11 MARINE ARCHAEOLOGY AND CULTURAL HERITAGE

11.1 INTRODUCTION

1. This section of the ES Addendum presents an evaluation of the likely significant effects of the Amended Project on marine archaeology and cultural heritage associated with the amendments presented in Section 4: Amended Project Description. In addition, this section presents a discussion of the effects which may occur as a result of the most likely scenario. The assessment has been undertaken by Headland Archaeology.

2. Specifically, this section of the ES Addendum assesses the effects associated with:

- The Amended OfTW Corridor; and
- Changes to the OfTW cable installation timescales.

3. This assessment is supported by the following documents located within the Original ES:

- Appendix 26.1: Gazetteer and Concordance; and
- Annex 26A: Archaeology and Cultural Heritage Baseline Technical Report.

4. This section presents an addendum to Section 26: OfTW Marine Archaeology and Cultural Heritage of the Original ES. Where applicable, reference is made in this assessment to the Original ES.

5. It should be noted that changes to the jack-up vessel footprints included in Section 4: Amended Project Description do not affect the worst case scenario in relation to the assessment of effects on marine archaeology and cultural heritage and have been scoped out of this assessment. Therefore, there are no amendments to Section 15: Wind Farm Marine Archaeology and Cultural Heritage (see Section 11.3 for rationale).

6. This section includes the following elements:

- Consultation;
- Scope of Assessment;
- Baseline;
- Assessment Methodology;
- Assessment of Potential Effects;
- Mitigation Measures and Residual Effects;
- Assessment of Cumulative Effects;
- Statement of Significance; and
- References.

11.2 CONSULTATION

7. Following the submission of the Original ES in April 2012, Beatrice Offshore Wind Farm Ltd (BOWL) has received consultation responses, via Marine Scotland Licensing Operations Team (MS-LOT) from various statutory and non-statutory consultees. A summary of these responses in relation to marine archaeology and

cultural heritage is presented in Table 11.1. Reference is also provided as to where these issues are addressed within this ES Addendum; if applicable.

Table 11.1: Summary of Original ES Consultation Responses and Project Response

Consultee	Summary of Consultation Response	Project Response	Consultation Response Addressed
Historic Scotland (HS)	HS are content with the principle of the development, and consider there shall be no significant adverse effects on marine or terrestrial assets within their statutory remit.	Noted.	No further environmental information required in this ES Addendum.
	HS are content with the assessment of potential effects on marine archaeology and with the proposed mitigation strategy in relation to identified sites which have archaeological potential.	Noted.	No further environmental information required in this ES Addendum.
	HS are content that there shall be no significant adverse direct, indirect or cumulative effects on terrestrial assets within their statutory remit, as a result of the proposed development.	Noted.	No further environmental information required in this ES Addendum.
	HS have noted that three terrestrial assets within their statutory remit considered for potential indirect effects were identified as being subject to an effect as follows: • Dunbeath Castle (HB no. 7936) – effect of negligible significance; • Cairn of Get (Index no. 90048) – effect of minor significance; • Hill O'Many Stanes (Index no. 90162) – effect of minor significance. HS are content with the predicted significance of effects within the ES for Cairn of Get and Hill O' Many Stanes. In terms of Dunbeath Castle category A Listed Building and its associated Designed Landscape, HS consider that the significance of the effect on the setting of these assets would be 'minor adverse' as opposed to 'negligible'.	While Headland Archaeology see this visual effect as negligible, and HS see it as minor, effects of both negligible and minor magnitude are not considered to be likely significant effects in terms of the EIA Regulations. Therefore, no further assessment is deemed to be required.	A formal response has been submitted to HS to this effect (letter dated 18/12/12). No further environmental information required in this ES Addendum.
	HS are content that there are no designated cultural heritage assets within the Inner or Outer Study Areas.	Agreed and noted.	No further environmental information required in this ES Addendum.
	HS are content with the proposed mitigation measures for the construction period, in relation to	Noted.	No further environmental information

Consultee	Summary of Consultation Response	Project Response	Consultation Response Addressed
	marine cultural heritage assets and potential marine cultural heritage assets.		required in this ES Addendum.
	HS recommend a condition be attached to any consent/licence issued, requiring implementation of the Protocol for Archaeological Discoveries (Offshore Renewables Projects).	Agreed. This was committed to in Section 15 and Section 26 of the Original ES.	No further environmental information required in this ES Addendum.

11.3 SCOPE OF ASSESSMENT

8. As shown in Section 11.2, there are no consultation responses which have required further material information or renewed assessment to be presented in this section. All consultation responses relating to marine archaeology and cultural heritage have been dealt with outwith this ES Addendum.

9. There are no amendments to methodologies presented in this section. The baseline and associated receptors have been updated in relation to the additional area created by the amendment to the Original OfTW Corridor.

10. The further cumulative information relating to the Moray Firth Round 3 Zone does not require any amendment to the assessment of marine archaeology and cultural heritage.

11. The scope of this section has therefore been determined by considering the changes to the Project presented in Section 4: Amended Project Description of this ES Addendum. Specifically, as stated in Section 11.1 above, the effects associated with:

- The Amended OfTW Corridor; and
- Changes to the OfTW cable installation timescales.

12. Section 15: Wind Farm Marine Archaeology and Cultural Heritage of the Original ES included the assessment of direct effects and secondary effects which were defined as:

- Direct effects on archaeological sites, features, deposits and artefacts that may be affected by the proposed works. These works might include excavation/ dredging or piling; and
- Secondary effects on archaeological sites, features and artefacts that may be affected by the Project. These might include the effects of the anchoring of maintenance vessels and associated activities during the installation phase.

13. No potential direct effects were identified within The Wind Farm Site as no designated cultural heritage assets were identified in this area. The potential for secondary effects on the wider Study Area, defined as including a 1 km buffer around the Wind Farm Site (Section 15.2.3 of the Original ES) were identified; however, this assessment was based on the presence of vessels in this area, and was

not related to the size of these vessels or their corresponding footprint on the sea bed.

14. As such, the change in the size of the jack-up vessel footprints bear no relevance to the assessment of effects on marine archaeology and cultural heritage and hence do not fall within the scope of this ES Addendum.

15. Section 11.6 considers the effects on marine archaeology and cultural heritage associated with the Amended Project. The conclusions of this assessment are supplemental to those of the Original ES and this section must be read alongside Section 26: OfTW Marine Archaeology and Cultural Heritage of the Original ES. Section 11.6.2 discusses the 'most likely' scenario.

11.4 BASELINE

11.4.1 STUDY AREA

16. The Study Area for the assessment of effects on marine archaeology and cultural heritage was presented in Section 26.2.3 of the Original ES. The Study Area has been updated to reflect the amendment to the Original OfTW Corridor (see Figure 11.1).

17. Further geophysical and geotechnical survey data collected by Gardline Geosurvey Ltd in 2007 on behalf of Ithaca Energy has been provided and assessed for the additional area created by the amendment to the Original OfTW Corridor. This data has been cross referenced with the results of the original baseline desk based survey (Annex 26A of the Original ES).

18. Geophysical survey data was collected over an area measuring 2 kilometres (km) x 2 km within the additional area using multi-beam echo sounder, sidescan sonar and sub-bottom profiler (see Figure 11.1). It should be noted this survey was not undertaken specifically for the Amended Project and does not cover the entirety of the additional area but does cover the majority of it. The survey also supplied further seabed imagery and benthic data covering a representative proportion upon which to base the amended assessment.

19. Environmental samples were collected at 10 locations within the additional area using a day grab (see Figure 11.1). While there is no industry guidance for indicating the quantity of grab samples that should be collected over a specific area for archaeological purposes and the samples themselves were not collected for archaeological purposes, the results do provide an accurate representative sample of the seabed sediments within the additional area. Seabed imagery and video footage were attained using still photography and drop down camera at these locations. One core penetration test (CPT) was also taken to determine the geotechnical engineering properties of sub seabed sediments and stratigraphy and the log provided for assessment.

11.4.2 BASELINE CONDITIONS

20. The baseline conditions relating to the Original Study Area were presented in Section 26.3 of the Original ES. The majority of the baseline conditions for the Amended Study Area are included in the original baseline. Supplementary baseline

information based on the geophysical data collected for the additional area created by the amendment to the Original OfTW Corridor is presented below.

11.4.2.1 Bathymetry of the Additional OfTW Area

21. The bathymetry for the additional area ranges from 36.0 m lowest astronomical tide (LAT) to 44.8 m LAT with the seabed sloping gently from north to south.

22. The geophysical survey indicates that seabed sediments across the additional area comprise sands and gravels, with areas of megaripples in the northern part of the site. The sub-bottom profiler and CPT data suggests that these sands and gravels are present across the additional area to a depth of 12 m.

23. The evidence from the grab samples and seabed imagery support the findings of the geophysical survey, indicating a predominantly sandy seabed across the additional area.

11.4.2.2 Cultural Heritage Assets within the Additional OfTW Area

24. There are no designated cultural heritage assets or previously recorded undesignated cultural heritage assets within the additional area.

25. No targets with archaeological potential were identified from the geophysical survey data analysis for the additional area.

26. No sites or features of archaeological potential were identified from the seabed imagery collected for the additional area.

27. No organic remains or deposits of palaeoenvironmental interest were identified from the grab sample logs or CPT log.

11.4.2.3 Potential for Unrecorded Cultural Heritage Sites in the Additional OfTW Area

28. A desk based review and assessment of geophysical survey data has been undertaken for the additional area and no sites of cultural heritage interest have been identified. No targets of archaeological potential were identified in the geophysical survey data and no organic remains or deposits of palaeoenvironmental interest were identified from the grab sample logs or CPT log.

29. It should be noted that the survey data (Gardline Geosurvey, 2007) did not cover the entire additional area and the survey techniques employed may not have detected any wreck or debris which was buried at the time of the surveys. Therefore, there is some potential for the discovery of previously unrecorded cultural heritage remains within the additional area. However, considering a comprehensive desk based archaeological study of available sources has not identified any maritime losses or cultural heritage remains within the additional area, the archaeological potential is considered to be low.

11.5 ASSESSMENT METHODOLOGY

30. The assessment methodology remains unchanged from that presented in Section 26.2 of the Original ES.

11.5.1 WORST CASE SCENARIO

31. A description of the amendment to the Original OfTW Corridor and the OfTW cable installation timescales from the Original ES are presented in Section 4: Amended Project Description.

32. The worst case parameters for the assessment of the effects on marine archaeology and cultural heritage associated with the Original OfTW were stated in Section 26.2.6 of the Original ES as:

- number of cables;
- corridor width;
- maximum number of trenches required; and
- maximum width of trenches.

33. The OfTW Corridor width has been increased by the additional area created by the amendment to the Original OfTW Corridor and this has been assessed in this section. The worst case also considered the "*installation of cables and associated activities including the deployment of construction vessels has the potential to damage or destroy cultural heritage assets*".

34. The Original ES presented a worst case OfTW cable installation and protection scenario of 240 days. Since the submission of the Original ES further information has become available relating to the construction processes for the Project. Consequently, this ES Addendum has considered a revised worst case OfTW cable installation scenario of 140 days per year for three years, plus an additional 90 days per year for cable protection operations. This increases the time on site for these construction vessels and therefore is assessed in terms of the potential effects on marine archaeology and cultural heritage in Section 11.6.

11.5.2 MOST LIKELY SCENARIO

11.5.2.1 Wind Farm

35. The most likely scenario for the Wind Farm, as outlined in Section 4: Amended Project Description is for the construction of 140 turbines installed using pin pile foundations with tubular jackets. The worst case assessment for the Original Wind Farm (Section 15.2.5 of the Original ES) is based on 277 turbines using gravity base foundations. The most likely scenario therefore presents a reduction in the number of turbines and associated foundations, plus a change to pin piles thus reducing the area of foundation which has the potential to cause direct effects.

36. The most likely scenario also uses pin piles of the foundations of the meteorological masts and offshore substation platforms (OSPs) further reducing the size of the foundations which have the potential to cause direct effects.

37. With regard to the inter-array cable, the worst case scenario is of maximum cable burial (325 km of a total cabling length of 350 km). In the most likely scenario the length of buried cable is reduced to 230 km of a total cabling length of 260 km.

38. With regard to operational effects of the Wind Farm, the worst case scenario was 142 turbines with a tip height of 198.4 m as this presents the most extensive Zone of

Theoretical Visibility (ZTV). The most likely scenario is 140 turbines of up to 187.4 m.

11.5.2.2 OfTW

39. A description of a most likely scenario is presented in Section 4: Amended Project Description. As stated in Section 11.5.1, the worst case for the OfTW is based on the number of cables, corridor width, number and size of trenches.

40. The most likely scenario for the OfTW is the same as the worst case in terms of archaeology and cultural heritage, with the exception of the maximum depth of the cable trench, which is reduced from 2.5 m in the worst case to 1.7 m in the most likely scenario.

41. The most likely scenario with regard to installation of the cable occurs over a two year period rather than three years in the worst case; however, this does not alter the spatial extent of the works. The most likely scenario in relation to installation time is expected to be 187 days of installation in Year 1, and 100 days of installation in Year 2, resulting in 287 days in total over two years. Additionally, cable protection is anticipated to take 128 days in Year 1 and 64 days in Year 2, giving a total protection time of 192 days over two years.

11.6 ASSESSMENT OF POTENTIAL EFFECTS

11.6.1 WORST CASE SCENARIO

11.6.1.1 OfTW

42. With regard to the Amended OfTW Corridor, no further sites or features of cultural heritage significance have been identified in the additional area, and therefore no further effects are predicted.

43. Section 4: Amended Project Description presents the worst case scenario for the Amended Project. As outlined above, the Amended Project has a revised OfTW cable installation period. This would result in an increase in vessel activity within the Amended Study Area and therefore the risk of damaging cultural heritage assets as a result of increased vessel movements and anchoring activities during the OfTW cable installation is considered. This amendment to the worst case parameters results in a temporal increase in construction vessels; however, the construction area does not change and hence the spatial extent within the Amended OfTW Corridor remains the same as the Original OfTW Corridor.

44. Section 26.4 of the Original ES, presents the embedded mitigation for the Original Project. This states all identified and potential cultural heritage assets within the OfTW have been avoided through the development design process; with the furnishing of appropriate exclusion zones to guard against physical/direct effects.

45. Therefore it is judged that the Amended Project would not alter the assessment conclusions presented in the Original ES.

46. The potential effects therefore remain unchanged from those presented in Section 26.5 of the Original ES.

11.6.2 CONSIDERATION OF THE MOST LIKELY SCENARIO

11.6.2.1 Wind Farm

47. As stated in Section 11.5.2, the most likely scenario differs from the worst in that it reduces the number of turbines and utilises pin piles as opposed to gravity bases for the turbine, OSPs and meteorological masts. Furthermore, the length of inter-array cable which will be buried is also reduced in the most likely scenario.

48. All of these factors result in a reduction in the area of the sea bed which may be subject to direct effects from the construction of these structures and thus the effects of the most likely scenario for the Wind Farm would be less than those of the worst case.

49. Operational effects of the Wind Farm are limited to those for which there maybe a visual effect on cultural heritage assets. In considering the most likely scenario in terms of visual effects (Section 8.6.3), it was concluded that the most likely scenario would not alter the magnitude of effect on visual receptors and hence there would be no change to the level of effects as a result of the most likely scenario.

11.6.2.2 OfTW

50. The most likely scenario presents a decrease of 0.8 m, from 2.5 m to 1.7 m in terms of the depth of cable burial. The potential to disturb hitherto unknown cultural heritage assets was assessed as being low and this reduction in trenching volume further alleviates the potential risk.

51. The most likely scenario presents a timescale for installation of the cable over a two year period, as opposed to a three year period assessed as the worst case. The spatial extent of the cable laying works does not change; however, in the most likely scenario there is a temporal decrease which would slightly minimise the effect. Given the embedded mitigation in place, this would be minimal.

52. Therefore it is judged that the most likely scenario would not alter the assessment conclusions presented for the worst case.

11.7 MITIGATION MEASURES AND RESIDUAL EFFECTS

53. Mitigation measures remain unchanged from those presented in Section 26.6 of the Original ES.

54. Residual effects remain unchanged from those presented in Section 26.6 of the Original ES.

11.8 ASSESSMENT OF CUMULATIVE EFFECTS

55. Cumulative effects for marine archaeology and cultural heritage are presented in Section 15.10 of the Original ES. Cumulative effects remain unchanged from those presented in Section 15.10 of the Original ES.

11.9 STATEMENT OF SIGNIFICANCE

56. As the findings of the assessment in the Original ES remain unchanged, the statement of significance therefore remains unchanged from that presented in Section 26.9 of the Original ES.

11.10 REFERENCES

57. References remain unchanged from those presented in Section 26.10 of the Original ES, with the exception of the following further unpublished source:

58. Gardline Geosurvey Limited (2007). UKCS 12/26c Polly Rig Site, Habitat Assessment and Environmental Baseline Survey.

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