

 TotalEnergies E&P North Sea UK Ltd

Culzean - Floating Offshore Wind Turbine Pilot Project Environmental Impact Assessment Report – Chapter 15 - Marine Archaeology

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GLOSSARY

TERMINOLOGY	DESCRIPTION
Culzean Floating Offshore Wind Turbine Pilot Project ("the Project")	The entire Development including all offshore components and all project phases from pre-construction to decommissioning.
Environmental Assessment (EIA) Impact	The procedure to predict, minimise, measure and, if necessary, correct and compensate the impacts produced by any human action.
Export Cable	Cable connecting the Floating Wind Turbine to the Culzean Platform
Innovation and Targeted Oil and Gas (INTOG)	<p>The Initial Plan Framework Sectoral Marine Plan for Offshore Wind for INTOG encompasses spatial opportunities and a strategic framework for future offshore wind developments within sustainable and suitable locations that will help deliver the wider United Kingdom (UK) and Scottish Government Net Zero targets.</p> <p>The 'IN' component of INTOG consists of small-scale innovative projects of 100 Megawatts (MW) or less. The aim of the 'TOG' component is to supplying renewable electricity directly to oil and gas infrastructure. The Culzean Floating Wind Pilot Project falls under the TOG component of INTOG.</p>
Marine Licence Application ("the Application")	A Marine Licence is granted under the Marine and Coastal Access Act 2009 for projects between 12-200 Nautical Miles (nm) from shore, or the Marine (Scotland) Act 2010 for projects between Mean High-Water Springs (MHWS) out to 12 nm from shore. The Application includes Habitats Regulations Appraisal (HRA)-supporting documentation (where required), an application letter, Marine Licence application form and this Environmental Impact Assessment Report (EIAR).
Net Zero	Refers to a government commitment to ensure the UK reduces its greenhouse gas emissions by 100% from 1990 levels by 2050 and in Scotland, the same target is set for 2045. If met, this would mean the amount of greenhouse gas emissions produced by the UK would be equal to or less than the emissions removed by the UK from the environment.
Project Design Envelope (PDE)	The maximum range of design parameters of all infrastructure assessed as part of the EIA.
Study Area	Receptor specific area used to characterise the baseline.
Project Area	The extent of the immediate area surrounding the floating Wind Turbine Generator (WTG) and cable route as characterised by the extent of the seabed environmental and habitat surveys. Also referred to as the Survey Area where specifically relating to survey activities.
Floating Wind Turbine Generator (WTG)	Device that converts the kinetic energy of wind into electrical energy. Can be functionally divided into four parts: wind turbine, tower and transition piece, floating foundation, and mooring system.

ACRONYMS AND ABBREVIATIONS

ACRONYM/ ABBREVIATION	DEFINITION
ACAS	Aberdeenshire Council Archaeology Service
CNSE	Central North Sea Electrification
DSLDP	Development Specification Layout Plan
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
HER	Historic Environment Record
HES	Historic Environment Scotland
HMPA	Historic Marine Protected Area
HRA	Habitats Regulations Appraisal
INTOG	Innovation and Targeted Oil and Gas
JNAPC	Joint Nautical Archaeology Policy Committee
km	kilometre
MBES	Multibeam Echo Sounder
MD-LOT	Marine Directorate – Licensing Operations Team
MDS	Maximum Design Scenario
MW	Megawatts
nm	nautical miles
PAD	Protocol for Archaeological Discoveries
PDE	Project Design Envelope
PoMRA	Protection of Military Remains Act 1986
SBP	Sub-Bottom Profiler
SSC	Suspended Sediment Concentrations
SSS	Side Scan Sonar
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
WSI	Written Scheme of Investigation
WTG	Wind Turbine Generator

15 MARINE ARCHAEOLOGY

15.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) presents the marine archaeology and cultural heritage receptors of relevance to the Culzean Floating Offshore Wind Turbine Pilot Project (the Project) and assesses the potential impacts from the construction, operation and maintenance and decommissioning of the Project on these receptors. Where required, mitigation is proposed, and the residual impacts and their significance are assessed. Potential cumulative impacts have also been considered, while transboundary impacts have been scoped out with the agreement of Scottish Ministers, as described in Section 15.3.

Wessex Archaeology have drafted and carried out the impact assessment. Further competency details of the Project Team including lead authors for each chapter are provided in Chapter 1: Introduction. Table 15-1 Supporting studies below provides a list of all the supporting studies which relate to and should be read in conjunction with the Marine Archaeology impact assessment.

Table 15-1 below provides a list of all the supporting studies which relate to and should be read in conjunction with the marine archaeology impact assessment.

Table 15-1 Supporting studies

DETAILS OF STUDY	LOCATIONS OF SUPPORTING STUDY
Archaeological Assessment of Geophysical Data (Doc. Ref. 280651.01)	Appendix K: Archaeological Assessment of Geophysical Data. containing gazetteer and baseline context for this Chapter
Geophysical, Geotechnical & Environmental Survey Culzean Field, Central North Sea	Appendix J: Geophysical Survey Report

The impact assessment presented herein draws upon information presented within other impact assessments within this EIAR, including:

- Chapter 7: Marine Physical Processes. Which supports the assessment of potential indirect physical impacts from hydrodynamic changes and Suspended Sediment Concentrations (SSC)

Where information is used to inform the impact assessment, reference to the relevant EIAR chapter is given. The impact pathways to other topic receptors are detailed further in Section 15.2 which considers the inter-related effects between the varying topic receptors addressed within this EIAR.

15.2 Legislation, policy and guidance

Over and above the legislation presented in Chapter 2 Legislation and Policy, the following legislation, policy and guidance are relevant to the assessment of impacts from the Project on Marine Archaeology:

- Legislation:
 - *Marine and Coastal Access Act 2009*;
 - *Protection of Military Remains Act 1986 (PoMRA)*; and
 - *Merchant Shipping Act 1995*.

The above legislation provides a protection for marine historic assets of national importance, as well as allowing military wrecks and aircraft remains to be protected. The Merchant Shipping Act 1995 requires that all wreck material that is recovered is reported to the Receiver of Wreck.

- Policy:
 - The United Kingdom Marine Policy Statement 2011 underpins the development of marine plans ensuring that marine resources are used in a sustainable way in line with high level objectives.
 - The following policy of the Scotland's National Marine Plan 2015 applies to this marine archaeology assessment:
 - (GEN) 6 Historic environment: Development and use of the marine environment should protect and where appropriate, enhance heritage assets in a manner proportionate to their significance (p.19).
- Guidance:
 - *Military Aircraft Crash Sites: Guidance on their significance and future management* (English Heritage (now Historic England), 2002);
 - *The Code of Practice for Seabed Developers* (Joint Nautical Archaeology Policy Committee (JNAPC) and The Crown Estate, 2006);
 - *Historic Environment Guidance for the Offshore Renewable Energy Sector* (Wessex Archaeology Ltd, 2007);
 - *Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment* (English Heritage (now Historic England), 2008);
 - *Our Seas - A shared resource: High level marine objectives* (HM Government, 2009);
 - *Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector* (Gribble & Leather, 2011);
 - *Ships and Boats: Prehistory to Present: Designation Selection Guide* (English Heritage (now Historic England), 2012);
 - *Marine Geophysics Data Acquisition, Processing and Interpretation Guidance Notes* (Bates *et al.*, 2013);
 - *Protocol for Archaeological Discoveries: Offshore Renewables Projects* (The Crown Estate, 2014);
 - *Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record* (Historic England, 2015);
 - *Managing Change in the Historic Environment: Setting* (Historic Environment Scotland 2016, updated 2020);
 - *Standard and guidance for historic environment desk-based assessment* (Chartered Institute for Archaeologists (CIfA) 2014a, last updated 2020);
 - *Standard and guidance for archaeological advice by historic environment services* (CIfA, 2014b, last updated 2020);
 - *Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects* (The Crown Estate, 2021) and
 - *Curating the Palaeolithic* (Historic England, 2023).

15.3 Scoping and consultation

Stakeholder consultation has been ongoing throughout the Environmental Impact Assessment (EIA) and has played an important part in ensuring the scope of the baseline characterisation and impact assessment are appropriate with respect to the Project and the requirements of the regulators and their advisors.

The Scoping Report was submitted to Scottish Ministers (Via Marine Directorate – Licensing Operations Team (MD-LOT), on 14th April 2023, who then circulated the report to relevant consultees. The Scoping Opinion was received from MD-LOT on 20th July 2023. Relevant comments from the Scoping Opinion and other consultation specific to Marine Archaeology are provided in Table 15-2 below, which provides a high-level response on how these comments have been addressed within the EIAR.

Table 15-2 Summary of Scoping consultation responses specific to Marine Archaeology

CONSULTEE	COMMENT	RESPONSE
Scoping Opinion		
<p>Scottish Ministers (via MD-LOT)</p>	<p>The Scottish Ministers agree that the desk-based sources to be examined for the EIA marine archaeology and cultural heritage baseline characterisation, which are noted in Section 8.7.4 of the Scoping Report are appropriate</p>	<p>Noted. Further response not required</p>
	<p>The Scottish Ministers note that the report has recommended in Table 8-20 within the Scoping Report recommends an archaeological assessment of available marine geophysical survey datasets is carried out. It is unclear if this survey coverage would include all areas where there is a potential risk of direct or indirect impacts on known or unknown cultural heritage assets. Therefore, the Scottish Ministers advise that all areas where there is a potential risk of impact, both within and outwith the proposal, must be surveyed using techniques which will produce data appropriate for archaeological assessment.</p>	<p>The baseline characterisation for Marine Archaeology has been supplemented with the assessment of seabed geophysical survey data captured for the Project (Appendix K). The area assessed was based on the geophysical data coverage. N.B. as the assessment of submerged prehistory receptors was scoped out, geotechnical datasets did not need to be taken forward for review as part of the EIA baseline.</p>
	<p>The Scottish Ministers are content with the impacts proposed to be scoped in and out of the EIA Report as noted in Table 8.21 of the Scoping Report.</p>	<p>Noted. Further response not required</p>
	<p>The Scottish Ministers, along with the Historic Environment Scotland (HES) representation, welcome the Developer’s findings that an area of debris consistent with a potential wreck was located close to the Proposed Developments leasing area. Where appropriate, the developer should produce an assessment of any potential impact from the Proposed Development on this potential wreck should be noted in the EIA Report</p>	<p>The baseline characterisation for Marine Archaeology has been enhanced with the assessment of seabed geophysical survey data captured for the Project (Appendix K). The area assessed was based on the geophysical data coverage. The EIA process has considered these baseline receptors in full in this Chapter.</p>

CONSULTEE	COMMENT	RESPONSE
	<p>In addition to the proposed mitigation and monitoring measures presented in section 8.7.6 of the Scoping Report, the Scottish Ministers recommend a Written Scheme of Investigation is produced and embedded to form an umbrella document for all archaeological survey, investigation and assessment required for the Proposed Development. This is supported by the HES representation</p>	<p>A Written Scheme of Investigation (WSI) is proposed as embedded mitigation (Table 15-8).</p>
<p>Historic Environment Scotland (HES)</p>	<p>Thank you for your consultation which we received on 05 May 2023 about the above scoping report, and for allowing us extra time to respond. We have reviewed the details in terms of our historic environment interests. This covers world heritage sites, scheduled monuments and their settings, category A-listed buildings and their settings, inventory gardens and designed landscapes, inventory battlefields, historic marine protected areas (HMPAs), and undesignated offshore archaeological remains within the development area.</p>	<p>Noted. Further response not required</p>
	<p>We understand that the project will have a capacity of 3MW and comprise 1 wind turbine (with upper tip height of 134m), 1 floater to support the wind turbine (with a mooring radius of c. 600m around the floater centre), mooring and anchoring systems for the floating substructure and a single export cable (c. 2km) connecting the turbine to the existing Culzean platform via an existing J-tube on the platform. Regarding the mooring design for the floating substructure, we note from the scoping report that there is a high likelihood that dragging anchors would be used, but pin piling may be used as a contingency if an alternative anchor is required, and will be assessed as the worst-case option within the scoping assessment.</p>	<p>Noted - Maximum Design Scenario (MDS) used within the marine archaeology assessment is detailed in Section 15.6</p>
	<p>Our Interests We can confirm that the application area does not fall within any HMPAs and there is no designated heritage asset within or near to the application area. An obstruction (Canmore ID 322112) is located c. 1.2km to the southwest of the application area.</p>	<p>Noted. All obstructions have been identified within the baseline characterisation, see Figure 15-2.</p>

CONSULTEE	COMMENT	RESPONSE
	<p><u>Our Advice</u></p> <p>We are content with the principle of the development. Regarding the scope of assessment, we would like to highlight the importance for all areas which have potential to be subject to direct and indirect impacts to be assessed for impacts on the historic environment. This assessment should conform to the requirements in the Guide for Archaeological Requirements for Offshore Wind. Our detailed comments on the scoping report and proposed methodology are in the Annex to this letter.</p>	<p>The assessment presented in Chapter 15: Marine Archaeology conform to the requirements in the Guide for Archaeological Requirements for Offshore Wind, as detailed in Section 15.2.</p>
	<p>Further information</p> <p>Guidance about national policy can be found in our 'Managing Change in the Historic Environment' series available online at www.historicenvironment.scot/advice-and-support/planning-and-guidance/legislation-and-guidance/managing-change-in-the-historic-environment-guidance-notes. Technical advice is available on our Technical Conservation website at https://conservation.historic-scotland.gov.uk/.</p> <p>We hope this is helpful. Please contact us if you have any questions about this response. The officer managing this case is Adrian Lee and they can be contacted by phone on 07500 579626 or by email on adrian.lee@hes.scot.</p>	<p>Noted. Relevant guidance notes have been used when undertaking the assessment, see Section 15.2 for further information.</p>
	<p>Scope of assessment</p> <p>We understand from Chapter 3.2 that the EIA for this project is adopting a Design Envelope approach due to the innovative nature of the development and that some of the final design details are likely to be unknown at the time of application, such as the number of mooring / anchors and the systems used and the export cable parameters.</p> <p>The scoping report has stated that the Design Envelope approach will present the Maximum Design Scenarios for the project for which significant effects can be established for each impact pathway and receptor to allow meaningful</p>	<p>Noted - maximum design envelope provided for the assessment is provided in Section 15.6.</p> <p>Further response not required</p>

CONSULTEE	COMMENT	RESPONSE
	<p>assessments to be undertaken for the project, while retaining reasonable flexibility for future project design. We are content that this is an appropriate approach to the assessment for this project.</p>	
	<p>We understand that an application area has been indicated in Figure 3.1 (of the Scoping Report). However, it is unclear in the report whether impacts on designated or undesignated historic environment features due to any modifications required to the host installation (i.e. the Culzean platform) will be considered (Chapter 3.2 refers). It is important that all areas which have potential to be subject to direct and indirect impacts are assessed.</p>	<p>Selected Study Area for Marine Archaeology allows for the assessment of both direct and indirect impacts (see Section 15.9) as this comprises the extent of the Project plus a 2 Kilometre (km) buffer.</p>
	<p>We agreed that the desk-based sources to be examined for the EIA marine archaeology and cultural heritage baseline characterisation in Chapter 8.7.4 are appropriate. We note that the report has recommended in Table 8-20 to carry out an archaeological assessment of available marine geophysical survey datasets. We understand that these datasets will consist of 'as available' geophysical and geotechnical data collected specifically for the proposed development. Similarly, it is not clear if this survey coverage would include all areas where there is a potential risk of direct or indirect impacts on known or unknown cultural heritage assets. We recommend all areas where there is a potential risk of direct or indirect impacts, both within and outwith the proposal, are surveyed using techniques which will produce data appropriate for archaeological assessment. Guidance on this can be found here: guide-to-archaeological-requirementsfor-offshore-wind.pdf (thecrownestate.co.uk).</p>	<p>Where potential archaeological receptors were found all direct and indirect impacts have been assessed (Section 15.9) using appropriate assessment of the seabed geophysical data provided, which consists of Multibeam Echosounder (MBES), bathymetry, Side Scan Sonar (SSS) and, magnetometer. N.B. as the assessment of submerged prehistory receptors was scoped out (see below), geotechnical datasets did not need to be taken forward for review as part of the EIA baseline.</p>
	<p>Known and unknown marine archaeology and cultural heritage receptors The report has proposed in Table 8-21 to scope in direct impacts on these receptors during construction and decommissioning as well as operation and maintenance. The report has also proposed to scope in indirect disturbance to these receptors caused by anchoring and mooring systems during construction and decommissioning, and caused by additional cable protection used during</p>	<p>Details on the activities considered in the assessment of direct and indirect physical impacts are discussed in section 15.9</p>

CONSULTEE	COMMENT	RESPONSE
	<p>repair and maintenance in the operation and maintenance phases. We are content with this approach.</p>	
	<p>We welcome the applicant's finding that an area of debris consistent with a potential wreck was located c. 0.9 km south of the application area according to previous survey (Chapter 8.7.5 (p.213) refers). We would welcome further update on, and where necessary, assessment of any potential impact from the project on this potential wreck in the EIA Report.</p>	<p>The baseline characterisation for Marine Archaeology has been supplemented with the assessment of seabed geophysical survey data captured for the Project (see Section 15.5.2). The area assessed was based on the geophysical data coverage. The EIA process has considered these baseline receptors in full in this Chapter.</p>
	<p>Submerged prehistory receptors. HES agree that the report's proposal in Table 8-21 to scope out submerged prehistory receptors is appropriate, as the report has demonstrated that the potential for in-situ deposits in the relevant location is unlikely.</p>	<p>Noted. Further response not required</p>
	<p>Setting impacts. Given the distance to shore, we are content that onshore designated assets will not be affected by the proposal and impacts on their settings can therefore be scoped out.</p>	<p>Noted. Further response not required.</p>
	<p>Cumulative and transboundary impacts. We are content with the approach for assessing cumulative impacts on marine archaeology receptors as discussed in Chapter 8.7.8. Having considered the location of this project, we are also content with the scoping out of the potential transboundary impacts on the marine historic environment during the construction, operation and maintenance, and decommissioning phases of the project.</p>	<p>Noted. Transboundary impacts have been scoped out of the assessment as agreed. Cumulative impacts have been considered in full (see Section 15.11).</p>
	<p>Having considered the location of this project, we are also content with the scoping out of the potential transboundary impacts on the marine historic environment</p>	<p>Noted. Further response not required.</p>

CONSULTEE	COMMENT	RESPONSE
	<p>during the construction, operation and maintenance, and decommissioning phases of the project.</p> <p>Proposed Embedded Mitigation Measures</p> <p>We welcome the recommendation to embed appropriate mitigation into the scheme. The proposals to avoid known cultural heritage receptors through the implementation and monitoring of Archaeological Exclusion Zones (AEZs), and to include a Protocol for Archaeological Discoveries (PAD) in the project's embedded mitigation, are appropriate.</p> <p>We would also recommend a Written Scheme of Investigation (WSI) is produced and embedded in the scheme. This would form an umbrella document for all archaeological survey, investigation and assessment required during the project.</p>	<p>Noted. Embedded mitigation proposals comprising provisions for AEZs, PAD and WSI are developed in section 15.8.</p>

In line with the Scoping Opinion, aspects relevant to Marine Archaeology but scoped out of further assessment in this EIAR include:

- Transboundary Impacts
- Impacts on submerged prehistory receptors during construction and decommissioning;
- Impacts on setting of onshore designated assets during operation and maintenance; and
- Potential transboundary impacts on the marine historic environment during construction, operation and maintenance, and decommissioning.

15.4 Study Area

The Marine Archaeology Study Area (the Study Area) comprises the extent of the Project (Figure 4-1 of the Project Description), including the proposed floating Wind Turbine Generator (WTG) location and the proposed export cable route, plus a 2 km buffer around the Project boundary (Figure 15-1). This includes the geophysical study area which is defined by the extents of the SSS data.

The applied buffer allows for the assessment of potential direct and indirect effects of the Project on marine heritage receptors. This also allows for a greater understanding of the wider archaeological baseline environment, enabling any archaeological trends within the region to be recognised and to allow any marine heritage assets identified to be represented in a broader archaeological context.

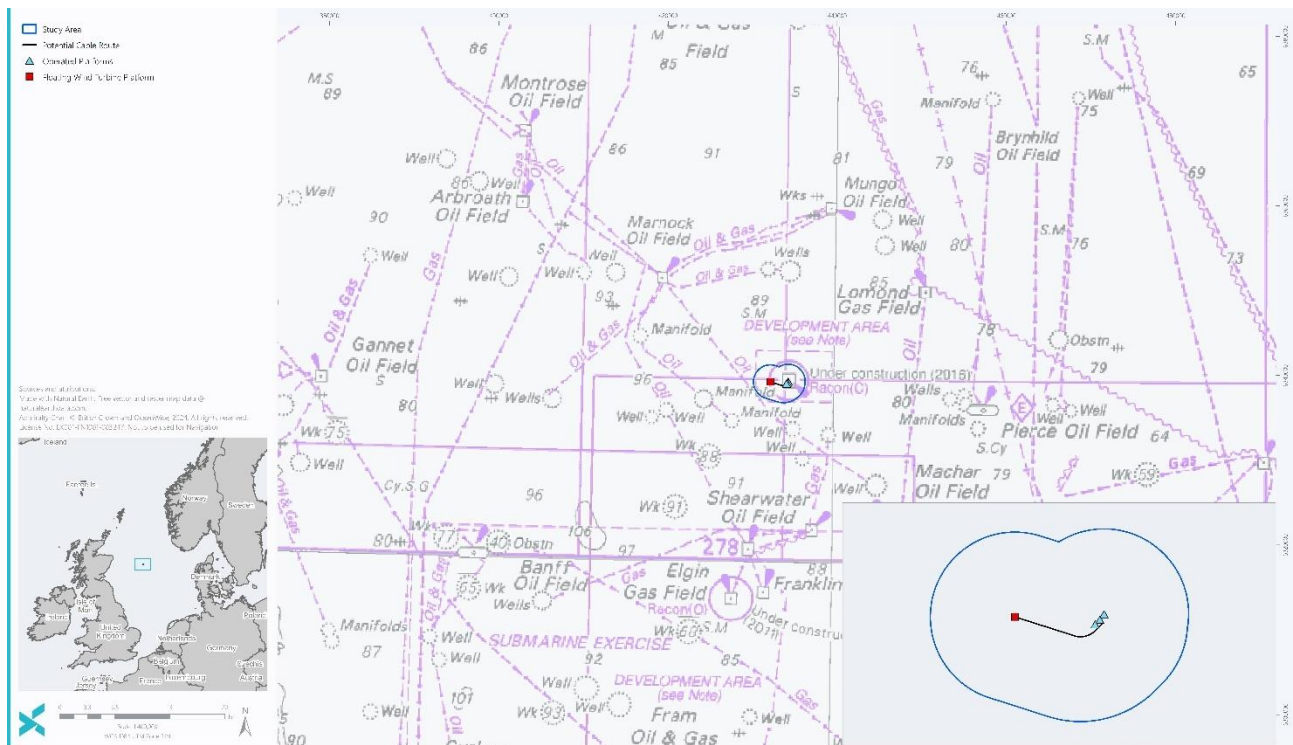


Figure 15-1 Marine Archaeology Study Area

15.5 Baseline environment

The detailed baseline resource of Marine Archaeology, which includes known wrecks and obstructions, identified geophysical receptors, and the potential for further maritime and aviation archaeological receptors is presented in Appendix K: Archaeological Assessment of Geophysical Data which contains the full gazetteer of anomalies and baseline context for this Chapter. The section below presents an overview of the baseline.

15.5.1 Data Sources

The existing data sets and literature with relevant coverage to the Study Area, which have been used to inform the baseline characterisation for Marine Archaeology are outlined in Table 15-3.

Due to the significant distance offshore, the United Kingdom Hydrographic Office (UKHO) wreck database is the primary source of data (Historic Environment Records (HER)) tend to be concentrated within 12 nautical miles (nm)). These were examined and cross-checked with any entries in the National Record of the Historic Environment (Canmore database) and adjacent Local Authority HER to assess known and potential marine cultural heritage assets.

Table 15-3 Summary of key datasets and reports

TITLE	SOURCE	YEAR	AUTHOR	
Chartered wrecks and obstructions database	UKHO	February updated undertaken 2024	2023, search January	UKHO
Database of recorded archaeological sites, find spots, and archaeological events	Canmore (https://canmore.org.uk/)	February updated undertaken 2024	2023, search January	The National Record of the Historic Environment of Scotland
Database of recorded archaeological sites, find spots, and archaeological events	Aberdeenshire, Moray, Angus & Aberdeen City Council HERs (https://online.aberdeenshire.gov.uk/smrpub/)	February records held at this location update not taken forward.	2023, no offshore, not taken	Aberdeenshire Council Archaeology Service (ACAS).

15.5.2 Project site-specific surveys

Several site-specific surveys have been completed across the Project. These include geophysical, geotechnical and environmental surveys.

The geophysical survey scope included the acquisition of MBES, SSS, magnetometer, Sub-Bottom Profiler (SBP) and Sparker data. The MBES, SSS and magnetometer data were acquired across the full extent of the Project, with the SBP and Sparker acquired as transects across the Project extent. The combination of the MBES and SSS, were used to capture the bathymetry, identify seabed features and variations in seabed sediment type. The SBP was used to map variations in the top 3 to 5 m of seabed sediment and shallow geology, while the lower frequency Sparker system was used for detailed geological mapping of the uppermost 50 m of the geological units. The outputs of the Project site-specific survey are summarised in Appendix J and this was used to directly inform the baseline characterisation and impact assessment presented within this EIAR.

An archaeological assessment of geophysical survey data, including MBES, SSS, and magnetometer data was undertaken to supplement the baseline characterisation for Marine Archaeology.

15.5.3 Existing baseline

A review of literature and available data sources, augmented by consultation and Project site-specific surveys has been undertaken to describe the current baseline environment for Marine Archaeology.

15.5.3.1 Seabed Features

There are currently no maritime or aviation sites within the Study Area that are subject to statutory protection.

Within the Study Area, two features were documented based on data from the UKHO and Canmore and, 55 from the archaeological assessment of the geophysical survey data. These are summarised as follows:

- 18 A2_h anomalies (anomaly of likely anthropogenic origin but of unknown date; may be of archaeological interest or a modern feature);
- 37 A2_l anomalies (anomaly of possible anthropogenic origin but interpretation is uncertain; may be anthropogenic or a natural feature);
- Two historic records (A3) of possible archaeological interest with no corresponding geophysical anomaly (70008, 70056);

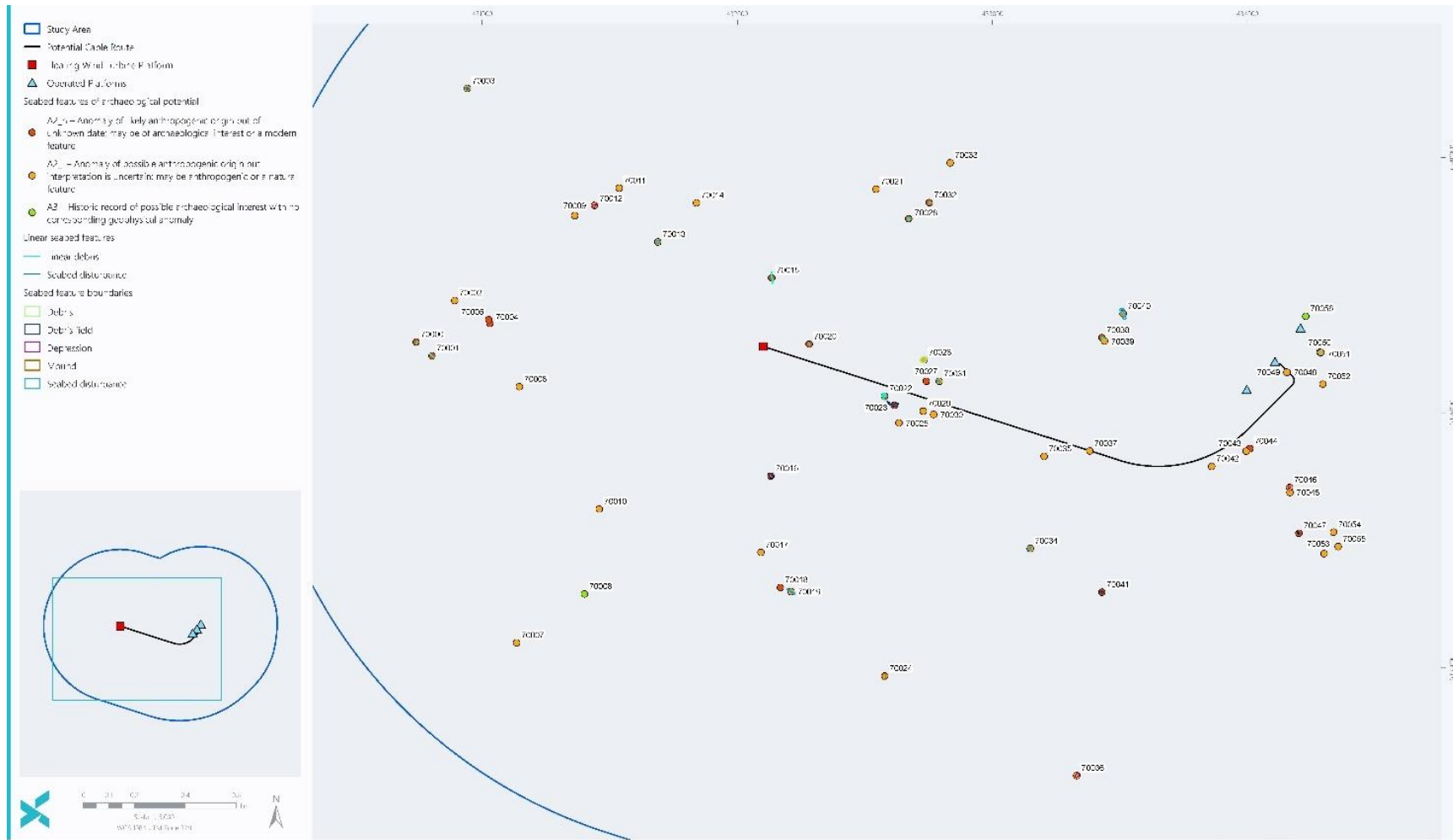


Figure 15-2 Seabed features of archaeological potential

In addition, there is potential for encountering:

- unknown shipwreck material; and
- 20th century aircraft material, particularly from the Second World War.

Full details can be found in section 3 of Appendix K to this EIAR and illustrated in Figures 2 and 3 of Appendix K.

15.5.3.2 Value and Sensitivity

The perceived value of an individual asset is generally assessed and assigned on a site-by-site basis. Those regarded as being of special interest may be designated under relevant legislation.

There is insufficient information to further assess the value of each individual unidentified anomaly identified in the geophysical assessment (A2_h and A2_l), all these additional anomalies are considered to have medium (A2_l) to high (A2_h) archaeological value until more information becomes available.

Baseline documentary sources identified two seabed obstructions (70008, 70056), discriminated as A3 anomalies (historic record of possible archaeological interest with no corresponding geophysical anomaly). These records are considered as having low archaeological value; obstruction 70008 was identified in 2022 and likely to form part of modern wreckage or a submerged feature, whilst foul ground 70056 has not been observed again since first detected in 1994.

As the value of potential shipwrecks cannot be evaluated until they are discovered, potential wrecks of all periods should be expected to be of high value, in accordance with the precautionary approach. Aircraft are considered to have significance for remembrance and commemoration, but also have an implicit heritage value as historic artefacts, providing information on the aircraft itself and also the circumstances of its use and loss (English Heritage (now Historic England), 2002, p. 2). In addition, all UK aircraft that crash while in military service are protected under the PoMRA, and therefore should be considered as designated sites until proven to be non-military. On this basis, all potential aircraft sites are of high value.

Derived artefacts are likely to be of limited archaeological value as individual discoveries. However, the occurrence of a number of seemingly isolated objects within a particular area has the potential to indicate shipping routes or maritime battlegrounds, or possibly even indicate the presence of a hitherto unknown wreck site. Isolated maritime finds are, therefore, regarded as being of medium archaeological value. Isolated aircraft finds are considered as being of medium archaeological value as they may provide insight into patterns of historical aviation across the Study Area or indicate the presence of uncharted aircraft crash sites.

15.5.4 Future Baseline

If undisturbed by the Project, there would be no change to the baseline conditions discussed above beyond those caused by natural physical processes, natural deterioration, as well as those associated with potential changes to the coastline or sediment processes caused by climate change.

Direct impact to the physical baseline resource may occur post-consent where mitigation measures are insufficient to protect the archaeological resource or are not established prior to interaction with the seabed occurring. However, Within the mooring line radius, the exclusion of trawling activities may assist the preservation of the potential features identified. There is less likelihood for indirect impact, as Chapter 7: Marine Physical Processes has concluded that the significance of the effects on the seabed bathymetry and sediment transport regime will be negligible.

When considered alongside other developments in the region, it is possible that the Project could have a cumulative impact on the current baseline resource.

15.5.5 Summary and key Issues

Table 15-4 Summary and key issues for Marine Archaeology

SUMMARY AND KEY ISSUES	PROJECT AREA
	57 seabed features of archaeological potential have been identified within the Study Area.
	The offshore location of the Project means that there is no interaction with the coast.

15.5.6 Data gaps and uncertainties

15.5.6.1 Historic Environment Records and Archives

The documentary sources used to compile this report consists of secondary information derived from a variety of sources, only some of which have been directly examined for the purposes of this assessment. The assumption is made that the data, as well as that derived from other secondary sources, are reasonably accurate.

The records held by the UKHO, Canmore, HER, and the other sources used in this assessment are not a record of all surviving cultural heritage assets, rather a record of the discovery of a wide range of archaeological and historical components of the marine historic environment. The information held within these datasets is not complete and does not preclude the subsequent discovery of further elements of the historic environment that are, at present, unknown. In particular, this relates to buried archaeological features.

The data supplied by the UKHO Canmore and HER were obtained in February 2023. The UKHO and Canmore data searches were refreshed in January 2024 (no data were held by the Aberdeenshire Council HER at this offshore location) and are considered current for the purposes of this baseline assessment and EIA process.

15.5.6.2 Geophysical Data

The Study Area considered for impact assessment is larger than the geophysical survey data extents leading to areas of the Study Area being without geophysical data coverage (Figure 15-1). However, the coverage of geophysical data includes the seabed area considered for direct and indirect impacts (e.g. considered for Chapter 7: Marine Physical Processes).

15.6 Key Parameters for Assessment

As detailed in Chapter 4: Project Description, this assessment considers a Project Design Envelope (PDE), which encompasses a MDS or a worst-case scenario. The MDS scenario represents, for any given receptor and potential impact on that receptor that would result in the greatest potential for change.

Given that the MDS is based on the design option (or combination of options) that represents the greatest potential for change, confidence can be held that development of any alternative options within the design parameters will give rise to no worse effects than assessed in this impact assessment. Table 15-5 presents the worst case scenario for potential impacts on Marine Archaeology during construction, operation and maintenance and decommissioning.

Table 15-5 Worst case scenario specific to Marine Archaeology receptor impact assessment

POTENTIAL IMPACT	WORST CASE SCENARIO	JUSTIFICATION
Construction		
<p>Loss or damage to known and unknown maritime and aviation receptors from direct impacts</p>	<p>Maximum number of WTGs: 1, supported by a floating (semi-submersible) substructure.</p> <p>Moorings: catenary system</p> <ul style="list-style-type: none"> • Maximum number of moorings is six per substructure / WTG; • Maximum length of each mooring line 600 m; • Maximum length of mooring that may come into contact with the seabed = 490 m per line; • Maximum mooring radius of each line is 610 m; • Maximum average lateral movement per line is estimated as 10 m (clump weights will be installed within this footprint); and • Maximum area of seabed where lateral movement of mooring line can occur based on 10 m corridor is 14, 700 m². 	<p>This covers the largest spatial area of impact associated with seabed activities including installation of the seabed anchors and substructure mooring line, export cable and any required scour protection measures.</p> <p>Any of the device designs, transmission cables and other infrastructure that impact the seabed have the potential to result in the damage / loss of known archaeological features and to unknown archaeological features, which may lie undiscovered on or below the surface or the seabed, if any are present. Similar effects may be expected from vessel anchoring systems that impact the seabed, or the removal of devices and other infrastructure in ways that disturb the seabed during decommissioning activities. Effects are considered to be permanent.</p> <p>Indirect impacts to known and potential maritime and aviation receptors could be caused by changes to the hydrodynamic and sedimentary regimes due to sediment redistribution during installation of anchors and cable, resulting in changes to sediment transport regimes.</p>
<p>Indirect disturbance to maritime and aviation receptors caused by anchoring and mooring systems</p>	<p>Anchors: drag anchors or plate anchors</p> <ul style="list-style-type: none"> • Worst case seabed disturbance and alteration is expected from drag anchors; • Up to six anchors per substructure / WTG (i.e. one per mooring line); • Maximum anchor size 11.2 m by 11.2 m by 6 m (length, width and height respectively) per anchor; • Maximum seabed footprint per anchor 125 m²; • Maximum scour protection footprint 70 m² per anchor; and 	

POTENTIAL IMPACT	WORST CASE SCENARIO	JUSTIFICATION
	<ul style="list-style-type: none">• Maximum scour protection height is 1 m. <p>Export Cable</p> <ul style="list-style-type: none">• A maximum of one export cable will be applied;• Maximum cable length is 2,500 m;• Maximum cable length in water column is 455 m;• Maximum cable length on seabed is 2,045 m;• Pre-installation works include pre-lay grapnel run (2 m wide along length of cable route);• Installation by means of either:<ul style="list-style-type: none">• pre-lay trenching using displacement plough; or• post-lay trenching using variety of tools including jet trenchers, mechanical trenchers, and non-displacement ploughs;• Maximum trench width 3 m and maximum trench depth 0.6 m; and• Where target burial depths are not reached, remedial cable protection will be required in the form of rock placement, concrete mattresses or sand / grout bags. Remedial cable protection height and width of 1 m and 7 m respectively. Total area of 7,000 m².	

POTENTIAL IMPACT	WORST CASE SCENARIO	JUSTIFICATION
Operation and maintenance		
<p>Loss or damage to known and unknown maritime and aviation receptors from direct impacts</p> <p>Indirect disturbance to maritime and aviation receptors caused by additional cable protection used during repair and maintenance</p>	<p>Permanent infrastructure including:</p> <ul style="list-style-type: none"> • Up to six anchors per substructure / WTG (i.e. one per mooring line); • Maximum scour protection footprint 70 m² per anchor; • Remedial cable protection in the form of rock placement, concrete mattresses or sand / grout bags. Remedial cable protection height and width of 1 m and 7 m respectively. Total area of 7,000 m². <p>Temporary infrastructure consisting of cable maintenance vessels to undertaken routine maintenance, unscheduled maintenance and any major component replacement / repair.</p>	<p>Any of the device designs, transmission cables and other infrastructure on the seabed or in the water column above that result in localised scouring have the potential to result in the damage / loss of known and unknown archaeological features lying on or below the seabed if such receptors are shown to be present.</p> <p>Maintenance vessel anchoring systems that impact the seabed, or the repeated removal and replacement of devices and other infrastructure in ways that disturb the seabed also have the potential to result in the damage / loss of any archaeological features lying on the seabed. Effects are considered to be permanent.</p> <p>Indirect impact to known and potential maritime and aviation receptors could also be caused by potential scour and plume effects resulting in increased protection to, or deterioration through erosion.</p>
Decommissioning		

The MDS for decommissioning will be the same or less than during construction.

15.7 Methodology for Assessment of Effects

An assessment of potential impacts is provided separately for the construction, operation and maintenance and decommissioning stages.

The assessment for Marine Archaeology is undertaken following the principles set out in Chapter 6: EIA Methodology.

The significance of potential effects has been evaluated using a systematic approach, based upon identification of the importance / value of receptors and their sensitivity to the project activity, together with the predicted magnitude of the impact.

The terms used to define receptor sensitivity and magnitude of impact are based on a range of sources, particularly Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (English Heritage (now Historic England) 2008) and Ships and Boats: Prehistory to Present – Designation Selection Guide (English Heritage (now Historic England) 2012), as there is currently no equivalent Scottish guidance available. These criteria have been adopted in order to implement a specific methodology for Marine Archaeology.

For each effect, the assessment identifies receptors sensitive to that effect and implements a systematic approach to understanding the impact pathways and the level of impacts on given receptors.

Receptor sensitivity is determined by considering a combination of value, tolerance, adaptability and recoverability. Cultural heritage and marine archaeology receptors cannot typically adapt, tolerate, or recover from physical impacts resulting in material damage or loss caused by development activities. Consequently, the sensitivity of each receptor is predominantly quantified only by its value. Within this EIAR, value is weighed by consideration of the potential for the receptor to demonstrate the following value criteria:

- Evidential value – deriving from the potential of a place to yield evidence about past human activity;
- Historical value – deriving from the ways in which past people, events and aspects of life can be connected through a place to the present. It tends to be illustrative or associative;
- Aesthetic value – deriving from the ways in which people draw sensory and intellectual stimulation from a place; and
- Communal value – deriving from the meanings of a place for the people who relate to it, or for whom it figures in their collective experience or memory. Communal values are closely bound up with historical (particularly associative) and aesthetic values but tend to have additional and specific aspects.

With regards to assessing the value of shipwrecks, the following criteria can also be used to assess a receptor in terms of its value (English Heritage (now Historic England) 2012):

- Period;
- Rarity;
- Documentation;
- Group value;
- Survival / condition; and
- Potential.

The definitions of receptor sensitivity for the purpose of the Marine Archaeology assessment are provided in Table 15-6

Table 15-6 Sensitivity criteria

SENSITIVITY RECEPTOR	OF DEFINITION
High	<ul style="list-style-type: none"> • Best known, only example or above average example and or significant or high potential to contribute to knowledge and understanding and/or outreach. Receptors with a demonstrable international or national dimension to their importance are likely to fall within this category; • Wrecked ships and aircraft that are protected under the PoMRA with an international dimension to their importance, plus as-yet undesignated sites that are demonstrably of equivalent archaeological value; and • Known submerged prehistoric sites and landscapes with the confirmed presence of largely in situ artefactual material or palaeogeographic features with demonstrable potential to include artefactual and/or palaeoenvironmental material, possibly as part of a prehistoric site or landscape.
Medium	<ul style="list-style-type: none"> • Average example and/or moderate potential to contribute to knowledge and understanding and/or outreach; • Includes wrecks of ships and aircraft that do not have statutory protection or equivalent significance, but have moderate potential based on a formal assessment of their importance in terms of build, use, loss, survival and investigation; and • Prehistoric deposits with moderate potential to contribute to an understanding of the palaeoenvironment.
Low	<ul style="list-style-type: none"> • Below average example and/or low potential to contribute to knowledge and understanding and/or outreach; • 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; and • Prehistoric deposits with low potential to contribute to an understanding of the palaeoenvironment.
Negligible	<ul style="list-style-type: none"> • Poor example and/or little or no potential to contribute to knowledge and understanding and/or outreach. Assets with little or no surviving archaeological interest.

The scale or magnitude of potential impacts (both beneficial and adverse) depends on the degree and extent to which the Project activities may change the environment, which usually varies according to project phase (i.e. construction, operation and maintenance and decommissioning).

Factors that have been considered to determine the magnitude of potential impacts include:

- Area of influence / spatial extent;
- Level of deviation from baseline conditions;

- Frequency of impact;
- Duration of impact; and
- Reversibility of impact.

The criteria for defining magnitude of impact for the purpose of the marine cultural heritage assessment are provided in Table 15-7.

Table 15-7 Magnitude criteria

MAGNITUDE CRITERIA	DEFINITION
High	<ul style="list-style-type: none"> • Impact occurs over a large spatial extent resulting in widespread, long term or permanent changes in baseline conditions or affecting a large proportion of the receptor. • The impact is very likely to occur and/or will occur at a high frequency or intensity.
Medium	<ul style="list-style-type: none"> • Impact occurs over a local to medium extent, with short to medium term change to baseline conditions or affecting a moderate proportion of the receptor. • The impact is likely to occur and/or will occur at a moderate frequency or intensity.
Low	<ul style="list-style-type: none"> • Impact is localised and temporary or short term, leading to detectable change in baseline conditions or noticeable effect on small proportion of the receptor. • The impact is unlikely to occur or may occur but at low frequency or intensity.
Negligible	<ul style="list-style-type: none"> • Impact is highly localised and short term with full rapid recovery expected to result in very slight or imperceptible changes to baseline conditions or the receptor. • The impact is very unlikely to occur and if it does will occur at very low frequency or intensity.

The consequence and significance of effect is then determined using the matrix provided in Chapter 6: EIA Methodology.

15.8 Embedded Mitigation

As described in Chapter 6: EIA Methodology, certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment, as presented in Table 15-8. These have been accounted for in the assessment presented below. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on Marine Archaeology receptors.

Table 15-8 Embedded mitigation measures relevant to Marine Archaeology

MITIGATION MEASURE	FORM (PRIMARY OR TERTIARY)	HOW MITIGATION WILL BE SECURED
<p>Micro-siting of WTG and associated offshore infrastructure including cable route</p>	<p>Primary</p>	<p>Secured within conditions attached to the Marine Licence. The final Project layout will be presented within the Cable Plan (CaP) and Development Specification Layout Plan (DSLPL) and conditions of the marine licence. The final placement of anchors and export cable will be informed through micro siting based on available site survey data to ensure avoidance of sensitive habitats, archaeological and other structures where possible. Where this is not possible, the route will take the shortest distance possible through the sensitive areas to reduce environmental effects.</p>
<p>WSI and Protocol for Archaeological Discoveries (PAD)</p>	<p>Primary</p>	<p>Secured within conditions attached to the Marine Licence. A WSI and PAD will be in place for any archaeological discoveries. This will include any recommended Archaeological Exclusion Zones (for example in relation to seabed preparation, installation activities and installed infrastructure) and a PAD for reporting and investigating unexpected archaeological discoveries encountered during installation activities, with a Retained Archaeologist providing guidance and advising industry staff on the implementation of the PAD. The PAD provides a mechanism to comply with the MSA 1995, including notification of the Receiver of Wreck, and accords with the Code of Practice for Seabed Developers (JNAPC, 2006). The PAD also makes provision for the implementation of temporary exclusion zones around areas of possible archaeological interest, for prompt archaeological advice, and, if necessary, for archaeological inspection of important features prior to further activities in the vicinity.</p>
<p>Archaeological Assessment of Marine Geophysical data for baseline enhancement</p>	<p>Tertiary</p>	<p>The archaeological assessment of available marine geophysical survey datasets has been undertaken in support of Primary mitigation measures listed here (Table 15-8).</p>

15.9 Assessment of Impacts

15.9.1 Potential effects during construction

15.9.1.1 Loss or damage to known and unknown maritime and aviation receptors from direct impacts

If direct impacts were to occur upon the marine archaeological receptors that have been identified in Section 15.5.3 of this chapter and any potential archaeology within the Study Area, these are most likely to occur during the construction phase of the Project. Impacts resulting in adverse effects upon archaeological assets as part of the construction phase are those involving contact with the seabed and/or the removal of seabed sediments. Marine archaeological receptors with height, such as shipwrecks, may also be impacted by activities that occur within the water column, including pre-installation activities and mooring / anchor / cable installation activities. Installation activities that may lead to direct physical impacts include:

- Seabed preparation activities (pre-lay grapnel run);
- Placement of catenary moorings, including their movement on the seabed;
- Anchor installation and presence;
- Placement of scour protection at anchors;
- Installation of export cable; and
- Placement of rock protection along the export cable.

Following the application of embedded mitigation, as outlined in Section 15.8 consisting of the implementation of AEZs around high value anomalies, direct impacts to known archaeological receptors would not occur. Unavoidable direct impacts to potential archaeological receptors, not yet identified, may occur at any point where development and related activities disturb the seafloor.

Receptor sensitivity

All seabed assets have the potential to be damaged or destroyed if they are directly impacted during the construction phase of the Project. Furthermore, all damage to archaeological sites or material is permanent and recovery is limited to stabilisation or re-burial so as to limit further impact. There is no potential for the recoverability of any seabed assets if they are affected following a direct impact. As such, all wrecks, aircraft, and associated material and debris should be regarded as having **high sensitivity**.

For all A2 anomalies, there is insufficient data to assess the value of each individual anomaly at this point. As such, all A2 anomalies must be considered to potentially have archaeological value, to a greater or lesser degree and, in accordance with the precautionary principle are considered as **medium** (A2_l) or **high** (A2_h) sensitivity assets.

For the two A3 anomalies, these have been ascribed as being of **medium sensitivity**, as their documentary record, but they are not observed in the archaeological assessment of geophysical data (7008, 7056).

Potential receptors on the seabed identified in the baseline that directly interact with the proposed development comprise three anomalies of low archaeological potential a small magnetic anomaly (70037), and two dark reflectors

– possibly natural features or non-ferrous debris (70048 and 70049) (Figure 15-2). These receptors are considered as **medium** sensitivity assets.

Magnitude of impact

All direct impacts to marine cultural heritage are permanent. Once archaeological deposits and material, and the relationships between deposits and material and their wider surroundings, have been damaged or disturbed it is not possible to reinstate or reverse those changes.

The application of embedded mitigation (implementation of AEZs and micro-siting of Project infrastructure) described in Section 15.8 means that all direct impacts to known maritime and aviation receptors would be avoided and therefore the magnitude of direct impacts on known receptors would be **negligible**.

Similarly, the application of embedded mitigation (including the implementation of a PAD) would mean that the magnitude of direct impacts on potential maritime and aviation receptors, and potential seabed features as part of construction activities, if they were to occur, would be **low**.

Evaluation of significance

Considering the medium to high sensitivity of marine archaeology receptors and low to negligible magnitude of impacts, the overall effect would result in **minor** to **negligible** significance of effect and therefore **not significant** in EIA terms.

Sensitivity	Magnitude of impact	Consequence
Medium to High	Low to Negligible	Minor to Negligible
Impact significance - NOT SIGNIFICANT		

15.9.1.2 Indirect disturbance to maritime and aviation receptors caused by anchoring and mooring systems

The indirect effects upon the known and potential marine archaeological assets considered here are those which occur as a result of changes to hydrodynamic and sediment transport regimes, where these changes have occurred as a consequence of activities and structures associated with the construction activities. These effects may occur subsequent to route preparation but may also occur through sediment dispersal / deposition or the placement of non-burial cable protection on the seabed. Construction activities that could potentially create indirect physical impacts include:

- Seabed preparation activities associated with installation of export cable, potentially resulting in changes to local hydrodynamics;
- Dispersal of suspended sediment (during placement of moorings, anchor installation and installation of export cable) potentially resulting in increased SSC and deposition; and

- Scour associated with the disturbance from construction activities and structures.

Receptor sensitivity

Indirect impacts may affect marine archaeological baseline conditions where they result in the increased exposure or burial of marine archaeological assets. The increased exposure of marine archaeological assets has the potential to cause erosion and deterioration to the assets. Conversely, should assets be subject to increased sedimentation and burial, they may, in turn, benefit from conditions which afford higher levels of preservation.

For all A2 anomalies, there is insufficient data to assess the value of each individual anomaly at this point. As such, all A2 anomalies must be considered to potentially have archaeological value, to a greater or lesser degree and, in accordance with the precautionary principle are considered as **medium** (A2_l) or **high** (A2_h) sensitivity assets.

For the two A3 anomalies, these have been ascribed as being of **medium sensitivity**, as their documentary record, but they are not observed in the archaeological assessment of geophysical data (7008, 7056).

Magnitude of impact

The magnitude of effect of indirect impacts to marine archaeological assets during construction is expected to be **low**.

Following an appraisal of the local hydrodynamic and SSC, Chapter 7: Marine Physical Processes concludes that the significance of the indirect effects on the local morphology and bedform features, and suspended sediments from pre-installation activities and installation activities will be **negligible**. This is because seabed disturbance will be temporary and highly localised. Furthermore, dispersal and deposition of suspended sediments will occur relatively rapidly, within a tidal cycle. Therefore, the impact is considered to be of **low** magnitude.

Evaluation of significance

Taking the high sensitivity of marine archaeology receptors and the assigned low to negligible magnitude of impact, the overall effect would result in **minor** to **negligible** significance of effect and therefore **not significant** in EIA terms.

Sensitivity	Magnitude of impact	Consequence
Medium to High	Low	Minor

Impact significance - NOT SIGNIFICANT

15.9.2 Potential effects during operations and maintenance

15.9.2.1 Loss or damage to known and unknown maritime and aviation receptors from direct impacts

Activities undertaken as part of operation and maintenance phase have the potential to impact marine archaeology directly and indirectly, located on or under the seabed, resulting in their loss or the disruption of relationships between receptors and their wider surroundings.

Operational effects will be limited to those arising from cable repair / replacement, cable protection repair / replacement, maintenance or any monitoring that may be required. Potential direct impacts on marine archaeology during operation of the Project may arise from:

- Re-burial of cables;
- Repair / replacement of cables;
- Placement of additional cable protection; and
- Anchors being used for any maintenance activities (although these are likely to be minimal).

Receptor sensitivity

Potential receptors on the seabed identified in the baseline that directly interact with the proposed development comprise three anomalies of low archaeological potential a small magnetic anomaly (70037), and two dark reflectors – possibly natural features or non-ferrous debris (70048 and 70049) (Figure 15-2). These receptors are considered as **medium** sensitivity assets.

Although the operation of the Project, and associated maintenance works, is anticipated to occur within areas already disturbed during the construction phase, seabed assets have the potential to be damaged or destroyed if they are directly impacted during the operation phase of the Project. Furthermore, all damage to archaeological sites or material is permanent and recovery is limited to stabilisation or re-burial so as to limit further impact. There is no potential for the recoverability of any seabed assets if they are affected following a direct impact. As such, all wrecks, aircraft, and associated material and debris should be regarded as having **high sensitivity**.

Magnitude of impact

As a result of the embedded mitigation measures, which remain applicable during both the construction phase and operation and maintenance phases (see Section 15.8), direct impacts to known archaeological receptors would not occur.

Unavoidable direct impacts to potential archaeological receptors may occur at any point where maintenance activities disturb the seafloor, and these would be permanent and irreversible. However, the application of embedded mitigation would result in a **low** magnitude of impact.

Evaluation of significance

Taking the high sensitivity of marine archaeology receptors and the assigned low to negligible magnitude of impact, the overall effect would result in **minor to negligible** significance of effect and therefore **not significant** in EIA terms.

Sensitivity	Magnitude of impact	Consequence
Medium to High	Low to Negligible	Minor to Negligible

Impact significance - NOT SIGNIFICANT

15.9.2.2 Indirect disturbance to maritime and aviation receptors caused by additional cable protection used during repair and maintenance.

The effects upon known and potential marine archaeological assets considered here are those which occur as a result of secondary scour from the associated protection measures. Such impacts cause effects which afford increased protection to, or deterioration of, archaeological receptors.

Receptor sensitivity

Indirect impacts may affect marine archaeological baseline conditions where they result in the increased exposure or burial of marine archaeological assets. The increased exposure of marine archaeological assets has the potential to cause erosion and deterioration to the assets. Conversely, should assets be subject to increased sedimentation and burial, they may, in turn, benefit from conditions which afford higher levels of preservation.

For all A2 anomalies, there is insufficient data to assess the value of each individual anomaly at this point. As such, all A2 anomalies must be considered to potentially have archaeological value, to a greater or lesser degree and, in accordance with the precautionary principle are considered as **medium** (A2_l) or **high** (A2_h) sensitivity assets.

For the two A3 anomalies, these have been ascribed as being of **medium sensitivity**, as their documentary record, but they are not observed in the archaeological assessment of geophysical data (7008, 7056).

Magnitude of impact

The magnitude of effect of indirect impacts to marine archaeological assets during construction is expected to be **negligible**.

Following an appraisal of scour properties, Chapter 7: Marine Physical Processes concludes that the potential for edge scour is considered to be unlikely. This is because there is low potential for scour formation, due to the application of scour protection around the anchors which would negate the potential for any scour development. Therefore, the impact is considered to be **negligible**.

Evaluation of significance

Taking the high sensitivity of marine archaeology receptors and the assigned negligible magnitude of impact, the overall effect would result in **negligible** significance of effect and therefore **not significant** in EIA terms.

Sensitivity	Magnitude of impact	Consequence
Medium to High	Negligible	Negligible

Impact significance - NOT SIGNIFICANT

15.9.3 Potential effects during decommissioning

In the absence of detailed information regarding decommissioning works, the impacts during the decommissioning of the Project are considered analogous with, or likely less than, those of the construction stage.

A Decommissioning Programme will be developed pre-construction to address the principal decommissioning measures for the Project and will be written in accordance with applicable guidance. The Decommissioning Programme will detail the environmental management, and schedule for decommissioning and will be reviewed and updated throughout the lifetime of the offshore Project to account for changing best practices.

The targeted scenario for decommissioning is a clear seabed. Given the nature of the decommissioning activities, which will largely be a reversal of the installation process, the impacts during decommissioning are expected to be similar to or less than those assessed for the construction stage. It should be noted that the decommissioning options for the Export Cable removal will be subject to comparative assessment of options at the end of the installation life. This will involve assessing the potential removal of artificial hard structures associated with the Project. Therefore, the magnitude of impacts assigned to Marine Archaeology receptors during the construction stage are also applicable to the decommissioning stage. It is also assumed that the receptor sensitivities will not materially change over the lifetime of the Project. Therefore, the decommissioning effects are not expected to exceed those assessed for construction.

15.9.4 Summary of potential effects

A summary of the outcomes of the assessment of potential effects from the construction, operation and maintenance and decommissioning of the Project is provided in Table 15-9.

No significant effects on Marine Archaeology receptors were identified. Therefore, no further mitigation measures are required beyond the Project embedded mitigation measures listed in Table 15-8 (Section 15.8).

Table 15-9 Summary of potential effects

POTENTIAL EFFECT	RECEPTOR	SENSITIVITY OF RECEPTOR	MAGNITUDE OF IMPACT	CONSEQUENCE (SIGNIFICANCE OF EFFECT)	SECONDARY MITIGATION REQUIREMENTS	RESIDUAL CONSEQUENCE (SIGNIFICANCE OF EFFECT)
Construction						
Direct disturbance to seabed causing damage to receptors	Known maritime and aviation receptors (A3s). Geophysical anomalies of possible anthropogenic origins (A2s). Currently unknown archaeological receptors.	Medium to High	Low to Negligible	Minor to Negligible (not significant)	None required above existing embedded mitigation measures.	N/A
Indirect disturbance to receptors caused by the changes to the hydrodynamic and SSC due to dispersal and deposition of suspended sediments	Known and potential maritime and aviation receptors	Medium to High	Low	Minor (not significant)	None required above existing embedded mitigation measures.	N/A

POTENTIAL EFFECT	RECEPTOR	SENSITIVITY RECEPTOR	OF	MAGNITUDE IMPACT	OF	CONSEQUENCE (SIGNIFICANCE EFFECT)	OF	SECONDARY MITIGATION REQUIREMENTS	RESIDUAL CONSEQUENCE (SIGNIFICANCE OF EFFECT)
Operation and maintenance									
Direct disturbance to previously not impacted seabed causing damage to receptors	Known and potential maritime and aviation receptors	Medium to High		Low to Negligible		Minor to Negligible (not significant)		None required above existing embedded mitigation measures.	Negligible (not significant)
Indirect disturbance to receptors caused by scour associated with protection measures applied to installation structures	Known and potential maritime and aviation receptors	Medium to High		Negligible		Negligible (not significant)		None required above existing embedded mitigation measures.	Negligible (not significant)
Decommissioning									

Potential effect of decommissioning would be the similar or less as construction phase if the Project was to be removed.

15.10 Proposed Monitoring

The assessment of impacts on Marine Archaeology receptors as a result of the construction, operation and maintenance and decommissioning phases of the Project are predicted to be not significant in EIA terms. Based on the predicted impacts it is concluded that no specific monitoring is required; however, in accordance with the PAD surveys undertaken for the Project will be subject to archaeological review, the outcomes of which will be reported to the relevant authority.

15.11 Cumulative Effects Assessment

Any potential impacts from the offshore Project could interact with impacts from other developments, plans and activities, resulting in a cumulative effect on Marine Archaeology receptors. The general approach to the cumulative effects' assessment is described in Chapter 6: EIA Methodology and further detail is provided below.

The Marine Archaeology Zone of Influence (Zoi) has been defined by a 10 km buffer around the Project. The Zoi is substantially larger than the Study Area extent to capture any potential buffer of impacts from other surrounding developments.

The closest offshore development to the Project will be the Central North Sea Electrification (CNSE) Project, located approximately 11 km from the proposed operations. Any potential impacts of the Project would be highly localised, occurring within the defined Study Area; therefore, there would be no overlap with other developments. Therefore, there is no pathway for effects to occur and no potential cumulative effects to assess.

15.12 Inter-Related Effects

Inter-relationships are defined as the interaction between the impacts assessed within different topic assessment chapters on a receptor. The other chapters and impacts related to the assessment of potential effects on Marine Archaeology are provided in Table 15-10.

Table 15-10 Marine Archaeology inter-relationships

CHAPTER	IMPACT	DESCRIPTION
Marine Physical Processes (Chapter 7)	Indirect impacts of suspended sediment dispersal and deposition and secondary scour on known and potential marine archaeological assets.	The impact pathway is characterised within the Marine Archaeology chapter 15.

15.13 Summary of Impacts and mitigation measures

No secondary mitigation, over and above the embedded mitigation measures proposed in section 15.8 is either required or proposed in relation to the potential effects of the Project on Marine Archaeology as no significant impacts are predicted.

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