Muir Mhòr Offshore Wind Farm

Environmental Impact Assessment Report

Volume 2, Chapter 15: Marine Archaeology and Cultural Heritage

Revision No.	Date	Reason for Issue	Author	Reviewer	Approver
01	22/11/2024	Final	Wessex Archaeology Limited	GoBe Consultants Ltd.	MMOWF Ltd

Document Information

Document ID	**MMH-GBE-A004-ENV-0006-208**
Revision	01
Date	22/11/2024

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Glossary

Term	Definition
Archaeological Exclusion Zone	An area around a heritage asset in which construction activities and anchoring are prohibited in order to avoid impacts to the asset.
Archaeological interest	There will be archaeological interest in a heritage asset if it holds, or potentially may hold, evidence of past human activity worthy of expert investigation at some point. Heritage assets with archaeological interest are the primary source of evidence about the substance and evolution of places, and of the people and cultures that made them.
Array Area	The area in which the generation infrastructure (including Wind Turbine Generators and associated foundations and inter-array cables), Offshore Electrical Platform(s), and an interconnector cable will be located.
Cultural Significance	Cultural significance means aesthetic, historic, scientific or social value for past, present or future generations. Cultural significance can be embodied in a place itself, its fabric, setting, use, associations, meanings, records, related places and related objects. (Australia International Council on Monuments and Sites (ICOMOS) Burra Charter 2013).
Designated heritage asset	A World Heritage Site, National Monument, Protected Wreck Site, designated under the relevant legislation.
Developer	Muir Mhòr Offshore Wind Farm Limited
EIA Regulations	Collectively the term used to refer to The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, The Marine Works (Environmental Impact Assessment) Regulations 2007, and The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017.
Environment Impact Assessment (EIA)	The procedure to predict, minimize, measure and, if necessary, correct and compensate the impacts produced by any human action.
Floating Foundations	The floating structures on which the Wind Turbine Generators are installed.
Foundation anchors	The structures which anchor the Floating Foundations to the seabed, connected to the foundation mooring.
Foundation mooring	The mooring structures which connect the Floating Foundations to the anchors.
Heritage asset	‘Heritage Asset’ or ‘Historic Asset’ is a physical element of the historic environment – a building, monument, site, place, area or landscape identified as having cultural significance. Heritage assets include designated heritage assets.
Historic Environment	The historic environment is ‘the physical evidence for human activity that connects people with place, linked with the associations we can see, feel and understand’ (Our Place in Time, the Historic Environment Strategy for Scotland).
Historic environment record	Information services that seek to provide access to comprehensive and dynamic resources relating to the historic environment of a defined geographic area for public benefit and use.
Horizontal Directional Drilling (HDD)	A method of cable installation where the cable is drilled beneath a feature without the need for trenching.
Inter-array cables	Cables which link the wind turbines generators to each other and the Offshore Electrical Platform(s).
Interconnector cable	Cable which links the Offshore Electrical Platform(s) to one another, allowing for power to be transferred between the platforms.

Term	Definition
Landfall	The area between Mean High Water Springs (MHWS) and Mean Low Water Springs (MLWS) where the offshore export cables are brought onshore.
Offshore Electrical Platform (OEP)	Offshore platform consisting of High Voltage Alternating Current (HVAC) equipment, details depending on the final electrical set up of the Project.
Offshore Export Cable Corridor (ECC)	The area within which the offshore export cables will be installed.
Offshore export cables	The subsea electricity cable circuits running from the Offshore Electrical Platform(s) to the landfall which will transmit the electricity generated by the offshore wind farm to the onshore export cables for transmission onwards to the onshore substation and the national electrical transmission system along with auxiliary cables such as fibre optic cables.
Offshore transmission infrastructure	The proposed transmission infrastructure comprising: Offshore Electrical Platform(s) and associated foundations and substructures; the interconnector cable, the offshore export cables; and the landfall area up to Mean High Water Springs (MHWS).
Project	Muir Mhòr Offshore Wind Farm – comprises the wind farm and all associated offshore and onshore components.
Proposed Development	The offshore Muir Mhòr Offshore Wind Farm project elements to which this Offshore EIA Report relates.
Significance (for heritage policy)	The value of a heritage asset to this and future generations because of its heritage interest. That interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting.
Study Area	Receptor specific area used to characterise the baseline.
Wind Turbine Generator (WTG)	The wind turbines that generate electricity consisting of tubular towers and blades attached to a nacelle housing mechanical and electrical generating equipment.

Acronyms

Term	Definition
AEZ	Archaeological Exclusion Zone
ALSF	Aggregates Levy Sustainability Fund
BGS	British Geological Survey
CaP	Cable Plan
CIfA	Chartered Institute for Archaeologists
CMS	Construction Management Statement
DP	Decommissioning Plan
DSLP	Development Specification and Layout Plan
ECC	Export Cable Corridor
EEA	European Economic Areas
EEZ	Exclusive Economic Zone
EIA	Environment Impact Assessment
EIAR	Environmental Impact Assessment Report
EMP	Environment Management Plan
HDD	Horizontal Directional Drilling
HEPS	Historic Environment Policy Statement
HER	Historic Environment Records
HES	Historic Environment Scotland
HMPA	Historic Marine Protected Area
ICOMOS	International Council on Monuments and Sites
JNAPC	Joint Nautical Archaeology Policy Committee
JUV	Jack-up Vessel
LSE	Likely Significant Effects
Mag.	Magnetometer
MBES	Multibeam Echosounder
MD-LOT	Marine Directorate - Licensing Operations Team
MEDIN	Marine Environment Data and Information Network
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MOD	Ministry of Defence
MPS	Marine Policy Statement
nm	Nautical miles
nT	nanotesla
NMP	National Marine Plan
NPF4	National Planning Framework for Scotland 4
OEP	Offshore Electrical Platform
PAD	Protocol for Archaeological Discoveries
RIAA	Report to Inform Assessment

Term	Definition
ROV	Remotely Operated Vehicle
SBP	Sub-Bottom Profiler
SSC	Suspended Sediment Concentrations
SSS	Sidescan Sonar
TJB	Transit Joint Bay
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
WA	Wessex Archaeology
WSI	Written Schemes of Investigation
WTG	Wind Turbine Generator

15. MARINE ARCHAEOLOGY AND CULTURAL HERITAGE

15.1. INTRODUCTION

15.1.1. This Chapter of the Offshore Environmental Impact Assessment Report (EIAR) presents an assessment of the potential impacts and associated Likely Significant Effects (LSE) on marine archaeology and cultural heritage from the construction, operation and maintenance, and decommissioning of the Muir Mhòr Offshore Wind Farm offshore infrastructure (hereafter referred to as 'the Proposed Development') up to Mean High Water Springs (MHWS). The offshore infrastructure of the Proposed Development includes Wind Turbine Generators (WTGs) and associated floating foundations, the Offshore Electrical Platform(s) (OEP(S)) and associated foundations, the inter-array cables, interconnector cable, offshore cables and landfall. This Chapter also discusses appropriate mitigation and monitoring as required to address any significant effects.

15.1.2. This Chapter should be read alongside and is informed by the following other Chapters and Technical Report:

- Volume 1, Chapter 2 (Legislation and Policy Context);
- Volume 1, Chapter 3 (Project Description);
- Volume 1, Chapter 5 (Consultation);
- Volume 1, Chapter 6 (Environmental Impact Assessment Methodology);
- Volume 2, Chapter 7 (Marine and Coastal Processes); and
- Volume 3, Chapter 15.1 (Marine Archaeology and Cultural Heritage Technical Report).
- Onshore EIAR Chapter 9 (Terrestrial Archaeology and Cultural Heritage) for coverage of the intertidal zone.

15.1.3. This Chapter includes a summary of information contained in Volume 3, Chapter 15.1 (Marine Archaeology and Cultural Heritage Technical Report). The Technical Report provides the baseline context and gazetteer to support the assessment presented in this Chapter of the EIAR. The baseline was collated from an assessment of primary and secondary sources aimed to identify anomalies of archaeological potential within the study area.

15.1.4. This Chapter does not include impacts relevant to marine archaeology and cultural heritage but scoped out of the assessment, as agreed with key stakeholders through consultation (as described in Table 15-13), including:

- Transboundary Impacts on the marine historic environment during construction, operation and maintenance, and decommissioning; and
- Impacts on setting of onshore designated assets during operation and maintenance.

15.1.5. A separate onshore EIAR is being prepared which will provide a description of the onshore elements of the Project landward of MLWS, and an assessment of the associated likely significant effects. Once published, Chapter 9 of the EIAR (Terrestrial Archaeology and Cultural Heritage) will provide coverage of the intertidal zone.

15.1.6. This Chapter has been prepared by Wessex Archaeology Ltd. Further details of the relevant qualifications, expertise and experience of Wessex Archaeology Limited are provided in Volume 1, Chapter 1 (Introduction).

15.2. PURPOSE OF THE CHAPTER

15.2.1. The primary purpose of the EIAR is defined in Volume 1, Chapter 1 (Introduction).

15.2.2. The key objective of this Chapter is to provide Scottish Ministers and statutory and non-statutory stakeholders, the information required to assess for LSE on marine archaeology and cultural heritage in relation to the Proposed Development. This assessment considers those effects from the Proposed Development in isolation, and also cumulative effects (the effects of the Proposed Development combined with the effects from other plans and projects).

15.2.3. This Chapter presents the following:

- A detailed description of current environmental baseline conditions relevant to marine archaeology and cultural heritage. These have been established from a detailed literature review, desk studies, site-specific surveys, and consultation with stakeholders;
- Discussion of assumptions and any limitations with respect to the information used to define the baseline;
- Identification of potential impacts and any resulting LSE on marine archaeology and cultural heritage related to Proposed Development activities. This process is informed by the application of embedded commitments;
- Consideration of the need for any 'secondary' mitigation measures (in addition to embedded commitments) to avoid, minimise, reduce, or offset LSE on marine archaeology and cultural heritage from the Proposed Development;
- Consideration of any residual effects following application of secondary mitigation; and
- Identification of monitoring measures to support any proposed mitigation.

15.3. LEGISLATION AND POLICY CONTEXT

15.3.1. Overarching legislation, policy, and guidance in relation to the EIAR for the Proposed Development is provided in Volume 1, Chapter 2 (Legislation and Policy Context) of the EIAR. Below is provided a summary of legislation, policy, and guidance directly relevant to marine archaeology and cultural heritage.

LEGISLATION AND POLICY

15.3.2. All legislation and policy directly applicable to marine archaeology and cultural heritage is illustrated in Table 15-1.

Table 15-1 Legislation and policy relevant to Marine Archaeology and Cultural Heritage

Legislation/Policy	Summary	How Chapter has considered this
The World Heritage Convention 1972	The Convention provides for the identification, protection, conservation and presentation of cultural and natural sites of 'outstanding universal value' for inscription on the World Heritage List. The Convention sets out the duties of States Parties in identifying potential sites and their role in protecting and preserving them. By signing the Convention, each country pledges to conserve not only the World Heritage sites situated on its territory, but also to protect its national heritage. The 1972 United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Convention was ratified by the UK in 1984, and the UK currently has 29 World Heritage Sites.	The significance of offshore heritage assets has been discussed in Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report). This is relevant to the topic assessment as the Environment Impact Assessment (EIA) demonstrates that potential harm to heritage assets will be avoided, minimised or mitigated (Table 15-11).
The United Nations Convention on the Law of the Sea (UNCLOS)1982	UNCLOS 1982 was ratified by the UK in 1997. Article 149 applies only to those archaeological and historical objects that lie outside national jurisdiction and stipulates that 'all objects of an archaeological and historical nature found in the Area shall be preserved or disposed of for the benefit of mankind as a whole, particular regard being paid to the preferential rights of the State or country of origin, or the State of cultural origin, or the State of historical and archaeological origin'. Article 303 stipulates that 'states have the duty to protect objects of archaeological and historical nature found at sea and shall co-operate for this purpose'. Article 303 also provides for coastal states to exert a degree of control over the archaeological heritage to 24 nm, though the UK has not introduced any measures to implement this right.	The significance of offshore heritage assets has been discussed in Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report). This is relevant to the topic assessment as the EIA demonstrates that potential harm to heritage assets will be avoided, minimised or mitigated (Table 15-11).
The European Convention on the Protection of the Archaeological Heritage (Revised) 1992 (the Valletta Convention)	The Articles of the Valletta Convention tackle various aspects. Article 1 deals with the inventorying and protection of sites and areas; Article 2 deals with the mandatory reporting of chance finds and providing for 'archaeological reserves' on land or underwater; Article 3 promotes high standards for all archaeological work undertaken by suitably qualified people; Article 4 requires the conservation of excavated sites and the safe-keeping of finds; and Article 5 is concerned with consultation that should take place between planning authorities and developers to avoid damage to archaeological remains. The Valletta Convention was ratified by the UK Government in 2000 and came into force in 2001. The convention binds the UK to implement protective measures for the archaeological heritage within the jurisdiction of each party, including sea areas. Insofar as the UK exerts jurisdiction over the Continental Shelf, then it would appear that the provisions of the Valletta Convention apply to that jurisdiction.	The significance of offshore heritage assets has been discussed in Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report). This is relevant to the topic assessment as the EIA demonstrates that potential harm to heritage assets will be avoided, minimised or mitigated (Table 15-11).

Legislation/Policy	Summary	How Chapter has considered this
International Council of Monuments Sites Charter on the Protection and Management of Underwater Cultural Heritage 1996 (the Sofia Charter)	The Charter upon which the Annex of the UNESCO Convention is largely based includes a series of statements regarding best practice, intending 'to ensure that all investigations are explicit in their aims, methodology and anticipated results so that the intention of each project is transparent to all'. The UK is a member of the International Council of Monuments and Sites.	Relevant best practice guidance applicable to the Proposed Development is provided in Table 15-2.
The European Landscape Convention 2000	The European Landscape Convention became binding on the UK from 1 March 2007. Its principal clauses require the Government to protect and manage landscapes and to integrate landscape into regional and town planning policies including its cultural, environmental, agricultural, social and economic policies. The Convention applies to the entire territory of the UK and includes land, inland water and marine areas. It is not regarded as applying to sea areas regulated by the UK that lie beyond territorial waters.	The approach to the assessment of impacts upon the historic environment is in line with the Convention.
UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001	The UNESCO Convention was concluded in 2001 and is a comprehensive attempt to codify the law internationally with regards to underwater archaeological heritage. The UK abstained in the vote on the final draft of the Convention, however, it has stated that it has adopted the Annex of the Convention, which governs the conduct of archaeological investigations, as best practice for archaeology. Although the UK is not a signatory, the convention entered into force on 2nd January 2009 having been signed or ratified by 20 member states. It has since been ratified or accepted by an additional 40 states.	The approach to the assessment of impacts upon the historic environment is in line with the Annex of the Convention.
Marine and Coastal Access Act 2009	The Marine and Coastal Access Act 2009 provides devolved authority to Scottish Ministers for marine planning and conservation powers in the Scottish Offshore Region (from 12 to 200 nm). Under Section 66 of the Marine and Coastal Access Act 2009 (in the context of the Scottish Offshore Region), the Proposed Development requires a Marine Licence for the marine licensable activities beyond 12 nm.	Marine Directorate – Licensing Operations Team (MD-LOT) are the governing body responsible for licensing, regulating and planning marine activities in Scotland (see Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report). An assessment of Proposed Development activities during the construction, operation and maintenance, and decommissioning phases which have the potential to result in an effect on historic environment receptors

Legislation/Policy	Summary	How Chapter has considered this
		(and which therefore require consideration as part of the Marine Licence application) are considered in Section 15.7.
Marine (Scotland) Act 2010	The Marine (Scotland) Act 2010 provides the legislative and management framework for the marine environment within Scottish Territorial Waters (from MHWS out to 12 nm). Under this legislation, Scottish Ministers along with public authorities have the responsibility to act to protect and enhance the marine biodiversity and the preservation of marine historic assets of national importance. Marine historic assets of national importance which are located within Scottish Territorial Waters, can be designated as Historic Marine Protected Areas (HMPAs). In Scotland, HMPAs have replaced Section 1 of the Protection of Wrecks Act 1973, which provides protection for designated shipwrecks in the UK. Military wrecks and aircraft are further addressed through the Protection of Military Remains Act 1986.	MD-LOT are the governing body responsible for licensing, regulating and planning marine activities in Scotland (see Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report). An assessment of Proposed Development activities during the construction, operation and maintenance, and decommissioning phases which have the potential to result in an effect on historic environment receptors (and which therefore require consideration as part of the Marine Licence application) are considered in Section 15.7
Historic Environment Scotland Act 2014	Section 1 of this Act provides for the creation of a new body to be known as Historic Environment Scotland (HES), with the functions conferred on it by this Act and any other enactment. HES's general function is to investigate, care for and promote Scotland's historic environment. HES is responsible for the archaeological resource within Scotland's Territorial Waters (up to 12 nm) and acts as consultee for the resource in the Scottish Exclusive Economic Zone (EEZ).	HES were consulted with regards to Marine Archaeology and Cultural Heritage Chapter presented in the Offshore Scoping Report (Volume 3, Appendix 5.2 (Offshore Scoping Report)). Feedback from the responses to the Scoping Report were incorporated in this Chapter as presented in Section 15.4.
Protection of Wrecks Act 1973: Section 2	Wrecks and wreckage of historical, archaeological or artistic importance can be protected by way of designation. It is an offence to carry out certain activities in a defined area surrounding a wreck that has been designated, unless a license for those activities has been obtained from the Government. Section 2 provides protection for wrecks that are designated as dangerous due to their contents and is administered by the Maritime and Coastguard Agency through the Receiver of Wreck. There are no protected wrecks under this legislation within the footprint of the Proposed Development.	There are no protected wrecks within the study area (Section 15.5). The embedded commitments for the Proposed Development have been designed to protect any marine archaeological receptors of interest (Table 15-11).

Legislation/Policy	Summary	How Chapter has considered this
Ancient Monuments and Archaeological Areas Act 1979 (as amended)	This Act is primarily land based, but in recent years it has also been used to provide some level of protection for underwater sites. Scheduled Monuments and Areas of Archaeological Importance are afforded statutory protection by the Secretary of State, and consent is required for any major works. It is a criminal offence to carry out any works on, or near to, a Scheduled Monument without Scheduled Monument Consent. Both terrestrial and maritime sites, including wrecks, may be designated under this Act. There are no Scheduled Monuments within the footprint (offshore or intertidal) of the Proposed Development.	There are no Scheduled Monuments or designated Areas of Archaeological Importance within the study area (Section 15.5)
Protection of Military Remains Act 1986	Under this Act, all aircraft that have crashed in military service are automatically protected. Maritime vessels 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 'controlled sites' around wrecks whose position is known and can designate named vessels as 'protected places' even if the position of the wreck is not known. It is not necessary to demonstrate the presence of human remains at either 'controlled sites' or 'protected places'. Beyond the 12 nm limit the Merchant Shipping Act 1995 covers wrecks found or taken into possession outside UK waters and stipulates that, if brought into UK waters, finds must be reported to the Receiver of Wreck. 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 known aircraft crash sites, controlled sites or protected places within the study area (Section 15.5)
Merchant Shipping Act 1995	This Act sets out the procedures for determining the ownership of underwater finds that turn out to be 'wreck', defined as any flotsam, jetsam, derelict and lagan found in or on the shores of the sea or any tidal water. It includes ships, aircraft, hovercraft, parts of these, their cargo or equipment. If any such finds are recovered and brought into UK territorial waters, the salvor is required to give notice to the Receiver of Wreck that he/she has found or taken possession of them and as directed by the Receiver, either hold them pending the Receiver's order or deliver them to the Receiver. The act is administered by the Maritime and Coastguard Agency.	The mitigation measures for the Proposed Development have been designed to protect any marine archaeological receptors of interest. Archaeological Exclusion Zones (AEZs) are recommended around historic records of archaeological material (see paragraph 15.6.16 and Table 15-12). A Protocol for Archaeological Discoveries (PAD) is recommended to report any discoveries of unexpected archaeological material (Table 15-11).

Legislation/Policy	Summary	How Chapter has considered this
United Kingdom (UK) Marine Policy Statement (MPS) (HM Government, 2011)	This statement was intended to facilitate and support the formulation of Marine Plans, ensuring that marine resources are used in a sustainable way in line with high level marine objectives. The MPS also states that Marine Plans must ensure a sustainable marine environment that will protect heritage assets.	Table 15-11 of this Chapter outlines the mitigation measures needed to preserve any archaeological or historical assets. Avoidance will be achieved through the recommendation of AEZs. 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 15.7.
Scottish National Marine Plan (NMP) Scottish Government, 2015)	This sets out a single framework for sustainable development within Scotland's marine area. General Policy 6 for 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".	This is relevant to the topic assessment as the EIA demonstrates that potential harm to heritage assets will be avoided, minimised or mitigated (Table 15-11).
National Planning Framework for Scotland 4 (NPF4) 2023	Long term spatial strategy for Scotland's development including the protection of the environment, with a focus on the conservation and enhancement of Scotland's distinctive natural and cultural heritage and a commitment to protect, promote and support the sustainable management of these assets. Policy 7 protects the embodied carbon in the historic built environment. The Policy intent is to protect and enhance historic environment assets and places, and to enable positive change as a catalyst for the regeneration of places. The suite of policies in NPF4 should be read as a whole, and Policy 10 and Policy 32 are particularly relevant to underwater heritage.	The significance of offshore heritage assets has been discussed in Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report). This is relevant to the topic assessment as the EIA demonstrates that potential harm to heritage assets will be avoided, minimised or mitigated (Table 15-11).
Historic Environment Policy Statement (HEPS) 2019	Includes policies that decisions affecting any part of the historic environment require understanding of its significance and consideration of avoiding or minimising detrimental impacts.	The significance of offshore heritage assets has been discussed in Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report). This is relevant to the topic assessment as the EIA demonstrates that potential harm to heritage assets will be avoided, minimised or mitigated (Table 15-11).

Legislation/Policy	Summary	How Chapter has considered this
Historic Environment Scotland Designation Policy and Selection Guidance (Historic Environment Scotland (HES), 2019)	Stands alongside HEPS 2019 and outlines the principles and criteria that underpin the designation of HMPAs.	The significance of offshore heritage assets has been discussed in Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report). This is relevant to the topic assessment as the EIA demonstrates that potential harm to heritage assets will be avoided, minimised or mitigated (see Table 15-11).

GUIDANCE

15.3.3. All guidance directly applicable to marine archaeology and cultural heritage is illustrated in Table 15-2.

Table 15-2 Guidance relevant to Marine Archaeology and Cultural Heritage

Guidance	Summary	How Chapter has considered this
Military Aircraft Crash Sites: Guidance on their significance and future management (Historic England, 2002)	This provides archaeological guidance regarding the significance and future management of military aircraft crash sites. It outlines the importance of aircraft crash sites and indicates that they should be considered where they are affected by development proposals.	The significance of offshore heritage assets has been discussed in Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report).
Code of Practice for Seabed Developers (Joint Nautical Archaeology Policy Committee (JNAPC) and The Crown Estate, 2006)	This voluntary code provides a framework for seabed developers similar to the principles found in current policy and practice on land. The aim of the Code is to ensure a best practice model for seabed development. The Code offers guidance to developers on issues such as risk management and legislative implications.	The EIA demonstrates that potential harm to heritage assets will be avoided, minimised or mitigated (see Table 15-11).
Historic Environment Guidance for Offshore Renewable Energy Sector (Wessex Archaeology, 2007)	Of relevance to the offshore renewable energy sector, this guidance is intended to promote the development of best practice in relation to the marine historic environment. It is also intended to promote an understanding of conservation issues arising from the effects of offshore renewable energy projects on the historic environment.	The EIA demonstrates that potential harm to heritage assets will be avoided, minimised or mitigated (see Table 15-11).
Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (Oxford Archaeology & George Lambrick Archaeology and Heritage, 2008)	This report provides guidance for the assessment of impacts on the historic environment from offshore renewable energy projects. It outlines the cumulative (additive / changes) and synergistic (impact interactions) effects that should be considered.	Cumulative impacts and interactions are assessed in Section 15.9
Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (Gribble, J. and Leather, S for EMU Ltd, 2011)	This report provides guidance on how best to achieve the integration of offshore geotechnical investigations and their data outputs, arising from offshore renewable energy projects, with archaeological historic environment analysis, and ensure optimum use of geotechnical data.	The significance of offshore heritage assets has been discussed in Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report).

Guidance	Summary	How Chapter has considered this
Assessing Boats and Ships 1860 -1913, 1914-1938 and 1939-1950 (Wessex Archaeology, 2011)	Guidance on the key themes and interests represented by wrecks of this period. This guidance, in the form of synthesised period reports, can be used to inform advice and decisions regarding importance and mitigation.	The significance of offshore heritage assets has been discussed in Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report).
Marine Geophysics Data Acquisition, Processing and Interpretation Guidance Notes (Historic England, 2013)	These notes were prepared as part of the Aggregates Levy Sustainability Fund's (ALSF) dissemination of heritage information, based on the assessment of a number of ALSF projects. It provides basic information for the characterisation of wreck sites and submerged prehistoric landscapes.	The significance of offshore heritage assets has been discussed in Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report).
Protocol for Archaeological Discoveries: Offshore Renewables Projects (The Crown Estate, 2014)	This document is a Protocol that will satisfy anticipated conditions relating to the reporting of archaeological discoveries across the offshore renewable energy industry, if followed correctly.	The EIA demonstrates that potential harm to heritage assets will be avoided, minimised or mitigated (see Table 15-11).
Ships and Boats: Prehistory to Present. Selection Guide (Historic England, 2012)	This guide outlines the selection criteria used when designating ships and boats that are part of the archaeological resource.	The significance of offshore heritage assets has been discussed in Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report).
Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland (HES and Scottish Natural Heritage, 2018)	The Handbook is intended to provide competent authorities, statutory consultees and others involved in the EIA process with practical guidance and a ready source of information about the process.	Impact assessment undertaken following best-practice and guidance.
Standard and guidance for historic environment desk-based assessment (Chartered Institute for Archaeologists (CIfA), 2014 (updated 2020))	This guidance seeks to define good practice for the execution and reporting of desk-based assessment, in line with the by-laws of the CIfA.	Assessment undertaken following best-practice and guidance.
Designation Policy and Selection Guidance (Historic Environment Scotland, 2019, updated 2020)	This document sets out the policy and selection guidance used by Historic Environment Scotland for designating historic sites and places at the national level.	The significance of offshore heritage assets has been discussed in Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report).
Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (The Crown Estate, 2021)	This document supersedes 'Model Clauses' document and draws on experience from projects developed as part of Offshore Wind Leasing Rounds 1 to 3, to provide robust, relevant guidance for Round 4 and beyond. The	The EIA demonstrates that potential harm to heritage assets will be avoided, minimised or mitigated (see Table 15-11).

Guidance	Summary	How Chapter has considered this
	Guidance is applicable to existing construction methods, but also new technologies, including floating turbines. The document sets out high level guidance on a range of archaeological methodologies that may be required in the production of Written Scheme of Investigation (WSI)s and Method Statements.	An Outline WSI forms part of the application (Volume 4, Appendix 8 (Outline Written Scheme of Investigation).

15.4. CONSULTATION

15.4.1. Ongoing statutory and non-statutory consultation and incorporation of feedback is an integral part of developing a robust EIAR. The Offshore Scoping Report (Volume 3, Appendix 5.1 (Offshore Scoping Report)) for the Proposed Development was submitted to MD-LOT in June 2023. A detailed response to the Scoping Report's content and questions was provided from MD-LOT, and multiple additional consultees in the September 2023 Scoping Opinion (Volume 3, Appendix 5.2 (Offshore Scoping Opinion)).

15.4.2. Table 15-3 provides a summary of the stakeholder consultation activities specific to marine archaeology and cultural heritage. Clarifications were requested from HES on points raised in the responses to the Offshore Scoping Report, received in September 2023. The issues raised and actions to address and incorporate this feedback into the EIAR are outlined in Table 15-3.

15.4.3. Further detail on the overall EIA stakeholder consultation process for the Proposed Development and associated actions is presented in Volume 1, Chapter 5 (Consultation) of the EIAR.

Table 15-3 Consultation Relevant to Marine Archaeology and Cultural Heritage

Date	Consultee and Type of Consultation	Description/ Issues Raised	How this has been considered in this Chapter
March 2023	HES – Introductory Meeting	Project Introductions; Project Actions / Assessment; Next Steps	Approach to scoping for Marine Archaeology and Cultural Heritage was provided; reflected in the baseline data set out in Table 15-4 and Table 15-5.
September 2023	MD-LOT – Scoping Opinion	The Scottish Ministers are content with the study area and that the baseline data for the assessment is appropriate.	The study area for Marine Archaeology and Cultural Heritage is defined in Section 15.5 and the baseline data is set out in Table 15-4 and Table 15-5.
		The Scottish Ministers are content that the methodology and embedded mitigation proposed are appropriate. This view is supported by HES.	The methodology is set out in Section 15.5 and embedded commitments are listed in Table 15-11.
		The Scottish Ministers, in line with HES, agree with the potential impacts to Marine Archaeology, identified in the Scoping Report to be scoped into the EIAR.	Direct and indirect impacts on marine archaeology and marine cultural heritage receptors within the scheme footprint have been scoped in. These are presented in Table 15-14.
		The Scottish Ministers advise that Cultural Heritage impacts can be scoped out of the EIA Report and direct the Developer to the HES representation for their comments in relation to this.	Noted. Aspects identified in Table 14-5 of the Scoping Report have been scoped into the EIA, and that the Scottish Ministers and HES are in agreement.
September 2023	HES – Representation to MD-LOT during consultation on Scoping Opinion	HES are content with the approach and conclusions of the Scoping Report and welcome the proposal to scope in impacts due to the potential for direct and indirect impacts on marine heritage assets. The methodology and embedded mitigation proposed in the Scoping Report are deemed appropriate at this stage. For this reason, HES are content for cultural heritage assets within our remit to be scoped out of the EIA assessment.	Aspects identified in Table 14-5 of the Scoping Report have been scoped into the EIA, and that the Scottish Ministers and HES are in agreement. As per HES clarification correspondence dated to April 9th 2024, impacts to the setting of onshore assets within HES' remit from marine infrastructure elements are scoped out of the marine archaeology and cultural heritage EIA process, and the agreed approach for these onshore heritage assets will be considered by the terrestrial Scoping and EIA process.

Date	Consultee and Type of Consultation	Description/ Issues Raised	How this has been considered in this Chapter
		To clarify, for the offshore elements of the proposal we confirm that Marine Archaeology should be scoped in, but impacts on cultural heritage, such as setting impacts by the marine cable, can be scoped out of the EIA report for the offshore elements. We understand that a standalone onshore EIA Scoping Report relating to impacts of onshore infrastructure will be submitted separately, and that this will consider impacts to onshore cultural heritage assets within our remit from the turbines and associated infrastructure. We are content with this approach.	The Developer agrees that the onshore EIA will cover the setting impacts of turbines and other offshore infrastructure on onshore assets.
		We note that there are no known heritage assets in the Array Area and 62 heritage assets within the wider study area; 39 of which are still 'live' wrecks which have not been salvaged. There are 4 World War II crash sites recorded within the study area, but we note that their locations are approximate.	Summary of baseline characterises for marine archaeology and cultural heritage is described in Section 15.5.
		The Scoping report proposes that marine archaeology and assets be scoped in for assessment due to the potential for direct and indirect impacts on marine heritage assets. This is due to the loss of or damage to known and unknown marine historic environment assets from direct impacts, the loss of or damage to submerged prehistoric landscapes from physical impacts and the indirect disturbance to marine assets caused by cable burial methods and/or cable protection are scoped in during the construction and decommissioning phases of the project (p.293). The report also notes (p.290-291) that during the operation and maintenance of the windfarm the loss of or damage to known and unknown historic environment	Direct and indirect impacts on marine archaeology and marine cultural heritage receptors within the scheme footprint have been scoped in, see Table 15-14 for details. As per HES clarification correspondence dated to April 9th, 2024, impacts to the setting of onshore assets within HES' remit from marine infrastructure elements are scoped out of the marine archaeology and cultural heritage EIA process, and the agreed approach for these onshore heritage assets will be considered by the terrestrial Scoping and EIA process.

Date	Consultee and Type of Consultation	Description/ Issues Raised	How this has been considered in this Chapter
		assets from direct impacts, the loss of or damage to submerged prehistoric landscapes from direct impacts, and the indirect disturbance to marine historic environment assets caused by additional cable protection during repair and maintenance are all scoped in for assessment (p.293-294). The Scoping report also outlines mitigations including a Marine Written Scheme of Investigation, the implementation of a Protocol for Archaeological Discoveries, scour protection and a decommissioning plan. We are content with the approach and scope of this assessment, and we welcome that the applicant proposes to Scope the above impacts into their assessment. However, we are content that the methodology and embedded mitigation proposed in the scoping report are deemed appropriate at this stage and for other cultural heritage assets within our remit to be scoped out of the EIA report undertaken in support of the offshore elements of the proposals.	
		HES are content that impacts on onshore cultural heritage assets within our remit, such as setting impacts by the turbines and infrastructure related to cable landfall sites, will be considered as part of a standalone onshore scoping assessment.	Noted.

15.5. BASELINE ENVIRONMENT

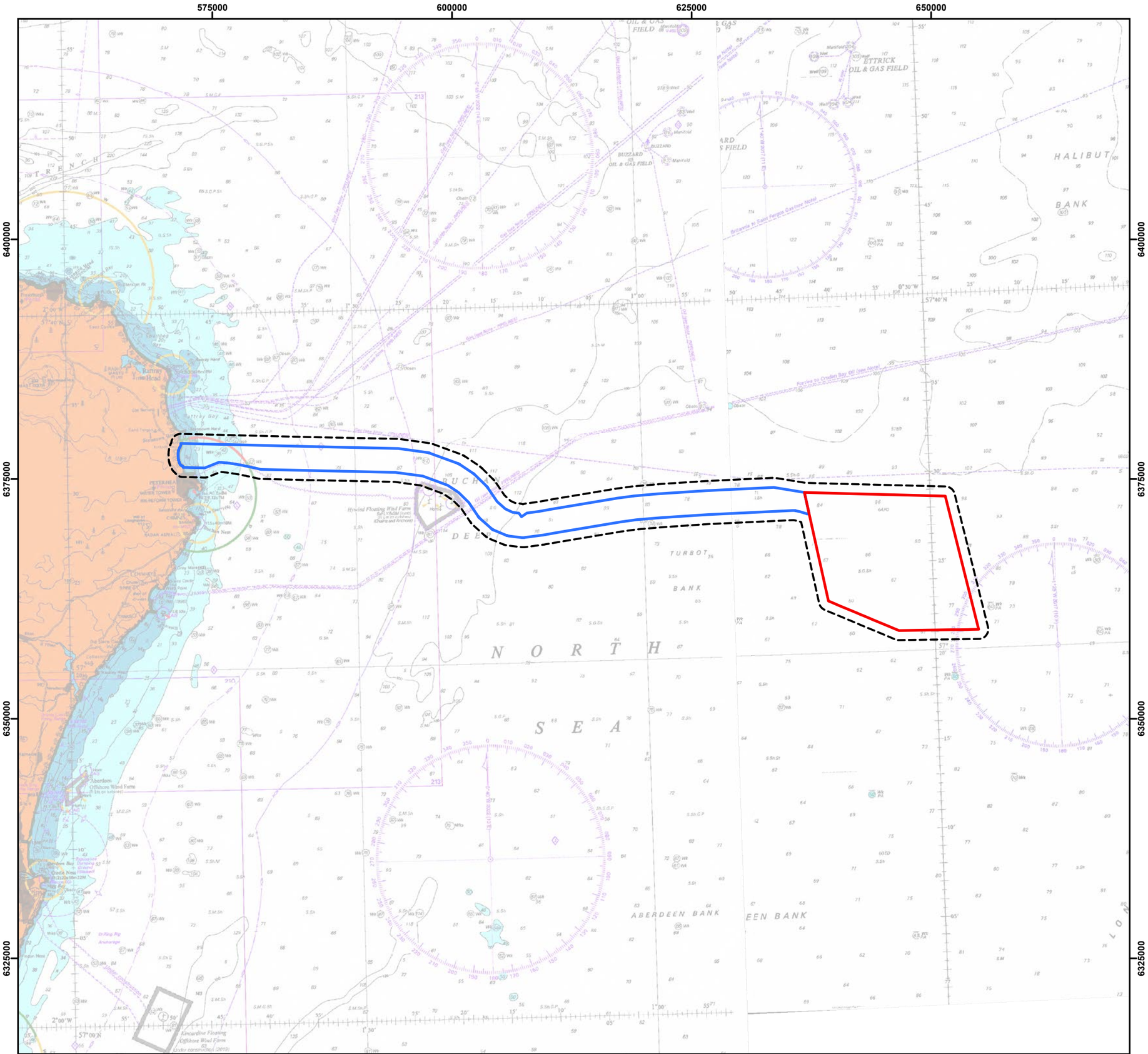
15.5.1. This section presents a summary of the marine archaeology and cultural heritage baseline environment study area, the methodology to establish the baseline, baseline conditions and the limitations and assumptions of the data used. The supporting analysis undertaken to develop this baseline is provided in Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report).

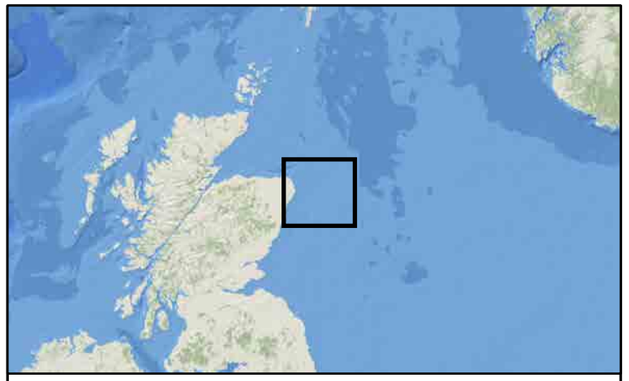
STUDY AREA

15.5.2. Figure 15-1 shows the Marine Archaeology and Cultural Heritage study area. This includes the following:

- Array Area;
- Offshore Export Cable Corridor (ECC);
- Geophysical survey data coverage; and
- Intertidal area seaward of MHWS.

15.5.3. A 1 km buffer has been added around the footprint of the Proposed Development to capture relevant data on proximate designated and non-designated marine archaeological assets, and to provide the necessary context for understanding archaeological potential and heritage significance of receptors that may be affected by the Proposed Development (Figure 15-1).





Legend:

- Array Area
- Offshore Export Cable Corridor
- Study Area

Project: Muir Mhòr	Report: Marine Archaeology and Cultural Heritage

Location of Proposed Development and Study Area

Figure: 15-1	Drawing No: WA-0001		
Revision:	Date:	Drawn:	Checked:
01	07/03/24	KJF	SS

Map scale 1:400,000 @ A3

0 5 10 km

Co-ordinate system: ETRS 1989 UTM Zone 30N **EPSG:** 25830

MUIR MHÒR OFFSHORE WIND FARM

A joint venture between Fred. Olsen Seawind & Vattenfall

Service Layer Credits: World Ocean Base: Esri, GEBCO, Garmin, NaturalVue. © British Crown and OceanWise, 2023. All rights reserved. Licence No. EK001-FN1001-003247. Not to be used for Navigation.

METHODOLOGY

15.5.4. Baseline data to inform the Marine Archaeology and Cultural Heritage assessment includes known wrecks and obstructions, geophysical anomalies of archaeological interest, and examines the potential for encountering further maritime and aviation archaeological receptors. Full details are presented in Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report) which contains the full gazetteer of anomalies and baseline context for this Chapter. The section below presents an overview of the baseline.

DESKTOP STUDY

15.5.5. For the purposes of this Marine Archaeology and Cultural Heritage Chapter, a desk-based review was undertaken using relevant datasets and literature with relevant coverage to the Marine Archaeology and Cultural Heritage study area (Table 15-4).

15.5.6. Due the significant distance offshore of the Array Area, the United Kingdom Hydrographic Office (UKHO) wreck database is the primary source of data as Historic Environment Records (HERs) tend to be concentrated nearshore within the 12 nm limit. Entries from the UKHO dataset were cross-checked with any entries in the National Record of the Historic Environment (Canmore database) and the adjacent Aberdeenshire HERs to assess known and potential marine cultural heritage assets.

SITE-SPECIFIC SURVEYS

15.5.7. Site- specific surveys were also carried out to collect data to inform the assessment of Marine Archaeology and Cultural Heritage. These surveys are detailed in Table 15-5.

15.5.8. The geophysical survey scope included the acquisition of multibeam echosounder (MBES), sidescan sonar (SSS), magnetometer (Mag.) and sub-bottom profiler (SBP) data acquired by EGS between April and August 2023. The outputs of the site-specific survey are summarised in Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report) and this was used to directly inform the baseline characterisation and impact assessment presented within the EIAR.

15.5.9. An archaeological assessment of geophysical survey data, including MBES, SSS, Mag. and SBP data was undertaken to enhance the baseline characterisation for Marine Archaeology and Cultural Heritage. Full details of the methodology can be found in Section 3.5 of Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report), with results presented in Section 4 and 5 of Volume 3, Appendix 15.1. The quality of these datasets was found to be good or average, and overall suitable for archaeological interpretation.

15.5.10. An archaeological walkover survey was conducted in September 2023 by the Onshore EIA team and to be reported on in the Onshore EIAR. A separate onshore EIAR is being prepared which will provide a description of the onshore elements of the Project landward of MLWS, and an assessment of the associated likely significant effects. The walkover did not identify the presence of any additional features not already recoded on the Aberdeenshire Historic Environment Record (AHER) that could be of interest.

Table 15-4 Key Sources of Marine Archaeology and Cultural Heritage Literature and Data

Source, Author, and Year	Summary	Coverage of Proposed Development Study Area
Wreck Database, UKHO, March 2023	Charted wrecks and obstruction database.	Full coverage of the study area (Array Area and offshore ECC)
Canmore, The National Record of the Historic Environment of Scotland, March 2023	Database of recorded archaeological sites, find spots and archaeological events, including buildings, industry and maritime heritage.	Full coverage of the study area (Array Area and offshore ECC).
Aberdeenshire HER, Aberdeenshire Council Archaeology Service, March 2023	Records of sites of archaeological and historical interest.	Full coverage of the study area (Array Area and offshore ECC).
BGS GeoIndex Offshore, British Geological Survey (BGS), March 2023	Marine Environmental Data and Information Network (MEDIN) data archive centre for geology, geophysics and backscatter	Full coverage of the study area (Array Area and offshore ECC)

Table 15-5 Site-Specific Surveys undertaken to inform Marine Archaeology and Cultural Heritage

Survey	Summary	Coverage of Proposed Development Study Area
Muir Mhòr Offshore Wind Farm: Preliminary Geophysical and Environmental Survey (EGS, 2023)	Archaeological assessment of geophysical survey data, including MBES, SSS, Mag. and SBP data. Results reported in Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report)	Partial coverage of the study area
Walkover Survey	A separate onshore EIAR is being prepared which will provide a description of the onshore elements of the Project landward of MLWS, and an assessment of the associated likely significant effects. Intertidal walkover survey which will be reported within the Onshore EIAR, Chapter 9 (Terrestrial Archaeology and Cultural Heritage).	Coverage of the intertidal zone including assets identified within Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report): see Figure 7 (WA 1001 – 1003).

DESCRIPTION OF BASELINE ENVIRONMENT

15.5.11. A summary of the marine archaeology and cultural heritage baseline environment is provided in the following sections. Full details of the analysis undertaken to develop the marine archaeology and cultural heritage baseline is provided in Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report).

DESIGNATED SITES

15.5.12. There are no maritime or aviation sites within the study area that have statutory designations under the Protection of Wrecks Act 1973; Section 2, Marine (Scotland) Act 2010, the Protection of Military Remains Act 1986, or the Ancient Monuments and Archaeological Areas Act 1979. If there were any aircraft material from crashed military aircraft within the study area, it would automatically be legally protected under the Protection of Military Remains Act 1986.

PALAEOGEOGRAPHY

15.5.13. There are currently no known submerged prehistoric sites within the study area, in large part due to significant data gaps in shallow coastal waters, with potential constrained by increased water depths in the northern North Sea (Bicket and Tizzard, 2015; Dawson *et al.*, 2017).

15.5.14. Hominids and humans have occupied the British Isles at various times, with the earliest occupation extending back to around one million years (Parfitt *et al.*, 2010), with coastal areas clearly attracting human populations, including landscapes that are now submerged (Bailey *et al*., 2020).

15.5.15. The earliest archaeological evidence for Scotland comprises around the last 15,000 years and reflects Later Upper Palaeolithic and Early Mesolithic human activity at various locations across Scotland (Saville *et. al.*, 2012) in periods when (now-inundated) coastal land was more extensive than today, due to lower global sea-levels following the end of the last ice age (Gaffney and Fitch, 2022).

15.5.16. Nearshore areas around Scotland's coasts retain higher potential for encountering Late Pleistocene and Early Holocene submerged palaeolandscapes. For example, within the offshore ECC and landfall areas there is potential for the presence of as yet undiscovered *in situ* palaeolandscape deposits (e.g. peats, estuarine and low-energy coastal sediments of archaeological interest), and prehistoric sites and finds located within the inundated nearshore. Any prehistoric discoveries will be regarded of national importance, above or below sea level.

15.5.17. Based on the available data the offshore ECC palaeogeographic assessment has been undertaken between -20 m and -50 m contours, approximately between 1.5 and 6.5 km offshore. No data have currently been acquired from between Mean Low Water Springs (MLWS) and the nearshore 1.5 km section of the offshore ECC. A replacement desk-study to cover the data gap was not possible as public data is not available for this location. Therefore, the area of highest archaeological potential does not have data coverage and has not been assessed (see paragraph 15.5.52). For nearshore areas where current baseline data within -20 m bathymetric contour is limited, targeted geoarchaeological work to aid in determining the submerged archaeological potential of the area is recommended (see Table 15-11). Furthermore, SBP data that may be acquired nearshore (e.g. for HDD routing purposes) will also be archaeologically reviewed to support the understanding of Quaternary stratigraphy contextualised by the geoarchaeological assessment of nearshore geotechnical logs and where appropriate, sediment samples.

15.5.18. The archaeological assessment of SBP data identified no distinct palaeogeographic features of archaeological potential from within the area of the offshore ECC. The identified shallow geological units (pre-Quaternary bedrock and Devensian till) are not considered of archaeological potential as these units either pre-date the earliest occupation of humans in the areas or consist of subglacial units and therefore not considered to be of archaeological potential.

15.5.19. The area assessed is interpreted to be covered by a veneer of modern seabed sediment, which in itself is not considered to be of archaeological potential in terms of submerged palaeolandscapes, however, has the potential to cover sites (e.g. wreck remains) where it attains sufficient thickness.

15.5.20. The Array Area is situated in water depths of approximately between 60 m and 90 m. Any potential terrestrial exposure is likely to have been limited to within the present day -20 m water depth contour, which in the study area comprises a relatively narrow shelf area off the coast of Peterhead approximately 1.5 km wide. As such, no palaeolandscape assessment has been undertaken within this area as the potential is judged to be too low.

VALUE AND SENSITIVITY

15.5.21. The assessment of SBP data shows that the geology beyond around 1.5 km offshore either pre-dates the earliest occupation of humans in the study area or consists of subglacial units and therefore not considered to be of archaeological potential. However, modern seabed sediments covering the area, have the potential to contain *in situ* and derived archaeological material.

15.5.22. Table 15-6 summarises the potential for seabed prehistory assets and their respective value based on the criteria described in Table 15-9.

Table 15-6 Value of seabed prehistory assets

Asset Type	Definition	Value
Potential *in situ* prehistoric sites	Primary context features and associated artefacts and their physical setting (if found)	High
Potential submerged landscape features	Other known submerged palaeolandscape features and deposits likely to date to periods of prehistoric archaeological interest with the potential to contain in situ material.	High
Potential derived prehistoric finds	Isolated discoveries of prehistoric archaeological material discovered within secondary contexts.	Low
Potential palaeoenvironmental evidence	Isolated examples of palaeoenvironmental material.	Low

SEABED FEATURES: MARITIME

15.5.23. There are currently no maritime or aviation sites within the study area that are subject to statutory protection from the Protection of Wrecks Act 1973: Section 2, the Protection of Military Remains Act 1986, or the Ancient Monuments and Archaeological Areas Act 1979.

15.5.24. A total of 563 anomalies have been identified from the assessment of geophysical survey datasets as being of possible archaeological potential within the study area. Full details can be found in Section 5 and illustrated in Figures 4-6 of Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report).

ARRAY AREA

15.5.25. A total of 195 geophysical anomalies have been identified as being of possible archaeological interest within the array study area, discriminated as follows:

- One A1 anomaly (i.e. anthropogenic origin of archaeological interest, e.g. wrecks upstanding on the seabed);
- 76 A2_h anomalies (i.e. anomaly of likely anthropogenic origin but of unknown date; may be of archaeological interest or a modern feature, e.g. debris fields); and
- 118 A2_l anomalies (i.e. anomaly of possible anthropogenic origin but interpretation is uncertain; may be anthropogenic or a natural feature e.g. isolated debris).

15.5.26. Anomaly 70183 located within the Array Area has been discriminated as an A1 anomaly and classified as a debris field. It was identified in the SSS data as a distinct, elongate area of linear, angular and rounded dark reflectors with tapered and irregular shadows, with more distinct features visible to the north-east, south and south-west. This area has total dimensions of 56.2 x 22.8 x 1.4 m. This feature was also observed in the MBES data as an elongate mound, distinct from the surrounding seabed. A large, magnetic anomaly of 257 nanotesla (nT) is associated with this location, indicating the presence of significant ferrous material. This has been interpreted as a ferrous debris field and has the potential to be a highly degraded wreck, though this cannot be confirmed without visual inspection.

OFFSHORE ECC

15.5.27. A total of 368 geophysical anomalies have been identified as being of possible archaeological potential within the offshore ECC study area, discriminated as follows:

- 11 A1 anomalies (i.e. anthropogenic origin of archaeological interest, e.g. wrecks upstanding on the seabed);
- 69 A2_h anomalies (i.e. anomaly of likely anthropogenic origin but of unknown date; may be of archaeological interest or a modern feature, e.g. debris fields);
- 272 A2_l anomalies (i.e. anomaly of possible anthropogenic origin but interpretation is uncertain; may be anthropogenic or a natural feature, e.g. isolated debris);
- Ten A3 records (i.e. historic record of possible archaeological interest with no corresponding geophysical anomaly), consisting of eight recorded wrecks and two recorded obstructions; and
- Six U2 anomalies (i.e. known non-archaeological feature / feature of non-archaeological interest).

15.5.28. Anomaly 70398 located within the offshore ECC has been discriminated as an A1 anomaly and classified as a wreck measuring 43.4 x 10.3 x 4.3 m. The wreck is oriented east to west and is generally taller in the western extents. Scouring is visible in the MBES data at the western extents of the site and sediment build-up is visible along the northern edge. A very large, sharp magnetic anomaly (5578 nT) was identified at this location, indicating that this vessel is ferrous in construction. This location has an associated UKHO record (2208) which reports an unknown wreck, upright with bows to the east, and last surveyed in 2010 (refer to Sheet 1 of Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report)). Two anomalies associated with 70398 (70397 and 70399) have been classified as individual pieces of debris.

15.5.29. Anomaly 70497 located within the offshore ECC has been discriminated as an A1 anomaly and classified as a wreck measuring 69.1 x 13.5 x 4.3 m. The hull appears to be intact in the north-west but very broken-up and low-lying in the south-eastern extents, with a spread of

debris along the western extents that is just distinguishable from the main structure (70498). A very large, sharp magnetic anomaly (3279 nT) was identified at this location, indicating that this vessel is ferrous in construction. This location has multiple associated historic records, including an associated UKHO record (2286), which identify this wreck as the *Saint Magnus* which was torpedoed and sunk by the submarine UC-58 on 12 February 1918 (refer to Sheet 2 of Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report)). Three anomalies associated with 70497 (70496, 70498, and 70499) have been classified as debris fields and linear debris surrounding the wreck.

15.5.30. Anomaly 70514 located within the offshore ECC has been discriminated as an A1 anomaly and classified as a wreck measuring 90.7 x 17.3 x 6.1 m, with internal dark reflectors visible indicating the vessel is lying upright. The vessel appears generally intact to the NNW but appears to become broken-up towards the SSE extents and the hull appears to be either partially buried or breached along the south-western edge. In the MBES data the difference in height between the NNW and the SSE extents is more obvious. The area is associated with three magnetic anomalies across different portions of the wreck ranging in amplitude from 396 nT to 2154 nT, indicating that the vessel is ferrous in construction. This location has multiple associated historic records including UKHO records 2282 and 2285 which identifies this wreck as the British steam ship *Muriel* which sank in 1918 after a loud explosion. The wreck was dived and confirmed in 2000, and it was reported that the bows are flattened at the SSE end. This wreck was last surveyed and dived in 2010 with recorded dimensions of 88.0 x 19.0 x 9.8 m. The slight difference in recorded measurements may be accounted for by likely further collapse in the intervening years, causing further spread (refer to Sheet 3 of Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report)). Three anomalies associated with 70514 (70513, 70515 and 70517) have been classified as debris fields and individual pieces of debris surrounding the wreck.

15.5.31. A total of ten historic records within the offshore ECC study area have been discriminated as an A3 - historic record of possible archaeological interest with no corresponding geophysical anomaly. Eight of these records (70246, 70284, 70372, 70432, 70482, 70559, 70560 and 70561) have been classified as recorded wrecks, whilst records 70350 and 70562 have been classified as recorded obstructions. Of these records only four records are located within the offshore ECC.

15.5.32. Record 70560 located within the offshore ECC is the UKHO record of the wreck of the *Magician* which wrecked at Craig Ewen Point 2 miles north of Peterhead on a voyage from Trinidad to London. Classified as a steel steamship, registered at Liverpool, it was built in 1926 by New Waterway SB Co. Scheidam. At the time of loss, it was owned by Chargente SS Co Ltd. carrying a general cargo of mixed goods. Date of loss cited as 14 April 1944. This record is covered by geophysical data, but no anomalous features were identified within any of the data sets.

15.5.33. Record 70350, located within the offshore ECC is the UKHO record of an obstruction, first observed in 1940 by Rear Admiral Home Fleet reported by SNS from Asdic Sonar. The position was last examined in 2010 and not located by MBES and record amended to dead (i.e. the recorded location of a wreck that has been reported but not located on repeated surveys). However, material from this site could still be buried at this location and therefore the record has been retained as a precaution.

15.5.34. Record 70561 is the Canmore and HER recorded position of a wreck listed in Ridley (1992) Dive Scotland. No anomalous features were identified in the geophysical data within the vicinity of this record and therefore any remains of this wreck may be buried, or the position is unreliable and may be related to a wreck to the north-east (70560). Retained as a separate record as a precaution.

15.5.35. Record 70562 is the reported location of a sonar contact identified on 1 April 1945 that is recorded as possible debris associated with the wreck of the *Cransdale*, lost in 1931. No anomalous features were identified in the geophysical data at this location. Therefore, any remains of this obstruction may be buried, or the position is unreliable. Retained as a separate record as a precaution.

15.5.36. The six U2 anomalies located within the offshore ECC have been classified as a wreck (70310) and associated debris (70307, 70308, 70309, 70309, 70311 and 70312). This was identified in the SSS and MBES data sets. The wreck corresponds with the UKHO record 2392 which reports the location of the British fishing vessel *Stella Marie* (possibly) which sank in 1987 after taking on water. The wreck was last surveyed in 2010 as intact, upright and degraded with recorded dimensions of 30.0 x 8.0 x 4.0 m with its bow to the north. Although this wreck is reported to have sunk in 1987 and is therefore likely to be modern in construction, the wreck and its surrounding debris have been retained for reporting purposes.

MARINE RECORDED LOSSES

15.5.37. Recorded Losses can be considered as an indication of the potential for archaeological maritime remains to exist within the study area and the type and number of wrecks that could be present. These records relate to vessels reportedly lost for which no physical wreck remains have ever been identified. Table 15-7 shows the distribution of these documented losses according to the date of loss for those records whose position fall within the study area. Details of these losses are present in Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report).

Table 15-7 Recorded Losses – summary by date

Date	Number of records of ships
Post-medieval	6
19th century	54
Modern	30
Unknown	1
Total	91

SEABED FEATURES: AVIATION

15.5.38. There are no known aircraft crash sites recorded within the study area. Nonetheless, there is the potential for aircraft or aircraft-related debris to exist on the seafloor within the study area, as indicated by coastal armaments and the presence of Peterhead military airfield within the area. Given the identified potential of the area for military aircraft crashes, particularly relating to the Second World War, the likelihood would be for any aircraft crash site to be of military origin, which would be automatically protected under the Protection of Military Remains Act 1986. Aircraft crash sites are also difficult to identify through archaeological assessments of geophysical survey, although past experience indicates material from the site, such as engines or other material may be recorded as small obstructions or anomalies. Furthermore, the positions of aircraft crash sites at sea are rarely recorded with any degree of accuracy and the vast majority were based solely on eyewitness estimations or the discovery of wreckage on the surface of the sea, both of which can lead to erroneous assumptions. Therefore, the presence and distribution of aircraft wrecks within the study area should not be underestimated.

INTERTIDAL HERITAGE RECEPTORS

15.5.39. There are three known archaeological sites located within the intertidal zone, up to MHWS, relating to Second World War defences infrastructure. These consist of pillboxes and anti-tank blocks along Craigewan Beach.

15.5.40. Further details of these records can be found in Section 6 and illustrated in Figure 7 of Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report).

15.5.41. There is the potential for further unknown heritage sites to be located within the intertidal zone of the study area. These assets may be of a maritime nature, relating to coastal infrastructure, or may represent individual finds.

FUTURE BASELINE CONDITIONS

15.5.42. In line with the EIA regulations, this EIAR requires a "description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the Project as far as natural changes from the baseline scenario can be assessed with reasonable effort, on the basis of the availability of environmental information and scientific knowledge". This reflects how the baseline relevant to marine archaeology and cultural heritage is expected to evolve without the Proposed Development.

15.5.43. If undisturbed by the Proposed Development, there would be no change to the baseline conditions discussed above beyond those caused by natural physical processes, natural deterioration, as well as those associated with potential changes to the coastline or sediment processes caused by climate change (as outlined in HES's Climate Action Plan – HES 2020).

15.5.44. Volume 2, Chapter 7 (Marine and Coastal Processes) concludes that based on current projections (based on UK Climate Projections 2018), soft and erodible shorelines across Scotland are at greater risk of erosion. This will be exacerbated by climate change and future sea level rise.

CLIMATE CHANGE EFFECTS

15.5.45. Impacts of climate change on marine archaeology and cultural heritage could result from a number of inter-related factors, including wind, waves and storms, relative sea level rise and coastal flooding, increased seawater temperatures, changes in salinity and dissolved oxygen, ocean acidification and changes in ocean circulation. The considered climate variables on marine archaeology and cultural heritage include storm surges, wave height and frequency and sea level rise. Based on the UK Climate Projections (UKPC) 18 data, there is potential for changes in the severity of future storm surge events. However, no evidence for this was made. Similarly, model predictions for wave height and frequency is variable along coastal locations and simulations suggest an overall decrease in mean significant wave height around most of the UK coastline. The baseline annual time-mean sea level is projected to increase over time. Direct impact pathways from the above factors could lead to exposure and / or damage to coastal features, notably the Second World War features identified at landfall (see paragraph 15.5.39).

15.5.46. Other factors that could lead to indirect impact pathways are biologically related aspects of acidity, dissolved oxygen and changes to sea temperature. Based on Gregory *et al.* (2022), it was noted that a general trend of increasing water temperatures and ocean acidity may lead to a small increase in corrosion rates for metal elements of wreck sites on centennial timescales. Warmer seas, in conjunction with complex interactions of environment, physical, chemical and human factors may indirectly influence the expansion of species which degrade wooden wreck material (e.g. wood-boring organisms). However, it was noted that a decrease

in dissolved oxygen is likely to decrease corrosion rates affecting metal elements of wreck sites and limit wood-degrading organisms.

15.5.47. As part of the Climate Change (Scotland) Act 2009, Historic Environment Scotland collated a Climate Action Plan detailing climate action ambitions for the historic environment for 2020-2025. This Plan sets out seven key areas of climate action including climate mitigation and climate adaptation. Due to projected increases in sea levels and storm surge which could result in increased frequency of coastal flooding and erosion, there could be significant impacts for coastal and heritage sites situated in proximity to the coast and on estuaries.

DATA LIMITATIONS AND ASSUMPTIONS

HISTORIC ENVIRONMENT RECORDS AND ARCHIVES

15.5.48. The information used to compile this Chapter derives from a variety of sources. With regards to the documentary sources, it is assumed that the HER data, as well as that derived from other secondary sources, are reasonably accurate.

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

15.5.50. The data supplied by the UKHO, Canmore and HER were obtained in March 2023, with updated searches obtained in June 2024 and are considered current for the purposes of this baseline assessment and EIA process.

GEOPHYSICAL DATA

15.5.51. The ECC study area considered for impact assessment is larger than the geophysical survey data coverage leading to parts of the study area being without geophysical data coverage (Figure 15-1).

15.5.52. No data were acquired from between landfall and the nearshore 1.5 km of the offshore ECC. This covers up to the 20 m bathymetric contour, and so the area of highest palaeolandscapes potential does not have data coverage and has not been assessed. A replacement desk-study to cover the data gap was not possible as public data is not available for this location. Effectively, the offshore ECC palaeogeographic assessment has been undertaken solely between the -20 m and -50 m contours. This data gap is partially driven by the application of Horizontal Directional Drilling (HDD) at landfall, avoiding the area between MLWS and 1.5 km of the offshore ECC, but also the difficulties accessing this nearshore area due to fishing activities. Targeted geoarchaeological work to aid in determining the submerged archaeological potential of the nearshore areas where current baseline data within -20 m bathymetric contour is limited, is recommended (see Table 15-11). Furthermore, SBP data that may be acquired nearshore (e.g. for HDD routing purposes) will also be archaeologically reviewed to support the understanding of Quaternary stratigraphy contextualised by the geotechnical log assessment.

15.5.53. The presence of small ferrous material, more likely to be anthropogenic in origin, cannot be determined due to the relatively large line spacings (75 m for the Array Area and 20 – 75 m for the ECC) of the Mag. survey acquired over the Project. Therefore, only significant ferrous objects (e.g. steel hulled wrecks) will be identified between lines of surveys, and smaller individual pieces of ferrous debris will not be detected. This means that there is potential for

any ferrous debris to be buried or have little surface expression across the Proposed Development.

15.5.54. The extents of the Mag. survey do not reach the full extents of the SSS mosaic along the offshore ECC. There is an approximate 60-100 m gap either side between the closest line of Mag. data and the edge of the SSS mosaic which is not considered to be covered. As this assessment was done primarily using the mosaic, it was still possible to undertake an archaeological interpretation of the SSS mosaic and MBES data in this area and so this did not impact the assessment to a significant degree, but any buried ferrous features along the edges of the offshore ECC may not have been detected.

15.6. MARINE ARCHAEOLOGY AND CULTURAL HERITAGE ASSESSMENT METHODOLOGY

15.6.1. Assessment of effects in this Chapter will follow the general approach outlined in Volume 1, Chapter 4 (EIA Methodology) of the EIAR.

15.6.2. Marine archaeology and cultural heritage-specific assessment criteria and recognised guidance on assessing marine archaeology and cultural heritage are provided below.

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

GUIDANCE

15.6.4. In addition to the general approach and guidance outlined in Volume 1, Chapter 6 (Environmental Impact Assessment Methodology), the Marine Archaeology and Cultural Heritage EIAR also considers the following guidance documents:

- Designation Policy and Selection Guidance (Historic Environment Scotland, 2019, updated 2020); and
- Ships and Boats: Prehistory to Present – Designation Selection Guide (English Heritage (now Historic England) 2012).

15.6.5. The terms used to define receptor sensitivity and magnitude of impact are based on the above listed guidance documents. These criteria have been adopted in order to implement a methodology specific to marine archaeology and cultural heritage.

CRITERIA FOR ASSESSMENT

15.6.6. The process for determining the significance of effects is a two-stage process that involves defining the magnitude of the potential impacts and the sensitivity of the receptors. This section describes the criteria applied in this Chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors.

15.6.7. The terms used to define impact magnitude and receptor sensitivity for marine archaeology and cultural heritage are based on those described in further detail in Volume 1, Chapter 6 (Environmental Impact Assessment Methodology) of the EIAR and the guidance documents listed above.

MAGNITUDE

15.6.8. The magnitude criteria for marine archaeology and cultural heritage are provided in Table 15-8. Factors that have been considered to determine the magnitude of potential impact include the area of influence / spatial extent, duration, frequency, and reversibility of impact (e.g., a duration of hours or days would be considered for most receptors to be of short-term duration, which is likely to result in a low magnitude of impact).

Table 15-8 Impact Magnitude Criteria for Marine Archaeology and Cultural Heritage

Magnitude Value	Description
Negligible	• Impact is highly localised and short term with full rapid recovery expected to result in very slight or imperceptible changes to baseline conditions or the receptor; and • The impact is very unlikely to occur and if it does will occur at very low frequency or intensity.
Low	• Impact is localised and temporary or short term, leading to detectable change in baseline conditions or noticeable effect on small proportion of the receptor; and • The impact is unlikely to occur or may occur but at low frequency or intensity.
Medium	• Impact occurs over a local to medium extent, with short to medium term change to baseline conditions or affecting a moderate proportion of the receptor; and • The impact is likely to occur and / or will occur at a moderate frequency or intensity.
High	• Impact occurs over a large spatial extent resulting in widespread, long term or permanent changes in baseline conditions or affecting a large proportion of the receptor; and • The impact is very likely to occur and / or will occur at a high frequency or intensity.

SENSITIVITY

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

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

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

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

15.6.11. The sensitivity criteria for marine archaeology and cultural heritage receptors are provided in Table 15-9.

Table 15-9 Receptor Sensitivity Criteria for Marine Archaeology and Cultural Heritage

Sensitivity of Receptor Values	Description
Very Low	• 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.
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.
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.
High	• Best known, only example or above average example and or significant or high potential to contribute to knowledge and understanding and / or outreach. Receptors with a demonstrable international or national dimension to their importance are likely to fall within this category; – Wrecked ships and aircraft that are protected under the Protection of Wrecks Act 1973, Ancient Monuments and Archaeological Areas Act 1979, and 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.

15.6.12. By assigning and combining magnitude and sensitivity criteria, overall effect significance upon marine archaeology and cultural heritage receptors can be determined (Table 15-10).

Table 15-10 Matrix Used for the Assessment of Significance of the Effect

MUIR MHÒR OFFSHORE WIND FARM A joint venture between Fred. Olsen Seawind & Vattenfall		Magnitude of Impact			
		Negligible	**Low**	**Medium**	**High**
Sensitivity of Receptor	**Very Low**	Negligible	Negligible	Negligible	Negligible
	Low	Negligible	Minor	Minor	Minor
	Medium	Negligible	Minor	Moderate	Moderate
	High	Negligible	Minor	Moderate	Major

15.6.13. A level of effect of moderate or more will be considered a 'significant' effect for the purpose of the EIA. A level of effect of minor or less will be considered 'not significant'. Effects of moderate significance or above are therefore considered important in the decision-making process, whilst effects of minor significance or less warrant little, if any, weight in the decision-making process.

EMBEDDED COMMITMENTS

15.6.14. As part of the project design process, several designed-in measures have been proposed to reduce the potential for impacts on environmental receptors. As there is a commitment to implementing these measures, they are considered inherently part of the design of the Proposed Development and have therefore been considered in the assessment (i.e., the determination of magnitude and therefore significance assumes implementation of these measures). These measures are considered standard industry practice for this type of development. The embedded commitments relevant to marine archaeology and cultural heritage are presented in Table 15-11. Volume 3, Appendix 6.1 (Commitments Register), provides additional information on how these commitments are secured.

15.6.15. The embedded commitments (C-01, C-02, C-03, C-08, C-09, C-28, and C-42) collectively aim to mitigate the impact of the Proposed Development on marine archaeology and cultural heritage assets. Commitments such as the use of scour protection (C-01) safeguard seabed integrity, preventing scour and erosion of the seabed avoiding, where possible, potential to cause erosion and deterioration of marine archaeology and cultural heritage assets. Adherence to plans like the Cable Plan (CaP) (C-02) and a DSLP (C-03) will ensure that installation, routing, and construction are optimised to minimise impact on marine archaeology and cultural heritage. Environmental management (C-08) further prevents impacts to the environment, while a Decommissioning Programme (DP) (C-09) ensures long-term prevention of the environment, including marine archaeology and cultural heritage. The archaeological assessment of survey datasets (C-28) and avoidance of identified seabed heritage assets (C-42) will facilitate the implementation mitigation measures which will be

detailed in a WSI (Volume 4, Appendix 8 (Outline Written Scheme of Investigation) and enacted throughout all phases of the Proposed Development.

Table 15-11 Embedded Commitment Measures of relevance to Marine Archaeology and Cultural Heritage

Code	Commitment	Type (Primary, Secondary or Tertiary)	How Commitment Secured
C-01	Scour protection to be implemented around foundations and offshore structures	Primary	Secured within conditions attached to the Marine Licence. Cable Plan (CaP) and Construction Method Statement (CMS) Archaeological assessment of geophysical data relating to scour surveys.
C-02	Development of and adherence to a CaP. The CaP will confirm planned cable routing, installation methods, cable specifications and any additional protection and requirement for any post installation monitoring.	Tertiary	Secured within conditions attached to the Marine Licence. The final layout will be presented within the CaP and conditions within the Marine Licence.
C-03	A Development Specification and Layout Plan (DSLP) will be developed and adhered to which will confirm the layout.	Tertiary	DSLP
C-04	The infrastructure will be designed in such a way to minimise the impacts and will be within the key parameters set out in the EIA Project Description and EIAR.	Primary	DSLP
C-08	Development of and adherence to an Environmental Management Plan (EMP). This will set out mitigation measures and procedures relevant to environmental management, including but not limited to chemical usage, invasive and non-native species, pollution prevention and waste management.	Tertiary	Secured within conditions attached to the Marine Licence. EMP
C-09	Development and adherence to a Decommissioning Plan (DP).	Tertiary	Secured within conditions attached to the Marine Licence. The DP will outline measures for the decommissioning of the Proposed Development.
C-28	The archaeological assessment of marine geophysical and geotechnical	Primary	Secured within conditions attached to the Marine Licence.

Code	Commitment	Type (Primary, Secondary or Tertiary)	How Commitment Secured
	survey datasets would facilitate the implementation of AEZs, micro siting of infrastructure, and the implementation of a PAD, as detailed in the WSI.		A WSI will include any recommended AEZs (for example in relation to seabed preparation, installation activities and installed infrastructure), along with recommendations for further schemes of investigation, and a PAD for reporting and investigating unexpected archaeological discoveries encountered during installation activities, with a Retained Archaeologist providing guidance and advising industry staff on the implementation of the PAD. AEZs around known features of archaeological interest will be avoided. No works that impact the seabed will be undertaken within the extent of an AEZ during construction, operational, or decommissioning phases. For features assigned A2 archaeological discrimination rating (potential seabed features), no AEZs are recommended. However, these features will be avoided, where possible. Where this is not possible, further appraisal is proposed prior to construction. For example, where geophysical surveys may be undertaken in advance of the Proposed Development, or during UXO survey, it is recommended that the data be assessed by a suitably qualified archaeological contractor. In relation to palaeogeography, targeted geoarchaeological work within the nearshore area will aid in determining the submerged archaeological potential of the area, including within nearshore areas where current baseline data within -20 m bathymetric contour is limited. The Retained Archaeologist will be consulted to advise on potential locations and samples to be acquired for geoarchaeological purposes from future geotechnical campaigns within the study area. Sub-bottom profiler data that may be acquired nearshore (e.g. for HDD routing purposes) will also be reviewed to support the understanding of Quaternary stratigraphy contextualizing the geotechnical log assessment. The WSI will be updated accordingly and

Code	Commitment	Type (Primary, Secondary or Tertiary)	How Commitment Secured
			agreed with MD-LOT to define appropriate geoarchaeological assessment methodologies. The WSI will include a PAD to be implemented for any archaeological discoveries. 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). 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.
C-42	Project infrastructure will avoid identified seabed heritage assets (such as protected wrecks) as described in the WSI.	Primary	Archaeological assessment of available marine geophysical survey datasets has been undertaken in support of Primary mitigation measures listed here (Table 15-11).

15.6.16. AEZs have been recommended for these anomalies within the Array Area and offshore ECC (Table 15-12) and are illustrated in Figure 15-2, Figure 15-3 and Figure 15-4.

15.6.17. These are as follows:

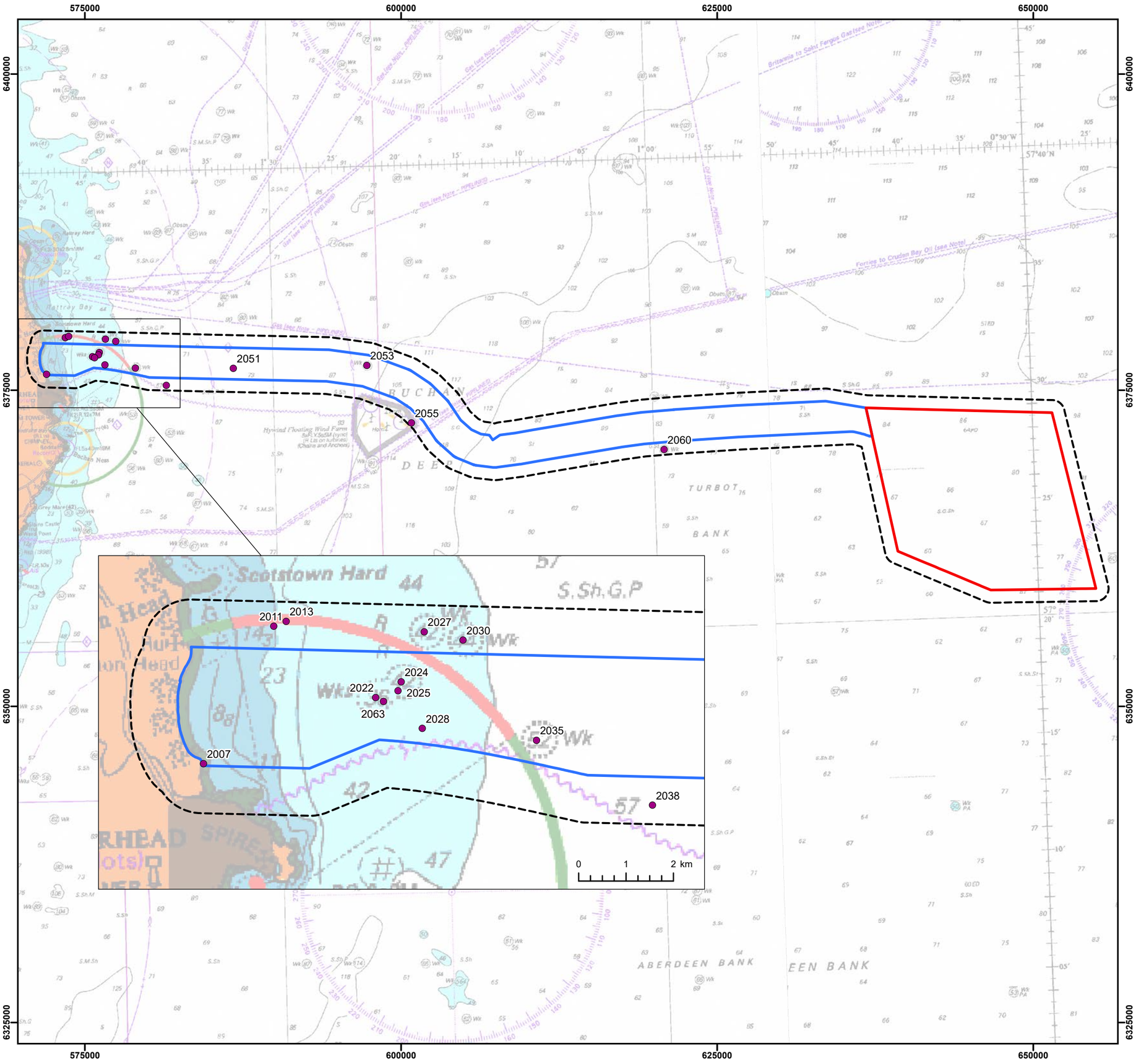
- For all anomalies assigned an A1 discrimination rating, an AEZ of 100 m is recommended[1], either around the central location or the feature extents; and
- For all anomalies assigned an A3 archaeological discrimination rating, an AEZ of 100 m is recommended centred on the reported position.

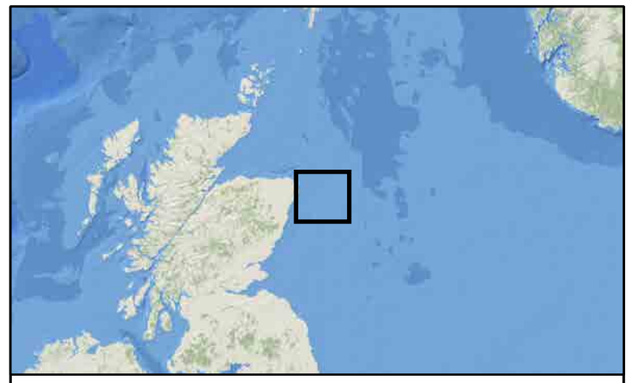
Table 15-12 Recommended AEZs within the study area

ID	Archaeological Discrimination	Classification	Position (WGS84 UTM31N)		Exclusion Zone
			Easting	Northing	
70183	A1	Debris field	651748	6362581	100 m buffer around feature extents
70397	A1	Debris	579033	6376744	100 m buffer around recorded position
70398	A1	Wreck	579012	6376751	100 m buffer

[1] 100 m is a standard AEZ, reflecting the Crown Estate WSI guidance and professional judgement.

ID	Archaeological Discrimination	Classification	Position (WGS84 UTM31N)		Exclusion Zone
			Easting	Northing	
					around feature extents
70399	A1	Debris	578980	6376760	100 m buffer around recorded position
70496	A1	Debris field	576134	6377983	100 m buffer around feature extents
70497	A1	Wreck	576136	6377972	100 m buffer around feature extents
70498	A1	Debris field	576135	6377962	100 m buffer around feature extents
70499	A1	Linear debris	576127	6377963	100 m buffer around feature extents
70513	A1	Debris field	575628	6377613	100 m buffer around feature extents
70514	A1	Wreck	575616	6377612	100 m buffer around feature extents
70515	A1	Debris field	575606	6377600	100 m buffer around feature extents
70517	A1	Debris	575567	6377633	100 m buffer around recorded position
70560	A3	Recorded wreck	571967	6376254	100 m buffer around recorded position
70561	A3	Recorded wreck	576069	6377791	100 m buffer around recorded position
70562	A3	Recorded obstruction	576581	6376999	100 m buffer around recorded position





Legend:

- Array Area
- Offshore Export Cable Corridor
- Study Area
- Known wrecks and obstructions

Project: Muir Mhòr	Report: Marine Archaeology and Cultural Heritage

Charted Wrecks and Obstructions within the Study Area

Figure: 15-2	Drawing No: WA-0002		
Revision:	Date:	Drawn:	Checked:
01	07/03/24	KJF	SS

Map scale 1:300,000 @ A3 — 0 4 8 km

Co-ordinate system: ETRS 1989 UTM Zone 30N **EPSG:** 25830

MUIR MHÒR OFFSHORE WIND FARM
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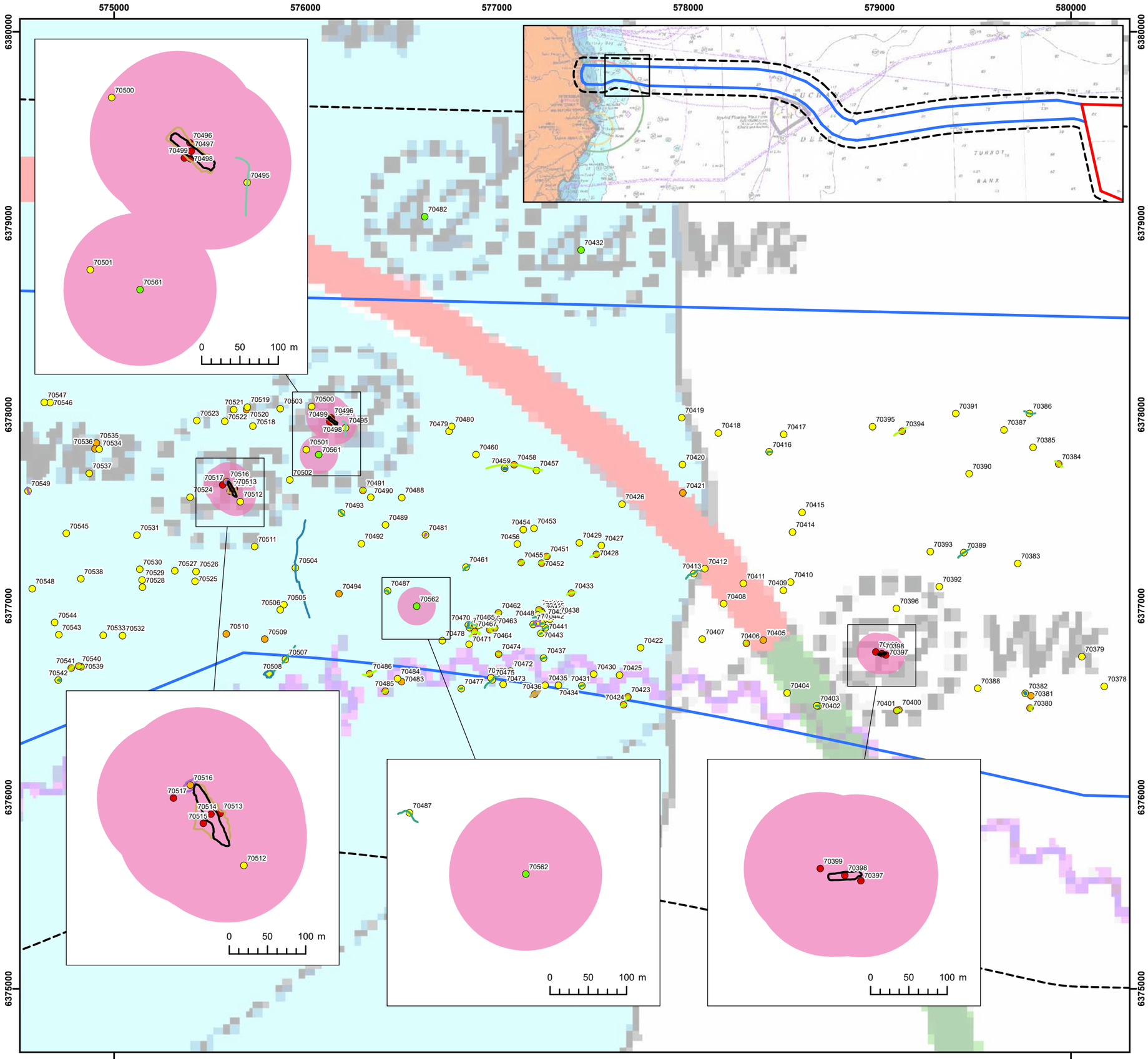

Legend:

- Array Area
- Offshore Export Cable Corridor
- Study Area
- Recommended archaeological exclusion zones – 100 m

Anomalies of archaeological potential

- A1 - Anthropogenic origin of archaeological interest
- A2_h – Anomaly of likely anthropogenic origin but of unknown date
- A2_l – Anomaly of possible anthropogenic origin but the interpretation is uncertain
- A3 – Historic record of possible archaeological interest with no corresponding geophysical anomaly

Seabed feature extents

- Wreck
- Debris field
- Mound
- Seabed disturbance

Linear seabed features

- Bright reflector
- Dark reflector
- Linear debris
- Seabed disturbance

Project:	Report:
Muir Mhòr	Marine Archaeology and Cultural Heritage

Recommended AEZ within the offshore ECC

Figure: 15-3	Drawing No: WA-0002		
Revision:	Date:	Drawn:	Checked:
01	02/07/24	KJF	SS

Map scale 1:20,000 @ A3 — 0 0.25 0.5 km

Co-ordinate system: ETRS 1989 UTM Zone 30N **EPSG:** 25830

MUIR MHÒR OFFSHORE WIND FARM
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Legend:

- Array Area
- Offshore Export Cable Corridor
- Study Area
- Recommended archaeological exclusion zones – 100 m

Anomalies of archaeological potential

- A1 - Anthropogenic origin of archaeological interest
- A2_h – Anomaly of likely anthropogenic origin but of unknown date
- A2_l – Anomaly of possible anthropogenic origin but the interpretation is uncertain
- A3 – Historic record of possible archaeological interest with no corresponding geophysical anomaly

Seabed feature extents

- Wreck
- Debris field
- Mound

Linear seabed features

- Dark reflector
- Linear debris

Project:	Report:
Muir Mhòr	Marine Archaeology and Cultural Heritage

Recommended AEZ within the offshore ECC

Figure: 15-4	Drawing No: WA-0002		
Revision:	Date:	Drawn:	Checked:
01	02/07/24	KJF	SS

Map scale 1:20,000 @ A3

0 0.25 0.5 km

Co-ordinate system: ETRS 1989 UTM Zone 30N **EPSG:** 25830

MUIR MHÒR OFFSHORE WIND FARM

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IMPACTS SCOPED OUT OF THE ASSESSMENT

15.6.18. Table 15-13 describes the impacts that have been scoped out of this Marine Archaeology and Cultural Heritage assessment.

15.6.19. Relevant stakeholder consultation (see Section 15.4), the Muir Mhòr Offshore Wind Farm Offshore Scoping Report (Volume 3, Appendix 5.1 (Offshore Scoping Report)), the Muir Mhòr Offshore Wind Farm Offshore Scoping Opinion (Volume 3, Appendix 5.2 (Offshore Scoping Opinion)), along with understanding of worst case design scenario and environmental baseline conditions has informed the decision to scope these impacts out for further consideration in the EIA for marine archaeology and cultural heritage.

Table 15-13 Impacts Scoped out of the Marine Archaeology and Cultural Heritage assessment.

Impact Scoped Out	Justification
Construction	
Transboundary Impacts	Predicted impacts on marine archaeology and cultural heritage will largely be localised to within the study area and will not give rise to effects on the marine environment beyond UK waters. The Proposed Development is a significant distance from the nearest adjacent EEZ of another state and, therefore, it is considered that transboundary impacts will not occur.
Operation and Maintenance	
Impacts on setting of onshore designated assets	Impacts to the setting of onshore cultural heritage from the Proposed Development, including the WTGs and associated infrastructure, has been scoped out of the Marine Archaeology and Cultural Heritage assessment. The onshore EIAR will consider impacts to onshore cultural heritage assets from the Proposed Development.
Transboundary Impacts	Predicted impacts on marine archaeology and cultural heritage will largely be localised to within the study area and will not give rise to effects on the marine environment beyond UK waters. The Proposed Development is a significant distance from the nearest adjacent EEZ of another state and, therefore, it is considered that transboundary impacts will not occur.
Decommissioning	
Transboundary Impacts	Predicted impacts on marine archaeology and cultural heritage will largely be localised to within the study area and will not give rise to effects on the marine environment beyond UK waters. The Proposed Development is a significant distance from the nearest adjacent EEZ of another state and, therefore, it is considered that transboundary impacts will not occur.

WORST CASE DESIGN SCENARIO

15.6.20. The Developer has adopted a design envelope approach to impact assessment (also known as a 'Rochdale Envelope'). In line with guidance from the Scottish Government (2022), the design envelope approach offers flexibility in the EIA process by enabling impact assessment to be carried out against several potential design options.

15.6.21. The assessment of marine archaeology and cultural heritage impacts has been undertaken with respect to the details provided in Volume 1, Chapter 3 (Project Description). A 'worst case' design scenario has been selected for each impact which would lead to the greatest impact for all receptors or receptor groups, when selected from a range of values. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within Volume 1, Chapter 3 (Project Description) (e.g., different infrastructure layout), to that assessed here, be taken forward in the final design scheme.

15.6.22. Table 15-14 presents the worst-case design scenario for each impact associated with LSE assessment on marine archaeology and cultural heritage, along with justification.

Table 15-14 Worst Case Design Scenarios with respect to the Marine Archaeology and Cultural Heritage Assessment.

Impact	Embedded Commitment	Worst Case Design Scenario	Justification
Construction			
Loss or damage to known and unknown marine historic environment assets from direct impacts. Loss or damage to submerged prehistoric landscapes from direct impacts.	C-01, C-02, C-03, C-08, C-28, C-42	**Met Masts and Wave Buoys** Max number of installations – Six consisting of Lidar buoy, wave rider buoy and wave radar Possible foundation types – floating with one or two anchor points **Turbines** Max number of WTGs – 67 **Floating Foundations** Six floating foundation types under consideration: Semi-Submersible Steel, Semi-Submersible Concrete, Barge, Tension Leg Platform (TLP), Multi-Tower Semi-Submersible, and Buoy. **Mooring & Anchoring** *Types of moorings under consideration:* Catenary Mooring, Semi-Taut Mooring, Taut Mooring, Tension Leg Mooring. Maximum number of mooring lines – worst case option is Tension Leg Mooring: 12 Maximum mooring line radius – worst case option is for Catenary Mooring, Semi-taut Mooring and Taut Mooring: 1500 m; Bottom chain length – worst case option is Catenary Mooring: 1450 m *Types of anchors under consideration:* Drag Embedded Anchor, Plate Anchor, Pile Anchor, Suction Anchor, and Gravity Anchor. Maximum number of anchors per floater foundation – Nine Maximum anchor seabed footprint – worst case option is Gravity Anchor: 500 m^2 Maximum penetration depth – worst case is Pile Anchor (driven or drilled): 60 m Minimum penetration depth – worst case is Pile Anchor: 30 m Maximum pile diameter – 4 m Maximum number suction caisson buckets - Nine Maximum suction caisson bucket diameter - 15 m **Scour & Scour Protection** Scour protection type needed for Suction Anchor and Gravity Anchor – consisting of loose rocks, rock bags, frond mats. Maximum scour protection area per floater (excl. structure area) – worst case is Gravity Anchor: 11000 m^2 Maximum scour protection area per project (excl. structure area) – worst case is Gravity Anchor: 737000 m^2 Seabed preparation – worst case is Gravity Anchor: 750 m^2 **OEP(s)** Maximum number of OEP(s) – Two Number of jacket legs – Six Maximum leg diameter – 7 m Footprint of jacket at seabed – 3600 m^2 Two foundation designs under consideration: *Jacket with pin piles* Number of piles per leg – Two	For Marine Archaeology and Cultural Heritage, the Worst-Case Design Scenario represents the maximum spatial area of impact associated with seabed disturbance/activities by: • Seabed preparation prior to foundation installation; • Foundation installation; • Cable installation (inter-array cables and export cables); • Scour protective measures; • HDD operations. Any of the device designs, transmission cables and other infrastructure that impact the seabed have the potential to result in the damage / loss of known archaeological features and to unknown archaeological features, which may lie undiscovered on or below the surface or the seabed, if any are present. Similar effects may be expected from vessel anchoring systems that impact the seabed. Effects are considered to be permanent. **Seabed preparation prior to foundation installation** Seabed preparation works, including unexploded ordnance (UXO) identification & clearance, sandwave clearance and boulder clearance, might be required prior to installation of certain foundation types, inter-array cables and export cables. The use of a Pre-Lay Grapnel Run (PLGR) is considered to be the realistic worst-case option for direct disturbance to known and potential archaeological features. **Foundation installation** The installation of certain mooring options will result in direct impact to known and potential archaeological features. The greatest seabed footprint is anticipated to be from the installation of the Catenary Mooring, with a bottom chain length of 1450 m. The installation of certain anchoring options will also result in direct impact to known and potential archaeological features. The greatest seabed footprint is anticipated to be from the installation of the Gravity Anchors, with an area of 500 m^2. The greatest sub-seabed footprint is anticipated to be from the installation of Pile Anchors, with a maximum depth penetration of 60 m. **Cable installation** Cable installation may require some combination of (e.g.) jetting, ploughing, trenching and/or cutting type installation techniques. All techniques could result in direct impacts to known and potential archaeological features. **Scour protective measures**

Impact	Embedded Commitment	Worst Case Design Scenario	Justification
		Maximum pile diameter – 4 m Maximum pile penetration depth – 80 m *Jacket with caissons* Maximum number of buckets – 12 Maximum bucket diameter – 14 m Maximum bucket penetration depth – 30 m Scour protection employed around foundations including: Rock placement and rock bags, concrete mattresses and frond mattresses. OEP scour protection thickness - 3 m OEP scour protection area - 3,600 m^2 OEP scour protection volume - 10,800 m^3 Total scour protection volume for 2 x OEP(s) - 21,600 m^3 **Interconnector Cable** Maximum number of interconnector cables – One Maximum length of interconnector cable – 3 km Area of seabed disturbed by interconnector cable route – 9,000 m^2 Volume affected (4m burial) = 36,000 m^3 Burial techniques – ploughing, jet trenching, mechanical trenching. Cable protection – rock placement, concrete mattresses, grout/rock bags, frond mattresses. **Export Cables** Maximum number of export cables – Three Maximum length of export cable (per cable) – 90 km Total maximum length of export cables – 270 km Maximum spacing between adjacent cables – 250 m Area of seabed disturbed by export cable route – 810,000 m^2 Volume affected (4m burial) = 3,240,000 m^3 Burial techniques – ploughing, jet trenching, mechanical trenching. Maximum trench width – 1 m Maximum burial depth – 4 m Cable protection – rock placement, concrete mattresses, grout/rock bags, frond mattresses. Landfall installation – HDD; punchout/exit points **Inter-Array Cables** Options for Buried Tether wave (up to three anchors): Maximum potential length – 250 km Maximum external diameter – 250 mm Burial technique – ploughing, jet trenching, mechanical trenching. Maximum burial depth – 2 m Cable protection options – rock placement, concrete mattresses, grout/rock bags, frond mattresses. Maximum length of cable protection/burial materials – 250 km Maximum area of cable protection/burial materials – 500,000 m^2 Area of disturbance from jetting/ploughing – 750,000 km^2	Scour protection employed around foundations and cables could include rock placement and rock bags, concrete mattresses and frond mattresses. All techniques could result in direct impacts to known and potential archaeological features. **HDD operations** Although other trenchless installation technologies are available, HDD is the established solution and has therefore been identified as the realistic worst-case option. HDD operations are expected to have localised and short-term effects on known and potential archaeological features.
Indirect disturbance to marine historic environment assets caused by installation methods	C-01, C-02, C-03, C-08, C-28, C-42	**Interconnector Cable** Maximum number of interconnector cables – One Burial techniques – ploughing, jet trenching, mechanical trenching	For Marine Archaeology and Cultural Heritage, the Worst-Case Design Scenario is represented in terms of maximum spatial area of impact associated with seabed disturbance/activities by: • Seabed preparation prior to foundation installation;

Impact	Embedded Commitment	Worst Case Design Scenario	Justification
		Maximum trench width – 1m Maximum burial depth – 4 m Cable protection Up to 50% of the length of the cable may require cable protection including: rock placement, concrete mattresses, grout/rock bags, and frond mattresses. Total interconnector cable protection footprint: worst case scenario is 50% of 3 km length of cable to be protected at a width of 1 m = 4,500 m^2 **Export Cables** Maximum number of export cables – Three Burial techniques – ploughing, jet trenching, mechanical trenching Maximum trench width – 1m Maximum burial depth – 4 m Cable protection Up to 50% of the length of the cables may require cable protection including: rock placement, concrete mattresses, grout/rock bags, and frond mattresses. Total export cable protection footprint: worst case scenario is 50% of 270 km length of cable to be protected at a width of 1 m = 135 km^2 **Inter-Array Cables** *Buried Tether wave option:* Burial technique – ploughing, jet trenching, mechanical trenching Maximum burial depth – 2 m Cable protection options – rock placement, concrete mattresses, grout/rock bags, frond mattresses. Maximum length of cable protection/burial materials – 125 km Maximum area of cable protection/burial materials – 125,000 m^2 Area of disturbance from jetting / ploughing – 750,000 km^2	• Foundation installation; • Cable installation (inter-array cables and export cables); • Scour and scour protective measures. Indirect impacts to known and potential maritime and aviation receptors could be caused by changes to the hydrodynamic and sedimentary regimes due to sediment redistribution during pre-installation actives, installation of cables and application of scour protective measures resulting in changes to sediment transport regimes.
Operation and Maintenance			
Loss or damage to known and unknown marine historic environment assets from direct impacts. Loss or damage to submerged prehistoric landscapes from direct impacts.	C-08, C-28, C-42	**Inter-array cables – replacement** Up to seven inter-array cable failures assumed throughout the lifetime of the wind farm, with 7,000 m km (length) x 5 m (width) (35,000 m^2) disrupted per repair, placement for a total impacted area of 245,000 m^2 over the lifetime of the Proposed Development (35 years). **Offshore Export cables – repair / burial** Cable burial using surface protection Cable re-burial Cable repair Additional cable laying One repair per cable every five years, seven repairs per cable over lifetime of the windfarm (35 years) x three export cables = 21 repairs in total. Area per repair = 1,000 m * 50 m = 50,000 m^2 per repair Total = 21 x 50,000 m^2 = 1,050,000 m^2 **Mooring & Anchoring** *Types of moorings under consideration:* Catenary Mooring, Semi-Taut Mooring, Taut Mooring, Tension Leg Mooring. Maximum number of mooring lines – worst case option is Tension Leg Mooring: 12 Maximum mooring line radius – worst case option is for Catenary Mooring, Semi-taut Mooring and	For Marine Archaeology and Cultural Heritage, the Worst-Case Design Scenario is represented in terms of maximum spatial area of impact associated with seabed disturbance/activities by: • Repair / replacement of cables; • Reburial of cables; • Maintenance of existing moor lines and anchoring points. Any of the device designs, transmission cables and other infrastructure on the seabed or in the water column above that result in localised scouring have the potential to result in the damage / loss of known and unknown archaeological features lying on or below the seabed if such receptors are shown to be present. Maintenance vessel anchoring systems that impact the seabed, or the repeated removal and replacement of devices and other infrastructure in ways that disturb the seabed also have the potential to result in the damage / loss of any archaeological features lying on the seabed. Effects are considered to be permanent.

Impact	Embedded Commitment	Worst Case Design Scenario	Justification
		Taut Mooring: 1500 m; Bottom chain length – worst case option is Catenary Mooring: 1450 m *Types of anchors under consideration:* Drag Embedded Anchor, Plate Anchor, Pile Anchor, Suction Anchor, and Gravity Anchor. Maximum number of anchors per floater foundation – 9	
Indirect disturbance to marine historic environment assets caused by additional cable protection used during repair and maintenance.	C-08, C-28, C-42	**Inter-array cables – replacement** Up to seven inter-array cable failures assumed throughout the lifetime of the wind farm, with 7,000 m km (length) x 5 m (width) (35,000 m^2) disrupted per repair, placement for a total impacted area of 245,000 m^2 over the lifetime of the Proposed Development (35 years). **Offshore Export cables – repair / burial** Cable burial using surface protection Cable re-burial Cable repair Additional cable laying Additional cable protection – rock placement, concrete mattresses, grout/rock bags, frond mattresses. One repair per cable every five years, seven repairs per cable over lifetime of the windfarm (35 years) x three export cables = 21 repairs in total. Area per repair = 1,000 m * 50 m = 50,000 m^2 per repair Total = 21 x 50,000 m^2 = 1,050,000 m^2	Indirect impact to known and potential maritime and aviation receptors could also be caused by potential scour and plume effects resulting in increased protection to, or deterioration through erosion.
Decommissioning			
Loss or damage to known and unknown marine historic environment assets from direct impacts. Loss or damage to submerged prehistoric landscapes from direct impacts.	C-09, C-28, C-42	As with the construction phase, decommissioning activities have the potential to affect archaeological features either directly or indirectly. It is anticipated that the WTGs and their floating foundations will be removed in a reversal of their installation process, with the same anticipated for the OEP. Mooring lines for the foundations will also be removed along with all infrastructure above the seabed. For the IAC and export cables, the decommissioning options will be reviewed at the end of the operational lifetime of the Proposed Development. If the Proposed Development structures are left in-situ any likely significant effects from decommissioning will be avoided. If the Proposed Development structures are to be removed at decommissioning this appraisal assumes that impacts from decommissioning activities are of similar nature to construction activities and would be of a similar or lesser scale, assuming the impact footprint is the same.	
Indirect disturbance to marine historic environment assets caused by decommissioning activities	*C-09, C-28, C-42*	Similar to those impacts assessed during the construction phase, during decommissioning, impacts may occur as a result of changes to hydrodynamic and sediment transport regimes, where these changes have occurred as a consequence of activities and removal of structures associated with decommissioning activities. This appraisal assumes that impacts from decommissioning activities are of similar nature to construction activities and would be of a similar or lesser scale, assuming the impact footprint is the same.	

15.7. ASSESSMENT OF POTENTIAL EFFECTS

15.7.1. Assessment of potential effects on marine archaeology and cultural heritage has been undertaken for all phases of the Proposed Development. A detailed description of each impact is provided below, and informed by Volume 1, Chapter 3 (Project Description) and baseline information provided in Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report).

15.7.2. The potential environmental impacts arising from the construction, operation and maintenance, and decommissioning of the Proposed Development are listed in Table 15-14 along with the parameters against which each phase impact has been assessed. A description of the potential effects on marine archaeology and cultural heritage assets caused by each identified impact is given below.

CONSTRUCTION PHASE

LOSS OF OR DAMAGE TO KNOWN AND UNKNOWN MARINE HISTORIC ENVIRONMENT ASSETS, AND LOSS OR DAMAGE TO SUBMERGED PREHISTORIC LANDSCAPES, FROM DIRECT IMPACTS

15.7.3. If direct impacts were to occur upon the marine archaeological receptors that have been identified in Section 15.5 of this Chapter and any potential archaeology within the study area, these are most likely to occur during the construction phase of the Proposed Development. Impacts resulting in adverse effects upon archaeological assets as part of the construction phase are those involving contact with the seabed and/or the removal of seabed sediments. Marine archaeological receptors with height, such as shipwrecks, may also be impacted by activities that occur within the water column, including pre-installation activities and mooring / anchor / cable installation activities. Installation activities that may lead to direct physical impacts include:

- Seabed preparation activities (e.g. pre-sweeping along export cable);
- HDD operations particularly along the drilling route (e.g. in relation to buried palaeolandscape features) and at punch-in and punch-out locations;
- Installation of lidar buoys and wave rider buoys;
- Placement of moorings, including catenary, semi-taut, taut and tension leg;
- Anchor installation, including drag embedded anchor, plate anchor, pile anchor, suction anchor and gravity anchor, and their presence;
- Placement of scour protection at anchors;
- Installation of OEP(s) and scour protection around foundation structure;
- Installation of inter-array cables and cable protection; and
- Installation of export cables and cable protection.

15.7.4. Following the application of embedded commitments, as outlined in Table 15-11 consisting of the implementation of AEZs around high value anomalies and avoidance of identified heritage assets by Proposed Development infrastructure, direct impacts to known archaeological receptors would not occur.

15.7.5. Unavoidable direct impacts to potential archaeological receptors, not yet identified, may occur at any point where development and related activities disturb the seafloor.

MAGNITUDE OF IMPACT

15.7.6. All direct impacts to marine cultural heritage are permanent. Once archaeological remains, 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.

15.7.7. Impacts on potential palaeogeography receptors, such as potential *in situ* prehistoric sites and submerged landscape features, could result in major effects, as these are considered as high value assets. This impact pathway is judged to be constrained to construction phase activities within the offshore ECC, primarily trenching and HDD-related activities, with greatest potential towards the nearshore within an identified data gap. For the cable burial along the offshore ECC this is anticipated to be down to a maximum burial depth of 4 m (see Volume 1, Chapter 3 (Project Description)), with HDD applied for landfall installation.

15.7.8. Ground investigation work is planned for 2026. The geoarchaeological assessment of these data, and where required, further assessment of sub-samples of sediment stratigraphy of archaeological interest, would aid in assessing the palaeogeographic and prehistoric archaeological potential of the inshore 1.5 km of the offshore ECC, which is currently not covered by geophysical data. The scope of works would be defined within the WSI which forms part of the embedded commitments described in Table 15-11. Therefore, the magnitude of direct impacts on such resources would be reduced to low.

15.7.9. 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 15.5. However, with the application of embedded commitments, including the implementation of AEZs and avoidance through further appraisal to ascertain the nature of the feature, described in Table 15-11, the magnitude of impacts are judged to be low.

15.7.10. As trenchless techniques (such as HDD) are being applied for landfall installation, impacts to known and unknown intertidal heritage receptors would be minimal and 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 this to negligible, and would be adopted to mitigate against adverse effects to any new discoveries.

SENSITIVITY OF RECEPTOR

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

15.7.12. As the value of potential shipwrecks cannot be evaluated until they are discovered, potential wrecks of all periods should be expected to be of high value, in accordance with the precautionary approach. Aircraft are considered to have significance for remembrance and commemoration, but also have an implicit heritage value as historic artefacts, providing information on the aircraft itself and also the circumstances of its use and loss (English Heritage (now Historic England), 2002, p. 2). In addition, all UK aircraft that crash while in military service are protected under the Protection of Military Remains Act 1986, and therefore should be considered as designated sites until proven to be non-military. On this basis, all potential aircraft sites are of high sensitivity.

15.7.13. Derived artefacts and other isolated finds are likely to be of limited archaeological value as individual discoveries. However, the occurrence of a number of seemingly isolated objects within a particular area has the potential to indicate shipping routes or maritime battlegrounds,

or possibly even indicate the presence of a hitherto unknown wreck site. Isolated maritime finds are, therefore, regarded as being of medium archaeological sensitivity. Isolated aircraft finds are considered as being of medium archaeological sensitivity as they may provide insight into patterns of historical aviation across the study area or indicate the presence of uncharted aircraft crash sites.

15.7.14. Based on the available assessed datasets, no features of palaeogeographic interest were identified (see Section 15.5) within the offshore ECC between 1.5 and 6.5 km offshore. As highlighted in Table 15-6 the potential for seabed prehistory assets and their respective value varies from high to low, depending on the asset type.

15.7.15. All A1 receptors and currently unknown archaeological sites are considered as high sensitivity receptors.

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

15.7.17. For the three sites located within the intertidal zone (see paragraph 15.5.39) these have been ascribed as being of high sensitivity due to the potential for further material to be discovered within the vicinity, but also their association to military infrastructure dating to the Second World War.

SIGNIFICANCE OF EFFECT

15.7.18. The significance of impacts have been evaluated according to defined parameters expressed as a matrix in Table 15-10.

15.7.19. The application of embedded commitments, including the implementation of AEZs around identified A1 features, where appropriate further assessment of identified A2 features, and a PAD, described in Table 15-11 means that all direct impacts to known and potential maritime and aviation receptors would be avoided and, hence, the magnitude of impact would be low.

15.7.20. For potential palaeogeographic receptors the low magnitude of impact, as a result of the application of embedded commitments, would lead to a minor significance of effect which is not significant in EIA terms.

15.7.21. The significance of effect to known and potential intertidal heritage receptors is deemed to be negligible, and not significant in EIA terms.

Table 15-15 Significance of loss or damage to known and unknown marine historic environment and submerged prehistoric landscapes from direct impacts

Receptor/Location	Magnitude	Sensitivity	Significance
Known maritime and aviation receptors (A1 and A2 receptors)	**Low**	**High**	**Minor**
Potential maritime and aviation receptors	**Low**	**High**	**Minor**
Potential palaeogeographic receptors	**Low**	**Low to High**	**Minor**
Known and potential intertidal heritage receptors	**Negligible**	**High**	**Negligible**

SECONDARY MITIGATION AND RESIDUAL EFFECT

15.7.22. No additional marine archaeology and cultural heritage mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 15.6) is not significant in EIA terms.

15.7.23. It should be noted that the level of mitigation would be determined by the importance of the archaeological receptor, for example, a medieval wooden shipwreck may require full excavation, whereas an A2 anomaly confirmed through further survey to be modern debris such as rebar would require no further mitigation.

15.7.24. In some cases, the application of appropriate mitigation, such as an archaeological investigation of seabed anomalies prior to impact or reported through a PAD, could lead to effects of minor to moderate beneficial significance which is a significant beneficial effect in EIA terms. For example, discovering a wreck of interest and being able to share information (via Virtual Reality / publications / outreach events etc.) with the wider public would be moderate beneficial.

15.7.25. Similarly, undertaking archaeological investigation of borehole logs and vibrocores prior to impact could lead to effects of minor to moderate beneficial significance which is a significant beneficial effect in EIA terms. For example, providing details about the prehistoric landscape and being able to share it with the wider public would be significant beneficial.

15.7.26. In instances where there is increased sediment burial of known or potential archaeological receptors due to installation activities, this could lead to effects of slight beneficial significance which is not significant in EIA terms.

INDIRECT DISTURBANCE TO MARINE HISTORIC ENVIRONMENT ASSETS CAUSED BY CABLE BURIAL METHODS AND / OR CABLE PROTECTION

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

- Seabed preparation activities (pre-sweeping along export cable), potentially resulting in changes to local hydrodynamics;
- Dispersal of suspended sediment (during placement of moorings, anchor installation and installation of inter-array cables and export cable), potentially resulting in increased suspended sediment concentration and deposition; and
- Scour associated with the disturbance from construction activities and structures.

MAGNITUDE OF IMPACT

15.7.28. The magnitude of effect of indirect impacts to marine archaeology and cultural heritage during installation is expected to be low.

15.7.29. Following an appraisal of the local hydrodynamic and suspended sediment concentrations (SSC), a review of data available from similar / nearby projects and preliminary calculations, Volume 2, Chapter 7 (Marine and Coastal Processes) concludes that the magnitude of impact

from increases in SSC and modifications to seabed morphology will be low. Consequently, the magnitude of impact on marine archaeology and cultural heritage would be low as seabed disturbance will be temporary and localised. During the construction phase, the primary means by which SSC and seabed morphology could be impacted is through the interruption of sediment transport patterns via seabed preparation activities and the installation of drag-embedded anchors. Debris brought to the surface from the use of PLGR prior to trenching activities will be disposed of in line with the relevant regulatory requirements. Sediment released from drag-embedded anchors is expected to be of relatively short duration and in close proximity to the seabed. The use of jetting for cable installation would result in the largest amount of displaced sediment in the water column. However, evidence base indicated that cable burial operations will result in localised and temporary re-suspension and subsequent settling of sediments.

15.7.30. For nearshore installation activities at landfall, the worst-case scenario assessed within Volume 2, Chapter 7 (Marine and Coastal Processes) is excavation of HDD exit pit(s) and cable protection measures. The results of the assessment indicated that seabed disturbance due to excavated pits will impact a relatively small area and therefore the magnitude of impact is assessed to be low.

SENSITIVITY OF RECEPTOR

15.7.31. 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 of 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.

15.7.32. Volume 2, Chapter 7 (Marine and Coastal Processes) suggests that the general regime of sediment accumulation would continue as previously and so the sensitivity of the receptors to sediment erosion is very low, as it is in effect protecting receptors as presently or to a greater extent.

SIGNIFICANCE OF EFFECT

15.7.33. The very low sensitivity to continued sediment deposition and low magnitude of indirect impacts on archaeological receptors would result in not significant effects in EIA terms.

Table 15-16 Significance of loss or damage to marine historic environment assets caused by cable burial methods and / or cable protection

Receptor/Location	Magnitude	Sensitivity	Significance
Known maritime and aviation receptors (A1 and A2 receptors)	**Low**	**Very Low**	**Negligible**
Potential maritime and aviation receptors	**Low**	**Very Low**	**Negligible**
Potential palaeogeographic receptors	**Low**	**Very Low**	**Negligible**
Known and potential intertidal heritage receptors	**Low**	**Very Low**	**Negligible**

SECONDARY MITIGATION AND RESIDUAL EFFECT

15.7.34. No additional marine archaeology and cultural heritage mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 15.6) is not significant in EIA terms.

OPERATION AND MAINTENANCE

LOSS OF OR DAMAGE TO KNOWN AND UNKNOWN MARINE HISTORIC ENVIRONMENT ASSETS, AND LOSS OR DAMAGE TO SUBMERGED PREHISTORIC LANDSCAPES, FROM DIRECT IMPACTS

15.7.35. 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.

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

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

MAGNITUDE OF IMPACT

15.7.37. As a result of the embedded commitments (Table 15-11), which remain applicable during both the construction phase and operation and maintenance phases, direct impacts to known archaeological receptors would not occur. Unavoidable direct impacts to potential archaeological receptors may occur at any point where operation and maintenance activities disturb the seafloor.

15.7.38. The magnitude of direct impacts on potential maritime and aviation receptors, and potential seabed features as part of operation activities, if they were to occur, would be high. Any impact upon marine archaeology, including any unknown archaeology would be permanent and irreversible. However, with the implementation of embedded commitments 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 low.

SENSITIVITY OF RECEPTOR

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

15.7.40. As the value of potential shipwrecks cannot be evaluated until they are discovered, potential wrecks of all periods should be expected to be of high value, in accordance with the precautionary approach. Aircraft are considered to have significance for remembrance and commemoration, but also have an implicit heritage value as historic artefacts, providing information on the aircraft itself and also the circumstances of its use and loss (English Heritage (now Historic England), 2002, p. 2). In addition, all UK aircraft that crash while in military service are protected under the Protection of Military Remains Act 1986, and therefore should be considered as designated sites until proven to be non-military. On this basis, all potential aircraft sites are of high sensitivity.

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

15.7.42. Based on the available assessed datasets, no features of palaeogeographic interest were identified (see Section 15.5) within the offshore ECC between 1.5 and 6.5 km offshore. As highlighted in Table 15-6 the potential for seabed prehistory assets and their respective value varies from high to low, depending on the asset type.

15.7.43. All A1 receptors and currently unknown archaeological sites are considered as high sensitivity receptors.

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

15.7.45. For the three sites located within the intertidal zone (see paragraph 15.5.36) these have been ascribed as being of high value, due to the potential for further material to be discovered within the vicinity, but also their association to military infrastructure dating to the Second World War.

SIGNIFICANCE OF EFFECT

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

15.7.47. In areas that have not yet been impacted, the magnitude of impact on marine archaeology are anticipated to be low, on the basis that embedded commitments and WSI measures are implemented.

15.7.48. Overall, the magnitude of the impact is deemed to be low, and the sensitivity of the receptor is considered to be high as a worst case. The effect will, therefore, be minor and not significant in EIA terms.

Table 15-17 Significance of loss or damage to known and unknown marine historic environment and submerged prehistoric landscapes from direct impacts

Receptor/Location	Magnitude	Sensitivity	Significance
Known maritime and aviation receptors (A1 and A2 receptors)	**Low**	**High**	**Minor**
Potential maritime and aviation receptors	**Low**	**High**	**Minor**
Potential palaeogeographic receptors	**Low**	**Low to High**	**Minor**
Known and potential intertidal heritage receptors	**Low**	**High**	**Minor**

SECONDARY MITIGATION AND RESIDUAL EFFECT

15.7.49. No additional marine archaeology and cultural heritage mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 15.6) is not significant in EIA terms.

INDIRECT DISTURBANCE TO MARINE HISTORIC ENVIRONMENT ASSETS CAUSED BY ADDITIONAL CABLE PROTECTION USED DURING REPAIR AND MAINTENANCE

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

- Changes to suspended sediment concentrations and deposition, as a result of installation structures; and
- Scour associated with installation structures.

MAGNITUDE OF IMPACT

15.7.51. The magnitude of effect of indirect impacts to marine archaeology and cultural heritage during operation and maintenance phase is expected to be low.

15.7.52. Following an appraisal of the local hydrodynamic and SSC, and a review of existing literature and evidence base, Volume 2, Chapter 7 (Marine and Coastal Processes) concludes that the magnitude of impact on seabed and coastal morphology and sediment transport regimes from scour associated with installed infrastructure (inc. catenary mooring system) and cable protection will be low. This is because the presence of partially installed structures on the seabed and the anticipated changes are highly localised. Although the presence of catenary mooring will have the largest sediment disturbance, this will likely only occur during large storm events and during more frequent events, otherwise this will have a considerably smaller seabed area / volume of disturbance. Changes to seabed morphology due to catenary mooring lines is highly localised to the chains, although this will persist during operational phase, the sediment volume disturbed under the more frequent events is likely to be relatively low.

SENSITIVITY OF RECEPTOR

15.7.53. 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 of 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. Volume 2, Chapter 7 (Marine and Coastal Processes) suggests that the general regime of sediment accumulation would continue as previously and so the sensitivity of the receptors to sediment erosion is very low, as it is in effect protecting receptors as presently or afford protection to a greater extent.

SIGNIFICANCE OF EFFECT

15.7.54. The very low sensitivity to continued sediment deposition and low magnitude of indirect impacts on archaeological receptors would result in not significant effects in EIA terms.

Table 15-18 Significance of indirect disturbance to marine historic environment assets caused by additional cable protection used during repair and maintenance

Receptor/Location	Magnitude	Sensitivity	Significance
Known maritime and aviation receptors (A1 and A2 receptors)	**Low**	**Very Low**	**Negligible**
Potential maritime and aviation receptors	**Low**	**Very Low**	**Negligible**
Potential palaeogeographic receptors	**Low**	**Very Low**	**Negligible**
Known and potential intertidal heritage receptors	**Low**	**Very Low**	**Negligible**

SECONDARY MITIGATION AND RESIDUAL EFFECT

15.7.55. No additional mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 15.6) is not significant in EIA terms.

DECOMMISSIONING

DIRECT PHYSICAL DISTURBANCE

15.7.56. As with the construction phase, decommissioning activities have the potential to affect archaeological assets either directly or indirectly. The Proposed Development is for a set term, and the operational lifetime of the Proposed Development is expected to be 35 years. Structures are proposed be removed in reverse order of the installation procedure. However, aspects, in particular inter-array, interconnector, and export cables, may be left in situ to minimise disturbance to seabed. The methodology for doing so will be based upon best regulations/practices and available technology, as described in Volume 1, Chapter 3 (Project Description).

15.7.57. As the Proposed Development structures are to be removed at decommissioning, this appraisal assumes that impacts from decommissioning activities are of similar nature to construction activities and would be of a similar or lesser scale, and therefore not likely to be significant.

INDIRECT PHYSICAL DISTURBANCE

15.7.58. The options for decommissioning will likely include the removal of WTG superstructure, removal of WTG substructures and foundations (including their anchors and mooring lines), removal of offshore substation platforms and foundations, removal of inter array cabling, and removal of entire cable or removal of sections of the cable.

15.7.59. Similar to those impacts assessed during the construction phase, during decommissioning, impacts may occur as a result of changes to hydrodynamic and sediment transport regimes, where these changes have occurred as a consequence of activities and removal of structures associated with decommissioning activities.

15.7.60. This appraisal assumes that impacts from decommissioning activities are of similar nature to construction activities and would be of a similar or lesser scale, and therefore not likely to be significant.

PROPOSED MONITORING

15.7.61. No marine archaeology and cultural heritage monitoring are proposed to test the predictions made within the assessment of likely significant effects on marine archaeology and cultural heritage receptors as no likely significant effects were predicted during construction, O&M and decommissioning phases of the Proposed Development.

15.8. WHOLE PROJECT ASSESSMENT

15.8.1. The Proposed Development's infrastructure and activities are the focus of this EIAR. However, where the potential exists for onshore elements of the Project (the onshore infrastructure landward of MLWS) to impact the offshore receptors, these have been identified and assessed below in the Whole Project Assessment (WPA).

15.8.2. A separate onshore EIAR is being prepared which will provide a description of the onshore elements of the Project landward of MLWS, and an assessment of the associated LSE.

CONSTRUCTION

15.8.3. The onshore aspects of the Project have been considered in relation to the impacts assessed in Section 15.7.

15.8.4. The onshore elements of the Project will undertake HDD operations above MHWS, with an HDD exit point offshore. The impacts from the HDD exit point on marine archaeology and cultural heritage receptors have been assessed in full in Section 15.7. It is not anticipated that there will be any additional impacts from the onshore elements of the Project on marine archaeology and cultural heritage as all other onshore activities are fully terrestrial, or, covered by embedded commitment strategies proposed for palaeogeographic receptors which may be impacted by construction phase HDD operations that extend across the intertidal zone (Table 15-11) which include the future geoarchaeological assessment of geophysical and geotechnical datasets.

15.9. CUMULATIVE EFFECTS ASSESSMENT

CEA METHODOLOGY

15.9.1. Effects of the Proposed Development alone are generally spatially restricted to being near the Muir Mhòr Array Area and offshore ECC. However, certain impacts have the potential to be observed over a wider area. These cumulative effects are the effects of the Proposed Development, combined with the effects from other projects, on the same receptor or group of receptors.

15.9.2. Volume 1, Chapter 6 (Environmental Impact Assessment Methodology) details how potential cumulative effects will be assessed for the Proposed Development through a Cumulative Effects Assessment (CEA). A CEA screening process has identified the relevant other plans, projects, and activities which are to be included in the assessment. Information on each Tiered project is given in Table 15-19.

15.9.3. For each of these relevant plans/projects, the most up-to-date publicly available project parameters will be used to inform the CEA. Where information is not publicly available, the Developer has sought to consult and collaborate to obtain project parameters for assessment.

15.9.4. These other plans or projects may present different levels of potential cumulative effect when combined with the Proposed Development, informed by other plan/project's readiness and likelihood for actual operation. A tiered approach to the CEA is therefore applied here, allowing weighted assessment of cumulative effects.

- **Tier 1** – The whole project (both onshore and offshore elements), combined with plans/projects which have become operational since the baseline characterisation of the Project, operational projects that have an ongoing impact, plus those that are consented and are yet to be constructed or under construction;
- **Tier 2** – All plans/projects assessed under Tier 1, plus those projects that have submitted a Scoping Report or those pending determination following a submitted application; and
- **Tier 3** – All plans/projects assessed under Tier 2, plus those projects that are not currently in the planning system but are likely to enter the planning system in the near future (e.g., Agreement for Lease (AfL) or projects at feasibility / early design stages) where information is available to inform the cumulative assessment and there is sufficient data confidence**.**

15.9.5. This CEA for this Marine Archaeology and Cultural Heritage Chapter has considered the worst-case design scenario for each of the projects, plans and activities in line with the methodology outlined in Volume 1, Chapter 6 (Environmental Impact Assessment Methodology). For potential effects on marine archaeology and cultural heritage planned projects were screened into the assessment based on a screening range that encapsulates the Proposed Development temporally and spatially as defined by the construction / decommissioning dates and study area. This initial screening exercise was undertaken based on a Zone of Influence (ZoI) defined by a 20 km buffer around the Proposed Development. The ZoI is substantially larger than the study area extent to capture any potential buffer of impacts from other surrounding developments.

15.9.6. Table 15-19 outlines the identifies shortlist of other development for the CEA for Marine Archaeology and Cultural Heritage. Table 15-20 presents those other development that have been scoped in the CEA for Marine Archaeology and Cultural Heritage and an assessment of the cumulative effects presented where appropriate.

15.9.7. Given the highly localised nature of direct impacts on marine archaeology and cultural heritage, the ZoI for cumulative effects is considered to be the spatial extent of the Proposed Development with the following projects considered to have the potential for direct and indirect interaction with the Proposed Development: Hywind Export Cable, NorthConnect, Peterhead to Drax HVDC, Green Volt Export Cables, Salamander Export Cables and Flora OWF.

15.9.8. The remaining four projects listed in Table 15-19 also have the potential to interact with the Proposed Development via indirect impacts relating to burial of marine archaeology and cultural heritage. The identified indirect impacts relate to the potential for cumulative impact on seabed sediment patterns, which generally are either positive (additional sediment is deposited over a known or unknown archaeological site, providing further protection) or negative (covering or supporting sediment is removed from a known or unknown archaeological site, causing damage through either exposure or lack of supporting sediment). Volume 2, Chapter 7 (Marine and Coastal Processes) predicted that changes to sediment caused by the Proposed Development will be low, due to the temporary and localised seabed disturbance from seabed preparation and construction activities. Therefore, there is likely no potential for cumulative effects related to these other developments.

Table 15-19 Other Plans/Projects included in the Marine Archaeology and Cultural Heritage CEA.

Plan/Project	Summary	Status	Distance from Array Area (km)	Distance from ECC (km)	Construction dates (if relevant)	Operational by (if relevant)	Summary of interaction with Proposed Development
Tier 1							
Offshore Wind Projects and cabling/Subsea Cables							
Hywind export cable	Floating Offshore Wind Farm (MCMS/05515 – L/05515/15/0)	In Operation	36.61	Intersecting ECC (0)	N/A	2024-	Potential for spatial overlap with Proposed Development construction and O&M phases. Activities that directly interact with the seabed could overlap temporally and spatially, resulting in direct impacts to seabed features and changes to local sediment patterns which may lead to increased exposure or burial of marine archaeology receptors.
Britannia to St Fergus	Umbilical Oil	In Operation	27.69	2.66	N/A	2024-	Potential for temporal overlap with Proposed Development construction and O&M phases. Activities that directly interact with the seabed could overlap temporally, resulting in changes to local sediment patters which may lead to increased exposure or burial of marine archaeology receptors.
Aberdeen Offshore Windfarm Cables (also known as European Offshore Wind Deployment Centre)	Power Licence 04309	In Operation	79.31	18.20	N/A	2024-	Potential for temporal overlap with Proposed Development construction and O&M phases. Activities that directly interact with the seabed could overlap temporally, resulting in changes to local sediment patters which may lead to increased exposure or burial of marine archaeology receptors.
NorthConnect	Power HVDC Cable Infrastructure Licence 06771 Licence 06870	Consented	43.96	Intersecting ECC (0)	Unknown	Unknown	Potential for spatial overlap with Proposed Development construction and O&M phases. Activities that directly interact with the seabed could overlap temporally and spatially, resulting in direct impacts to seabed features and changes to local sediment patters which may lead to increased exposure or burial of marine archaeology receptors.
Peterhead to Drax HVDC (E4D3)	Power – also known as Eastern Green Link 2 (MLA/2022/00273 - L/2023/00211/1) / (MS-00009943)	Consented	47.69	Intersecting ECC (0)	2024	2025-	Potential for spatial overlap with Proposed Development construction and O&M phases. Activities that directly interact with the seabed could overlap temporally and spatially, resulting in direct impacts to seabed features and changes to local sediment patters which may lead to increased exposure or burial of marine archaeology receptors.
Peterhead to South Humber (E4L5)	Power	Consented	47.69	3.70	2024-2028	2029-	Potential for temporal overlap with Proposed Development construction and O&M phases. Activities that directly interact with the seabed could overlap temporally, resulting in changes to local sediment patters which may lead to increased exposure or burial of marine archaeology receptors.
Green Volt OWF Export Cables	Power Cables Licence 00010231 Licence 00010232	Consented – not constructed	29.40	Intersecting ECC (0)	2025-2027	2028-	Potential for spatial overlap with Proposed Development construction and O&M phases. Activities that directly interact with the seabed could overlap temporally and spatially, resulting in direct impacts to seabed features and changes to local sediment patters which may lead to increased exposure or burial of marine archaeology receptors.

Plan/Project	Summary	Status	Distance from Array Area (km)	Distance from ECC (km)	Construction dates (if relevant)	Operational by (if relevant)	Summary of interaction with Proposed Development
Tier 2							
Offshore Wind Projects and cabling							
Salamander OWF WTG structures	Floating Offshore Wind Farm Licence 00010807	EIA application submitted - Determination Phase	28.37	9.10	2028-2030	2031-	Potential for temporal overlap with Proposed Development construction and O&M phases. Activities that directly interact with the seabed could overlap temporally, resulting in changes to local sediment patterns which may lead to increased exposure or burial of marine archaeology receptors.
Salamander OWF Export Cables	Power Cables Licence 00010807	EIA application submitted - Determination Phase	30.88	Intersecting ECC (0)	2026-2030	2031-	Potential for spatial overlap with Proposed Development construction and O&M phases. Activities that directly interact with the seabed could overlap temporally and spatially, resulting in direct impacts to seabed features and changes to local sediment patters which may lead to increased exposure or burial of marine archaeology receptors.
Tier 3							
Offshore Wind Projects and cabling							
Flora	Offshore Wind Farm	Concept/pre-planning/proposed	24.12	Intersecting ECC (0)	Unknown	Unknown	Potential for spatial overlap with Proposed Development construction and O&M phases. Activities that directly interact with the seabed could overlap temporally and spatially, resulting in direct impacts to seabed features and changes to local sediment patters which may lead to increased exposure or burial of marine archaeology receptors.

WORST CASE DESIGN SCENARIO CEA

15.9.9. The Marine Archaeology and Cultural Heritage CEA has been undertaken with respect to the details provided in Volume 1, Chapter 3 (Project Description). A 'worst case' design scenario has been selected for each cumulative impact which would lead to the greatest impact for all receptors or receptor groups, when selected from a range of values. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within Volume 1, Chapter 3 (Project Description) (e.g., different infrastructure layout), to that assessed here, be taken forward in the final design scheme.

15.9.10. Table 15-20 presents the worst case design scenario for each cumulative impact associated with the Marine Archaeology and Cultural Heritage CEA, along with justification.

Table 15-20 Worst Case Design Scenarios with respect to the Marine Archaeology and Cultural Heritage CEA

Cumulative Impact	Tier	Worst Case Design Scenario
Construction (including pre-construction)		
Cumulative effects resulting in loss of or damage to known and unknown marine historic environment assets, and loss or damage to submerged prehistoric landscapes, from direct impacts	**Tier 1** **Cables and Pipelines** • Hywind export cable; • Britannia to St Fergus; • Aberdeen OWF Cables; • NorthConnect; • Peterhead to Drax HVCD; • Peterhead to South Humber; • Green Volt export cables. **Tier 2** **Offshore Energy** • Salamander WTG structures; • Salamander export cables. **Tier 3** **Offshore Energy** • Flora.	There is the potential for cumulative impacts to known and potential marine archaeological receptors from a variety of developments. 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.
Cumulative effects resulting in the disturbance to marine historic environment assets caused by cable burial methods and / or cable protection from indirect impacts		There is also the potential for cumulative indirect effects to occur upon known and potential receptors as a result of changes to hydrodynamic and sediment transport regimes. 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.
Operation and Maintenance		
Cumulative effects resulting in disturbance to marine historic environment assets caused by additional cable protection used during repair and maintenance, from indirect impacts	**Tier 1** **Cables and Pipelines** • Hywind export cable; • Britannia to St Fergus; • Aberdeen OWF Cables; • NorthConnect; • Peterhead to Drax HVCD; • Peterhead to South Humber; • Green Volt export cables.	There is the potential for cumulative indirect effects to occur upon known and potential receptors as a result of changes to sediment transport regimes and scour associated with additional cable protection. 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.

Cumulative Impact	Tier	Worst Case Design Scenario
	Tier 2 **Offshore Energy** • Salamander WTG; • Salamander export cables. **Tier 3** **Offshore Energy** • Flora.	

CONSTRUCTION CEA

CUMULATIVE DIRECT AND INDIRECT DISTURBANCE TO RECEPTORS

15.9.11. Direct and indirect physical impacts on marine archaeology and cultural heritage will in most cases be limited by the location and extent of sensitive receptors. Due to the proposed embedded commitments details in Section 15.6 such as the implementation of AEZs, archaeological reporting protocols and other best-practice elements, most effects will be avoided, particularly to known receptors identified on, in or beneath the seabed.

15.9.12. The potential for indirect impacts increases as the distance between sites decreases, and therefore there is high potential relating to Hywind Export Cable, NorthConnect, Peterhead to Drax HVDC, Green Volt Export Cables, Salamander Export Cables, and Flora, as these spatially intersect the offshore ECC. There is the potential for indirect impacts to occur upon known and potential marine archaeology and cultural heritage as a result of changes to hydrodynamic and sediment transport regimes.

TIER 1

15.9.13. There are seven projects for consideration, relating to the following projects:

- Hywind OWF has undergone EIA process and as part of the Marine Licence a Written Scheme of Investigation (WSI) was required, which included the implementation of an archaeological reporting protocol for all phases of the project;
- Britannia to St Fergus is in operation;
- Five cables and pipelines listed in Table 15-19, for which all projects have undergone EIA process and as part of the Marine Licence conditions a WSI and implementation of an archaeological reporting protocol is required.

15.9.14. As the above listed other developments have undergone EIA, it is assumed that known seabed features have been avoided during route development process, as these constitute design constraints, and any potential impacts likely mitigated against. Therefore, there is no potential for these projects to give rise to cumulative effects with the construction of the Proposed Development.

TIER 2

15.9.15. Salamander OWF has submitted an EIA and is in determination phase. As part of the proposed embedded mitigation for marine archaeology and cultural heritage Chapter, including implementation of AEZs, temporary AEZs, and / or Areas of Archaeological Potential, further investigations by means of geoarchaeological assessment of geotechnical

samples, and implementation of a WSI including a PAD, resulted in no significant effects. Therefore, potential impacts are likely to be mitigated against.

TIER 3

15.9.16. Flora OWF is early concept stage and will also likely undergo EIA process, and as such, any potential impacts are likely to be mitigated against.

MAGNITUDE OF CUMULATIVE IMPACT

15.9.17. Any known seabed features should have been avoided during construction, as these would constitute engineering hazards. Impacts to buried material in general are likely to be relatively minimal, as the impact to the seabed is relatively minimal, although over a long distance. As cables are likely to be buried or covered by low-lying material, they are unlikely to cause noticeable changes to hydrodynamic, sedimentation or erosion regimes. Therefore, any cumulative impacts of indirect impacts of cables would be of negligible magnitude.

15.9.18. Early concept, concept / early planning or pre-planning offshore wind farms will likely undergo EIA, therefore suitable measures are likely to be implemented. Additionally, the Proposed Development has committed to avoid the identified A1 and A2 features wherever possible or to undertake additional investigation to determine their archaeological potential. Therefore, any cumulative impacts from other developments with the Proposed Development would be of negligible magnitude.

15.9.19. Discrete archaeological sites and unknown sites encountered by chance during the construction of the Proposed Development or the other developments, will be too small to be subject to impact interactions arising from combined effects of the Proposed Development with other developments and activities in the area. Additionally, the Proposed Development has committed to include a PAD to mitigate against any unknown sites discovered during construction.

SENSITIVITY OF RECEPTOR

15.9.20. Based on the available assessed datasets, no features of palaeogeographic interest were identified (see Section 15.5) within the offshore ECC between 1.5 and 6.5 km offshore. As highlighted in Table 15-6 the potential for seabed prehistory assets and their respective value varies from high to low, depending on the asset type.

15.9.21. All A1 receptors and currently unknown archaeological sites are considered as high sensitivity receptors.

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

SIGNIFICANCE OF CUMULATIVE EFFECT

15.9.23. As a result of the embedded commitments to avoid the identified A1 and A2 features wherever possible or to undertake additional investigation to determine its archaeological potential, direct effects as a result of the Proposed Development will be avoided. Therefore, cumulative effects between the Proposed Development and the other Tier 1, Tier 2, and Tier 3 projects will also be avoided.

15.9.24. Changes in local scouring and sedimentation patterns may lead to increased exposure or burial of marine archaeological assets. As per Volume 2, Chapter 7 (Marine and Coastal Processes), the localised effects and short-term duration of the construction activities of the Proposed Development alone is such that the magnitude is considered to be low. Also, as the intent of the Proposed Development and other projects within the ZoI is to bury cables where

practically possible, the impacts of morphological change have been assessed to be negligible. Therefore, no major cumulative effect would occur as a result of additive effects from the Proposed Development and the other Tier 1, Tier 2, and Tier 3 projects.

Table 15-21 Significance of cumulative direct and indirect disturbance to receptors

Receptor/Location	Magnitude	Sensitivity	Significance
Known and potential palaeogeography	Negligible	Low to High	Negligible
Known and potential maritime and aviation receptors	Negligible	High	Negligible

SECONDARY MITIGATION AND RESIDUAL CUMULATIVE EFFECTS

15.9.25. No additional marine archaeology and cultural heritage mitigation is considered necessary because the likely cumulative effect in the absence of further mitigation (beyond the commitments outlined in Section 15.6) is not significant in EIA terms.

OPERATION AND MAINTENANCE CEA

CUMULATIVE DIRECT & INDIRECT DISTURBANCE TO RECEPTORS

15.9.26. The Proposed Development's operational period is expected to be 35 years. The O&M phase of the Proposed Development involves routine maintenance, which is expected to include cable repair / replacement, cable protection repair / replacement, and maintenance or any monitoring.

15.9.27. The O&M phase of the Proposed Development, alongside other plans / projects in the area have the potential to cause direct physical impacts to areas not already disturbed during the construction phase. However, due to the proposed embedded commitments details in Section 15.6 such as the implementation of AEZs, archaeological reporting protocols and other best-practice elements, most effects will be avoided, particularly to known receptors identified on, in or beneath the seabed.

15.9.28. The potential for indirect impacts increases as the distance between sites decreases, and therefore there is high potential relating to Hywind Export Cable, North Connect, Peterhead to Drax HVDC, Green Volt Export Cables, Salamander Export Cables, and Flora, as these spatially intersect the offshore ECC. There is the potential for indirect impacts to occur upon known and potential marine archaeology and cultural heritage as a result of changes to hydrodynamic and sediment transport regimes.

TIER 1

15.9.29. There are seven projects for consideration, relating to the following projects:

- Hywind OWF has undergone EIA process and as part of the Marine Licence a Written Scheme of Investigation (WSI) was required, which included the implementation of an archaeological reporting protocol for all phases of the project;
- Britannia to St Fergus is in operation;
- Five cables and pipelines listed in Table 15-19, for which all projects have undergone EIA process and as part of the Marine Licence conditions a WSI and implementation of an archaeological reporting protocol is required.

15.9.30. As the above listed other developments have undergone EIA, it is assumed that known seabed features have been avoided during route development process, as these constitute design constraints, and any potential impacts likely mitigated against. Therefore, there is no

potential for these projects to give rise to cumulative effects with the construction of the Proposed Development.

TIER 2

15.9.31. Salamander OWF has submitted an EIA and is in determination phase. As part of the proposed embedded mitigation for marine archaeology and cultural heritage Chapter, including implementation of AEZs, temporary AEZs, and / or Areas of Archaeological Potential, further investigations by means of geoarchaeological assessment of geotechnical samples, and implementation of a WSI including a PAD, resulted in no significant effects. Therefore, potential impacts are likely to be mitigated against.

TIER 3

15.9.32. Flora OWF is early concept stage and will also likely undergo EIA process, and as such, any potential impacts are likely to be mitigated against.

MAGNITUDE OF CUMULATIVE IMPACT

15.9.33. Any known seabed features should have been avoided during construction, as these would constitute engineering hazards. Impacts to buried material in general is likely to be relatively minimal, as the impact to the seabed is relatively minimal, although over a long distance. The intent of the Proposed Development and other OWF projects / cables and pipelines is to bury cables where practically possible. These are likely to be shallowly buried, and any covering material would have a relatively small footprint. Although O&M activities could represent a potential cumulative impact, the mitigation measures which would likely be required for any such activity including further surveys after cable installation would reduce the pathway for cumulative impacts to occur. Therefore, any cumulative impacts of cables would be of negligible magnitude.

15.9.34. As cables and pipelines are likely to be buried or covered by low-lying material, they are unlikely to cause noticeable changes to hydrodynamic, sedimentation or erosion regimes. Therefore, any cumulative impacts of indirect impacts of cables would be of negligible magnitude.

15.9.35. Early concept, concept / early planning or pre-planning offshore wind farms will likely undergo EIA, therefore suitable measures are likely to be implemented. Additionally, the Proposed Development has committed to avoid the identified A1 and A2 features wherever possible or to undertake additional investigation to determine its archaeological potential. Therefore, any cumulative impacts from other developments with the Proposed Development would be of negligible magnitude. Therefore, any cumulative impacts from other offshore wind farms would be of negligible magnitude.

15.9.36. Discrete archaeological sites and unknown sites encountered by chance during the construction of the Proposed Development or the other developments, will be too small to be subject to impact interactions arising from combined effects of the Proposed Development with other developments and activities in the area. Additionally, the Proposed Development has committed to include a PAD to mitigate against any unknown sites discovered during construction.

SENSITIVITY OF RECEPTOR

15.9.37. Based on the available assessed datasets, no features of palaeogeographic interest were identified (see Section 15.5) within the offshore ECC between 1.5 and 6.5 km offshore. As highlighted in Table 15-6 the potential for seabed prehistory assets and their respective value varies from high to low, depending on the asset type.

15.9.38. All A1 receptors and currently unknown archaeological sites are considered as high sensitivity receptors.

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

SIGNIFICANCE OF CUMULATIVE EFFECT

15.9.40. As a result of the embedded commitments to avoid the identified A1 and A2 features wherever possible or to undertake additional investigation to determine its archaeological potential, direct effects as a result of the Proposed Development will be avoided. Therefore, cumulative effects between the Proposed Development and the other Tier 1, Tier 2 and Tier 3 projects will also be avoided.

15.9.41. Changes in local scouring and sedimentation patterns may lead to increased exposure or burial of marine archaeological assets but this potential impact has been assessed to be negligible. As per Volume 2, Chapter 7 (Marine and Coastal Processes), sediment plumes from operational and maintenance activities are generally short-lived, with major maintenance works infrequent. Any impacts from operational activities from other developments are likely to be short-lived and of localised extent, with limited opportunity to overlap with the Proposed Development's activities. Therefore, no major cumulative effect would occur as a result of additive effects from the Proposed Development and the other Tier 1, Tier 2 and Tier 3 projects.

Table 15-22 Significance of cumulative direct and indirect disturbance to receptors

Receptor/Location	Magnitude	Sensitivity	Significance
Known and potential palaeogeography	Negligible	Low to High	Negligible
Known and potential maritime and aviation receptors	Negligible	High	Negligible

SECONDARY MITIGATION AND RESIDUAL CUMULATIVE EFFECTS

15.9.42. No additional marine archaeology and cultural heritage mitigation is considered necessary because the likely cumulative effect in the absence of further mitigation (beyond the commitments outlined in Section 15.6) is not significant in EIA terms.

PROPOSED MONITORING FOR CUMULATIVE EFFECTS

15.9.43. No marine archaeology and cultural heritage monitoring are proposed to test the predictions made within the assessment of cumulative effects on marine archaeology and cultural heritage receptors as no likely significant effects were predicted during construction, O&M and decommissioning phases of the Proposed Development.

15.10. TRANSBOUNDARY EFFECTS

15.10.1. A transboundary effect assessment assesses the marine archaeology and cultural heritage effects from the Proposed Development upon interests of European Economic Areas (EEA).

15.10.2. Predicted impacts on marine archaeology and cultural heritage will largely be localised to within the study area and will not give rise to effects on the marine environment beyond UK waters. As the Proposed Development is a significant distance from the nearest adjacent EEZ of another state, it is considered that transboundary impacts will not occur (see Table 15-13).

15.11. INTER-RELATED EFFECTS

15.11.1. Inter-related effects may occur due to multiple impacts on a receptor or a group of receptors from the Proposed Development. This includes the following:

- **Project Lifecycle Effects** - Interactions between impacts across different phases of the Proposed Development i.e., interaction of impacts across construction, operation and maintenance and decommissioning; and
- **Inter-related Receptor Effects** - Interactions between impacts on a receptor or group of receptors within a phase of the Proposed Development (Inter-related Receptor Effects).

15.11.2. Project Lifecycle and Receptor led inter-related effects from marine archaeology and cultural heritage are presented in Table 15-23.

Table 15-23 Inter-Related Effects of Marine Archaeology and Cultural Heritage

Impact	Significant Inter-Related Effects
Project lifecycle effects	
Loss of or damage to known and unknown marine historic environment, and loss of or damage to submerged prehistoric landscapes from direct impacts.	Direct impacts on marine archaeological receptors could occur when contact with the seabed and/or the removal of seabed sediment occurs, whether during construction, operation & maintenance or decommissioning phase of the Proposed Development. All damage to archaeological sites or material is permanent and recovery is limited to stabilisation or reburial so as to limit further impact. The greatest magnitude of effect would occur during the construction phase of the Proposed Development. Once this disturbance impact has ceased all further impact during operation will be small scale, highly localised and episodic. It is therefore considered that over the project lifetime these impacts would not combine to increase the significance level of any impacts identified in this assessment. Therefore, there will be no inter-related effects of greater significance compared to the impacts considered alone.
Receptor Led Effects	
Indirect disturbance to marine historic environment assets caused by cable burial methods and / or cable protection	Indirect impacts could lead to an increased or decreased exposure of marine archaeological receptors, causing higher levels of preservation or erosion and deterioration, respectively. The assessment concluded that the general regime of sediment accumulation would continue as previously throughout the project phases and impacts are short term and localised. Therefore, there will be no inter-related effects of greater significance compared to the impacts considered alone.

15.12. ASSESSMENT SUMMARY

15.12.1. A summary of the findings of the effects and cumulative effects assessments undertaken in Section 15.7 and Section 15.9 is given in Table 15-24 and Table 15-25 respectively. This includes residual effect significance after any required secondary mitigation and proposed monitoring.

Table 15-24 Summary of Assessment of Effects on Marine Archaeology and Cultural Heritage

Effect	Receptor	Magnitude of Impact	Receptor Sensitivity	Effect Significance	Secondary Mitigation	Residual Effect	Proposed Monitoring
Construction							
Loss or damage to known and unknown marine historic environment from direct impacts. Loss or damage to submerged prehistoric landscapes from direct impacts.	Potential palaeogeographic receptors	Low	Low to High	Minor	None	No significant residual effect	None
	Known maritime and aviation receptors (A1 and A2 receptors)	Low	High	Minor	None	No significant residual effect	None
	Potential maritime and aviation receptors	Low	High	Minor	None	No significant residual effect	None
	Known and potential intertidal heritage receptors	Negligible	High	Negligible	None	No significant residual effect	None
Indirect disturbance to marine historic environment assets caused by cable burial methods and / or cable protection.	Potential palaeogeography receptors; known and potential maritime and aviation receptors; known and potential intertidal heritage receptors	Low	Very Low	Negligible	None	No significant residual effect	None
Operation and Maintenance							
Loss or damage to known and unknown marine historic environment from direct impacts Loss or damage to submerged prehistoric landscapes from direct impacts.	Potential palaeogeographic receptors	Low	Low to High	Minor	None	No significant residual effect	None
	Known maritime and aviation receptors (A1 and A2 receptors)	Low	High	Minor	None	No significant residual effect	None
	Potential maritime and aviation receptors	Low	High	Minor	None	No significant residual effect	None
	Known and potential intertidal heritage receptors	Low	High	Minor	None	No significant residual effect	None
Indirect disturbance to marine historic environment assets caused by additional cable protection used during repair and maintenance	Potential palaeogeography receptors; known and potential maritime and aviation receptors; known and potential intertidal heritage receptors	Low	Very Low	Negligible	None	No significant residual effect	None
Decommissioning							
Potential effect of decommissioning would be the same as Construction Phase if the Proposed Development was to be removed.							

Table 15-25 Summary of Assessment of Cumulative Effects on Marine Archaeology and Cultural Heritage

Effect	CEA Tier	Receptor	Magnitude of Cumulative Impact	Receptor Sensitivity	Cumulative Effect Significance	Secondary Mitigation	Residual Cumulative Effect	Proposed Monitoring
Construction								
Loss or damage to known and unknown marine historic environment from direct impacts. Loss or damage to submerged prehistoric landscapes from direct impacts.	All tiers	Potential palaeogeography receptors; known and potential maritime and aviation receptors.	Negligible	Low to High	Negligible	None	None	None
Indirect disturbance to marine historic environment assets caused by cable burial methods and / or cable protection.	All tiers	Potential palaeogeography receptors; known and potential maritime and aviation receptors.	Negligible	Low to High	Negligible	None	None	None
Operation and Maintenance								
Loss or damage to known and unknown marine historic environment from direct impacts. Loss or damage to submerged prehistoric landscapes from direct impacts.	All tiers	Potential palaeogeography receptors; known and potential maritime and aviation receptors.	Negligible	Low to High	Negligible	None	None	None
Indirect disturbance to marine historic environment assets caused by additional cable protection used during repair and maintenance	All tiers	Potential palaeogeography receptors; known and potential maritime and aviation receptors.	Negligible	Low to High	Negligible	None	None	None
Decommissioning								
Potential cumulative effect of decommissioning would be the same as Construction Phase if the Proposed Development were to be removed.								

15.13. REFERENCES

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