1 INTRODUCTION

1.1 THE APPLICATIONS

1. This Environmental Statement (ES) has been prepared to accompany the consent applications to construct, operate and decommission the Beatrice Offshore Wind Farm (the Wind Farm) and associated offshore electricity transmission works (OfTW), together referred to as "the Project" (Figure 1.1). This ES reports the findings of the Environmental Impact Assessment (EIA) which has been carried out to assess the likely significant effects of the Project on the environment. The consent applications to be submitted are as follows and are discussed in further detail in Section 3: Legislation and Consenting Requirements of this ES.

   - Applications under Section 36 and 36A of the Electricity Act 1989; and
   - Marine Licence applications under the Marine (Scotland) Act 2010 and Marine and Coastal Access Act 2009.

2. The consent applications will be determined by the Scottish Ministers, acting through Marine Scotland Licensing Operations Team (MS-LOT).

3. An ES relating to the onshore transmission works associated with the Project is being prepared and will be submitted to the relevant authorities.

1.2 THE APPLICANT

4. In May 2008 the Crown Estate invited expressions of interest from companies wishing to develop commercial wind farms in Scottish territorial waters. Following the tender and selection process, in February 2009 SSE Renewables and SeaEnergy Renewables (now Repsol Nuevas Energias UK Limited) was awarded exclusivity by the Crown Estate to develop the Beatrice Offshore Wind Farm in Scottish territorial waters, off the east Caithness coastline. SSE Renewables and SeaEnergy Renewables (now Repsol Nuevas Energias UK Limited) then created a joint venture company to develop the Beatrice Offshore Wind Farm. The joint venture company is called 'Beatrice Offshore Wind Farm Limited' (BOWL) and 75% of its share capital is held by SSE Renewables Holdings (UK) Limited and 25% is held by Repsol Beatrice Limited (a wholly owned subsidiary of Repsol Nuevas Energias UK Limited). BOWL signed an Agreement for Lease with the Crown Estate in July 2011. The full lease with the Crown Estate will be entered into once the necessary statutory consents and permissions have been obtained and prior to construction commencing.

5. **SSE Renewables** is the renewable energy development division of SSE (Scottish and Southern Energy plc). It is responsible for the development and construction of onshore and offshore wind farms in the UK, Ireland and Europe, as well as developing hydro and marine projects. SSE is the UK's leading generator of renewable energy with over 2,450 megawatts (MW) of renewable electricity generation capacity. SSE is the second largest generator in the UK with a total electricity generation capacity of 11,290 MW. In partnership with Talisman, SSE developed and owns the two existing wind turbines adjacent to the Beatrice oil platforms known as the Beatrice demonstrator project (10 MW). In association with

joint venture partners, SSE is already constructing 876 MW of offshore wind farm capacity in the UK (Greater Gabbard and Walney). In addition to this, SSE has secured the Crown Estate rights for the possible development of additional offshore wind farm assets later in the decade with a potential total capacity of up to 4.8 GW, including Beatrice Offshore Wind Farm.

6. **Repsol Nuevas Energías UK (Repsol)** was formed following Repsol FVP's purchase of 100 % of SeaEnergy Renewables Limited in June 2011. The Repsol development team includes members of the team which conceived, developed and delivered the Beatrice Wind Farm Demonstrator Project, the world's first deep water wind farm development. Repsol has development rights for a total of 1,190 MW of generating capacity in the United Kingdom.

1.3 PURPOSE AND STRUCTURE OF THIS ENVIRONMENTAL STATEMENT

7. This ES comprises the following volumes:

- Non Technical Summary (NTS);
- Environmental Statement Volume 1a and b: Main Text;
- Environmental Statement Volume 2: Figures;
- Environmental Statement Volume 3: Seascape, Landscape and Visual Assessment Figures; and
- Environmental Statement Volume 4a and b: Technical Annexes.

8. The Volume 1 ES Main Text is structured as follows:

- Sections 1 to 6 provide an overview of the Project in terms of the legislative, planning and consenting process and requirements including details of consultation undertaken and site selection and consideration of alternatives;
- Section 7 provides a full description of the Project, and outlines construction and decommissioning methodologies;
- Section 8 describes relevant designated sites and the process by which they have been considered in the ES;
- Sections 9 to 20present the topic specific EIAs for the Wind Farm element of the Project, including identification of potential effects, assessment of likely significant effects, proposed mitigation measures, subsequent residual effects and an assessment of cumulative effects; and
- Sections 21 to 29 present the topic specific EIAs for the OfTW element of the Project, including consideration of potential effects, assessment of likely significant effects, proposed mitigation measures, subsequent residual effects and an assessment of cumulative effects; and
- Section 30 describes other relevant infrastructure and marine uses in the Moray Firth not covered elsewhere in the ES.

9. The ES is accompanied by the following:

- A cover letter;
- Planning and Policy Statement;
- Pre-Application Consultation Report; and

- Non Technical Summary.

10. Information to Inform an Appropriate Assessment will be submitted separate to the ES. Likely significant effects on ecological receptors are addressed in terms of EIA requirements throughout this ES.

1.4 THE EIA TEAM

11. The ES co-ordination and EIA team is summarised in Table 1.1 and includes technical experts from a number of specialist consultancies as well as input from BOWL.

Table 1.1 EIA Team

Topic Area	Organisation Responsible
EIA Team	
EIA co-ordination and management	Arcus Renewable Energy Consulting Ltd (Arcus) Environmental Resources Management (ERM)
Introduction, Climate Change and Marine Policy, Legislation and Consenting, EIA Methodology, Consultation	ERM Arcus
Site Selection and Consideration of Alternatives	BOWL ERM J P Kenny
Project Description	BOWL Arcus
Airborne noise	ERM
Other issues	ERM SSE Arcus
Physical processes and geomorphology	ABP marine environmental research (ABPmer)
Underwater noise	Subacoustech
Benthic and epibenthic ecology	Centre for Marine and Coastal Studies (CMACS)
Fish and shellfish ecology	Brown and May Marine Ltd
Commercial fisheries	Brown and May Marine Ltd
Ornithology	RPS Group PLC
Marine mammals	RPS Group PLC
Shipping and navigation	Anatec
Seascape, Landscape and visual environment	LDA Design
Marine archaeology and cultural heritage	Headland Archaeology
Aviation and MOD	SSE Helios Osprey Consulting
Socio economics, recreation and tourism	SQW

Topic Area	Organisation Responsible
EIA Baseline Survey and Support	
Boat based ornithology surveys	Institute of Estuarine Coastal Studies (IECS) University of Plymouth RPS Group PLC
Marine mammal baseline data collection	Sea Mammal Research Unit Limited (SMRU) University of Aberdeen Institute of Estuarine Coastal Studies (IECS)
Planning and environmental legal advice	Dundas and Wilson
Metocean surveys	Partrac
Geotechnical Surveys and Site Investigation	Senergy Survey and Geoengineering Fugro Geoconsulting Limited Gardline
Geophysical surveys	Osiris Projects Gardline
Engineering design and drawings	J P Kenny
Collaboration and Data Share with Moray Offshore Renewables Ltd	
Physical processes and geomorphology, Underwater noise, Benthic ecology, Fish and shellfish ecology, Commercial fisheries, Ornithology, Marine mammals, Shipping and navigation, Marine archaeology and cultural heritage, Aviation and MOD.	

1.5 THE PROJECT

12. The Project comprises three key elements which are defined and described in Table 1.2.

1.5.1 DEFINITION OF TERMS

13. For the purposes of the EIA and this ES the definitions in Table 1.2 have been used.

Table 1.2 Definition of Terms

Term	Definition
BOWL	Beatrice Offshore Windfarm Limited (BOWL), the body submitting the applications for the Project.
The Project	The offshore development proposal in its entirety, including the Wind Farm and the Offshore Transmission Works.
The Project Boundary	The Project Boundary includes the Wind Farm Site and the OfTW Corridor i.e. the whole area to which the consent applications relate (Figure 1.1).
Beatrice Offshore Wind Farm (the Wind Farm)	The Wind Farm comprises a number of key elements including the wind turbines, inter-array cabling and meteorological masts.
The Wind Farm Site	The area within which the Wind Farm will be located (Figure 1.2).
Offshore Transmission Works (the OfTW) Site	The OfTW includes the approximate 65 km length of the route of the cable required to connect the Wind Farm to the Grid. This covers the cable route from the offshore substation platform(s) (OSPs) to the Mean High Water Springs (MHWS) at the landfall

Term	Definition
	west of Portgordon on the Moray coast. The OfTW may contain the OSPs depending on the Offshore Transmission Owner's arrangements. For the purposes of this ES the OSPs are assessed in the Wind Farm topic sections. The OSPs will however form part of the Marine License application for the OfTW.
The OfTW Corridor	The area within which the OfTW cable will be located (Figure 1.2).
Onshore Transmission Works (OnTW)	All components and operations for the onshore elements. The EIA of these elements is being reported in a separate ES and is subject to a separate consent application.

1.5.2 THE WIND FARM

14. The Wind Farm Site is located approximately 25 km south south-east of Wick, Caithness. The Wind Farm Site boundary is, at its closest point, 13.5 km from the coastline (Figure 1.1).

15. The total development area is approximately 131.5 km^2 and sits at the north westernmost point of the Smith Bank. The two existing Beatrice demonstrator turbines are located approximately 11 km to the south west of the Wind Farm site (Figure 1.1). The existing unmanned Jacky oil platform is located adjacent to the south west of the site and the existing Beatrice B, A and C oil platforms are located approximately 5, 10 and 14 km south west of the site, respectively.

16. The Wind Farm will have an installed capacity of up to 1,000 MW and will comprise up to 277 three-bladed horizontal axis wind turbines. The wind turbines will be secured to the seabed and a network of electricity cables, known as the inter-array cables, will be required to connect the wind turbines to Offshore Substation Platforms (OSPs). Up to three OSPs will be required to collect the electricity generated by the wind turbines. Up to three meteorological masts will be constructed and will be located at the edge of the Wind Farm Site and up to three metocean buoys will be anchored to the seabed within the Wind Farm Site to gather data on the wave and tidal regime throughout the lifetime of the Project.

17. The wind turbines will be designed to operate for a minimum period of 25 years. The future of the site will be determined towards the end of the operational life of the turbines and the Wind Farm could be repowered, refurbished and reconditioned or decommissioned. A decommissioning plan will be prepared and submitted to the Department of Energy and Climate Change (DECC) for approval prior to construction of the Project.

1.5.3 OFFSHORE TRANSMISSION WORKS

18. The Wind Farm requires an electricity export cable to run from the Wind Farm and connect it to the Grid. The cable route from the Wind Farm to the MHWS at the landfall to be located west of Portgordon, forms the OfTW. To enable this connection approximately 65 km of subsea cable is required to be laid between the Wind Farm and the landfall (Figure 1.2).

1.5.4 ONSHORE TRANSMISSION WORKS

19. The OnTW constitutes the underground cable to be laid between the Mean Low Water Springs (MLWS) at the landfall near Portgordon and the Grid connection point at Blackhillock near Keith, and a new substation which is required to connect into the Grid. This new substation is in addition to the existing substation at Blackhillock. The EIA for the OnTW will be reported within a separate ES.

15 WIND FARM MARINE ARCHAEOLOGY AND CULTURAL HERITAGE

15.1 INTRODUCTION

1. This Section of ES evaluates the likely significant effects of the Wind Farm on both offshore and onshore cultural heritage assets. The assessment has been undertaken by Headland Archaeology (HA) and includes an assessment of cumulative effects.

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

- Appendix 15.1: Gazetteer and Concordance;
- Appendix 15.2: Assessment of Setting Effects;
- Annex 15A: Marine Archaeology and Cultural Heritage Baseline Technical Report;
- Section 9: Physical Processes and Geomorphology; and
- Section 14: Seascape, Landscape and Visual Assessment.

3. Cultural heritage assets are referred to by Headland Archaeology (HA) numbers, listed in Appendix 15.1.

4. This Section of the ES includes the following elements:

- Assessment Methodology and Significance Criteria;
- Baseline Description;
- Development Design Mitigation;
- Assessment of Potential Effects;
- Mitigation Measures and Residual Effects;
- Summary of Effects;
- Assessment of Cumulative Effects;
- Statement of Significance; and
- References.

5. The assessment of cumulative effects also considers cumulative effects as a result of activities related to the OfTW.

15.1.1 POLICY AND PLANS

6. The following policy, guidance and best practice documents have been considered in the preparation of this marine archaeology and cultural heritage baseline and assessment of effects:

- Historic Environment Guidance for the Offshore Renewable Energy Sector (COWRIE/Wessex Archaeology, 2007);
- Guidance for Assessment of Cumulative Effects on the Historic Environment from Offshore Renewable Energy (COWRIE/Oxford Archaeology, 2007);
- The Joint Nautical Archaeology Policy Committee (JNAPC) Code of Practice for Seabed Developers (JNAPC, 2007); and
- Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (COWRIE/ EMU Ltd., 2011).

7. Relevant International and European Charters and Conventions, UK & Scottish Legislation, Scottish Planning Policy, Regional and Local Planning Guidance are presented in more detail in Annex 15A.

15.2 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

15.2.1 CONSULTATION

8. In order to produce an informed assessment, contact was initiated with relevant statutory authorities who included Historic Scotland and the Highland Council Historic Environment Team (HCHET). The Moray Archaeological Service indicated that they considered the Wind Farm would not adversely affect assets within their remit.

Table 15.1 Summary of Consultation Responses

Consultee	Summary of Consultation Response	Headland Archaeology Response
Historic Scotland (EIA Scoping Response in relation to marine archaeology)	The principle of the proposal is satisfactory and Historic Scotland consider it unlikely that there shall be significant adverse effects on marine heritage assets. There are no relevant designations within the identified area or the immediate vicinity of the Wind Farm search area. Potential effects on undesignated wrecks within the surrounding area be assessed, and indirect effects to historic assets on the seabed within the Wind Farm area that may be affected by alteration to tidal currents and sedimentary regimes, and by changes to the chemical balance of the water and seabed sediments should be assessed. The fact that an archaeological analysis of the geophysical survey would be undertaken consistent with guidelines set down in 'Historic Environment Guidance for the Offshore Renewable Energy Sector' (Cowrie 2007) was noted by Historic Scotland. Historic Scotland encouraged that archaeological analysis of geotechnical surveys be undertaken.	This has been noted where the advice from Historic Scotland has been integrated into the established assessment methodology.
Historic Scotland (EIA Scoping Response in relation to Scheduled Monuments and their settings, category A Listed Buildings and their settings, Inventoried Gardens and Designed Landscapes and	Historic Scotland is content with the proposed study area and methodology. Historic Scotland recommended that 'JNAPC – Code of Practice for Seabed Development' and 'Historic Environment Guidance for the Offshore Renewable Energy Sector' (COWRIE 2007) should be referenced for guidelines. That there are terrestrial assets with a	The assessment has been conducted in line with industry best practice guidance including the JNAPC Code of Practice for Seabed Development. This has been noted and considered within the 'setting' impacts on key onshore receptors within

Consultee	Summary of Consultation Response	Headland Archaeology Response
Designated Wreck sites (Protection of Wrecks Act 1973), and in this case, matters relating to marine archaeology outside the scope of the terrestrial planning system)	seascape setting which may be subject to an effect as result of the proposed offshore turbines (15 April 2010). Historic Scotland concluded that (in reference to visualisation within the Scoping Report) it is unlikely that the Project will have a significant adverse effect on the setting of terrestrial assets within Historic Scotland's statutory remit. Historic Scotland confirmed that it was content that, with regards to assets within its remit, the cumulative effect assessment (for the BOWL and MORL projects) should only consider the setting of Dunbeath Castle.	the assessment.
Historic Scotland (Other correspondence)	Historic Scotland agreed general viewpoints from Dunbeath and Wick Bay, with specific viewpoints from Hill O'Many Stanes and general viewpoints in the vicinity of the Hill of Ulbster (Borrowston Broch) and Latheronwheel.	Wireframes and photographs from the agreed viewpoints were provided to Historic Scotland. Photomontages from viewpoints in the vicinity of Hill o'Many Stanes (Viewpoint 6), Dunbeath (Viewpoint 9), Wick Bay (Viewpoint 4), Hill of Ulbster (Viewpoint 5) and Latheronwheel (Viewpoint 8) are presented in Section 14: Seascape, Landscape and Visual Assessment of this ES.
The Highland Council Historic Environment Team (HCHET) (Response to correspondence from Headland Archaeology)	In response to a consultation request from Headland Archaeology, the HCHET stated that it required those sites which are publically accessible, and where access and interpretation have been provided, to be identified and assessed for potential setting effects (email 24 February 2011). Assets which have been intentionally aligned to incorporate sea views should also be identified and assessed. The HCHET also requested that the assessment consider the Yarrows and Warehouse Hill landscape, as well as any potential cumulative effects by the Burn of Whilk wind farm, associated mitigation of which may include opening up access and interpretation to other scheduled monuments in the vicinity. Cairn of Get was also requested by the HCHET to be included within the assessment. The HCHET confirmed (email 22 June 2011)	The effect upon the setting of the agreed assets has been assessed (Appendix 15.2)

Consultee	Summary of Consultation Response	Headland Archaeology Response
	that, with regards to assets within its remit, it was content that the cumulative effect assessment (for the BOWL and MORL projects) should only consider the setting of Lybster Conservation Area, Lybster Harbour complex and Whaligoe Steps.	After review of the preliminary Zone of Theoretical Visibility (ZTV), and a list of those assets to be visited during the site visit (compiled by Headland Archaeology), the HCHET required two more sites to be added to the list, the Category A-listed farmhouse, The Corr, and the Category B-listed Forse House Hotel.

15.2.2 SCOPE OF ASSESSMENT

9. The assessment has considered the effects of the Wind Farm upon the following:

- Designated cultural heritage assets, comprising Designated Wrecks, Scheduled Monuments, Listed Buildings, Conservation Areas, Inventory Gardens and Designed Landscapes (IGDLs), Inventory Battlefields and non-designated cultural heritage assets; and
- Undesignated submerged archaeology, including maritime losses such as wrecks, aircraft and their associated debris and palaeo-environmentally significant deposits.

15.2.2.1 Elements Scoped out of the assessment

10. The scope of this assessment does not include the following:

- Potential for Unexploded Ordnance (UXO);
- Onshore undesignated assets have been scoped out through consultation with the Highland Council and Moray Council; and
- The assessment of effects during decommissioning of the Wind Farm as these are essentially the same as the construction phase.

15.2.3 GEOGRAPHICAL SCOPE

15.2.3.1 Physical Effects

11. Two Study Areas have been used in the assessment of physical effects. The Inner Study Area consists of the Wind Farm site, while the Outer Study Area included a 1 km buffer zone around the Wind Farm site. All cultural heritage assets within the Inner Study Area and the Outer Study Areas are considered for potential physical effects.

15.2.3.2 Effects on Setting

12. A Study Area extending 15 km from the outermost proposed turbines has been considered for setting effects. Within it, data has been gathered for all designated nationally important assets (Scheduled Monuments, Category A listed buildings and Inventory Gardens and Designed Landscapes (IGDL)) which lie within the

ZTV. In addition, Conservation Areas were identified and other assets considered where raised by consultees. Beyond this distance, only assets specifically identified by consultees as being of concern have been considered.

13. The Study Areas described above and utilised for the purposes of the assessment are illustrated on Figure 15.1.

15.2.4 BASELINE SURVEY METHODOLOGY

14. The cultural heritage assessment comprises the results of a baseline desk based survey and site visit, with analysis and assessment of marine geophysical and geotechnical survey data in order to identify all cultural heritage assets within the Study Areas (as illustrated on Figure 15.1).

15.2.4.1 Desk Based Surveys

15. The desk based study has been based on readily available and relevant documentary sources. The following archives were referred to:

- Databases of designated cultural heritage assets maintained by Historic Scotland including Designated Wrecks;
- National Monuments Record of Scotland (NMRS) held by the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) including maritime losses;
- UK Hydrographic Office Wrecks and Obstructions Database (SeaZone);
- Ministry of Defence (military remains only);
- Receiver of Wreck (ROW);
- The Inventory of Gardens and Designed Landscapes in Scotland;
- The Inventory of Historic Battlefields in Scotland;
- The HCHET Historic Environment Record (HER); and
- National Library (for historic charts and maps only).

15.2.4.2 Site Visit

16. An onshore site visit was completed between the 13th and 15th April 2011. During the consultation outlined in section 15.2.1, seventeen sites had been identified by Historic Scotland and the HCHET (Table 15.1), all of which were visited during the course of the site visit. The baseline condition of each monument was noted, as were key views from each location. Photographs from the field visit were forwarded to Historic Scotland and to the HCHET for further comment. No further comment was received.

15.2.4.3 Geophysical Survey Analysis

17. A geophysical survey of the Wind Farm Application Site was undertaken by Osiris Projects on behalf of BOWL (Cullen & Regan, 2010; Walters, 2010) and subsequently made available for archaeological analysis and assessment (Appendix 15.1).

18. The aim of this marine geophysical archaeological assessment was to identify any cultural heritage assets recorded from the surveyed area and to inform the baseline study and Assessment of Environmental Effects for the Project. Marine geophysical

survey data was collected using sidescan sonar, magnetometer, sub-bottom profiler and multi-beam bathymetry. Geophysical targets were identified and given a high, medium or low archaeological potential rating.

15.2.4.4 Geotechnical Survey Analysis

19. A geotechnical survey of the Wind Farm site was undertaken and an archaeological assessment of the palaeo-environmental potential of the study areas was carried out (Appendix 15.1). A total of five boreholes were collected and assessed from five locations across the Wind Farm site. The borehole logs were assessed in order to gauge whether the deposits contained any sediments with palaeo-environmental potential; in particular peats or sediments with high organic contents such as organic silts.

15.2.5 METHODOLOGY FOR THE ASSESSMENT OF EFFECTS

15.2.5.1 Worst Case

20. The complete range of options being considered for each element of the Wind Farm is provided in Section 7: Project Description. The worst case scenario for cultural heritage has been considered in relation to foundation options for wind turbines and offshore platforms (OSP's), and for cable installation techniques. The temporary zone of influence (the largest area that could be affected including scour protection) has been considered. The Rochdale Envelope parameters considered for each effect assessed in this Section are set out in Table 15.2.

Table 15.2 Worst Case Scenarios Tested

Potential Effect	Worst Case / Scenario Assessed
Wind Farm: Construction and Decommissioning Phases	
Direct physical effects on the sea bed as a result of wind turbine foundation construction	277 no. 3.6MW turbines using tubular jacket & gravity base foundations are considered to be the worst case scenario, as this option effects upon the largest area of seabed (3.81 km^2)
Direct physical effects on the sea bed as a result of offshore platform foundation construction	2 single AC substations and one HVDC converter station with a gravity based foundation are considered to present the worst case as this option has the largest seabed footprint (62,601 m^2).
Laying of Inter array cables	Burying all cabling is assessed as the worst case construction method.
	277 no. 3.6MW turbines are considered to present the worst case, as the greatest length of cable would be required (up to 350 km buried).
Wind Farm: Operational Phase	
Effects on the setting of onshore cultural heritage assets	142 no. 7 MW turbines of 198.4 m to tip are considered to be the worst case scenario as they have the most extensive ZTV and will be the most prominent.

15.2.5.2 Construction Effects

21. The construction of the Wind Farm and associated activities including construction vessels deploying anchors has the potential to damage or destroy cultural heritage assets. This may occur either as a result of routine or non-routine effects, as outlined in Section 4.2.4 of this ES and in Table 15.3.

Table 15.3 Type of Effects

Type of Effect	Description
Direct Effect	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.
Indirect Effect	Potential damage to archaeological sites and features within the Application Site may be caused by indirect effects. These might include inter-relating effects such as scour changes to the sediment regime within the Wind Farm site. Some indirect effects may be beneficial, for instance the burial of sites and features by increased sedimentation.
Secondary Effect	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.
Cumulative Effect	The assessment will consider the potential for the effects of cumulative effects associated with the Project on sites, features and artefacts of cultural heritage interest. Possible effects may include those within the Outer Study Area, such as, continued interference through cable laying activities upon a relict landscape surface or deposit. Effects outside the Wind Farm Site may include the effects of several developments within the same locality on the cultural heritage resource.

22. Effects on setting are considered in relation to the construction and operational effects of the Project.

Sensitivity

23. The sensitivity of a cultural heritage asset to an effect reflects the level of importance assigned to it. This is the product of a number of factors, including its potential as a resource of archaeological data, its association with significant historical events, its role as a local landmark with cultural associations and its aesthetic value.

24. Official designations applied respectively to cultural heritage assets have been taken as indicators of importance as they reflect these factors. Sensitivity is assigned to undesignated cultural heritage assets according to the professional judgment of the assessor.

25. The criteria used for defining a cultural heritage asset's sensitivity to direct and indirect physical effects is summarised in Table 15.4.

Table 15.4 Sensitivity of Cultural Heritage Assets to Physical Effects

Sensitivity to Effect	Definition
High	Cultural heritage assets of international/ national importance. Designated wrecks and Scheduled Monuments. Maritime losses where the position is known and positively identified. Targets of high archaeological potential identified in the geophysical survey.
Medium	Cultural heritage assets of regional importance. Targets of medium archaeological potential identified in the geophysical survey. Obstructions that could be indicative of wreckage or submerged features
Low	Targets of low potential identified in the geophysical survey.

Magnitude

26. In determining the magnitude of effect, the values of the asset affected are first defined. This allows the identification of key assets and provides the baseline against which the magnitude of change can be assessed; the magnitude of effect being proportional to the degree of change in the asset's baseline value. The criteria used for assessing the magnitude of effects on cultural heritage is summarised in Table 15.5.

Table 15.5 Magnitude of Effects on Cultural Heritage Assets

Magnitude of Effect	Definition
Large	Total loss or major alteration of the cultural heritage asset
Medium	Loss of, or alteration to, one or more key elements of the cultural heritage asset
Small	Slight but perceptible alteration of the cultural heritage asset
Negligible	Where there is a barely perceptible alteration to the cultural heritage asset.

15.2.5.3 Operational Effects

27. During the construction and operation of a development, the setting of cultural heritage assets may be affected. There is considerable debate over definitions of setting and approaches to the assessment of setting effects (Lambrick, 2008), with no standardised industry wide approach. Historic Scotland has produced a guidance note on setting as part of its 'Managing Change in the Historic Environment' (Historic Scotland, 2010) series of documents. This states that:

> *"Setting should be thought of as the way in which the surroundings of a historic asset or place contribute to how it is experienced, understood and appreciated". (Historic Scotland, 2010)*

28. Therefore, setting is not simply the visual envelope of the asset in question. Rather, it is those parts of the asset's surroundings that are relevant to the cultural significance of the asset. In general, there will be an appreciable historical relationship between the asset and its setting, either in terms of a physical relationship, such as between a castle and the natural rise that it occupies, or a more

distant visual relationship, such as a designed vista or the view from, for example, one Roman signal station to another. Some assets' cultural significance will relate to an aesthetic relationship with their surroundings which may result from design or be fortuitous.

29. In such instances the relevant landscape elements will be considered to form part of the asset's setting. The cultural significance of assets has been considered in terms of the values described in Scottish Historic Environment Policy (Historic Scotland, 2009,) as being:

- Intrinsic - those relating to the fabric of the asset;
- Contextual – those relating to the monument's place in the landscape or in the body of existing knowledge; and
- Associative – more subjective assessments of the associations of the monument, including with current or past aesthetic preferences.

30. Most setting effects will relate to contextual and associative values.

Sensitivity

31. The sensitivity of a cultural heritage asset to changes in its setting can be evaluated in the first instance by reference to any relevant designation, whereby assets designated as nationally important will generally be considered the most sensitive. Consequently, the assessment has focused on nationally important cultural heritage assets in the study areas which are considered in relation to effects upon setting.

32. Other assets are considered where, in the assessor's professional opinion, there is potential for significant effects or where they have been raised by consultees. Such assets are assigned sensitivity on the basis of professional judgement, but in general will be of no greater than medium sensitivity.

33. Following reference to the designation of the asset, sensitivity can be more finely assessed by reference to the importance of the asset's surroundings, to its character and value as a cultural heritage asset and the appreciation of its value. Also taken into account is the extent to which an asset is visible on the ground. Some assets may have a well-defined and appreciable setting but the asset itself is barely perceptible. Such assets will generally be less sensitive than those that are readily appreciable.

34. Table 15.6 is a general guide to the attributes of cultural heritage assets of high, medium, low sensitivity to setting effects. It should be noted that not all the qualities listed need be present in every case and professional judgement is used in balancing the different criteria. As noted above, the guideline criteria have been developed by Headland, in the absence of official guidance or a standard methodology.

Table 15.6 Sensitivity of a Cultural Heritage Asset to Effects on Setting

Sensitivity	Guideline Criteria
High	The asset has a clearly defined setting that is readily appreciable on the ground and is vital to its significance or the appreciation thereof. The asset will generally be readily appreciable on the ground.
Medium	The asset's significance and the appreciation thereof relate to some extent to its setting. The asset will generally be appreciable on the ground.
Low	The asset's surroundings have little relevance to its significance or the appreciation thereof. The asset is difficult to identify on the ground or its setting is difficult to appreciate on the ground.

Magnitude

35. The magnitude of an effect reflects the extent to which relevant elements of the cultural heritage asset's setting are changed by a development and the effect that this has upon the significance and value of the asset and the appreciation thereof; a development may be visible from an asset without necessarily affecting significance or a large degree of visual change may only have a slight effect upon cultural significance. Guideline criteria for positive or negative magnitude defined as large, medium, small or negligible magnitude are described in Table 15.7. As with other criteria presented, this is intended as a general guide and it is not anticipated that all the criteria listed will be present in every case. Whilst some developments may adversely affect cultural significance as a result of noise or other sensory effects, such effects are not considered relevant in this instance owing to the distance of the turbines from the cultural heritage assets in question. Some developments may have positive effects where visual relationships are reinstated, for example. In this instance positive effects are highly unlikely to occur.

36. The following are guides that are used in the assessment of magnitude of effect.

- **Obstruction of or distraction from key views.** Some assets have been sited or designed with specific views in mind, such as the view from a Roman signal station to an associated fort or a country house with designed vistas. The obstruction or cluttering of such views would reduce the extent to which the asset could be understood and appreciated by the visitor. Developments such as that proposed outside a key view may also distract from them and make them difficult to appreciate on account of their prominence. In such instances the magnitude is likely to be greatest where views have a particular focus or a strong aesthetic character.
- **Changes in prominence**. Some assets are deliberately placed in prominent locations in order to be prominent in the surrounding landscape, for example prehistoric cairns are often placed to be silhouetted against the sky and churches in some areas are deliberately placed on ridges in order to be highly visible. Developments can reduce such prominence and therefore reduce the extent to which such assets can be appreciated.
- **Changes in landscape character**. A particular land use regime may be essential to the appreciation of an asset's function, for instance the fields surrounding an

Improvement Period Farmstead are inextricably linked to its appreciation. Changes in land use can leave the asset isolated and reduce its value. In some instances, assets will have aesthetic value or a sense of place that is tied to the surrounding landscape character.

- **Duration of effect**. Effects that are short term are generally of lesser magnitude than those that are long term or permanent.
- **Reversibility of Effects.** Readily reversible effects are generally of lesser magnitude than those that cannot be reversed.

37. Effects upon a defined setting will be of greater magnitude than those that affect unrelated elements of the asset's surroundings or incidental views to or from an asset that are unrelated to the appreciation of its value. It should be noted that the assessment of magnitude has been based on the interplay of these factors. No single factor is taken to override other factors, for instance a negative effect that would be of high magnitude will not generally be reduced to low magnitude, simply on the grounds that it is reversible. Where this is the case, the reasoning behind this has been given. As above, the criteria provided have been developed by Headland in the absence of official guidance or an accepted methodology.

Table 15.7 Magnitude of an Effect on the Setting of a Cultural Heritage Asset

Magnitude	Guideline Criteria
Large positive	The contribution of setting to the cultural heritage asset's significance is considerably enhanced as a result of the development; a lost relationship between the asset and its setting is restored, or the legibility of the relationship is greatly enhanced. Elements of the surroundings that detract from the asset's cultural heritage significance or the appreciation of that significance are removed.
Medium positive	The contribution of setting to the cultural heritage asset's significance is enhanced to a clearly appreciable extent as a result of the development; as a result the relationship between the asset and its setting is rendered more readily apparent. The negative effect of elements of the surroundings that detract from the asset's cultural heritage significance or the appreciation of that significance is appreciably reduced.
Small positive	The setting of the cultural heritage asset is slightly improved as a result of the development, slightly improving the degree to which the setting's relationship with the asset can be appreciated.
Negligible	There are changes in the surroundings of the asset, however, these do not appreciably reduce its cultural significance.
Small negative	The contribution of the setting of the cultural heritage asset to its significance is slightly degraded as a result of the development, but without adversely affecting the interpretability of the asset and its setting; characteristics of historic value can still be appreciated, the changes do not strongly conflict with the character of the asset, and could be easily reversed to approximate the pre-development conditions.
Medium negative	The contribution of the setting of the cultural heritage asset to its significance is reduced appreciably as a result of the development and cannot easily be reversed to approximate pre-development conditions. Relevant setting characteristics can still be appreciated but less readily.
Large negative	The contribution of the setting of the cultural heritage asset to its significance is effectively lost or substantially reduced as a result of the development, the relationship between the asset and its setting is no longer readily appreciable.

15.2.6 ASSESSMENT OF SIGNIFICANCE

38. The significance of an effect on a cultural heritage asset, whether a physical effect (direct or indirect) or an effect on its setting, is assessed by combining the magnitude of the effect and the sensitivity of the cultural heritage asset. The Evaluation of Significance matrix presented in Table 15.8 provides a guide to decision making, but is not a substitute for professional judgement and interpretation, particularly where the sensitivity or effect magnitude levels are not clear or are borderline between categories. Effects of moderate or major significance are considered significant in terms of the EIA Regulations.

Table 15.8 Criteria for Assessing the Significance of Effects on Cultural Heritage Assets

Sensitivity or Value of Resource or Receptor	Magnitude of Effect			
	Negligible	**Small**	**Medium**	**Large**
Low	Negligible	Negligible	Minor	Moderate
Medium	Negligible	Minor	Moderate	Major
High	Negligible	Moderate	Major	Major

15.2.7 ASSESSMENT LIMITATIONS

39. No data gaps or uncertainty arose during the course of this assessment.

15.3 BASELINE CONDITIONS

40. From the surveys undertaken and described above the following description of the existing cultural heritage environment has been made.

41. The Moray Firth has been undergoing isostatic uplift since the end of the last glacial period and it is estimated that the Inner Moray Firth may have undergone as much as 42 m of uplift since c. 9,600 Before Present (BP) (Haggart, 1982). Holocene relative sea level change has been investigated across sites in northeast Scotland and show a broad trend of falling sea level from the Late Glacial Maximum of c. 15,000 BP to c. 10,000 BP to levels below that of present day sea level; the early-Holocene minimum (Shennan et al, 2000; Shennan and Horton, 2002). This is followed by a period of sea level rise, until around 5,000 BP when sea level began to fall, with this trend continuing in the area to the present (Shennan and Horton 2002). It is thought that the driving cause for this sea level fall within this area is isostatic uplift (Lambeck, 1992).

42. The Wind Farm Site itself is known from previous studies (e.g. Flemming, 2004) to have been largely restricted in the past to glacial and marine conditions; therefore never becoming terrestrialised within the last 12,000 years. Relative sea level change in the area, combined with glacial isostatic uplift, has meant that the Outer Moray Firth has remained either under ice sheets or submerged by the North Sea since the last glacial period. This means that there have been no opportunities for terrestrial deposits of palaeo-environmental interest, such as peats to develop.

43. The solid geology directly beneath the Wind Farm Site is composed of a thick sequence of sandstones and mudstones of Lower Cretaceous Age (Cullen & Regan, 2010). This is overlaid with Pleistocene deposits of Quaternary age made up of soft clayey silts to hard gravely clays. The silts are recorded to be <10 m, if present at all, with gravels reaching depths of up to 50 m in parts likely to represent glacial tills. Above these Quaternary deposits are thin surface sediments of sands and gravels accrued during from the Holocene period. The pre-Holocene sediment deposits in the Inner Moray Firth have been recorded up to a maximum depth of

47 m from borehole evaluations from the British Geological Survey (BGS). These shallow boreholes from the Inner Moray Firth date as far back as mid-last Glaciation and reveal seven units of stratigraphy providing further evidence for the geomorphology of the region.

44. There have been no reported Palaeolithic finds or deposits of archaeological significance in the vicinity of the Inner and Outer Study Area. A flint scraper recovered from a borehole core sample taken on the Viking Bank off Shetland some distance to the north in the North Sea represents the only prehistoric find from a maritime context discovered to date (Fleming, 2004). A number of lithic scatters have been identified along the north east coast at Keiss and in the Yarrows basin. This evidence suggests that settlement was occurring at coastal locations from the later Mesolithic period onwards, and that tool manufacturing had occurred over a prolonged period of time throughout prehistory in the area (Pannett and Baines, 2002).

45. In addition, there is a dense concentration of prehistoric sites known from coastal locations to the west of the Inner and Outer Study Area on the north east coast. The Cairn of Get and Hill o'Many Stanes near Wick suggest ritual activity from the Neolithic into the Bronze Age close to Moray Firth, which was presumably associated with settlement, evidence for which is less readily apparent. At Freswick, a shell midden of limpet shells and fish bones was excavated and suggested to be the site of a Bronze Age encampment that overlay a mesolithic layer containing flakes, cores and scrapers (Lacaille, 1954). Iron Age activity appears to have been widespread along this area of coast. Up to 200 brochs have been identified in Caithness, many having widespread views of the seascape including Borrowston Broch (Hill of Ulbster), Watenan Fort (SM 907) and Tulloch (Usshilly) Broch and field system (SM 599).

46. Archaeological and documentary evidence for Roman occupation in Scotland is well documented and discussion with regard to the utilisation of the sea around Scotland has also been postulated (Martin in Smout, 1991). There is no question that both military and merchant maritime traffic would have been extensively employed during this period, connecting with the many Roman fort networks on the major east coast Firths; notably Cramond on the Forth and Carpow on the Tay, and possibly maritime nodal points such as Aberdeen.

47. The Early Medieval and Medieval Period witnessed increasing contact between cultural groups throughout the British Isles, especially in relation to the spread of Christian culture and the written record from this period makes constant reference to journeys undertaken by those involved with the church. Monastic foundations on the east coast of Scotland are well represented, particularly the monastery at Portmahomack (Carver, 2008) approximately 60 km to the south west of the study area at the mouth of the Dornach Firth.

48. Documentary sources state that the North Sea was frequently navigated by Danish and Norse Vikings, Orkney becoming a base in their expansion south and west from Norway. There are a number of accounts of maritime travel by the Vikings from Orkney, including an account from the 13th century when King Haakon

Haakonson arrived in Orkney with a fleet of over 100 ships (Ó Cróinín, 2005). Place names show that Caithness was an area for Norse activity, Wick being an example. Excavations at Freswick Links revealed evidence of a Norse settlement from at least the 11th century. Investigation of eroding deposits along the cliff revealed traces of buildings and midden debris comprised of sufficient fish bone to suggest that fishing may have been undertaken here on a commercial scale in the middle ages.

49. The post-Medieval period saw a steady increase in coastal activity where military activity and the expansion of world-wide trade meant further growth in the volume of shipping. Fishing has also been a significant industry in the area. During the 18th and 19th centuries there were major increases in the populations of Wick, Fraserburgh and Lossiemouth, while fishing villages and port facilities emerged at Whaligoe and Lybster, driven mainly by the growth of herring fishing. It is not surprising therefore, that many of the reported losses in this area are of smaller fishing vessels of various designs. It was not until the 20th century that metal hulls came into use in the herring trade and many of the earlier losses of wooden vessels are likely to be highly degraded and difficult to detect.

50. From the 18th century onwards records began to be kept of ship losses and from the middle of the 19th century these records became far more comprehensive. This is reflected in the National Monuments Record for Scotland (NMRS) that shows over 1,500 wrecks in the Moray Firth/North Sea area alone. Many of the recorded losses occurred during major storms, including the Great Storm of 1800 and other famous storms in 1852, 1874, 1875 and 1876. In the 1875 storm at least 15 vessels were lost and in 1876 there appears to have been at least 31 sinkings (Ferguson, 1991). So severe were these losses that they encouraged the adoption of steam power for cargo vessels and by the end of WWI most of the larger vessels in the area were steam powered.

51. The majority of identified shipwrecks in the seas of the Outer Moray Firth are as a result of military activity during WWI and WWII. Initial losses during WWI were caused by the extinguishing of coastal lights which resulted in numerous wrecks concentrated along the shoreline. In the latter half of 1917 a submarine offensive was launched by the German Navy which resulted in the sinking of at least eleven ships in the Outer Moray Firth (Ferguson, 1991). Records for shipping casualties are somewhat incomplete between 1939 and 1945 due to censorship, but approximately 50 merchant vessels were sunk off the north east coast as well as numerous military boats, ships, submarines and allied and German aircraft losses. WWII losses are concentrated around Rattray Head and the eastern approaches to the Moray Firth (Ferguson, 1991).

15.3.1 CULTURAL HERITAGE ASSETS WITHIN THE INNER STUDY AREA

52. There are no designated cultural heritage assets within the Inner Study Area. There are no previously recorded undesignated cultural heritage assets within the Inner Study Area.

53. In total, 11 targets of medium archaeological potential have been identified from the marine geophysical survey assessment within the Inner Study Area (Appendix 15.1). Of these, two have been identified as modern wellheads and are not considered further. The remaining 9 targets are unknown anomalies that could be indicative of unknown wreckage or submerged features. They are therefore considered to be of medium sensitivity within this assessment. This classification was based on a target that exhibits characteristics likely to represent the remains of a feature or maritime loss such as a vessel or aircraft including any associated debris; or fragments of the same.

Table 15.9 Table of Cultural Heritage Assets within the Inner Study Area

Headland Archaeology Number	Name	Type	Sensitivity
HA2	Unknown	Sonar Target	Medium
HA22	Unknown	Sonar Target	Medium
HA41	Unknown	Sonar Target	Medium
HA53	Unknown	Sonar Target	Medium
HA111	Unknown	Sonar Target	Medium
HA130	Unknown	Sonar Target	Medium
HA137	Unknown	Sonar Target	Medium
HA139	Unknown	Sonar Target	Medium
HA140	Unknown	Sonar Target	Medium

54. A further 131 targets considered to be of low archaeological potential were identified within the Inner Study Area. This classification was based on the shape, strength of reflection and in most cases uniqueness on the seabed in relation to the surrounding seabed characteristics. These are classed to be of low sensitivity within this assessment.

15.3.2 CULTURAL HERITAGE SITES WITHIN THE OUTER STUDY AREA

55. There are no designated cultural heritage assets within the Outer Study Area. There is one wreck charted by the UKHO within the Outer Study Area (Site HA1). This site is within the 1 km buffer zone and is considered to be of high sensitivity within this assessment.

56. One target of high potential was identified during the geophysical survey assessment within the Outer Study Area (Site HA63). The site was subsequently identified as a wellhead and of low sensitivity and was therefore scoped out of the assessment due to its modernity.

57. In total three targets of medium archaeological potential have been identified from the marine geophysical survey assessment within the Outer Study Area, as listed in Table 15.10 (for Sites HA122, HA136 and HA138 see also Gazetteer and Concordance in Appendix 15.1). These targets are unknown anomalies that could be indicative of unknown wreckage or submerged features. They are therefore

considered to be of medium sensitivity within this assessment unless further investigation proves otherwise.

Table 15.10 Table of Cultural Heritage Assets within the Outer Study Area

HA No.	Name	Type	Sensitivity
HA1	Carisbrook (possibly)	Wreck	High
HA63	Wellhead	Sonar & Mag Target	Low
HA122	Unknown	Sonar Target	Medium
HA136	Unknown	Sonar Target	Medium
HA138	Unknown	Sonar Target	Medium

15.3.3 POTENTIAL FOR UNRECORDED CULTURAL HERITAGE SITES IN THE STUDY AREA

58. There is low potential to encounter previously unrecorded cultural heritage assets within the Wind Farm Site. One wreck has been identified from the UKHO and NMRS datasets within the Outer Study Area and 3 other wrecks identified in the desk based assessment within a 5 km buffer zone. The NMRS data records more than 1,500 wrecks as having been lost in the Moray Firth/North Sea area, the majority of which the precise location is unknown.

59. The assessment of geophysical survey data has been undertaken and targets of archaeological potential have been identified. However, despite this comprehensive geophysical assessment any wooden wreck or debris which was buried at the time of the survey may not have been detected by the magnetometer or acoustic survey, therefore the possibility that undiscovered wrecks or features may still be present remains, albeit low.

60. No organic sediments such as peats or organic silts were identified in the geotechnical survey analysis. As discussed in Section 15.2.4.4 the potential for the presence of organic archaeological remains is low; although the presence of residual flints and lithic artefacts within the marine sediments remains a possibility.

15.3.4 ONSHORE CULTURAL HERITAGE ASSETS CONSIDERED WITH RESPECT TO SETTING EFFECTS

61. Through consultation with Historic Scotland and the HCHET, 16 assets were selected for consideration during the assessment (Figure 15.2), these are listed in Table 15.11.

Table 15.11 Cultural Heritage Assets Considered with Respect to Setting Effects

Reference Number	Asset Name	Status
N/A	Lybster	Conservation Area
HB 7935	The Corr	Category A-listed building
HB 7936	Dunbeath Castle	Category A-Listed building with IGDL
HB 7946 HB 7947	Forse House	Category B-listed building
HB 7954	Lybster Harbour	Category B-listed building
HB 7945	Dunbeath Portomin harbour	Category B-listed building
HB 9007, HB 75560	Whaligoe Steps and Quay	Category B-listed building
SM 4289 and 696	Watenan Broch and Fort	Scheduled monument
SM 5073	Dunbeath Inver Fort	Scheduled monument
SM 5182	Latheronwheel promontory fort	Scheduled monument
SM 527	Borrowston Broch (Hill of Ulbster)	Scheduled monument
SM 548	Garrywhin Fort and settlement	Scheduled monument
SM 7242	Tulloch (Usshilly) broch and field system	Scheduled monument
SM 90048	Cairn of Get	Scheduled monument
SM 90065	Castle of Old Wick	Scheduled monument
SM 90162	Hill O'Many Stanes	Scheduled monument

62. A detailed description of each asset presented in Table 15.11 is provided in Appendix 15.2.

15.4 DEVELOPMENT DESIGN/EMBEDDED MITIGATION

63. All identified and potential cultural heritage assets within the Inner and Outer Study Areas will be avoided through the Project design process; with the identification of appropriate exclusion zones to guard against potential damage to or loss of an asset. In addition, a Protocol for Archaeological Discoveries (PAD) will be established in the event of unexpected archaeological discoveries during construction, operation and decommissioning (Section 15.6).

15.5 ASSESSMENT OF POTENTIAL EFFECTS

15.5.1 CONSTRUCTION

15.5.1.1 Direct Physical Effects

64. No known cultural heritage assets identified will be directly affected by the construction of the Wind Farm.

15.5.1.2 Indirect Physical Effects

65. No known cultural heritage assets identified will be indirectly affected by the construction of the Wind Farm.

15.5.1.3 Secondary Physical Effects

66. Site HA1 is considered to be of high sensitivity within the assessment. The potential magnitude of the secondary physical effect on this heritage asset, as a result of constructing the Offshore Wind Farm would be medium. This is considered to be a major effect, significant in terms of the EIA regulations, in the absence of mitigation.

67. Sites HA2, HA22, HA41, HA53, HA111, HA122, HA130, HA136, HA137, HA138, HA139 and HA140 are all considered to be of medium sensitivity within this assessment. The potential magnitude of the secondary effect on all identified assets of medium sensitivity in this assessment is medium. This is considered to be a moderate effect, significant in terms of the EIA regulations, in the absence of mitigation.

15.5.1.4 Setting Effects

68. It is considered that the potential effects of the construction phase upon the setting of cultural heritage assets will be the same or of lesser significance as those of the operation phase. This conclusion is based on the distance of the Wind Farm and hence construction operations from the potentially affected assets. The assessment of operational setting effects is presented in Section 15.5.2.4.

15.5.2 OPERATIONAL EFFECTS

15.5.2.1 Direct Physical Effects

69. There are considered to be no direct physical effects associated with the operational phase of the Wind Farm.

15.5.2.2 Indirect Physical Effects

70. The possibility of alterations to the tidal and wave regimes leading to long-term effects on patterns of sediment transport within the application area are assessed and reported in Section 9: Physical Processes and Geomorphology of this ES. The effects of the Wind Farm on water levels, currents and waves will persist for the lifetime of the development but are likely to result in a reduction in wave energy and be of small magnitude, and are therefore considered to be not significant. The predicted effect of a reduction in wave height on sediment transport could see sediment accumulate at a slightly higher rate in the central part of the site, than would have otherwise occurred, during the operational lifetime of the Wind Farm. However, the difference in sediment transport attributable to the Wind Farm is less than the potential for natural variability over the same period and therefore there will be no significant effect on sediment transport rates through the Wind Farm site as a result of the Wind Farm.

71. Potential effects have all been described as of small magnitude, and are not significant in terms of the EIA Regulations. It is therefore considered that there will be no significant effect on cultural heritage assets due to changes to tidal currents or sedimentary regimes as a result of the presence of the Wind Farm.

15.5.2.3 Secondary Physical Effects

72. Potential secondary physical effects associated with the operational phase for the proposed Wind Farm relate to potential effects through maintenance vessel anchoring activities. These effects are the same as those considered for the construction phase.

15.5.2.4 *Setting Effects*

73. The assessment of operational effects upon setting is summarised below. Only those assets where there is potential for an effect, i.e., those where views relevant to setting might be affected, are included in Table 15.12. The assessment is presented in full in Appendix 15.2. Effects upon the setting of four cultural heritage assets have been identified however in all cases these have been assessed as minor or negligible and are therefore not considered significant. All effects are considered to be reversible in nature and will cease upon decommissioning of the Wind Farm.

Table 15.12 Summary of Effects on Setting

Reference Number	Asset Name	Sensitivity of Asset to Setting Effects	Magnitude of Effect	Level of significance	Significance
N/A	Lybster Conservation Area	Medium	No effect	No effect	Not significant
HB 7935	The Corr	Medium	No effect	No effect	Not significant
HB 7936	Dunbeath Castle	High	Negligible	Negligible	Not significant
HB 7945	Dunbeath Portomin harbour	High	No effect	No effect	Not significant
HB 14070	Whaligoe Steps and Quay	Medium	Small negative	Minor	Not Significant
SM 4289 and 696	Watenan Broch and Fort	Medium	No effect	No effect	Not significant
SM 5073	Dunbeath Inver Fort	Low	No effect	No effect	Not significant
SM 5182	Latheronwheel promontory fort	Low	No effect	No effect	Not significant
SM 527	Borrowston Broch (Hill of Ulbster)	Low	No effect	No effect	Not significant
SM 548	Garrywhin Fort and settlement	Medium	No effect	No effect	Not significant
SM 7242	Tulloch (Usshilly) broch and field system	Medium	No effect	No effect	Not significant
SM 90048	Cairn of Get	Medium	Small negative	Minor	Not significant
SM 90065	Castle of Old Wick	High	No effect	No effect	Not significant
SM 90162	Hill O'Many Stanes	Medium	Small negative	Minor	Not significant

15.6 MITIGATION MEASURES

15.6.1 CONSTRUCTION

74. Direct physical effects on the nine sites of potential cultural heritage interest identified in this assessment will be avoided where possible through the Project Design. The implementation of temporary exclusion zones (paragraph 75) will ensure avoidance of these assets. 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.

75. 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 in this assessment, while an exclusion zone of a minimum 50 m will be established around those of medium sensitivity.

76. 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.

77. In order to mitigate the risk of damage to any previously unrecorded archaeological remains a 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.

15.6.2 OPERATION

78. Mitigation proposed during the operational phase includes that presented in paragraph 75 and 76.

15.7 MONITORING AND ENHANCEMENTS

79. No monitoring is required and no enhancements are proposed.

15.8 RESIDUAL EFFECTS

15.8.1 CONSTRUCTION AND OPERATION

80. Following implementation of the mitigation measures for secondary physical effects outlined in section 15.6.1, it is considered that significant adverse effects will be prevented, or the probability of significant adverse effects upon known cultural heritage assets occurring will be reduced.

15.9 SUMMARY OF EFFECTS

81. A desk based study and archaeological assessment of geophysical and geotechnical survey data have been carried out in order to identify potential cultural heritage assets that may be affected by the Wind Farm and to establish their current condition. This work also provided information upon which to base the assessment of archaeological potential.

82. There are no known cultural heritage assets within the Inner Study Area. There is one known wreck from the UKHO database within the Outer Study Area which is considered to be of high sensitivity.

83. There is low potential for the discovery of unrecorded cultural heritage assets.

84. The archaeological geophysical assessment identified 11 sites of medium archaeological potential within the Inner Study Area. Two of these sites have been identified as wellheads and therefore were not considered further. Three sites of medium archaeological potential have been identified in the Outer Study Area which could be subject to significant effects.

85. The archaeological geotechnical assessment indicated that the potential for the presence of organic archaeological artefacts is regarded as low, however the

presence of residual flints and lithic artefacts located within the marine sediments remains a possibility.

86. Potential construction effects will be mitigated through the establishment of exclusion zones, micro-siting and pre-construction seabed investigations.

87. Mitigation of potential effects offshore will involve the introduction of a PAD for any unexpected archaeological discoveries.

88. Any proposed mitigation measures are subject to approval by Historic Scotland and the HCHET.

89. Effects upon the setting of four cultural heritage assets have been identified. In all cases these have been assessed as not significant. No mitigation is proposed in relation to these and the effects will cease upon decommissioning.

Table 15.13 Summary of Effects on Marine Archaeology and Cultural Heritage Assets

Effect	Predicted Level of Effect / Significance	Mitigation Proposed	Residual Effect Significance
Secondary physical effect: Damage to cultural heritage assets as a result of anchoring/ jack- up barges	Moderate/significant	All sites are avoided by cable route, and turbine and OSP foundations. Exclusion zones established around wrecks Anchor patterns will be designed to avoid known wrecks and targets. Archaeological reporting protocol to be established and followed during installation.	Negligible/Not significant
Setting effect: Cairn o'Get (SM 90048)	Minor/Not Significant	None	Minor/Not Significant
Setting effect: Hill o'Many Stanes (SM 90162)	Minor/Not Significant	None	Minor/Not Significant
Setting effect: Dunbeath Castle (HB 7936)	Negligible/Not Significant	None	Negligible/Not Significant
Setting effect: Whaligoe Steps (HB 14070)	Minor/Not Significant	None	Minor/Not Significant

15.10 ASSESSMENT OF CUMULATIVE EFFECTS

15.10.1 INTRODUCTION

90. Given below is the assessment of cumulative impacts upon Marine Archaeology and Cultural Heritage receptors arising from the Wind Farm in conjunction with other existing or foreseeable planned project/development activities.

91. A CIADD (MROWDG, 2011) was produced which set out the developments to be considered and the assessment method for each technical assessment and is the basis of this assessment. The CIADD is presented in Annex 5B.

92. The Wind Farm may have both direct and indirect effects upon the physical fabric and/or setting of cultural heritage assets. Both positive and negative potential effects are considered.

15.10.2 SCOPE OF ASSESSMENT

93. The scope and method of this assessment was previously described in the CIADD (Annex 5B). This remains unchanged from the method presented in the CIADD.

94. The assessment of significance of cumulative impacts has used the same criteria to determine significance based on the sensitivity of the receptor and the magnitude of the potential change as presented in section 15.2.

95. Cultural heritage is defined here as all Scheduled Monuments, Listed Buildings, Inventory Designed Gardens and Designed Landscapes, Inventory Battlefields as well as non-designated cultural heritage sites highlighted by the local authority as at risk from potential effects, submerged archaeology and palaeo-environments, including maritime losses such as wrecks, aircraft and their associated debris.

15.10.2.1 Consultation

96. The CIADD (MROWDG, 2011) was presented to Marine Scotland for review in April 2011 for comment.

97. As the regulator for Cultural Heritage in Scottish jurisdiction Historic Scotland commented with regard to the potential effects of the Project in relation to the marine and terrestrial cultural heritage within their statutory remit. In respect of marine and terrestrial assets Historic Scotland stated in its correspondence.

- That potential effects to historic assets on the seabed within the proposed development area that may be affected by alteration to tidal currents and sedimentary regimes, and by changes to the chemical balance of the water and seabed sediments should be assessed (letter dated 15th April 2010).
- That in relation to its statutory remit for scheduled monuments and their settings, category A listed buildings and their settings, gardens and designed landscapes appearing in the Inventory and designated wreck sites (Protection of Wrecks Act 1973), and in this case, matters relating to marine archaeology out-with the scope of the terrestrial planning system, Historic Scotland is content with the proposed study area and study methodology (letter dated 4h May 2010).
- That 'JNAPC – Code of Practice for Seabed Development' and 'Historic Environment Guidance for the Offshore Renewable Energy Sector' (Cowrie 2007) should be referenced for guidelines (letter dated 4th May 2010).
- That it was content that with regards to assets within its remit, the cumulative effect assessment (for the Beatrice and Moray array) shall only consider the effect on Dunbeath Castle (email dated 23rd June 2010).

98. In response to a consultation request from Headland Archaeology, the HCHET confirmed (email 22nd June 2011) that it was content with regards to assets within their remit and that the cumulative effect assessment (for Beatrice and the Moray array) should only look at Lybster Conservation Area, Lybster Harbour complex and Whaligoe Steps.

99. The cumulative impact assessment has been undertaken taking into consideration the consultation responses noted above. As such physical effects on cultural heritage assets and the onshore receptors identified below have been considered within this assessment.

15.10.2.2 Geographical Scope

100. The study area within which effects are considered from a cultural heritage perspective is defined by the MORL and BOWL site boundaries, including an initial buffer zone of 1 km to take into consideration any likely dispersion and settlement of sediments during the construction phases of the projects.

101. For the purposes of assessing the cumulative effect on terrestrial cultural heritage assets, assets within 35 km of the Wind Farm and Moray Round 3 zone turbines were initially considered. Assets considered by the assessment were then identified and confirmed through consultation with Historic Scotland and Highland Council Archaeology Service (section 15.2.1).

15.10.2.3 Policy/ Guidance

102. There are currently a number of specific guidance documents available to inform the approach and these were considered during the cumulative effect assessment on archaeology and cultural heritage assets. The guidance considered includes the following:

- Oxford Archaeology with George Lambrick Archaeology and Heritage (2008) Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy. COWRIE Ltd;
- Historic Scotland (2009) Assessment of Impact on the Setting of the Historic Environment Resource – Some general considerations; and
- Historic Scotland (2011) Managing Change in the Historic Environment – Setting.

15.10.2.4 Developments Considered in Assessment

103. Section 4.8.8 of the CIADD (MROWDG, 2011) (Appendix 5B) presented the developments for which it was considered an assessment of cumulative impacts with the Project should be undertaken for cultural heritage and archaeology. These were:

- BOWL generating station
- Other Offshore Wind Farms and Infrastructure:
  - Individual sites within the MORL Eastern Development area;
  - MORL Western Development area;
  - Aberdeen Bay Offshore Wind Farm;

  - Neart na Gaoithe;
  - Firth of Forth Round 3 sites;
  - Beatrice Demonstrator Turbines;
  - Methil Offshore Windfarm; and
  - SHETL Offshore hub.
- Relevant Oil and Gas Developments
  - Beatrice and Jacky platforms and associated infrastructure;
  - The proposed Polly Well; and
  - The proposed Caithness and PA Resources infrastructure for existing leases.
- Onshore wind farms.

104. The study area for direct effects on cultural heritage and archaeological has been set at 1 km from the MORL and Beatrice Wind Farm boundary. The majority of the developments listed in the CIADD are located outside of this study area, with the exception of the MORL Eastern and Western Development areas. Of the developments within the 1 km study area, it was found that the majority of these developments have no potential to significantly affect currents and waves, and therefore patterns of sediment transport. Given the distance of these developments from the Beatrice Wind Farm and the lack of sediment generated from these developments, the potential cumulative effect on patterns of sediment transport were scoped out for all developments with the exception of the Moray Round 3 Zone (Telford, Stevenson and MacColl Wind Farms and western development area) only. The assessment includes the secondary physical cumulative effects of the OfTW only as the indirect physical effects of the cable and associated infrastructure on changes in sediment transport were considered to be localised, of small magnitude and not significant.

105. With regard to setting effects on cultural heritage and archaeological receptors, a study area of 35km from the Wind Farm site was agreed with consultees, along with the receptors to be considered in the cumulative assessment. Following consultation the potential cumulative effects resulting from the operation of the Wind Farm, Moray Round 3 Zone developments and the consented Burn of Whilk onshore wind farm were deemed appropriate for the consideration of cumulative effects. This was agreed with consultees. As the Beatrice OfTW was scoped out of the seascape, landscape and visual assessment due to the lack of effects once constructed, there is no cumulative indirect effect on the setting of cultural heritage assets between the Wind Farm and the OfTW and hence this is not assessed here.

106. The OnTW have no interaction with the mobilization of sediment within the 1 km study area and hence are not considered for cumulative assessment. With regard to effects on setting the OnTW are located outwith the 35km study area agreed as applicable to the Wind Farm and hence are not considered here.

15.10.3 CUMULATIVE BASELINE

15.10.3.1 Offshore

107. The baseline for marine cultural heritage assets comprises three confirmed known wreck locations classified as 'live' by the UKHO within the Moray Round 3 Zone

and associated 1 km buffer; three further known wrecks or obstructions lie within the Moray Zone and associated 1 km buffer that are classified as 'dead' (i.e. the identity was established initially but subsequent survey has failed to locate the wreck remains). Whilst this is the case, the preliminary assessment of marine geophysical data has identified two anomalies that may well represent at least one of the 'dead' wrecks located within the Moray Round 3 Zone and an obstruction within the 1 km buffer.

108. There are no known wrecks or obstructions located within the Wind Farm. One wreck (HA1) was identified within the associated 1 km buffer (Outer Study Area). Three geophysical anomalies indicate the location of a well-head associated with the Jacky gas and oil field and 12 potential features of anthropogenic origin were identified during the geophysical survey, nine in the Inner Study Area and three in the Outer Study Area (Table 15.9, Appendix 15.1 and Annex 15A). There are no designated or protected wrecks within either development area. In addition, initial geoarchaeological assessment of the seabed substrates has indicated negligible potential for the survival of relict landscape surfaces, features or deposits within the Wind Farm and Moray Round 3 Zone.

15.10.3.2 Onshore

109. There are 199 scheduled monuments, four of which are Properties in Care, 22 Category A Listed Buildings, two Conservation Areas and two Inventory Gardens or Designed Landscapes within 35 km of Wind Farm and Moray Round 3 Zone. The Scheduled Monuments comprise a wide range of monument types, but in the current context the most significant are the various prehistoric burial cairns located near the coast and several stone alignments. Such monuments have specific alignments and therefore views associated with their function and in some instances there is a clear relationship between these monuments' architecture and views out over the sea. Many of the inland monuments lie outside the ZTV (Figure 15.2). Most of the Category A Listed Buildings lie some distance from the coast and are unlikely to be of concern. The exception to this is Dunbeath Castle, which stands on the coast. Associated with the castle is its garden, which appears in the Inventory of Gardens and Designed landscapes. The remaining Designed Landscape is Langwell Lodge. The Conservation Areas comprise the fishing villages of Lybster and Wick.

15.10.4 PREDICTED CUMULATIVE EFFECTS

15.10.4.1 Direct Physical Effects

110. No known cultural heritage assets identified will be directly affected by the construction or operation of the Wind Farm, therefore no cumulative assessment of direct physical effects has been undertaken.

15.10.4.2 Indirect Physical Effects

111. Based on information from surveys undertaken by ABPMer the magnitude of the effect of the wind farms on water levels and currents during construction and operation is predicted to be very small when compared to the natural range of

variability and are not considered to be measurable in practice (Section 9: Physical Processes and Geomorphology of this ES). Some short to medium term localised increases in sediment thickness are predicted, but it is not expected to be a significant change in the textural properties of the sediment available for transport. This supports the further conclusion that actual sediment transport rates through the Wind Farm and MORL sites will not be affected by the proposed wind farms and therefore the indirect physical effects upon all known and unknown cultural heritage assets will be negligible and therefore not significant in terms of the EIA Regulations.

15.10.4.3 Secondary Physical Effects

112. There is potential for secondary effects to occur within the Study Areas which might include the effects of the anchoring of maintenance vessels and associated activities during the construction and operation of the Wind Farm, the OfTW and MORL. Unmitigated, the cumulative secondary effects could result in effects of up to large magnitude occurring on sites of up to high sensitivity resulting in major effects occurring which would be significant in terms of the EIA Regulations. The possibility of large magnitude, significant effects occurring upon known and unknown archaeological features could increase as a result of higher levels of construction related activity in a particular area as a result of cumulative developments.

15.10.4.4 Setting Effects

113. Following consultation, cumulative effects on setting have been considered in relation to the following assets.

- Dunbeath Castle;
- Whaligoe Steps;
- Lybster Conservation Area;
- Lybster harbour complex; and
- Yarrows palimpsest landscape.

114. Visualisations produced as part of Section 14: Seascape, Landscape and Visual Assessment of this ES were used to inform the assessment of effects on setting.

115. Table 15.14 summarises the predicted cumulative effects upon the setting of onshore assets.

Table 15.14 Summary of Predicted Cumulative Effects upon the Setting of Selected Onshore Cultural Heritage Assets

Cultural Heritage Asset	Sensitivity of Asset to Setting Effects	Magnitude of Effect	Level of Significance	Significance	Summary
Dunbeath Castle (HB 7936)	High	Negligible	Negligible	Not Significant	The Wind Farms will be seen from the castle itself and its immediate surroundings as part of the wider landscape. Key views of the castle will be unaffected
Whaligoe Steps (HB 14070)	Medium	Negligible	Negligible	Not Significant	The Wind Farms will be seen in the context of general views from the viewing platform and from the top of the stairs. They will not be visible in the dramatic cliff-framed views from the foot of the steps, which are relevant to the sense of place.
Lybster Conserva-tion Area	Medium	No effect	No effect	Not Significant	The Wind Farms will only be visible from the edges of the Conservation Area in general views of the surrounding area and no key views will be affected. The cultural significance of the Conservation Area will remain unchanged.
Lybster Harbour Complex	Medium	No effect	No effect	Not Significant	The Wind Farms will be screened in views from the harbour. No key views from third locations will be affected and the cultural significance of the harbour will remain unchanged.
Yarrows Palimpsest Landscape	Medium	Negligible	Negligible	Not Significant	The addition of the Wind Farms will increase the number of turbines visible from the palimpsest landscape. However, this will not cause any greater loss of cultural significance than the Burn of Whilk wind farm alone, though it will result in more views containing turbines.

116. Given that there will be no intervisibility from the Lybster Conservation Area and harbour complex with the proposed Wind Farm and the MORL site and that no effect is predicted, it is concluded that there is no potential for effects upon the setting of these assets. They are not therefore considered further. Cumulative effects for the remaining assets are considered below.

117. The cumulative effect of the proposed Wind Farm, the MORL site and the consented Burn of Whilk onshore wind farm upon the setting of the Yarrows palimpsest landscape has also been considered. The assets and their relationship with their surroundings are described in detail in Appendix 15.2, as is their sensitivity.

15.10.4.5 Dunbeath Castle

118. Dunbeath Castle is a Category A-listed building within an inventory designed landscape. It is considered to be of high sensitivity to setting effects (Appendix 15.2).

119. The proposed Wind Farm will be seen in combination with the proposed Moray Round 3 Zone Wind Farm from the castle and its immediate vicinity. The proposed turbines will be seen at a distance of at least 25 km, in front of the Moray eastern development area, which will lie at a distance of at least 35 km from the castle. The turbines of the Moray western development area will lie at least 22km from the castle. Turbines in the eastern part of the western development area will lie behind the Wind Farm; views from the castle of those in the western part will not be so filtered.

120. Although the construction of the Wind Farm will bring turbines closer to the castle, it will not increase the degree to which turbines are seen in key views. Clustering could lead to a cumulative effect upon setting if the aesthetics of the affected view were linked to its cultural significance. In this instance, the affected view is not linked to the aesthetic appreciation of the castle and its cultural significance. Given the distance of the Moray Round 3 Zone turbines from the castle, the clustering effect will only be perceptible in conditions of excellent visibility and even then it will not be pronounced. It is therefore concluded that there will be a negligible cumulative effect upon its setting. The castle is of high sensitivity however this effect is considered to be of negligible magnitude, and therefore is not significant in the terms of the EIA regulations).

15.10.4.6 Whaligoe Steps

121. The Whaligoe Steps are Category B-listed and are considered to be of medium sensitivity to setting effects.

122. The proposed Wind Farm will be seen in combination with the proposed Moray Round 3 Zone Wind Farm from the top of the Whaligoe Steps and from the observation platform. The proposed turbines will be seen at a distance of at least 15km against the backdrop of the Moray Round 3 Zone eastern development area turbines, which will lie at least 23 km from the steps, and in combination with those of the MORL western development area, which will lie at least 23km from the steps.

This will result in turbines being closer to the steps and a greater degree of clustering of turbines giving rise to a more cluttered appearance.

123. Clustering could lead to a cumulative effect upon setting if the aesthetics of the affected view were linked to its cultural significance. The foreground of the views from the affected locations is very dramatic, comprising precipitous dark cliffs seen against the background of the North Sea and this contributes to the sense of place rather than the aesthetics of the experience of the asset. Given the distance of the Moray Round 3 Zone turbines from the steps, the bunching effect will only be perceptible in conditions of good visibility and even then it will not be pronounced. It is therefore concluded that there will be a negligible cumulative effect upon the sense of place of the asset and hence a negligible cumulative effect upon the setting of the steps. The sites are considered to be of medium sensitivity to setting effects and the cumulative effect is considered to be of negligible magnitude therefore the effect is of negligible significance and not significant in the terms of the EIA Regulations.

15.10.4.7 Yarrows palimpsest landscape

124. The Yarrows palimpsest landscape comprises a wide range of upstanding prehistoric assets, including Neolithic and Bronze Age cairns, standing stones, settlements, an Iron Age hillfort, brochs and other monument types. A heritage trail links many of the best-preserved assets around Loch of Yarrows, but the landscape extends beyond the immediate environs of the loch, which lies in a north/south fold in the landscape, to the area around Loch Watenan. The landscape's cultural significance resides in its intrinsic value as rare survival as a landscape with great chronological depth and as a potential data source. It does not relate to relationships with the wider landscape.

125. The cumulative effect of the Wind Farm and MORL has been assessed in relation to several monuments within the Yarrows palimpsest landscape, namely Garrywhin fort (SM 548), Borrowston broch (SM 527), Watenan broch (SM 696) and Cairn of Get (SM 90048). The proposed turbines of both developments will be visible from all of these assets, however, only in the case of Cairn of Get is this considered to constitute an effect upon setting. This was assessed as being of minor significance. The ZTV indicates that the proposed turbines will not be visible from much of the area around the Loch of Yarrows.

126. The consented Burn of Whilk wind farm lies in forestry immediately to the west of the Yarrows palimpsest landscape. From some locations within the palimpsest landscape the Burn of Whilk turbines will be fully visible at distances of less than 1 km in some areas.

127. The addition of the Wind Farm and MORL will increase the number of turbines visible from the palimpsest landscape. However, this will not cause any greater loss of cultural significance than the Burn of Whilk wind farm alone, though it will result in more views containing turbines albeit at a much greater distance. It is concluded that the cumulative effect will be negligible. This is not significant.

15.10.5 MITIGATION

128. No additional mitigation for cumulative effects is proposed to that outlined in section 15.6.

15.10.6 RESIDUAL CUMULATIVE EFFECTS

129. Following the implementation of the mitigation measures proposed in section 15.6 it is considered that significant adverse cumulative effects will be prevented, or the probability of significant adverse cumulative effects upon known cultural heritage assets occurring will be reduced.

15.11 STATEMENT OF SIGNIFICANCE

130. The potential effects of the Wind Farm upon recorded and unrecorded cultural heritage assets have been considered. It has been established that there is low potential for the discovery of unrecorded cultural heritage assets within the Wind Farm.

131. The assessment of the construction effects have highlighted that there will be no direct and indirect physical effects on recorded cultural heritage assets within the Wind Farm development. Thirteen sites have been identified that may be subject to moderate to major secondary effects, and in the absence of mitigation are therefore regarded to be significant in terms of the EIA Regulations. However, following implementation of the proposed mitigation measures the effects are considered to be negligible and therefore not significant. Setting effects during construction range from no effect to minor effect and are therefore considered to be not significant.

132. The assessment of the operational physical effects have concluded that there will be a small magnitude of effect on cultural heritage assets due to changes to tidal currents or sedimentary regimes as a result of the presence of the Wind Farm and effects are therefore considered to be not significant.

133. The assessment of operational setting effects has concluded that there will be no significant effect on onshore cultural heritage assets considered within this assessment.

134. The assessment has concluded that there will be no significant residual effects during the construction and operation phases of the Wind Farm following the implementation of the proposed mitigation measures.

135. Following the implementation of mitigation measures the Wind Farm will have no significant cumulative physical or setting effects.

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15.12.3 DATABASES OF CULTURAL HERITAGE ASSETS CONSULTED

186. Designated wreck data was downloaded from Historic Scotland's website © Historic Scotland

187. Offshore Sites and Monuments Record information derived from NMRS data © Crown Copyright RCAHMSWrecks and Obstructions information derived from SeaZone data © Copyright UKHO

188. Wrecks information taken from www.wrecksite.eu

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APPENDIX 15.1: GAZETTEER AND CONCORDANCE OF CULTURAL HERITAGE ASSETS WITH KNOWN LOCATIONS WITHIN THE OFFSHORE STUDY AREA

HA No.	Name	Type	Description	Designations	Concordance	BNG Co-ordinates
HA1	Carisbrook (possibly)	Steamer	British merchant steamer of 1907, 91.4m long, 13.4m wide and 6.1m high, sunk on 21st June 1915 when she was captured by German submarine *U-38* whilst en route from Montreal to Leith. The wreck is now reported to be spread over an area 80 x 40 m with a height of 1m above the seabed. The remains are quite collapsed and degraded.	None	-	515045 6461955
HA2	Unknown	Sonar Target	Dark and light reflector	-	-	503988.1 6452797.9
HA22	Unknown	Sonar Target	Dark and light reflector	-	-	506379.4 6458452.9
HA41	Unknown	Sonar Target	Debris	-	-	509895.6 6461456.1
HA53	Unknown	Sonar Target	Dark and light reflector	-	-	510640 6462129.2
HA63	Unknown	Sonar/Magnetometer Target	Dark reflector corresponding to the location of a known well head	-	-	501185.9 6449187.7
HA111	Unknown	Sonar Target	Large amount of debris	-	-	506187.3 6453893.9
HA122	Unknown	Sonar Target	Dark and light reflector	-	-	500505.6 6449732.6
HA130	Unknown	Sonar Target	Object/ Debris	-	-	509703.2 6462000.9
HA136	Unknown	Sonar Target	Object(s)/ Debris	-	-	501877.18 6447824.12
HA137	Unknown	Sonar Target	Object(s)/ Debris	-	-	504159.15 6456488.94

HA No.	Name	Type	Description	Designations	Concordance	BNG Co-ordinates
HA138	Unknown	Sonar Target	Object(s)/ Debris	-	-	504831.35 6462581.89
HA139	Unknown	Sonar Target	Object(s)/ Debris	-	-	507805.04 6463086.4
HA140	Unknown	Sonar Target	Object(s)/ Debris	-	-	508585.71 6464099.88
HA151	Unknown	Magnetometer Target	Magnetic Fluctuation, corresponding to the location of a known well head	-	-	506957.85 6458776.67
HA152	Unknown	Magnetometer Target	Magnetic Fluctuation, corresponding to the location of a known well head	-	-	500855.78 6450144.2

APPENDIX 15.2: ASSESSMENT OF SETTING EFFECTS

189. The complete assessment of the setting effects of the Wind Farm, carried out following the methodology provided in Section 15.2 is presented below.

190. **Borrowston Broch (SM 527, SLVIA Viewpoint 5)** comprises the scheduled remains of a broch. The broch survives as a low grassy mound with walling exposed in places by erosion. The broch's cultural significance resides primarily in its intrinsic value as a potential source of data. Its setting is defined as the land immediately surrounding it, as it is this area that its occupants farmed and which the broch was intended to overlook. No specific views are considered relevant to its setting.

191. The broch lies some 15 km from the Wind Farm site boundary and the Wind Farm will be partially visible from it. However, this will not affect the relationship between the broch and its setting and it is concluded that there will be no effect upon its setting. Effects are therefore considered as not significant.

192. **Garrywhin Fort (SM 548)** is a scheduled Iron Age fort comprising a single low rampart with two entrances; one to the south south west and one to the north north east. These are marked by orthostats, which in the past have been mistakenly interpreted as standing stones. There are slight internal features. The fort lies on a steep-sided ridge, which the rampart follows and is a part of the Warehouse Hill palimpsest landscape. The fort has been damaged in places but has clear potential as a data source giving it intrinsic value. As a part of a palimpsest landscape it has contextual value. Its appreciable relationship with local topography, which is exploited defensively, and views over the immediate landscape, which its occupants presumably farmed, also contribute to its contextual value. It has no associative value. The fort's setting is therefore defined as the ridge upon which it stands and the adjacent land that it overlooks. There are no specific views that might be considered important to its cultural significance or the appreciation of that significance.

193. The Wind Farm will be visible at a distance of just over 16 km. This will not affect the extent to which the fort's relationship with its surroundings and, hence, contextual value can be appreciated. The views to the sea that are available from the fort are entirely incidental to the fort's cultural significance. It is therefore concluded that the fort's setting will be unaffected and effects will be not significant.

194. **Tulloch (Usshilly) Broch and field system (SM 599**) comprises the scheduled remains of a broch, later buildings and extensive areas of post-medieval cultivation. It occupies a low rocky outcrop. The remains of the broch are poorly preserved on the surface. It lies directly north of the **Wag of Forse settlement (SM 2301**) and **Forse House settlement, field system and burnt mound (SM 7242).** The former comprises a multi-phase Iron Age settlement, which was partially excavated in the 1930s and 40s. As a result, the walls of the core part of the site area exposed. Associated features are less clearly visible, however. The latter comprises

prehistoric and later settlements and their associated field systems. All three are within an area of low-lying improved land.

195. Individually and collectively, these assets have great intrinsic value as sources of data regarding the development of the Caithness landscape over at least 2000 years. They have contextual value in that they together form a palimpsest landscape. Wag of Forse has further contextual value because of its unusual form, which may cast light on the development of Iron Age architecture. It also has associative value because it was excavated by Alexander Curle, a key figure in Scottish archaeology. Their setting is therefore defined individually as the adjacent sites and collectively as the surrounding farmland. No specific views are relevant to an appreciation of their setting.

196. These assets lie approximately 16 km from the Wind Farm site boundary. Whilst they have clear views out to sea and will therefore have clear views of the Wind Farm, this will not affect the contribution of their setting to their cultural significance. It is concluded that there will be no effect on the setting of these assets. This is not significant.

197. **Watenan Broch (SM 696)** is a scheduled Iron Age broch. It is located on the edge of a terrace overlooking Loch Watenan and survives as substantial overgrown walls. A possible cairn is located some 10 m away. The broch has intrinsic value as a potential data source and, as part of the wider palimpsest landscape that surrounds it, it has contextual value. The terrace upon which its stands and the surrounding land are also relevant to its contextual value as the location at the terrace's edge would have rendered it a prominent feature in the landscape, allowing it to dominate the surrounding farmed land, which is now given over to rough grazing. It has no associative value. The broch's setting is therefore defined as the terrace upon which it stands and the adjacent land that it overlooks. There are no specific views that might be considered important to its cultural significance or the appreciation of that significance.

198. The broch is approximately 15 km from the Wind Farm. Whilst the broch has clear views of the sea and will have similarly clear views of the Wind Farm, it is the more immediate landscape that is relevant to the understanding of its character and cultural significance; views out to sea form only a backdrop to this landscape. The presence of the turbines on the horizon will not affect this relationship and it is concluded that there will be no effect on the setting of this monument. This is not significant.

199. Despite its legal name, **Watenan Fort (SM4289)** is now interpreted as a heavily mutilated burial cairn. It comprises an oval stone-built structure located on a natural rise. It has intrinsic value as a potential data source, although this is somewhat compromised by the robbing that renders its identification uncertain. It has greater contextual value as a part of the wider palimpsest landscape. The rise upon which it is located is relevant to its contextual value as this prominent location is relevant to an understanding of its inter-relationship with surrounding assets and landscape. It has no associative value. The cairn's setting is therefore defined as the terrace upon which it stands and the adjacent land that it overlooks. There are

no specific views that might be considered important to its cultural significance or the appreciation of that significance.

200. The cairn is approximately 15 km from the Wind Farm. Whilst it has clear views of the sea and will have similarly clear views of the Wind Farm, it is the more immediate landscape that is relevant to the understanding of its character and cultural significance; views out to sea form only a backdrop to this landscape. The presence of the turbines on the horizon will not affect this relationship and it is concluded that there will be no effect on the setting of this monument. This is not significant.

201. **Dunbeath Inver Fort (SM 5073)** is a multi-period scheduled site comprising a prehistoric fort, possibly a broch, post-medieval building and a World War II lookout post. The fort's cultural significance primarily relates to its intrinsic value as a data source, with particular interest resulting from the multiple phases of activity that are evident. Although the fort is located in a position with striking views along the coast these are incidental, as the fort itself is not readily apparent to the non-specialist. Its setting is therefore defined as the promontory itself and the adjacent fields. No specific views are considered relevant to the appreciation of the fort's setting.

202. The fort lies some 23 km to the north west of the Wind Farm site boundary and all the turbines will be clearly visible. However, this will not affect the contribution of the fort's surroundings to its cultural significance. It is concluded that there will be no effect upon its setting. This is not significant.

203. **Latheronwheel promontory fort (SM 5182)** is a scheduled prehistoric fort located on a sea-stack. Surface remains are restricted to a rampart and three or four internal scoops. There are slight indications of an outer rampart. The fort's cultural significance primarily relates to its intrinsic value as a data source. Although the fort is located in a position with striking views along the coast these are incidental, as the fort itself is not readily apparent to the non-specialist. Its setting is therefore defined as the promontory itself and the adjacent fields. No specific views are considered relevant to the appreciation of the fort's setting.

204. The fort lies some 23 km to the north west of the Wind Farm site boundary and all the turbines will be clearly visible. However, this will not affect the contribution of the fort's surroundings to its cultural significance. It is concluded that there will be no effect upon its setting. This is not significant.

205. **Cairn of Get (SM 90048, SLVIA Viewpoint 10)** is a Neolithic chambered cairn. It is a scheduled monument and a property in care. The cairn is of the Orkney-Cromarty type, with a passage leading to a central chamber. It appears as a grass-covered mound in the wider landscape, but from shorter distances the exposed stones of the passage and interior are apparent. The passage opens to the east south east. The cairn is set within high ground with open views to the north east, east, south east and south. It is surrounded by moorland beyond which improved pasture is visible as is modern housing, which is visible to the northeast, east and southeast. In the distance the sea may be glimpsed.

206. A public footpath, which starts from a small B road, tracks along open moorland (on an east to west alignment) up to the cairn and interpretation board. The cairn was excavated in the 19th century, which allows access and egress to the monument through the passageway. It has been suggested that some chambered cairns were built with reference to views of the sea, but this does not appear to be the case here; the passage and forecourt area are not aligned with the sea.

207. Although excavated in the 19th century, the cairn has intrinsic value as potential source of data and simply as an example of a Neolithic tomb. It has contextual value as a part of the Yarrows palimpsest landscape. It has no readily identifiable associative value. The cairn's setting is therefore defined as the terrace upon which it is located and the surrounding moorland in which the palimpsest landscape is located.

208. The cairn's intended relationship with its surroundings is not clear, although it is evident that it is a part of a wider prehistoric landscape. This relationship is not appreciated by a single view, but rather by the visitor moving through the landscape visiting individual monuments and thereby gaining an appreciation of the existence of a relict early prehistoric landscape. It is concluded that the cairn is of medium sensitivity to effects upon setting.

209. The Wind Farm will be visible approximately 15 km to the east. When approaching the monument, the Wind Farm will be behind the visitor and will not form part of the backdrop to the monument. The passage way faces towards the Wind Farm so when exiting the monument, the visitor will see the Wind Farm on the horizon, but it will not affect the relationship between the cairn and its setting. While the Wind Farm will represent a new modern element within the seascape it will not affect the understanding and appreciation of Cairn of Get's sense of place. It is therefore considered that an effect of small magnitude will occur. This will constitute an effect of at most minor significance.

210. **Castle of Old Wick (SM 90065)** is a ruined keep, situated to the south of Wick Bay. It is a scheduled monument and a Property in Care. It stands on a narrow promontory with steep cliffs dropping to the sea below. Based on comparisons with similar structures in Orkney and Scandinavia, it is thought to date to the 12th century. This would make it one of the earliest keeps in Scotland. This early date and long history of occupation gives the castle substantial intrinsic value in terms of its potential to inform understanding of the development of fortifications in Scotland and influences from outside Scotland. It has a clear relationship with the surrounding topography as it has evidently been placed to exploit the promontory for defensive purposes, giving it contextual value. Views of the sea may have been important to the function of the castle as ships hugging the coast would have been clearly visible from it. The location is spectacular; the ruined keep is seen as an isolated block on the promontory against the backdrop of the sea. This gives it associative value and is very important to modern day appreciation of the castle. The castle's setting is defined as the promontory upon which it stands and it is considered to be of high sensitivity to effects upon setting.

211. The car park serving the castle lies to the north of the castle on the opposite side of an inlet. The footpath to the castle runs around the inlet finally approaching the castle from the south west. The results of the site visit indicated that key views in the appreciation of the castle, particularly its associative value, were those from the south west and from the north east, across the inlet. In these views the castle is seen silhouetted and isolated on its promontory. Views to the sea from the castle are restricted to the north and north east.

212. The Wind Farm will lie some 15 km to the south east. While the Wind Farm will be visible to a visitor on the approach to the monument, they will be peripheral to views of the castle. Consequently, the sense of isolation that is so important to the keep's sense of place and hence associative value will remain unaffected. It is considered that there will therefore be no effect upon the castle's setting. This is not significant.

213. **The Hill O'Many Stanes (SM90162, SLVIA Viewpoint 6)** is a prehistoric monument comprising stone rows on an east/west alignment situated on an east-facing slope. The lines are composed of 200 principal earthfast stones, with a further 540 small stones, set in 22 rows radiating below the crest of a rocky knoll. Further features were recorded in 2003 in the surrounding area, which may relate to the monument. These monuments typically date to the late Neolithic/Early Bronze Age and it is currently thought that the Hill O'Many Stanes is the remains of prehistoric 'observatory'. The monument is promoted by Historic Scotland as a 'Property in Care' and a footpath is maintained around the edge of the monument, together with an interpretation board on the northern periphery of the stones' extent. The monument has extensive views to the north, east and south, which include the Caithness seaboard. This area of Caithness has remained relatively undeveloped, with the surrounding landscape comprising improved fields and dispersed modern houses. The existing Beatrice oil platforms are visible from the monument and do not detract from its appreciation and understanding. The stones have great intrinsic value as a rare example of their kind and as a potential data source. They have limited contextual value, as their relationship with their surroundings is very poorly understood. They have some associative value because of their association with antiquary research.

214. The east/west alignment of the stones, together with the clear and open views of the seascape to the east, suggests that views towards the sea may have been an important factor in the original siting of the stones. No alignments with specific features are, however, visible and it is probable that the alignments were astronomical. Consequently, the setting of the stones is defined as the hill upon which they are located and, to a lesser extent, the sea to the east. Given the potential astronomical function of the stones, the sky must also be considered to form part of its setting.

215. Although the function of the stone rows is enigmatic, they are a well-known and frequently visited asset and those visiting them are likely to have a strong interest in the relationship of the stones with their surroundings. Given the nebulous

nature of this relationship, the stones are considered to be of medium sensitivity to setting effects.

216. The Wind Farm will be approximately 16 km to the south east of the monument, and will form part of the backdrop of the existing seaview, positioned on the horizon. As SLVIA Viewpoint 6 demonstrates, the Wind Farm will leave much of the arc of view clear. While the Wind Farm will be visible from the monument, the development will not obstruct views from the monument to sea. While the inclusion of the Wind Farm will add a modern element to the current seascape visible from this monument, and thus altering the current view from the monument, this change will not affect the enjoyment, understanding or cultural significance of the monument. It is considered that there will be a negative effect of small magnitude. This is considered to constitute an effect of minor significance. This is not significant.

217. **The Corr (HB 7935)** is a Category A-listed thatched croft complex, built in the 19th century. Its cultural significance primarily relates to its intrinsic value as an excellent example of its kind. The farmhouse is situated on an east facing hillside – the elevated position results in wide reaching views of the surrounding landscape. The site visit demonstrated that The Corr is set within its own localised landscape – associated improved land, outbuildings and other ancillary buildings contribute to the appreciation and understanding of this building. Consequently, its setting is defined as the adjacent fields which are intrinsically liked with its operation as a croft.

218. Situated 23 km from the Wind Farm, The Corr will have views of the development, but the understanding and appreciation of the building's cultural significance will remain unchanged. There will be no effect on the setting of the croft. This is not significant.

219. **Dunbeath Castle (HB 7936, SLVIA Viewpoint 9)** is Category A-listed and comprises a late 16th/early 17th century structure, extensively altered and remodelled in the late 19th century. It was built by the Sinclairs of Dunbeath. Situated on a rocky promontory, the castle is enclosed within a small garden, which forms part of the associated designated designed landscape. Further associated listed buildings are situated to the north-west and include a gatehouse and stables. These buildings will not have views of the development and are not considered further. The castle is approached from the north west by way of a long straight drive. For much of its length, this is either enclosed by trees or in a cutting. As the drive is perfectly aligned upon the castle, the regular cutting frames the castle as the visitor approaches.

220. The castle's intrinsic value relates to its 400 hundred year history during which it has been remodelled several times. Its fabric therefore reflects Scottish history during this period as the building was transformed from a fortification to a comfortable country home. The castle's contextual value relates to the surrounding designed landscape. The designed landscape was laid out in the mid-17th century and its design is entirely determined by the castle, the designer clearly intended to create an approach that is absolutely dominated by the castle, which results in the

castle being seen in framed views against the backdrop of the sea. Its contextual value also relates to the nearby Dunbeath Harbour, from where the castle is visible. The harbour was developed by the Sinclairs and the visual relationship is important to the appreciation of the Sinclairs in developing the surrounding area. The castle's associative value relates to its role as the seat of the Sinclairs and as a landscape feature; its white form is prominent against the dark cliffs in views along the coastline and it is generally visible in the wider landscape. The setting of the castle is therefore defined as being the surrounding designed landscape, the cliffs upon which it stands and the seascape that forms a backdrop to the castle, specifically that to the south east of the castle. Key views relating to setting are those along the drive to the castle and those along the coast in which the castle is seen dramatically located on the cliffs.

221. The castle has a clearly defined relationship with its surroundings that is readily apparent on the ground and that is important to all aspects of its cultural significance. It is of high sensitivity to effects upon setting.

222. The Wind Farm will not affect views along the coastline of the castle, nor will it be visible from the enclosed section of the driveway. However, the turbines will be visible from the castle and its immediate surroundings. The turbines will be some 25 km to the east of the castle, where they will occupy some 30° of the view. They will appear on the horizon, the southern turbines will be seen as parallel rows while the northern turbines will appear to be arranged in a more random fashion.

223. The turbines will not be seen as a backdrop to the crucial views of the castle from the drive nor will they interfere with views along the coastline. Instead they will be seen in more incidental views of the sea from the castle and its immediate surroundings. The castle will remain the dominant feature in the designed landscape. It is concluded that the effect will be of negligible magnitude and that this will result in an effect of negligible significance. This is not significant.

224. **Forse House Hotel (HB 7946)** lies outside the ZTV and there are no viewpoints from third locations that might be considered relevant to its setting. It is not considered further. This is not significant.

225. **Dunbeath Portomin Harbour (HB 7945)** is Category B-listed. It was built over several phases during the 19th century as a herring and salmon fishing station and comprises a harbour, ice house and other infrastructure. These lie at the mouth of the Dunbeath Water, and steep slopes rise sharply immediately to the north of the harbour. Although originally built as a commercial harbour it is now primarily a recreational facility. The buildings present have intrinsic value as examples of their kind and as evidence of the boom in fishing during the 19th century. They have some contextual value as their relationship with the landscape is readily appreciable; it can be seen that the harbour has been sited to make the most of the little natural shelter afforded by the river mouth. The harbour has associative value as it forms a pretty scene and because of associations with the author John Gunn, who was born in Dunbeath and wrote about the area. The harbour's setting is therefore defined as the river mouth that it occupies, the cliffs to the north and south, which limit opportunities for building harbours on this coastline and which

provide a backdrop to the harbour and the sea, which is clearly intrinsically linked to the harbour's function and contributes to its sense of place. As it is considered to be of regional significance, it is of medium sensitivity to setting effects.

226. The harbour lies some 24 km from the application site boundary. The headland to the north of the harbour will screen the Wind Farm from view from the harbour itself and from the beach to the south. It is concluded that there will be no effect upon the setting of the harbour. This is not significant.

227. **The Whaligoe Steps (HB 14070, SLVIA Viewpoint 10)** are Category B-listed and comprise 330 flagstone steps leading down precipitous cliffs to a fishing quay, which is covered by the same listing. The steps were built in the mid-18th century and renovated in the early 19th century, when the quay was built. The steps and quay are referred to in Sir John Sinclair's 'Account of Improvements'[1] with the site referred to as the 'Creek of Whalego' in 1812. The work included clearing the harbour area of large stones and building a platform for the boats, as well as making stairs in the face of the rock. Fixtures and fittings are still in place, including the original boat winch that was used to pull the boats onto dry land. The associated curing yard (also a Category B-listed building), is situated at the top of Whaligoe Steps. The quay is no longer operational but is instead a popular tourist attraction, which although not actively promoted by the Highland Council (for health and safety reasons) is served by a carpark and a guidebook is available. Halfway down the steps is a viewing platform, where visitors can stop and look out to sea.

228. Whaligoe has intrinsic value as an example of the lengths that the inhabitants of Caithness had to go to exploit the sea owing to the lack of ready natural harbours on the eastern coast. It has contextual value as one of a string of small fishing harbours that take advantage of what little shelter there is. It has associative value because of the strong sense of place that derives from the spectacular location, in which steep cliffs frame a view eastwards out to the featureless North Sea. This helps the visitor appreciate the danger involved in fishing these waters. The site visit demonstrated that while views out to sea contribute towards the current setting of the monument to some degree, the enclosed sheltered inlet and dramatic natural stratigraphy, together with the acoustics audible to the visitor, dominate what can be perceived by a modern visitor as the asset's sense of place. Consequently, the setting of the steps and harbour is defined as the small bay in which they are located, the steep cliffs adjacent and the sea to the east.

229. The Wind Farm will lie some 15 km to the south east. The ZTV suggests that the quay area will have views of the Wind Farm. However, this does not take into account the local topography; the turbines will be screened from view by the cliffs forming the southern side of the inlet. Consequently, the Wind Farm will only be visible from the viewing platform (Viewpoint 10) and from the very top of the

[1] (http://www.ambaile.org.uk/en/item/item_page.jsp?item_id=39085)

steps. From both the top of the steps and the viewing platform the turbines will be seen beyond the headland that forms the southern side of the inlet.

230. The surroundings of the steps and quay contribute greatly to its cultural significance and the appreciation thereof. However, it is of only regional importance and it is concluded that it is of medium sensitivity to effects upon setting.

231. The turbines will be visible from the top of the steps and the viewing platform at a distance of 15 km. They will lie on the horizon and be seen in lines, though there will be some bunching of the northernmost turbines. Given their distance, the cliffs in the foreground will remain the dominant feature in these views and the turbines will not detract from the views' dramatic qualities, which relate to the steep cliffs. The turbines will not be visible from the quay and there will be no question of the view out to sea being closed down or broken up. Consequently, it is concluded that the effect will be of at most small magnitude. The effect will be negative and of at most minor significance. This is not significant.

232. **Lybster conservation area (SLVIA Viewpoint 7)** takes in the 19th century core of the village of Lybster. This is a planned village laid out by General Patrick Sinclair, which succeeded an earlier settlement. As with many other villages laid out on Caithness' coast in the early 19th century, Lybster was intended to house fishermen and their families and to provide all the necessary facilities for a working community; school, churches, inns etc. These buildings and the houses are arrayed along a long straight street aligned north/south. The associated harbour lies to the west outside the conservation area. The conservation area's cultural significance lies primarily in its intrinsic value, its buildings collectively provide a good example of a planned 19th century fishing village, but it also has contextual value, in that the village is important to the understanding of the rise and decline of the herring industry, and associative value, as the single phase design of the buildings on Main Street results in a striking view southwards along the street to the sea framed by buildings of consistent scale and form. It is concluded that the conservation area is of medium sensitivity to effects upon setting.

233. The Wind Farm will lie some 19 km to the east and south east of Lybster. It will not be visible from the heart of the conservation area, owing to the buildings lining along Main Street, but will be visible from ground to the rear of the buildings on the eastern side of the street and, to varying degrees, from the rear of the buildings themselves. Views from public areas will be restricted to the very southern end of Main Street, in which the turbines will be partially visible beyond modern housing. This will not affect the appreciation of the village's cultural significance. There are no views from third locations that are relevant to the appreciation of the village's cultural significance and it is concluded that there will be no effect upon its setting. This is not significant.

234. The associated **Lybster Harbour (HB 7954, SLVIA Viewpoint 7)** lies to the west of the village. It lies in Lybster Bay, which is surrounded by steep cliffs and opens to the south. Although outside the conservation area, the harbour is intrinsically linked to it as the harbour and village are two parts of the same development. The

cultural values of the harbour are essentially the same as those of the village. The Wind Farm lies to the east and south east of the harbour and will be completely screened from view by topography. There are no views relevant to the appreciation of the harbour's cultural significance in which the turbines will be visible. It is concluded that there will be no effect upon the setting of the harbour. This is not significant.

26 OFFSHORE TRANSMISSION WORKS MARINE ARCHAEOLOGY AND CULTURAL HERITAGE

26.1 INTRODUCTION

1. This Section of the ES evaluates the likely significant effects of the Offshore Transmission Works (OfTW) on marine archaeology and cultural heritage. The assessment has been undertaken by Headland Archaeology.

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

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

3. Cultural heritage assets are referred to by Headland Archaeology (HA) numbers listed in Appendix 26.1.

4. This Section includes the following elements:

- Assessment Methodology and Significance Criteria;
- Baseline Description;
- Development Design Mitigation;
- Assessment of Potential Effects;
- Mitigation Measures and Residual Effects;
- Summary of Effects;
- Statement of Significance; and
- References.

5. The cumulative effects of the OfTW are assessed in Section 15: Marine Archaeology and Cultural Heritage which assesses the marine archaeology and cultural heritage effects of the Wind Farm.

26.1.1 POLICY AND PLANS

6. This assessment is conducted in line with industry best practice. Particular reference is made to the following.

- Historic Environment Guidance for the Offshore Renewable Energy Sector (COWRIE/Wessex Archaeology, 2007);
- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (COWRIE/Oxford Archaeology, 2007);
- The Joint Nautical Archaeology Policy Committee (JNAPC) Code of Practice for Seabed Developers (JNAPC, 2007); and
- Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (COWRIE/EMU Ltd., 2011).

7. All relevant International and European Charters and Conventions, UK & Scottish Legislation, and Scottish Planning Policy are detailed in Appendix C in Annex 26A.

26.2 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

26.2.1 CONSULTATION

8. In order to produce an informed assessment, contact was initiated with statutory authorities including Historic Scotland and the Moray Council Archaeologist.

Table 26.1 Summary of Consultation Responses

Consultee	Summary of Consultation Response	Headland Archaeology Response
Historic Scotland	As the regulator for cultural heritage in Scottish jurisdiction, Historic Scotland commented with regard to the potential effects of the OfTW in relation to the marine assets within their statutory remit; comprising designated wrecks and Scheduled Monuments.	This has been noted where the advice from Historic Scotland has been integrated into the established assessment methodology
Historic Scotland	Historic Scotland recommends that archaeological analysis of geophysics is undertaken consistent with guidelines set out in Historic Environment guidance for the offshore renewable energy sector; and Historic Scotland encouraged the analysis of any geotechnical surveys which are gathered for other purposes as part of the EIA process, and requested that the results be archived through the Royal Commission on the Ancient and Historical Monuments of Scotland.	The assessment has been conducted in line with industry best practice guidance including the JNAPC Code of Practice for Seabed Development; Historic Environment Guidance for the Offshore Renewable Energy Sector (COWRIE/Wessex Archaeology, 2007); and Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (COWRIE/EMU Ltd., 2011).
The Moray Council Archaeologist	The Moray County Archaeologist did not have any comments with regard to the OfTW	Noted.

26.2.2 SCOPE OF ASSESSMENT

9. The assessment has considered the effects of the OfTW upon the following:

- Designated cultural heritage assets, comprising Designated Wrecks, Scheduled Monuments and non-designated cultural heritage assets; and
- Undesignated submerged archaeology, including maritime losses such as wrecks, aircraft and their associated debris and palaeoenvironmentally significant deposits.

26.2.2.1 Elements Scoped out of the Assessment

10. The assessment has only considered the physical effects on cultural heritage assets during construction and operation and does not include indirect effects on the setting of key onshore receptors as the cable will be buried and therefore not visible. In addition decommissioning effects have not been considered within this

assessment as the effects are essentially the same as those for the construction phase.

26.2.3 GEOGRAPHICAL SCOPE

11. Two Study Areas have been used in the assessment of physical effects. The Inner Study Area consists of the OfTW corridor while the Outer Study Area includes a 1 km buffer of the OfTW corridor. These Study Areas are illustrated on Figure 26.1-3.All cultural heritage assets within the Inner Study Area and the Outer Study Area are considered for potential physical effects.

26.2.4 BASELINE SURVEY METHODOLOGY

12. This cultural heritage assessment comprises the results of a baseline desk based survey and site visit to the proposed landfall location, with analysis and assessment of marine geophysical and geotechnical survey data in order to identify all potential cultural heritage assets within the Study Areas.

26.2.4.1 Desk Based Surveys

13. The desk based study was based on readily available and relevant documentary sources (Annex 26A). The following archives were referred to:

- Databases of designated cultural heritage assets maintained by Historic Scotland including designated wrecks;
- National Monuments Record of Scotland (NMRS) held by the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) including maritime losses;
- UK Hydrographic Office Wrecks and Obstructions Database (SeaZone);
- Ministry of Defence (military remains only);
- Receiver of Wreck (ROW);
- Moray Council Historic Environment Team (HCHET) Historic Environment Record (HER); and
- National Library (for historic charts and maps only).

26.2.5 SITE VISIT

14. A site visit of the foreshore and inter-tidal areas in the vicinity of the cable landfall locations was completed between the 18th and 22nd July 2011. The baseline condition of known or identified features was noted, as were key views from each cultural heritage asset location. Photographs from the field visit were also compiled for the baseline record.

26.2.5.1 Geophysical Survey Analysis

15. A geophysical survey of the OfTW corridor was undertaken by Gardline Geosurvey Ltd. and was subsequently made available for archaeological analysis and assessment (Appendix 26.1 and Appendix 26.2).

16. The aim of this marine geophysical archaeological assessment was to identify any cultural heritage assets recorded from the surveyed area and to inform the baseline study and EIA for the Project. Marine geophysical survey data was collected using sidescan sonar, magnetometer, sub-bottom profiler and multi-beam bathymetry.

Geophysical targets were identified and given a high, medium or low archaeological potential rating based on the characteristics of the anomalies.

26.2.5.2 Geotechnical Survey Analysis

17. A geotechnical survey of the OfTW Corridor was undertaken by Gardline Geosciences Limited and an archaeological assessment of the palaeoenvironmental potential of the OfTW Corridor carried out (Annex 26A). A total of 31 Core Penetration Logs (CPT) and 31 Vibrocore (VC) logs were assessed along the OfTW Corridor. The information for the borehole and grab sample logs was gathered and supplied. The logs were assessed in order to gauge whether the deposits contained any sediments with palaeoenvironmental potential; in particular peats or sediments with high organic contents such as organic silts.

26.2.6 METHODOLOGY FOR THE ASSESSMENT OF EFFECTS

26.2.6.1 Worst Case

18. The Rochdale Envelope parameters for the Project are presented in Section 7: Project Description. The OfTW corridor includes a single route towards the landfall near Portgordon (Figures 26.1-3).

19. The worst case scenario for cultural heritage has been considered for the OfTW in relation to the maximum number of cables (AC and DC), expected cable corridor width, number of trenches and maximum width and depth of the trench, which are directly related to the OfTW corridor.

Table 26.2 Worst Case Scenarios Tested DC and AC

Potential Effect	Worst Case / Scenario Assessed
OfTW: Construction Phase	
Direct physical effects on the sea bed as a result of OfTW construction.	3 Cable Trenches.
	Maximum distance between trenches of approximately four times water depth.
	Maximum Width of Cable Trench of 3 m.
	Maximum Depth of Cable Trench of 2.5 m.
	Maximum length of OfTW 65km.

20. For AC and DC OfTW, the number of cables, the cable corridor width, the maximum number of trenches required and the maximum width of trenches required for installation are identical for all Rochdale Envelope parameters.

26.2.6.2 Construction Effects

21. The installation of cables and associated activities including the deployment of construction vessels has the potential to damage or destroy cultural heritage assets. This may occur either as a result of the design or as an accidental consequence of construction activities, such as the anchoring of craft involved in installation. The effects may be direct, for instance where an archaeological deposit is removed during ground works; indirect, for example disturbance of sediments in the

offshore areas may lead to covering of nearby archaeological remains; or secondary, such as vessel anchoring activities during installation. The type and description of effects used for the purpose of the assessment are presented in Table 26.3.

Table 26.3 Type of Effect

Type of Effect	Description
Direct Effect	Direct effects on archaeological sites, features, deposits and artefacts that may be affected by the OfTW. These works might include trenching and the associated area of influence on the seabed.
Indirect Effect	Potential damage to archaeological sites and features within the OfTW corridor may be caused by indirect effects. These might include interrelating effects such as changes to the sediment regime within the area. Some indirect effects may be beneficial, for instance the burial of sites and features by increased sedimentation.
Secondary Effect	Secondary effects on archaeological sites, features and artefacts that may be affected within the OfTW corridor. These might include the effects of the anchoring of installation and operational vessels and associated activities during the pre-installation and installation operations.

26.2.6.3 Sensitivity

22. The sensitivity of a cultural heritage asset to an effect reflects the level of importance assigned to it. This is the product of a number of factors, including its potential as a resource of archaeological data, its association with significant historical events, its role as a local landmark with cultural associations and its aesthetic value.

23. Official designations applied respectively to cultural heritage assets have been taken as indicators of importance as they reflect these factors. Sensitivity is assigned to undesignated cultural heritage assets according to the professional judgment of the assessor.

24. The criteria used for defining a cultural heritage asset's sensitivity to direct and indirect physical effects and then assessing the magnitude of those effects is summarised in Table 26.4.

Table 26.4 Sensitivity of Cultural Heritage Assets

Sensitivity to Effect	Definition
High	Cultural heritage assets of international/ national importance. Designated wrecks and scheduled monuments. Maritime losses where the position is known and positively identified. Targets of high archaeological potential identified in the geophysical survey.
Medium	Cultural heritage assets of regional importance. Targets of medium archaeological potential identified in the geophysical survey. Obstructions that could be indicative of wreckage or submerged features.
Low	Targets of low potential identified in the geophysical survey.

26.2.6.4 Magnitude

25. In determining the magnitude of effect, the values of the asset affected are first defined. This allows the identification of key assets and provides the baseline against which the magnitude of change can be assessed; the magnitude of effect being proportional to the degree of change in the asset's baseline value. The criteria used for assessing the magnitude of effects on cultural heritage is summarised in Table 26.5.

Table 26.5 Magnitude of Effects on Cultural Heritage Assets

Magnitude of Effect	Definition
Large	Total loss or major alteration of the cultural heritage asset
Medium	Loss of, or alteration to, one or more key elements of the cultural heritage asset.
Small	Slight alteration of the cultural heritage asset
Negligible	Barely perceptible alteration of the cultural heritage asset

26.2.7 ASSESSMENT OF SIGNIFICANCE

26. The significance of an effect on a cultural heritage asset is assessed by combining the magnitude of the effect and the sensitivity of the cultural heritage asset. The evaluation of significance presented in Table 26.6 provides a guide to decision making, but is not a substitute for professional judgement and interpretation, particularly where the sensitivity or effect magnitude levels are not clear or are borderline between categories. Predicted effects of major or moderate significance are considered significant in terms of the EIA Regulations for the purpose of the assessment of effects on cultural heritage.

Table 26.6 Criteria for Assessing the Significance of Effects on Cultural Heritage Assets

Sensitivity or Value of Resource or Receptor	Magnitude of Effect			
	Negligible	**Small**	**Medium**	**Large**
Low	Negligible	Negligible	Minor	Moderate
Medium	Negligible	Minor	Moderate	Major
High	Negligible	Moderate	Major	Major

26.2.8 ASSESSMENT LIMITATIONS

27. No data gaps or uncertainty arose during the course of this assessment.

26.3 BASELINE CONDITIONS

28. From the surveys undertaken and described above the following description of the existing cultural heritage environment has been made.

29. The area of the Moray Forth has been undergoing isostatic uplift since the end of the last glacial period and it is estimated that the area of the Inner Moray Firth may have undergone as much as 42 m of uplift since c. 9,600 BP (Haggart, 1982). Holocene relative sea level change has been investigated across sites in northeast Scotland and show a broad trend of falling sea level from the Late Glacial Maximum of c. 15,000 BP to around 10,000 BP to levels below that of present day sea level; the early-Holocene minimum (Shennan et al, 2000; Shennan and Horton, 2002). This is followed by a period of sea level rise, until around 5000 BP when sea level began to fall, with this trend continuing in the area to the present (Shennan and Horton, 2002). It is thought that the driving cause for this sea level fall within this area is isostatic uplift (Lambeck, 1992).

30. The OfTW corridor is known from previous studies (e.g. Flemming, 2004) to have been largely restricted in the past to glacial and marine conditions; therefore never becoming terrestrialised within the last 12,000 years. Relative sea level change in the area, combined with glacial isostatic uplift, has meant that the Outer Moray Firth has remained either under ice sheets or submerged by the North Sea since the last glacial period. This means that there have been no opportunities for terrestrial deposits of palaeoenvironmental interest, such as peats to develop.

31. The solid geology directly beneath the OfTW corridor is composed of a thick sequence of sandstones and mudstones of Lower Cretaceous Age (Cullen & Regan, 2010). This is overlaid with Pleistocene deposits of Quaternary age made up of soft clayey silts to hard gravely clays. The silts are recorded to be <10m, if present at all, with gravels reaching depths of up to 50m in parts likely to represent glacial tills. Above these Quaternary deposits are thin surface sediments of sands and gravels accrued during from the Holocene period. The pre-Holocene sediment deposits in the inner Moray Firth have been recorded up to a maximum depth of 47m from borehole evaluations from the British Geological Survey (BGS). These shallow boreholes from the inner Moray Firth date as far back as mid-last Glaciation and reveal seven units of stratigraphy providing further evidence for the geomorphology of the region. There have been no reported Palaeolithic finds or deposits of archaeological significance in the vicinity of the Inner and Outer Study Area.

32. Superficial geology along the OfTW corridor is variable, with one of three main soil types. The uppermost stratum is a medium dense to very dense sand with variable amounts of silt and gravel. This layer overlays a very soft to stiff clay, which in turn overlies bedrock.

33. Seabed sediments comprise shelly sand, between Kilometre Point (KP) 0 and KP13.980, with numerous minor depressions filled with more gravelly sediment. Areas of megaripples are present between KP14.5 and KP15.7. At KP29.465 numerous ribbons of gravel are present crossing the OfTW corridor. These ribbons of gravel progress to an area of gravelly shelly sand between KP31.385 and KP32.29. From KP 32.29 to KP45.475 the seabed sediments comprise soft clay with various minor partings of sand and silt. There are a number of pockmarks present in this region of soft clay. Occasional boulders/debris and frequent patches of gravelly sand are also recorded. At KP53.785 seabed sediments change to gravelly sand and remain so until KP62. A number of large boulder fields and areas with numerous boulders and cobbles are present along this section. Between KP62 and the landfall at KP64.7, seabed sediments comprise a mixture of gravelly sand with frequent boulders and cobbles and sand with frequent boulders and cobbles.

34. A flint scraper recovered from a borehole core sample taken on the Viking Bank off Shetland some distance to the north in the North Sea represents the only prehistoric find from a maritime context discovered to date (Fleming, 2004). A number of lithic scatters have been identified along the north east coast at Keiss and in the Yarrows basin. This evidence suggests that settlement was occurring at coastal locations from the later Mesolithic period onwards, and that tool manufacturing had occurred over a prolonged period of time throughout prehistory in the area (Pannett and Baines, 2002).

35. In addition, there is a dense concentration of prehistoric sites known from coastal locations to the west of the Study Area on the northeast coast. The Cairn of Get and Hill O'Many Stanes near Wick suggest ritual activity from the Neolithic into the Bronze Age close to Moray Firth, which was presumably associated with settlement, evidence for which is less readily apparent. At Freswick, a shell midden of limpet shells and fish bones was excavated and suggested to be the site of a Bronze Age encampment that overlay a Mesolithic layer containing flakes, cores and scrapers (Lacaille, 1954). Iron Age activity appears to have been widespread along this area of coast. Up to 200 brochs have been identified in Caithness, many having widespread views of the seascape including Borrowston Broch (Hill of Ulbster), Watenan Fort (SM 907) and Tulloch (Usshilly) Broch and field system (SM 599).

36. Archaeological and documentary evidence for Roman occupation in Scotland is well documented and discussion with regard to the utilisation of the sea around Scotland has also been postulated (Martin, 1991). There is no question that both military and merchant maritime traffic would have been extensively employed during this period, connecting with the many Roman fort networks on the major east coast Firths; notably Cramond on the Forth and Carpow on the Tay, and possibly maritime nodal points such as Aberdeen.

37. The Early Medieval and Medieval Period witnessed increasing contact between cultural groups throughout the British Isles, especially in relation to the spread of Christian culture and the written record from this period makes constant reference to sea journeys undertaken by those involved with the church. Monastic

foundations on the east coast of Scotland are well represented, particularly the monastery at Portmahomack (Carver, 2008) c.45 km to the west of the study area at the mouth of the Dornach Firth.

38. Documentary sources state that the North Sea was frequently navigated by Danish and Norse Vikings, Orkney becoming a base in their expansion south and west from Norway. There are a number of accounts of maritime travel by the Vikings from Orkney, including an account from the 13th century when King Haakon Haakonson arrived in Orkney with a fleet of over 100 ships (Ó Cróinín, 2005). Place names show that Caithness was an area for Norse activity, Wick being an example. Excavations at Freswick Links revealed evidence of a Norse settlement from at least the 11th century. Investigation of eroding deposits along the cliff revealed traces of buildings and midden debris comprised of sufficient fish bone to suggest that fishing may have been undertaken here on a commercial scale in the middle ages.

39. The post-Medieval period saw a steady increase in coastal activity where military activity and the expansion of world-wide trade meant further growth in the volume of shipping. Fishing has also been a significant industry in the area. Gordon's map of the Counties of Scotland (1580- 1652) depicts a number of villages at the proposed landfall sites. During the 18th and 19th centuries there were major increases in the populations of Wick, Fraserburgh and Lossiemouth, while fishing villages and port facilities emerged at Portgordon, Whaligoe and Lybster, driven mainly by the growth of herring fishing. The new harbour at Portgordon built in 1874 replaced an earlier wooden harbour. It is not surprising therefore, that many of the reported losses in this area are of smaller fishing vessels of various designs. It was not until the 20th century that metal hulls came into use in the herring trade and many of the earlier losses of wooden vessels are likely to be highly degraded and difficult to detect.

40. From the 18th century onwards records began to be kept of ship losses and from the middle of the 19th century these records became far more comprehensive. This is reflected in the National Monuments Record for Scotland (NMRS) data collected that shows over 1,500 wrecks in the Moray Firth/ North Sea area alone. Many of the recorded losses occurred during major storms, including the Great Storm of 1800 and other famous storms in 1852, 1874, 1875 and 1876. In the 1875 storm at least 15 vessels were lost and in 1876 there appears to have been at least 31 sinking's (Ferguson, 1991). So severe were these losses that they encouraged the adoption of steam power for cargo vessels and by the end of World War I most of the larger vessels in the area were steam powered.

41. The majority of identified shipwrecks in the seas of the Outer Moray Firth are as a result of military activity during World War I and World War II. Initial losses during WWI were caused by the extinguishing of coastal lights which resulted in numerous wrecks concentrated along the shoreline. In the latter half of 1917 a submarine offensive was launched by the German Navy which resulted in the sinking of at least eleven ships in the Outer Moray Firth (Ferguson, 1991). Records for shipping casualties are somewhat incomplete between 1939 and 1945 due to censorship, but approximately 50 merchant vessels were sunk off the northeast

coast as well as numerous military boats, ships, submarines and allied and German aircraft losses. WWII losses are concentrated around Rattray Head and the eastern approaches to the Moray Firth (Ferguson, 1991).

42. There is a moderate concentration of offshore aircraft losses along the north-east coast of Scotland resulting from military operations. There were several airbases in the area including Royal Air Force (RAF)Lossiemouth to the west of the proposed landfall sites. The RAF base at Lossiemouth was built in 1938 and although mainly a training unit for Bomber crews during World War II, some operational raids were launched from there. In the 1980s the wreck of a four engine aircraft observed during an inspection of a submarine oil pipeline off Helmsdale in the Moray Firth has been identified as a Liberator Bomber that had gone down in 1945 with the loss of six lives. A number of aircraft are recorded in the NMRS as having gone down in the Moray Firth, however exact locations are not known.

26.3.1 CULTURAL HERITAGE ASSETS WITHIN THE INNER STUDY AREA

43. There are no designated cultural heritage assets or previously recorded undesignated cultural heritage assets within the Inner Study Area (Figure 26.1-3).

44. In total one target of high archaeological potential and 18 targets of medium archaeological potential were identified during the archaeological assessment of marine geophysical survey data within the Inner Study Area (Table 26.7 and Gazetteer and Concordance in Appendix 26.1). The target of high archaeological potential has been positively identified as a previously unknown and unrecorded wreck and is considered as of high sensitivity in this assessment. The remaining 18 targets of medium archaeological potential are unknown anomalies that could be indicative of unrecorded wreckage or submerged features. They are therefore considered to be of medium sensitivity within this assessment (Figure 26.1-3).

Table 26.7 Table of Cultural Heritage Assets within the Inner Study Area

Headland Archaeology Number	Name	Type	Sensitivity
17	Linear debris	Sonar Target	Medium
20	Linear debris	Sonar Target	Medium
28	Linear debris	Sonar Target	Medium
33	Linear debris	Sonar Target	Medium
52	Debris	Sonar Target	Medium
61	Linear debris	Sonar Target	Medium
63	Debris	Sonar Target	Medium
68	Wreck	Sonar Target & Magnetometer Target	High
87	Debris	Sonar Target	Medium
90	Possible Debris	Sonar Target	Medium
102	Possible debris	Sonar Target	Medium
121	Linear Debris	Sonar Target	Medium
126	Linear Debris	Sonar Target	Medium
127	Linear Debris	Sonar Target & Magnetometer Target	Medium
133	Linear Debris	Sonar Target	Medium
135	Possible Debris	Sonar Target	Medium
143	Linear Debris	Sonar Target	Medium
154	Debris	Sonar Target	Medium
156	Debris	Sonar Target	Medium

45. A further 149 targets considered to be of low archaeological potential were identified within the Inner Study Area. This classification was based on the shape, strength of reflection and in most cases uniqueness on the seabed in relation to the surrounding seabed characteristics. These are classed to be of low sensitivity within this assessment.

26.3.2 CULTURAL HERITAGE SITES WITHIN THE OUTER STUDY AREA

46. There are no designated cultural heritage assets within the Outer Study Area. There are eight wrecks charted by the United Kingdom Hydrographic Office (UKHO) within the Outer Study Area (HA1001- HA1008, Table 26.8). There are five reported losses with confirmed locations within the offshore outer study area recorded in the National Monuments Record of Scotland. These losses correspond with the UKHO SeaZone entries (HA1003- HA1007) and are therefore assigned the same Headland Archaeology numbers in this report (Figure 26.1-3). These are considered to be of low to high sensitivity dependant on the 'live' or 'dead' status of the record and the nature of the anomaly.

Table 26.8 Cultural Heritage Assets within the Outer Study Area

Headland Archaeology Number	UKHO No.	Name	NGR	Status	Sensitivity
1001	00897	Sunbeam (Possibly)	496719.788 6439047.215	Live	High
1002	00895	Day Jet	498924.265 6428676.953	Dead	Medium
1003	02119	Unknown Craft	497031.018 6422183.054	Live	High
1004	02116	Unknown Craft	498756.869 6418503.008	Dead	Medium
1005	02096	John Dunkin	497192.683 6417336.969	Live	High
1006	02117	Unknown Aircraft	497335.503 6410124.405	Live	High
1007	02103	Pharon	496730.233 6395306.391	Dead	Low
1008	02068	Bpt No 31	496876 6391921	Live	High

26.3.3 POTENTIAL FOR UNRECORDED CULTURAL HERITAGE SITES IN THE STUDY AREA

47. The relatively large number of recorded maritime losses in the area of the OfTW corridor suggests a medium potential for the discovery of unrecorded cultural heritage assets, particularly along the coast in the vicinity of the cable landfall around Portgordon. Eight wrecks have been identified from the UKHO and NMRS datasets within the Outer Study Area. The NMRS data records more than 1,500 wrecks as having been lost in the Moray Firth/North Sea area, the majority of which the precise location is unknown.

48. The assessment of geophysical survey data has been undertaken and targets of archaeological potential have been identified. However, despite comprehensive geophysical assessment using the latest survey methods, any wooden wreck or debris which was buried at the time of the surveys may not have been detected by the magnetometer or acoustic survey techniques used, and therefore there remains low potential for the presence of undiscovered wrecks or other unknown cultural features within the OfTW corridor.

49. No organic sediments such as peats or organic silts were identified in the geotechnical survey analysis. The potential for the presence of organic archaeological remains is low; although the presence of residual flints and lithic artefacts within the marine sediments remains a possibility.

26.4 DEVELOPMENT DESIGN/EMBEDDED MITIGATION

50. 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, i.e. potential damage to or loss of an asset.

26.5 ASSESSMENT OF POTENTIAL EFFECTS

26.5.1 CONSTRUCTION

26.5.1.1 Direct Effects

51. No known cultural heritage assets are located within the area likely to be directly affected by the OfTW, and therefore there will be no direct effects on known cultural heritage assets.

52. There is low potential for direct effects on unknown previously unrecorded archaeological remains, however in the absence of mitigation, these effects have the potential to be major and therefore significance in terms of the EIA Regulations.

26.5.1.2 Indirect Effects

53. Changes to the sedimentary regime as a result of the construction of the OfTW have been assessed as not significant (Section 21: OfTW Physical Processes and Geomorphology) and are of a magnitude not considered likely to have any effects on any cultural heritage receptors, therefore there will be no indirect effects.

26.5.1.3 Secondary Effects

54. Sites HA68, HA1001, HA1003, HA1005, HA1006, and HA1008 are considered to be of high sensitivity within the assessment. The potential magnitude of the secondary effect on these assets, as a result of OFTW construction is large, with the potential for major alteration or total loss of an asset. In the absence of mitigation, there is therefore potential for a major effect upon these sites which would be significant in terms of the EIA Regulations.

55. Sites HA17, HA20, HA28, HA33, HA52, HA61, HA63, HA87, HA90, HA102, HA121, HA126, HA127, HA133, HA135, HA143, HA154, HA156, HA1002 and HA1004, are all considered to be of medium sensitivity within this assessment. The potential magnitude of the secondary effect on all identified assets of medium sensitivity in this assessment would be medium with the potential for loss of, or alteration to, one or more key elements of the cultural heritage asset. In the absence of mitigation, there is therefore potential for a moderate effect upon these sites which would be significant in terms of the EIA Regulations.

56. Site HA1007 is considered to be of low sensitivity within this assessment. The potential magnitude of the secondary effect on all identified assets of low sensitivity in this assessment would be medium. In the absence of mitigation, there is therefore potential for a minor effect upon this site which would not be significant in terms of the EIA Regulations.

57. There is potential for secondary effects on unknown previously unrecorded archaeological remains, however in the absence of mitigation, these effects have the potential to be of large magnitude and significant in terms of the EIA Regulations.

26.5.2 OPERATIONAL EFFECTS

58. Changes to tidal currents, sedimentary regimes, or water quality during operation of the OfTW have been assessed as being within the range of natural variability (Section 21: OfTW Physical Processes and Geomorphology). It is therefore considered that there will be no effect on cultural heritage assets as a result of the operational phase of the OfTW.

26.6 MITIGATION MEASURES AND RESIDUAL EFFECTS

26.6.1 CONSTRUCTION

59. Direct physical effects on the nine sites of potential cultural heritage interest identified in this assessment will be avoided where possible. Should it not be possible to avoid sites of cultural heritage interest, a full programme of archaeological investigation which may include diver survey or 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.

60. All sites of cultural heritage interest included in this report will be avoided where possible with the implementation of temporary exclusion zones and the micro-siting and re-routing of the OfTW cable. In addition, data gathered as part of pre and post-installation geophysical and geotechnical survey should be made available for archaeological assessment.

61. Where cultural heritage assets may potentially be subject to secondary effects, temporary exclusion zones will be implemented to prevent these resulting from invasive activities, such as cable installation and associated anchoring activites. Exclusion zones of at least 100 m will be established around sites identified as being of high sensitivity in this assessment while an exclusion zone of a minimum 50 m will be established around those of medium sensitivity. In the event that dynamic positioning systems are used for operational vessels, these mitigation proposals may be deemed unnecessary and appropriate alternative archaeological mitigation agreed with Historic Scotland.

62. In order to mitigate the risk of damage to any previously unrecorded archaeological remains, an archaeological Protocol for Archaeological Discoveries (PAD) will be prepared for the approval of Historic Scotland and Moray Council Archaeologist to mitigate direct or secondary effects in the event of any unexpected discoveries of archaeological remains during installation.

63. Should it not be possible to avoid known sites of cultural heritage interest, a full programme of archaeological investigation which may include diver survey or 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.

64. It is considered that through the programme of mitigation offered for construction, such as temporary exclusion zones and the implementation of a WSI (Written Scheme of Investigation) and Protocols and Procedures, that all potential effects

will be reduced to negligible, and therefore not significant in terms of the EIA Regulations.

26.6.2 OPERATION

65. No mitigation is proposed for the operational phase of the OfTW as no effects are predicted on the cultural heritage resource.

26.7 MONITORING AND ENHANCEMENTS

66. No monitoring is required and no enhancements are proposed.

26.8 SUMMARY OF EFFECTS

67. A desk based study and archaeological assessment of geophysical and geotechnical survey data have been carried out in order to identify potential cultural heritage assets that may be affected by the OfTW and to establish their current condition. This work also provided information upon which to base the assessment of archaeological potential.

68. There are no known cultural heritage assets within the Inner Study Area. There is one known wreck from the UKHO database within the Outer Study Area. There remains low potential for the discovery of unrecorded cultural heritage assets.

69. The archaeological geophysical assessment identified one site of high archaeological potential that has been positively identified as a previously unrecorded wreck of unknown origin and 18 sites of medium archaeological potential within the Inner Study Area.

70. The archaeological geotechnical assessment indicated that the potential for the presence of organic archaeological artefacts is regarded as low, however the presence of residual flints and lithic artefacts located within the marine sediments remains a possibility.

71. Potentially significant construction effects will be mitigated as far as possible through the establishment of exclusion zones, micro-siting and re-routing, and pre-installation and post-installation investigations.

72. Mitigation of potential significant effects will involve the introduction of a WSI and protocols and procedures for any unexpected archaeological discoveries.

73. Any proposed mitigation measures are subject to approval by Historic Scotland and the Moray Council (to the low water mark).

Table 26.9 Summary of Effects on Marine Archaeology and Cultural Heritage Assets

Predicted Effect	Level of Effect/ Significance	Monitoring, Enhancement or Mitigation Proposed	Residual Effect/ Significance
Construction Effects			
Direct Effects	Major/ Significant	Archaeological WSI and reporting protocol to be established and followed during installation. Diver survey or ROV investigation will be undertaken to identify the nature and extent of sites that cannot be avoided.	Negligible, Not significant
Indirect Effects	Negligible / Not significant	Archaeological WSI and reporting protocol to be established and followed during installation.	Negligible, Not significant
Secondary Effects	Major/ Moderate /Significant	All sites are avoided by cable route where practicably possible. Exclusion zones established around wrecks and sites. Anchor patterns will be designed to avoid known wrecks and targets. Archaeological WSI and reporting protocol to be established and followed during installation. Diver survey or ROV investigation will be undertaken to identify the nature and extent of sites that cannot be avoided.	Negligible, Not significant
Operational Effects			
Direct. Indirect and Secondary Effects	Negligible / Not significant	None.	Negligible, Not significant

26.9 STATEMENT OF SIGNIFICANCE

74. The potential effects of the proposed OfTW cable upon recorded and unrecorded cultural heritage assets have been considered. It has been established that there is low potential for the discovery of unknown unrecorded cultural heritage assets within the OfTW corridor.

75. The assessment of the construction effects has highlighted that there will be negligible direct and indirect effects on identified and potential cultural heritage assets. A total of 26 sites have been identified that may be subject to secondary effects, and in the absence of mitigation are regarded to be of moderate to major effects, and significant in terms of the EIA Regulations. However, following the implementation of the proposed mitigation measures the effects are considered to be negligible and not significant.

76. The assessments of the operational effects have concluded that there will be a negligible effect on cultural heritage assets and therefore the effects are not significant.

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26.10.3 DATABASES OF CULTURAL HERITAGE ASSETS CONSULTED

121. Designated wreck data was downloaded from Historic Scotland's website © Historic Scotland

122. Offshore Sites and Monuments Record information derived from NMRS data © Crown Copyright RCAHMS

123. Wrecks and Obstructions information derived from SeaZone data © Copyright UKHO

124. Wrecks information taken from www.wrecksite.eu

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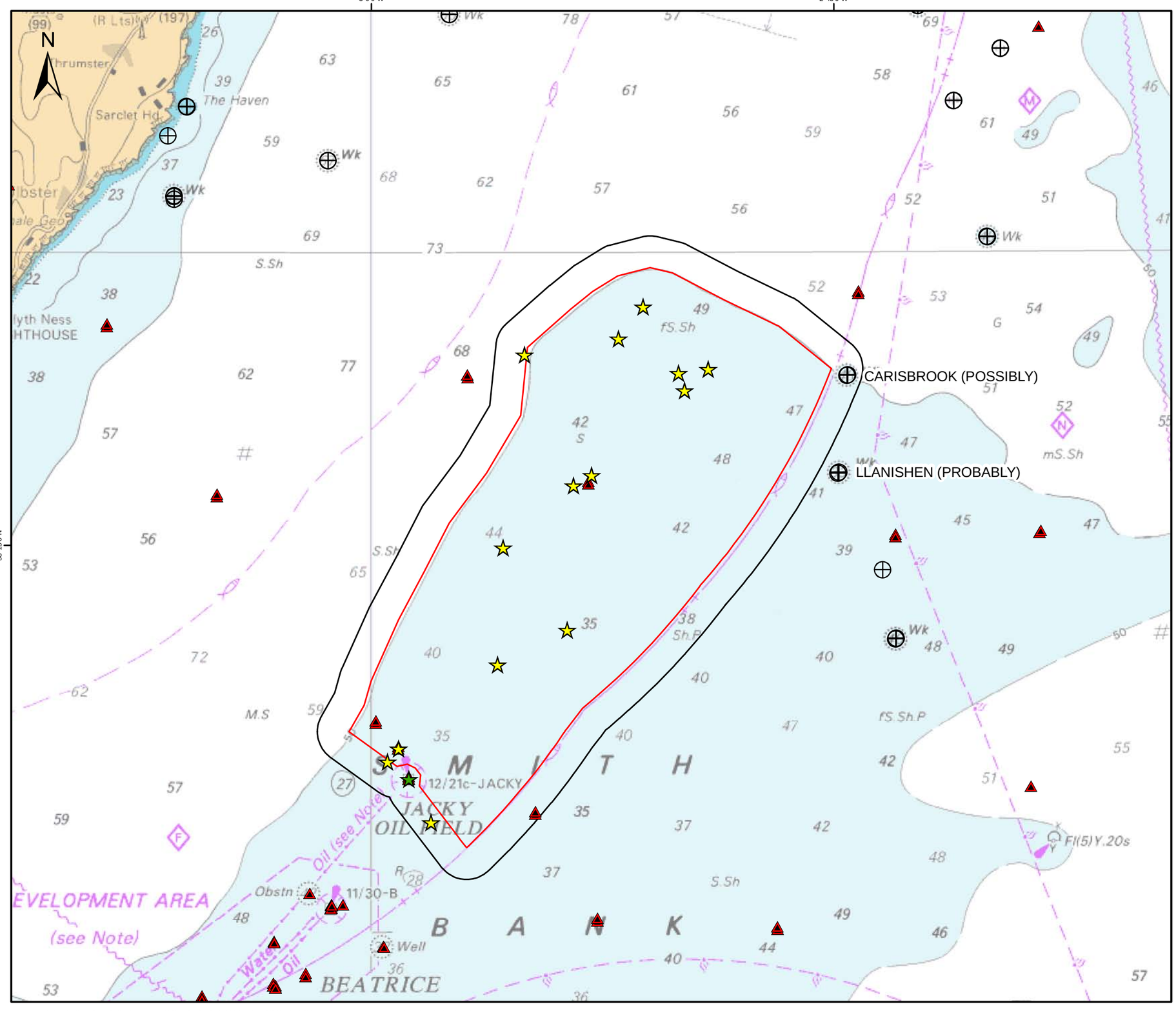
APPENDIX 26.1: GAZETTEER AND CONCORDANCE OF CULTURAL HERITAGE ASSETS WITH KNOWN LOCATIONS WITHIN THE OFFSHORE STUDY AREA

HA	Name	SeaZone ID	NMRS ID	Status	Description	DD Long/ DD Lat	UTM30NmE/ UTM30NmN
HA1001	Sunbeam (Possibly)	00897	-	Live	Sunbeam was a British Merchant sailing vessel (Schooner)of 132grt. On the 4th July 1915 when 17 miles S by E from Wick, Scotland she was captured by German submarine U-25 and sunk by gunfire. Found by multi-beam in a general depth of 42 m. LENGTH 25MTRS, WIDTH 10MTRS, HT 2.5MTRS. NO MAGNETIC ANOMALY. HIGLY DEGRADED		496719.788 6439047.215
HA1002	Day Jet	00895		Dead	Aircraft ditched in the Moray Firth not found by survey		498924.265 6428676.953
HA1003	Unknown Craft	02119	101775	Live	A small wreck, about 20 metres (65 feet) long, was examined on the 21 November 1987. The least echosounder depth was 74 in a general depth of 77 metres. The side scan sonar indicated a height of 2.6 metres. Found by echo-sounder		497031.018 6422183.054
HA1004	Unknown Craft	02116	101773	Dead	August 1986. Possible wreckage is reported by a local fishing skipper.		498756.869 6418503.008
HA1005	John Dunkin	02096	101769	Live	John Dunkin FV was a British Strath Class Trawler of 215 tons built in 1918 by Fleming & Ferguson, Paisley, Yard No 448 as the PEKIN. From 1918 to 1921 she was owned by the Admiralty but from May 1919 she was loaned to the United States Navy for post war mine clearing (based at Kirkwall). She was renamed JOHN SUNKIN. Sold for mercantile use 1921. Official Number 143875. Purchased by John Boyle, Glasgow in 1931 and purchased by W. Livingstone, Aberdeen in 1940. In 1941 she was sunk by German bombing 13 miles N by E of Buckie. One crewman was lost. This trawler sank 13 miles N by E from Buckie on11/02/194S. The wreck of the JOHN DUNCAN was reported at 57 53 50N, 003 02 34W by a local fishing skipper.		497192.683 6417336.969

HA	Name	SeaZone ID	NMRS ID	Status	Description	DD Long/ DD Lat	UTM30NmE/ UTM30NmN
HA1006	Unknown Aircraft	02117	101711	Live	On 6 August 1986 the wreck of an aircraft was reported by a local fishing skipper at 57 50 00N, 003 02 36W, position unreliable.		497335.503 6410124.405
HA1007	Pharon	02103	202207	Dead	Fishing Vessel, approximate location, reported sinking 10/05/1981		496730.233 6395306.391
HA1008	Bpt No 31	02068	None	Live	This British battle target practice has been located within the intertidal zone. The wreckage lies in an area of 7 m x 2 m and orientated N- S. Metal ribs are exposed 0.3 m above the sand during low water. Other wreckage less than 1 m in size lies 25 m to the east.		496876.409 6391921.638

APPENDIX 26.2: GAZETTEER OF GEOPHYSICAL TARGETS OF HIGH AND MEDIUM ARCHAEOLOGICAL POTENTIAL IDENTIFIED BY HEADLAND ARCHAEOLOGY WITHIN THE OFFSHORE STUDY AREA

HA No.	Description	Potential	Geophysical Length	Geophysical Width	Geophysical Height	DDM_Long	DDM_Lat	UTM30NmE	UTM30NmE
17	Linear debris	Medium	5.32	1.35	0.06	-2 57.4563	57 40.2704	497470.56	6392102.62
20	Linear debris	Medium	22.61	2.53	0.11	-2 57.7436	57 40.1162	497753.5	6391816.63
28	Linear debris	Medium	11.62	1.31	0.1	-2 57.9523	57 40.3100	497963.84	6392176.34
33	Linear debris	Medium	2.41	2.14	1.32	-2 57.5535	57 40.2649	497567.7	6392092.86
52	Debris	Medium	11.01	4.53	0.94	-2 58.3360	57 40.7144	498347.52	6392925.68
61	Linear debris	Medium	12.76	5.15	0.54	-2 58.3890	57 41.0521	498398.56	6393553.55
63	Debris	Medium	4.43	1.56	0.58	-2 58.2978	57 41.6155	498309.52	6394711.45
68	Wreck	High	24.09	7.82	2.38	-2 58.3972	57 41.0879	498407.62	6393620.09
87	Debris	Medium	1.47	1.35	0.1	-2 58.6594	57 47.4975	498671.59	6405511.5
90	Possible Debris	Medium	4.26	1.79	0.61	-2 58.3015	57 41.6502	498311.99	6394662.17
102	Possible debris	Medium	12.89	1.93	0.18			498267.34	6393862.75
121	Linear Debris	Medium	5.96	3.14	0.13	-2 57.8002	58 01.1820	497834.03	6430902.59
127	Linear Debris	Medium	3.02	1.19	0.18	-2 57.7949	57 41.6449	497808.31	6394651.85
133	Linear Debris	Medium	8.09	1.5	0.18	-2 58.9662	58 08.1409	498987.44	6443815.26
135	Linear Debris	Medium	4.57	2.16	0.43	-2 57.0435	58 01.2755	497089.34	6431077.84
136	Possible Debris	Medium	2.26	0.88	0.09	-2 57.3409	57 58.6170	497379.11	6426144.86
143	Linear Debris	Medium	5.99	2.14	0.32	-2 57.0389	58 01.2681	497084.81	6421066.66
154	Debris	Medium	7.35	3.07	0.13	-2 58.9604	58 08.1387	498979.07	6443812.46
156	Debris	Medium	8.1	0.68	0.16	-2 58.9625	58 08.1371	498979.17	6443807.59



Legend

- Inner Study Area
- Outer Study Area
- Well Head Installations
- Wreck Locations

Geophysical Targets

- High Geophysical Potential
- Medium Geophysical Potential

0 1 2 4 km 0 0.5 1 2 Nm

UK Offshore Development

Figure 15.1

Site Location: Wrecks, Obstructions & Geophysical Targets

Drawn: MM	Checked: RC	Approved: RC
Date: 14/10/2011	Scale: 1:125,000 @ A3	
Drawing Number: BEA-MAP-EWF-BOWL-172		Revision: 01
Datum: WGS84	Projection: UTM30N	

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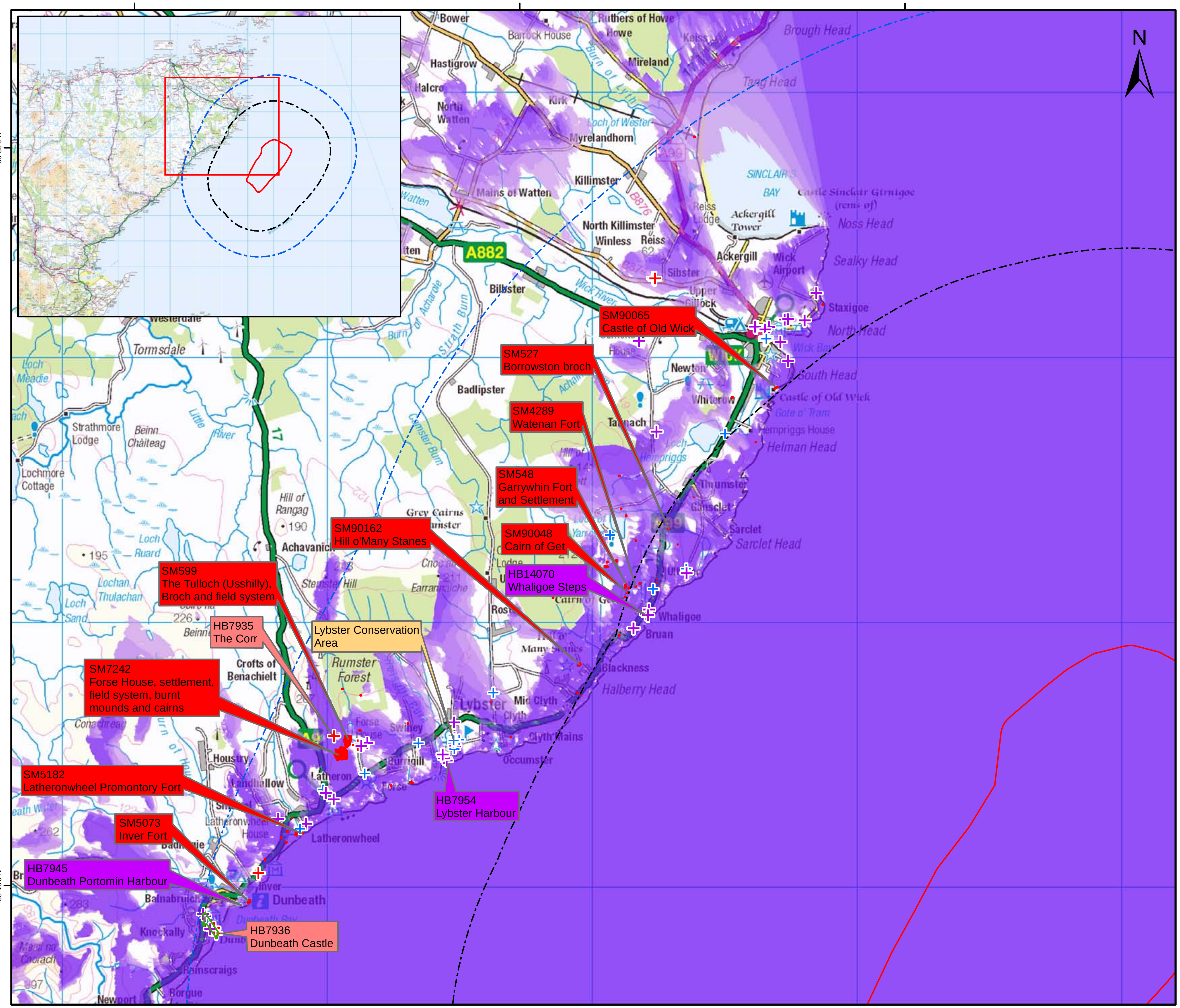
File ref: E:\GIS_Scottish\Projects\Beatrice\mxd\ES\Chapter 15\BEA_MAP_EWF_BOWL_172_Site_loc_wrecks_obs_geophys_targets_ES_15_1_v01.mxd



Legend

- Inner Study Area
- 15km Buffer of Inner Study Area
- 25km Buffer of Inner Study Area
- Scheduled Monument
- Gardens and Designed Landscapes
- Category A-listed Building
- Category B-listed Building
- Category C(S)-listed Building

Number of Turbines Theoretically Visible - with obstructions

- 1 - 18
- 19 - 53
- 54 - 88
- 89 - 123
- 124 - 142

Text Boxes

- Scheduled Monument
- Category A-listed Building
- Category B-listed Building
- Conservation Area

Source: Historic Scotland

0 1 2 4 km

0 0.5 1 2 Nm

UK Offshore Development

Figure 15.2

Designated Onshore Cultural Heritage Assets

Drawn: MM	Checked: RC	Approved: RC
Date: 21/02/2012	Scale: 1:150,000 @ A3	
Drawing Number: BEA-MAP-EWF-BOWL-173		Revision: 02
Datum: OSGB36	Projection: BNG	

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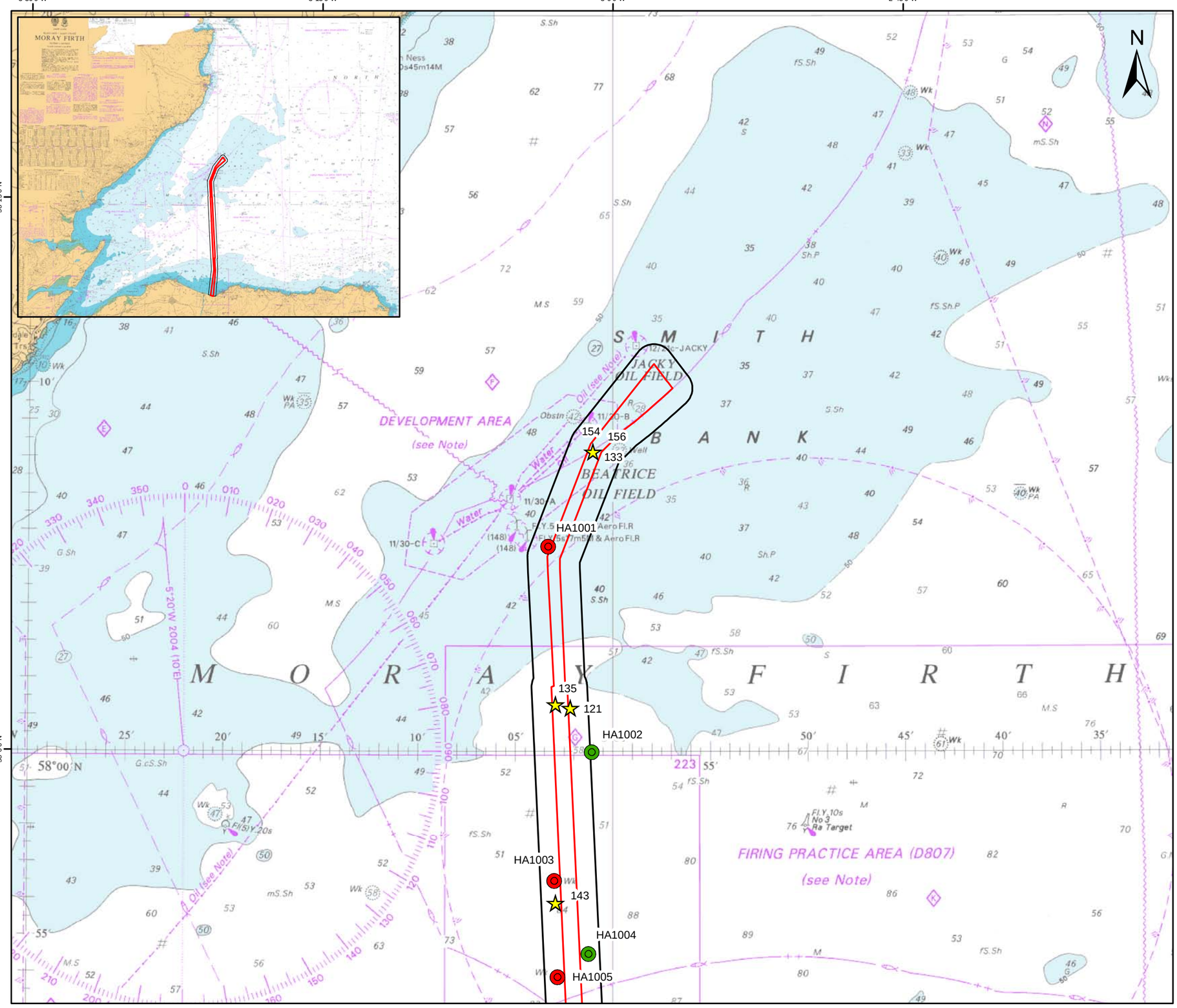
File ref: E:\GIS_Scottish\Projects\Beatrice\mxd\ES\Chapter 15\BEA_MAP_EWF_BOWL_173_Designated_onshore_cultural_heritage_assets_ES_15_2_v02.mxd



Legend

- Inner Study Area
- Outer Study Area
- Live Wreck
- Dead Wreck

Geophysical Targets Targets

- High Archaeological Potential
- Medium Archaeological Potential

0 1.5 3 6 km

0 0.5 1 2 Nm

UK Offshore Development

Figure 26.1

Location of Recorded Archaeological Sites (North)

Drawn: MM	**Checked:** DA	**Approved:** DA
Date: 22/12/2011	**Scale:** 1:200,000 @ A3	
Drawing Number: BEA-MAP-OFTW-BOWL-176		**Revision:** 01
Datum: WGS84	**Projection:** UTM30N	

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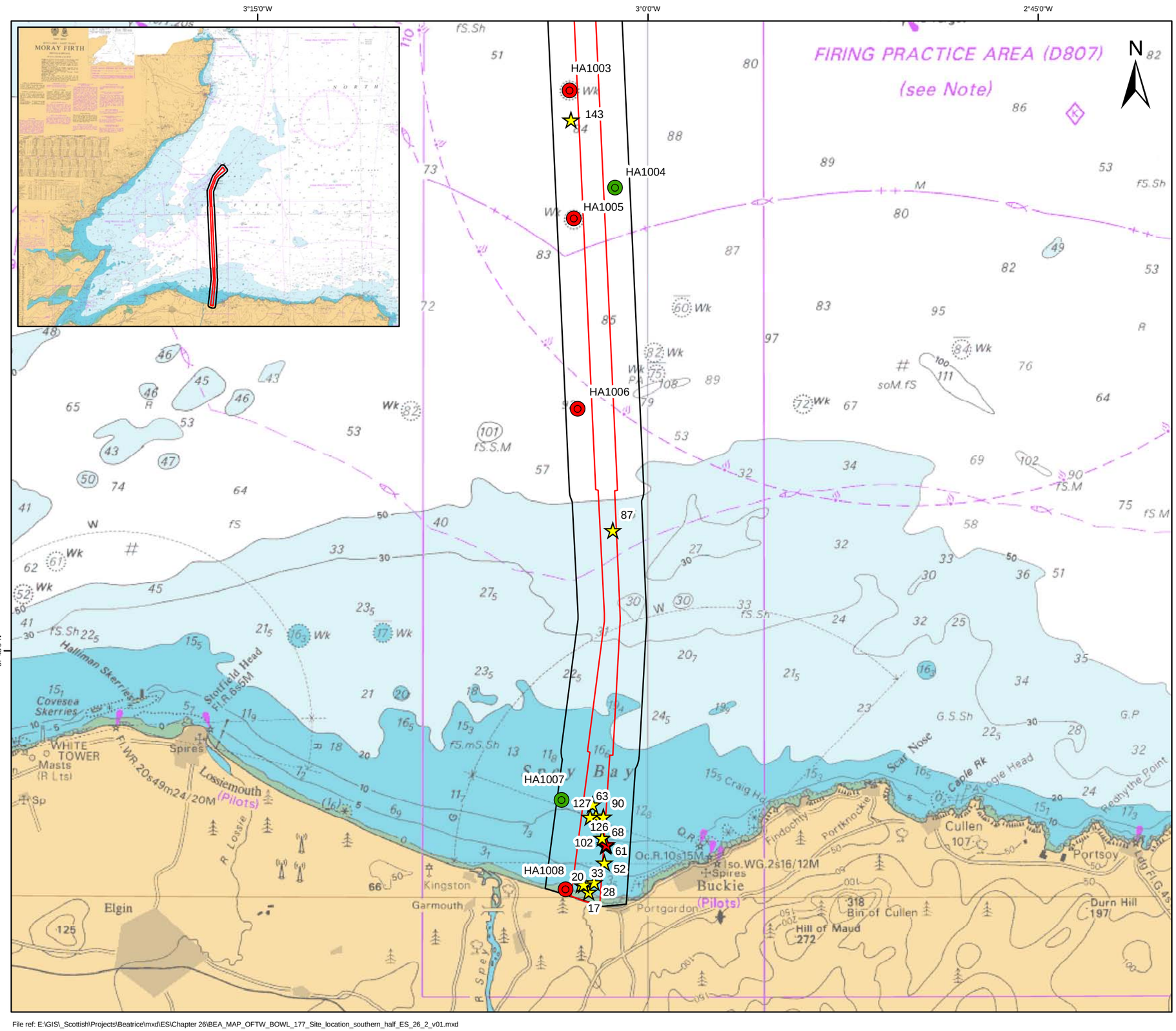

Legend

- Inner Study Area
- Outer Study Area
- Live Wreck
- Dead Wreck

Geophysical Targets

- High Archaeological Potential
- Medium Archaeological Potential

0 1.25 2.5 5 km

0 0.5 1 2 Nm

UK Offshore Development

Figure 26.2

Location of Recorded Archaeological Sites (South)

Drawn: MM	**Checked:** DA	**Approved:** DA	
Date: 22/12/2011	**Scale:** 1:150,000 @ A3		
Drawing Number: BEA-MAP-OFTW-BOWL-177		**Revision:** 01	
Datum: WGS84	**Projection:** UTM30N		

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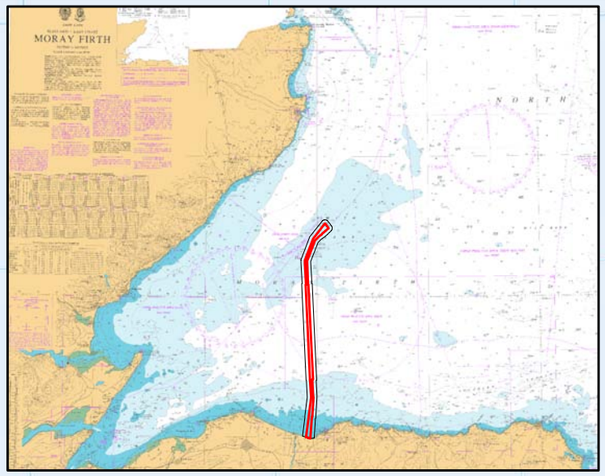
File ref: E:\GIS_Scottish\Projects\Beatrice\mxd\ES\Chapter 26\BEA_MAP_OFTW_BOWL_177_Site_location_southern_half_ES_26_2_v01.mxd



3°0'0"W

N

HA1007

126

127

63

90

102

68

61

52

28

17

33

20

HA1008

Spey Bay

69

68

67

66

65

64

63

Spey Bay Nature Reserve

Tugnet

Hotel

PC

NTL

CH

Garmouth and Kingston Golf Course

Spey Bay

Deadman

Spey Bay Golf Course

The Links

Cunninghaugh

Speyside Way

B9015

Garmouth

Spey Viaduct

Carsemoor

Gravel Pit

Dismantled Railway

Recycling Centre

Ross House

Nether Dallachy

Moor of Dallachy

Wife o' Beith

Curlach Wood

Cemy

Bow Bridge

Alma Cottage

Meml

Bogmoor

Airfield (disused)

Recycling Centre

Ory Burn

Cairn

Dryburn

Cowiemuir

Court Hillock

Wood of Auchenreath

Lower Auchenreath

Ha' of Auchenreath

Mill House

Mains of Tannachy

Windsoer

Norrie Scalp

Mean High Water Springs

Mean Low Water Springs

Tannachy Sands

Craigan Roan

Porttannachy

Harbour

Arthur's Point

Speyside Way

Pit (disl)

Weir

Refuse Compactor

Mains of Gollachy

Gollachy

Portgordon

Slackend

Damhead

Smirack

Maltings

Slack Wood

Slackhead

Enzie

Score Burn

Legend

- Inner Study Area
- Outer Study Area
- Live Wreck
- Dead Wreck

Geophysical Targets

- High Archaeological Potential
- Medium Archaeological Potential

0 200 400 800 m

0 0.1 0.2 0.4 Nm

UK Offshore Development

Figure 26.3

Location of Recorded Archaeological Sites (Landfall Detail)

Drawn: MM	**Checked:** DA	**Approved:** DA
Date: 22/12/2011	**Scale:** 1:25,000 @ A3	
Drawing Number: BEA-MAP-OFTW-BOWL-178		**Revision:** 01
Datum: WGS84	**Projection:** UTM30N	

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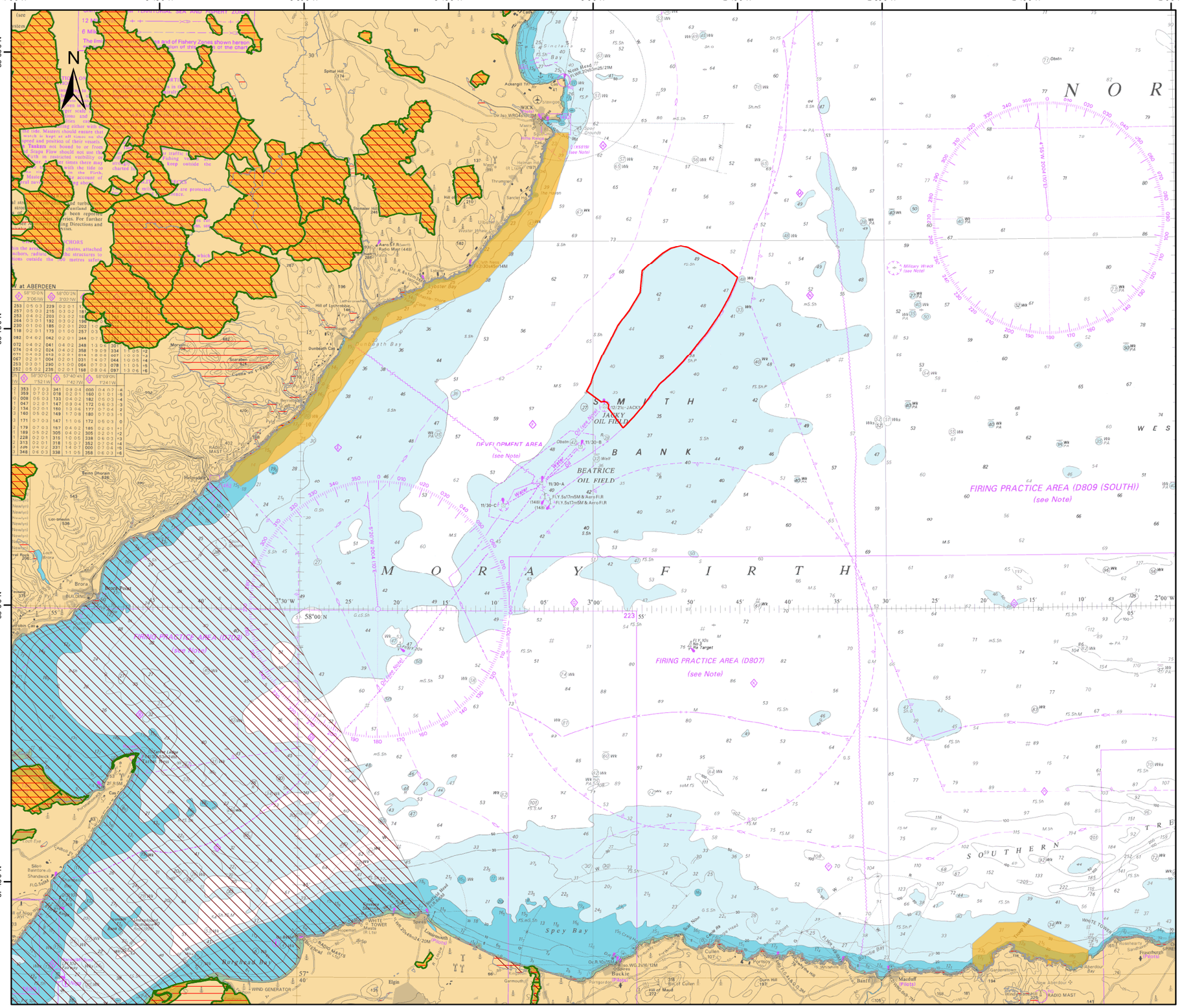
File ref: E:\GIS_Scottish\Projects\Beatrice\mxd\ES\Chapter 26\BEA_MAP_OFTW_BOWL_178_Site_location_proximity_to_landfall_ES_26_3_v01.mxd



Legend

Beatrice Offshore Wind Farm Site

Designations

- SSSI
- RAMSAR
- SAC
- SPA

0 3.5 7 14 km 0 1.5 3 6 Nm

UK Offshore Development

Beatrice Offshore Wind Farm Site

Drawn: MM	**Checked:** RS	**Approved:** RS
Date: 23/02/2012	**Scale:** 1:400,000 @ A3	
Drawing Number: BEA-MAP-EWF-BOWL-211		**Revision:** 02
Datum: WGS84	**Projection:** UTM30N	

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