



To	Andrew Sutherland (MS), Adrian Tait (MS).
Cc.	Roger May (MS), Finlay Bennet (MS), Erica Knott (SNH), Karen Hall (JNCC), Victoria Appleyard (JNCC).
From	Enrique Pardo (JNCC), Catriona Gall (SNH).
Date	28 March 2013.
Subject	Seagreen Outer Forth Offshore Windfarm, Phase 1: Preliminary advice from JNCC & SNH.

This memo provides JNCC and SNH interim advice from our review of the Seagreen Phase 1 Environmental Statement (ES). We provide overarching comments on Habitats Regulations Appraisal (HRA) and cumulative impact assessment. We outline the key steps that will need to be addressed by Marine Scotland (MS), in conjunction with JNCC and SNH, in order to be able to provide final advice on the Seagreen application alone, and cumulatively with the other offshore wind development proposals in the Forth & Tay. We are currently in discussion with MS to progress these issues and highlight our forthcoming discussions in italics below.

Firstly, we note that JNCC and SNH have a meeting with Marine Scotland on 2 April 2013 in order to discuss developer applications and timelines for consent and how MS will be considering cumulative effects from multiple developments within the consenting framework.

We welcome our pre-application dialogue with Seagreen individually, as well as with the Forth & Tay offshore wind developers as a group (FTOWDG). This has been helpful in attempting to ensure consistency in methods and approaches to impact assessment, although it has not been possible to achieve complete agreement between all parties. Therefore JNCC and SNH are currently in the process of checking and liaising over each submitted ES to ensure that approaches are consistent enough for information to be collated in cumulative Habitats Regulations Appraisal (HRA).

We did find it helpful that Seagreen submitted an HRA screening report during pre-application dialogue. We are, however, disappointed with the subsequent decision to submit a final HRA report separate to the licence application and ES submission. We have always advised that the HRA is integral to Seagreen's overall impact assessment as the key ornithological and marine mammal receptors are Natura (SPA or SAC) qualifying interests. These receptors are included in Section 1 below – the key natural heritage interests and impacts to consider.

As we have only very recently received Seagreen's final HRA report (on 22 March 2013), we are still in the process of reviewing it. We find that receiving this HRA report separate to the ES makes the overall appraisal of the Seagreen application more time-consuming than it might otherwise have been.

As noted in italics below, there are a number of aspects relating to cumulative impact assessment which require further discussion between ourselves and Marine Scotland. We need to resolve and agree these matters before we can offer finalised advice on applications individually, as well as cumulatively.

1. KEY NATURAL HERITAGE INTERESTS AND IMPACTS TO CONSIDER

The following key natural heritage interests and impacts (a)-(d) are the priority for assessment, for Seagreen on its own and in combination with the other Forth & Tay offshore wind proposals – Neart na Gaoithe (please see SNH’s preliminary advice, 23 November 2012) and Inch Cape (anticipating ES consultation in April), in Scottish waters.

Cumulative impact assessment, particularly for the qualifying interests of SPAs and SACs as noted below, remains complicated due to the differences in methodologies and approaches to technical assessments between the developments as well as the way that information is presented by each applicant to inform the cumulative HRA that MS is required to undertake.

a) Qualifying Interests of Special Protection Areas (SPAs)

HRA of operational windfarm impacts on key seabird species during the breeding season, as the windfarm is located within foraging range of a number of SPA breeding seabird colonies. See further discussion under section 2 on ornithology.

b) Qualifying Interests of Special Areas of Conservation (SACs)

HRA of windfarm construction impacts on harbour seals as a qualifying interest of the Tay & Eden Estuary SAC and on grey seals as a qualifying interest of Isle of May and the Berwickshire and North Northumberland Coast SACs.

HRA of windfarm and export cable construction impacts on bottlenose dolphin as a qualifying interest of the Moray Firth SAC.

HRA of windfarm and export cable impacts, particularly underwater noise and any EMF impacts, on the qualifying fish interests of Rivers Teith, Tay and South Esk SACs.

See further discussion under section 3 on marine mammals and section 4 on fish interests.

c) European Protected Species (EPS)

Consideration of EPS licensing requirements for the range of cetacean species potentially disturbed by this windfarm proposal. See further discussion under section 3.

d) Seascape, Landscape and Visual Impacts

SNH anticipates providing advice to Marine Scotland on the seascape, landscape and visual impacts of the three Forth and Tay windfarm proposals once the application for Inch Cape is submitted and we can review all available information. We confirm, as set out in our memo of 27 February 2013, that the illustrative material due to be submitted in the Inch Cape ES should address the concerns we raised previously in our letter of 23 November 2012.

2. ORNITHOLOGY

JNCC & SNH consider the assessment of ornithological impacts presented in the Seagreen ES to be thorough and robust. We welcome the level of pre-application engagement sought by Seagreen, alongside the meetings with the Forth & Tay Offshore Wind Developers’ Group (FTOWDG) and we hope to continue this level of engagement.

Cumulative HRA for seabird species at SPA breeding colonies

This is the key priority for ornithological impact assessment – agreement of the scope and timeframe for cumulative HRA in respect of the breeding seabird species from SPA colonies where JNCC / SNH have advised connectivity with Seagreen phase 1, Neart na Gaoithe and Inch Cape windfarm proposals.

At this stage we provide only over-arching comments on the HRA process, but we note the key issues raised in Seagreen’s letter dated 21 February 2013 (A4MR-SEAG-Z-MGT110-SLE-214) and will work with Marine Scotland to address these points. We anticipate that the intended ornithology meeting between MS, JNCC and SNH during April should help inform matters.

For cumulative HRA, the following points require agreement between MS, JNCC and SNH and are currently being finalised as this information is needed for the population modelling contract:

- Agreement of reference populations and collation of recent counts for SPA breeding seabird colonies within foraging range and where JNCC / SNH have advised 'likely significant effect'.
- Agreement of reference populations and collation of recent counts for any other non-SPA breeding seabird colonies within foraging range of the proposed windfarms.
- Agreement of any required over-arching regional population estimates based on the agreed SPA and non-SPA reference populations.
- Agreement of the appropriate breeding season for each species – and agreement on which life-cycle stages are included within a breeding season assessment (post-breeding dispersal, pre-breeding attendance at colonies?).

It will also be necessary to check developer's ES to ensure consistency in approach relating to data collection, data analysis and quantification of effects (displacement and collision risk in particular). Please see **Appendix A** for our detailed comments on the Seagreen ES.

Impact assessment for seabird species outwith the breeding season

MS, JNCC and SNH need to agree an approach to this issue in order to deal consistently with submitted applications – Round 3 proposals and those in Scottish territorial waters. We note that there are ongoing discussions to determine appropriate reference populations for seabirds in the non-breeding season.

Impact assessment for migratory species

We are satisfied that impact assessment for migratory species will be addressed by the MS research contract to undertake strategic collision risk modelling for wildfowl, waders and seabirds on migration. This contract will determine the appropriate reference populations in respect of birds on migration and estimate the overall numbers that may be at potential risk of collision with Scottish offshore windfarms (those in territorial waters and Round 3).

SNH and JNCC have advised that project or site-specific HRAs will not be required for these interests (at the MS meeting held 25 January 2013 and previously at FTOWDG ornithology meetings) because we do not consider it possible to assign connectivity with any degree of certainty between individual birds on migration and any particular SPA (with the exception of barnacle geese at Upper Solway Flats & Marshes and bean geese at Slammanan).

Export cable route – SPA interests

Figure 9.3 of the Seagreen ES provides detail of the export cable route corridor where it approaches shore, and the designated sites in proximity. As recognised in the ES, consideration will need to be given to potential impacts on the qualifying interests of the Firth of Tay and Eden Estuary SPA, which includes designation for wintering wildfowl and waders. As agreed by exchange of email (SNH advice dated 1 July 2011), the applicant has carried out shore-based vantage point work for these interests as indicated in paragraphs 10.61 - 10.6 of the ornithology chapter and discussed in detail in Volume III of Appendix F2.

While the applicant suggests that these SPA interests are screened out of HRA on the basis of no 'likely significant effect' (see Table 4.3 of the Seagreen HRA screening report) we're not yet able to provide confirmed advice in this regard until we have reviewed the survey results in more detail and / or have greater clarity on proposed installation methods and location of the cable landfall within the wider corridor.

We consider it would be helpful for Marine Scotland and Angus Council to discuss and agree who is taking the lead for the inter-tidal area and who will act as the competent authority in considering any impacts to qualifying bird interests of the Firth of Tay and Eden Estuary SPA arising from the export cable and proposed landfall. SNH is happy to input any (HRA) advice that might help inform discussion. Currently we anticipate providing such advice in our response to Seagreen's application for the onshore works.

3. MARINE MAMMALS

The key priority for marine mammal impact assessment is the cumulative HRA for qualifying interests of SACs. We provide the following headline points for further discussion with Marine Scotland in the first instance, and then between ourselves and FTOWDG, including Seagreen. We are aiming to provide our detailed comments on marine mammals in respect of the Seagreen HRA report and relevant chapters of the ES at a date to be agreed with MS.

Cumulative HRA for qualifying marine mammal interests of SACs

MS, JNCC and SNH need to agree the scope and timeframe for cumulative HRA in respect of the qualifying marine mammal interests from SACs where connectivity and 'likely significant effect' have been identified. As noted in section 1(b) this includes:

- **harbour seals** of the Tay & Eden Estuary SAC.

MS-S and SNH jointly commissioned SMRU to model the declining harbour seal population at this SAC, as reported in this paper:

Lonergan M, and Thompson D; Harbour seal (*Phoca vitulina*) abundance within the Firth of Tay and Eden Estuary Special Area of Conservation: recent trends and extrapolation to extinction. 2012 SCOS – BP 12/05.

MS-S, SNH and JNCC discussed the modelling outputs at our meeting of 12 December 2012. From this meeting, SNH and JNCC have an action to draft a joint position statement to inform advice to MS considering whether or not HRA can be carried out for development proposals in respect of the Tay & Eden SAC harbour seals and how we best address this matter in respect of the wider Natura network for this species and in reporting to Europe. This position statement is currently being finalised by SNH and will then require consideration by JNCC before being discussed with MS in relation to applications within this region.

- **grey seals** of Isle of May and the Berwickshire and North Northumberland Coast SACs.

As we advised FTOWDG in our note of 26 March 2012 and follow up email of 9 May 2012, HRA will apply to grey seals as a breeding interest (when they are most closely associated with a particular SAC and we can assign connectivity with some degree of certainty).

As previously advised, the grey seal population of the east coast management unit should be used as the reference population in HRA for the breeding season, however, there may need to be some interpretation to consider impacts against each of the SAC populations. Outwith the breeding season, this same population should be used for reference in the EIA.

We have not identified any requirement for population modelling in respect of grey seals – assessment of windfarm impacts will be informed by consideration of noise modelling outputs (numbers of individuals potentially displaced, numbers potentially suffering PTS) against the grey seal population of the east coast management unit.

MS, JNCC and SNH need to meet to discuss the outputs from FTOWDG's underwater noise modelling and how this informs the cumulative HRA for grey seals. MS will need to take an overview of the licensing requirements for marine renewables and any necessary conditions in respect of potential impacts to grey seals. It should be possible to initiate this discussion in advance of the submission for Inch Cape. As such, MS, JNCC and SNH have a preliminary meeting organised for the 16 April to discuss cumulative HRA issues and potential licensing conditions in relation to marine mammals.

- **bottlenose dolphin** of the Moray Firth SAC.

In our note of 26 March 2012, we advised that it is only the Moray Firth SAC that requires consideration in respect of HRA for bottlenose dolphin. We also advised that the east coast population is the reference population for cumulative HRA and that the potential impacts of the Moray Firth and FTOWDG offshore wind proposals would therefore need to be considered in combination against this reference population.

Our advice on the MORL Round 3 proposal included our advice on HRA for the bottlenose dolphins of the Moray Firth SAC. The population modelling undertaken in support of this ES included consideration of the cumulative impacts of MORL and Beatrice together on the SAC bottlenose dolphin. This allowed us to advise Marine Scotland that the Moray Firth proposals, in combination, would not result in any long-term impact to the viability of the SAC dolphins. We noted that disturbance impacts arising during construction could be managed / mitigated via construction programming.

We now need to meet with MS to take an overview of cumulative impacts to bottlenose dolphin for FTOWDG in addition to MFOWDG (and Aberdeen Bay). As discussed at our meeting held 12 December 2012, a key concern in respect of the FTOWDG proposals is whether or not a barrier might be created to bottlenose dolphin movements up and down the east coast, and its potential 'porosity' (influenced by the frequency of piling activity across the FTOWDG sites).

MS, JNCC and SNH need to meet to discuss the outputs from FTOWDG's underwater noise modelling and how this informs the cumulative HRA for bottlenose dolphin. MS will need to take an overview of marine renewables licensing requirements and any necessary conditions in respect of potential impacts to bottlenose dolphin. We think it should be possible to initiate discussion in advance of Inch Cape's submission. As such, MS, JNCC and SNH have a preliminary meeting organised for the 16 April to discuss cumulative HRA issues and potential licencing conditions in relation to marine mammals.

European protected species

JNCC and SNH need to meet with Marine Scotland's EPS licensing team to discuss the implementation of an EPS licensing framework for Scottish territorial waters, as agreed at our meeting of 12 December 2012. Although, it is for MS to implement the framework, we are required to advise on some aspects, in particular to recommend the reference populations for each cetacean species against which to assign significance of effects. We would welcome the opportunity to meet with Marine Scotland to discuss how the EPS licensing framework will be applied.

We also welcome the release of Marine Scotland's EPS licensing guidance for Scottish territorial waters, due this summer. We consider that applications for marine renewables development should be referencing the relevant EPS legislation and are disappointed that the Seagreen ES provides no consideration of EPS licensing requirements for cetacean species recorded on-site. We consider it certain that an EPS licence will be needed for this development proposal and we would be happy to provide further advice on a shadow EPS assessment for Seagreen, if requested.

The finalisation of appropriate reference populations for EPS assessments for cetaceans is nearing completion between all the UK statutory nature conservation advisers via the marine mammals working group. JNCC and SNH will feedback the outcomes to MS as soon as feasible on this matter to inform EPS assessments.

4. FISH OF CONSERVATION CONCERN

Cumulative HRA for qualifying interests of riverine SACs

There is a confusing discrepancy between the Seagreen and Neart na Gaoithe ES in respect of the outputs of underwater noise modelling for Atlantic salmon. This will need to be resolved in order for MS to be able to conclude a cumulative HRA for Atlantic salmon and the other qualifying interests of riverine SACs.

We are, however, able to provide interim advice to begin to inform a cumulative HRA for these SAC interests – please see **Appendix B** of this memo. We will be able to provide our confirmed advice once the Inch Cape ES is submitted and the discrepancies between developers' technical assessments and any other aspects of the ES are resolved.

Marine Scotland will need to take an overview of marine renewables licensing requirements and any necessary conditions in respect of potential impacts to SAC freshwater fish interests. We think it should be possible to initiate discussion in advance of Inch Cape's submission.

Marine fish and shellfish interests

Cumulative noise impacts

As noted in our preliminary advice on Neart na Gaoithe (memo dated 23 November 2012), we are concerned about the cumulative impacts from the Forth & Tay developments on marine fish and shellfish – particularly with regard to underwater construction noise (from pile-driving the turbine foundations).

In reviewing the Seagreen and Neart na Gaoithe ES we have noted some discrepancies in the interpretation of underwater noise modelling outputs for fish species. These will need to be resolved to complete cumulative impact assessment for these two proposals in combination, and together with Inch Cape once an application is made.

The Seagreen ES identifies herring as the most sensitive fish species relevant to the area and the noise impact assessment for fish is primarily focussed on this receptor. We highlight that cumulative impact assessment will also be required for other relevant fish species with a medium / high sensitivity to noise, particularly gadoids (cod, haddock, whiting) which are likely to be common in the area. Both the Seagreen and Neart na Gaoithe ES are weak in addressing these cumulative impacts and further work is needed to collate and interpret the outputs from underwater noise modelling.

For herring we also note that there is confusion in the Seagreen ES regarding the appropriate reference population against which to assign impacts. We advise that the impacts are best considered against the Buchan spawning stock (both for Seagreen alone and for FTOWDG cumulatively).

We have previously requested a meeting with MS and FTOWDG (September 2011) in order to discuss how cumulative impact assessment for marine fish and shellfish interests would be presented. We consider a meeting with MS would still be helpful in order to resolve any discrepancies between the technical assessments in ES and uncertainty over the reference populations against which to assign impacts. Resolution of these matters should then allow MS to take an overview of cumulative impacts to marine fish and shellfish to inform their consideration of conditions and other licensing aspects.

The ES does not mention the potential for noise from operating turbines to interfere with fish behaviour for those species relying on acoustic communication. While this issue is poorly understood, we do not expect there to be any significant impacts in this regard.

Impacts on sandeels

The ES for Seagreen phase 1 clearly identifies that much of the seabed within the proposed windfarm sites (alpha and bravo) comprises appropriate habitat to support sandeels. Many of the benthic trawls (72%) also contained sandeels, although they were not designed to sample sandeels specifically. However, it is not clear what the density of sandeels is across phase 1 and therefore (a) whether as a whole it's important, or (b) whether the relative importance of areas within phase 1 can be identified. MS-S will need to consider this issue alongside any other available data (such as annual dredge survey data) and advise further.

We welcome the suggestion in the ES that turbines can be micro-sited in order to mitigate impacts to sandeels, if required. Looking at relative density of sandeels taken from sampling stations as part of MS-S annual survey may be of relevance when it comes to micro-siting infrastructure (i.e. focussing away from higher density areas).

Assessment of sediment release

The assessment of impacts from the release of sediment is incomplete in the Seagreen ES. While the ES does estimate the increase in suspended sediments arising from the installation of foundations, it does not then address the potential impacts of the settlement of these sediments to cause smothering of fish or shellfish, or eggs that are deposited on the seabed. This is a notable omission in the assessment, given the volumes of material that could potentially be released, particularly for 'worst-case' gravity base foundations. Please see section 5 below, indicating the information we consider would be helpful for concluding an assessment in this regard.

It is possible that smothering could be an important consideration for sandeels, depending on the importance of this area for this species. It is also relevant to consider this potential impact in respect of scallops and some other shellfish.

Electro-magnetic fields (EMF)

There continues to be poor scientific understanding of EMFs and associated effects, so some caution is required. The ES does not attempt to predict the strength and range of EMFs from intra-array or export cabling – either exposed or buried. However, we consider that cable burial will provide some assurance of a reduction in potential EMF effects. Seagreen propose a minimum burial depth of 0.5m, we advise 1m as a preferred minimum target.

There is no discussion in the ES of the value of the Forth & Tay area for species likely to be most sensitive to EMF, such as skates and rays. The impacts to these species are of most concern at a cumulative level and we recommend that MS considers this issue strategically.

We consider that a meeting with MS would be helpful in order to discuss the various strategic concerns in respect of marine fish and shellfish, as MS will need to take an overview of marine renewables licensing requirements and any necessary conditions.

5. HYDRODYNAMIC PROCESSES & COASTAL GEOMORPHOLOGY

Assessment of sediment release

Some of the Seagreen ES is confusing in respect of the impact assessments undertaken for hydrodynamic processes and coastal geomorphology. In particular, we found it difficult to keep track of the discussion in chapter 7 regarding sediment release and whether the volumes quoted relate to project alpha, project bravo, or both.

We note that while volumes are estimated for the amount of sediment that could be released from installation of foundations, there is no supporting modelling to understand the likely dispersal of this dredged material from the seabed preparation required for these structures—how far it might travel, the depths that might accumulate. Nor is there full consideration of the sediment release related to scour effects around the foundations of operational turbines (particularly relevant to the consideration of gravity bases).

We note that it would also be helpful to present available contextual information on background levels of sediment within the area, including seasonality / consideration of storm events (or at least state clearly if this information is not available). We recommend for the ES to include a comparison of estimated windfarm impacts against the natural baseline, including consideration of seasonal variation.

We consider it would be very helpful if sediment concentration modelling was undertaken for installation of a single gravity base foundation, using a 'worst case' assumption that all the dredgings are released on-site. While construction impacts are the key concern, such modelling would also be informative for understanding the likely dispersal of sediment released from scour. We think it would be informative if the modelling could be undertaken for gravity base installation on each of the four key sediment types likely to be encountered on-site in the Seagreen phase 1 area. Based on Figure 7.7, these are: gravelly sand (dark pink), muddy sandy gravel (pale green), sandy gravel (pale pink) and slightly gravelly sand (grey).

In this regard, Marine Scotland have indicated they may let a contract to undertake 'worst case' sediment concentration modelling for each of the MFOWDG and FTOWDG windfarm clusters. This would help provide an overview of cumulative impacts in this regard, in order to inform any required licensing conditions.

Neither does the Seagreen ES adequately address the dispersal of sediments from installation of the subsea cable. This does not need to be a complex assessment, but it would be helpful for the ES to present the general habitat types encountered along the cable corridor, to consider the typical current speeds, and to roughly estimate the percentage of sediments likely to accumulate in close proximity (within 25m) to cable installation, and the percentage of fines dispersing over greater distance (within the next 2km). It is possible that we will need this information for consideration of potential impacts to the SAC habitat interests of the Firth of Tay and Eden Estuary SAC (see Section 6, as follows).

6. BENTHIC ECOLOGY

Sediment release

Please see section 5 above for our outstanding concerns in respect of assessment of the impacts of sediment release from Seagreen phase 1 (alpha, bravo and associated export cabling). We recommend that the applicant further discusses this issue with MS in the first instance – particularly with regard to anticipated dredging work and sediment discharge (with associated licensing requirements) and the decommissioning of gravity bases.

General comments

The benthic ecology of the windfarm site supports a diverse habitat complex, which supports potential Annex I habitat, i.e. *Sabellaria spinulosa* and other potential reef builders (although not currently present in reef form from the survey evidence presented), as well as Marine Protected Areas (MPA) search features being considered as part of the Scottish Nature Conservation MPA Project. These include offshore subtidal sands and gravels and the presence of *Arctica islandica*. *Modiolus Modiolus* are also recorded from the area, but we do not consider their presence in such small numbers to be a significant issue for development.

Seagreen outline potential mitigation measures to try and reduce the impact to benthic habitats from this development, including site specific surveys to inform the final turbine and export cable locations, minimising the introduction of new materials (e.g. rock dumping, mattresses etc) into the area that alters seabed habitat type and the micro-siting of infrastructure where possible in relation to sensitive benthic habitats. JNCC & SNH welcome these initial proposals and are keen to be involved in the development of these plans as they progress.

As noted in the ES, work is underway to identify MPAs in Scotland's seas. JNCC and SNH have now made recommendations to Scottish Parliament on locations for possible MPAs: <http://www.scotland.gov.uk/Resource/0041/00410442.pdf>. Public consultation on these MPA proposals is likely to take place in summer 2013, including consultation on potential conservation objectives and management measures for these possible MPAs.

The Project development area overlaps with the Firth of Forth Banks Complex possible MPA, which with relevance to this work is being considered for *Arctica islandica* aggregations and offshore subtidal sands and gravels (the bank features are considered unlikely to be impacted by human activity). We anticipate continuing close liaison between Marine Scotland and Seagreen over this possible MPA, in order to inform any mitigation or monitoring that may be required in this regard.

MS will need to take an overview of marine renewables licensing requirements and any necessary conditions alongside the designation of MPAs. JNCC and SNH are keen to continue liaison with MS and Seagreen over these aspects.

The ES does not mention any potential mitigation or good practice measures to reduce / avoid the possibility of introducing non-native species into the area from the range of activities associated with the proposed windfarm development. We would welcome further discussion of this aspect in order to inform our recommendations for consent conditions.

Export cable route – SAC & geological interests

Paragraphs 3.65 – 3.71 of the ES provide an overview of the options appraisal carried out for selection of the final export cable route, as illustrated in Figures 1.1 & 1.2. Appendix A presents the ‘Landfall Site Selection’ which provides the supporting detail to this process, and Seagreen kept us informed of decisions during pre-application dialogue over this cabling.

Figure 9.3 shows the export cable corridor as it approaches shore, with the confirmed option making landfall just south of Carnoustie. As set out in our scoping advice for the onshore works, dated 15 February 2011, the cable corridor encompasses part of the Firth of Tay and Eden Estuary SAC and includes part of the Barry Links Geological Conservation Review Site.

We seek confirmation whether this matter is to be addressed in the ES for the onshore works? We apologise for any confusion in respect of the Seagreen pre-application HRA screening report where we focussed our consideration to potential impacts from the windfarm itself (to the qualifying harbour seal interest of this SAC) and did not also consider possible impacts from the cable corridor on the SAC habitat interests. (At this time the final route option had not yet been confirmed and both the Carnoustie and Arbroath options were being kept open).

We consider it would be helpful for Marine Scotland and Angus Council to discuss and agree who is taking the lead for the inter-tidal area and who will act as the competent authority in considering any impacts to habitat interests of the Firth of Tay and Eden Estuary SAC arising from the export cable and proposed landfall. SNH is happy to input any (HRA) advice that might help inform discussion.

APPENDIX A

JNCC & SNH DETAILED COMMENTS ON SEAGREEN ORNITHOLOGY

These detailed comments on the Seagreen ES relate to the methods for data collection / analysis, and the approach to quantifying effects (primarily displacement and collision risk) – we have focused our review on these aspects to ensure that we have confidence in the underlying data for EIA and HRA processes, including cumulative impact assessment.

A1. METHODS FOR DATA COLLECTION / ANALYSIS

A1.1 Data Collection

Seagreen's approach to data collection was agreed with JNCC and SNH during pre-application consultation. In general we are satisfied with the methods employed for both data collection and to determine population and density estimates for the project area. Our confidence in the data presented is high. However, we request clarification on several points below and note that no full raw count or distance corrected counts were provided in the ES and as such we cannot verify the results presented.

We note that two observers were used simultaneously on either side of the boat, thus covering a transect width of 600m rather than the standard 300m. This method, whilst allowing for greater coverage of the survey area, can result in double counting due to the movement of individual birds from the arc of one observer to the other. We note that in the appendices (4.2.29) it is stated "the notation used during data collection meant that there was minimal double counting" but this is not explained further. We ask that this is expanded on to better understand how double counting was reduced.

We accept the use of radial snapshots as an appropriate method as per the recommended guidance (Camphuysen *et al.* 2004; Maclean *et al.*, 2009). We recognise that distance analysis was not performed on snapshot data due to lack of advice / guidance on this issue. However, we are unable to recommend or provide specific guidance on this method for a number of reasons:

- There are issues with vessel attraction when using the radial snapshot technique with distance bands.
 - Birds attracted to the vessel cannot be used for distance sampling.
 - It is most likely that the highest proportions of attracted birds are in the closest bands.
 - There is also the risk that numbers in the outer bands are lower as birds have moved from them towards the vessel.
 - There is also an issue with different levels of elimination of ship followers when using dual observers.
- It is very difficult to estimate distances to flying birds.

We note that dual observers were used under the assumption that this method eliminates heaping of birds into distance band A. We would welcome further explanation of the reasoning behind this assumption.

We note that two observers and one scribe were used during surveys. Observer fatigue can often affect the efficiency of detection by an observer and we ask for further explanation as to how observer fatigue risk was reduced or accounted for in analysis. Additionally, the use of one scribe to record two sets of observations simultaneously is considered challenging, we ask for more information regarding the efficiency of recording for two observers.

Page 25, Technical report F1: Table 4.4 – Our understanding is that there was only 74% coverage of the area in January (23-24th) 2010 and that this survey was amalgamated in Feb (26% - 21 Feb 2010) although these surveys were a month apart. Thus, there was a month of no coverage in February. Could Seagreen confirm that our understanding is correct?

We note that the survey points were changed each time along 3km spacing, producing 4 different patterns. We understand that this allowed 80% of the survey area to be covered over each phenological period. We also note that the reasoning behind this method is to capture potential hotspots of fine scale clustering of birds as per work by Dr Scott *et. al.* The method used is an acceptable approach and a good way to ensure a better coverage of the survey area over key phenological periods. However, this method and the reference supplied cannot justify the assumption that large aggregations of birds are likely to have been captured. The paper used as evidence for this phenomena provides evidence of fine scale clustering of marine animals as a result of high primary productivity within a spatial location although this spatial location is largely influence by oceanographic conditions and thus is transient in nature. A hotspot of bird abundance in one spatial location may not necessarily exist in the same location during a different tidal regime for instance. Thus, unless surveys were timed to capture certain tidal and current conditions, changing the survey route would not increase the likelihood of capturing higher aggregations of birds and thus the presence/absence of these hotspots should not be indicative of importance of a spatial location.

A1.2 Population estimates and Distance

We note that for species in which too few observations were recorded for traditional distance analysis, uncorrected densities coupled with in flight birds were used to establish a population estimate for these species. It is recommended that correction factors are used where possible to avoid underestimating populations. A uniform detection function in program Distance allows for corrected population estimates for birds recorded on the water. This may not be relevant for most species in which low abundances were recorded but we recommend that this should be addressed for any sensitive species that may have been underestimated.

The lower confidence intervals (LCI) and upper confidence intervals (UCI) for the population estimated appear to be incorrect in table 5.5 page 87 of the appendices. The total lower and total upper population estimates should be presented and not the difference between the upper and lower values and the predicted population. Additionally, there is no presentation of population levels for each year and no indication if what is presented is a mean for both survey years or for either years 1 or 2. The trends in population levels are described (ie lower densities in late winter rising to high in February etc.) but there is no discussion regarding the variation between the survey years. We ask for a fuller account of the population estimates for both years and comparison of the population levels between these years.

The description of the distance analysis methodology does not detail whether observations beyond 300m were excluded or not. The inclusion of observations beyond 300m is not recommended and we ask that this is clarified.

Provided that observations beyond 300m were excluded, we are satisfied with the methods employed to determine population and density estimates for the project area and our confidence in the data presented is high. However, we note that no full raw count or distance corrected counts were provided in the ES and as such we cannot verify these results.

A2. QUANTIFICATION AND ASSESSMENT OF EFFECT

A2.1.1 Displacement and barrier effects

We acknowledge that the quantification of displacement effects is extremely challenging due to a paucity of evidence and a lack of specific guidance. However, we did provide FTOWDG with some preliminary guidance on this issue in our advice note of 26 August 2011, where we recommended that a range of displacement rates and mortality rates are presented.

Marine Scotland has also commissioned research relevant to this issue, which is currently being undertaken by CEH:

- an investigation of the demographic effect of displacement and barrier effects; and
- population modelling for key SPA seabird species relevant to each of the Forth & Tay windfarm proposals.

JNCC and SNH will be able to confirm our advice on displacement effects once we are informed by the outputs from the MS research contracts. In the meantime, please find below our comments on the approach to estimating displacement presented in the Seagreen ES. There is unlikely to be merit in addressing these comments until the outputs from the MS research contracts are available and can be discussed between all parties.

A2.1.2 JNCC & SNH comments on the approach to displacement presented in the Seagreen ES

There is little empirical evidence to support the use of the displacement radii selected. For instance, the rationale given for guillemot reads that '(pers obs) densities of the auk appeared to be unaffected at 400m'. We ask that further evidence in support of this method is provided or that displacement is reconsidered using JNCC recommended methods of considering displacement from the entire project area as a worst case scenario.

We note that kernel density was used to determine habitat suitability to identify the importance of the project sites to foraging birds. However, seabirds do not necessarily forage in the same area as habitat quality is variable over time and space. Tracking studies are limited in their ability to identify preferential habitats for foraging as they only provide a proportion of a population's feeding preference thus confidence in the kernel analysis performed is low.

Expressing the area of the site lost as a proportion of a whole foraging range assumes that the whole area within a species foraging range is of equal value. Can evidence to support this assumption be provided?

Assessment of habitat quality through kernel analysis of tracking data does not take into account the degree of variability shown between years, and the small number of years tracking data is available for. As such, it cannot be assumed that the project area is consistently of lower, higher or equal value to the surrounding available habitat. We ask that this assumption is considered in more depth and discussed.

Absence of tracked birds from an area should not be taken as evidence of no or little use. Birds tracked from colonies are usually a small sample and do not represent the full geographic range of the colony. Tagged birds may also have their behaviour modified, for example, discouraging them from travelling long distances.

The displacement matrices are not discussed fully in the text, regional displacement is ignored and it is obviously higher. Additionally, regional razorbill displacement across the full project area seems odd (regionally) as it is lower than both project individually, this seems unlikely.

A2.1.3 Comments on specific ES sections relating to displacement and associated issues

- **10.290** – There is concern over the use of numbers of escape-diving birds being used to assess vessel disturbance. How is 'escape diving' defined, and how does it differ from 'diving'? Birds further from the vessel are less likely to have dives attributed to 'escape diving' due to observer perception of disturbance rather than any real difference in behaviour or rate of 'escaping'. More evidence to support these assumptions would be welcome.
- **10.341** – We ask that there is more evidence or justification for use of a 400m displacement distance for auks.
- **10.342** – See comments for displacement distances used above. Not only does this need to be thoroughly backed up, implications for cumulative displacement need to be investigated.
- **10.130** – Where there is less overlap between mapped displacement radii there will be more displacement per turbine, surely resulting in more displacement rather than less displacement as stated.
- **10.340** – There is some evidence suggesting Gannets exhibit considerable macroavoidance (e.g. Krijgsveld et al 2011), so we recommend that the effect of displacement on this species is considered as well as for the other four species (Kittiwake, Guillemot, Puffin and Razorbill).
- **10.358** – Requires further justification for not including fulmar in assessment of barrier effects.

- **10.343** – It is stated that a 1% mortality rate is more realistic than a 100% mortality rate but there is no evidence provided to support this statement. We advise that the full range of impacts are presented based on a matrix of displacement rates and mortality rates, as well as offering a preferred rate for each. We note that matrices are provided in the appendices for national and regional populations of the four species considered for displacement risk as a result of this development. However, in the environmental statement, only impacts on national populations are reported.
- **10.362** – An additional energy expenditure of 1.3% per trip may not have an impact of negligible magnitude over the course of a breeding season. The more trips a bird makes, the more 'out of condition' it will become compared to those birds facing no barriers. This may have implications for productivity at SPAs that need to be considered.
- **10.39** – This is the same as the map shown for gannet and thus incorrect.
- **10.370** – “Again, the dominance of return rather than outbound flights suggested birds at the edge of their foraging range” – this statement is difficult to understand and we ask for further clarification.
- **10.147** – We consider that more accurate flight directions could have been obtained by using records of birds carrying fish (for those species that carry fish for provisioning in the bill, where they are visible).
- **10.152** – There is some concern that the implicit assumption that additional costs are rapidly recovered may be flawed. A permanent increase in foraging bout range could result in cumulative decreases in condition of breeding birds.
- **10.152** – The additional costs caused by barrier effects may be tolerable to adult birds, but could affect colony productivity – thus potentially impacting upon an SPA population. It is not unreasonable to assume that increased time between provisions and decreased hunting ability due to additional energy expenditure could have a negative effect on colony productivity.
- **10.154** – The magnitudes of impacts from barrier effects need to be revised – describing increases in energy expenditure of 60% as low, and 89% as medium is misleading.

A2.2 Collision mortality

The description of the collision risk modelling methodology employed appears in line with the guidance provided (Band 2011). However, we ask that example spreadsheets used for collision risk modelling is provided to verify the methodology has been undertaken correctly. We generally agree with the assessment of impact due to collision mortality for Alpha and Bravo alone (summarised in Tables 10.41 and 10.42).

We are not currently in a position to agree with the assessment of cumulative impacts, this reflects a need to ensure consistency in CRM approaches, and data presentation of other key OWFs (as noted in 10.499). We note that the appropriate cumulative scale in the non-breeding season may extend beyond the range of projects currently identified for some species (Table 10.36). We are committed to working with Marine Scotland to ensure an appropriate, consistent and robust approach has been taken for the assessment of cumulative collision mortality.

Lesser Black-Backed Gull (LBBG) collision risk at the Bravo project site is 0.12% per annum is considered minor and not significant at a regional level but the same proportion for Herring Gull has been classed as moderate and significant. We ask for further clarification as to why LBBG is of less concern when both of these species are classed as highly sensitive species.

We note that LBBG was only represented in Alpha, but there are a number of collisions estimated for the Bravo project area. We ask for clarification as to whether there were LBBG recorded in the Bravo project area and, if not, where these collision estimates have been derived from.

A3 FURTHER MINOR COMMENTS on the SEAGREEN ES

A3.1 Sensitive Receptors

We ask that, when referring to whether numbers on site meet 1% thresholds, it would be useful to provide the population level the threshold refers to.

We note that for Arctic tern, the 1% regional passage population is exceeded within the project area. Expressing what the 1% regional threshold level is would be useful, allowing assessment of the importance of the site on a regional level during the passage period, especially as it is acknowledged that 'the Firth of Forth is known to be a key feeding area for passage Arctic terns'.

A3.2 Indirect effects

We note that avoidance of prey has been estimated and tracking data has been used to identify whether Alpha/Bravo are key feeding areas for seabirds. The total area of prey avoidance (for hearing specialists i.e. herring/sprat) has been calculated followed by the proportion of habitat lost by the sensitive receptors based on their mean max range +1SD. However, this percentage of area lost has the underlying assumption that the habitat lost is of equal quality of the habitat that remains but this is not the case. As identified in section 10.299, the avoidance behaviour could extend beyond the project area to highly productive areas including Wee Bankie, Scalp Bank and Marr Bank and this should be highlighted as a limitation of the methods employed.

A3.3 General comments on specific ES sections

- **10.45** – The box snapshot methodology does not assume that birds are recorded within 300 of the observer. It assumes that birds are recorded in a 300 m by 300 m box. As such, there is no issue with including birds in 'the corner of the box' as this area is taken into account in the density calculations. This makes the calculation in **10.46** unnecessary.
- **10.188** – We request that the developer clarifies which IEEM principles were used to screen out fulmar and common tern.
- **10.192 & 10.21** – No species are listed as having likely origin of St Abbs Head to Fast Castle SPA. Details of the specific criteria used to eliminate birds from, for example, St Abbs Head to Fast Castle SPA would be welcome, as well as outlining the justification for the other 'likely origin' decisions shown in table **10.21**.
- **10.215** – We would welcome the mapping of the observations of birds observed feeding or actively searching as this would highlight the most important areas.
- **10.220** – 'Fowlsheugh is by far the largest colony with 50556 individuals in 200' – the date in this section is not correct.
- **10.222** – We highlight that it is not possible to age auks in the field as adult unless they are accompanied by clearly recognisable young birds.
- **10.223** – We note that, in this section, densities given for birds on the water only whereas for other species, densities have been given for birds on the water and in snapshots.
- **10.243** – We note that www.bbc.co.uk has been used as a reference as evidence for the exclusion of the Farne Islands population of Puffin even though this colony is within the potential range of the project areas. This evidence base is not sufficient to support the exclusion of this SPA and the named interest feature.
- **Appendix F1. Table 10.5** – Why are indirect effects only considered during construction and decommissioning?

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APPENDIX B

FRESHWATER FISH of CONSERVATION CONCERN SNH INTERIM ADVICE for HABITATS REGULATIONS APPRAISAL

Introduction

Habitats Regulations Appraisal (HRA) is the process which applies to any plan or project with the potential to affect the qualifying interests of a Natura site. As JNCC and SNH advised in response to the Seagreen HRA report (see our letter of 31 January 2012), the qualifying fish interests of the following SACs need to be addressed under HRA for Seagreen phase 1 (the alpha and bravo windfarm sites):

- **River South Esk** designated for its populations of Atlantic salmon (*Salmo salar*) and freshwater pearl mussel (*Margaritifera margaritifera*).
- **River Tay** designated for its populations of the following fish species – Atlantic salmon, brook lamprey (*Lampetra planeri*), river lamprey (*Lampetra fluviatilis*) and sea lamprey (*Petromyzon marinus*); and for otter (*Lutra lutra*) and clear water lochs.
- **River Teith** designated for its populations of the following fish species – Atlantic salmon, brook lamprey, river lamprey and sea lamprey.

SNH interim advice for Habitats Regulations Appraisal

We provide the following interim HRA advice for the freshwater fish interests of each of the SACs listed above. We note that we will be able to provide our confirmed advice for cumulative HRA once the Inch Cape ES is submitted and the discrepancies between developers' technical assessments and any other relevant aspects of the ES are resolved.

1. Is the proposal connected with or necessary for SAC conservation management?

The proposal is not directly connected with or necessary for the conservation management of any of the above riverine SACs.

2. Is the proposal likely to have a significant effect on the qualifying interests of the SACs either alone or in combination with other plans or projects?

- **Atlantic salmon**

We advise **likely significant effect** from Seagreen phase 1 on Atlantic salmon due to the possibility that they could be disturbed by construction noise and / or possible effects of electro-magnetic fields (EMF) arising from installed cables. We confirm that we have considered the location of the export cable route and proposed landfall point and are satisfied that construction work associated with this cable installation would not result in likely significant effects to salmon. We are also satisfied that operational noise would not result in likely significant effects to salmon.

Cumulative impacts are a key concern for Seagreen phase 1 in combination with Neart na Gaoithe and Inch Cape, and will need to be considered in appropriate assessment.

- **Freshwater pearl mussel**

Atlantic salmon (and other salmonids) are integral to the life cycle of freshwater pearl mussel (FWPM), therefore any impacts to Atlantic salmon that prevent them from returning to their natal rivers may have a resulting effect on FWPM populations.

We therefore advise **likely significant effect** from Seagreen phase 1 on FWPM, so potential indirect impacts to this species will need to be considered in appropriate assessment.

- **Sea lamprey**

We advise **likely significant effect** from Seagreen phase 1 on sea lamprey due to the possibility that they could be disturbed by construction noise and / or possible effects of electro-magnetic fields (EMF) arising from installed cables. We confirm that we have considered the location of the export cable route and proposed landfall point and are satisfied that construction work associated with this cable installation would not result in likely significant effects to sea lamprey. We are also satisfied that operational noise would not result in likely significant effects to this species.

Cumulative impacts are a key concern for Seagreen phase 1 in combination with Neart na Gaoithe and Inch Cape, and will need to be considered in appropriate assessment.

3. **Can it be ascertained that the proposal will not adversely affect the integrity of the SAC, either alone or in combination with other plans or projects?**

This step is termed **appropriate assessment**, and it is to be undertaken by Marine Scotland, based on information submitted in each of the ES for the Forth & Tay windfarm proposals, with advice from ourselves. It considers the implications of the proposal for the (relevant) conservation objectives relating to the SAC qualifying species of concern. Please refer to <http://www.snh.org.uk/snhi/> for a full list of these conservation objectives as we only discuss the relevant ones below.

We provide the following interim advice, but we provide it in order to inform discussion with Marine Scotland over cumulative HRA for these freshwater fish interests of riverine SACs.

- **Atlantic salmon**

The relevant conservation objective to consider is whether or not the proposed FTOWDG windfarm proposals (Seagreen phase 1, Neart na Gaoithe and Inch Cape) would alone or in combination result in any impacts on the viability of Atlantic salmon populations supported by the SACs listed above. We need to consider whether noise disturbance to individuals during windfarm construction would result in population level effects and / or what mitigation can be applied to avoid such impacts. Marine Scotland, as the competent authority, needs to consider whether any conditions are needed on Section 36 / marine licences in this regard.

SNH notes that we are satisfied that operational noise from Seagreen alone, or from the FTOWDG proposals in combination, would not result in likely significant effects to salmon.

The applicant proposes to bury cables to reduce EMF. To mitigate impacts to Atlantic salmon, we advise a minimum target depth of at least 1m for cable burial, potentially increasing to 1.5m in shallower water close to shore.

- **Freshwater pearl mussel**

Potential indirect impacts to freshwater pearl mussel populations in the River South Esk will be addressed via mitigation to avoid population level effects on Atlantic salmon.

- **Sea lamprey**

The relevant conservation objective to consider is whether or not the proposed FTOWDG windfarm proposals (Seagreen phase 1, Neart na Gaoithe and Inch Cape) would alone or in combination result in any impacts on the viability of the populations of sea lamprey supported by the SACs listed above. We need to consider whether noise disturbance to individuals during windfarm construction would result in population level effects and / or what mitigation can be applied to avoid such impacts. Marine Scotland, as the competent authority, needs to consider whether any conditions are needed on Section 36 / marine licences in this regard.

SNH notes that we are satisfied that operational noise from Seagreen alone, or from the FTOWDG proposals in combination, would not result in likely significant effects to lamprey.

The applicant proposes to bury cables to reduce EMF. To mitigate impacts to sea lamprey, we advise a minimum target depth of at least 1m for cable burial, potentially increasing to 1.5m in shallower water close to shore.