICOL to exclude ADDs from the embedded mitigation. MSS note that the re-analysis using the 1% conversion factor has incorporated ADDs; therefore, there is no assessment using the 1% conversion factor without ADDs. However, given the re-analyses presented within Chapter 10, Appendix 9B and Appendix 10B, MSS consider it unlikely that this scenario (1% conversion factor without the use of ADDs) would make a difference to the conclusion of the assessment.

MSS are in agreement with SNH, such that a piling strategy submitted to MS-LOT for approval prior to piling activities, should incorporate appropriate mitigation measures to minimise the risk of PTS. This can be developed through discussion with the Forth and Tay Regional Advisory Group (FTRAG), and MSS acknowledge that ICOL will continue to participate in this forum, as required.

As noted by SNH, some scenarios do have large effect zones for cumulative PTS for minke whale, which are at distances that are unlikely to make current mitigation practices effective. Therefore, an EPS license for injury may be required. MSS note that this is likely to be a precautionary measure. For example, one important assumption of the model is that the animal will flee to a maximum of 25 km; therefore, if the noise modelling predicts that the sound propagates further than 25 km and/or if the animal flees towards the coast and becomes 'trapped', it is possible for the animal to accumulate the dose, and thus exceed the cumulative PTS threshold. However, MSS consider these to be unlikely real-world scenarios.

Marine fish ecology

Comments have previously been submitted on the particle motion paper (Appendix 9D and the herring spawning study (Appendix 9A) as well as the discussion paper on sedimentation effects on scallops and *Nephrops* (Appendix 9E). MSS welcome the consideration given to comments made on fish and shellfish ecology that were made on the draft chapter during the gatecheck review. Having reviewed the relevant EIA report chapters and appendices, MSS is broadly in agreement with the conclusions reached on this receptor group.

With regards to herring, the applicant has shown, through utilisation of the popper criteria, that recoverable injury or mortality effects are not likely to be a concern for marine fish species considered. Ranges for potential temporary threshold shift (TTS) effects are modelled, both alone and in combination with Neart na Gaoithe and the Firth of Forth OWF's, and presented in conjunction with Coull *et al* (1998) herring spawning areas. From here, it can be seen that there is a small overlap at the southern limits of the Buchan population spawning area, indicating the potential for TTS effects on herring during spawning periods. The applicant has however been able to consider available evidence relating to herring spawning activity and concludes that this overlap area is rarely (if at all) utilised for spawning activity. It finds that there will be low impact on key spawning habitat for herring as a result of piling activity at the Inch Cape Wind Farm, resulting in a negligible effect on the species which is not significant. MSS is inclined to agree with this conclusion. It can be noted that the findings related to fish use of the indicative spawning area presented by Coull *et al* (1998) are upheld by a recently published ORJIP study into the impacts from piling on fish at offshore wind sites. Here, heat maps based on IHLS abundance data over years 2007 - 2017 are presented and these show that spawning within the TTS overlap area is likely to be minimal, if at all.

Mitigation

MSS welcome the embedded mitigation as provided in section 9.5.2 and also commitment to the purpose of the relevant consent conditions granted for the Inch Cape 2014 Consent, being recognised as relevant to this application.

Diadromous fish

Papers on salmon migration behaviour (now Appendix 9C) and particle motion (now Appendix 9D) were submitted previously by ICOL and commented on. ICOL has included summary details in Chapter 9 and LOT has previously advised that it does not require MSS to revisit these papers.

Diadromous fish - Habitats Regulations Appraisal

ICOL is aware that Scottish Ministers have accepted the advice of SNH that "any impacts from marine renewables on diadromous fish should now be undertaken via EIA not Habitats Regulations Appraisal (HRA)."

Further explanation is provided that “This is because it is not possible to determine which Special Area of Conservation (SAC) rivers any individuals recorded at sea are coming from or returning to”.

Nonetheless, ICOL has reviewed the existing HRA material in case one should be required in the future. This may be useful as there is a growing ability to identify which SAC rivers individuals recorded at sea are from or returning to through tracking studies on tagged fish and by using genetics techniques.

Two sections now deal with diadromous fish HRA matters.
Biological Environment: Natural Fish and Shellfish. 13.13 Habitats Regulations Appraisal (HRA).
Biological Environment: Diadromous Fish Habitats Regulations Appraisal

In the second of these, ICOL specifically considers the potential for barrier effects or physical injury which could result from the increased hammer energies now proposed within the design envelope.

The SACs considered are those from the Dee to the Tweed.

These sections state that returning adults will migrate north close to the coast, so will be away from the main construction work. MSS would note that prior to this migration north close to the coast (against the main currents) adults will have migrated south, probably a little further offshore, which could bring them into the proximity of the construction work.

It is also assumed in these sections that smolts from the River Dee will head north away from the construction site. The acoustic tagging studies which have been taking place in 2017 and 2018 at the mouth of the River Dee are showing that many smolts actually head east to south east and some data on this were presented at the EIMR 2018 conference in April.

MSS would note that some of Scotland’s most important salmon rivers, including several SACs for salmon, are in this part of Scotland and that substantial numbers of emigrating smolts and returning adults will be associated with these rivers so that substantial numbers of emigrating smolts and returning adults will migrate through the general area.

Diadromous fish - Chapter 9. Biological Environment: Natural Fish and Shellfish
In line with the agreed scope of assessment, only the impacts on hearing specialists from piling during the construction of the wind farms were assessed, with herring, cod, sprat and both shad species used as the examples. Shad are diadromous species and some information on shad is presented. It was concluded that it is unlikely that there are populations of shad in the local area. MSS would note that adult shad, including at least allis shad are regularly reported on the River Forth just upstream of Stirling at spawning time and that there has been speculation that there could be a small population in the Forth. They have also not infrequently been reported in the River Tay.

Diadromous fish - Appendix 14B Human Environment: Salmon and sea trout baseline
As previously noted, this section correctly mentions that there are still uncertainties in salmon distribution patterns and that there is ongoing work, some in the development area, including that for example from survey work for smolts carried out by MSS in May 2018, in relation to salmon migration, although at the time of writing the output of his work was not available and therefore could not be considered in the baseline information. Some data from the survey work carried out in 2017 has been presented at meetings and some data from the 2018 survey work was presented at the MASTS annual science meeting in late October 2018. MSS would again note that some of Scotland’s most important salmon rivers are in this part of Scotland and that substantial numbers of emigrating smolts and returning adults will be associated with these rivers so that substantial numbers of emigrating smolts and returning adults will migrate through the general area.

Diadromous fish - Objections
MSS notes that the Tay District Salmon Fisheries Board, The River Tweed Commission and SNH have lodged objections either specifically about or including material in relation to diadromous fish. The Advice Proforma of 9/8/18 does not specifically request comments on these objections. If this is also required, please let MSS know.

Diadromous fish - Other comments
As previously noted, it would be very helpful if ICOL engaged with MSS to discuss what work would best be carried out or commissioned by ICOL to meet an expected licence condition that it carry out suitable project work to feed into the developing SpORRAn (ScotMER) Diadromous Fish evidence map.

Commercial fisheries

MSS has reviewed ICOL's (Revised Design) EIA report. This is the second review MSS has provided. The original review took place as part of MS-LOT's Gate check review in May 2018.

In response to comments from the original review, applicants have now provided more information on dropped objects and have re-instated the CFWG, No additional information have been provided neither in relation to modifications to bottom towed fishing gears nor in relation to the Fisheries Management and Mitigation Plan. However, developers have committed to both topics as part of consent conditions.

MSS has no additional comments in relation to the baseline data used, the identified fisheries impacted by the development, and the significance levels of effects.

Ornithology

The assessed impacts for the 2018 application are less than for the 2014 consented design, this is owing to fewer larger turbines in the revised (2018) design over the consented (2014) design. This point is noted by both RSPB and SNH in their consultations responses (RSPB consultation response dated 9th October 2018, SNH consultation response dated 28th September 2018, hereafter referred to as RSPB and SNH). However, both object to the application based on the assessed in combination impacts on SPA site integrity. For SNH this was with respect to Forth and Tay proposed developments only (Inch Cape with Neart na Gaoithe, Seagreen Alpha and Seagreen Bravo) while RSPB object based on in combination impacts with the other Forth and Tay proposed developments and with other UK east coast projects.

Assessment methodology
The main assessed impacts for ornithology are collision risk assessed via collision risk modelling (CRM) and displacement.
SNH are in support of how the assessment has been done stating that it 'takes full account of the scoping opinion'.

Collision risk modelling (CRM)
Collision risk was assessed as the key impact for black-legged kittiwake and northern gannet for SPA site populations (see below). CRMs were also ran for herring gull. The CRM approach is described in detail in Appendix 11C to the EIA report.

The scoping advice was to use Band 2012 options 1 and 2 for gannet and kittiwake. These both use the basic model but either with site-specific flight height data (option 1) or generic (published data collected from a range of sites) (option 2). The PVA (see below) uses the option 2 outputs.

The developer provides estimated collisions following both options. With site specific flight height data derived from boat based observations during base-line surveys (ESAS-type). SNH state that a strong case is made for using option 1. This is in contrast to RSPB who do not support using site specific data for this application (thus suggest option 2), they are sceptical that the site specific data collected by Inch Cape are accurate. RSPB argue this based on the calculated flight height distributions being somewhat lower than found for most other sites or studies. The developer defends this apparent discrepancy in their application (see paragraphs 22-24 of Appendix 11C). They suggest that systematic bias in recording is unlikely to explain differences in flight height recorded between the site specific surveys and generic values for gannet (HRA report, paragraph 84), though it is unclear how they reach this view. Since the application was submitted a study comparing flight heights measured from boat based survey using observer versus optical rangefinder estimates has been published (Harwood et al. 2018. Journal of Field Ornithology. https://doi.org/10.1111/jofo.12269). Optical range finders give quite accurate flight height estimates, thus can be used to validate boat based visual observations. While that study indicates broad agreement between the two methods, it does suggest potential for quite large differences in estimates of the proportion of birds at collision risk height finding observer data to be biased towards lower (less precautionary) flight heights for gannets and towards slightly higher (more precautionary) flight height for kittiwake. Though that study was in the same general area (Forth and Tay region) the transferability of these results to other surveys with different vessels and observer teams is unclear. If in assessing potential impacts more weight were to given to the CRM option 1 output (using site specific flight height distributions) further explanation supporting the developers contention that their data are reliable would be helpful especially in light of this recently published study.

There are two 2017 design options, either using 40 wind turbine generators (WTGs) or 72 WTGs. The 40 WTG design using larger turbines than the 72 WTGs. CRMs were ran for both design options. In all cases the calculated number of collisions are lower or the same for the 72 WTG compared to the 40 WTG design. The developer suggests (Appendix 11C. paragraph 18) this is because there is a larger air gap (distance between the sea surface and lower rotor swept area) for the WTGs in the 72 WTG design over the 40 WTGs, meaning fewer birds are expected to be at collision risk height (more flying beneath the rotor swept zone).

The HRA report uses the worst case of the 2017 designs (HRA report, section 3.6.3.), the 40 WTG. It also follows option 2 of the CRM which is more precautionary (given lower site specific flight height distributions used in option 1 than the generic distributions used in option 2).

Displacement

Displacement was assessed as a key impact for razorbill for Forth Islands and Fowlsheugh SPA populations (see below).

The main assessment of displacement follows the scoping advice, using the matrix approach.

Also given are outputs using two other approaches which also incorporate barrier effects (where birds have to modify their flight paths around wind farms), the Searle et al. model and a related newly developed tool, SeabORD (see: https://data.marine.gov.scot/dataset/finding-out-fate-displaced-birds). Guidance on how this tool should be used in assessments is still being developed. As such the appropriate assessment should be based on the matrix approach values, though results from the SeabORD tool may provide useful additional context.

RSPB note that there is a lack of empirical data for displacement and thus advise that 'estimated effects should be treated with caution' (RSPB consultation response, at end of section 1.0).

In-combination Assessment

SNH objected to the development based on the in-combination assessed impacts of the Forth and Tay proposed and consented wind farms of Inch Cape together with Neart na Gaoithe, Seagreen Alpha and Seagreen Bravo.

The in-combination assessment is for two scenarios, i) the worst case 2017 Inch Cape design (40 WTG, see CRM above) and the worst case of the 2014 consented designs for the other Forth and Tay wind farms, and ii) the 2017 designs for all Forth and Tay wind farms (section 3.6.3 of HRA report). Seagreen in their consultation response (dated 1st October 2018) state that the collision numbers calculated by Inch Cape for Seagreen are higher than what Seagreen has calculated, this resulting from Inch Cape's use of an earlier design specification than used in Seagreen's application. This will need to be considered when interpreting the in combination impacts of Forth and Tay developments.

Population Viability Analysis

The potential effect of the impacts assessed following displacement and CRM are modelled for a given SPA species population using population viability analysis (PVA).

The CRM impacts used in the PVA are those from option 2 of the CRMs (see above), this likely leads to significantly greater assessed impacts for gannet and kittiwake than calculated impacts following option 1 that are lower. A point noted by SNH in their consultation response (SNH consultation response, Appendix A, paragraphs 4 and 8).

Assessed impacts to SPA qualifying ornithology features

The main species of concern for both RSPB and SNH are gannet, black-legged kittiwake, and razorbill. Following a summary for each SPA by species combination for those where effects were judged likely or potentially to have adverse effects on SPA site integrity for a given species. SNH noted no adverse effect on site integrity for Outer Firth of Forth and St Andrews Bay Complex pSPA.

SNH note in their consultation response that in combination impacts calculated by Neart na Gaoithe are greater for a number of SPA populations (e.g. gannet at Forth Islands, kittiwake at Forth Islands and Fowlsheugh SPA sites) than found by Inch Cape (see points 14-20 of Appendix A of SNH's consultation response).

Forth Islands SPA

- Black-legged kittiwake

SNH assess that the development will have an adverse effect on the site integrity. Key impact collision risk.

- Northern gannet

SNH assess that the development will have an adverse effect on the site integrity. Key impact collision risk.

- Razorbill

SNH assess that the development will have an adverse effect on the site integrity. Key impact displacement.

Fowlsheugh SPA
- Black-legged kittiwake
SNH assess that the development will have an adverse effect on the site integrity. Key impact collision risk.
- Razorbill
SNH assess that the development will have an adverse effect on the site integrity. Key impact displacement.

St Abb's Head To Fast Castle SPA
- Black-legged kittiwake
SNH assess that the development **could** have an adverse effect on the site integrity. Key impact collision risk. SNH note that use of site specific flight height data (Band option 1 CRM model – see Collision Risk Modelling above) would 'have reduced the impacts significantly' (SNH consultation response, Appendix A, point 20).

Hopefully these comments are helpful to you. If you wish to discuss any matters further contact the MSS Renewables in-box at MS_Renewables@gov.scot

Yours sincerely

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Marine Scotland Science

08 November 2018