

## 5 Human Environment

### 5.4 Archaeology and Cultural Heritage

#### 5.4.1 Baseline Information

##### Introduction

5.4.1.1 This chapter is an assessment of the effects of the modified Transmission Infrastructure (TI) upon archaeology and cultural heritage receptors. It covers both offshore and onshore elements of the modified TI (modified offshore transmission infrastructure (OfTI) and modified onshore transmission infrastructure (OnTI)) and deals with direct, indirect and, setting and cumulative effects, together with mitigation.

5.4.1.2 The chapter is informed by a baseline review of onshore, intertidal and offshore archaeology and cultural heritage (Technical Appendix 5.4 A – Transmission Work EIA: Baseline Review of Offshore and Onshore Archaeology). Two archaeological study areas (ASAs) have been defined. These include:

- The OfTI, inclusive of the three consented wind farm areas (Telford, Stevenson and MacColl) in relation to the OSPs;
- The OnTI; and
- The chapter also has direct linkages with the following ES Chapters, details of which have been cross-referred here where applicable:
  - Chapter 3.1: Hydrodynamics, Sedimentary and Coastal Processes; and
  - Chapter 5.3: Seascape, Landscape and Visual Assessment.

##### Consultations

5.4.1.3 The following consultation responses relevant to cultural heritage were received (see Chapter 1.3 (Environmental Impact Assessment) of this ES for full scoping consultations). Responses relating to cultural heritage were received from Marine Scotland, Historic Scotland (HS) and Aberdeenshire Council (AC) as part of the formal Scoping Opinion (June 2014). In addition, a further consultation meeting was held with Historic Scotland (20th May 2014) to discuss the nature of the modified TI, the approach and methodology of the cultural heritage impact assessment presented in this chapter, and the approach to pre-construction geophysical and geotechnical assessment.

Table 5.4-1 Summary of Consultation Responses

Organisation	Consultation Response	MORL Approach
<b>Marine Scotland</b>	Consultation dated 13 <sup>th</sup> June 2014: Requirement for ES focussing upon marine historic environment. Reiterated the Scottish Planning Policy including that Scheduled Monuments should be preserved in situ within an appropriate setting; listed buildings and their settings to be preserved.	Suggested Guidance and Methodology has been incorporated into the methodology for the modified OfTI and modified OfTI Cultural Heritage assessment
<b>Historic Scotland (HS)</b>	General agreement with methodology, with the following points:  The majority of sites in the (Sites and Monuments Record) SMR are recorded rather than scheduled; Scottish Planning Policy 23: Planning and the Historic Environment has been superseded by the consolidated Scottish Planning Policy.  Consultation dated 20th May 2014: It was highlighted that in terms of the archaeological assessment of marine geophysical data, there is a preference to include the results in the main consent submission. Given the timeframes for the acquisition of data for review however it was acknowledged that this may be included as a post-consent condition; or prior to the formal HS response to Marine Scotland if practicable.	Amendments made to methodology and legislation considered.
<b>Aberdeenshire Council Archaeology</b>	Having reviewed Section 5.3.9 'Archaeology and Cultural Heritage' of the submitted scoping report, it is confirmed that an EIA will be required for the historic environment given the scale, type and location of the proposed works and the potential that they have to impact upon archaeological remains.  The recommended methodology as detailed within Section 5.3.9 is agreed however note the following comment:  Page 149 – List of 'Best Practice Guidance' – replace Planning Advice Note 42 with the more up-to-date Planning Advice Note 2/2011	Amendments made to methodology and legislation considered.

## Baseline Characteristics

### *Inter-tidal Cultural Heritage Receptors – Modified OfTI ASA*

5.4.1.4 Baseline review has established that there no known cultural heritage receptors within the inter-tidal area of the modified OfTI at the Inverboyndie landfall (see Technical Appendix 5.4 A: Cultural Heritage; and Figures 1 and 2 as per technical figures).

### *Offshore Cultural Heritage Receptors – Modified OfTI ASA*

5.4.1.5 There are eight documented wrecks (**WA 2000-2007**), and an aircraft loss (**WA 2008**) in the modified OfTI ASA offshore export cable route corridor outwith the area of the three consented wind farms (Figure 1 within Technical Appendix 5.4 A). These are based upon UKHO and NMRS records with substantial positional uncertainties and are **WA 2000 – 2007** are noted as 'Dead' wrecks by the UKHO.

5.4.1.6 There are a further two geophysical anomalies identified from a previous assessment (Chapter 5.5 Archaeology, and Visual Receptors MORL 2012).

5.4.1.7 Cultural heritage receptors within the three consented wind farms area have been previously outlined as part of the baseline review for the three consented wind farms (Chapter 5.5 of MORL ES, 2012). The baseline review identified four known wrecks within the consented wind farm area. In addition, the archaeological geophysical assessment identified three anomalies of high archaeological potential and 17 anomalies of medium archaeological potential. The potential for submerged prehistoric remains to be encountered within the wind farm area was considered to be very limited.

#### ***Potential for Further Unknown Cultural Heritage Receptors – Modified OfTI ASA***

5.4.1.8 At present it is not possible to establish the location, extent, and characteristics of all cultural heritage receptors within the modified OfTI outwith the area of the three consented wind farms. The baseline review presented in Technical Appendix 5.4 A has indicated the potential for three main types of receptor that may be encountered within in the modified OfTI.

#### ***Submerged Prehistory***

5.4.1.9 The MORL ES (2012) included the assessment of marine geotechnical datasets. This identified fine-grained sediments and organic sediments in nearshore and coastal areas (Chapter 5.5 and Technical Appendix 5.5 A of MORL ES, 2012) which may relate to inundated coastal geomorphology that was exploitable by past human groups. Although this assessment did not include the modified OfTI ASA outwith the three consented wind farms, the findings provide general context prior to the assessment of bespoke geotechnical and geophysical datasets for the modified OfTI.

5.4.1.10 Palaeo-landscape features have potential for preserving submerged archaeological material and palaeoenvironmental archives of archaeological interest. Accurate baseline datasets regarding relative sea-level and the potential for encountering submerged prehistory are currently sparse or lacking for the area necessitating a precautionary approach to assessing submerged prehistory receptors.

5.4.1.11 From intertidal zone to further offshore there is potential for encountering early prehistory, particularly Mesolithic period archaeology, including artefacts and sites which is of high archaeological value due to its rarity. In addition, inundated palaeo-landscape features and associated sedimentary sequences are of high archaeological interest for establishing palaeoenvironmental character of the area and the palaeogeographical context for Early Prehistory.

#### ***Maritime***

5.4.1.12 The use of the Moray Firth for transport and as a resource probably dates back at least several thousand years. More recently there has been significant naval use associated mainly with the Cromarty Firth and other anchorages and commercial activity associated with the oil and gas industry. However, the maritime history of the Firth has throughout been dominated by fishing.

5.4.1.13 Archaeological evidence by period in the modified OfTI is sparse or entirely lacking. No wrecks have been identified. There is some evidence to suggest that wreck material from 18th and 19th century wrecks could be present within the intertidal zone or just offshore at the Inverboyndie landfall. However, there is insufficient data to say anything further about potential at these locations, other than that it is probably low. The available data suggests that the potential for encountering wrecks elsewhere in the modified OfTI is also low, although the possibility cannot be discounted in either case.

### *Aviation*

5.4.1.14 The Moray Firth became a centre of air activity during the Second World War, when a number of mainly training and Coastal Command bases were established. Aircraft wreckage has been recovered from the Firth and there are anecdotal reports of wreckage being washed up. However, no aircraft wrecks have been identified in the modified OfTI and although there is one relevant casualty record, it is based only upon a very approximate position of loss. Whilst the possibility cannot be discounted, particularly inshore, the potential for aircraft wreckage or debris within the modified OfTI is likely to be low.

### *Onshore Cultural Heritage Receptors*

5.4.1.15 Overall there are 190 known Cultural Heritage Assets within the modified OnTI ASA (Technical Appendix 5.4 A, Figures 2-5); with potential for encountering unknown cultural heritage assets of prehistoric or more recent date. Within the application boundary, there are a range of Cultural Heritage Assets which have been considered for assessment in relation to potential direct physical impacts, these comprise:

- Lower Inchdrewer (**WA 1008**, B-listed);
- St Brandon's Church, Inverboyndie (**WA 1041**, B-listed);
- Hill of Alvah, cairns 1350m WSW of Mill of Alvah (**WA 1035**, Scheduled Monument);
- Boyndie Old Kirk, church 200m NW of Boyndie Bridge (**WA 1040**, Scheduled Monument);
- Hills of Boyndie, barrows & enclosures 700m SW of Mill of Boyndie (**WA 1010**, Scheduled Monument); and
- 76 undesignated Cultural Heritage Assets located within the Application Area; ranging from possible prehistoric cropmark features to post-medieval agricultural sites. These sites are listed in Technical Appendix 5.4 A, Appendix VI.

5.4.1.16 There are six designated cultural heritage assets within the visual envelope of the substation area which have been considered for indirect effects to their setting; the recumbent Stone circle at Auchmaliddie (**WA 1184**), the scheduled remains of Gight Castle (**WA 1168**) and doocot (**WA 1164**), the Designed Landscapes of Fyvie Castle (**WA 1108**) and Hatton Castle (**WA 1102**), and the Battle of Fyvie battlefield (**WA 1110**).

### *Potential for Further Unknown Cultural Heritage Receptors – Modified OnTI ASA*

5.4.1.17 There is potential for encountering unknown Cultural Heritage Assets of any archaeological period within the modified OnTI ASA, ranging from Early Prehistory, Mesolithic archaeology, and more recent periods to the 20th century.

## Desktop Studies

- 5.4.1.18 The ASAs for data searches for the baseline review are based on an iteration of the modified OnTI centreline buffered to 500m, incorporating the area of the modified OnTI which includes the onshore substations and modified onshore export cable route corridor. The modified OfTI ASA is based on the modified OfTI including a wide area around the modified OfTI outwith the area of the three consented wind farms. The use of a buffer enabled heritage assets adjacent to the ASA or whose location is only known approximately to be included (Figure 1 within Technical Appendix 5.4 A).
- 5.4.1.19 The modified OfTI ASA includes that part of the modified TI extending offshore from Mean High Water Springs (MHWS) at the modified export cable landfall, including the intertidal zone. The modified OnTI ASA includes the modified TI from MHWS at the Inverboyndie landfall to the onshore substation at New Deer. Background information was sought from a much wider area in order to provide a national and regional context for the review.
- 5.4.1.20 The modified OnTI was investigated by desk-top review followed by a walk-over survey. The modified OfTI was investigated by desk-top review; excepting the intertidal zone at the landfall which formed part of the modified OnTI walkover survey. Archaeological assessment of geophysical survey data acquired for the modified TI will be reported pre-construction, the results of which will be compiled into the Written Scheme of Investigation (WSI) for the project providing effective mitigation to potential direct effects.
- 5.4.1.21 The modified OfTI and modified OnTI baseline review relied on the following datasets:
- The Wrecks and Obstructions database held by the UKHO;
  - The National Monuments Record Scotland (NMRS) held by Royal Commission on Ancient and Historic Monuments (RCAHMS);
  - The Aberdeenshire Council Historic Environment Record (HER);
  - Databases of designated assets held by Historic Scotland;
  - Maps held by the National Library of Scotland;
  - Relevant available archaeological assessments, including the MORL ES (2012) and Beatrice Offshore Wind Farm ES (2012); and
  - Other readily available published sources.

## Site Specific Surveys

- 5.4.1.22 Site visits and walkover surveys were undertaken by Wessex Archaeology across the modified onshore export cable route corridor where access was possible, between 27th and 28th May 2014. Due to the vast majority of the modified OnTI being under crop at the time of walkover survey access was restricted, intervening publically-accessible areas were selected to enhance the desk-based assessment. Full coverage of the intertidal zone portion of the modified OfTI was achieved at Inverboyndie Bay and all designated Cultural Heritage Assets within 5km of the proposed substation site were visited and assessed for setting effects.

## Legislative and Planning Framework

- 5.4.1.23 In addition to the consultation responses, the following legislation, charters, conventions and planning documents have been considered in the preparation of this chapter in relation to the modified OfTI and modified OnTI (further details are provided in Appendix I of the Technical Appendix 5.4 A):

### ***International Frameworks***

- The Valetta Convention, 1992 – this defines archaeological heritage and requires the state to develop and maintain inventories of on and offshore cultural heritage assets and to legislate for its protection;
- The ICOMOS Charter on the protection and management of underwater cultural heritage, 1996 - this charter aims to provide decision-makers, such as curators and archaeologists, with criteria for assessing and managing marine archaeological projects; and
- The UNESCO Convention on the Protection of the Underwater Cultural Heritage, 2001 - this convention provides that a States Party shall use the best practicable means to prevent or mitigate any adverse effects that might arise from activities under its jurisdiction incidentally affecting underwater cultural heritage sites.

### ***UK Legislation and Planning Policy***

- Protection of Military Remains Act 1986 (PMRA 1986) – this provides protection for the wreckage of military aircraft and designated military vessels of any nationality;
- The Merchant Shipping Act 1995 (MSA 1995) – this regulates the ownership and disposal of underwater finds considered to be ‘wreck’;
- The UK Marine Policy Statement (UKMPS) 2011 - the only marine policy document currently in place for this geographical area. It provides the framework for preparing Marine Plans and taking decisions affecting the marine environment; and
- Ancient Monuments and Archaeological Areas Act 1979 (AMAA 1979) – this provides legal protection for heritage assets of national importance. AMAA 1979 primarily deals with terrestrial sites but there is provision to designate sites in territorial waters as Scheduled Monuments.

### ***Scottish Legislation and Planning Policy***

- Scottish Historic Environment Policy 2011 (SHEP) - this sets out Scottish Ministers’ policies, providing direction for HS and a policy framework that informs the work of a wide range of public sector organisations;
- Marine (Scotland) Act 2010 - this provides for the establishment of national and regional marine plans and for offshore sites of national importance to be designated as a Historic Marine Protected Areas (Historic MPAs);
- Historic Environment (Amendment) (Scotland) Act, 2011 – the Act amends and harmonises existing legislation relating to the management of historic environment including the Historic Buildings and Ancient Monuments Act 1953, the Ancient Monuments and Archaeological Areas Act 1979 and Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997. Planning Advice Note (PAN) 2/2011: Planning and Archaeology – this provides advice to planning authorities and developers on dealing with archaeological remains with an emphasis which is proportionate to the relative value of the remains and of the developments under consideration; and

- Scotland's Draft National Marine Plan (due to be issued at the end of 2014) – this is currently available in consultation draft and provides a number of general marine policies that will apply to all marine development proposals. It includes statements on cultural heritage (GEN 13) with a focus on protecting and enhancing designated and undesignated heritage, and methods of suitable mitigation in relation to marine development.

### *Local Planning Policy*

- Aberdeenshire Local Plan (2008) policies – particularly Env\18: Listed Buildings, Env\19: Archaeological Sites and Ancient Monuments, Env\20: Historic Gardens and Designed Landscapes, with the focus on conservation, and avoidance of adverse impacts to these cultural heritage resources; and
- Aberdeenshire Local Development Plan (2012) policies and supplementary guidance - SG Historic Environment1: Listed Buildings; SG Historic Environment 2: Conservation Areas; SG Historic Environment 3: Historic gardens and designed landscapes; and, SG Historic Environments 4: Archaeological sites and monuments. The policies focus on conservation, and avoidance of adverse impacts to these cultural heritage resources through the planning process.

## 5.4.2 Impact Assessment

### Summary of Effects - Modified OfTI

- 5.4.2.1 The predicted and potential direct and indirect construction, operation and decommissioning effects of the modified OfTI upon cultural heritage receptors are summarised in Table 5.4-2 below.
- 5.4.2.2 There are eight documented wrecks (**WA 2000-2007**) within the modified OfTI ASA, and one reported aircraft crash site (**WA 2008**) (Technical Appendix 5.4 A: Figure 1).
- 5.4.2.3 Cultural heritage receptors within the three consented wind farms area have been previously assessed as part of the MORL ES (2012). The OfTI Rochdale Envelope has subsequently been amended from eight OSPs to two OSPs, located within the three consented wind farms area (modified OfTI).
- 5.4.2.4 Prehistoric, Maritime and Aviation receptors were assessed previously for the consented wind farm area (Chapter 5.5 and Technical Appendix 5.5 A of MORL ES, 2012). Unmitigated, the installation of OSPs could induce **major adverse effects** on Cultural Heritage Receptors, reducing to **negligible significance** following mitigation.
- 5.4.2.5 No indirect setting effects have been identified in relation to the two OSPs to be located within the three consented wind farms area. Previously effects for the scenario of installing the OSPs in the turbine area concluded potential indirect setting effects of the OSPs on Cultural Heritage Receptors to be **not significant** (Chapter 5.5 and Technical Appendix 5.5 A of MORL ES, 2012).
- 5.4.2.6 No significant indirect effects have been identified from changes to seabed processes which may induce adverse effects upon Cultural Heritage Receptors (see Chapter 3.1 Hydrodynamics, Sedimentary and Coastal Processes). In fact minor positive effects from increases in suspended sediment may benefit Cultural Heritage Receptors by increasing protective sediment cover.
- 5.4.2.7 Following consultation with HS, it was agreed that the assessment of geophysical and geotechnical data will be reviewed pre-construction in order to precisely define mitigation strategies for unknown cultural heritage receptors identified in the modified OfTI outwith the area of the three consented wind farms.

## Summary of Effects – Modified OnTI

5.4.2.8 The predicted and potential construction, operation and decommissioning effects of the modified OnTI upon cultural heritage receptors are summarised in Table 5.4-3 below.

5.4.2.9 There are a number of Cultural Heritage Receptors within the modified onshore export cable route corridor which have the potential to experience direct physical effects during the construction phase. Indirect physical effects from vehicles and other construction machinery may also be induced along the modified OnTI export cable route corridor.

- Lower Inchdrewer (**WA 1008**, B-listed);
- St Brandon's Church, Inverboyndie (**WA 1041**, B-listed);
- Hill of Alvah, cairns 1350m WSW of Mill of Alvah (**WA 1035**, Scheduled Monument);
- Boyndie Old Kirk, church 200m NW of Boyndie Bridge (**WA 1040**, Scheduled Monument);
- Hills of Boyndie, barrows & enclosures 700m SW of Mill of Boyndie (**WA 1010**, Scheduled Monument); and
- 76 undesignated Cultural Heritage Receptors located within the Application Area comprising possibly prehistoric cropmark features to post-medieval agricultural sites (Technical Appendix 5.4 A, Appendix VI, Figures 2-5).

5.4.2.10 There are six designated cultural heritage assets within the wider onshore study area around the proposed substations area which have been considered for indirect effects to their setting;

- The recumbent Stone circle at Auchmaliddie (**WA1184**);
- The scheduled remains of Gight Castle (**WA1168**) and doocot (**WA1164**);
- The Designed Landscapes of Fyvie Castle (**WA1108**) and Hatton Castle (**WA1102**); and
- The Battle of Fyvie battlefield (**WA1110**).

## Proposed Mitigation Measures and Residual Effects

5.4.2.11 Proposed mitigation measures and residual effects are set out in Table 5.4-3 below.

5.4.2.12 As regards "unknown" heritage, a realistic worst case approach has been adopted in assessing the possible magnitude and sensitivity of effects. A package of mitigation has then been proposed which ensures that there will be no significant effects on such assets (even on that worst case basis). It is proposed that geotechnical and geophysical survey work will be carried out pre-construction to finalise the appropriate mitigation from the package of options identified.



**Table 5.4-2 Impact Assessment Summary – Modified OffI**

Effect	Receptor	Pre-mitigation Effect	Mitigation	Post-mitigation Effect
<i>Construction</i>				
Direct effect as a result of installation of OSP	Recorded cultural heritage assets	No effect	Geophysical and geotechnical assessment facilitating micro-siting and/or geoarchaeological assessment  Written Scheme of Identification (WSI)	No effect
Direct effect resulting from installation of OSPs	Unknown cultural heritage assets	Minor-major, depending upon receptor sensitivity	Geophysical and geotechnical assessment facilitating micro-siting and/or geoarchaeological assessment.  WSI  Reporting protocol for finds of archaeological interest	Minor / Negligible
Direct effect resulting from burial of inter-tidal cables	Unknown cultural heritage assets	Minor-major, depending upon receptor sensitivity	Geophysical and geotechnical assessment facilitating micro-siting and/or geoarchaeological assessment  WSI  Reporting protocol for finds of archaeological interest	Minor / Negligible
Direct effect resulting from burial of offshore cables	Recorded cultural heritage assets	Major	Geophysical and geotechnical assessment facilitating micro-siting and/or geoarchaeological assessment  WSI  Reporting protocol for finds of archaeological interest	Minor / Negligible
Direct effect resulting from burial of offshore cables	Unknown cultural heritage assets	Minor-major, depending upon receptor sensitivity	Geophysical and geotechnical assessment facilitating micro-siting and/or geoarchaeological assessment	Minor / Negligible
Direct effect by construction vessel	Recorded cultural heritage assets	Major		Minor / Negligible

Effect	Receptor	Pre-mitigation Effect	Mitigation	Post-mitigation Effect
Direct effect by construction vessel	Unknown cultural heritage assets	Minor-major, depending upon receptor sensitivity	Avoidance of effect through Exclusion Zones or offsetting through the recovery/preservation by record (depending upon WSI provisions)  WSI  Reporting protocol for finds of archaeological interest	Minor / Negligible
Indirect effect from construction vehicles and other machinery (inter-tidal)	Recorded cultural heritage assets	Major	Avoidance/micro-siting  Programme of Archaeological Works	Minor / Negligible
Indirect effect from construction vehicles and other machinery (inter-tidal)	Unrecorded cultural heritage assets	Major	Programme of Archaeological Works	Minor / Negligible
<i>Operation</i>				
Direct effect by IMR (Inspection, Maintenance and Repair) vessel	Recorded cultural heritage assets	Major	Geophysical and geotechnical assessment facilitating micrositing and/or geoarchaeological assessment	Minor / Negligible
Direct effect by IMR (Inspection, Maintenance and Repair) vessel	Unknown cultural heritage assets	Minor-major, depending upon receptor sensitivity	Avoidance of effect through Exclusion Zones or offsetting through the recovery/preservation by record (depending upon WSI provisions)	Minor / Negligible
Indirect effect due to changes in scour and sedimentation	Recorded cultural heritage assets	No effect		No effect
Indirect effect due to changes in scour and sedimentation	Unknown cultural heritage assets	Unknown (minor-major, depending upon receptor sensitivity)	WSI  Reporting protocol for finds of archaeological interest	Minor / Negligible
Indirect effect due to changes to the setting of designated Cultural Heritage Receptors	Recorded cultural heritage assets	Minor-major, depending upon magnitude of effect	Micro-siting, screening  Effect removed on decommissioning	Minor / Negligible
<i>Decommissioning</i>				
As construction phase, but effects are considered to already have occurred if similar construction footprint is applied.				

**Table 5.4-3 Impact Assessment Summary – Modified OnTI**

Effect	Receptor	Pre-mitigation Effect	Mitigation	Post-mitigation Effect
<i>Construction</i>				
Direct effect resulting from burial of onshore cables	Known cultural heritage assets	Minor-major, depending upon receptor sensitivity	Geophysical and geotechnical assessment facilitating micro-siting and/or geoarchaeological assessment  WSI  Programme of Archaeological works	Minor / Negligible
Direct effect resulting from burial of onshore cables	Unknown cultural heritage assets	Minor-major, depending upon receptor sensitivity	WSI  Programme of Archaeological works	Minor / Negligible
Direct effect resulting from construction of substation and associated buildings and infrastructure	Unknown cultural heritage assets	Minor-major, depending upon receptor sensitivity	Geophysical and geotechnical assessment facilitating micro-siting and/or geoarchaeological assessment  WSI  Programme of Archaeological works	Minor / Negligible
Indirect effect from construction vehicles and other machinery	Recorded cultural heritage assets	Major	Avoidance through micro-siting  WSI	Minor / Negligible
Indirect effect from construction vehicles and other machinery	Unrecorded cultural heritage assets	Major	WSI	Minor / Negligible
<i>Operation</i>				
Indirect effect due to changes to the setting of designated Cultural Heritage Receptors	Recorded cultural heritage assets	Minor-major, depending upon magnitude of effect	Micro-siting, screening  Effect removed on decommissioning	Minor / Negligible
<i>Decommissioning</i>				
Effects arising from the decommissioning of the modified OfTI are considered to be the same as those arising in the construction phase.  No predicted decommissioning effects are predicted from the decommissioning of the modified OnTI.				

## Introduction to Impact Assessment

### *Relevant Guidance in relation to Cultural Heritage – Modified OfTI and Modified OnTI*

5.4.2.13 The following relevant guidance documents have informed the EIA of the modified OfTI and modified OnTI:

- The Code of Practice for Seabed Development (The Joint Nautical Archaeology Policy Committee, 2008);
- Collaborative Offshore Wind Research Into the Environment (COWRIE), Historic Environment Guidance for the Renewable Energy Sector (Wessex Archaeology, 2007);
- COWRIE Guidance for Assessment of Cumulative Impact on the Historic Environment from Offshore Renewable Energy (Oxford Archaeology, 2008);
- Protocol for Archaeological Discoveries: Offshore Renewables Projects (The Crown Estate/Wessex Archaeology, 2010b);
- Model Clauses for Archaeological Written Schemes of Investigation: Offshore Renewables Projects (The Crown Estate/Wessex Archaeology, 2010a);
- Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (Leather & Gribble/COWRIE 2011);
- Managing Change in the Historic Environment: Setting (HS, 2010); and
- Standard and Guidance for Desk Based Assessment (Institute for Archaeologists, revised 2011).

5.4.2.14 Effects on known and potential receptors during all construction, operation and decommissioning activities identified by MORL have been considered. Three types of effects have been assessed: direct and indirect physical effects; and indirect setting effects.

5.4.2.15 A key factor in the assessment of physical impacts on Cultural Heritage Receptors is the extent of ground disturbance. All physical damage or removal of archaeological sites or material is effectively permanent and recovery is limited to stabilisation or re-burial, to limit further effects. Therefore, direct physical effects on Cultural Heritage Receptors are likely to induce high magnitude effects.

5.4.2.16 Recovery from indirect setting impacts is possible after decommissioning, where a development is removed and no longer visible from a receptor.

## Details of Impact Assessment

5.4.2.17 This section considers the source and nature of the effects on the cultural heritage resource and the degree to which archaeological receptors are exposed to and affected by the modified OfTI and modified OnTI export cable route corridor and substations footprint. The impact assessment is considered in relation to the construction, operation and decommissioning of the cable corridor. The impact assessment is summarised in Table 5.4-2 and Table 5.4-3 above.

## Rochdale Envelope Parameters Considered in the Assessment

5.4.2.18 The Rochdale Envelope considers all the potential modified TI parameters and scenarios, the details of which are presented in Chapter 2.2: Project Description. The potential to affect cultural heritage during the construction, operation and decommissioning phases of the modified OnTI and modified OfTI are based upon the 'worst case scenario' indicated in the Design Envelope and are specific to the potential effects assessed in this Chapter. This assumes that the agreed modified TI design involves:

- The greatest area of contact with the sea floor;
- The maximum number of locations at which that contact occurs;
- The greatest volume of disturbed sediments;
- The maximum number of cable trenches and transition pits at the landfall;
- The maximum width and depth of onshore and landfall trenching; and
- The greatest extent of proposed substation buildings, access and other infrastructure and facilities.

5.4.2.19 The details of the Rochdale Envelope parameters are summarised in Table 5.4-4 below. The summary assumes that decommissioning will have a similar Rochdale Envelope to that of construction.

**Table 5.4-4 Rochdale Envelope Parameters Relevant to the Impact Assessment**

Potential Effect	Rochdale Envelope Scenario Assessed
<i>Construction &amp; Decommissioning</i>	
Direct effect as a result of installation of OSP	<p>Damage and/or displacement of cultural heritage assets within footprint of pin piling or suction caissons.</p> <p>Damage and/or displacement of cultural heritage assets within construction footprint.</p> <p>Damage and/or displacement of cultural heritage assets within scour protection footprint.</p> <p>Worst case scenario involves an effect footprint of 3 m diameter pin piles or 20 m diameter suction caissons; with a maximum depth of effect of 60 m (pin piles). Scour footprint will be up to an additional 20 m diameter for suction caissons.</p>
Direct effect as a result of burial of onshore, inter-tidal and offshore export cables	<p>Damage and/or displacement of cultural heritage assets within footprint of cable trench.</p> <p>Damage and/or displacement of cultural heritage assets within footprint of directional drilling or trenching at landfall.</p> <p>Offshore: 70 km of cable for inter-platform cables and cabling up to the boundary of the three consented wind farms; and a maximum of 52 km export cable corridor length from the boundary of the three consented wind farms. 1m target burial depth, matting or rock emplacement for sections where burial not possible. Cable bundles separate by 4x water depth. Trench footprint 6 m per cable.</p> <p>Onshore: 33 km route. 1m target burial depth. Up to four trenches within a 60 m wide corridor – 4 m wide trenches. If 2 trenches used, 6 m trench width required.</p> <p>Landfall: Worst case maximum area of seabed disturbance and therefore of direct effect for each trench is likely to be the length of each trench by a width of 6 m (in bundled) by 3 m maximum depth.</p>

Potential Effect	Rochdale Envelope Scenario Assessed
Direct effect as a result of groundworks and construction of substation and associated buildings and infrastructure	<p>Damage and/or displacement of cultural heritage assets within footprint of substation and associated buildings and infrastructure.</p> <p>The MORL Onshore Substation area is 270 x 135 m, covering an area of 45,900 m<sup>2</sup>, the additional substation area is 270 x 135 m, covering an area of 36,450 m<sup>2</sup>. Additional lay down areas, screening, landscaping and access, and other groundworks for sewerage or a septic tank. The depth of the foundations is unknown but is likely to require the removal of topsoil.</p>
Direct effect by construction vessel or vehicle/machinery (cable corridor and substation footprint)	<p>Damage and/or displacement of cultural heritage assets within footprint of jack-up spud cans during OSP installation.</p> <p>Damage and/or displacement of cultural heritage assets within construction vessel anchor pattern (caused by contact with anchors and/or their cables) during OSP and cable installation and general marine activities associated with construction.</p> <p>Damage and/or displacement of cultural heritage assets within footprint of construction vehicles and machinery such as mechanical excavators, Cable Plough, Direction Drilling rig and other attending vehicles (e.g. 4x4 vehicles transporting personnel and transport vehicles).</p> <p>Offshore: The spud cans of the four or six jack-up legs of the construction vessel will be in contact with the seabed and will penetrate 1-4 m. The worst case area of effect will be m<sup>2</sup> per vessel placement.</p> <p>Onshore: The onshore construction footprint around the cable trench and substation such as lay down areas is unknown at present but the construction footprint assessed here incorporates a trench width of 6 m and assumes a route located anywhere within the area of the modified OnTI to accommodate the footprint of the Cable Plough or vehicles involved in trenching.</p>

Potential Effect	Rochdale Envelope Scenario Assessed
<i>Operation</i>	
Direct effect by IMR (Inspection, Maintenance and Repair) vessel	<p>Damage and/or displacement of cultural heritage assets within footprint of jack-up spud cans during IMR work.</p> <p>Damage and/or displacement of cultural heritage assets within IMR vessel anchor pattern (caused by contact with anchors and/or their cables).</p> <p>Although it is likely that there will be some co-location, worst case area of effect will be a multiple of the installation figures.</p>
Indirect effect due to changes in scour and sedimentation	<p>Damage and/or displacement of cultural heritage assets caused by scour induced by the nearby presence of the OSPs and sections of offshore cables protected by rock placement or concrete mattresses.</p> <p>Changes in preservation environment of cultural heritage assets caused by sedimentation induced by the nearby presence of the OSPs and sections of offshore cables protected by rock placement or concrete mattresses.</p> <p>Worst case area of effect will depend upon the final design of the substructure and the characteristics of the chosen location. Assessed in conjunction with findings of Chapter 3.1: Hydrodynamics, Sedimentary and Coastal Processes.</p>
Indirect effect due to changes to the setting of designated Cultural Heritage Receptors	<p>Changes in the setting of designated Cultural Heritage Receptors caused by presence of the proposed substations in the landscape.</p> <p>The MORL Onshore Substation area is 270 x 135 m, covering an area of 45,900 m<sup>2</sup>. The additional substation area is 270 x 135 m, covering an area of 36,450 m<sup>2</sup>. The maximum height of the structures is 13 m. Up to 60 acres of 'disturbance' within the substations area may be required as part of landscaping.</p>

## EIA Methodology

### *Direct Physical Effects*

5.4.2.20 Receptors may be upstanding features, buried or may be lying exposed on the seabed. Direct effects can therefore result from any activity that disturbs the ground surface, seabed or intertidal land surface or the water column immediately above it. Direct effects can have a significant effect upon both the receptor itself and upon the relationships between receptors and their wider environment, i.e. their physical setting or cultural heritage context. The effect of direct effects in development contexts remains poorly understood. A common sense attitude to the scale of effect has therefore been adopted: a receptor subject to pin piling or trenching for example is likely to be severely damaged.

### *Indirect Physical Effects*

5.4.2.21 Indirect physical effects are processes that involve a chain reaction; and in this case are considered primarily for the modified OfTI ASA.

5.4.2.22 They typically occur when activities lead to changes in the environment that then have an effect upon receptors. For example, the construction of an OSP can lead to changes in current flow at that location which then produce scour or sedimentation around a nearby receptor. These effects can be either positive or negative. For example scour often leads to rapid and destructive changes in the condition of a receptor, whereas sedimentation can protect it by burying it. Indirect effects are difficult to predict and their complex effect upon cultural heritage assets is currently only partially understood.

5.4.2.23 Damage caused by direct and indirect effects is normally permanent and recovery is limited to stabilisation and the prevention of further effects.

#### ***Effects on the Setting of Cultural Heritage Receptors***

5.4.2.24 Setting effects on cultural heritage receptors are often considered to be indirect; and in this case are particularly considered for designated receptors within the modified OnTI ASA within the vicinity of the proposed substation.

5.4.2.25 These occur when the visible elements of a development's infrastructure or the effects upon the land- or seascape caused by its presence are inter-visible with cultural heritage receptors. Setting includes the way in which the surroundings of a historic asset or place contribute to how it is experienced, understood and appreciated and setting effects are not therefore limited to visual changes. Assessing setting effects and particularly the magnitude of their effect is therefore a complex process that depends upon more than proximity. Setting effects have only been considered for the operational phase of the modified OfTI, as effects during construction and decommissioning are considered to be very short term only.

5.4.2.26 The methodology for assessment of setting effects upon the cultural heritage significance of the selected receptors has been undertaken in line with Managing Change in the Historic Environment: Setting (HS, 2010). The approach taken is to:

- Identify the cultural heritage assets that might be affected;
- Define the setting of each of these receptors without reference to the development; and
- Assess how the development will affect this defined setting.

5.4.2.27 The setting assessment included in this chapter has been carried out to identify where changes in setting have a potential to affect the cultural heritage significance of assets as distinct from the aesthetic land and seascapes. Therefore there is no direct correlation between the magnitude and significance of setting effects identified in other chapters of this EIA (Chapter 5.3: Seascape, Landscape and Visual Assessment).

#### ***Impact Assessment Criteria***

5.4.2.28 Where the importance (or sensitivity as it is defined here) of a cultural heritage receptor has been assessed, this is based upon an analysis of the archaeological and historical evidence available. Sensitivity is defined spatially in local, regional, national and international terms. A very wide range of contributing factors is typically considered, including: the receptor's age; what type of asset it is; how rare or alternatively how representative of a type or other group it is; how much of it survives; what condition it is in; its vulnerability; whether it is associated with non-archaeological evidence; what its associations are; and what its potential is, for example in terms of research or public interest and outreach.

5.4.2.29 Offshore, with the exception of assets that are automatically protected such as crashed military aircraft, statutory protection is only usually given to assets that are nationally important and often only when this is combined with other factors, most typically vulnerability. The principle reason appears to be lack of data. However, the UK Marine Policy Statement makes it clear that nationally important non-designated assets are to be considered subject to the same planning policies as designated assets.



### Defining Receptor Sensitivity

5.4.2.30 For the purposes of this impact assessment, the definitions in the Table 5.4-5 have been used to assess the importance or sensitivity of receptors.

**Table 5.4-5 Receptor Sensitivity**

Sensitivity	Definition
<b>High</b>	<p>Above average example and / or high potential to contribute to knowledge and understanding and / or outreach. Receptors with a demonstrable international or national dimension to their importance or those considered to be rare are likely to fall within this category.</p> <p>Sites with statutory protection (i.e. those protected under the Marine (Scotland) Act 2010, Ancient Monuments and Archaeological Areas Act 1979 or the Protection of Military Remains Act 1986, A-listed Buildings, Scheduled Monuments, Gardens and Designed Landscapes, Inventory Battlefields, Conservation Areas) plus as-yet undesignated sites that are demonstrably of equivalent cultural heritage value.</p> <p>Palaeogeographic features with demonstrable potential to include artefactual and / or palaeoenvironmental material, possibly as part of a prehistoric site or landscape.</p>
<b>Medium</b>	<p>Average example and / or moderate potential to contribute to knowledge and understanding and / or outreach. Receptors with a demonstrable regional dimension to their importance or those considered to be comparatively rare are likely to fall within this category.</p> <p>Includes B-listed buildings plus as-yet undesignated sites that are demonstrably of equivalent cultural heritage value.</p> <p>Includes wrecks of ships and aircraft that do not have statutory protection or equivalent, but have moderate potential based on formal assessment of their importance in terms of build, use, loss, survival and investigation ('BULSI' system, Wessex Archaeology 2011a-d). Onshore sites with a regional importance.</p> <p>Prehistoric deposits with moderate potential to contribute to an understanding of the palaeoenvironment.</p>
<b>Low</b>	<p>Below average example and / or low potential to contribute to knowledge and understanding and / or outreach. Receptors with a demonstrable local dimension to their importance are likely to fall within this category. Onshore sites with a local importance.</p> <p>Included C-listed buildings plus as-yet undesignated sites that are demonstrably of equivalent cultural heritage value.</p> <p>Also, Includes wrecks of ships and aircraft that do not have statutory protection or equivalent significance, but have low potential based on a formal assessment of their importance in terms of build, use, loss, survival and investigation ('BULSI' system, Wessex Archaeology 2011a,b).</p> <p>Prehistoric deposits with low potential to contribute to an understanding of the palaeoenvironment.</p>
<b>Negligible</b>	<p>Poor example and / or little or no potential to contribute to knowledge and understanding and / or outreach. Assets that are not considered to be rare with little or no surviving archaeological interest.</p>

***Defining Magnitude of Effect***

5.4.2.31 The definitions in the Table 5.4-6 have been used to assess the magnitude of effect upon receptors.

**Table 5.4-6 Magnitude of Effects**

<b>Magnitude</b>	<b>Definition</b>
<b>High</b>	Total loss or major alteration to key elements / features of the existing baseline (pre-development) conditions such that post-development character / distinctiveness / composition / attributes will be fundamentally changed and may be lost from the site altogether. Includes permanent/irreversible changes to existing baseline conditions.
<b>Moderate</b>	Loss or alteration to one or more key elements / features of the existing baseline conditions such that post-development character / distinctiveness / composition / attributes of the baseline will be partially but considerably changed. Includes permanent/irreversible changes to existing baseline conditions.
<b>Low</b>	Minor shift away from existing baseline conditions. Change arising from the loss / alteration will be discernible but underlying character / distinctiveness / composition / attributes of baseline condition will be similar to pre-development circumstances / patterns. Includes temporary (throughout project duration) changes.
<b>Negligible</b>	Very slight change from existing baseline conditions. Change barely distinguishable, approximating to the 'no change' situation or temporary (for part of the project duration) change.

***Defining Significance of Effects***

5.4.2.32 In line with standard EIA practice, sensitivity and magnitude of effect have been cross referenced to determine the significance of effects on cultural heritage receptors indicated in Table 5.4-7 below.

**Table 5.4-7 Significance of Effects**

<b>Sensitivity</b>	<b>Magnitude</b>				
	High	Moderate	Low	Negligible	No change
<b>High</b>	Major	Major	Moderate	Minor	No impact
<b>Medium</b>	Major	Moderate	Minor	Negligible	No impact
<b>Low</b>	Moderate	Minor	Minor	Negligible	No impact
<b>Negligible</b>	Minor	Negligible	Negligible	Negligible	No impact

5.4.2.33 Significance can be defined as follows in Table 5.4-8.

**Table 5.4-8 Definition of Significance**

Significance	Definition
<b>Major</b>	Very large or large change in receptor condition, adverse or beneficial, which are likely to be important considerations at a regional or district level. Major beneficial effects may contribute to achieving national, regional or local objectives in providing a significant positive gain to the environment. Major adverse effects could result in exceeding statutory objectives and / or breaches of legislation and give rise to serious concern. Such effects are deemed significant in EIA terms.
<b>Moderate</b>	Intermediate change in receptor condition, adverse or beneficial. Moderate beneficial effects may provide some gain to the environment. Moderate adverse effects may give rise to some concern and are likely to be an important consideration at a local level. Such effects are deemed significant in EIA terms.
<b>Minor</b>	Small change in receptor condition, adverse or beneficial. Minor beneficial effects may have some environmental benefits. Minor adverse effects may be undesirable, but of limited concern. Such changes are unlikely to be important in the decision making process and are deemed not significant in EIA terms.
<b>Negligible</b>	No discernible change in receptor condition. The effect is deemed not significant in EIA terms.
<b>No impact</b>	No change in receptor condition. The effect is deemed not significant in EIA terms.

5.4.2.34 There is a high level of uncertainty often applied to cultural heritage assets, due to the often inherent incompleteness of information associated with them, particularly on the sea bed. Geophysical surveys may locate previously unknown wrecks but identification is often difficult or impossible. As a result the 'Precautionary Principle' is normally applied to impact assessment. Available guidance, COWRIE: Historic Environment Guidance for the Renewable Energy Sector (Wessex Archaeology 2007) states that this principle should be applied if at the time of decision-making:

- There is good reason to believe that the historic environment may be subject to harmful effects; and
- The level of uncertainty about the consequences or likelihood of these effects is such that risk cannot be assessed with sufficient confidence to inform decision-making.

## Offshore Impact Assessment – Modified OfTI

### Construction

#### Introduction

5.4.2.35 Potential direct and indirect effects within the modified OfTI ASA comprise direct damage to archaeological deposits and material and the disturbance or destruction of relationships between deposits and material and their wider surroundings; and indirect effects through changes in scour and sedimentation, which can be seen as both positive and negative.

5.4.2.36 Potential direct and indirect effects during construction comprise damage, disturbance or destruction of submerged prehistoric archaeology, shipwrecks and crashed aircraft from a number of identified activities. These have been assessed independently below.

5.4.2.37 It is noted that indirect effects relating to changes in scour and sedimentation are considered to be **not significant** with regard to the construction phase.

#### Installation of OSPs

5.4.2.38 Cultural heritage receptors within the three consented wind farms area have been previously assessed as part of the MORL ES (2012). The OfTI Rochdale Envelope has subsequently been amended from eight OSPs to two OSPs, located within the three consented wind farms area (modified OfTI).

5.4.2.39 The jacket design to be used for the OSPs requires either the drilling of pin piles, which will destroy receptors within the footprint of the pile, or suction caissons, which will destroy or damage receptors within their footprint. Both will require the laying of scour protection, which may damage or destroy receptors within its footprint' depending upon their depth of burial. This is a direct, short term (construction), permanent and adverse effect.

5.4.2.40 Previously Prehistoric, Maritime and Aviation receptors were assessed (Chapter 5.5 and Technical Appendix 5.5 A of MORL ES, 2012). Unmitigated, the installation of OSPs could induce **major adverse effects** on Cultural Heritage Receptors, reducing to **minor to negligible significance** following mitigation.

#### Installation of Inter-tidal and Offshore Export Cables

5.4.2.41 The cable installation method has not yet been finalised. The cable will be buried by trenching where possible. Trenching options for the landfall are dredging, back-hoe dredging, mechanical rock cutter/excavator and direction drilling. Options for the rest of the offshore export cable are trenching, cable plough, jetting and mechanical rock cutter/excavator. Any receptors present within the area of effect are likely to be destroyed, damaged or displaced, regardless of the trenching method. This will be a direct, short term (construction), permanent and negative effect. Directional drilling, will likely affect receptors in the path of or immediately above or below the drill string.

5.4.2.42 There is potential for encountering submerged prehistory receptors within the modified OfTI ASA outwith the area of the three consented wind farms, both archaeological and palaeogeographical which are potentially of **high sensitivity**. Direct physical impacts to such receptors would induce **high magnitude** effects. The significance of effect in the absence of mitigation is **major**. Following mitigation (see Proposed Monitoring and Mitigation Section below) however, the significance of effect will be reduced to an acceptable level in terms of EIA, likely to be no more than **minor**.

- 5.4.2.43 Baseline review has established that there are no known cultural heritage receptors within the inter-tidal modified OfTI at the Inverboyndie landfall. There will therefore be **no effect**.
- 5.4.2.44 Documented wrecks (**WA 2000 - 2007**) are classified as 'dead'. In the absence of positive identification their sensitivity is regarded as high. Magnitude of effect is considered to be high and in the absence of mitigation the significance of effect is **major**. Following mitigation however, the significance of effect will be reduced to an acceptable level in terms of EIA, likely to be no more than **minor**.
- 5.4.2.45 There is one reported aviation loss (**WA 2008**) within the modified OfTI outwith the area of the three consented wind farms. In the absence of positive identification the sensitivity is regarded as **high**. Magnitude of effect is considered to be **high** and in the absence of mitigation the significance of effect is **major**. Following mitigation however, the significance of effect will be reduced to an acceptable level in terms of EIA, likely to be no more than **minor**.

#### *Vessel activity during construction*

- 5.4.2.46 Although no method statement is currently available, the OSPs are likely to be installed by a self-elevating vessel or platform (jack up), within the three consented wind farms area only. Any receptors present within the area of effect may be destroyed or damaged or displaced downwards. This will be a direct, short term (construction), permanent and negative effect. It is conceivable that there may also be a short term indirect effect caused by scour or sediment deposition induced by the presence of the jack up legs.
- 5.4.2.47 Direct physical impacts to such receptors would induce **high magnitude** effects. The significance of effect in the absence of mitigation is **major**. Following mitigation however, the significance of effect will be reduced to an acceptable level in terms of EIA, likely to be no more than **minor**.
- 5.4.2.48 Effects caused by the cable laying vessel/s will depend upon the station keeping method. A Dynamic Positioning (DP) vessel is unlikely to cause an effect as it does not have gear in contact with the seabed. However, a vessel that manoeuvres on anchors may cause an effect. The effect will arise in the footprint of each anchor, which may be linear as some movement of the anchor towards the vessel may occur when tension is placed on its cable. This cable itself may cause an effect along its length and possible in an arc as tension is applied to it. Contact between anchors and their cables and archaeological material tends to be highly destructive. It will be a direct, short term (construction), permanent and negative effect. A similar effect may result from anchoring of support vessels in the modified OfTI, including diving support vessels used for hook up activities.
- 5.4.2.49 The magnitude of any effect is considered to be **high**. The significance of effect in the absence of mitigation therefore is **major**. Following mitigation however, the significance of effect will be reduced to an acceptable level in terms of EIA, likely to be no more than **minor**.

#### **Operation**

##### *Vessel activity during IMR (Inspection, Maintenance and Repair)*

- 5.4.2.50 The worst-case scenario anticipates that each OSP will require five visits by a jack up vessel during its operational life. These visits are likely to replicate the effects of OSP installation, which will be direct, short term (operation), permanent and negative effects. Sensitivity and magnitude can be expected to be similar, although magnitude of effect will be reduced if the footprint of the spud cans is co-located with those of construction.

5.4.2.51 The magnitude of any effect is considered to be **high**. The significance of effect in the absence of mitigation therefore is **major**. Following mitigation however, the significance of effect will be reduced to an acceptable level in terms of EIA, likely to be no more than **minor** to **negligible**.

#### *Changes in Scour and Sediment Deposition Patterns*

5.4.2.52 In the event that the presence of the OSPs and any proposed export cable matricing causes erosion (scour) and sediment deposition in their vicinities, receptors within the footprint of these changes may be subject to indirect effects. Significant effects are likely to be complex and difficult to predict for Cultural Heritage Receptors. They will be long term (operational life of the wind farm), temporary and/or permanent and either positive (sediment deposition) or negative (erosion). The assessment of sensitivity and magnitude is the same as that for OSP construction and offshore export cable installation. The potential indirect effect through the construction of the OSPs may be reversed by the removal of the jacket during decommissioning and may therefore be temporary, although any negative effect may already have become permanent.

5.4.2.53 **No significant indirect effects** have been identified from changes to seabed processes which may induce adverse effects upon Cultural Heritage Receptors (see Chapter 3.1 Hydrodynamics, Sedimentary and Coastal Processes). In fact **minor positive effects** from increases in suspended sediment may benefit Cultural Heritage Receptors by increasing protective sediment cover.

#### *Indirect setting effects*

5.4.2.54 In terms of the effects on the setting of onshore receptors, the OSPs have been considered as part of the MORL ES, 2012 (MORL ES Chapter 5.5 and Technical Appendix 5.5 A of MORL ES, 2012).

5.4.2.55 Due to distance offshore and the reduced number of OSPs, **no significant effects** from OSPs located in the consented wind farm areas have been identified.

#### *Decommissioning*

5.4.2.56 The effects of decommissioning will depend upon the methodology applied. It is assumed that they are at least equivalent to or lesser than the effects predicted for construction.

### **Onshore Impact Assessment – Modified OnTI**

#### *Construction*

##### *Installation of Onshore Cables*

5.4.2.57 The cable installation method has not yet been finalised but may include cable plough or trenching. Any receptors present within the area of effect are likely to be destroyed, damaged or displaced, regardless of the trenching method. Additionally, each method has a footprint around the cable trench where direct physical impacts may occur. This will be a direct, short term (construction), permanent and negative effect. The visibility of archaeological receptors encountered using a cable plough may be significantly reduced and effective mitigation may require additional methodologies such as geophysical assessment.

5.4.2.58 The Scheduled Monuments, Boyndie Old Kirk (**WA 1040**), Hill of Alvah cairns (**WA 1035**) and The Hills of Boyndie Scheduled area around the prehistoric barrows and enclosures (**WA 1010**) are located in the area of the OnTI. As scheduled monuments these sites are considered of **high value** and would, in the absence of mitigation potentially be subject to direct physical impacts of **high magnitude**. The significance of effect in the absence of mitigation therefore is **major adverse**. Following mitigation, i.e. micrositing to avoid these receptors the significance of the effect will be reduced to **no effect**.

5.4.2.59 There are 76 undesignated Cultural Heritage Receptors within the modified onshore export cable route corridor which may be encountered by the cable trenching. Avoidance where possible comprises inherent mitigation within the design of the cable route. Where avoidance is not possible or previously unknown receptors are encountered during construction direct physical effects will occur to receptors within the footprint of the cable trenching, of **high magnitude**. The sensitivity of the receptors varies but they are likely to vary between local and regional importance – i.e. **low** and **medium sensitivity**. For example, the designed landscape around Eden House (WA1063), and possible sub-surface prehistoric cropmark features at Lower Inchdrewer (WA1006) (and similar types of features) are likely to be regarded as of regional importance, highlighted by the Environmental Policies of the Aberdeenshire Local Plan. The significance of effect in the absence of mitigation therefore is **moderate** or **major**. Following mitigation however the significance of the effect will be reduced to **negligible** (reduced to an acceptable level in terms of EIA).

#### *Groundworks and Construction of Substation and Associated Buildings and Infrastructure*

5.4.2.60 The construction of the substation site and associated structures which require groundworks or damage the ground surface may encounter unknown archaeological receptors. It is assumed that indirect physical effects from vehicles and machinery are working within the construction footprint. There are currently no known Cultural Heritage Receptors within the substation building footprint.

5.4.2.61 There are no known cultural heritage receptors within the footprint of the substation area, but there is potential for unknown receptors to be encountered. Direct physical effects to unknown receptors are likely to be of **high magnitude** to receptors of **unknown sensitivity**, leading to unmitigated effects of **minor to major significance**. Following mitigation, post-mitigation effects are likely to be reduced to **minor or negligible significance**.

#### **Operation**

##### *Indirect Setting Effects*

5.4.2.62 There are six designated cultural heritage assets within the visual envelope of the substation area which have been considered for indirect effects to their setting (Figure 5 of Technical Appendix 5.4 A: Transmission Work EIA: Baseline Review of Offshore and Onshore Archaeology); the recumbent Stone circle at Auchmaliddie (WA1184), the scheduled remains of Gight Castle (WA1168) and doocot (WA1164) the Designed Landscapes of Fyvie Castle (WA1108) and Hatton Castle (WA1102), and the Battle of Fyvie battlefield (WA1110).

5.4.2.63 The remaining two megaliths (one probably the Recumbent Stone and a flanker) within the recumbent stone circle at Auchmaliddie (WA1184) lie prone at the edge of an arable field (Photo-1060); striking quartzite stone suggesting the monument was an impressive and distinctive monument prior to falling into disrepair. Views towards the proposed substation site are to the west at a distance of around 4.5 km. Views are open, across rolling arable farmland. The existing overhead power line is the dominant modern element in the landscape as viewed to the west. The scale of the substation within the landscape, at this distance, is not judged to be a large change to the setting of this monument. As a scheduled monument, the receptor is of high sensitivity. Indirect effects to the setting of the receptor are judged to be of low magnitude. Therefore, it is judged that effects in the absence of mitigation are of moderate adverse significance. Following mitigation however the significance of the effect will be reduced by screening proposed for the substations area, which are judged to represent effective mitigation.

5.4.2.64 Gight Castle (**WA1167, 1168**) and Doocot (**WA1164**) are located to the south of the substation site at a distance of around 5 km. The receptor is located within the upper slopes of the River Ythan and with effective screening by the topography and mature trees (Photo-1065). Therefore, it is judged that there is no effect.

5.4.2.65 Fyvie Castle (**WA1108**) and the Battle of Fyvie battlefield (**WA1110**) are located to the southwest of the substation site at a distance of over 6 km (Photo-1072). Considering the combined influence of distance from the site, intervening topography and mature tree cover, it is judged that there is no effect.

5.4.2.66 The designed landscape of Hatton Castle is located to the west of the proposed substation site, at a distance of over 6 km. Considering the combined influence of distance from the site, intervening topography and mature tree cover, it is judged that there is no effect.

### *Decommissioning*

5.4.2.67 The effects of decommissioning will depend upon the methodology applied. It is assumed that they are at least equivalent to or lesser than the effects predicted for construction.

### **Proposed Monitoring and Mitigation**

#### *Approach to Mitigation*

5.4.2.68 The following measures are designed to mitigate the effect of the construction, operation and decommissioning phases upon known Cultural Heritage Receptors, and to establish the presence of, and appropriate mitigation for, unknown assets. The generic measures proposed here apply to offshore and inter-tidal elements of the modified OfTI and modified OnTI ASAs. Measures specific to the modified OfTI for each area is described in the relevant section below. The primary aim of the 'Precautionary Principle' is the prevention of damage to receptors by proactively putting in place protective measures, rather than attempting to repair damage (which may be irreversible) after it has occurred. Specific mitigation includes:

- Avoidance of the Scheduled Monuments (**WA 1010, 1035, 1040**) by micrositing within the area of the modified OnTI;
- Avoidance of known undesignated Cultural Heritage Assets by micrositing where possible within the modified OfTI and modified OnTI export cable route corridors; and
- Mitigation in respect of previously identified geophysical anomalies (MORL 2012: HAID 40, 42) will depend upon whether they are re-located during the assessment of geophysical data – within the modified OfTI export cable corridor.

5.4.2.69 In addition, the following mitigation measures are proposed in addition to embedded mitigation within the modified OfTI and modified OnTI Rochdale Envelope.

5.4.2.70 No mitigation is proposed for the potential indirect effects of the operational phase of the modified OfTI.



## *Modified OfTI*

### *Geophysical and Geotechnical Assessment*

5.4.2.71 Geophysical and geotechnical datasets being acquired for the modified OfTI will be subject to archaeological assessment enhancing the Written Scheme of Investigation comprising an agreed program of Works in consultation with Curators (see reference 5.4.2.76 below). The modified OfTI design, and mitigation measures will be reported on pre-construction.

### *Exclusion Zones*

5.4.2.72 The preferred method of mitigation is avoidance. Exclusion Zones placed around all discrete archaeological sites or more extensive areas identified within an EIA prohibit development related activities within their extents and have been widely applied in offshore contexts to sites and anomalies with known or potential archaeological significance. As the marine historic environment in Scottish and UK waters is still largely unknown and poorly documented, it is often not possible to fully assess the extent or importance of an archaeological site. In many instances, therefore, to assist developers with planning a scheme layout, the implementation of buffers around sites may be more appropriate.

5.4.2.73 In view of their potential archaeological significance, development exclusion zones will be placed around **WA 2000-2008**. Although these receptors have been classified as 'Dead' or have substantial positional uncertainties, remains may still be present; either fragmentary or buried within the modified OfTI ASA. A minimum exclusion zone of 50 m around each of these receptors will be implemented, pending further clarification on the presence or not of any remains through the assessment of the marine geophysical data. The WSI will also set out Exclusion Zones in relation to the OSPs located within the consented wind farm area in cognisance with the baseline previously assessed (MORL ES, 2012).

5.4.2.74 Wreck material can often be spread over a wide area in the vicinity of a wreck site and the buffers are expected to incorporate such material within their boundaries. In order to further refine the exclusion zone it is suggested that the results of any pre-construction seabed survey (i.e. Remotely Operated Vehicle (ROV)), and any other sites of potential archaeological interest are inspected by a suitably qualified archaeologist and it may be appropriate to have a suitably qualified archaeologist(s) involved in such survey fieldwork. In addition, in order to maximise the potential benefits of such work, it would be advantageous to seek archaeological advice prior to its implementation.

5.4.2.75 It is proposed that all exclusion zones will be marked on the scheme masterplans, including contract documents. The final modified OfTI will take account of these buffers, which may evolve as the project progresses subject to scheme design and survey requirements. If effects cannot be avoided measures to reduce, remedy or offset disturbance will be set out in a Written Scheme of Investigation (WSI) agreed with HS as outlined below.

*Written Scheme of Investigation (WSI)*

5.4.2.76 Following completion of geophysical and geotechnical assessment, a Written Scheme of Investigation (WSI) will be prepared in consultation with Aberdeenshire Council and Historic Scotland – reviewing and updating the existing WSI included as part of the 2012 MORL ES (Technical Appendix 1.3 A of MORL ES, 2012). This WSI will be compliant with existing archaeological guidance (specifically The Crown Estate/Wessex Archaeology 2010a) and should apply to all construction, operation and decommissioning activities with potential to have an effect upon cultural heritage receptors. It should be incorporated into the final environmental management plan for the modified OfTI and OnTI. The WSI will set out:

- When, how, why and by whom archaeological mitigation measures are to be implemented (including archaeological exclusion zones and buffers and micro-siting allowances); and
- Provide for the appointment of a retained archaeologist to carry out and/or co-ordinate archaeological mitigation activities and to monitor compliance with the WSI during construction.

*Protocol for Archaeological Discoveries (PAD)*

5.4.2.77 All construction, operation and decommissioning activities will be subject to a scheme-specific protocol document for dealing with archaeological discoveries. This will be compliant with existing archaeological guidance (specifically The Crown Estate/Wessex Archaeology, 2010b) and incorporated into the WSI (in line with the draft WSI included within Technical Appendix 1.3 A of the MORL ES, 2012). Compliance with the protocol will be monitored by the retained archaeologist during construction and installation.

**Modified OnTI***Geophysical Assessment*

5.4.2.78 The use of a Cable Plough during construction for the modified OnTI may preclude visual inspection of the subsurface. Therefore other methods of investigation, such as geophysical survey and assessment prior to cable installation, may be required to verify known sites or features of archaeological interest, and the potential for unknown receptors along the modified OnTI export cable corridor including the proposed substation site and associated buildings and infrastructure; particularly in relation to identified crop mark features. This will be discussed and agreed in consultation between MORL and the Aberdeenshire Council Archaeologist.

*Screening*

5.4.2.79 Indirect effects which maybe induced by the substations will be mitigated through screening of the substation structures.

*Written Scheme of Investigation (WSI)*

5.4.2.80 A WSI will be provided for the modified OnTI, outlining specific mitigation requirements identified by the Aberdeenshire Council Archaeologist, which will include the requirements for further investigation where necessary through a suitable programme of archaeological works.

### 5.4.3 Cumulative Impact Assessment

#### Summary

5.4.3.1 No significant cumulative effects have been identified within the modified OnTI and modified OfTI. This includes consideration of indirect effects to the setting of Cultural Heritage Receptors and the range of wind turbines considered for CIA with Chapter 5.3: Seascape, Landscape and Visual Assessment. No development is intervisible between sites assessed to potentially be subject to indirect effects (i.e. Auchmaliddie recumbent stone circle, WA 1184), the closest, the three turbines at Balquhindachy are judged to have no effect to key views between the receptor and the proposed development.

#### Assessment of Cumulative Effects

5.4.3.2 The specific developments that have been considered within this assessment are as follows:

- Beatrice Offshore Wind Farm (BOWL) and associated TI;
- Telford, Stevenson and MacColl Wind Farms (three consented wind farms);
- SHEFA-2 cable; and
- SHE-T cable, Caithness – Moray HVDC link.

5.4.3.3 Cumulative effects pertaining to BOWL were previously assessed to be not significant (MORL ES, 2012). Mitigation strategies relating to cultural heritage receptors have already been developed for BOWL, the MORL three consented wind farms.

5.4.3.4 The precise landfall and cable corridor for SHE-T is not currently known and therefore the potential geographical overlap with the modified OfTI is also unknown. However, should the SHE-T interact with the modified OfTI then it is considered that potential cumulative effects to unknown Cultural Heritage Receptors will be effectively mitigated by the strategies set out in this ES.

5.4.3.5 No other development likely to be of significance to cumulative impact assessment has been identified. The likelihood of cumulative effects from developments outside of the Moray Firth is considered to be remote.

#### Methodology

5.4.3.6 The assessment methodology has followed that outlined in the Moray Firth Offshore Wind Developers Group Discussion Document presented in Chapter 1.3: Environmental Impact Assessment.

5.4.3.7 As defined for the purposes of this assessment, cumulative effects are those which could occur as a result of the proposed development in conjunction with other, existing or planned offshore wind farms or other planned marine and coastal developments or activities. Cumulative effects may therefore occur to cultural heritage receptors that have the potential to be incrementally affected by other existing, consented and / or proposed developments or activities. These effects may be regarded individually as minor but collectively as significant. However, the emphasis is on the assessment of potentially significant effects rather than on comprehensively cataloguing every conceivable impact that might occur.

5.4.3.8 Individual sites at specific locations represent both archaeological receptors in themselves, but are also part of the archaeological resource as a body of data and as collective heritage. Hence, not only is it necessary to consider the full range of other plans or projects across the region, not just those in close proximity, but it is also necessary to consider how a number of effects upon a specific aspect of the collective heritage may result in a significant cumulative impact.

#### *Cumulative Assessment*

5.4.3.9 Cumulative effects in relation to the three MORL consented wind farms and modified OfTI (Whole Project) are only likely to occur at cable crossings (offshore cable and inter-array). The significance of effect is considered to be of **minor/negligible** significance following mitigation.

5.4.3.10 There is no geographical overlap between the Whole Project and the Beatrice development but there is a potential for overlap with the SHEFA-2 landfall in Boyndie Bay. Therefore a cumulative impact with other offshore development is considered to be **minor/negligible** following mitigation.

5.4.3.11 There is however the potential for unknown cultural heritage receptors to be encountered in relation to the Project and at the Boyndie Bay landfall of SHEFA-2. While the sensitivity and magnitude of effects could potentially be high, the significance of effect in the absence of mitigation is **major**. Mitigation strategies relating to cultural heritage receptors have already been developed for the consented wind farm projects. As such the same mitigation will apply for the modified OfTI. It is unknown at this time the mitigation strategies set out for the SHE-T and SHEFA-2 cable schemes. Potential cumulative impacts from cable schemes (SHE-T and SHEFA-2) will be reduced by the mitigation methods set out in this document (Table 5.4-3). The significance of any potential post-mitigation effect is therefore considered to be of **minor significance**.

5.4.3.12 Setting effects on Cultural Heritage Receptors in relation to the onshore substations has been considered taking into account the range of wind turbines considered for CIA with Chapter 5.3: Seascape, Landscape and Visual Assessment. No development is inter-visible between sites assessed to potentially be subject to indirect effects (i.e. Auchmaliddie recumbent stone circle, **WA 1184**), the closest, the three turbines at Balquhindachy are judged to have **no effect** to key views between the receptor and the proposed development.

#### 5.4.4 References

BOWL (2012) Beatrice Offshore Wind Farm Environmental Statement. Arcus Renewable Energy Consulting Ltd.

MORL (2012) Telford, Stevenson, MacColl Wind Farms and associated Transmission Infrastructure Environmental Statement: Technical Appendix 5.5A – Archaeology Technical Report, Moray Offshore Renewables Ltd.

Wessex Archaeology (2010a) Model Clauses for Archaeological Schemes of Investigation: Offshore Renewables Projects, The Crown Estate.

Wessex Archaeology (2010b) Protocol for Archaeological Discoveries: Offshore Renewables Projects, The Crown Estate.

Wessex Archaeology (2011a) Assessing Boats and Ships: Methodology Report, Unpublished report ref: 70861.04

Wessex Archaeology (2011b) Characterising Scotland's Marine Archaeological Resource, Unpublished report ref: 76930.04.