25 OFFSHORE TRANSMISSION WORKS ORNITHOLOGY

25.1 INTRODUCTION

1. This Section of the ES evaluates the likely significant effects of the Offshore Transmission Works (OfTW) on the ornithological assemblage during construction, operation and maintenance and decommissioning phases of the Project. The assessment has been undertaken by RPS Group plc.

2. This Section of the ES is supported by the following document:

- Annex 13A: Ornithology Technical Report.

3. A cumulative assessment of the OfTW in relation to the Wind Farm and other developments is provided in Section 13: Wind Farm Ornithology.

25.2 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

25.2.1 LEGISLATION AND GUIDANCE

4. In addition to the EIA Regulations, key legislation for ornithological interest includes:

- The Council Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora 1992/43/EEC (EU Habitats Directive);
- The Council Directive on the Conservation of Wild Birds 2009/147/EC (EU Birds Directive);
- Nature conservation (Scotland) Act 2004;
- Wildlife and Countryside Act 1981 (as amended);
- Conservation (Natural Habitats, etc.) Regulations 1994 (as amended); and
- Conservation of Habitats and Species Regulations 2010.

5. Further details of these items of legislature in relation to ornithology can be found in Section 13: Wind Farm Ornithology.

25.2.2 CONSULTATION

6. Consultation relevant to the scope of this Section was undertaken with Scottish Natural Heritage (SNH) at a meeting with BOWL on 28th February 2011, with outcomes confirmed in writing on 8th July 2011. The main issues are summarised in Table 25.1.

Table 25.1 Summary of Consultation Undertaken

Consultee	Summary of Consultation Response	Project Response
SNH	Although initially scoped out of the EIA, impacts of the cable route should be assessed as part of the EIA and Habitats Regulations Appraisal.	Effects of the cable route are considered as part of this EIA.
	A desk based qualitative appraisal of the impacts of the cable route on ornithology would be sufficient and that no specific bird surveys would be necessary along the cable route corridor.	A qualitative appraisal has been undertaken and is presented in this ES.
	Foreshore bird surveys may be required to inform the potential impacts of the cable landfall.	Once the cable landfall site and the method for bringing the cable onshore were determined it was concluded that no surveys were necessary.

25.2.3 GEOGRAPHIC SCOPE

7. The effects on birds considered here are restricted to the vicinity of the linear route of the OfTW Corridor from the Wind Farm to landfall on the foreshore. No onshore elements beyond the intertidal land fall area of the OfTW Corridor are within the scope of this assessment. The OfTW Corridor is shown on Figure 1.2.

25.2.4 SURVEY METHODOLOGY

8. For the purpose of this assessment no survey work along the cable route corridor was required following discussions with SNH (summarised in Table 25.1). Therefore, a qualitative assessment of potential effects is presented using examples from other cable routes, similar activities and the existing literature.

9. A desk-based assessment thus considers the seabird activity across the Wind Farm site from survey results in Annex 13A: Ornithology Technical Report and summarised in Section 13: Wind Farm Ornithology, as well as the wider Moray Firth, in order to best determine the range of receptors and potential effects associated with the OfTW.

10. In addition, references are made to other Sections where effects may interact with the ornithological interests, namely Section 10: Wind Farm Benthic Ecology, Section 11: Wind Farm Fish and Shellfish Ecology, Section 22: OfTW Benthic Ecology and Section 23: OfTW Fish and Shellfish Ecology.

11. These Sections enabled an assessment of indirect and secondary effects on birds, due to possible changes in prey type, numbers and distribution.

25.2.4.1 Identification of receptors and sensitivity

12. It was agreed with SNH that the seabird assemblage along the cable route is unlikely to differ significantly from that recorded within the Wind Farm survey area. Therefore the receptors considered in this Section are the same as those

included for assessment within Section 13. The species selected were those identified during the boat-based surveys of the Wind Farm Site which are present at seabird breeding SPAs and nearby seabird breeding colonies with potential connectivity to the Wind Farm Site.

13. The sensitivity of each bird species observed within the Wind Farm Site plus 4 km buffer during the surveys was defined according to a range of criteria (see Section 13.2.6 of Section 13 for further details). These included measures of the importance of both the numbers of birds on the site and/or the conservation status of the species as a whole, and whether the species is protected by legislation, or is cited as an interest feature of a designated site of national or international importance. The sensitivities range from high to low (Table 25.2).

Table 25.2 Definition of Species Sensitivity

Sensitivity	Definition
High	Species present in internationally important numbers i.e. greater than 1% of European flyway population Cited interest of SPAs. Cited means mentioned in the citation text for the site as a species for which the site is designated. Other species which contribute to the integrity of an SPA (i.e. within assemblage criteria).
Medium	Regionally important population of a species, either because of population size or distributional context. EU Birds Directive Annex 1, EU Habitats Directive priority habitat / species and / or Wildlife and Countryside Act Schedule 1 species (if not covered above). UK BAP priority species (if not covered above). Red and Amber-listed species of the Birds of Conservation Concern in the UK. Species present in nationally important numbers i.e. greater than 1% of the Great Britain population
Low	Any other species of conservation interest under Article 1 of the Birds Directive (e.g. Green-listed species of the Birds of Conservation Concern).

14. The timing of peak abundance has a bearing on the classification of the species with regards to the numbers seen and thresholds of significance. Thus, species which peaked in abundance during the breeding season were typically assessed against smaller regional populations than those which peaked in the non-breeding season, when populations are migratory and more likely to come from a wider variety of sources.

15. Peak populations recorded on the study area (comprising the Wind Farm Site and the 4 km buffer) which exceeded 1 % of the national and/or regional thresholds were classified as nationally and/or regionally important respectively.

25.2.4.2 Magnitude

16. The magnitudes of any potential effects resulting from the OfTW are considered in relation to the construction and decommissioning phases, and the operational phase.

17. The magnitudes of effect used in this assessment range from Negligible to Large (see Table 25.3). The definitions of magnitude should not be taken literally and are there to serve as generic guidelines that can be adapted to suit the different types of effect.

Table 25.3 Definition of Magnitude of Effect

Magnitude	Definition
Large	Major effects on the feature / population, which would have a sufficient effect to irreversibly alter the nature of the feature in the short-to-long term and affect its long-term viability (i.e. > 20 % population loss).
Medium	Effects that are detectable in short and long-term, but which should not alter the long-term viability of the feature / population (i.e. 5-20 % population loss).
Small	Minor effects, either of sufficiently small-scale or of short duration to cause no long-term harm to the feature / population, (i.e. 1-5 % population loss).
Negligible	A potential effect that is not expected to affect the feature / population in any way; therefore no effects are predicted (i.e. <1 % population loss).

25.2.4.3 Significance

18. The significance of effect upon each receptor was determined by combining the sensitivity of the species (Table 25.2) with the magnitude of the effect (Table 25.3), as illustrated in Table 25.4. Effects of major or moderate significance are considered to be significant for the purposes of the EIA regulations. Effects of minor or negligible significance are considered to be not significant.

Table 25.4 Significance of Effect

		Magnitude of Effect			
		Negligible	**Small**	**Medium**	**Large**
Sensitivity	**Low**	Negligible	Negligible	Minor	Minor
	Medium	Negligible	Minor	Minor	Moderate
	High	Negligible	Minor	Moderate	Major

19. The four point measures of negligible, minor, moderate and major effects resulting from the different combinations of sensitivity and magnitude are interpreted as defined in Table 25.5.

Table 25.5 Definition of Significance Terms

Effect	Definition
Major	The effect on birds gives rise to serious concern and should be considered unacceptable.
Moderate	The effect on birds gives rise to some concern but it is likely to be tolerable (depending upon its scale and duration)
Minor	The effect on birds is undesirable, but of limited concern. Not significant.
Negligible	Not significant

20. An effect of major significance, whilst considered unacceptable, need not necessarily lead to the development being abandoned or even radically overhauled, if the effect can be demonstrated to be reversible or is of insufficient duration to be damaging in the longer term, especially where effective mitigation is supplied. Where mitigation is undertaken, it is the nature of the resulting residual effect that needs to be carefully considered. Similarly, effects of moderate significance may be judged as tolerable even without mitigation if the effects are of limited scope and duration.

25.3 WORST CASE

21. In order to present a worst case assessment, the parameters associated with the OfTW that represent those most likely to result in the greatest magnitude of change have been taken from Section 7: Project Description.

22. For the installation phase it is considered that the maximum number of cable bundles/trenches constitute the worst case scenario, as this will result in the greatest footprint, duration and frequency of cable installation operations. This scenario will be a maximum of three trenches with three cable bundles in each.

23. This scenario will potentially result in the maximum amount of temporary displacement of birds foraging in the vicinity of the cable laying vessel. In the case of the OfTW, the proposed installation techniques will be ploughing, jetting, trenching or some combination of these techniques (See Section 7: Project Description). The cable laying operation is anticipated to take up to 120 days to complete, and effects will be limited to the immediate area and be very short lived. Effects of a similar nature will likely occur during the period of any decommissioning works, and so do not require separate consideration within this Section.

24. For the operational phase the installation of three AC cables in three trenches is again considered the worst case, given the uncertainties in relation to requirements for any maintenance activities, and species specific sensitivities of prey to Electromagnetic Fields (EMFs) generated by cables.

25. Although seabirds are largely unlikely to be directly affected by the presence of the sub-sea cable, a long-term indirect effect may occur due to the alteration, displacement or loss of the prey assemblage from an area surrounding the entire length of cable route (65 km), due to direct habitat loss as well as EMFs and thermal radiation.

26. In addition, occasional maintenance activities similar to those during construction may cause short-term, temporary disturbance to seabirds and their prey during the operation phase. While the extent and duration of such activities cannot be easily predicted at this stage they are considered for assessment.

25.4 ASSESSMENT LIMITATIONS

27. As outlined earlier, no specific surveys were carried out to determine the bird assemblage along the OfTW Corridor, and so local populations and distributions are unknown. Specific surveys were deemed unnecessary during consultation with SNH, as the assemblage is unlikely to differ from the Wind Farm survey area. In addition, effects associated with the construction are likely to be temporary and there are no lasting disturbance related impacts to birds foraging on the surface.

25.5 BASELINE CONDITIONS

28. The ornithological baseline environment information applicable to the OfTW draws from the range of survey work used to inform the ornithological assessment for the Wind Farm. A detailed description of the ornithology of the area can be found in Annex 13A. It was assumed for the purposes of this assessment that information on the general spatial and temporal usage by birds of the wider Moray Firth is similar to that determined for the Wind Farm survey area, thus no OfTW Corridor specific surveys were undertaken.

25.6 DEVELOPMENT DESIGN MITIGATION

29. No specific design measures of the cable route were considered necessary to avoid or reduce effects on the ornithological interest, due to the limited nature of predicted influences.

25.7 ASSESSMENT OF POTENTIAL EFFECTS

30. This Section considers the direct and indirect effects of the OfTW on seabirds, in relation to the aspects of the development with the potential to cause a significant effect. These have been identified as:

- Habitat loss/gain;
- Visual disturbance and displacement;
- Noise disturbance and displacement; and
- EMFs and thermal radiation.

25.7.1 ORNITHOLOGICAL RECEPTORS

31. Thirteen seabird species were identified as sensitive receptors in Section 13, based on the criteria summarised in Section 25.2.4.1 above:

- Fulmar
- Sooty shearwater
- Gannet
- Shag
- Arctic skua
- Great skua
- Kittiwake
- Great black-backed gull
- Herring gull

- Arctic tern
- Guillemot
- Razorbill
- Puffin

32. These are also considered to be the ornithological receptors for the purposes of this assessment of the OfTW. The level of sensitivity of each receptor, based on legal and conservation status as well as population size within range of influence, is also considered to be the same as presented in Section 13. This is likely to result in conservative predictions for any species where the sensitivity level has been based on population size, since peak numbers found along the OfTW route will almost certainly be much smaller than those recorded within the larger Wind Farm survey area.

33. As outlined in Section 13 and described in more detail in Annex 13A, ornithological receptors respond to effects in different ways due to specific biology and behaviour. However, in many cases the predicted magnitude of effects from the OfTW are sufficiently small to allow the sensitivity to be judged against the seabird assemblage as a whole, without the requirement of species-specific assessment. In some other cases it is sufficient to describe possible effects against species groups such as gulls, skuas or auks.

25.7.2 HABITAT LOSS/GAIN

34. The main long-term effect of submarine cables is the presence of the cable itself and any accompanying protective structures (OSPAR Commission 2009). Depending on the installation procedure and the remaining footprint during the operational phase, these can remove habitat suitable for current flora and fauna, but alternatively can provide artificial hard substrate habitats that attract species that may not be typical of the area. Since it is confined to the cable route itself, the magnitude of any such effects will generally be small in comparison with any species' foraging range and also prey distribution, and not likely to result in any significant impacts (OSPAR Commission 2009). There will be no habitat loss on the sea surface that will affect loafing or surface-feeding birds, nor within the bulk of the water column to impede most diving species.

35. Results from two years post-construction monitoring at the Egmond aan Zee Wind Farm (OWEZ) indicate no short-term effects on the benthos in the sandy area between turbines, while the new hard substratum of the monopiles and the scouring protection led to the establishment of new species and new fauna communities (Lindeboom *et al*. 201). Bivalve recruitment was not impacted by the OWEZ wind farm. Recruit abundances were most likely to be attributed not to the presence of the farm but to the absence of fisheries.

36. The assessment of effects of the OfTW on benthic ecology (Section 22: OfTW Benthic Ecology) concluded that the effects of cable laying activities is expected to be temporary due to the rapid installation methods and will affect a limited area of the biotopes present. The overall magnitude of effects were therefore assessed as being small. Rapid colonisation by species from undisturbed habitat is expected to

occur and the benthic habitats present are likely to recover rapidly and were assessed as being of low sensitivity.

37. At present, although there is limited scientific evidence of any effects of micro-habitat creation or alteration, the extent of such benefits or adverse effects for seabirds are likely to be of negligible magnitude compared to overall foraging ranges of ornithological receptors, resulting in a long-term effect of negligible significance.

25.7.3 DISTURBANCE AND DISPLACEMENT

38. Displacement of birds feeding on the sea may take place as a result of disturbance caused by the installation phase of the cable route, through (i) the visible presence of the cable-laying ship and its associated activities (e.g. changes in turbidity within the water column); and (ii) associated noise disturbance (see following Section). Further visual and noise disturbance may occur during servicing and maintenance operations during the operational phase.

39. Some sea bird species (e.g. divers) are relatively sensitive to visual disturbance and are often displaced by ship traffic (Mendel *et al*. 2008 cited in OSPAR Commission 2009) but in general the majority of species are tolerant of disturbance from vessels and some, such as gulls and fulmar are actively attracted by them due to their propensity for following fishing vessels that may expel fishery discards (e.g. Furness *et al*. 1992); Camphuysen *et al*. 1993). Although the cable laying vessel will cover a corridor of up to 65 km from the Wind Farm to landfall any disturbance effects are likely to be ephemeral and displacement minimal and temporary.

40. Disturbance of the seabed via the digging of the cable trench which will be a maximum of 2.5 m deep will cause reduced visibility due to the re-suspension of sediments which may impact on the ability of diving species such as gannets or auks to see their prey, but any fine sediment suspended during the cable laying process would most likely be re-deposited quickly and in close proximity to the cable without prolonged suspension (See Section 21: OfTW Physical Processes and Geomorphology for further details).

41. The assessment of effects on fish and shellfish ecology (Section 23: OfTW Fish and Shellfish) states that mobile fish species will be able to avoid localised areas disturbed by increased suspended sediment concentrations (SSCs). If displaced, juveniles and adults will be able to move to adjacent undisturbed areas within their normal distribution range, although immobile shellfish species could be affected by smothering as a result of sediment re-deposition. There are a number of species and life stages potentially present in the area which may be particularly sensitive due to certain aspects of their ecology and life cycles (e.g. migratory salmon and seabed egg-laying species such as sandeels and herring). However, given the low magnitude of the impact expected and the wide distribution ranges of most species relative to the areas impacted at a given time, it is considered that increased SSCs and seabed disturbance associated with the installation of the cables will result in at worst an effect of minor significance on fish and shellfish populations.

42. Any visual impacts are therefore likely to be limited to the installation period of approximately 120 days. and will be short-term and temporary. On disturbance BERR (2008) states '…given the transient nature of cable installation, such disturbance will be highly limited, both spatially and temporally and would not be of major concern.'

43. At worst, a small magnitude of change is therefore assessed to affect any receptor, resulting in at worst a small magnitude negative effect for high sensitivity species, which is an effect of no greater than negligible significance.

25.7.4 NOISE (DIRECT EFFECTS)

44. A literature review by RPS has highlighted the paucity of published research into the direct and indirect impacts of high level underwater noise disturbance on marine birds, in particular diving species (RPS 2011).

45. In comparison with high intensity piling activities associated with turbine construction, the main noise sources associated with cable installation will be predominantly above surface from the vessel itself, the cable laying machinery and the on-deck operations. This level of noise is not likely to cause much more than local disturbance, and should not cause any additional effects to any receptors than the visual disturbance caused by the cable-laying vessel.

46. Overall, the effect on birds of noise disturbance during the construction phase is likely to be of small magnitude for all receptors, resulting in at worst an effect of minor significance for high sensitivity species.

25.7.5 NOISE (INDIRECT EFFECTS)

47. There may be the potential for indirect effects on seabirds due to disturbance to their prey. Such disturbance caused by the presence of cable installation vessel and equipment (and associated noise) will displace fish within the water column from the vicinity of operations. Perrow et al. (2005) found that mobile fish such as herring and sprats are likely to be displaced by piling noise, and it is therefore likely that marine birds will incidentally move in the same direction. This is, however, seen as a localised and temporary displacement of fish, which in isolation is generally not of sufficient magnitude to cause a significant effect on natural fish resources (BERR 2008).

48. Noise associated with cable trenching at North Hoyle Offshore Wind Farm recorded a source level of 178dB re1 μPa at 1 m if a Transmission Loss of 22 log(R) is assumed, which is much lower than the piling operations recorded at 260-262dB re1 μPa at 1 m (Nedwell *et al.* 2004). The noise was highly variable, and apparently dependent on the physical properties of the particular area of seabed that was being cut at the time.

49. Although at this stage it is not clear as to the exact levels of noise that will be associated with various forms of cable installation, the indications are that there is no significant impact from cable burial noise on fish species (BERR 2008). Shallow coastal waters are already a noisy environment when compared with deep waters

(Parvin and Nedwell 2005), and no harmful events have been reported from the well-established subsea telecommunications industry (e.g. Nedwell *et al.* 2003).

50. In order to assess the potential effects of construction noise on marine species, the noise levels resulting from a range of cable installation related activities were modelled, and the results in respect of fish and shellfish ecology are presented in Section 23: OfTW Fish and Shellfish. It was concluded that the areas where strong avoidance and milder behavioural reactions may occur in fish, and potentially in some shellfish species, are comparatively small when taking account of the spatial extent of available spawning and nursery areas and of the extent of their normal distribution ranges. It was therefore considered that construction noise and vibration will at worst result in an effect of negligible significance on fish and shellfish resources.

51. At worst, a small magnitude of change is therefore assessed to affect any ornithological receptor, resulting in negative effects of minor significance for high sensitivity species.

25.7.6 ELECTROMAGNETIC FIELDS AND THERMAL RADIATION (INDIRECT EFFECTS)

52. EMFs are generated by operational transmission cables, thus the transport of electricity through an export and inter-array power cable has the potential to emit a localised EMF which could potentially affect the sensory mechanisms of some species of marine fauna.

53. The strength of EMFs decreases quickly with distance to source. The magnitude and intensity of the potential movement and behavioural effects on pelagic species is therefore closely linked to the proximity of the fish to the source of EMF.

54. According to conclusions in Section 23: Fish and Shellfish, there is potential for EMFs generated by the export cables to result in a behavioural response on prey species such as migrating salmon and sea trout as well as other teleost (bony fish) species such as cod and plaice. It should be noted however, that for the most part, they will not be exposed to the strongest EMFs as they normally swim in the upper metres of the water column during migration. Furthermore, species may be able to use other cues for navigation in addition to the geomagnetic field.

55. The results of monitoring programmes carried out in operational wind farms do not suggest that EMFs have resulted in a detrimental impact on these species, compared to the presence of turbine foundations and scour protection (e.g. see Lindeboom *et al*. 2011). Research carried out at the Nysted offshore wind farm (Denmark), focused on detecting and assessing possible effects of EMFs on fish during power transmission (Hvidt *et al*., 2006), found no differences in the fish community composition after the wind farm was operational with those found previously.

56. Elasmobranches (sharks and rays) are much more sensitive to EMF than teleosts. Therefore there is potential for EMF to change the behaviour or affect the distribution of some prey species of diving birds. However, as elasmobranch species are typically very rare prey items of most of the seabirds using the cable

route corridor the potential effects of such disturbance or re-distribution of prey items are considered to be of small magnitude which would result in effects of no greater than minor significance for high sensitivity species.

57. In general terms and given that effects will be limited to the immediate vicinity of the export cable route, it was considered in Section 23: OfTW Fish and Shellfish that the impact of EMFs on other fish species would be negligible and not significant.

58. Thermal radiation from submarine cables has become an emerging issue of concern recently (OSPAR Commission 2009). Although temperature increases will decline rapidly with distance from the cable it may still be high enough to cause abiotic and biotic impacts in the sediments near the sea bottom. Potential effects include alteration in the endobenthic community including colonisation by alien species and increased risk of botulism in eulittorial areas used by wading birds and water birds.

59. There is evidence that various marine organisms react sensitively to even minor increases in the ambient temperature. For example, the recruitment of eastern populations of Atlantic cod (*Gadus morhua*) decreases with increasing water temperature (Drinkwater 2004 in OSPAR Commission, 2009) and the mortality rates of some intertidal gastropods increases due to rising temperatures (Newell 1979 in OSPAR Commission, 2009). Therefore there is some potential for thermal radiation to affect populations of some prey species of diving birds, albeit on a very local scale depending on the heat dissipation through various sediments. In a worst case scenario, thermal changes due to HVDC cables may affect the behaviour of fish or cause a barrier effect disrupting migration patterns of fish prey species. However, prey species for the seabirds using the Moray Firth are not restricted to the cable corridor area and birds feed across a much broader area. In addition, higher levels of heat exchange will only occur during periods when the Wind Farm is operating at full capacity. Variations in Wind Farm operating levels will be reflected in fluctuations in the cable temperatures, thereby reducing the overall magnitude of effects.

60. Any effects are very likely to be local to the cable. For both EMF and thermal radiation the indirect effect on birds is assessed as leading to an effect of negligible significance.

25.8 MITIGATION MEASURES

61. No significant effects are predicted on seabirds as a result of the construction, operation and decommissioning of the OfTW and as such no mitigation is required.

25.9 RESIDUAL EFFECTS

62. As no mitigation measures are required, the magnitude and significance predicted for each effect will remain unchanged. As such, no significant effects are predicted as a result of habitat loss/gain, disturbance and displacement, noise, EMFs or thermal radiation.

25.10 MONITORING AND ENHANCEMENTS

63. No further ornithological monitoring is considered necessary for the OfTW as there are no significant environmental effects predicted.

25.11 SUMMARY

64. It is evident that from the limited extent and duration of activities and the relatively small footprint of the OfTW Corridor compared to overall foraging ranges of seabirds, any effects on ornithological receptors are likely to be negligible, or minor at worst for high sensitivity species (Table 25.6).

Table 25.6 Summary of Effects

Residual effects	Nature	Significance of Effect	Significant
Habitat loss/gain	Negative or positive	Negligible	No
Visual disturbance	Negative	Minor	No
Noise disturbance	Negative	Minor	No
EMFs and thermal radiation	Negative	Negligible	No

25.12 STATEMENT OF SIGNIFICANCE

65. This Section has assessed the likely significance of effects on birds of the OfTW. This assessment was based on a review of potential effects from similar developments and survey data collected for the Wind Farm assessment.

66. No effects of greater than minor significance were assessed for any aspect of the OfTW. Therefore no effects of significance in terms of the EIA regulations were identified.

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