Cambois Connection – Marine Scheme

Environmental Statement – Volume 2

ES Chapter 14: Marine Archaeology and Cultural Heritage

sse Renewables

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Acronyms

Acronym	Description
AEZ	Archaeological Exclusion Zone
BBWF	Berwick Bank Wind Farm
BGS	British Geological Survey
BNG	British National Grid
CIfA	Chartered Institute for Archaeologists
DBA	Desk-based Assessment
EEZ	Exclusive Economic Zone
EIA	Environment Impact Assessment
ES	Environment Statement
FO	Fibre Optic
HVDC	High Voltage Direct Current
MHWS	Mean High Water Springs
HDD	Horizontal Directional Drilling
HE	Historic England
HER	Historic Environment Record
HES	Historic Environment Scotland
HSC	Historic Seascape Character
MCAA	Marine and Coastal Access Act
MD-LOT	Marine Directorate Licensing Operations Team
MMO	Marine Management Organisation
MoD	Ministry of Defence
MPA	Marine Protected Area
MPS	Marine Policy Statement
NCC	Northumberland County Council
NERCZ	North East Rapid Coastal Zone Assessment
NPPF	National Planning Policy Framework
NRHE	National Record of the Historic Environment
PAD	Protocol for Archaeological Discoveries
PEIR	Preliminary Environment Impact Report

Acronym	Description
UKHO	United Kingdom Hydrographic Office
UXO	Unexploded Ordnance
WSI	Written Scheme of Investigation

Units

Unit	Description
km	kilometres
m	metres
nm	Nautical miles

14. Marine Archaeology and Cultural Heritage

14.1 Introduction

1. This chapter presents the assessment of the likely significant effects (as per the "Environmental Impact Assessment (EIA) Regulations"1) on the environment arising from the Cambois Connection (hereafter referred to as "the Project") Marine Scheme on marine archaeology and cultural heritage. Specifically, this chapter of the Environmental Statement (ES) considers the potential impacts of the Marine Scheme, seaward of Mean High Water Springs (MHWS), during the construction, operation and maintenance, and decommissioning phases.

2. This assessment is informed by the following technical chapters:

- Volume 2, Chapter 3: EIA Methodology;
- Volume 2, Chapter 4: Stakeholder Consultation and Engagement;
- Volume 2, Chapter 5: Project Description;
- Volume 2, Chapter 7: Offshore Physical Environment and Seabed Conditions;
- Volume 3, Appendix 14.1: Marine Archaeology Technical Report; and
- Volume 5, Appendix 14.2: Outline Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD).

14.2 Purpose of this Chapter

3. This chapter:

- Presents the existing environmental baseline established from desk studies, site-specific surveys and feedback obtained during technical engagement with stakeholders;
- Identifies any assumptions and limitations encountered in compiling the environmental information;
- Presents the potential impacts on marine archaeology and cultural heritage arising from the Marine Scheme alone and cumulatively with other projects, and reaches a conclusion on the likely significant effects on marine archaeology and cultural heritage based on the information gathered and the analysis and assessments undertaken;
- Identifies where impacts are relevant to the parts of the Marine Scheme in Scottish waters, English waters, or both. Where there is no separation of assessment of impacts, the assessment for the Marine Scheme (as a whole entity) applies to the Marine Scheme in both Scottish and English waters; and
- Highlights any necessary monitoring and/or mitigation measures recommended to prevent, minimise, reduce or offset the likely significant adverse effects of the Marine Scheme on marine archaeology and cultural heritage.

14.3 Study Area

4. The Marine Archaeology study area has been defined on the basis of the area over which potential direct and indirect effects of the Marine Scheme are predicted to occur on marine heritage receptors during the construction, operation and maintenance, and decommissioning phases.

[1] For the Marine Scheme, these are The Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended).

5. The Marine Archaeology study area comprises the Marine Scheme and a 500 m buffer in order to capture heritage receptors that may be close to, or partly within, the red line boundary (Volume 4, Figure 14.1). It should be noted that as Berwick Bank Wind Farm (BBWF) has been previously reported on (Berwick Bank Wind Farm Limited (BBWFL), 2022), including a marine geophysical data assessment, an additional 500 m buffer was therefore not required around that part of the Marine Scheme which overlaps BBWF array area.

14.4 Policy and Legislative Context

6. A summary of the main policy and legislative provisions relevant to marine archaeology and cultural heritage are provided in Table 14.1 and Table 14.2 below.

Table 14.1 Summary of legislation relevant to marine archaeology and cultural heritage

Relevant Legislation	Summary of Relevant Legislative Framework	How and Where Considered in the ES
England		
National Policy Statement (NPS)[2],[3]	Section 5.9 of EN-1 sets out the policy in relation to genetic historic environment impacts. Paragraphs 5.9.1 to 5.9.34 outline the considerations pertaining to designations, assessment approach within an EIA, mitigation and consideration of the decision makers in determining applications with regards to heritage assets.	The approach to the assessment of impacts upon the historic environment is in line with the policy outlined in EN-1.
	Paragraphs 2.6.137 to 2.6.146 of EN-3 set out policy in relation to historic environment impacts on offshore wind development, including considerations to the approach for assessment and implementation of mitigation.	The approach to the assessment of impacts upon the historic environment is in line with the policy outlined in EN-3.
Scotland and England (UK)		
Marine and Coastal Access Act 2009	This is the primary legislation relevant to marine development within UK waters. Under sections 49 and 50 of this Act the UK was divided into marine planning regions with an associated plan authority responsible for preparing a marine plan for that area. This enables for marine licensing, regulating and planning marine activities within UK waters. The MCAA provides that a marine licence is required for certain activities carried out within the marine environment. MD-LOT is responsible for marine licencing in Scottish waters and the MMO is	Marine Directorate Licensing Operations Team (MD-LOT) and the Marine Management Organisation (MMO) are the governing bodies responsible for licensing, regulating and planning marine activities (see Table 14.2 and Annex 2 of Volume 3, Appendix 14.1: Marine Archaeology Technical Report). An assessment of Marine Scheme activities during the construction, operation and maintenance, and decommissioning phases which have the potential to result in an effect to historic environment receptors (and

[2] Whilst it is acknowledged that neither BBWF nor the Marine Scheme comprise or form part of an NSIP (please see Volume 2: Chapter 2: Policy and Legislative Context), NPSs are however a statement of government intention relating, in this case, to renewable energy projects, therefore can be taken into consideration during the preparation of the Marine Scheme ES.

[3] A suite of draft revised Energy NPSs were published and consulted on by the UK Government in March 2023, and consultation closed on 23rd June. The consultation responses will be subject to consideration and the draft revised NPSs may now be revised before the NPSs are formally adopted. There is currently no date for the next stage of the review process and therefore this ES presents the current adopted NPSs which have been considered during the preparation of this ES. It is however noted by the Applicant that the new draft NPSs state that they may be material considerations in other applications which are not considered under the Planning Act (2008), this includes the Marine Scheme. Further detail on the consideration of the draft NPSs in this ES is provided in Volume 2 Chapter 2 Policy and Legislation.

Relevant Legislation	Summary of Relevant Legislative Framework	How and Where Considered in the ES
	responsible for marine licencing within English waters.	which therefore require consideration as part of the Marine Licence applications) are considered in section 14.12.
Protection of Wrecks Act 1973: Section One	Wrecks and wreckage assessed to be of historical, archaeological or artistic importance can be protected from unauthorised interference by way of site specific designation. It is an offence to carry out certain activities within a defined area surrounding a designated wreck, unless a licence for those activities has been obtained through Historic England.	There are no protected wrecks within the Marine Archaeology study area (section 14.7.1.2). The mitigation measures for the Marine Scheme have been designed to protect any marine archaeological receptors of interest (section 14.11).
Protection of Wrecks Act 1973: Section Two	An area surrounding wrecks may be designated as dangerous due to the contents or condition of the wreck. It is an offence to enter a prohibited area, unless authority is obtained – this is administered by the Maritime and Coastguard Agency through the Receiver of Wreck.	There are no protected wrecks within the Marine Archaeology study area (section 14.7.1.2). The mitigation measures for the Marine Scheme have been designed to protect any marine archaeological receptors of interest (section 14.11).
Ancient Monuments and Archaeological Areas Act 1979 (as amended)	Scheduled Monuments and Areas of Archaeological Importance (AAIs or their equivalent) are afforded statutory protection and the consent of Secretary of State (CMS), as advised by Historic England and Historic Environment Scotland, is required for any works. This Act is primarily used to protect terrestrial sites, but has also been used to protect underwater sites.	There are no Scheduled Monuments or designated Areas of Archaeological Importance within the Marine Archaeology study area (section 14.7).
Protection of Military Remains Act 1986	Under this Act, all aircraft that have crashed whilst in military service are automatically protected. Maritime vessels (e.g. ships and boats) lost during military service are not automatically protected, although the Ministry of Defence (MoD) has powers to protect any vessel that was in military service when lost. The MoD can designate wrecks whose position is known as 'controlled sites' and can designate named vessels whose location is unknown 'protected places'. It is not necessary to demonstrate the presence of human remains for wrecks to be designated as either 'controlled sites' or 'protected places'. The provisions of the Protection of Military Remains Act 1986 regarding Controlled Sites are applicable in international waters, though they are only enforceable with respect to British-controlled ships, British citizens and British companies.	There are no aircraft crash sites within the Marine Archaeology study area (section 14.7.1.4).
Merchant Shipping Act 1995	This Act sets out the procedures for claiming the ownership of 'wreck', defined as any flotsam, jetsam, derelict and lagan found in or on the shores of the sea or any tidal water. It includes ship, aircraft, hovercraft, parts of these, their cargo or equipment. If any person finds, or takes possession of, any wreck in, or brought within, UK waters, the salvor is required to give notice to the Receiver of Wreck that he/she has found or taken possession of it and, as directed by the Receiver, either hold it to	The mitigation measures for the Marine Scheme have been designed to protect any marine archaeological receptors of interest. Archaeological Exclusion Zones (AEZs) are recommended around historic records of archaeological material (section 14.11). Any discoveries of unexpected material will be reported through a Protocol of Archaeological Discoveries (PAD) and

Relevant Legislation	Summary of Relevant Legislative Framework	How and Where Considered in the ES
	the Receiver's order or deliver it to the Receiver, where the salvor is not the owner. Beyond the 12 NM limit, the Merchant Shipping Act 1995 covers wrecks found or taken into possession outside UK waters, and brought into UK waters.	reported to the Receiver of Wreck (section 14.11)

Table 14.2 Summary of policies relevant to marine archaeology and cultural heritage

Relevant Policy	Summary of Relevant Policy Framework	How and Where Considered in the ES
Scotland		
National Marine Plan (Marine Scotland 2015)	The National Marine Plan sets out a single framework for sustainable development within Scotland's marine area. General Policy 6 for the Historic Environment states, 'development and use of the marine environment should protect and, where appropriate, enhance heritage assets in a manner proportionate to their significance' and also notes the requirement for development proposals to provide 'information on the significance of known heritage assets and the potential for new discoveries to arise'. Proposals should demonstrate how any adverse impacts will be avoided, or, if not possible, minimised and mitigated. The Scottish Marine Regions Order 2015 identifies 11 Scottish Marine Regions for the purposes of regional marine planning and establishes their boundaries. The Marine Scheme falls out with the 12 nm and therefore is not covered by a marine plan.	This is relevant to the topic assessment as the ES will demonstrate that potential harm to heritage assets will be avoided, minimised or mitigated (section 14.12). A demonstration of how the Marine Scheme conforms with the Marine Plans of the UK Government and devolved governments is provided in Volume 3, Appendix 2.1: Marine Plan Conformance Checklist.
England		
National Planning Policy Framework (NPPF) 2012	The primary planning framework relevant to the Marine Scheme in England, whose core planning principle is to '[conserve heritage assets] in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of existing and future generations'.	The significance of offshore heritage asserts has been discussed in Volume 3, Appendix 14.1 Marine Archaeology Technical Report. This is relevant to the topic assessment as the ES will demonstrate that potential harm to heritage assets will be avoided, minimised or mitigated (section 14.12).
North East Offshore and Inshore Marine Plan Area (HM Government 2021)	This states (NE-HER-1) that where proposals may cause harm to the significance of heritage assets, proponents must demonstrate that they will, in order of preference: • avoid • minimise • mitigate any harm to the significance of heritage assets. If it is not possible to mitigate, then public benefits for proceeding with the proposal must outweigh the harm to the significance of heritage assets.	This chapter of the Marine Scheme ES demonstrates that potential harm to heritage assets will be avoided, minimised or mitigated (section 14.12).
Scotland and England (UK)		
UK Marine Policy Statement 2011	The statement is intended to facilitate and support the formulation of Marine Plans, ensuring that	Section 14.11 of this chapter outlines the mitigation measures needed to preserve any archaeological or historical assets.

Relevant Policy	Summary of Relevant Policy Framework	How and Where Considered in the ES
	marine resources are used in a sustainable way in line with high level marine objectives.	Avoidance will be achieved through the recommendation of AEZs. The AEZs have been designed to protect any marine archaeological receptors of interest. The minimisation and mitigation of impacts have been assessed for the construction, operation and maintenance and decommissioning phase in section 14.12. A demonstration of how the Marine Scheme conforms with the Marine Plans of the UK Government and devolved governments is provided in Volume 3, Appendix 2.1: Marine Plan Conformance Checklist.

14.5 Consultation and Technical Engagement

7. A summary of the key issues raised during consultation and technical engagement activities undertaken to date specific to marine archaeology and cultural heritage is presented in Table 14.3[4] below, together with how these issues have been considered in the production of this chapter. Further detail is presented within Volume 2, Chapter 4: Stakeholder Consultation and Engagement.

[4] Where scoping comments from stakeholders and consultees has been restated and/or paraphrased by the regulators within Scoping Opinions, this is only referenced with regards to MD-LOT and MMO Scoping Opinions, for brevity and to reduce duplication.

Table 14.3 Summary of key consultation and technical engagement undertaken for the Marine Scheme relevant to marine archaeology and cultural heritage

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
Relevant consultation and engagement undertaken to date			
24 January 2023	Historic Environment Scotland (HES) – consultation meeting	A discussion regarding the proposed approach to impact assessment for the historic environment was undertaken. It was acknowledged that the approach outlined by the Applicant in Scoping may be updated in light of Historic England's comments (please see below). Any change would be agreed with HES in writing.	Noted. It is recommended that the archaeological assessment of geophysical and geotechnical data for Scottish Waters is to be included in the WSI as a post-consent work package as well as further archaeological assessment of geophysical and geotechnical data in English waters. See section 14.11 for further information about the WSI.
03 February 2023	Historic England (HE) – consultation meeting	A discussion regarding the proposed approach to impact assessment for the historic environment was undertaken. HE provided specific recommendations with regards to the impact assessment and baseline compilation, including the incorporation of archaeological review of geophysical survey data across the Marine Scheme.	The archaeological assessment of geophysical data has been incorporated in the baseline for English waters. This includes a geoarchaeological assessment, informed by the archaeological assessment of sub-bottom profiler data. See Volume 3: Appendix 14.1 Marine Archaeology Technical Report.
28 April 2023	HE – update meeting	An update on progress was provided to HE, covering data audit, assessment of geophysical survey data, DBA assessment and walkover survey.	No issues were raised.
Consultation on the Marine Scheme: Scoping Opinion			
14 March 2023	MMO	In regard to Archaeology and cultural heritage the EIA Scoping Report produced for this proposed project is inadequate and the MMO disagree with the stated approach to produce and EIA chapter which is entirely a desk-based study.	Following consultation with relevant archaeology stakeholders, it was agreed that the desk-based assessment be supplemented by an archaeological assessment of geophysical and geotechnical survey data in English Waters. This assessment has been completed, see

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
			Volume 3: Appendix 14.1 Marine Archaeology Technical Report.
14 March 2023	MMO *HE*	Pre-Installation Surveys While we appreciate that the list of geophysical survey techniques is not limited to those identified, it is appropriate to highlight the importance of the inclusion of shallow seismic survey to inform the subsequent programme of geotechnical survey. In particular, how any such survey should be optimised to support Page 15 of 27 archaeological analysis. It is also noted that in this section no mention is made about analysis of those data by professional, accredited and experienced maritime archaeological consultants. This should be addressed in the ES.	Advice from appropriately qualified marine archaeologists, Wessex Archaeology who have undertaken the archaeological assessment and have authored this ES chapter and the Outline WSI, has been sought to inform data capture, assessment of datasets and recommended mitigation.
14 March 2023	MMO *HE*	Pre-Installation Actives In consideration of the techniques described for obstacle clearance and pre-sweeping etc., it is essential that detailed archaeological assessment is completed to optimise route selection within the spatially defined cable corridor. We are therefore very concerned about reference to removal of “other obstacles” without any attempt at qualification or procedures to be adopted if such obstacles are revealed to be of archaeological interest. In sub-section 3.4.2.2. of the scoping document (Pre-Sweep), mention is made about sand waves, we must add that adequate risk assessment is necessary to determine if archaeological sites could presently be concealed in such dynamic seabed features. These same comments are equally applicable to sub-section 3.4.3.1 (Cable Installation Methods).	The archaeological assessment of geophysical and geotechnical data has been incorporated within the baseline for English waters and developed within the outline WSI for the Marine Scheme.
14 March 2023	MMO *HE*	Pre-Installation Actives We find that we must question the approach advocated in sub-section 3.4.2.3 (UXO Clearance), whereby investigation and disposal of UXO should be included within the scope of the Marine Scheme. In general there appears to be a lack of appreciation that it is the purpose of an EIA Scoping Report to consider risk and likely significant effect. Through inclusion within the scope of the EIA, it is the function of the draft ES to acquire more precise information about UXO risk through desk-based sources of information for corroboration with directly acquired survey data to determine exact locations of UXO and thereby produce a “meaningful assessment”. We add that coordination must be prioritised	As detailed in Volume 2, Chapter 5: Project Description; UXO clearance is not anticipated, and this activity is not included in the Marine Scheme. As discussed and agreed with the MMO. As such UXO clearance has not been considered further as part of this ES. The rationale for this is included in full within Volume 2, Chapter 5: Project Description; in summary:

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
		between survey outputs, engineering studies and specialist archaeological analysis and interpretation; this important principle is alluded to in section 14.5.	• The exact locations of potential UXO / UXO are not currently known and will not be known until detailed design, as informed by UXO surveys along the route of the Marine Scheme; • The corridor for the Marine Scheme is approximately 1 km wide. A key reason for adopting this corridor is to provide the construction contractor(s) with flexibility to micro-route around potential UXO / UXO; • If at a later stage UXO clearance is required, it will be subject to a robust assessment at the time based on data regarding UXO to enable a meaningful assessment; and in the event that such an assessment is required, it will be subject to separate marine licensing requirements. Any potential for UXO will be reviewed by UXO specialists and assessed by appropriate consultants. Appropriate designed in mitigation measures including avoidance of known wrecks including military wrecks of HMS/M Unity by Archaeological Exclusion Zones have been recommended, including a WSI which will address the coordination between different themes (including UXO survey) that might encounter material of archaeological interest (please see section 14.11).

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14 March 2023	MMO *HE*	Section 14.2.2 National legislation This section outlines the national legislation that is relevant to the assessment of marine archaeology and cultural heritage receptors across the Marine Scheme. The MMO have noted that the Protection of Wrecks Act 1973 has not been included in this list. Given that the Landfall location for this cable is Cambois, Northumberland, the works will be taking place within the North East Inshore Marine Planning Area, as such, this legislation could be applied to any heritage assets discovered either through this project or separately. We would expect this legislation to be referred to in future submissions related to this project and for these works to be compliant with the legislation in question.	The Applicant apologies for this omission and can confirm that all relevant legislations, policies and guidelines have been included in section 14.4.
14 March 2023	MMO *HE*	14.3.1 Seabed Prehistory The MMO acknowledge the attention directed at the likelihood of encountering prehistoric features of interest in the proposed development corridor probably, which is probably of low potential due to the impacts of the last glaciation and the North Sea lobe (as described in sub-section 14.5.4). We appreciate that there is also a low likelihood of submerged peats, as at Low Hauxley. Therefore, in reference to Table 14-3 regarding impacts and suggested mitigations, we are prepared to accept the approach outlined in this table. Any monitoring scheme for the presence of buried landscapes should be set out in an archaeological Written Scheme of Investigation (WSI), so that should geotechnical survey campaigns encounter buried peats or other palaeoenvironmental material the appropriate sampling strategy is immediately enacted.	Appropriate mitigation measures have been recommended in section 14.11.
14 March 2023	MMO *HE*	Section 14.3.2 Maritime Archaeology The information provided in this section was not helpful as no attempt was made to explain whether any of the six identified vessels within the marine historic environment study area were located in the English marine planning area. The accompanying Figures 13-1 and 14-1 were of no particular help in clarifying this matter. The use of the term “maritime artefact” is also unhelpful as it is not defined in the Glossary. It is therefore important that in the production of a draft ES that use is made of established terms such as “heritage asset” as defined within the UK Marine Policy Statement (2011). The statement that “HMS/M Unity (1940) was the only maritime artefact which fell under the Protection of Military Remains Act 1986” lacks clarity. The text should be clear whether any of the	Section 14.7 describes the baseline within each jurisdiction. No sites were identified as having statutory protection within the refined Marine Archaeology study area considered for the ES, including with regards PMRA 1986. Military vessels such as HMS/M Unity have been included in the overarching mitigation strategy and are to be avoided.

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
		identified wrecks are designated under the Protection of Military Remains Act 1986 as either a Protected Place or a Controlled Site.	
14 March 2023	MMO *HE*	Section 14.3.3 Aviation Archaeology Insufficient consideration is given to whether there are losses of aircraft recorded within publicly accessible archives. Referral to aviation wrecks within the Newcastle International Airport is not relevant. This section quotes Marine (Scotland) Act 2010 it is therefore necessary for all equivalent statutes for England to be quoted.	Section 14.7 describes the baseline within each jurisdiction. Volume 3, Appendix 14.1: Marine Archaeology Technical Report provides full details of Recorded Losses. The Marine (Scotland) Act 2010 does not apply in the 12-200 nm zone, where the Scottish part of the Marine Scheme is located, and therefore is not relevant to the Marine Scheme. Relevant legislation is described in Table 14.1 applicable to each jurisdiction.
14 March 2023	MMO *HE*	Section 14.4 Key Data Sources It is important that you understand that Historic England's National Marine Heritage Record is relevant and applicable for heritage assets under consideration for statutory protection within the English Inshore Marine Planning Area. It is therefore essential that all other sources of information are used which are best obtained through the employment of a professional, accredited and experienced maritime archaeological consultant. Table 4-5 includes other cable projects between Scotland and England which will have produced archaeological studies that should inform this proposed project, in addition to any material produced for the proposed BBWF array area.	A full list of data sources has been provided in Table 14.4. Advice from appropriately qualified marine archaeologists has been sought to inform data capture, assessment of datasets and recommended mitigation.
14 March 2023	MMO *HE*	Section 14.5 Baseline Environment The first sentence lacks essential clarity. The text should state explicitly that any draft ES produced (the term "EIAR" is used without explanation) will employ professional, accredited and experienced maritime archaeological consultant(s) to corroborate desk-based sources of information with geophysical survey data acquired specifically for this proposed development. The text mentions "relevant archaeological points" including "seabed history"; without explanation. If you mean conducting Historic Seascape Characterisation, then this should be stated clearly. It is apparent that insufficient attention is given to understanding that the lack of defined spatial records for lost vessels or crashed aircraft does not	Advice from appropriately qualified marine archaeologists has been sought to inform data capture, assessment of datasets and recommended mitigation. The assessment has been drawn from a number of data sources available for each jurisdiction (Table 14.4). Section 14.7 describes the baseline within each jurisdiction. Volume 3, Appendix 14.1:

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		equate to actual absence. It is entirely likely that this project will encounter presently unknown heritage assets and therefore this risk must be factored into the EIA exercise and associated mitigation strategies for consultation with Historic England. A separate avoidance strategy should be prepared for any charted wrecks i.e. known wreck records, such as held by the UK Hydrographic Office. We note the attention given to applying Historic Environment Scotland Designation Policy and Selection Guidance 2019; it is of course, the case that this guidance is not relevant or applicable to any part of this proposed development that occurs within English Marine Planning Areas.	Marine Archaeology Technical Report provides full details of Recorded Losses. Relevant guidance is described in section 14.10.1 applicable to each jurisdiction.
14 March 2023	MMO *HE*	Section 14.5 Baseline Environment Historic sea defences are most likely to be at risk from cable installation and landing connection to terrestrial network. Although it is unlikely that these features are presently of nationally significance, they should be identified and located, so that they can be avoided if possible or a suitable mitigation strategy developed for recording them. The relevant local authority archaeological advice service is therefore an essential stakeholder in the preparation of any draft ES should this project proceed with an EIA.	As part of the baseline characterisation, an intertidal walkover survey was undertaken in May 2023. No additional features / sites of archaeological interest were observed (section 14.6.2).
14 March 2023	MMO *HE*	Section 14.5.1 Wrecks The text states that “There are marine cultural heritage statutory designations within the marine historic environment study area” however, this detail is not adequately explained or any inclusion within accompanying figures. The text also includes other significant errors demonstrating lack of familiarity with the subject matter. For example: 1. Military vessels lost while on military service are not automatically protected under the terms of The Protection of Military Remains Act 1986. 2. Vessels (e.g. merchant vessels) lost due to enemy action resulting in the death of crew onboard have no official status as “War Graves”. Table 14-1 only appears to identify charted wrecks within the marine archaeology and cultural heritage study area within the Scottish Marine Area. We therefore will defer to our colleagues at Historic Environment Scotland regarding the attempt made to attribute “importance” to any of these sites. In sufficient explanation is provided about the “unnamed non-dangerous” wrecks listed in Table 14-2, for example, if any are recorded within English Marine Planning Areas, We add that if any such sites do occur within English Marine	Section 14.7 describes the baseline within each jurisdiction. Volume 3, Appendix 14.1: Marine Archaeology Technical Report provides full details of baseline along with Recorded Losses.

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		Planning Areas that it is entirely possible that they could possess more "importance" than the sites listed in Table 14-1.	
14 March 2023	MMO *HE*	Section 14.5.3. Historic Minefields and Ordnance This section does not acknowledge that targets which could potentially be UXO might actually be other artefacts of archaeological interest (such as cannon or anchors) and could actually reveal the presence of shipwreck of considerable antiquity. It is for reasons like this that it is essential provision is put in place for coordination between UXO investigations and professional archaeological advice. We also take this opportunity to confirm the primacy of safety measures when dealing with UXO and consultation with Historic England to plan UXO surveys should afford the greatest efficiencies to all parties.	Appropriate mitigation measures have been recommended, including a WSI which will address the coordination between different themes (including UXO survey) that might encounter material of archaeological interest (see section 14.11). As noted above, and as detailed in Volume 2, Chapter 5: Project Description; UXO clearance is not anticipated, and this activity is not included in the Marine Scheme. As discussed and agreed with the MMO. As such UXO clearance has not been considered further as part of this ES. Any potential for UXO will be reviewed by UXO specialists and assessed by appropriate consultants. Appropriate designed in mitigation measures including avoidance of known wrecks including military wrecks of HMS/M Unity by Archaeological Exclusion Zones have been recommended, including a WSI which will address the coordination between different themes (including UXO survey) that might encounter material of archaeological interest (see section 14.11). Should UXO investigation be required consultation Historic England will be undertaken in advance of the surveys.

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14 March 2023	MMO *HE*	Section 14.6. Designed in Measures We do not concur that this project is at an "…early stage in the development of the Marine Scheme", by the very fact that this is a formal EIA Scoping Report consultation. It should therefore be entirely possible to provide an exhaustive and detailed list of topic specific mitigation. However, the mitigation measures alluded to such as a Written Scheme of Investigation (WSI) is presently misdirected at the installation phase of the Marine Scheme, should an EIA Scoping Opinion be forthcoming. In reference to the production of an archaeological WSI and Protocol for reporting Archaeological Discoveries (PAD) the entire focus for attention should be on the post-consent and pre-construction phase when higher resolution geophysical and geotechnical data are acquired to inform the design and planning of this project should consent be obtained. It is therefore essential that any draft WSI produced and supplied with a draft ES (or shadow PEIR) should adequately assess the risk of encountering presently unknown archaeological and historic sites as could be encountered prior to potentially damaging and destructive activities inclusive of: • pre-sweeping; • pre-lay grapnel run; • cable burial; and deployment of anchors for any required installation vessels.	The outline WSI provides recommendations for further archaeological assessment of data captured post-consent and pre-construction (via further geophysical/geotechnical survey data or UXO work packages) to enhance the baseline characterisation. See Volume 5, Appendix 14.2 Outline WSI and Protocol for Archaeological Discoveries.
14 March 2023	MMO *HE*	Section 14.7 Scoping of Potential Impacts We note the content of Table 14-3 which summarises the potential impacts for Marine Archaeology and Cultural Heritage that you will scope in or out of the EIA. Regarding the content of this table, we state the following qualifications: • "Impact" – Direct loss of or damage to known or unknown marine and intertidal historic environment assets arising from all works necessary to support cable installation. • "Information required to inform the Assessment: the following should be approach adopted" – Desk based assessment will utilise all existing data which is corroborated with direct access to all geophysical data acquired for this project. The analysis will be conducted by accredited, experienced and	Noted. Advice from appropriately qualified marine archaeologists has been sought to inform data capture, assessment of datasets and recommended mitigation.

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
		professional marine archaeological consultants that will produce technical reports to inform preparation of the Marine Archaeology and Cultural Heritage chapter and will be appended to the draft ES (or shadow PEIR) for consultation with local and national curatorial bodies in England. • "Assessment Method" – the desk-based assessment will consider the design scenario of two monopole systems of up to four cables installed in separate trenches alongside each other together with fibre optic (FO) and communications cables (as explained in section 3.4.3). The above text is directly applicable to the following items in Table 14-3: • Direct loss of or damage to presently known marine and intertidal historic environment assets arising from all works as required to support cable installation; • Indirect loss of or damage to known marine and intertidal historic environment assets arising from all works as required to support cable installation; • Direct loss of or damage to unknown marine and intertidal historic environment assets arising from all works as required to support cable installation; • Indirect loss of or damage to unknown marine and intertidal historic environment assets arising from all works as required to support cable installation; • Loss of or damage to in-situ submerged palaeoenvironmental sedimentary sequences and prehistoric landscape elements arising from all works as required to support cable installation.	
14 March 2023	MMO *HE*	Section 14.8 Potential Cumulative and Transboundary Impacts • The MMO concur with the statements made in this section vis. Cumulative Impact Assessment as summarised in Table 4-5. However, the general principle that the assessment will be made based on information in the public domain requires challenge. This assessment should look to directly access from other development projects all relevant and applicable	Noted. The assessment and CEA has been drawn from a number of data sources available for each jurisdiction (Table 14.4).

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
		information and data as relevant and applicable to the sustainable management of all aspects of the marine environment.	In particular, information drawn from BBWF development has been undertaken (please see section 14.14).
14 March 2023	MMO *HE*	Section 14.9. Proposed EIA Methodology We are not supportive of an approach to assessing impact to marine archaeology and cultural heritage receptors which is an "entirely desk-based study of existing data sources." You must demonstrate the stated commitment to "undertaking a more detailed geophysical and geotechnical survey" by directly confirming in response to this formal EIA Scoping Report consultation that you will commission professional, accredited and experienced marine archaeological consultants to corroborate all desk-based sources of information with geophysical and geotechnical data directly acquired for this proposed project. We require confirmation that all this work will be completed and subject to consultation with Historic England and the relevant local authority curatorial body through a draft ES prior to formal Marine Licence application.	Advice from appropriately qualified marine archaeologists has been sought to inform data capture, assessment of datasets and recommended mitigation. The archaeological assessment of geophysical data has been incorporated in the baseline. in English waters. This includes a geoarchaeological assessment, informed by the archaeological assessment of sub-bottom profiler data. See Volume 3: Appendix 14.1: Marine Archaeology Technical Report. Consultation with HE and HES has been undertaken, allowing for updates to be provided on progress of data audit, DBA assessment and walkover survey. However, noting that this application is not the subject of a DCO, no draft ES was submitted prior to formal MLA as was agreed with the MMO.
14 March 2023	MMO *HE*	Section 14.9. Proposed EIA Methodology While we appreciate the sentiment expressed whereby the assessment of impacts for marine archaeology and cultural heritage will be conducted in line with the process identified in Section 4. It is essential that the relevant legislation and policy is correctly applied to any area subject to English jurisdiction. Every effort must now be made to engage effectively to inform the design of this proposed development in a meaningful way through consultation with Historic England and the relevant local authority archaeological curatorial body for all elements of the proposed Marine Scheme that occur within local authority planning control.	All relevant legislations, policies and guidelines have been included (section 14.4). Stakeholder consultation with relevant bodies has also been undertaken as demonstrated within this table. Further information on wider consultation undertaken for the Marine Scheme is provided in Volume 2, Chapter 4: Stakeholder Consultation and Engagement.

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
23 February 2023	MD-LOT *HES*	The Scottish Ministers are content with regard to the study area and baseline information described by the Applicant at section 14.3 and 14.5 within the Scoping Report. At section 14.5.3 of the Scoping Report the Applicant has recognised the need to take account for the potential for historic unexploded ordnance and minefields to be present within the study area. The Scottish Ministers advise that consideration must also be given within the EIA Report to the potential presence of unexploded munitions as a result of more recent MOD activities. This view is supported by the MOD representation.	As noted above, and as detailed in Volume 2, Chapter 5: Project Description; UXO clearance is not anticipated, and this activity is not included in the Marine Scheme. As such UXO clearance has not been considered further as part of this ES. Noted. Any potential for UXO will be reviewed by UXO specialists and assessed by appropriate consultants. Appropriate designed in mitigation measures including avoidance of known wrecks including military wrecks of HMS/M Unity by Archaeological Exclusion Zones have been recommended, including a WSI which will address the coordination between different themes (including UXO survey) that might encounter material of archaeological interest (see section 14.11).
23 February 2023	MD-LOT *HES*	Within Table 14-3 of the Scoping Report, the Applicant details the potential impacts to be scoped in and scoped out of the EIA Report during the different phases of the Proposed Works. The Scottish Ministers are content with what has been identified to be scoped in and scoped out. The Scottish Ministers advise that given the relatively limited number of known marine historic environment assets within the study area of the Proposed Works and the commitment to pre-construction assessment, the proposal to undertake desk based assessments of existing data sources is sufficient for the purposes of the EIA Report. This view is supported by the HES representation.	Noted, particularly that the Scottish Ministers confirm approach to desk based assessment being sufficient at this stage. The archaeological review of available geophysical survey data has been completed for English waters. The approach for Scottish waters is to undertake a similar assessment post-consent, as agreed with HES.
23 February 2023	MD-LOT *HES*	With regards to the designed in measures the Scottish Ministers advise that the EIA Report must give an indication as to the size/scale of any potential implementation of exclusion zones to ensure these are of appropriate size with respect to mitigating the risk of undertaking a desk based assessment only for the purposes of the EIA Report.	Section 14.11 of this chapter outlines the mitigation measures needed to preserve any archaeological or historical assets. Avoidance will be achieved through the recommendation of AEZs. AEZs around the

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
			detectable extent of wrecks have been designed to protect any marine archaeological receptors of interest. Please refer to section 14.12.
23 February 2023	MD-LOT *Scottish Ministers* *HES*	The Scottish Ministers refer the Applicant further to the HES representation in this regard and furthermore, to the representation regarding the approach to be taken for the proposed Protocol for Archaeological Discoveries and Written Scheme of Investigation.	Section 14.11 of this chapter outlines the mitigation measures needed to preserve any archaeological or historical assets including provision for Protocols for Archaeological Discoveries to be employed across the Marine Scheme. The minimisation and mitigation of impacts have been assessed for each phase in section 14.12.
13 January 2023	HES	We are content for potential setting impacts from vessels engaged in installation/decommissioning and for the potential for setting impacts during operation/maintenance to be scoped out. We are also content for potential transboundary impacts to be scoped out of further assessment.	Noted. Setting impacts from vessels have not been assessed, and setting impacts from O&M have been scoped out. Transboundary impacts have also been scoped out.
13 January 2023	HES	Given the relatively limited number of known marine historic environment assets within the study area in Scottish territorial waters we are content with the proposal to undertake a desk-based assessment (DBA) only for the EIA and follow up with pre-construction surveys, particularly given the designed-in mitigation proposals.	The archaeological review of available geophysical survey data has been completed for English waters. The approach for Scottish waters is to undertake a similar assessment post-consent, as agreed with HES.
13 January 2023	HES	We can confirm that the proposed additional cable route is not likely to have any additional significant effects on the setting of terrestrial designated assets within our remit given the limited area within Scottish territorial waters and that the landfall is within England.	Noted.
19 December 2022	MoD	The MoD highlights Salvage and Marine Operations (SALMO) Team is responsible for the environmental and safety risks associated with Ministry of Defence (MOD)-owned shipwrecks. As such, I would like to draw the applicant's attention to the fact that some of the wrecks identified in the scoping area could	Noted. As above, Appropriate mitigation measures including avoidance of known wrecks (including HMS/M Unity) by Archaeological Exclusion Zones have been recommended, including a WSI which will address the coordination between different

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
		contain hazardous materials, primarily fuel oil and munitions, which should be considered during the EIA and subsequent work in the area.	themes (including UXO survey) that might encounter currently unknown material of archaeological interest (see section 14.11). Any potential for the presence of hazardous material will be reviewed and assessed by appropriate consultants. An EMP will be developed and employed to ensure potential release for pollutants will be reduced as far as practicable. This will include a Marine Pollution Contingency and Control Plan and an INNS management plan. An outline EMP has been provided as part of this application (Volume 5, Appendix 5.1) and will be updated for submission to MMO and MD-LOT prior to construction.

14.6 Methodology to Inform Baseline

8. The methodology follows the best practice professional guidance outlined by the Chartered Institute for Archaeologists' (CIfA) (2014, updated 2020). Full details can be found in Volume 3, Appendix 14.1: Marine Archaeology Technical Report.

14.6.1. Desktop Study

9. Information on marine archaeology and cultural heritage within the Marine Archaeology study area was collected through a detailed desktop review of existing studies and datasets. These are summarised in Table 14.4 below.

Table 14.4 Summary of key desktop studies & datasets

Title	Source	Year	Author
Scottish and English Waters			
Wreck and obstruction database	United Kingdom Hydrographic Office (UKHO); covering English and Scottish inshore waters	2023	UKHO
Admiralty Charts	UKHO	2023	UKHO
English waters			
National Record of the Historic Environment (NRHE)	HE; covering English inshore waters	2023	HE
National Heritage List for England	HE; covering English inshore waters	2023	HE
Northumberland County Council (NCC) HER	NCC; covering English inshore waters	2023	NCC
Historic Seascape Characterisation (HSC) North East Coast and East Yorkshire to Norfolk Area 1	https://landuse.co.uk/portfolio-items/national-historic-seascape-characterisation-consolidation/	2018	Land Use Consultants
The North East Rapid Coastal Zone Assessment (NERCZ)	https://archaeologydataservice.ac.uk/archives/view/nercza_eh_2009/	2009	Archaeological Research Services Ltd
Decommissioning of Blyth Offshore Wind Farm	Natural Power; covering English waters	2018	Natural Power on behalf of E.ON Climate and Renewables UK ltd.
North Sea Network Link HVDC Interconnector; Offshore Written Scheme of Investigation	Wessex Archaeology; covering English waters	2017	Wessex Archaeology on behalf of North Sea Link Ltd.
Scottish Waters			
Berwick Bank Wind Farm Offshore Environmental Impact Assessment - Marine Archaeology Technical Report	BBWFL; covering Scottish waters	2022	BBWFL, 2022a
Berwick Bank Wind Farm Offshore Environmental Impact Assessment; Appendix 22, Annex D: Outline Written Scheme of Investigation and Protocol for Archaeological Discoveries	BBWFL; covering Scottish waters	2022	BBWFL, 2022b
Canmore Historic Environment Records (HER)	HES; covering Scottish inshore waters	2023	HES

14.6.2. Site-specific Surveys

10. To inform the marine archaeology and cultural heritage chapter, site-specific surveys were undertaken.

11. For the parts of the Marine Scheme in Scottish Waters, specifically the BBWF array area, geophysical data (Magnetometer, Sidescan Sonar (SSS), Sub-Bottom profiler (SBP) and Multibeam Echosounder bathymetry (MBES)) was collected between August and October 2019 to inform the potential for submerged prehistoric archaeology and anomalies of potential anthropogenic origin. An archaeological assessment of the data was completed by the Applicant for the consent application of the BBWF (BBWFL, 2022a) whose results have been incorporated for this chapter.

12. For the parts of the Marine Scheme in English Waters, as agreed with HE, an archaeological intertidal walkover survey was undertaken on 16 May 2023 at the proposed Landfall location. This was undertaken by two archaeologists on an outgoing tide consisting of a visual inspection of the Marine Archaeology study area in order to identify and position known and unreported archaeological features with surface expression. The methodology applied and results are presented in Volume 3, Appendix 14.1 Marine Archaeology Technical Report.

13. In addition, marine geophysical and geotechnical surveys acquired by the Applicant have been archaeologically reviewed across the English Marine Scheme, including SBP, MBES bathymetry and backscatter. The methodology applied and results are presented in Volume 3, Appendix 14.1 Marine Archaeology Technical Report.

14.7 Baseline Environment

14.7.1. Overview of Baseline Environment

14. The following section provides a description of the baseline conditions for marine archaeology and cultural heritage. The baseline resource which includes known wrecks and obstructions, the potential for further maritime and aviation archaeological receptors, potential seabed prehistory and intertidal heritage receptors, is presented in Volume 3, Appendix 14.1: Marine Archaeology Technical Report.

15. The baseline conditions apply to the full extent of the Marine Scheme, with the exception of intertidal heritage receptors which are covered within the part of the Marine Scheme in English waters only.

16. For the extent of the Marine Archaeology study area that falls within Scottish waters, the baseline has drawn on the results presented in the BBWF Marine Archaeology Technical Report (BBWFL, 2022a).

17. The baseline is therefore informed by two technical reports, both of which are summarised in the sections below to provide a full overview of the Marine Archaeology study area baseline.

14.7.1.1. SEABED PREHISTORY

18. There are no known prehistoric receptors within the Marine Archaeology study area. However, the southern North Sea is known to contain relatively well preserved palaeolandscape features such as fluvial channels, created during periods of sea level lowstand but while the landscape was still free of ice. The remains of this terrestrial landscape are frequently recovered by dredging and fishing in numerous areas around the southern North Sea, generally in the form of the remains of extinct megafauna (e.g. mammoths, bison, horse etc.).

19. Reported finds from offshore activity have, to date, produced a range of early prehistoric lithic artefacts indicating early prehistoric activity in submerged palaeolandscapes from Lower, Middle, and Upper Palaeolithic periods (Tizzard, et al., 2014) with notable collections of more recent Mesolithic artefacts from submerged palaeolandscape contexts (Bicket and Tizzard, 2015).

20. It is noted in Wessex Archaeology (2015) that the coastal strip moving north to Northumberland is a key palaeogeographical zone, which not only links the onshore and offshore archaeological records, but also represents an area of merging routes through the southern North Sea basin into northern England and Scotland, during both the Later Upper Palaeolithic and the Mesolithic. It is also thought that larger valleys such as the Tweed may have served as routeways in and out of the North Sea Basin (Wessex Archaeology, 2015).

21. In general, on the basis of their age and rarity in a marine context, all *in situ* Palaeolithic and Mesolithic material are likely to be of high archaeological value and of national / international importance. Sites containing certain forms of Palaeolithic material are so rare in Great Britain that they should, whenever possible, remain undisturbed. In the event that prehistoric archaeological material is discovered *in situ* it should be considered of particularly high archaeological importance. As such, the features and deposits which have the potential to contain within them *in situ* material should be considered as high value assets.

22. Prehistoric archaeological material discovered within secondary contexts (e.g. redeposited sediments) also has the potential to provide valuable information on patterns of human land use and demography in a field of study which is still little understood and rapidly evolving. They are, however, by their very nature derived and, as such, isolated prehistoric finds should be regarded as medium value assets.

23. The palaeogeographic assessment for the Marine Scheme in English waters has identified a small number of features of archaeological interest, sporadically distributed across the Marine Scheme in English Waters (Volume 3, Appendix 14.1: Marine Archaeology Technical Report) (Volume 4, Figure 14.2).

14.7.1.1.1. English Offshore Waters

24. A buried, possible dune feature (**75000**) perhaps suggestive of a buried land surface overlying till, was identified from the archaeological assessment of geophysical survey data and characterised as being Not of anthropogenic origin (U1). In addition, two cut and fill features in the interpreted till surface (**75001**, **75002**) have also been reported and characterised as features of possible archaeological interest (P2) (Volume 4, Figure 14.2).

14.7.1.1.2. English Inshore Waters

25. A further possible cut and fill feature cut into interpreted till has been identified from the archaeological assessment of geophysical survey data, in English inshore waters (**75003**); of possible archaeological interest (P2).

14.7.1.2. SEABED FEATURES: MARITIME

26. There are no sites within the Marine Archaeology study area that are subject to statutory protection from the Protection of Wrecks Act 1973, the Protection of Military Remains Act 1986 or the Ancient Monuments and Archaeological Areas Act 1979; the three principal statues that could be used to protect marine archaeological sites.

14.7.1.2.1. Scottish Offshore Waters

27. Three known sites are located within the Scottish Exclusive Economic Zone (EEZ) (Volume 4, Figure 14.3A), consisting of the Swedish steamship *Oswin* (2004), one unknown wreck (2015) and a large piece of associated debris (2019).

28. Based on the desk based assessment and archaeological assessment of geophysical data for BBWF, there are 11 anomalies of high potential and 20 anomalies of medium potential in the BBWF array area (BBWFL, 2022a). All anomalies of high and medium potential within the BBWF array area have previously been proposed to be protected in Archaeological Exclusion Zones (AEZs) by the Applicant, as part of the consent application for BBWF (BBWFL, 2022b) (Volume 4, Figure 14.3A).

14.7.1.2.2. English Offshore Waters

29. Five documented sites are located within the English EEZ (Volume 4, Figure 14.3B-H), including the possible wreck of the British trawler *Acantha* (70056), three unknown wrecks (70022, 70039, 70074), and the loss position of British steamship *San Bernardo* (70072). These sites are regarded as being of high value.

30. In addition, a notable elongated mound (20.4 x 8.0 x 2.2 m) interpreted as a possible piece of debris was recorded in the archaeological assessment of geophysical data (70041) and has been characterised a high archaeological potential (A1 – anthropogenic origin of archaeological interest) (see Volume 3, Appendix 14.1: Marine Archaeology Technical Report for full details on archaeological characterisation methodology).

31. Furthermore, one feature (70040) a large elongate depression containing a possible internal mound, has been characterised as being of likely anthropogenic origin but of unknown date (A2_h).

32. Sixty-nine other anomalies have been characterised as possible archaeological interest, but interpretation is uncertain (A2_l); they may be anthropogenic or a natural feature.

14.7.1.2.3. English Inshore Waters

33. Ten known sites are located within English inshore waters (Volume 4, Figure 14.3I-K). These include the probable wreck of HMS *Unity* (70087), the British steamship *Svava* (70086), the possible steamship *Ragnhild* (70088), the British collier *Bangarth* (70089), a wreck site possibly of HMS *Herring* (70083), three obstructions (70091, 70102, 70103), possible debris (70085) and a rectangular timber with metal strip observed during seabed development in 2017 (70104). Generally, these sites are regarded as being of high value, however the HMS Unity is considered very high value.

34. Furthermore, three features (70105, 70106, 70108) comprise debris characterised as being of likely anthropogenic origin but of unknown date (A2_h).

35. Twenty other anomalies have been characterised as possible archaeological interest, but interpretation is uncertain (A2_l); they may be anthropogenic or a natural feature.

14.7.1.3. MARITIME RECORDED LOSSES

36. Recorded Losses can be considered as an indication of the potential for archaeological maritime remains to exist within the Marine Archaeology study area and the type and number of wrecks that could be present. These records relate to vessels reportedly lost or for which no physical wreck remains have ever been identified. Table 14.5 below shows the distribution of these documented losses according to the date of loss for those records whose position fall within the Marine Archaeology study area. Details regarding these losses are presented in Volume 3, Appendix 14.1: Marine Archaeology Technical Report.

Table 14.5 Summary of recorded losses by period

Period	Number of records of ships within Scottish waters	Number of records of ships within English inshore waters
Post-medieval	1	-
19th century	2	10
Modern	5	4
Unknown	1	1
Total	**9**	**15**

14.7.1.4. SEABED FEATURES: AVIATION

37. There are no known aircraft crash sites located within the Marine Archaeology study area. Nonetheless, there is the potential for aircraft or aircraft-related debris to exist on the seafloor. Given the identified potential of the Marine Archaeology study area for military aircraft crashes (Wessex Archaeology, 2008a), particularly relating to the Second World War, the likelihood would be for any aircraft crash to be of military origin, which would be protected under Protection of Military Remains Act 1986 and therefore would be of very high value. This applies to the fabric of the aircraft and applies to both complete aircraft wrecks and debris scatters.

14.7.1.5. INTERTIDAL ARCHAEOLOGICAL RECEPTORS

38. There is one known site within the intertidal zone located within the part of the Marine Scheme in English waters (Volume 4, Figure 14.4). The site (WA1003) consists of a Second World War trench

located on Cambois Beach. However, according to HER record, this has since been demolished. This trench is considered to have low value.

39. During the intertidal walkover survey, no additional sites or features of archaeological interest were observed (Volume 4, Figure 14.4).

40. There is the potential for further unknown heritage assets to be located within the intertidal zone of the Marine Archaeology study area. These assets may be of a maritime nature, relating to coastal infrastructure, or may represent individual finds. Potential unknown receptors are considered to have high value.

14.7.1.6. SUMMARY OF BASELINE AND KEY RECEPTORS FOR ASSESSMENT

41. Table 14.6 provides a summary of the key marine archaeology and cultural heritage themes and their location with respect to the Marine Scheme in Scottish waters and in English waters, including for each scheme the 500 m buffer of the Marine Archaeology study area added around the Marine Scheme (refer to section 14.3).

Table 14.6 Summary and key receptors for marine archaeology and cultural heritage

Receptor	Location of Marine Scheme	
	Scottish waters	English waters
Known wrecks and obstructions	✓	✓
Potential maritime and aviation archaeology receptors	✓	✓
Potential seabed prehistory	✓	✓
Intertidal heritage receptors	X	✓

14.7.2. Future Baseline Scenario

42. In the absence of the Marine Scheme there would be no change to known and potential marine heritage receptors beyond those caused by natural physical processes and natural deterioration. Physical effects to marine receptors are considered below in terms of likely impacts and effects.

43. Any changes that may occur during the design life span of the Marine Scheme should be considered in the context of both greater variability and sustained trends occurring on national and international scales in the marine environment.

14.7.3. Data Assumptions and Limitations

44. The assessment has been undertaken based on the following assumptions:

- Data used to compile this chapter comprises elements 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 secondary data, as well as that derived from other secondary sources, are reasonably accurate;
- The records held by the UKHO, NRHE, 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 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 quality of the SBP data has been rated as ‘Average’ (see Volume 3, Appendix 14.1: Marine Archaeology Technical Report for full criteria). The data are affected by weather noise and shallow sea state in the inshore areas to some degree, meaning the subtle change between

shallower reflectors is not always clear. Penetration varies across the lines between 6 m to 10 m, meaning the full extents of deeper features may not be visible on some lines;

- The MBES data were rated as 'Below Average'. The data have been affected by pitch and roll to a significant degree with the nadir clearly visible, causing multiple data artefacts being present in the data, which may be mistaken for, or obscure the interpretation of, 'real' features present on the seabed. The resolution of 1 m across most of the site allows for archaeological assessment of objects and debris over 1 m in size. The resolution of 0.5 m in the nearshore (L16) section allows for archaeological assessment of objects and debris over 0.5 m in size;
- The Backscatter data were rated as 'Below Average'. The data have been affected by pitch and roll to a significant degree with the nadir clearly visible, causing multiple data artefacts being present in the data, which may be mistaken for, or obscure the interpretation of, 'real' features present on the seabed. The resolution of 1 m across most of the site allows for archaeological assessment of objects and debris over 1 m in size. The resolution of 0.5 m in the nearshore (L16) section allows for archaeological assessment of objects and debris over 0.5 m in size;
- The grouping and discrimination of information at this stage is based on all available information and is not definitive. It allows for all features of potential archaeological interest to be highlighted, while retaining all the information produced during the course of the geophysical interpretation and desk-based assessment for further evaluation should more information become available;
- A limitation of the data used for this assessment is the absence of acquired sidescan sonar data which would provide more accurate height information. As such, all dimensions provided in the results section, especially the height readings, should be considered a minimum, which is a robust and precautionary approach. Sidescan sonar data also provides more detailed representation of features which allows for easier interpretation and discernment as to whether features are likely to be natural or anthropogenic in origin; and
- The presence of ferrous material, more likely to be anthropogenic in origin, cannot be determined in the absence of magnetometer data. This means that there is potential for any potential ferrous debris to be buried or have little surface expression across the study area.

45. Despite the limitations in the geophysical survey data, sufficient data is available to allow for characterisation of the baseline and to inform the impact assessment. It should also be noted that the Applicant will be undertaking pre-construction surveys (for example, geophysical and geotechnical). A Retained Archaeologist (RA) will provide input to specifications for these surveys, conduct an archaeological analysis of the outputs from the surveys, and will provide advice regarding any archaeological finds which may occur during construction. All finds will be subject to archaeological input, review, recording and sampling.

14.8 Scope of the Assessment

14.8.1. Impacts Scoped into the Assessment

46. The following impact pathways have been scoped into the assessment for the construction, operation and maintenance and decommissioning phases[5], as agreed through the Scoping process and follow up consultation with stakeholders and consultees:

- Direct loss of or damage to known and unknown marine and intertidal historic environment assets[6] arising from construction and decommissioning (C, D);

[5] C = Construction, O&M = Operation and maintenance, D = Decommissioning

[6] Including submerged pre-historic landscapes

- Indirect loss of or damage to known and unknown marine and intertidal historic environment assets[6] arising from construction and decommissioning (C, D);
- Direct loss of or damage to known and potential marine cultural heritage receptors from Offshore Export Cable repair and maintenance (O&M); and
- Indirect loss of or damage to known and potential marine cultural heritage receptors from changes in local scouring and sedimentation patterns (O&M).

14.8.2. Impacts Scoped Out of the Assessment

47. Impacts scoped out of the assessment were agreed with key stakeholders through consultation following receipt of the Scoping Opinion from the Marine Directorate Licensing Operations Team (MD-LOT) and the MMO in February and March 2023 respectively. These are summarised below for completeness:

- Potential impacts on the setting of heritage assets from the presence of vessels (C & D);
- Long-term changes to the setting of historic environment assets arising from the presence of the Offshore Export Cable (O&M); and
- Transboundary Effects. (C, O&M, D).

14.9 Key Parameters for Assessment

14.9.1. Maximum Design Scenario

48. The maximum design scenario(s) summarised here have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. These scenarios have been selected from the details provided in the Volume 2, Chapter 5: Project Description. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the PDE (e.g. different infrastructure layout), to that assessed here, be taken forward in the final design scheme.

49. Given that the maximum design scenario 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 14.7 presents the maximum design scenario for potential impacts on marine archaeology and cultural heritage during construction, operation and maintenance, and decommissioning.

50. Site preparation works, in advance of construction, are predicted to commence in Q4 of 2026 and will continue until all installation activities have ceased. Landfall construction is expected to occur between Q4 of 2027 until Q4 of 2028. Export cable installation is expected to begin in Q3 2028 and is expected to last until Q4 of 2029. All activities associated with the Marine Scheme are predicted to conclude by the end of 2029. Until detailed design of the Marine Scheme is progressed and further refined pre-construction, this programme for the Marine Scheme as a whole is indicative and is subject to further refinement, but is used to inform assessment of construction phase impacts for the Marine Scheme

Table 14.7 Maximum design scenario specific to marine archaeology and cultural heritage impact assessment

Potential Impact	Maximum Design Scenario (Marine Scheme whole)	Maximum Design Scenario – Marine Scheme in Scottish waters and in English waters	Justification
Construction and Decommissioning			

Direct loss of or damage to known marine and intertidal historic environment assets arising from construction and decommissioning.
 	
Direct loss of or damage to unknown marine and intertidal historic environment assets arising from construction and decommissioning.
 	
Loss or damage to submerged prehistoric landscapes arising from construction and decommissioning.
	Direct disturbance to potential seabed prehistory receptors, known and recorded maritime and aviation receptors, and unknown archaeological sites and artefacts from:
	
	• Site preparation activities, including pre-construction surveys;
	• Route preparation activities including: Pre-lay grapnel run; boulder clearance; seabed levelling; sea trials (as required); pre-sweep; and pre-installation trenching through harder sediment;
	• Seabed levelling may be conducted to a width of 25 m, average height 5 m and clearance along approximately 20% of the Marine Scheme length (3.6 km^2);
	• Crossing preparation activities;
	• Construction activities, including cable laying and burial, and cable protection measures:
	  ○ Offshore Export Cable Corridor length: up to 180 km;
	  ○ Offshore Export Cable Corridor width: up to 1 km;
	  ○ Maximum of 4 trenches for 4 Offshore Export Cables;
	  ○ Maximum burial depths of 3 m and maximum width of 2.5 m;
	  ○ Cable construction methods include plough, jetting machines, mechanical trenchers and Mass Flow Excavation;
		Marine Scheme (Scottish waters):
		
		Direct disturbance to potential seabed prehistory receptors, known and recorded maritime and aviation receptors, and unknown archaeological sites and artefacts from:
		
		• Site preparation activities, including pre-construction surveys;
		• Route preparation activities including: Pre-lay grapnel run; boulder clearance; seabed levelling; sea trials (as required); pre-sweep; and pre-installation trenching through harder sediment;
		• Seabed levelling may be conducted to a width of 25 m, average height 5 m and clearance along approximately 20% of the Marine Scheme length (0.8 km^2);
		• Construction activities, including cable laying and burial, and cable protection measures:
		  ○ Offshore Export Cable Corridor length: up to 40 km;
		  ○ Offshore Export Cable Corridor width: up to 1 km;
		  ○ Maximum of 4 trenches for 4 Offshore Export Cables;
		  ○ Maximum burial depths of 3 m and maximum width of 2.5 m;
		  ○ Cable construction methods include plough, jetting machines,
			Direct physical impacts relate to seabed preparation, construction of cables and decommissioning. This will form the worst case as this represents the greatest area of impact. Any other scenarios resulting in a lower level of disturbance would not introduce new or different impacts and would not result in an effect of greater significance.

Potential Impact	Maximum Design Scenario (Marine Scheme whole)	Maximum Design Scenario – Marine Scheme in Scottish waters and in English waters	Justification
	○ Cable protection materials, including rock construction, rock bags, concrete mattress, cast iron cast and CPS systems; • Construction at Landfall, consisting of trenchless techniques and exit pits; • Vessel usage associated with construction and decommissioning; and • Total width of temporary seabed disturbance is up to 25 wide per Offshore Export Cable, resulting in an overall footprint of disturbance of 18 km^2.	mechanical trenchers and Mass Flow Excavation; ○ Cable protection materials, including rock construction, rock bags, concrete mattress, cast iron cast and CPS systems; and • Vessel usage associated with construction and decommissioning; and • Total width of temporary seabed disturbance is up to 25 wide per Offshore Export Cable, resulting in an overall footprint of disturbance of 4 km^2. **Marine Scheme (English waters):** Direct disturbance to potential seabed prehistory receptors, known and recorded maritime and aviation receptors, and unknown archaeological sites and artefacts from: • Site preparation activities, including pre-construction surveys; • Route preparation activities including: Pre-lay grapnel run; boulder clearance; seabed levelling; sea trials (as required); pre-sweep; and pre-installation trenching through harder sediment; • Sand waves may be cleared to a width of 25 m, average height 5 m and clearance along approximately 20% of the Marine Scheme length (2.8 km^2). • Crossing preparation activities; • Construction activities, including cable laying and burial, and cable protection measures: ○ Offshore Export Cable Corridor length up to 140 km;	

Potential Impact	Maximum Design Scenario (Marine Scheme whole)	Maximum Design Scenario – Marine Scheme in Scottish waters and in English waters	Justification
		○ Offshore Export Cable Corridor width: up to 1 km; ○ Maximum of 4 trenches for 4 Offshore Export Cables; ○ Maximum burial depths of 3 m and maximum width of 2.5 m; ○ Cable construction methods include plough, jetting machines, mechanical trenchers and Mass Flow Excavation; ○ Cable protection materials, including rock construction, rock bags, concrete mattress, cast iron cast and CPS systems; • Construction at Landfall, consisting of trenchless techniques and exit pits; • Vessel usage associated with construction and decommissioning; and • Total width of temporary seabed disturbance is up to 25 wide per Offshore Export Cable, resulting in an overall footprint of disturbance of 14 km^2.	
Indirect loss of or damage to known marine historic environment assets arising from construction and decommissioning. Indirect loss of or damage to unknown marine historic environment assets arising from construction and decommissioning.	Indirect disturbance to potential seabed prehistory receptors, maritime and aviation receptors, caused by changes to the hydrodynamic and sedimentary regimes due to sediment redistribution.	**Marine Scheme (Scottish waters):** The MDS in Scottish waters is the same as that for the Marine Scheme as a whole. **Marine Scheme (English waters):** The MDS in English waters is the same as that for the Marine Scheme as a whole.	Indirect physical impacts relate to changes to the hydrodynamic and sedimentary regimes due to spoil removal and sediment redistribution from seabed preparation and construction/decommissioning of cables. This will form the worst case as this represents the greatest area of impact. Any other scenarios resulting in a lower level of disturbance would not introduce new or different

Potential Impact	Maximum Design Scenario (Marine Scheme whole)	Maximum Design Scenario – Marine Scheme in Scottish waters and in English waters	Justification
			impacts and would not result in an effect of greater significance.
Operation and Maintenance			
Direct loss of or damage to known and potential marine cultural heritage receptors	Direct disturbance to potential seabed prehistory receptors, known and recorded maritime and aviation receptors, and unknown archaeological sites and artefacts from: • Offshore Export Cable repair and reburial.	**Marine Scheme (Scottish waters):** The MDS in Scottish waters is the same as that for the Marine Scheme as a whole. **Marine Scheme (English waters):** The MDS in English waters is the same as that for the Marine Scheme as a whole.	Direct physical impacts relate to Offshore Export Cable repair and reburial. This will form the worst case as this represents the greatest area of impact. Any other scenarios resulting in a lower level of disturbance would not introduce new or different impacts and would not result in an effect of greater significance.
Indirect loss or damage to known and potential marine cultural heritage receptors	Indirect disturbance to potential seabed prehistory receptors, maritime and aviation receptors, caused by changes in local scouring and sedimentation patterns.	**Marine Scheme (Scottish waters):** The MDS in Scottish waters is the same as that for the Marine Scheme as a whole. **Marine Scheme (English waters):** The MDS in English waters is the same as that for the Marine Scheme as a whole.	Indirect physical impacts relate to changes in local scouring and sediment patterns from the presence of the Offshore Export Cable. This will form the worst case as this represents the greatest area of impact. Any other scenarios resulting in a lower level of disturbance would not introduce new or different impacts and would not result in an effect of greater significance.

14.10 Method of Assessment of Effects

14.10.1. Overview

51. The marine archaeology and cultural heritage assessment of effects has followed the methodology set out in Volume 2, Chapter 3: EIA Methodology. As there is no specific guidance associated with the assessment of construction and operation and maintenance of marine cables, the assessment has been completed in line with the following national, regional and industry specific standards and guidance:

- Military Aircraft Crash Sites – Archaeological Guidance on their Significance and Future Management (English Heritage (now Historic England), 2002);
- Code of Practice for Seabed Development (Joint Nautical Archaeology Policy Committee (JNAPC), 2006);
- Annexe to the Protocol Guidance on the Use of the Protocol for Reporting Finds of Archaeological Interest in Relation to Aircraft Crash Sites at Sea (Wessex Archaeology, 2008b);
- Our Seas - A shared resource: High level marine objectives (DEFRA, 2009);
- Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (COWRIE, 2011);
- COWRIE Historic Environment Guidance for the Offshore Renewable Energy Sector (Wessex Archaeology, 2007);
- Marine Geophysics Data Acquisition, Processing and Interpretation Guidance Notes (English Heritage (now Historic England), 2013);
- Standard and Guidance for Archaeological Advice by Historic Environment Services (CIfA 2014, updated 2020);
- Code of Conduct (CIfA 2014, revised 2019);
- Protocol for Archaeological Discoveries: Offshore Renewables Projects (ORPAD). (The Crown Estate, 2014);
- Managing Significance in Decision-Taking in the Historic Environment (English Heritage (now Historic England), 2015a);
- Management of Research Projects in the Historic Environment: the MoRPHE Project Managers' Guide (English Heritage (now Historic England), 2015b);
- Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record (English Heritage (now Historic England), 2015c);
- Preserving Archaeological Remains: Decision-Taking for Sites under Development (English Heritage (now Historic England), 2016);
- Ships and Boats: Prehistory to Present - Designation Selection Guide (Historic England, 2017);
- Deposit Modelling and Archaeology. Guidance for Mapping Buried Deposits, Historic England, Swindon (Historic England, 2020);
- Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects. (The Crown Estate, 2021); and
- Commercial Renewable Energy Development and the Historic Environment (Historic England, 2021).

14.10.2. Impact Assessment Criteria

52. The criteria for the assessment for marine archaeology and cultural heritage differs slightly from those set out in Volume 2, Chapter 3: EIA Methodology. Where there is no equivalent Scottish guidance, the assessment has followed standards and guidance from Historic England.

53. To appraise the potential impacts of the Marine Scheme on marine archaeology and cultural heritage, the conceptual approach known as the 'source-pathway-receptor' model has been adopted. This approach is based on the identification of the source (i.e. the origin of a potential impact), the pathway (i.e. the means by which the effect of the activity could impact a receptor) and the receptor that may be impacted (e.g. known/potential heritage assets). For the significance of any given impact to be fully understood and for appropriate mitigation to be identified, the sensitivity of any marine archaeology and cultural heritage assets that may be impacted needs to be considered. This section outlines how the sensitivity of marine archaeology and cultural heritage assets is ascertained.

54. The capability of an asset to accommodate change and its ability to recover if affected is a function of its sensitivity. Asset sensitivity is typically assessed via the following factors:

- Adaptability - the degree to which an asset can avoid or adapt to an effect;
- Tolerance - the ability of an asset to accommodate temporary or permanent change without significant adverse impact;
- Recoverability - the temporal scale over and extent to which an asset will recover following an effect; and
- Value - a measure of the asset's importance, rarity and worth.

55. Marine archaeology and cultural heritage assets cannot typically adapt, tolerate or recover from physical impacts resulting in material damage or loss caused by project activities. Consequently, the sensitivity of each asset is predominantly quantified only by its value.

56. Based on Historic England’s Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment English Heritage (now Historic England), 2008, p. 21) the significance of a historic asset ‘embraces all the diverse cultural and natural heritage values that people associate with it, or which prompt them to respond to it’.

57. Within this chapter, significance is weighed by consideration of the potential for the asset 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.

58. With regards to appraising the value of shipwrecks, the following criteria listed in Historic England’s Ships and Boats: Prehistory to Present – Selection Guide (Historic England, 2017) can be used to assess an asset in terms of its value:

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

59. These aspects help to characterise each asset whilst also comparing them to other similar assets. The criteria also enable the potential to contribute to knowledge, understanding and outreach to be assessed.

60. The value of known archaeological and cultural heritage assets were appraised on a five-point scale using professional judgement informed by criteria provided in Table 14.8 below.

Table 14.8 Definition of terms relating to the sensitivity of the receptor

Value (Sensitivity of the Receptor)	Description
Very High	Best known and / or significant or high potential to contribute to knowledge and understanding and / or outreach. Assets 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 Marine (Scotland) Act 2010, Protection of Wrecks Act 1973, Ancient Monuments and Archaeological Areas Act 1979 or Protection of Military Remains Act 1986 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.
High	Best known, only example or above average example and / or significant or high potential to contribute to knowledge and understanding and / or outreach. Assets 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 Marine (Scotland) Act 2010, Protection of Wrecks Act 1973, Ancient Monuments and Archaeological Areas Act 1979 or Protection of Military Remains Act 1986 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	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	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	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.

61. The magnitude of an impact is defined by a series of factors including the spatial extent of any interaction, the likelihood, duration, frequency, and reversibility of a potential impact. The definitions of the levels of magnitude used in this assessment are described in Table 14.9.

Table 14.9 Definition of terms relating to the magnitude of an impact

Magnitude of Impact	Definition
High	Complete and comprehensive physical damage or changes to the character of the asset.
Medium	Considerable changes that affect the character of the asset, resulting in considerable physical damage.
Low	Minor change that partially affects the character of the asset, resulting in some physical damage.
Negligible	Very minor or negligible change to the character of the asset, with no or negligible physical damage leading to an imperceptible change to the baseline.

62. The likely significance of the effect upon marine archaeology and cultural heritage is determined by correlating the magnitude of the impact and the sensitivity of the receptor, as outlined in Table 14.10 below.

Table 14.10 Matrix used for the assessment of the likely significance of the effect

		Magnitude of Impact			
		Negligible	**Low**	**Medium**	**High**
Sensitivity of Receptor	**Negligible**	Negligible	Negligible to Minor	Negligible to Minor	Minor
	Low	Negligible to Minor	Negligible to Minor	Minor	Minor to Moderate
	Medium	Negligible to Minor	Minor	Moderate	Moderate to Major
	High	Minor	Minor to Moderate	Moderate to Major	Major
	Very High	Minor	Moderate to Major	Major	Major

63. In line with the request from MD-LOT through Scoping, the assessment of impacts identifies where impacts are relevant to Scottish waters, English waters, or both. Where there is no separation of assessment of impacts, the assessment for the Marine Scheme (as a whole) applies to the Marine Scheme in both Scottish and English waters.

14.11 Measures Adopted as Part of the Marine Scheme

64. As part of the design process of the Marine Scheme, a number of measures have been proposed to reduce the potential for impacts on marine archaeology and cultural heritage (see Table 14.11). These include measures which have been incorporated as part of the Marine Scheme's design (referred to as 'designed in measures') and measures which will be implemented regardless of the impact assessment outcomes (referred to as 'tertiary mitigation'). As there is a commitment to implementing these measures, they are considered inherently part of the design of the Marine Scheme and have therefore been considered in the assessment presented in section 14.12 below (i.e. the determination of impact magnitude and therefore effect significance assumes

implementation of these measures). These measures are considered standard industry practice for this type of development.

65. Whilst the array area of BBWF has also been included in the overview of the baseline environment for marine heritage receptors (BBWFL, 2022a), as part of the Marine Scheme overlaps with the BBWF array area, mitigation for these receptors has already been proposed in the Outline Written Scheme of Investigation, including a Protocol for Archaeological Discoveries, for the BBWF (BBWFL, 2022b). This has been submitted by the Applicant as part of the separate consent application for BBWF in December 2022, which is currently being considered by MD-LOT as part of consent determination for BBWF. Adverse impacts arising from the Marine Scheme within the BBWF array area will be mitigated by the BBWF WSI and PAD, and adverse impacts arising from the Marine Scheme outwith the BBWF array area (e.g. within the Offshore Export Cable Corridor) will be mitigated by the Marine Scheme WSI and PAD.

Table 14.11 Measures adopted as part of the Marine Scheme (designed in measures & tertiary mitigation)

Mitigation Measure	Justification	Applicable Jurisdication
Written Scheme of Investigation (WSI)[7]	The purpose of this document is to identify possible features of marine archaeological importance and to agree mitigation to avoid and/or mitigate potential impacts. The WSI will detail the agreed mitigation that will be implemented during construction of the Marine Scheme. The implementation of a WSI is the mitigation, rather than the document itself. The mitigation measures are designed to either avoid, reduce or offset any damage/disturbance occurring as a result of the Marine Scheme upon known receptors, and to establish the presence of unknown sites. An outline WSI has been provided as part of this application (Volume 5, Appendix 14.2) and will be updated for submission to MMO and MD-LOT prior to construction.	Scottish and English waters
Protocol for Archaeological Discoveries (PAD)[7]	In order to provide for unexpected discoveries encountered during the construction, operation and maintenance and decommissioning phases of the Marine Scheme, a PAD will be adopted. This is a system for reporting and investigating unexpected archaeological discoveries encountered during construction activities, with a Retained Archaeologist providing guidance and advising on the implementation of the PAD. 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. The PAD provides a mechanism to comply with the Merchant Shipping Act 1995, including notification of the Receiver of Wreck, and accords with the Code of Practice for Seabed Developers (JNAPC, 2006) and relevant Guidance (Historic England 2016). A PAD has been provided as part of this application (Volume 5, Appendix 14.2) and will be updated for submission to MMO and MD-LOT prior to construction.	Scottish and English waters

[7] Adverse impacts arising from the Marine Scheme within the BBWF array area will be mitigated by the BBWF WSI and PAD, and adverse impacts arising from the Marine Scheme outwith the BBWF array area (e.g. within the Offshore Export Cable Corridor) will be mitigated by the Marine Scheme WSI and PAD.

Mitigation Measure	Justification	Applicable Jurisdication
Engagement of a Retained Archaeologist	A Retained Archaeologist will be engaged to implement the agreed mitigation secured through a WSI. The Retained Archaeologist will provide input into specifications for further surveys and archaeological analysis of the outputs from any pre-construction surveys (for example, geophysical and geotechnical), and will provide advice regarding any archaeological finds which occur during construction. Where suitable for archaeological assessment, further geophysical surveys undertaken in advance of the development commencing, for example for the purposes of detailed design, that require magnetometer data (e.g. UXO survey) will also be assessed by a suitably qualified archaeological contractor. This will allow for the identification of any additional ferrous features of archaeological potential within the Marine Scheme, as well as to confirm the presence of ferrous material at the location of features identified during this assessment. To avoid and / or reduce impacts on sites of archaeological importance.	Scottish and English waters
Micro-routeing within the Marine Scheme	Micro-siting within the Marine Scheme will be carried out to help avoid or minimise interactions with localised engineering and environmental constraints identified during pre-construction surveys.	Scottish and English waters
Implementation of Archaeological Exclusion Zones (AEZs)	The primary mitigation for the protection of known archaeological receptors is avoidance. This is commonly achieved through the implementation and monitoring of AEZs, which are proposed for identified high value seabed receptors of anthropogenic origin, to avoid direct impacts on sites of known archaeological importance.	Scottish and English waters
Adherence to BBWF WSI, including implementation of PAD and AEZs	The Applicant is committed to the mitigation measures set out in the Outline WSI/PAD for Adverse impacts arising from the Marine Scheme within the BBWF array area. Mitigation measures including implementation of PAD and AEZs are secured through adherence to the BBWF WSI (BBWFL, 2022b).	Scottish waters

14.12 Assessment of Impacts

66. The potential impacts arising from the construction, operation and maintenance and decommissioning phases of the Marine Scheme are listed in Table 14.7 along with the maximum design scenario against which each impact has been assessed.

67. An assessment of the likely significance of the effects of the Marine Scheme on marine archaeology and cultural heritage receptors caused by each identified impact is given below.

14.12.1. Potential Effects During Construction

14.12.1.1. DIRECT LOSS OF OR DAMAGE TO KNOWN AND UNKNOWN MARINE AND INTERTIDAL HISTORIC ENVIRONMENT ASSETS ARISING FROM OCONSTRUCTION

68. If direct impacts were to occur upon the archaeological receptors that have been identified in section 14.7 of this chapter and any potential archaeology within the Marine Scheme, these are most likely to occur during the construction phase of the Marine Scheme. Impacts resulting in negative 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 site preparation activities and cable installation activities. Construction activities that may lead to direct physical impacts include:

- Pre-construction surveys and sea trials;
- Cable construction, including route clearance, cable laying and burial, and cable protection;
- Landfall construction activities, consisting of trenchless techniques, excavation of exit pits and cable installation; and
- Seabed contact with jack-up vessels (English waters only).

69. Impacts would also occur to known archaeological receptors within the part of the Marine Scheme which overlaps BBWF array area, however, AEZs have been recommended to high and unconfirmed medium archaeological features, so these impacts will be avoided. Impacts may, however, occur to previously unknown receptors in the part of the Marine Scheme which overlaps BBWF array area; therefore a PAD is also a key element of the outline WSI (BBWFL, 2022b) which will be followed.

14.12.1.1.1. Magnitude of impact

14.12.1.1.1.1. Submerged Prehistoric Landscapes

70. All direct impacts to submerged prehistoric landscapes 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.

71. Seabed prehistory receptors, such as potential *in situ* prehistoric sites and submerged landscape features are considered as high value assets. Therefore, the magnitude of direct impacts on such resource, if they were to occur, would be high. However, with the implementation of designed in mitigation the magnitude of impact would be negligible.

14.12.1.1.1.2. Seabed Features: Maritime and Aviation

72. The magnitude of direct impacts on known maritime and potential seabed features as part of construction activities, if they were to occur, would be high. This applies to all known sites identified in section 14.7 (Volume 4, Figure 14.3A-K). However, with the implementation of designed in mitigation the magnitude of impacts are judged to be negligible.

14.12.1.1.1.3. Intertidal Archaeological Receptors

73. The magnitude of impact on known intertidal heritage receptors is expected to be negligible. The one known feature has since been demolished, and no new features having a surface expression were observed during the intertidal walkover survey.

74. As trenchless techniques (such as HDD) are being applied for Landfall installation, impacts to unknown intertidal heritage receptors would be minimal as the ducts will bass underneath the intertidal area. Therefore, the magnitude of impact is expected to be low, prior to the consideration of designed in mitigation. Implementation of the PAD as designed in mitigation reduces the magnitude to negligible.

14.12.1.1.2. Sensitivity of the receptors

75. All seabed receptors have the potential to be damaged or destroyed if they are directly impacted during the construction phase of the Marine Scheme. 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 known wrecks, aircraft, associated material and debris, seabed prehistory, and intertidal receptors should be regarded as having a high sensitivity, with HMS Unity and potential military aircraft receptors are considered as having very high sensitivity.

14.12.1.1.3. Significance of the effect

76. The application of designed in mitigation, including the implementation of AEZs, further assessment of identified features, and a PAD, described in section 14.11 means that all direct impacts to known receptors would be avoided and, hence, the magnitude of impact would be negligible for the Marine Scheme as a whole.

77. It should be noted that in some cases, the application of appropriate mitigation, such as an archaeological investigation of seabed anomalies prior to construction activities via the implementation of a PAD could lead to effects of minor to moderate beneficial significance. For example, undertaking further geoarchaeological assessment of survey data and samples and enhancing knowledge of the wider prehistoric landscape or discovery of a wreck of interest, and being able to share information with the wider public.

78. Overall, the magnitude of the impact is deemed to be negligible, and the sensitivity of the receptors are considered to be high / very high as a worst case. The effect will, therefore, be of **minor adverse significance** for the Marine Scheme as a whole, which is not significant in EIA terms.

79. For impacts to intertidal archaeological receptors, the magnitude of impact is negligible on receptors with high sensitivity, which constitutes a **minor adverse effect** from the Marine Scheme in English waters only, which is not significant in EIA terms.

14.12.1.1.4. Secondary mitigation and residual effect

80. Given that there are no likely significant effects in EIA terms when considering the designed in mitigation measures, secondary mitigation is not required.

14.12.1.2. INDIRECT LOSS OF OR DAMAGE TO KNOWN AND UNKNOWN MARINE AND INTERTIDAL HISTORIC ENVIRONMENT ASSETS ARISING FROM CONSTRUCTION

81. 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 phase. These impacts may occur from seabed levelling during seabed preparation, but may also occur through sediment dispersal / deposition or the placement of external cable protection on the seabed. Construction activities that could potentially create indirect physical impacts include:

- Seabed levelling, potentially resulting in changes to local hydrodynamics;
- Dispersal of suspended sediment potentially resulting in increased sediment transport regimes; and
- Scour associated with the disturbance from construction activities.

14.12.1.2.1. Magnitude of impact

14.12.1.2.1.1. Submerged Prehistoric Landscapes

82. An assessment of potential indirect loss or damage to submerged prehistoric landscapes was conducted, including; an assessment of the local hydrodynamic and sediment transport regime, a review of data available from similar projects and desktop analysis to assess for potential impacts of the Marine Scheme (please see section 7.12.1 of Volume 2, Chapter 7: Offshore Physical Environment and Seabed Conditions). It is concluded that the impact is predicted to be of local spatial extent, short to long term in duration and high reversibility, and there considered to be of negligible magnitude of impact (following consideration of the designed in mitigation measures).

14.12.1.2.1.2. Seabed Features: Maritime and Aviation

83. An assessment of potential indirect loss or damage to maritime and aviation features was conducted, including; an assessment of the local hydrodynamic and sediment transport regime, a review of data available from similar projects and desktop analysis to assess for potential impacts of the Marine Scheme (please see section 7.12.1 of Volume 2, Chapter 7: Offshore Physical Environment and Seabed Conditions). It is concluded that the impact is predicted to be of local spatial extent, short to long term in duration and high reversibility, and there considered to be of negligible magnitude of impact (following consideration of the designed in mitigation measures).

14.12.1.2.1.3. Intertidal Archaeological Receptors

84. Chapter 7: Offshore Physical Environment and Seabed Conditions concludes that the impact to the coastal morphology of Cambois Bay will be of local spatial extent, short-term duration and high reversibility on completion of the Landfall installation. Seabed disturbance due to Landfall activities (including trenchless techniques) will impact a relatively small area and therefore a negligible magnitude of impact is anticipated (following consideration of the designed in mitigation measures).

14.12.1.2.2. Sensitivity of the receptor

85. All seabed receptors have the potential to be damaged or destroyed if they are impacted during the construction phase of the Marine Scheme. 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 impact. As such, all wrecks, aircraft, associated material and debris and seabed prehistory should be regarded as having a high sensitivity, with HMS Unity and potential military aircraft receptors are considered as having very high sensitivity.

14.12.1.2.3. Significance of the effect

86. 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.

87. Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be high / very high. The effect will, therefore, be of **minor** adverse significance for the Marine Scheme as a whole, which is not significant in EIA terms.

88. For impacts to intertidal archaeological receptors, the magnitude of impact is negligible on receptors with high sensitivity, which constitutes a **minor adverse effect** from the Marine Scheme in English waters only, which is not significant in EIA terms.

14.12.1.2.4. Secondary mitigation and residual effect

89. Given that there are no likely significant effects in EIA terms, secondary mitigation is not required.

14.12.2. Potential Effects During Operation and Maintenance

14.12.2.1. DIRECT LOSS OF OR DAMAGE TO KNOWN AND POTENTIAL MARINE CULTURAL HERITAGE RECEPTORS FROM OFFSHORE EXPORT CABLE REPAIR AND MAINTENANCE

90. Activities undertaken as part of the 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.

91. 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 the operation and maintenance phase of the Marine Scheme arise from the following activities:

- Re-burial of cables;
- Repair/replacement of cables; and
- Placement of additional cable protection.

14.12.2.1.1. Magnitude of impact

14.12.2.1.1.1. Submerged Prehistoric Landscapes

92. As a result of designed in measures (see Table 14.11), direct impacts to known seabed prehistory would not occur. Unavoidable direct impacts to potential archaeological receptors may occur at any point where operation and maintenance activities disturb the seafloor.

93. The magnitude of direct impacts on potential marine archaeological receptors, as part of operation and maintenance activities, if they were to occur, would be high. However, with the implementation of designed in mitigation and implementation of measures within the WSI including archaeological input in any future geoarchaeological surveys and a PAD, the magnitude of impacts is judged to be negligible.

14.12.2.1.1.2. Seabed Features: Maritime and Aviation

94. As a result of designed in measures (see Table 14.11), direct impacts to known maritime and aviation archaeological receptors would not occur. Unavoidable direct impacts to unknown potential archaeological receptors may occur at any point where operation and maintenance activities disturb the seafloor.

95. The magnitude of direct impacts on potential marine archaeological receptors, as part of operation and maintenance activities, if they were to occur, would be high. However, with the implementation of designed in mitigation impacts, and WSI measure including archaeological input in any future geophysical surveys and a PAD, the magnitude of impacts is judged to be negligible.

14.12.2.1.1.3. Intertidal Archaeological Receptors

96. The magnitude of impact on known intertidal heritage receptors is expected to be negligible. The one known feature has since been demolished, and no new features having a surface expression were observed during the intertidal walkover survey.

97. Seabed disturbance at the in the intertidal area are not anticipated to occur, and therefore a negligible magnitude of impact is anticipated.

14.12.2.1.2. Sensitivity of the receptor

98. All unknown seabed assets have the potential to be damaged or destroyed if they are directly impacted during the operation and maintenance phase of the Marine Scheme. 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 unknown seabed assets if they are affected following a direct impact. As such, all known wrecks, aircraft, associated material and debris, seabed prehistory, and intertidal receptors should be regarded as having a high sensitivity, with HMS Unity and potential military aircraft receptors are considered as having very high sensitivity.

14.12.2.1.3. Significance of the effect

99. In areas where the impact has already occurred during the construction phase, there is unlikely to be further effect during operation and maintenance.

100. In areas that have not yet been impacted, the magnitude of impact on marine archaeology are anticipated to be negligible, on the basis that designed in mitigation and WSI measures are implemented.

101. Overall, the magnitude of the impact is deemed to be negligible, and the sensitivity of the receptor is considered to be high / very high as a worst case. The effect will, therefore, be of **minor adverse significance** for the Marine Scheme as a whole, which is not significant in EIA terms.

102. For impacts to intertidal archaeological receptors, the magnitude of impact is negligible on receptors with high sensitivity, which constitutes a **minor adverse effect** from the Marine Scheme in English waters only, which is not significant in EIA terms.

14.12.2.1.4. Secondary mitigation and residual effect

103. Given that there are no likely significant effects in EIA terms, secondary mitigation is not required.

14.12.2.2. INDIRECT LOSS OF OR DAMAGE TO KNOWN AND POTENTIAL MARINE CULTURAL HERITAGE RECEPTORS FROM CHANGES IN LOCAL SCOURING AND SEDIMENTATION PATTERNS

104. The effects upon the known and potential marine cultural heritage receptors considered here are those which occur as a result of changes to hydrodynamic and sediment transport, where these changes have occurred as a result of the presence of cable protection associated with the Marine Scheme.

14.12.2.2.1. Magnitude of impact

14.12.2.2.1.1. Submerged Prehistoric Landscapes

105. Following an assessment of the local hydrodynamic and sediment transport regime, Chapter 7: Offshore Physical Environment and Seabed Conditions concludes that the potential changes to the tidal, wave and sediment transport regimes, as a result of blockage effects from cable and crossing protection measures is assessed to be minimal. Therefore, following consideration of designed in mitigation, the magnitude is considered to be negligible for the Marine Scheme as a whole, and the potential for edge scour across the Marine Scheme is considered to be negligible.

14.12.2.2.1.2. Seabed Features: Maritime and Aviation

106. The magnitude impact of indirect effects to marine archaeological receptors during construction is expected to be low. Following an assessment of the local hydrodynamic and sediment transport regime, concludes that the potential changes to the tidal, wave and sediment transport regimes, as a result of blockage effects from cable and crossing protection measures is assessed to be minimal. Therefore, following consideration of designed in mitigation, the magnitude is considered to be negligible for the Marine Scheme as a whole, and the potential for edge scour across the Marine Scheme is considered to be negligible.

14.12.2.2.1.3. Intertidal Archaeological Receptors

107. The magnitude of impact to intertidal archaeological receptors during operation is expected to be negligible. Chapter 7: Offshore Physical Environment and Seabed Conditions has not identified any change to scour or deposition in the intertidal area above existing baseline conditions, resulting from the operation and maintenance phase of the Marine Scheme. Therefore a negligible magnitude of impact is anticipated following consideration of designed in mitigation.

14.12.2.2.2. Sensitivity of the receptor

108. All seabed receptors have the potential to be damaged or destroyed if they are impacted during the operation and maintenance phase of the Marine Scheme. 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 impact. As such, all wrecks, aircraft, associated material and debris and seabed prehistory should be regarded as having a high sensitivity, with HMS Unity and potential military aircraft receptors are considered as having very high sensitivity.

14.12.2.2.3. Significance of the effect

109. 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.

110. Overall, the magnitude of the impact is deemed to be negligible, and the sensitivity of the receptor is considered to be high / very high. The effect will, therefore, be of minor adverse significance for the Marine Scheme as a whole, which is not significant in EIA terms.

111. For impacts to intertidal archaeological receptors, the magnitude of impact is negligible on receptors with high sensitivity, which constitutes a **minor adverse effect** from the Marine Scheme in English waters only, which is not significant in EIA terms.

14.12.2.2.4. Secondary mitigation and residual effect

112. Given that there are no likely significant effects in EIA terms, secondary mitigation is not required.

14.12.3. Potential Effects During Decommissioning

113. At the end of the operation and maintenance phase of the Marine Scheme, the options for decommissioning works will be assessed, taking into consideration constraints (e.g. safety and liability) and the potential environmental impacts associated with decommissioning works.

- The principal options for decommissioning include:
- Leaving the cable in-situ, trenched;
- Leaving the cable in-situ and providing additional protection;
- Remove sections of the cable that present a risk to other sea users; and
- Remove the cable entirely.

114. Should complete removal of the Offshore Export Cables be required, the significance of effect is considered to result in similar impacts to those assessed as part of the construction phase of the Marine Scheme. Impacts are anticipated to be of similar or lower magnitude to the construction phase (depending on the decommissioning option selected, and noting that complete removal of infrastructure in Scottish waters is required by MD-LOT (Scottish Government, 2022)).

115. Complete removal of the Offshore Export Cables is considered the scenario of highest magnitude potential impacts, , and therefore if the other decommissioning options were to be progressed, they would have equivalent or less significant adverse effects, and therefore not likely to be significant in EIA terms.

116. Overall, the magnitude of the impact is deemed to be low / negligible, and the sensitivity of the receptor is considered to be high. The effect will, therefore, be (at worst) of **minor adverse significance** for the Marine Scheme as a whole, which is not significant in EIA terms.

14.13 Proposed Monitoring

117. No marine archaeology and cultural heritage monitoring to test the predictions made within the assessment of likely significant effects on marine archaeology and cultural heritage is considered necessary.

14.14 Cumulative Effects Assessment

14.14.1. Methodology

118. The Cumulative Effects Assessment (CEA) takes into account the impact associated with the Marine Scheme together with other relevant plans, developments and activities. Cumulative effects are therefore the complete set of effects arising from the Marine Scheme together with the effects from a number of different developments, on the same receptor or resource. Please see Volume 2, Chapter 3 of the Marine ES for detail on CEA methodology.

119. The developments selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise and the development of a 'long list' of cumulative developments relevant to the Marine Scheme (see Volume 3, Appendix 3.4: Long-list of Cumulative Developments). Each development has been considered on a case by case basis for screening in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved, to create the 'short list' as summarised in Table 14.12. This approach was agreed during Scoping and further consultation and technical engagement undertaken with consultees, as detailed in Table 14.3.

120. The specific projects scoped into the CEA for marine archaeology and cultural heritage, are outlined in Table 14.12. Given the highly localised nature of direct impacts on marine archaeology and cultural heritage, the Zone of Influence (ZoI) for cumulative effects is considered to be the spatial extent of the Marine Scheme and indirect impacts relating to burial of marine archaeology and cultural heritage.

121. It should be noted that the Marine Scheme and BBWF overlap both spatially (within the BBWF array area) and temporally (with regards to construction, operation and maintenance and decommissioning). As the Marine Scheme and BBWF are both being progressed by the Applicant, it is expected that both developments will be jointly coordinated using the same Marine Coordination Centre for all phases of each development. Therefore, this allows potential cumulative effects between these developments to be managed through coordination.

Table 14.12 List of other developments considered within the CEA for marine archaeology and cultural heritage

Development/Plan	Status [i.e. Application, Consented, Under Construction, Operational]	Distance from Study Area (km)	Description of Development /Plan	Dates of Construction (If Applicable)	Dates of Operation (If Applicable)	Overlap with the Marine Scheme
BBWF	In planning	0	Offshore Wind Farm	2025 to 2033	2033 onward (35 year operational life)	Construction phase of the Marine Scheme overlaps with the development's timeline and spatially in Scottish waters; O&M and decommissioning phases will also overlap
Eastern Green Link 1	In planning	0	Transmission Infrastructure	2024 to 2027	2027 onward (50 year operational life)	Construction phase of Marine Scheme overlaps with development spatially in English waters. O&M phases will overlap.
Blyth Demonstrator Phase 2 (&3) Cable Corridor	Consented	0	Transmission Infrastructure	Complete by 2025	Assumed to be consistent with Blyth Demonstrator Offshore Wind Farm – Phase 2	The Marine Archaeology study area overlaps with the development spatially in English waters. Overlap will be with the Marine Scheme construction and O&M phase.

14.14.2. Cumulative Effects Assessment

122. An assessment of the likely significance of the cumulative effects of the Marine Scheme together with other relevant plans, projects, developments and activities upon marine archaeology and cultural heritage receptors arising from each identified impact, as assessed in section 14.12, is given below.

123. The potential for impact increases as the distance between developments decreases, and therefore there is higher potential relating to the developments listed in Table 14.3 as these spatially overlap with the Marine Scheme in either Scottish waters or English waters during construction and / or operation and maintenance.

124. There should be limited cumulative effects on the marine archaeology and cultural heritage as all of the other projects will have undergone EIA and the impacts will have been mitigated for. The only cumulative effects should be beneficial in the form of data becoming publicly available and contributing to society. For example, if a wreck was discovered and avoided as a result of the project, and a dive trail was made, this would be a beneficial magnitude.

125. It is appropriate to consider the Landfall area in further detail in the context of the Cambois Connection Onshore Scheme. Based on the maximum design scenario for the Marine Scheme, a trenchless technique, such as HDD, will be deployed to bring the Offshore Export Cables ashore via ducts that will be installed from a point landward of MHWS to an exit point at least 250 m seaward of MLWS, thus completely bypassing the intertidal area. All construction works and infrastructure associated with the Onshore Scheme will be above MHWS, and landward of the Cambois beach, and therefore there is no potential for any direct interaction with the intertidal area. Given there will be no construction works associated with the Onshore Scheme within the intertidal area, there is no potential for any direct or indirect effects on archaeological receptors. Therefore, the Onshore Scheme is not considered further within this CEA. Further detail on the Onshore Scheme is provided in Volume 2, Chapter 5: Project Description.

14.14.2.1. POTENTIAL EFFECTS DURING CONSTRUCTION, OPERATION AND MAINTENANCE, AND DECOMMISSIONING

14.14.2.1.1. Cumulative Direct loss of or damage to known and unknown marine and intertidal historic environment assets

126. Significant cumulative impacts to known and potential marine archaeological receptors can result from the construction, operation and maintenance, and decommissioning of marine transmission infrastructure, such as the Marine Scheme, and other marine transmission infrastructure or offshore wind farms. Such impacts may result in direct effects on potential receptors on or under the seabed or disturb relationships between receptors and their wider surroundings as the result of seabed contact, the removal of seabed sediments or other such activity in the water column.

127. BBWF in Scottish waters is currently in the planning stage and is being determined for a Marine Licence. As part of the consent application an Outline WSI was submitted to MD-LOT, and suitable mitigation measures have been recommended, including implementation of AEZs, geophysical and geotechnical surveys, and a PAD (BBWFL, 2022b). BBWF is being developed by the same Applicant therefore, as outlined above, it is expected that both developments will be jointly coordinated using the same Marine Coordination Centre for all phases of each development reducing the likelihood of any cumulative effects.

128. There are two transmission infrastructure projects which interact with the Marine Scheme within English waters, both of which have undergone EIA, and as such, any potential impacts will be mitigated with proposed management plans secured through consent conditions if approved. For

cable developments, any known seabed features should have been avoided during the route development process, as these would constitute engineering constraints. As part of the marine licence consent conditions, a WSI is required for those developments which are under construction. As part of the WSI, a PAD would be adopted to mitigate against any new discoveries.

14.14.2.1.2. Magnitude of impact

129. Direct physical impacts on marine archaeology will in most cases be limited by the location and extent of sensitive receptors (i.e. more than one development is unlikely to impact the same specific seabed receptor to create a cumulative impact).

130. As a result of the designed in mitigation detailed in section 14.11 such as the implementation of AEZs, archaeological reporting protocols and other best-practice elements, most effects will be avoided by the Marine Scheme, particularly to known receptors identified on, in or beneath the seabed.

131. Given that implementation of AEZs, archaeological reporting protocols and other best-practice elements are industry standard, it is assumed that other developments will have a commitment to these mitigation measures as part of their consent conditions also. Furthermore, as noted in section 14.11, the Applicant is committed to adherence to BBWF WSI, including implementation of PAD and AEZs for the adverse impacts from the Marine Scheme arising within the BBWF array area.

132. The cumulative magnitude of impacts of the Marine Scheme is therefore considered to be negligible, as any adverse impacts would be mitigated against by the Marine Scheme through the measures adopted as part of the Marine Scheme (refer to section 14.11) and as described in paragraph 127 for the BBWF and in paragraph 128 for third party transmission infrastructure.

14.14.2.1.3. Sensitivity of receptor

133. All seabed receptors have the potential to be damaged or destroyed if they are directly impacted by third party developments acting cumulatively with the Marine Scheme. 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, associated material and debris and seabed prehistory should be regarded as having a high sensitivity, with HMS Unity and potential military aircraft receptors are considered as having very high sensitivity.

14.14.2.1.4. Significance of effect

134. Overall, the magnitude of the cumulative impacts is deemed to be negligible, and the sensitivity of the receptors is considered to be high / very high. The cumulative effect will, therefore, be of **minor adverse significance** for the Marine Scheme as a whole cumulatively with other plans, projects and developments, which is not significant in EIA terms.

14.14.2.1.5. Secondary mitigation and residual effect

135. Given that there are no cumulative likely significant effects in EIA terms, secondary mitigation is not required.

14.14.2.2. CUMULATIVE INDIRECT LOSS OF OR DAMAGE TO KNOWN AND UNKNOWN MARINE AND INTERTIDAL HISTORIC ENVIRONMENT ASSETS

136. There is the potential for cumulative indirect effects to occur upon known and potential marine archaeological features as a result of changes to hydrodynamic and sediment transport regimes,

during the construction, operation and maintenance, and decommissioning phases of the Marine Scheme cumulatively with other plans, projects and developments. Such effects are predicted to arise as a result of changes to bed levels at the seabed caused by changes to sedimentation and erosion regimes and leading to increased exposure or coverage of receptors. Increased exposure could cause receptors to be vulnerable to deterioration, whereas increased coverage would promote preservation.

137. As all developments listed in Table 14.12 have undergone EIA, any potential impacts would have been mitigated. Suitable mitigation measures have been recommended, including geophysical and geotechnical surveys, and protocols for unexpected archaeological discoveries.

14.14.2.2.1. Magnitude of impact

138. For cable developments, impact to buried material in general is likely to be relatively minimal, as cumulative impact is likely to occur at cable crossing during construction phase, covering a relatively small construction impact footprint. Although Marine Scheme activities could represent a potential cumulative impact with regards changes to hydrodynamic and sediment transport regimes, the designed in mitigation measures in place required for any such activity would reduce the pathway for cumulative impacts to occur. Therefore, cumulative impacts of the Offshore Export Cables of the Marine Scheme with marine cables listed in Table 14.12 are considered to be of negligible magnitude.

14.14.2.2.2. Sensitivity of receptor

139. All seabed receptors have the potential to be damaged or destroyed if they are directly impacted by third party developments acting cumulatively with the Marine Scheme. 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, associated material and debris and seabed prehistory should be regarded as having a high sensitivity, with HMS Unity and potential military aircraft receptors are considered as having very high sensitivity.

14.14.2.2.3. Significance of Effect

140. Overall, the magnitude of the cumulative impacts is deemed to be negligible, and the sensitivity of the receptors is considered to be high / very high. The cumulative effect will, therefore, be of **minor adverse significance** for the Marine Scheme as a whole cumulatively with other plans, projects and developments, which is not significant in EIA terms.

14.14.2.2.4. Secondary mitigation and residual effect

141. Given that there are no cumulative likely significant effects in EIA terms, secondary mitigation is not required.

14.14.3. Proposed Monitoring

142. No marine archaeology and cultural heritage monitoring to test the predictions made within the assessment of likely cumulative significant effects on marine archaeology and cultural heritage is considered necessary.

14.15 Inter-Related Effects

143. Inter-related effects are the potential effects of multiple impacts, effecting one receptor or a group of receptors. Inter-related effects include interactions between the impacts of the different stages of the Marine Scheme (i.e. interaction of impacts across construction, operation and maintenance and decommissioning), as well as the interaction between impacts on a receptor within a Marine Scheme stage. With the implementation of Archaeological Exclusion Zones around key receptors, and other designed in mitigation measures (section 4.11) it is judged that there is no potential for multiple impacts to individual receptors.

144. Potential inter-related effects are not anticipated to interact in such a way for marine archaeological and cultural heritage assets to result in combined effects of greater significance than the assessments presented for each individual phase. Therefore, these inter-related effects would not be significant in EIA terms.

14.16 Transboundary Effects

145. Transboundary effects were scoped out for all impacts pertaining to marine archaeology and cultural heritage (see section 14.8.2).

14.17 Summary of Impacts, Mitigation Measures, Likely Significant Effects and Monitoring

146. Information on marine archaeology and cultural heritage within the Marine Archaeology study area was collected through a desktop review, site surveys (and associated archaeological assessment of the data), and stakeholder consultation and existing archaeological assessments (RPS 2022a, b). Table 14.13 presents a summary of the potential impacts, mitigation measures and the conclusion of likely significant effects in EIA terms in respect to marine archaeology and cultural heritage. The impacts assessed include:

- Direct loss of or damage to known and unknown marine and intertidal historic environment assets arising from construction and decommissioning (C, D);
- Indirect loss of or damage to known and unknown marine and intertidal historic environment assets arising from construction and decommissioning (C, D);
- Loss of or damage to submerged prehistoric landscapes arising from construction and decommissioning (C, D);
- Direct loss of or damage to known and potential marine cultural heritage receptors from repair and maintenance (O&M); and
- Indirect loss of or damage to known and potential marine cultural heritage receptors from changes in local scouring and sedimentation patterns (O&M).

147. Overall, it is concluded that there will be no likely significant effects arising from the Marine Scheme during the construction, operation and maintenance or decommissioning phases.

148. Table 14.14 presents a summary of the potential cumulative impacts, mitigation measures and the conclusion of likely significant effects on marine archaeology and cultural heritage in EIA terms. The cumulative effects assessed include direct and indirect effects on marine archaeology. Overall, it is concluded that there will be no likely significant cumulative effects from the Marine Scheme alongside other projects, plans or developments.

Table 14.13 Summary of likely significant environmental effects, mitigation and monitoring

Description of Impact	Receptor	Phase			Magnitude of Impact	Sensitivity of Receptor	Significance of Effect	Secondary Mitigation	Residual Effect	Proposed Monitoring
		C	O	D						
Direct loss of or damage to known and unknown marine and intertidal archaeology receptors arising from construction										
Marine Scheme overall	Known and recorded marine and aviation receptors, and currently unknown archaeological sites and artefacts	✓	×	✓	Negligible	High/Very High	Minor	N/A	Minor	None
English waters only	Known and recorded marine and aviation receptors, known and recorded intertidal cultural heritage, and currently unknown archaeological sites and artefacts	✓	×	✓	Negligible	High/Very High	Minor	N/A	Minor	None
Indirect loss of or damage to known and unknown marine and intertidal archaeology receptors arising from construction										
Marine Scheme overall	Known and recorded marine and aviation receptors, and currently unknown archaeological sites and artefacts	✓	×	✓	Negligible	High/Very High	Minor	N/A	Minor	None
English waters only	Known and recorded marine and aviation receptors, known and recorded intertidal cultural heritage, and currently unknown archaeological sites and artefacts	✓	×	✓	Negligible	High/Very High	Minor	N/A	Minor	None
Direct loss of or damage to to known and unknown marine and intertidal archaeology receptors arising from Offshore Export Cable repair and maintenance										
Marine Scheme overall	Known and recorded marine and aviation receptors, and currently unknown archaeological sites and artefacts	×	✓	×	Negligible	High/Very High	Minor	N/A	Minor	None
English waters only	Known and recorded marine and aviation receptors, known and recorded intertidal cultural heritage, and currently unknown archaeological sites and artefacts	×	✓	×	Negligible	High/Very High	Minor	N/A	Minor	None
Indirect loss of or damage to known and potential marine cultural heritage receptors from changes in local scouring and sedimentation patterns										
Marine Scheme overall	Known and recorded marine and aviation receptors, and currently unknown archaeological sites and artefacts	×	✓	×	Negligible	High/Very High	Minor	N/A	Minor	None
English waters only	Known and recorded marine and aviation receptors, known and recorded intertidal cultural heritage, and currently unknown archaeological sites and artefacts	×	✓	×	Negligible	High/Very High	Minor	N/A	Minor	None

Table 14.14 Summary of likely significant cumulative environment effects, mitigation and monitoring

Description of Impact	Phase			Magnitude of Impact	Sensitivity of Receptor	Significance of Effect	Secondary Mitigation	Residual Effect	Proposed Monitoring
	C	O	D						
Cumulative Direct loss of or damage to known and unknown marine and intertidal historic environment assets	✓	✓	✓	Negligible	High/Very High	Minor	N/A	Minor	None
Cumulative Indirect loss of or damage to known and unknown marine and intertidal historic environment assets	✓	✓	✓	Negligible	High/Very High	Minor	N/A	Minor	None

14.18 References

BBWFL (2022a). Berwick Bank Wind Farm Offshore Environmental Impact Assessment: Marine Archaeology Technical Report. Commissioned by SSE Renewables.

BBWFL (2022b) Berwick Bank Wind Farm Offshore Environmental Impact Assessment: Outline Written Scheme of Investigation and Protocol for Archaeological Discoveries. Commissioned by SSE Renewables.

Bicket, A., Tizzard, L., 2015. A review of the submerged prehistory and palaeolandscapes of the British Isles, Proceedings of the Geologists' Association 126 (6): 643–663, doi.org/10.1016/j.pgeola.2015.08.009

Chartered Institute for Archaeologists (CIfA) (2014). Standard and guidance for Archaeological Advice by Historic Environment Services. Reading, CIfA (updated 2020).

CIfA (2014, Revised 2019). Code of Conduct, Reading: CIfA.

DEFRA (2009). Our Seas - A shared resource: High level marine objectives, DEFRA.

DEFRA (2011). The UK Marine Policy Statement, DEFRA.

English Heritage (now Historic England) (2002). Military Aircraft Crash Sites: archaeological guidance on their significance and future management. London, English Heritage.

English Heritage (now Historic England) (2008). Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment.

English Heritage (now Historic England) (2013). Marine Geophysics Data Acquisition, Processing and Interpretation Guidance Notes.

English Heritage (now Historic England) (2015a). Managing Significance in Decision-Taking in the Historic Environment, English Heritage.

English Heritage (now Historic England) (2015b). Management of Research Projects in the Historic Environment: the MoRPHE Project Managers' Guide, English Heritage.

English Heritage (now Historic England) (2015c). Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record . English Heritage.

English Heritage (now Historic England) (2016). Preserving Archaeological Remains: Decision-Taking for Sites under Development, English Heritage.

English Heritage (now Historic England) (2017). Ships and Boats: Prehistory to Present: Designation Selection Guide. London, English Heritage.

Historic England (2020). Deposit Modelling and Archaeology. Guidance for Mapping Buried Deposits, Swindon: Historic England.

Historic England (2021). Commercial Renewable Energy Development and the Historic Environment. Historic England.

JNAPC (2006). Code of Practice for Seabed Development. York, Joint Nautical Archaeology Policy Committee.

Scottish Government (2022). Offshore renewable energy: decommissioning guidance for Scottish waters. Available at: https://www.gov.scot/publications/offshore-renewable-energy-decommissioning-guidance-scottish-waters/documents/

Tizzard, L., Bicket, A. R., Benjamin, J. & De Loecker, D. A. (2014). Middle Palaeolithic Site in the Southern North Sea: Investigating the Archaeology and Palaeogeography of Area 240. Journal of Quaternary Science, Volume 29, p. 698–710.

The Crown Estate. (2014). Protocol for Archaeological Discoveries: Offshore Renewables Projects (ORPAD). The Crown Estate.

The Crown Estate. (2021). Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects. The Crown Estate.

Wessex Archaeology (2007). Historic Environment Guidance for the Offshore Renewable Energy Sector. Commissioned by COWRIE Ltd (project reference ARCH-11-05).

Wessex Archaeology (2008a). Aircraft Crash Sites at Sea: A Scoping Study. London. English Heritage.

Wessex Archaeology (2008b). Annex to the Protocol Guidance on the Use of the Protocol for Reporting Finds of Archaeological Interest in Relation to Aircraft Crash Sites at Sea, BMAPA & English Heritage.

Wessex Archaeology (2015). Understanding submerged palaeo-environments in the southern North Sea: Pathways and timescales of hominin colonisation, Salisbury: unpubl report, ref: 102771.02.