15 SUMMARY OF RESIDUAL EFFECTS

15.1 INTRODUCTION

1. This section of the ES Addendum summarises the residual likely significant effects of the Amended Project as presented within the Original ES and ES Addendum. Likely significant residual effects are those that are assessed as remaining significant in terms of the EIA Regulations following the implementation of identified mitigation measures. Where appropriate, mitigation measures are discussed within the relevant technical section within the Original ES and/or the ES Addendum. The assessment of significance of effects follows the general approach outlined in Section 4: Environmental Impact Assessment Process and Methodology of the Original ES and Section 3: Environmental Impact Assessment Process and Methodology of the ES Addendum. Residual effects that are not likely significant effects are described in the relevant assessment sections of the Original ES and ES Addendum.

2. It should be noted that the effects presented within this section are for the full Rochdale Envelope being applied for, and relate to the worst case scenarios for each receptor e.g. piled foundations for marine mammal disturbance and gravity base foundations for habitat loss. It should therefore be considered that it is impossible for these effects to all occur at the same time as described in Section 3: Environmental Impact Assessment Process and Methodology of the ES Addendum.

3. Further detail is provided within the ES Addendum technical assessment sections (Sections 5 to 14) as to the 'most likely' scenario, which provides some context on how the worst case effects may be realised through a Project design within the parameters of the Rochdale Envelope.

4. Table 15.1 summarises residual likely significant effects across all topics. Table 15.2 summarises proposed mitigation measures and monitoring for all topics.

15.2 PHYSICAL PROCESSES AND GEOMORPHOLOGY

15.2.1 SUMMARY OF RESIDUAL EFFECTS

15.2.1.1 Conclusions of the Original ES

Project Alone

5. No likely significant effects were predicted on physical processes and geomorphology as a result of the Project alone in the Original ES.

Cumulative

6. No likely significant effects were predicted on physical processes and geomorphology as a result of the Project cumulatively in the Original ES.

15.2.1.2 Final Conclusions following ES Addendum

Amended Project Alone

7. The assessment presented in the ES Addendum considers the amendment to the OfTW Corridor and the changes to the jack-up vessel footprints associated with the

Wind Farm. It concludes that the effects remain unchanged from those presented within the Original ES, i.e. no likely significant effects.

Cumulative

8. The cumulative assessment for physical processes and geomorphology is not within the scope of the ES Addendum and therefore effects remain unchanged from those presented within the Original ES, i.e. no likely significant effects.

15.2.2 MITIGATION MEASURES

9. Although no likely significant effects are predicted, a range of mitigation measures are proposed to limit effects on physical processes and geomorphology receptors. These include embedded measures such as construction methods and use of equipment to reduce overspill during dredging and construction operations on the seabed. Additionally, scour protection will be implemented where required around seabed structures to reduce the effects of scour on the seabed. These are standard mitigation measures used in the construction of offshore wind farms.

10. At the landfall, horizontal directional drilling (HDD) will be used to drill beneath the Spey Bay Site of Special Scientific Interest (SSSI) to minimise effects on this designated shingle beach.

15.3 BENTHIC ECOLOGY

15.3.1 SUMMARY OF RESIDUAL EFFECTS

15.3.1.1 Conclusions of the Original ES

Project Alone

11. The Original ES identified that likely significant effects are predicted for MoeVen biotope resulting from worst case loss of seabed habitat, from the placement of gravity base foundations and scour protection for up to 277 turbines. This effect also takes into account the loss of habitat as a result of inter-array cable installation and protection. No other likely significant effects were predicted for the Project alone.

Cumulative

12. The assessment also identified the above effects to be likely significant effects on a cumulative basis. No other likely significant effects were predicted for the Project cumulatively.

15.3.1.2 Final Conclusions following ES Addendum

Amended Project Alone

13. The assessment presented in the ES Addendum considers the amendment to the OfTW Corridor, changes to the OfTW cable installation timescales and changes to the jack-up vessel footprints associated with the Wind Farm. It concludes that operational phase effects remain unchanged from those detailed in the Original ES, i.e. likely significant effects for MoeVen biotope for loss of habitat for the Wind Farm. However, likely significant effects are predicted for MoeVen biotope due to

disturbance of the seabed during the construction phase of the Wind Farm. No other likely significant effects are predicted for the Amended Project alone.

Cumulative

14. Cumulative effects remain unchanged from those presented within the Original ES for the operational phase, i.e. likely significant effects for MoeVen biotope for loss of habitat. However, likely significant effects have been identified for the MoeVen biotope during the construction phase due to disturbance of the seabed. No other likely significant effects are predicted for the Amended Project cumulatively.

15.3.2 MITIGATION MEASURES

15. There are no feasible mitigation measures that can be put in place to reduce the anticipated effects as a result of direct habitat loss arising from the footprint of the Wind Farm. No mitigation is proposed for the effects occurring during construction.

15.4 FISH AND SHELLFISH ECOLOGY

15.4.1 SUMMARY OF RESIDUAL EFFECTS

15.4.1.1 Conclusions of the Original ES

Project Alone

16. The assessment presented within the Original ES concluded that likely significant effects could potentially occur on cod, herring and European eel as a result of disturbance from construction noise. No other likely significant effects were predicted for the Project alone.

Cumulative

17. Likely significant cumulative effects were identified for cod, herring, European eel, salmon and sea trout as a result of construction noise; and for sandeel due to loss of habitat. No other likely significant effects were predicted for Project cumulatively.

15.4.1.2 Final Conclusions following ES Addendum

Amended Project Alone

18. The assessment presented in the ES Addendum considers the amendment to the OfTW Corridor and changes to the OfTW cable installation timescales as well as further information as requested by consultees. The conclusions of the ES Addendum are for likely significant effects on cod and herring as a result of construction noise. Effects for all other receptors remain unchanged from the Original ES, i.e. likely significant effects for European eel due to construction noise. No other likely significant effects are predicted for the Amended Project alone.

Cumulative

19. The ES Addendum also presents an updated cumulative assessment. Likely significant cumulative effects are again identified for herring, cod, salmon and sea trout as a result of construction noise. Potential effects due to loss of habitat for sandeel on a cumulative basis are no longer considered to be likely significant

effects. No other likely significant effects are predicted for the Amended Project cumulatively.

15.4.2 MITIGATION AND MONITORING MEASURES

20. Likely significant effects are predicted on cod, herring, European eel, salmon and sea trout as a result of construction noise during piling operations. These are based on a number of worst case assumptions on the location of species in proximity to the Wind Farm and the level and duration of effect arising from piling operations. Although there is currently no technically feasible mitigation to reduce noise at-source for the piling operations assessed, there are a range of mitigation measures which may be implemented during the construction of the Wind Farm.

21. When piling commences a 'soft-start' procedure will be employed and the force of piling will gradually be increased to alert species in the vicinity to the commencement of the operations and thus reduce the potential for injury to these species. The soft-start is the gradual ramping up of piling power, incrementally over a set time period, until full operational power is achieved. In line with best practice guidelines, BOWL will implement a soft-start period of not less than 20 minutes. Until further geotechnical data is made available, no further information is available on the ramping up process and soft-start procedure, this will however be further defined in the construction management statement.

22. Upon receiving detailed geotechnical information, BOWL will develop a piling strategy with the aim of minimising effects on agreed species throughout the construction period. The Rochdale Envelope currently allows for the use of hammer energy up to 2,300kJ, although it is possible that a lesser hammer energy will be required. Where possible, the piling programme will determine what hammer energies are most likely to be used at specific locations, which will allow the development of a piling programme that has measures embedded within it to reduce the effects on fish and shellfish when compared to the worst case scenario presented in the Original ES. BOWL is committed to continued discussions with Marine Scotland in order to devise a piling strategy with the aim to, where possible, minimise certain effects.

23. BOWL and the wider offshore wind industry are investigating a number of mitigation measures to minimise the effects of construction noise on fish and shellfish ecology receptors, and there are techniques under development that may help to minimise construction noise levels at-source. However, none of these techniques are currently sufficiently developed to enable developers to commit to their use in construction.

24. BOWL is engaged in ongoing consultation with Marine Scotland Science in relation to suitable monitoring that may be required for key receptors.

25. In addition, to further minimise effects associated with electromagnetic fields, inter-array cables will be buried or protected where feasible to increase the separation between species and the cables. Export cables will be buried or protected for their entire length.

15.5 MARINE MAMMALS

15.5.1 SUMMARY OF RESIDUAL EFFECTS

15.5.1.1 Conclusions of the Original ES

Project Alone

26. The Original ES identified potential short-term likely significant effects on harbour seal and bottlenose dolphin as a result of pile driving noise. These effects related to injury or displacement of these species during the construction of the Wind Farm. The long-term effect of construction noise was assessed, and was considered to be a likely significant effect for bottlenose dolphin, but was not considered to be a likely significant effect for any other species. No other likely significant effects were predicted for the Project alone.

Cumulative

27. Cumulative effects from construction noise were predicted to be as per the effects of the Project alone, although may occur for a longer period depending on the piling scenario across the Wind Farm and the adjacent Moray Firth Round 3 Zone. As per the Wind Farm alone, the long-term effects from construction noise were considered to be likely significant effects for bottlenose dolphin, but were not considered to be likely significant effects for all other species. No other likely significant effects were predicted for the Project cumulatively.

15.5.1.2 Final Conclusions following ES Addendum

Amended Project Alone

28. The ES Addendum presents an updated assessment which seeks to address a number of consultation responses through provision of further information and renewed assessment (including carrying out further population modelling) for bottlenose dolphin and harbour seal. As a result, for harbour seal, the certainty relating to conclusions of long-term effects has been increased, and for bottlenose dolphin, the long-term effect is no longer considered to be a likely significant effect. Following further noise modelling using humpback whale (a baleen whale) as a proxy for minke whale the assessment has been re-evaluated in the ES Addendum. In summary, there are short - (immediate) to medium - (over the piling phase) term likely significant effects identified for minke whale, bottlenose dolphin and harbour seal although these are considered not to be likely significant effects in the long-term. All other effects remain unchanged from those presented in the Original ES. No other likely significant effects are predicted for the Amended Project alone.

Cumulative

29. An updated cumulative assessment for marine mammals is also provided in the ES Addendum for minke whale, bottlenose dolphin and harbour seal. Short - (immediate) to medium - (over the piling phase) term likely significant effects were identified for minke whale, bottlenose dolphin and harbour seal although these are not considered to be likely significant effects in the long-term. No other likely significant effects are predicted for the Amended Project cumulatively.

15.5.2 MITIGATION AND MONITORING MEASURES

30. Mitigation will be required to reduce the effects of construction noise on marine mammals. BOWL will adopt a piling protocol in accordance with JNCC guidelines which involves employment of dedicated marine mammal observers (MMOs) and potentially Passive Acoustic Monitoring (PAM) and Acoustic Deterrent Device (ADD) operatives. The aim of these would be to detect marine mammals within an agreed 'mitigation zone' (no less than 500 m measured from the pile location) and potentially recommending a delay in the commencement of piling activity if any marine mammals are detected. When piling commences a 'soft-start' procedure will be employed and the force of piling will gradually be increased to alert marine mammals in the vicinity to the commencement of the operations and thus reduce the potential for injury on all marine mammal species.

31. BOWL and the wider offshore wind industry are investigating a number of mitigation measures to minimise the effects of construction noise on marine mammals, and there are techniques under development that may help to minimise construction noise levels at-source. However, none of these techniques are currently sufficiently developed to enable developers to commit to their use in construction.

32. Upon receiving detailed geotechnical information, BOWL will develop a piling strategy with the aim of minimising effects on agreed species throughout the construction period. The Rochdale Envelope currently allows for the use of hammer energy up to 2,300kJ, although it is possible that a lesser hammer energy will be required. Where possible, the piling programme will determine what hammer energies are most likely to be used at specific locations, which will allow the development of a piling programme that has measures embedded within it to reduce the effects on marine mammals when compared to the worst case scenario presented in the Original ES. BOWL is committed to continued discussions with Marine Scotland in order to devise a piling strategy with the aim to, where possible, minimise certain effects.

33. A detailed Marine Mammal Monitoring Programme (MMMP) is currently being developed in consultation with Moray Offshore Renewables Ltd (MORL) (the developers of the Moray Firth Round 3 Zone), Marine Scotland, Scottish Natural Heritage and the University of Aberdeen to allow the unique existing baseline information of the Moray Firth to be built on, and to provide the opportunity to better understand the interactions between marine mammals and offshore wind farms.

15.6 ORNITHOLOGY

15.6.1 SUMMARY OF RESIDUAL EFFECTS

15.6.1.1 Conclusions of the Original ES

Project Alone

34. No likely significant effects were predicted on ornithology as a result of the Project alone in the Original ES.

Cumulative

35. No likely significant effects were predicted on ornithology as a result of the Project cumulatively in the Original ES.

15.6.1.2 Final Conclusions following the ES Addendum

Amended Project Alone

36. The ES Addendum presents an updated assessment which seeks to address a number of consultation responses through provision of further information and renewed assessment. The updated assessment includes the use of revised reference populations to determine the baseline conditions, use of stochastic as opposed to deterministic population modelling and use of an updated collision risk model.

37. As per the Original ES, no likely significant effects were predicted on ornithology as a result of the Amended Project alone.

Cumulative

38. The ES Addendum replaces the cumulative assessment in the Original ES for fulmar, gannet, kittiwake, herring gull, great black-backed gull, guillemot, razorbill and puffin. For all other receptors the assessment presented in the Original ES remains unchanged.

39. As per the Original ES, no likely significant effects were predicted on ornithology as a result of the Amended Project cumulatively.

15.6.2 MITIGATION MEASURES

40. No mitigation measures are proposed for ornithology.

15.7 SEASCAPE, LANDSCAPE AND VISUAL ENVIRONMENT

15.7.1 SUMMARY OF RESIDUAL EFFECTS

15.7.1.1 Conclusions of the Original ES

Project Alone

41. The assessment in the Original ES considered the various likely seascape, landscape and visual effects that were anticipated to arise as a result of the Wind Farm. Likely significant effects were identified for the Regional Seascape Unit (RSU) Noss Head to Berriedale and the Regional Seascape Character Type (RSCT) Coastal Waters; on visual receptor groups; residents, footpath users, motorists and offshore recreational sailors; and on the representative viewpoints of Wick Bay, Sarclet, Hill

O'Many Stanes, Dunbeath and Whaligoe Steps. No other likely significant effects were predicted for the Project alone.

Cumulative

42. The cumulative assessment identified the same likely significant effects as for the Wind Farm alone but also identified further cumulative likely significant effects for residents of Lybster and temporarily for travellers on the Aberdeen to Orkney / Shetland ferry route. No other likely significant effects were predicted for the Project cumulatively.

15.7.1.2 Final Conclusions following ES Addendum

Amended Project Alone

43. The ES Addendum presents a supplemental assessment which seeks to address a number of consultation responses through provision of further information and renewed assessment. Specifically, the ES Addendum incorporates an assessment of Coastal Character Areas (CCAs) and assessment of an further viewpoint at Lybster Harbour. CCAs were assessed to complement the assessment of RSUs; CCAs present an assessment at a smaller scale, similar to the scale of Landscape Character Types. The assessment concludes that likely significant effects on CCAs are limited to Sarclet Head. Effects on the Lybster Harbour viewpoint are not deemed to be likely significant effects. All other effects remain unchanged from those presented in the Original ES, i.e. likely significant effects for the RSU Noss Head to Berriedale and the RSCT Coastal Waters; on visual receptor groups; residents, footpath users, motorists and offshore recreational sailors; and on the representative viewpoints of Wick Bay, Sarclet, Hill O'Many Stanes, Dunbeath and Whaligoe Steps. No other likely significant effects are predicted for the Amended Project alone.

Cumulative

44. The ES Addendum replaces the cumulative assessment section of the Original ES and identifies likely significant effects on Sarclet Head CCA as well as the Coastal Waters RSCT (NB. CCAs were assessed in place of RSUs for the purpose of the revised cumulative assessment). Likely significant cumulative effects are predicted for residents of Sarclet, motorists, footpath users and recreational sailors and for workers at sea. The viewpoint assessment identifies likely significant effects on residents at Wick Bay, Sarclet, Lybster, Dunbeath and Whaligoe Steps; for visitors to Hill O'Many Stanes and Lybster Harbour and temporarily for travellers on the Aberdeen to Orkney / Shetland ferry route. No other likely significant effects are predicted for the Amended Project cumulatively.

15.7.2 MITIGATION MEASURES

45. The inherent characteristics of the Wind Farm mean that there are very limited opportunities for incorporating mitigation measures for seascape, landscape and visual effects. Mitigation is also constrained by engineering and other technical issues to enable deliverability of the Wind Farm. Although exact layouts and positioning of turbines cannot be determined until appropriate detailed site surveys are undertaken post-consent, BOWL is committed to ensuring that, in so far as it is

possible, seascape, landscape and visual sensitivities will continue to be taken into account at detailed design stage.

15.8 MARINE ARCHAEOLOGY AND CULTURAL HERITAGE

15.8.1 SUMMARY OF RESIDUAL EFFECTS

15.8.1.1 Conclusions of the Original ES

Project Alone

46. No likely significant residual effects were predicted on marine archaeology and cultural heritage for the Project alone.

Cumulative

47. No likely significant residual effects were predicted on marine archaeology and cultural heritage for the Project cumulatively.

15.8.1.2 Final Conclusions following ES Addendum

Amended Project Alone

48. The assessment presented in the ES Addendum considers the amendment to the OfTW Corridor and changes to the OfTW cable installation timescales. The assessment concludes that the significance of effects remain unchanged from those presented in the Original ES, i.e. no likely significant effects.

Cumulative

49. The cumulative assessment for marine archaeology and cultural heritage is not within the scope of the ES Addendum and therefore effects remain unchanged from those presented within the Original ES, i.e. no likely significant effects.

15.8.2 MITIGATION MEASURES

50. Direct physical effects on the identified sites of potential cultural heritage interest will be avoided where possible through the project design. The implementation of temporary exclusion zones will ensure avoidance of assets during construction. However, should it not be possible to avoid sites of cultural heritage interest, a full programme of archaeological investigation, which may include diver survey or Remote Operated Vehicle (ROV) investigation, will be undertaken to identify the nature and extent of these sites. Subject to these investigations, an appropriate mitigation strategy will be agreed upon with Historic Scotland.

51. Where cultural heritage assets may potentially be subject to secondary physical effects, temporary exclusion zones will be implemented to prevent these resulting from invasive activities, such as cable installation, anchoring or installation of jack-up vessels. Exclusion zones of 100 m will be established around sites identified as being of high sensitivity, while an exclusion zone of a minimum 50 m will be established around those of medium sensitivity.

52. The use of dynamic positioning systems for construction vessels would reduce the need for anchoring and the likelihood of secondary effects to cultural heritage assets.

53. In order to mitigate the risk of damage to any previously unrecorded archaeological remains a Protocol of Archaeological Discoveries (PAD) will be prepared for the approval of Historic Scotland to mitigate construction effects in the event of any unexpected discoveries of archaeological remains during installation.

15.9 COMMERCIAL FISHERIES

15.9.1 SUMMARY OF RESIDUAL EFFECTS

15.9.1.1 Conclusions of the Original ES

Project Alone

54. The Original ES identified no likely significant effects upon commercial fisheries for the Wind Farm. Likely significant effects were identified for the construction phase of the OfTW, in relation to complete loss or restricted access to traditional fishing grounds and displacement of fishing vessels into other areas. No other likely significant effects were predicted for the Project alone.

Cumulative

55. Likely significant cumulative effects were identified relating to complete loss or restricted access to fishing grounds during the construction/ decommissioning and operational phases of the Wind Farm, OfTW and Moray Firth Round 3 Zone and the displacement of fishing vessels as a result of this. No other likely significant effects were predicted for the Project cumulatively.

15.9.1.2 Final Conclusions following ES Addendum

Amended Project Alone

56. The assessment presented in the ES Addendum considers the amendment to the OfTW Corridor and changes to the OfTW cable installation timescales. The assessment concludes that the significance of effects remain unchanged from those presented in the Original ES, i.e. likely significant effects for the construction phase of the OfTW, in relation to complete loss or restricted access to traditional fishing grounds and displacement of fishing vessels into other areas. No other likely significant effects are predicted for the Amended Project alone.

Cumulative

57. The cumulative assessment for commercial fisheries was not within the scope of the ES Addendum and therefore effects remain unchanged from those presented within the Original ES, i.e. likely significant cumulative effects relating to complete loss or restricted access to fishing grounds during the construction/ decommissioning and operational phases of the Wind Farm, OfTW and Moray Firth Round 3 Zone and the displacement of fishing vessels as a result of this. No other likely significant effects are predicted for the Amended Project alone.

15.9.2 MITIGATION MEASURES

58. Consultation will be ongoing with fisheries interests to further minimise, where possible, the effect of construction activities that will result in the temporary loss of fishing grounds. BOWL is in consultation with the Scottish Fishermen's Federation

(SFF) and the Moray Firth Inshore Fisheries Group (MFIFG) through a fisheries working group to ensure that the considerations of fishermen are taken into account through the detailed design of the Project, and during the development of the construction method statement.

59. Consultation will extend beyond the construction phase in order to minimise the effects associated with obstacles on the sea bed.

60. BOWL is committed to ensuring that the post installation status of the OfTW enables fishing activities to be safely resumed. Embedded design mitigation to facilitate this includes cable burial or protection of cable where burial is not feasible.

15.10 AIRBORNE NOISE

15.10.1 SUMMARY OF RESIDUAL EFFECTS

15.10.1.1 Conclusions of the Original ES

Project Alone

61. No likely significant residual effects were predicted from airborne noise for the Project alone.

Cumulative

62. No likely significant residual effects were predicted from airborne noise for the Project alone.

15.10.1.2 Final Conclusions following ES Addendum

63. Airborne noise is not within the scope of the ES Addendum and therefore effects remain unchanged from those presented in the Original ES for the Project alone and cumulatively, i.e. no likely significant effects.

15.10.2 MITIGATION MEASURES

64. No mitigation measures are proposed for airborne noise.

15.11 SHIPPING AND NAVIGATION

15.11.1 SUMMARY OF RESIDUAL EFFECTS

15.11.1.1 Conclusions of the Original ES

Project Alone

65. The Original ES identified no likely significant effects on shipping and navigation from the Wind Farm and OfTW for the Project alone.

Cumulative

66. The Original ES identified no likely significant effects on shipping and navigation from the Wind Farm and OfTW for the Project cumulatively.

15.11.1.2 Final Conclusions following ES Addendum

Amended Project Alone

67. The assessment presented in the ES Addendum considers the amendment to the OfTW Corridor and the changes to the OfTW cable installation timescales. The

assessment concludes that the significance of effects remain unchanged from those presented in the Original ES, i.e. no likely significant effects.

Cumulative

68. The cumulative assessment for shipping and navigation is not within the scope of the ES Addendum and therefore effects remain unchanged from those presented within the Original ES, i.e. no likely significant effects.

15.11.2 MITIGATION MEASURES

69. No mitigation measures are proposed further than those which are industry standard. In summary, embedded industry standard mitigation including the following:

- Consideration of a requirement for 500 m safety zones around construction activities and a 50 m safety zone during the operational phase;
- Marine navigational marking will be provided;
- Burial or protection of inter-array cables where feasible;
- Liaison to ensure information circulated to mariners;
- The Wind Farm and associated inter-array cables will be charted by the UK Hydrographic Office in Admiralty Charts; and
- An Emergency Response Co-operation Plan (ERCoP) for the Wind Farm will be put in place pre-construction.

15.12 AVIATION

15.12.1 SUMMARY OF RESIDUAL EFFECTS

15.12.1.1 Conclusions of the Original ES

Project Alone

70. The Original ES found that following agreement with the relevant stakeholders on mitigation requirements, there would be no likely significant effect on aviation receptors as a result of the Project alone.

Cumulative

71. The Original ES found that following agreement with the relevant stakeholders on mitigation requirements, there would be no likely significant effect on aviation receptors as a result of the Project cumulatively.

15.12.1.2 Final Conclusions following ES Addendum

72. Aviation is not within the scope of the ES Addendum and therefore effects remain unchanged from those presented in the Original ES for the Project alone and cumulatively, i.e. no likely significant effects.

15.12.2 MITIGATION MEASURES

73. Rationalisation of the instrument approach procedures at Highlands and Islands Airports Ltd (HIAL) Wick Airport is currently ongoing, with the procedural redesign work currently being conducted by the Directorate of Airspace Policy on behalf of HIAL Wick Airport. The new rationalised and amended procedures are

expected to be published and in everyday use in advance of the consent determination for the Wind Farm.

74. A number of potential Primary Surveillance Radar mitigation solutions are being considered to mitigate effects on RAF Lossiemouth and NERL Allanshill radar systems, some of which are emerging technologies. These are described in detail within the Original ES. Consultation is ongoing with the MOD and NERL to agree the most appropriate technologies.

75. The minimum safe altitude above the Wind Farm will need to be raised to allow a clearance of 1,000 ft (305 m) from the turbines.

76. Mitigation is required for helicopter approach procedures to helidecks. Since publication of the Original ES, a combination of solutions has been agreed with helicopter and platform operators, including a 2.5 km exclusion zone for turbines, offshore substation platforms and meteorological masts around the Beatrice Jacky oil platform.

15.13 SOCIO-ECONOMICS, RECREATION AND TOURISM

15.13.1 SUMMARY OF RESIDUAL EFFECTS

15.13.1.1 Conclusions of the Original ES

Project Alone

77. The socio-economics, recreation and tourism assessment in the Original ES identified likely significant positive effects as a result of the Project alone in relation to increased Gross Value Added (GVA) and employment effects. No other likely significant effects were predicted for the Project alone.

Cumulative

78. The socio-economics, recreation and tourism assessment in the Original ES identified likely significant positive effects as a result of the Project cumulatively in relation to increased GVA and employment effects. No other likely significant effects were predicted for the Project cumulatively.

15.13.1.2 Final Conclusions following ES Addendum

Amended Project Alone

79. The assessment presented in the ES Addendum considers the amendment to the OfTW Corridor and the change to the OfTW cable installation timescales. The assessment concludes that the significance of effects remains unchanged from those presented in the Original ES, i.e. likely significant positive effects in relation to increased GVA and employment effects. No other likely significant effects were predicted for the Amended Project alone.

Cumulative

80. The cumulative assessment for socio-economics, recreation and tourism is not within the scope of the ES Addendum and therefore effects remains unchanged from those presented within the Original ES, i.e. likely significant positive effects in

relation to increased GVA and employment effects. No other likely significant effects were predicted for the Amended Project cumulatively.

15.13.2 MITIGATION MEASURES

81. No mitigation measures are proposed.

15.14 OTHER ISSUES

15.14.1 SUMMARY OF RESIDUAL EFFECTS

15.14.1.1 Conclusions of the Original ES

Project Alone

82. The Original ES did not identify any likely significant effects on other marine users and infrastructure as a result of the Project alone.

Cumulative

83. The Original ES did not identify any likely significant effects on other marine users and infrastructure as a result of the Project cumulatively.

15.14.1.2 Final Conclusions following ES Addendum

84. Other issues is not within the scope of the ES Addendum and therefore effects remain unchanged from those presented in the Original ES for the Project alone and cumulatively, i.e. no likely significant effects.

15.14.2 MITIGATION MEASURES

85. No mitigation measures are proposed.

Table 15.1: Summary of Residual Likely Significant Effects

	Conclusions from Original ES			**Final Conclusions following ES Addendum** (including effects unchanged from Original ES)		
	Wind Farm	**OfTW**	**Cumulative**	**Wind Farm**	**OfTW**	**Cumulative**
Physical Processes and Geomorphology	No likely significant effects.	No likely significant effects.	No likely significant effects.	No likely significant effects.	No likely significant effects.	No likely significant effects.
Benthic Ecology	Likely significant effects predicted for MoeVen biotope during the operational phase resulting from loss of habitat.	No likely significant effects.	Likely significant effects predicted for MoeVen biotope resulting from loss of habitat due to placement of foundations and scour protection including over cables.	Likely significant effects predicted for MoeVen biotope during the operational phase resulting from loss of habitat. Likely significant effects predicted for MoeVen biotope during the construction phase due to sea bed disturbance.	No likely significant effects.	Likely significant effects predicted for MoeVen biotope during the operational phase resulting from loss of habitat. Likely significant effects predicted for MoeVen biotope during the construction phase due to sea bed disturbance.
Fish and Shellfish Ecology	Likely significant effects resulting from construction noise on cod, herring and European eel.*	No likely significant effects.	Likely significant effects resulting from construction noise on herring, cod, European eel and salmon and sea trout.* Likely significant effects were predicted on sandeels resulting from loss of habitat.	Likely significant effects resulting from construction noise on cod, herring and European eel.*	No likely significant effects.	Likely significant effects resulting from construction noise on herring, cod, European eel and salmon and sea trout.* Effects on sandeels have been revised based on further baseline information across the Moray Firth and are considered to be not likely significant effects.
Marine Mammals	Likely significant short and medium term effects on harbour seal and bottlenose dolphin as a result of pile driving noise. Long-term significant effects on bottlenose dolphins.	No likely significant effects.	Likely significant short and medium term effects on harbour seal and bottlenose dolphin as a result of pile driving noise. Long-term significant effects on bottlenose dolphins.	Likely significant short and medium term effects on harbour seal, minke whale and bottlenose dolphin as a result of pile driving noise.	No likely significant effects.	Likely significant short and medium term effects on harbour seal, minke whale and bottlenose dolphin as a result of pile driving noise.

*In addition to the species, species groups and life stages listed, the potential effect of construction noise was assessed for a number of fish species not modelled and without defined surrogates, including sandeels, elasmobranchs, river and sea lamprey, anglerfish, haddock, European eel and sprat. The effect of construction noise on these was assessed to be negligible or negative minor, depending on the species under consideration. An exception to this was the European eel, for which a negative moderate effect was predicted. Given the limitations and qualitative nature of the noise assessment carried out for these species, probabilities were not assigned to the predicted significance of the effect, and they are not included in the table.

	Conclusions from Original ES			**Final Conclusions following ES Addendum** (including effects unchanged from Original ES)		
	Wind Farm	**OfTW**	**Cumulative**	**Wind Farm**	**OfTW**	**Cumulative**
Seascape, Landscape and Visual	Likely significant effects identified for the RSU Noss Head to Berridale and the RSCT Coastal Waters; on visual receptor groups, residents, footpath users, motorists and offshore recreational sailors; and on the representative viewpoints of Wick Bay, Sarclet, Hill O'Many Stanes, Dunbeath and Whaligoe Steps.		Likely significant effects identified for the RSU Noss Head to Berridale and the RSCT Coastal Waters; on visual receptor groups, residents, footpath users, motorists and offshore recreational sailors; on the representative viewpoints of Lybster, Wick Bay, Sarclet, Hill O'Many Stanes, Dunbeath and Whaligoe Steps; and temporarily for travellers on the Aberdeen to Orkney / Shetland ferry route.	Likely significant effects identified for the RSU Noss Head to Berridale,the Sarclet Head CCA and the RSCT Coastal Waters; on visual receptor groups, residents, footpath users, motorists and offshore recreational sailors; and on the representative viewpoints of Wick Bay, Sarclet, Hill O'Many Stanes, Dunbeath and Whaligoe Steps.		Likely significant effects identified for the Sarclet Head CCA and the RSCT Coastal Waters; on visual receptor groups, residents, footpath users, motorists and offshore recreational sailors; on the representative viewpoints of Lybster, Wick Bay, Sarclet, Hill O'Many Stanes, Dunbeath and Whaligoe Steps; and temporarily for travellers on the Aberdeen to Orkney / Shetland ferry route.
Marine Archaeology and Cultural Heritage	No likely significant effects.	No likely significant effects.	No likely significant effects.	No likely significant effects.	No likely significant effects.	No likely significant effects.
Commercial Fisheries	No likely significant effects.	Likely significant effects during the construction phase due to loss or restricted access to traditional fishing grounds and displacement of fishing vessels into other areas.	Likely significant effects during the construction and operational phase due to loss or restricted access to traditional fishing grounds and displacement of fishing vessels into other areas.	No likely significant effects.	Likely significant effects during the construction phase due to loss or restricted access to traditional fishing grounds and displacement of fishing vessels into other areas.	Likely significant effects during the construction and operational phase due to loss or restricted access to traditional fishing grounds and displacement of fishing vessels into other areas.
Airborne Noise	No likely significant effects.		No likely significant effects.	No likely significant effects.		No likely significant effects.
Shipping and Navigation	No likely significant effects.	No likely significant effects.	No likely significant effects.	No likely significant effects.	No likely significant effects.	No likely significant effects.
Aviation	No likely significant effects.		No likely significant effects.	No likely significant effects.		No likely significant effects.
Socio-Economics, Recreation and Tourism	Likely significant positive effects for GVA and employment.	Likely significant positive effects for GVA and employment.	Likely significant positive effects for GVA and employment.	Likely significant positive effects for GVA and employment.	Likely significant positive effects for GVA and employment.	Likely significant positive effects for GVA and employment.
Other Issues	No likely significant effects.	No likely significant effects.	No likely significant effects.	No likely significant effects.	No likely significant effects.	No likely significant effects.

Table 15.2: Summary of Mitigation and Monitoring Measures

Assessment	**Summary of Mitigation and Monitoring Measures[2]**
Physical Processes and Geomorphology	Construction best practice to minimise sediment release to the marine environment. HDD at landfall to minimise effects on the Spey Bay SSSI. Scour protection of seabed structures.
Benthic Ecology	No specific mitigation proposed.
Fish and Shellfish Ecology	Inter-array cable burial/protection proposed where feasible to increase the separation between species and the cables to potentially reduce EMF effects. Piling protocol to be put in place with the aim of preventing injury occurring to fish and shellfish species during pile driving activities. When piling commences a 'soft-start' procedure will be employed and the force of piling will gradually be increased to alert fish and shellfish species in the vicinity to the commencement of the operations and thus minimise the potential for injury on all fish and shellfish species. Upon receiving detailed geotechnical information, BOWL will develop a piling strategy with the aim of minimising effects on agreed species throughout the construction period. The Rochdale Envelope currently allows for the use of hammer energy up to 2,300kJ, although it is possible that a lesser hammer energy will be required. Where possible, the piling programme will determine what hammer energies are most likely to be used at specific locations, which will allow the development of a piling programme that has measures embedded within it to reduce the effects on fish and shellfish when compared to the worst case scenario presented in the Original ES. BOWL is committed to continued discussions with Marine Scotland in order to devise a piling strategy with the aim to, where possible, minimise certain effects. BOWL will, in consultation with Marine Scotland

[2] This table does not detail Project design (embedded) mitigation measures which contribute to the overall mitigation strategy for the Amended Project. Details of embedded mitigation measures are included in the technical assessment sections of the Original ES.

Assessment	Summary of Mitigation and Monitoring Measures[2]
	Science and other relevant fisheries stakeholders, review and consider the requirement for additional survey and monitoring work. In addition, BOWL is currently engaging with Marine Scotland Science and other developers to define an adequate salmon and sea trout monitoring strategy.
Marine Mammals	Piling protocol to be put in place with the aim of preventing injury occurring to marine mammals during pile driving activities. When piling commences a 'soft-start' procedure will be employed and the force of piling will gradually be increased to alert marine mammals in the vicinity to the commencement of the operations and thus minimise the potential for injury on all marine mammal species. A number of mitigation measures to minimise the effects of construction noise on marine mammals are under investigation, and will remain as such. However, there are currently no feasible measures available for the Project to reduce noise at-source. Upon receiving detailed geotechnical information, BOWL will develop a piling strategy with the aim of minimising effects on agreed species throughout the construction period. The Rochdale Envelope currently allows for the use of hammer energy up to 2,300kJ, although the most likely scenario is that a lesser hammer energy will be required. Where possible, the piling programme will determine what hammer energies are most likely to be used at specific locations, which will allow the development of a piling programme that has measures embedded within it to minimise the effects on marine mammals when compared to the worst case scenario presented in the Original ES. BOWL is committed to continued discussions with Marine Scotland in order to devise a piling strategy with the aim to, where possible, mitigate certain effects. A detailed MMMP is currently being developed in consultation with developers, Marine Scotland, Scottish Natural Heritage and the University of Aberdeen to allow the unique existing baseline information of the Moray Firth to be built on, and to provide the opportunity to better understand the

Assessment	Summary of Mitigation and Monitoring Measures[2]
	interactions between marine mammals and offshore wind farms.
Ornithology	No specific mitigation proposed.
Seascape, Landscape and Visual	No specific mitigation proposed.
Marine Archaeology and Cultural Heritage	Temporary exclusion zones or a full programme of archaeological investigation where avoidance is not possible for sites identified as high / medium sensitivity. Implementation of PAD.
Commercial Fisheries	BOWL will remain in consultation with fisheries groups to ensure that the considerations of fishermen in the Moray Firth are considered through the design and construction of the Project. Consultation will extend beyond the construction phase. BOWL is committed to ensuring that the post installation status of the OfTW enables fishing activities to be safely resumed. Embedded design mitigation to facilitate this includes cable burial or protection of cable where burial is not feasible.
Airborne Noise	No specific mitigation proposed.
Shipping and Navigation	No mitigation proposed beyond industry standard measures. In summary, embedded industry standard mitigation including the following: • Consideration of a requirement for 500 m safety zones around construction activities and a 50 m safety zone during the operational phase; • Marine navigational marking will be provided; • Burial or protection of inter-array cables; • Liaison to ensure information circulated to mariners; • The Wind Farm and associated inter-array cables will be charted by the UK Hydrographic Office in Admiralty Charts; and • An ERCoP for the Wind Farm will be put in place pre-construction.
Aviation	Rationalisation of the instrument approach procedures at HIAL Wick Airport.

Assessment	**Summary of Mitigation and Monitoring Measures[2]**
	Primary Surveillance Radar mitigation for NATS and MOD. Minimum safe altitude to be raised above the Wind Farm Site to ensure clearance of 1,000 ft (305 m). A combination of solutions has been agreed with helicopter and platform operators, including a 2.5 km exclusion zone for turbines, offshore substation platforms and meteorological masts around the Beatrice Jacky oil platform.
Socio-economics, Recreation and Tourism	No specific mitigation proposed.
Other Issues	No specific mitigation proposed.

THIS PAGE IS INTENTIONALLY BLANK