

# **Outer Dowsing Offshore Wind Preliminary Environmental Information Report**

## **Volume 1, Chapter 13: Marine and Intertidal Archaeology**

Date: June 2023

Document Number: 6.1.13

Internal Reference: PP1-ODOW-DEV-CS-REP-0018

Rev: V1.0

Company:	<b>Outer Dowsing Offshore Wind</b>	Asset:	<b>Whole Asset</b>			
Project:	<b>Whole Wind Farm</b>	Sub Project/Package:	Whole Asset			
Document Title or Description:	Marine and Intertidal Archaeology					
Document Number:	6.1.13	3 <sup>rd</sup> Party Doc No (If applicable):	N/A			
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Rev No.	Date	Status / Reason for Issue	Author	Checked by	Reviewed by	Approved by
V1.0	June 2023	Final	Maritime Archaeology	GoBe	Shepherd and Wedderburn	Outer Dowsing Offshore Wind

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## Abbreviations

Acronym	Expanded name
ADS	Archaeology Data Service
AEZ	Archaeological Exclusion Zone
ANS	Artificial Nesting Structures
AoS	Area of Search
BEIS	Department for Business, Energy & Industrial Strategy (now the Department for Energy Security and Net Zero (DESNZ))
BMAPA	British Marine Aggregate Producers Association
BP	Before Present
BSF	Below Seafloor
CEA	Cumulative Effects Assessment
CITiZAN	Coastal and Intertidal Zone Archaeological Network
DBA	Desk Based Assessment
DCO	Development Consent Order
DECC	Department of Energy & Climate Change, now the Department for Energy Security and Net Zero (DESNZ)
Defra	Department for Environment, Food and Rural Affairs
DESNZ	Department for Energy Security and Net Zero, formerly Department of Business, Energy and Industrial Strategy (BEIS), which was previously Department of Energy & Climate Change (DECC).
dML	deemed Marine Licence
ECC	Export Cable Corridor (offshore ECC or indicative onshore ECC)
EIA	Environmental Impact Assessment
EMHERF	East Midlands Historic Environment Research Framework
EPP	Evidence Plan Process
ES	Environmental Statement
ETG	Expert Topic Group
GT R4 Ltd	The Applicant. The special project vehicle created in partnership between Corio Generation (a wholly owned Green Investment Group portfolio company), Gulf Energy Development and TotalEnergies
HER	Historic Environment Record
HLC	Historic Landscape Character
HSC	Historic Seascape Characterisation
IPC	Infrastructure Planning Commission
ka	kiloannus (one thousand years)
LAT	Lowest Astronomical Tide
LUC	Land Use Consultants
MA	Maritime Archaeology Ltd.
MAG	Magnetometer
MBES	Multi-Beam Echo Sounder
MDS	Maximum Design Scenario
MHWS	Mean High Water Springs
MLWS	mean low water springs

Acronym	Expanded name
MMO	Marine Management Organisation
MPS	Marine Policy Statement
NHSC	National Historic Seascape Characterisation
NRHE	National Record of Historic Environment
NPS	National Policy Statement
NSIPs	Nationally Significant Infrastructure Projects
NSPP	The North Sea Palaeolandscapes Project
NSPRMF	North Sea Prehistory Research and Management Framework
O&M	Operation and Maintenance
ODOW	Outer Dowsing Offshore Wind (The Project)
ORCP	Offshore Reactive Compensation Platforms
OSS	Offshore Substation
OP	Offshore Platform
OWF	Offshore Wind Farm
PAD	Protocol for Archaeological Discoveries
PEIR	Preliminary Environmental Information Report
RAF	Royal Air Force
ROV	Remotely Operated Vehicle
SBP	Sub-bottom Profiler
SEA	Strategic Environmental Assessment
SoS	Secretary of State
SSS	Side Scan Sonar
SSSI	Site of Special Scientific Interest
TCE	The Crown Estate
UKHO	United Kingdom Hydrographic Office
UXO	Unexploded ordnance
WSI	Written Schemes of Investigation
WTG	Wind Turbine Generator
WWI	World War One
WWII	World War Two
ZoI	Zone of Influence

## Terminology

Term	Definition
Archaeological Exclusion Zone (AEZ)	A spatially defined zone around a known marine archaeological and cultural heritage receptor that will be avoided during intrusive works. The avoidance of AEZs must also consider that the use of anchors and lines, which could impact upstanding features, are adequately considered in the planning of operations.
Archaeological Interest	Refers to a site, find or anomaly of anthropogenic origin that has the potential to contribute to our knowledge and understanding of the past.

Term	Definition
Archaeological Potential	Refers to the likelihood a site, find or anomaly is considered to map material of archaeological interest such as wreck or aviation crash sites, buried and confirmed palaeolandscapes and their margins, and the potential that such evidence would reveal a greater understanding of the past through expert investigation.
Archaeological Significance	Refers to the potential of a site or find to contribute to our knowledge and understanding of the past based on its period, rarity, documentation, group value, condition, vulnerability, diversity, and potential, as defined by DCMS, 2013.
Array area	The area offshore within the PEIR Boundary within which the generating stations (including wind turbine generators (WTG) and inter array cables), offshore accommodation platforms, offshore transformer substations and associated cabling are positioned.
Baseline	The status of the environment at the time of assessment without the development in place.
Before Present	Time scale referring to years before 1950.
Bronze Age	Archaeological period lasting from 4,600 – 2,200 BP. This period follows on from the Neolithic and is characterised by the increasing use of bronze work. It is subdivided in the Early, Middle and Late Bronze Age.
deemed Marine Licence (dML)	A licence administered under the Marine and Coastal Access Act 2009. The licence set out within a Schedule within the Development Consent Order (DCO).
Decommissioning	The period during which a development and its associated processes are removed from active operation.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP) from the Secretary of State (SoS) for Department for Energy Security and Net Zero (DESNZ).
Early Medieval	Archaeological period lasting from AD 410 to 1066. This dates from the breakdown of the Roman rule in Britain to the Norman invasion in 1066 and is to be used for sites, monuments and finds of post Roman, Saxon and Viking date.
Early Prehistoric	Archaeological period lasting from 52,000 to 6,000 BP. For sites, monuments and finds which are characteristic of the Palaeolithic to Mesolithic but cannot be specifically assigned.
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of an impact with the sensitivity of a receptor, in accordance with defined significance criteria.
Environmental Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive and



Term	Definition
	EIA Regulations, including the publication of an Environmental Statement (ES).
Environmental Statement (ES)	The suite of documents that detail the processes and results of the EIA.
Geophysical	Relating to the physical properties of the earth.
Heritage	The historic environment and especially valued assets and qualities such as historic buildings and cultural traditions.
Historic England	The public body that champions and protects England's historic places.
Historic England National Record of the Historic Environment	National database of known wrecks and reported losses held by Historic England. Currently (March 2023) being developed into the National Marine Heritage Record (NMHR).
Historic Landscape Characterisation	Maps and describes historic cultural influences within an area looking beyond individual heritage assets and interpreting the patterns and connections within a landscape, spatially and through time.
Historic Seascape Characterisation	Maps and describes historic cultural influences which shape seascape perceptions across marine areas and coastal land.
Impact	An impact to the receiving environment is defined as any change to its baseline condition, either adverse or beneficial.
Intertidal	Area where the ocean meets the land between high and low tides.
Iron Age	Archaeological period lasting from 2,800 BP to AD 43. This period follows on from the Bronze Age and is characterised by the use of iron for making tools and monuments such as hillforts and oppida. The Iron Age is taken to end with the Roman invasion.
Landfall	The location at the land-sea interface where the offshore export cable will come ashore.
Last Glacial Maximum	Most recent time during the last glacial period that the ice sheets were at their greatest extents, approximately 26,500 – 19,000 BP.
Magnetometer	A device used to measure direction, strength, or relative change of magnetic field at a particular location.
Marine archaeological and cultural heritage receptors	Physical resources such as shipwrecks, remains of aircraft, archaeological sites, archaeological finds, and material including pre-historic deposits as well as archival documents and oral accounts recognised as historical/archaeological or cultural significance.
Marine archaeology study area	Defined as the PEIR array area and ECC areas up to MHWS and surrounded by a 1km buffer.
Marine Written Schemes of Investigation (WSI)	A document forming the agreement between the client, the appointed archaeologist, contractors, and the relevant stakeholders. The document sets out methods to mitigate the effects on all the known and potential marine archaeological and cultural heritage receptors within the marine archaeology study area. An Outline Marine WSI, specific for the offshore area and developed during the EIA process will form frameworks for mitigation strategies that will

Term	Definition
	be submitted with the DCO application. Followed by the Draft Marine WSI (based on the Outline Marine WSI) and the final Agreed Marine WSI (based on the Draft Marine WSI).
Medieval	Archaeological period lasting from AD 1066 – 1540. The Medieval period or Middle Ages begins with the Norman invasion and ends with the dissolution of the monasteries.
Mesolithic	Archaeological period lasting from 12,000 – 6,000 BP. The Middle Stone Age, falling between the Palaeolithic and the Neolithic; marks the beginning of a move from a fisher-hunter-gatherer society towards food producing society.
Mitigation	Mitigation measures, or commitments, are commitments made by the Project to reduce and/or eliminate the potential for significant effects to arise as a result of the Project. Mitigation measures can be embedded (part of the project design) or secondarily added to reduce impacts in the case of potentially significant effects.
Multi-beam Echo Sounder (MBES)	A type of sonar survey used to map the seabed by emitting acoustic waves in a fan shape beneath its transceiver. The time it takes for the sounds waves to reflect off the seabed and return to the receiver is used to calculate the water depth and produce a visualisation of depths and shapes of underwater terrain.
National Policy Statement (NPS)	A document setting out national policy against which proposals for Nationally Significant Infrastructure Projects (NSIPs) will be assessed and decided upon.
Nanotesla	Measurement describing the magnetic field (flux) of ferrous materials as measured by a magnetometer. (One nanotesla equals $10^{-9}$ tesla).
Neolithic	Archaeological period lasting from 6,000 – 4,200 BP. This period follows on from the Palaeolithic and the Mesolithic and is itself succeeded by the Bronze Age. This period is characterised by the practice of a farming economy and extensive monumental constructions.
Offshore Export Cable Corridor (ECC)	The Offshore Export Cable Corridor (Offshore ECC) is the area within the Preliminary Environmental Information Report (PEIR) Boundary within which the export cable running from the array to landfall will be situated.
Offshore Substation (OSS)	Platforms located within the array area which house electrical equipment and control and instrumentation systems. They also provide access facilities for work boats and helicopters.
Outer Dowsing Offshore Wind (ODOW)	The Project.
Palaeolithic	Archaeological period lasting from 52,000 – 12,000 BP. The period is defined by the practice of hunting and gathering and the use of chipped flint tools. This period is usually divided up into the Lower, Middle and Upper Palaeolithic.

Term	Definition
Preliminary Environmental Information Report (PEIR)	Preliminary Environmental Information Report. The PEIR is written in the style of a draft Environmental Statement (ES) and provides information to support and inform the statutory consultation process in the pre-application phase. Following that consultation, the PEIR documentation will be updated to produce the Project's ES that will accompany the application for the Development Consent Order (DCO).
PEIR Boundary	The PEIR Boundary is outlined in Figure 3.1 of Volume 1, Chapter 3: Project Description and comprises the extent of the land and/or seabed for which the PEIR assessments are based upon.
Portable Antiquities Scheme	The Portable Antiquities Scheme is run by the British Museum and Amgueddfa Cymru – National Museum Wales to encourage the recording of archaeological objects found by members of the public in England and Wales.
Post-Medieval	Archaeological period lasting from AD 1540 – 1901. Begins with the dissolution of the monasteries (AD 1536 – 1541) and ends with the death of Queen Victoria (AD 1901). A more specific period is used where known.
Pre-construction and post-construction	The phases of the Project before and after construction takes place.
Project Design envelope	A description of the range of possible elements that make up the Project's design options under consideration, as set out in detail in the project description. This envelope is used to define the Project for Environmental Impact Assessment (EIA) purposes when the exact engineering parameters are not yet known. This is also often referred to as the "Rochdale Envelope" approach.
Protocol for Archaeological Discoveries	A document detailing how unexpected finds or sites made during the lifetime of the Project should be reported.
Receiver of Wreck	Official of the British Government whose main task is to administer the law in relation to Wreck and Salvage.
Receptor	A distinct part of the environment on which effects could occur and can be the subject of specific assessments. Examples of receptors include species (or groups) of animals or plants, people (often categorised further such as 'residential' or those using areas for amenity or recreation), watercourses etc.
Roman	Archaeological period lasting from AD 43 – 410. Traditionally begins with the Roman invasion of Britain in AD 43 and ends with the emperor Honorius directing Britain to look to its own defences in AD 410.
Seascape	Landscapes with views of the coast or seas, and coasts and adjacent marine environments with cultural, historical and archaeological links with each other.

Term	Definition
Side Scan Sonar	A sonar system that provides high-resolution seafloor morphology from both sides of the vessel track to produce an image of the seafloor.
study area	Area(s) within which environmental impact may occur – to be defined on a receptor-by-receptor basis by the relevant technical specialist.
Sub-bottom Profiler	An acoustic system used to determine physical properties of the seafloor and to image and characterise geological information a few meters below the seafloor.
Subsea	Subsea comprises everything existing or occurring below the surface of the sea.
The Applicant	GT R4 Ltd. The Applicant making the application for a DCO. The Applicant is GT R4 Limited (a joint venture between Corio Generation, TotalEnergies and Gulf Energy Development (GULF)), trading as Outer Dowsing Offshore Wind. The project is being developed by Corio Generation (a wholly owned Green Investment Group portfolio company), TotalEnergies and GULF.
The Project	Outer Dowsing Offshore Wind including proposed onshore and offshore infrastructure.
United Kingdom Hydrographic Office database	Database of known wrecks and obstruction held and maintained by the UKHO.
Ultra-High Resolution Seismic	An acoustic system used to image submerged buried features shallow water.
Wind turbine generator (WTG)	All the components of a wind turbine, including the tower, nacelle, and rotor.

## **13 Marine and Intertidal Archaeology**

### **13.1 Introduction**

- 13.1.1 This Chapter of the Preliminary Environmental Information Report (PEIR) presents the results to date of the Environmental Impact Assessment (EIA) process for the potential impacts of Outer Dowsing Offshore Wind (ODOW) (“the Project”) on Marine and Intertidal Archaeology. Specifically, this chapter considers the potential impact of the Project seaward of Mean High Water Springs (MHWS) during the construction, operation and maintenance (O&M), and decommissioning phases.
- 13.1.2 GT R4 Ltd (trading as Outer Dowsing Offshore Wind) hereafter referred to as the ‘Applicant’, is proposing to develop the Project. The Project will be located approximately 54km from the Lincolnshire coastline in the southern North Sea. The Project will include both offshore and onshore infrastructure including an offshore generating station (windfarm), export cables to landfall, onshore cables, and connection to the electricity transmission network, and ancillary and associated development. Full description in Volume 1, Chapter 3: Project Description (PEIR document reference 6.1.3).

### **13.2 Statutory and Policy Context**

- 13.2.1 This chapter was drafted by Maritime Archaeology Ltd. (MA) which is a Registered Organisation with the Chartered Institute for Archaeologists (CIfA); all work conducted is in accordance with the guidance and principles set out in CIfA’s Code of Conduct (2014a) and Code of Professional Conduct (2019).
- 13.2.2 The Archaeological Curators (further detailed in document 8.5 Outline Marine Written Schemes of Investigation (WSI)), who have the jurisdiction over archaeology and cultural heritage, are Historic England seaward of Mean Low Water Springs (MLWS) and the Lincolnshire County Council landward of MLWS.
- 13.2.3 The relevant legislation and planning policy for offshore renewable energy Nationally Significant Infrastructure Projects (NSIPs), specifically in relation to marine and intertidal archaeology, is outlined in Table 13.1 below.

Table 13.1: Legislation and Policy Context

Legislation/policy	Key provisions	Section where comment addressed
Marine and Coastal Access Act (2009)	The Act sets out a framework for the management of marine functions and activities for areas which include waters in or adjacent to England up to the seaward limits of the territorial sea. It provides for the preparation and adoption of marine plans and for the regulation of licensable activities in the marine environment through the grant and enforcement of conditions on marine licences.	The Project will need to consider and comply with the requirements of the adopted UK Marine Policy Statement (MPS) (HM Government, 2011) and East Inshore and East Offshore Marine Plans (HM Government, 2014) as they relate to the impact of the proposed development on marine archaeological and cultural heritage receptors. The embedded mitigation will be secured through the deemed grant of a marine licence pursuant to the Act. The significance of marine archaeological and cultural heritage receptors within the marine archaeology study area is presented in Volume 2, Appendix 13.1: Marine and Intertidal Archaeology Technical Report (PEIR document refence 6.1.13). The embedded mitigation is presented in Table 13.9.
Merchant Shipping Act (1995)	The Receiver of Wreck enforces the Merchant Shipping Act 1995, in the UK in relation to salvage and wreck. The Receiver of Wreck is responsible for processing incoming reports of wreck and cargo.	The Project may cause impacts on objects associated with wrecks. If any material is recovered during works associated with the Project which fall within the definition of 'wreck', the Receiver of Wreck must be notified and will seek to identify the original owner (see document 8.5).
Protection of Wrecks Act (1973)	Act to secure the protection of wrecks within designated areas in territorial waters, and the sites of such wrecks, from interference by unauthorised persons.	Marine archaeological and cultural heritage receptors regarded as of special interest or significance may become designated with the

Legislation/policy	Key provisions	Section where comment addressed
		Project area. There are currently no protected wrecks sites identified within the marine archaeology study area as presented in Section 3 of Volume 2, Appendix 13.1.
The Protection of Military Remains Act (1986)	Provides protection for the wreckage of military aircraft and certain military wrecks. Designations can be either as a Controlled Site or Protected Place where access may be permitted but any operations which may disturb the site are illegal unless licensed by the Ministry of Defence.	If any material associated with a vessel or aircraft that was in military service when lost or wrecked is located, the area will be protected under this Act. All military aircraft are automatically protected under this legislation; however, vessels must be designated individually. There are currently no aircraft wreck sites within the marine archaeology study area. Should an aircraft wreck site be identified a licence under this Act will be required before any works that may impact the wreck can commence.
Burial Act (1857)	The Act requires a licence to be granted prior to the removal of human remains from deliberately deposited contexts	If human remains are discovered during works associated with the Project, they will be protected under this Act. The actions required where human remains are found are further detailed in Section 7 of Volume 2, Appendix 13.1
The Treasure Act (1996)	The Act is supplemented by the Treasure (Designation) Order 2002. Finders of gold and silver objects (over 300 years old) and some base metal assemblages, (prehistoric) as defined in the Act, are required to report such finds by contacting the Coroner and delivering the items for handover as per the Coroner's instruction.	Should any relevant material be found during works associated with the Project, advice from the Coroner must be sought and their instructions adhered to as detailed in Section 7 of Volume 2, Appendix 13.1.

Legislation/policy	Key provisions	Section where comment addressed
Ancient Monuments and Archaeological Areas Act (1979)	Monuments that are of national importance within UK territorial waters can be protected by being designated within the schedule of monuments protected under this Act.	It is an offence to damage or conduct a range of specified activities on a 'scheduled monument' unless authorised to do so. There are currently no scheduled monuments in the marine archaeology study area as presented in Section 3 of Volume 2, Appendix 13.1.
East Inshore and East Offshore Marine Plans (2014)	<p>Objective 5:  <i>"To conserve heritage assets, nationally protected landscapes and ensure that decisions consider the seascape of the local area."</i></p> <p>Policy SOC2:  <i>"Proposals that may affect heritage assets should demonstrate, in order of preference:</i></p> <ul style="list-style-type: none"> <li><i>a. that they will not compromise or harm elements which contribute to the significance of the heritage asset</i></li> <li><i>b. how, if there is compromise or harm to a heritage asset, this will be minimised</i></li> <li><i>c. how, where compromise or harm to a heritage asset cannot be minimised, it will be mitigated against or</i></li> <li><i>d. the public benefits for proceeding with the proposal if it is no possible to minimise or mitigate compromise or harm to the heritage asset".</i> <p>Policy SOC3:  <i>"Proposals that may affect the terrestrial and marine character of an area should demonstrate, in order of preference:</i></p> <ul style="list-style-type: none"> <li><i>a. that they will not adversely impact the terrestrial and marine character of an area</i></li> <li><i>b. how, if there are adverse impacts on the terrestrial and marine character of an area, they will minimise them</i></li> </ul> </li></ul>	All known and unknown marine archaeological and cultural heritage receptors within the marine archaeology study area that may be affected by the Project and their archaeological significance has been described in Volume 2, Appendix 13.1 and summarised in Section 13.4. Potential impacts on marine archaeological and cultural heritage receptors are discussed in Section 13.7 and Section 13.9. Mitigation to avoid or offset any impacts as a result of the Project is detailed in Volume 2, Appendix 13.1 and Table 13.9.



Legislation/policy	Key provisions	Section where comment addressed
	<p>c. <i>how, where these adverse impacts on the terrestrial and marine character of an area cannot be minimised, they will be mitigated against</i></p> <p>d. <i>the case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts”.</i></p>	
<p>UK Marine Policy Statement (MPS) (2011) Paragraph 2.6.6 Historic Environment</p>	<p>Paragraph 2.6.6.1 <i>“The historic environment includes all aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged. Those elements of the historic environment – buildings, monuments, sites or landscapes – that have been positively identified as holding a degree of significance meriting consideration are called ‘heritage assets’.”</i></p>	<p>‘Heritage assets’ are defined within this Project as Marine Archaeological and Cultural Heritage Receptors as further detailed in Section 13.4.</p>
<p>MPS (2011)</p>	<p>Paragraph 2.6.6.2 <i>“The historic environment of coastal and offshore zones represents a unique aspect of our cultural heritage. In addition to its cultural value, it is an asset of social, economic and environmental value. It can be a powerful driver for economic growth, attracting investment and tourism and sustaining enjoyable and successful places in which to live and work. However, heritage assets are a finite and often irreplaceable resource and can be vulnerable to a wide range of human activities and natural processes.”</i></p>	<p>All known and unknown marine archaeological and cultural heritage receptors within the marine archaeology study area that may be affected by the Project and their archaeological significance has been described in Volume 2, Appendix 13.1 and summarised in Section 13.4. Potential impacts on marine archaeological and cultural heritage receptors are discussed in Section 13.7 and Section 13.9. Mitigation to avoid or offset any impacts as a result of the Project is detailed in Volume 2, Appendix 13.1 and Table 13.9.</p>
<p>MPS (2011)</p>	<p>Paragraph 2.6.6.3</p>	<p>Embedded mitigation measure for the archaeological assessment of data as outlined</p>

Legislation/policy	Key provisions	Section where comment addressed
	<p><i>“The view shared by the UK Administrations is that heritage assets should be enjoyed for the quality of life they bring to this and future generations, and that they should be conserved through marine planning in a manner appropriate and proportionate to their significance. Opportunities should be taken to contribute to our knowledge and understanding of our past by capturing evidence from the historic environment and making this publicly available, particularly if a heritage asset is to be lost.”</i></p>	<p>in Table 13.9 and Volume 2, Appendix 13.1. Positive contributions to knowledge and understanding of the historic environment can be realised through data gathering, interpretation and publication. The results of the archaeological works will utilise as well as contribute to, reflect and enhance the ongoing research in the area.</p>
MPS (2011)	<p>Paragraph 2.6.6.4</p> <p><i>“Some heritage assets have a level of interest that justifies statutory designation, the purpose of which is to ensure that they are protected and conserved for the benefit of this and future generations. In coastal/intertidal zones and inshore/offshore waters designated heritage assets may include scheduled monuments (designated under the Ancient Monuments and Archaeological Areas Act 1979), protected wreck sites (designated under the Protection of Wrecks Act 1973) and sites designated under the protection of Military Remains Act 1986. In Scotland they may also include Historic Marine Protected Areas designated under the Marine (Scotland) Act 2010.”</i></p>	<p>Marine archaeological and cultural heritage receptors regarded as of special interest or significance may become designated with the Project area. There are currently no designated heritage assets identified within the marine archaeology study area as presented in Section 3 of Volume 2, Appendix 13.1.</p>
MPS (2011)	<p>Paragraph 2.6.6.5</p> <p><i>“Many heritage assets with archaeological interest in these areas are not currently designated as scheduled monuments or protected wreck sites but are demonstrably of equivalent significance. The absence of designation for such assets does not necessarily indicate lower significance and the marine plan authority should consider them subject to the same policy principles as designated heritage assets (including those outlined)</i></p>	<p>All known and unknown marine archaeological and cultural heritage receptors in the marine zone that may be affected by the Project and their archaeological significance have been described in detail in Volume 2, Appendix 13.1 and summarised in Section 13.4. Potential impact on the marine archaeological and cultural heritage receptors</p>

Legislation/policy	Key provisions	Section where comment addressed
	<i>based on information and advice from the relevant regulator and advisors</i>	of the proposed development is discussed in Section 13.9 and Section 13.13.
MPS (2011)	<p>Paragraph 2.6.6.6</p> <p><i>“Marine activities have the potential to result in adverse effects on the historic environment both directly and indirectly, including damage to or destruction of heritage assets. In developing and implementing Marine Plans, the marine plan authority should take into account the available evidence, including information and advice from the relevant regulator and advisors, in relation to the significance of any identified heritage assets (or the potential for such assets to be discovered), and consider how they are managed. It should also take into account the historic character of the plan area, with particular attention paid to the landscapes (see section 2.6.5) and groupings of assets that give it a distinctive identity.”</i></p>	<p>The significance of the known marine archaeological and cultural heritage receptors within the offshore zone and potential impact on known and unknown marine archaeological and cultural heritage receptors identified has been undertaken according to the methodology outlined in Section 13.8. The results of the assessments, including the heritage significance of the known receptors as well as the potential to locate marine archaeological and cultural heritage receptors of heritage significance during works are detailed in Volume 2, Appendix 13.1.</p> <p>Ongoing consultation with relevant regulators and advisors is outlined in section 13.3.</p>
MPS (2011)	<p>Paragraph 2.6.6.7</p> <p><i>“In considering the significance of heritage assets and their setting, the marine plan authority should take into account the particular nature of the interest in the assets and the value they hold for this and future generations. This understanding should be applied to avoid or minimise conflict between conservation of that significance and any proposals for development.”</i></p>	<p>The significance of the known marine archaeological and cultural heritage receptors within the offshore zone, and potential impact on known and unknown marine archaeological and cultural heritage receptors identified has been undertaken according to the methodology outlined in Section 13.8. The results of the assessments, including the heritage significance of the known receptors</p>

Legislation/policy	Key provisions	Section where comment addressed
		as well as the potential to locate marine archaeological and cultural heritage receptors of heritage significance during works are detailed in Volume 2, Appendix 13.1.
MPS (2011)	<p>Paragraph 2.6.6.8</p> <p><i>“The marine plan authority, working with the relevant regulator and advisors, should take account of the desirability of sustaining and enhancing the significance of heritage assets and should adopt a general presumption in favour of the conservation of designated heritage assets<sup>56</sup> within an appropriate setting. The more significant the asset, the greater should be the presumption in favour of its conservation. Substantial loss or harm to designated assets should be exceptional, and should not be permitted unless it can be demonstrated that the harm or loss is necessary in order to deliver social, economic or environmental benefits that outweigh the harm or loss.”</i></p>	The commitment to avoid all known marine archaeological and cultural heritage receptors and to further investigate the area of impacts ensuring that unknown marine archaeological and cultural heritage receptors are located, and impact mitigated will ensure preservation <i>in situ</i> (see document 8.5). Where marine archaeological and cultural heritage receptors are directly impacted or removed from the seabed, justification will be clearly outlined in the relevant Method Statements produced ahead of any archaeological works and following agreement with Historic England.
MPS (2011)	<p>Paragraph 2.6.6.9</p> <p><i>“Where the loss of the whole or a material part of a heritage asset’s significance is justified, the marine plan authority should identify and require suitable mitigating actions to record and advance understanding of the significance of the heritage asset before it is lost. Requirements should be based on advice from the relevant regulator and advisors.”</i></p>	Where marine archaeological and cultural heritage receptors are expected to be directly impacted or will need to be removed from the seabed, justification will be clearly outlined in the relevant Method Statements produced ahead of any archaeological works and following agreement with Historic England.
Overarching National Policy Statement for Renewable Energy Infrastructure (NPS EN-1) (2011)	<p>Paragraph 5.8.8</p> <p><i>“As part of the ES (see Section 4.2) the applicant should provide a description of the significance of the heritage assets affected by the proposed development and the contribution of their setting to that significance. The level of detail should be proportionate to the</i></p>	All known and unknown marine archaeological and cultural heritage receptors in the marine zone that may be affected by the Project and their archaeological significance have been described in detail in

Legislation/policy	Key provisions	Section where comment addressed
	<p><i>importance of the heritage assets and no more than is sufficient to understand the potential impact of the proposal on the significance of the heritage asset. As a minimum the applicant should have consulted the relevant Historic Environment Record (HER) (or, where the development is in English or Welsh waters, English Heritage or Cad) and assessed the heritage assets themselves using expertise where necessary according to the proposed development's impact."</i></p>	<p>Volume 2, Appendix 13.1 and summarised in Section 13.4. Potential impact on the marine archaeological and cultural heritage receptors of the proposed development is discussed in Section 13.9 and Section 13.13.</p>
<p>NPS EN-1 (2011)</p>	<p>Paragraph 5.8.9  <i>"Where a development site includes, or the available evidence suggests it has the potential to include, heritage assets with an archaeological interest, the applicant should carry out appropriate desk-based assessment and, where such desk-based research is insufficient to properly assess the interest, a field evaluation."</i></p>	<p>Marine archaeological and cultural heritage receptors and the archaeological potential within the marine archaeology study area have been considered and assessed in Volume 2, Appendix 13.1 and summarised in Section 13.4.</p>
<p>NPS EN-1 (2011)</p>	<p>Paragraph 5.8.10  <i>"The applicant should ensure that the extent of the impact of the proposed development on the significance of any heritage assets affected can be adequately understood from the application and supporting documents."</i></p>	<p>The archaeological significance and potential impact, including positive contribution on the marine archaeology receptors identified within the marine archaeology study area was undertaken according to the methodology outlined in Section 13.8. Table 13.8 outlines the Maximum Design Scenario (MDS) and relevant activities that may impact marine archaeological and cultural heritage receptors. Sections 13.9 to 13.13 further details how marine archaeological and cultural heritage receptors may be affected.</p>
<p>NPS EN-1 (2011)</p>	<p>Paragraph 5.8.11</p>	<p>The significance of the known marine archaeological and cultural heritage receptors</p>

Legislation/policy	Key provisions	Section where comment addressed
	<p><i>“In considering applications, the [Infrastructure Planning Commission] IPC should seek to identify and assess the particular significance of any heritage asset that may be affected by the proposed development, including by development affecting the setting of a heritage asset, taking account of:</i></p> <ul style="list-style-type: none"> <li>▪ <i>evidence provided with the application;</i></li> <li>▪ <i>any designation records;</i></li> <li>▪ <i>the Historic Environment Record, and similar sources of information;</i></li> <li>▪ <i>the heritage assets themselves;</i></li> <li>▪ <i>the outcome of consultations with interested parties; and</i></li> <li>▪ <i>where appropriate and when the need to understand the significance of the heritage asset demands it, expert advice.”</i></li> </ul>	<p>within the offshore zone and potential impact on known and unknown marine archaeological and cultural heritage receptors identified has been undertaken according to the methodology outlined in Section 13.8. The results of the assessments, including setting in the context of Historic Seascape Characterisation (HSC), are detailed in Volume 2, Appendix 13.1 and are summarised in Section 13.4.</p>
NPS EN-1 (2011)	<p>Paragraph 5.8.12</p> <p><i>“In considering the impact of a proposed development on any heritage assets, the IPC should take into account the particular nature of the significance of the heritage assets and the value that they hold for this and future generations. This understanding should be used to avoid or minimise conflict between conservation of that significance and proposals for development.”</i></p>	<p>The significance of the known marine archaeological and cultural heritage receptors within the offshore zone and potential impact on known and unknown marine archaeological and cultural heritage receptors identified has been undertaken according to the methodology outlined in Section 13.8. The results of the assessments, including the heritage significance of the known receptors as well as the potential to locate marine archaeological and cultural heritage receptors of heritage significance during works are detailed in Volume 2, Appendix 13.1. The significance of the known marine archaeological and cultural heritage receptors</p>

Legislation/policy	Key provisions	Section where comment addressed
		<p>within the offshore zone and potential impact on known and unknown marine archaeological and cultural heritage receptors identified has been undertaken according to the methodology outlined in Section 13.8. The results of the assessments, including the heritage significance of the known receptors as well as the potential to locate marine archaeological and cultural heritage receptors of heritage significance during works are detailed in Volume 2, Appendix 13.1.</p>
NPS EN-1 (2011)	<p>Paragraph 5.8.13  <i>“The IPC should take into account the desirability of sustaining and, where appropriate, enhancing the significance of heritage assets, the contribution of their settings and the positive contribution they can make to sustainable communities and economic vitality. The IPC should take into account the desirability of new development making a positive contribution to the character and local distinctiveness of the historic environment. The consideration of design should include scale, height, massing, alignment, materials and use. The IPC should have regard to any relevant local authority development plans or local impact report on the proposed development in respect of the factors set out in footnote 122.”</i></p> <p>“122 This can be by virtue of:</p> <ul style="list-style-type: none"> <li>▪ <i>heritage assets having an influence on the character of the environment and an area’s sense of place;</i></li> </ul>	<p>While this provision is not directly applicable to marine archaeological and cultural heritage receptors, the embedded mitigation measure for the archaeological assessment of data as outlined in Table 13.9 and Volume 2, Appendix 13.1 is expected to be reflected in the Development Consent Order (DCO) requirements or deemed marine licence (dML) conditions. Positive contributions to knowledge and understanding of the historic environment can be realised through data gathering, interpretation and publication. The works will contribute to current research frameworks in the region and will be further detailed in forthcoming relevant Method Statements, which will consider relevant research frameworks to reflect and enhance the ongoing research in the area.</p>

Legislation/policy	Key provisions	Section where comment addressed
	<ul style="list-style-type: none"> <li>▪ <i>heritage assets having a potential to be a catalyst for regeneration in an area, particularly through leisure, tourism and economic development;</i></li> <li>▪ <i>heritage assets being a stimulus to inspire new development of imaginative and high quality design;</i></li> <li>▪ <i>the re-use of existing fabric, minimising waste; and</i></li> <li>▪ <i>the mixed and flexible patterns of land use in historic areas that are likely to be, and remain, sustainable.”</i></li> </ul>	
NPS EN-1 (2011)	<p>Paragraph 5.8.14  <i>“There should be a presumption in favour of the conservation of designated heritage assets and the more significant the designated heritage asset, the greater the presumption in favour of its conservation should be. Once lost heritage assets cannot be replaced and their loss has a cultural, environmental, economic and social impact. Significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting. Loss affecting any designated heritage asset should require clear and convincing justification. Substantial harm to or loss of a grade II listed building park or garden should be exceptional. Substantial harm to or loss of designated assets of the highest significance, including Scheduled Monuments; registered battlefields; grade I and II* listed buildings; grade I and II* registered parks and gardens; and World Heritage Sites, should be wholly exceptional.”</i></p>	<p>Marine archaeological and cultural heritage receptors regarded as of special interest or significance may become designated with the Project area. There are currently no designated heritage assets identified within the marine archaeology study area as presented in Section 3 of Volume 2, Appendix 13.1.</p>
NPS EN-1 (2011)	<p>Paragraph 5.8.15  <i>“Any harmful impact on the significance of a designated heritage asset should be weighed against the public benefit of development, recognising that the greater the harm to the significance of the heritage asset the greater the justification will</i></p>	<p>While generally no active conservation strategy is proposed, Archaeological Exclusion Zones (AEZ) (as per mitigation in Table 13.9) have been applied to all known wrecks and obstructions and anomalies of</p>



Legislation/policy	Key provisions	Section where comment addressed
	<p><i>be needed for any loss. Where the application will lead to substantial harm to or total loss of significance of a designated heritage asset the IPC should refuse consent unless it can be demonstrated that the substantial harm to or loss of significance is necessary in order to deliver substantial public benefits that outweigh that loss or harm.”</i></p>	<p>high and medium archaeological potential identified in the geophysical data.</p> <p>The commitment to avoid all known marine archaeological and cultural heritage receptors and to further investigate the area of impacts ensuring that unknown marine archaeological and cultural heritage receptors are located, and impact mitigated will ensure preservation <i>in situ</i> (see document 8.5). Where items might be removed from the seabed, conservation strategies will be clearly outlined in the relevant Method Statements produced ahead of any such archaeological works.</p> <p>No impact on marine archaeology marine archaeological and cultural heritage receptors is expected to lead to harm or total loss of significance. AEZs (as per mitigation in Table 13.9) have been applied to all known wrecks and anomalies of high and medium archaeological potential.</p>
NPS EN-1 (2011)	<p>Paragraph 5.8.17  <i>“Where loss of significance of any heritage asset is justified on the merits of the new development, the IPC should consider imposing a condition on the consent or requiring the applicant to enter into an obligation that will prevent the loss occurring until it is reasonably certain that the relevant part of the development is to proceed.”</i></p>	<p>The commitment to avoid all known marine archaeological and cultural heritage receptors and to further investigate the area of impacts ensuring that unknown marine archaeological and cultural heritage receptors are located, and impact mitigated will ensure preservation <i>in situ</i> (see document 8.5) Where marine</p>

Legislation/policy	Key provisions	Section where comment addressed
		archaeological and cultural heritage receptors are directly impacted or removed from the seabed, justification will be clearly outlined in the relevant Method Statements produced ahead of any archaeological works and following agreement with Historic England.
NPS EN-1 (2011)	<p>Paragraph 5.8.18</p> <p><i>“When considering applications for development affecting the setting of a designated heritage asset, the IPC should treat favourably applications that preserve those elements of the setting that make a positive contribution to, or better reveal the significance of, the asset. When considering applications that do not do this, the IPC should weigh any negative effects against the wider benefits of the application. The greater the negative impact on the significance of the designated heritage asset, the greater the benefits that will be needed to justify approval.”</i></p>	As detailed in the Outline Marine WSI (see document 8.5) which is secured through embedded mitigation (Table 13.9) and is expected to be reflected in the DCO requirements or DML conditions, positive contributions to knowledge and enhancement of understanding of the historic environment can be realised through data gathering, interpretation and publication. The works will contribute to current research frameworks in the region and will be further detailed in forthcoming Method Statements.
NPS EN-1 (2011)	<p>Paragraph 5.8.20</p> <p><i>“Where the loss of the whole or a material part of a heritage asset’s significance is justified, the IPC should require the developer to record and advance understanding of the significance of the heritage asset before it is lost. The extent of the requirement should be proportionate to the nature and level of the asset’s significance. Developers should be required to publish this evidence and deposit copies of the reports with the relevant HER. They should also be required to deposit the archive generated in a local museum or other public depository willing to receive it.”</i></p>	For marine archaeological and cultural heritage receptors this will be secured through embedded mitigation (Table 13.9) and is expected to be reflected in the DCO requirements or dML conditions, positive contributions to knowledge and understanding of the historic environment can be realised through data gathering, interpretation and publication. The works will contribute to current research frameworks in the region and will be further detailed in

Legislation/policy	Key provisions	Section where comment addressed
		forthcoming relevant Method Statements, which will consider relevant research frameworks to reflect and enhance the ongoing research in the area.
NPS EN-1 (2011)	<p>Paragraph 5.8.21  <i>“Where appropriate, the IPC should impose requirements on a consent that such work is carried out in a timely manner in accordance with a WSI that meets the requirements of this Section and has been agreed in writing with the relevant Local Authority (where the development is in English waters, the Marine Management Organisation and English Heritage, or where it is in Welsh waters, the Marine Management Organisation (MMO) and Cadw)) and that the completion of the exercise is properly secured <sup>123</sup>.”</i></p> <p><i>“123 Guidance on the contents of a written scheme of investigation is set out in the Practice Guide to PPS5.”</i></p>	<p>Document 8.5 outlines all provisions made and standards expected for archaeological recording of marine archaeological and cultural heritage receptors. The document further details where archives and material will be deposited.</p> <p>The securement of the Outline Marine WSI (see document 8.5) is detailed in Table 13.9 and is expected to be reflected in the DCO requirements or DML conditions.</p> <p>Consultation with Historic England undertaken as part of this project is outlined in Section 13.3.</p>
NPS EN-1 (2011)	<p>Paragraph 5.8.22  <i>“Where the IPC considers there to be a high probability that a development site may include as yet undiscovered heritage assets with archaeological interest, the IPC should consider requirements to ensure that appropriate procedures are in place for the identification and treatment of such asset discovered during construction.”</i></p>	<p>Embedded mitigations relevant to marine archaeological and cultural heritage receptors are set out in Table 13.9 and detail how data will be collected and assessed to ensure that as yet undiscovered marine archaeological and cultural heritage receptors are identified. Should unidentified marine archaeological and cultural heritage receptors be located during project works, a Protocol for Archaeological Discoveries (PAD) (see Annex</p>

Legislation/policy	Key provisions	Section where comment addressed
		A of document 8.5) is implemented as per embedded mitigation (Table 13.9). The embedded mitigations are expected to be reflected in the DCO requirements or DML conditions.
Draft National Statement for Energy NPS EN-1 (2023) Overarching Policy for Energy	Paragraph 5.9.9 <i>“The applicant should undertake an assessment of any likely significant heritage impacts of the proposed development as part of the EIA and describe these in the ES (see Section 4.2). This should include consideration of heritage assets above, at, and below the surface of the ground. Consideration will also need to be given to the possible impacts, including cumulative, on the wider historic environment. The assessment should include reference to any historic landscape or seascape character assessment and associated studies as a means of assessing impacts relevant to the proposed project.”</i>	All known and unknown marine archaeological and cultural heritage receptors in the marine zone that may be affected by the Project and their archaeological significance have been described in detail in Volume 2, Appendix 13.1 and summarised in Section 13.4. Potential impact on the marine archaeological and cultural heritage receptors of the proposed development is discussed in Section 13.9 and Section 13.13.
Draft NPS EN-1 (2023)	Paragraph 5.9.10 <i>“As part of the ES the applicant should provide a description of the significance of the heritage assets affected by the proposed development, including any contribution made by their setting. The level of detail should be proportionate to the importance of the heritage assets and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum, the applicant should have consulted the relevant Historic Environment Record<sup>232</sup> (or, where the development is in English or Welsh waters, Historic England or Cadw) and assessed the heritage assets themselves using expertise where necessary according to the proposed development’s impact.”</i>	All known and unknown marine archaeological and cultural heritage receptors in the marine zone that may be affected by the Project and their archaeological significance have been described in detail in Volume 2, Appendix 13.1 and summarised in Section 13.4. Potential impact on the marine archaeological and cultural heritage receptors of the proposed development is discussed in Section 13.9 and Section 13.13.

Legislation/policy	Key provisions	Section where comment addressed
	<p><i>“232 Historic Environment Records (HERs) are information services maintained by local authorities and National Park Authorities with a view to providing access to comprehensive and dynamic resources relating to the historic environment of an area for public benefit and use. Details of Historic Environment Records in England are available from the Heritage Gateway website. For Wales, HERs can be obtained through the Historic Wales Portal at See <a href="https://historic-wales-rcahmw.hub.arcgis.com/">https://historic-wales-rcahmw.hub.arcgis.com/</a> Historic England and Cadw hold additional information about heritage assets in English or Welsh waters. Historic England or Cadw should also be consulted, where relevant”</i></p>	
Draft NPS EN-1 (2023)	<p>Paragraph 5.9.11</p> <p><i>“Where a site on which development is proposed includes, or the available evidence suggests it has the potential to include, heritage assets with an archaeological interest, the applicant should carry out appropriate desk-based assessment and, where such desk-based research is insufficient to properly assess the interest, a field evaluation. Where proposed development will affect the setting of a heritage asset, accurate representative visualisations may be necessary to explain the impact<sup>233</sup>.”</i></p> <p><i>“233 Relevant guidance is given in the Historic England publication, The Setting of Heritage Assets See <a href="https://historicengland.org.uk/images-books/publications/qa3-setting-of-heritage-assets/">https://historicengland.org.uk/images-books/publications/qa3-setting-of-heritage-assets/</a>”</i></p>	Marine archaeological and cultural heritage receptors and the archaeological potential within the marine archaeology study area have been considered and assessed in Volume 2, Appendix 13.1 and summarised in Section 13.4.
Draft NPS EN-1 (2023)	<p>Paragraph 5.9.12</p> <p><i>“The applicant should ensure that the extent of the impact of the proposed development on the significance of any heritage assets</i></p>	The archaeological significance and potential impact, including positive contribution on the marine archaeology receptors identified

Legislation/policy	Key provisions	Section where comment addressed
	<p><i>affected can be adequately understood from the application and supporting documents. Studies will be required on those heritage assets affected by noise, vibration, light and indirect impacts, the extent and detail of these studies will be proportionate to the significance of the heritage asset affected."</i></p>	<p>within the marine archaeology study area was undertaken according to the methodology outlined in Section 13.8. Table 13.8 outlines the Maximum Design Scenario (MDS) and relevant activities that may impact marine archaeological and cultural heritage receptors. Sections 13.9 to 13.13 further details how marine archaeological and cultural heritage receptors may be affected.</p>
<p>Draft NPS EN-1 (2023)</p>	<p>Paragraph 5.9.13 The applicant is encouraged, where opportunities exist, to prepare proposals which can make a positive contribution to the historic environment, and to consider how their scheme takes account of the significance of heritage assets affected. This can include, where possible:</p> <ul style="list-style-type: none"> <li>▪ enhancing, through a range of measures such a sensitive design, the significance of heritage assets or setting affected</li> <li>▪ considering where required the development of archive capacity which could deliver significant public benefits</li> <li>▪ considering how visual or noise impacts can affect heritage assets, and whether</li> <li>▪ there may be opportunities to enhance access to, or interpretation, understanding</li> <li>▪ and appreciation of, the heritage assets affected by the scheme</li> </ul>	<p>As detailed in the Outline Marine WSI (see document 8.5) which is secured through embedded mitigation (Table 13.9) and is expected to be reflected in the DCO requirements or DML conditions, positive contributions to knowledge and enhancement of understanding of the historic environment can be realised through data gathering, interpretation and publication. The works will contribute to current research frameworks in the region and will be further detailed in forthcoming Method Statements.</p>
<p>Draft NPS EN-1 (2023)</p>	<p>Paragraph 5.9.14</p>	<p>Potential direct and indirect impacts on marine archaeological and cultural heritage receptors are discussed in Section 13.7 and</p>

Legislation/policy	Key provisions	Section where comment addressed
	<p><i>“Careful consideration in preparing the scheme will be required on whether the impacts on the historic environment will be direct or indirect, temporary, or permanent.”</i></p>	<p>Section 13.9. Mitigation to avoid or offset any impacts as a result of the Project is detailed in Volume 2, Appendix 13.1 and Table 13.9.</p>
<p>Draft NPS EN-1 (2023)</p>	<p>Paragraph 5.9.17  <i>“Where the loss of the whole or part of a heritage asset’s significance is justified, the Secretary of State will require the applicant to record and advance understanding of the significance of the heritage asset before it is lost (wholly or in part). The extent of the requirement should be proportionate to the asset’s importance and significance and the impact. The applicant should be required to publish this evidence and to deposit copies of the reports with the relevant Historic Environmental Record. They should also be required to deposit the archive generated in a local museum or other public repository willing to receive it. ”</i></p>	<p>For marine archaeological and cultural heritage receptors this will be secured through embedded mitigation (Table 13.9) and is expected to be reflected in the DCO requirements or dML conditions, positive contributions to knowledge and understanding of the historic environment can be realised through data gathering, interpretation and publication. The works will contribute to current research frameworks in the region and will be further detailed in forthcoming relevant Method Statements, which will consider relevant research frameworks to reflect and enhance the ongoing research in the area.</p>
<p>Draft NPS EN-1 (2023)</p>	<p>Paragraph 5.9.18  <i>“Where appropriate, the Secretary of State will impose requirements on the Development Consent Order to ensure that the work is undertaken in a timely manner, in accordance with a written scheme of investigation that complies with the policy in this NPS and which has been agreed in writing with the relevant local authority, and to ensure that the completion of the exercise is properly secured.”</i></p>	<p>Document 8.5 outlines all provisions made and standards expected for archaeological recording of marine archaeological and cultural heritage receptors. The document further details where archives and material will be deposited.</p> <p>The securement of the Outline Marine WSI (see document 8.5) is detailed in Table 13.9 and is expected to be reflected in the DCO requirements or DML conditions.</p>

Legislation/policy	Key provisions	Section where comment addressed
		Consultation with Historic England undertaken as part of this project is outlined in Section 13.3.
Draft NPS EN-1 (2023)	<p>Paragraph 5.9.19  <i>“Where there is a high probability (based on an adequate assessment) that a development site may include, as yet undiscovered heritage assets with archaeological interest, the Secretary of State will consider requirements to ensure appropriate procedures are in place for the identification and treatment of such assets discovered during construction .”</i></p>	<p>Embedded mitigations relevant to marine archaeological and cultural heritage receptors are set out in Table 13.9 and detail how data will be collected and assessed to ensure that as yet undiscovered marine archaeological and cultural heritage receptors are identified. Should unidentified marine archaeological and cultural heritage receptors be located during project works, a Protocol for Archaeological Discoveries (PAD) (see Annex A of document 8.5) is implemented as per embedded mitigation (Table 13.9). The embedded mitigations are expected to be reflected in the DCO requirements or DML conditions.</p>
Draft NPS EN-1 (2023)	<p>Paragraph 5.9.20  <i>“In determining applications, the Secretary of State should seek to identify and assess the particular significance of any heritage asset that may be affected by the proposed development, including by development affecting the setting of a heritage asset (including assets whose setting may be affected by the proposed development), taking account of:</i></p> <ul style="list-style-type: none"> <li>▪ <i>relevant information provided with the application and, where applicable, relevant information submitted during</i></li> </ul>	<p>The significance of the known marine archaeological and cultural heritage receptors within the offshore zone and potential impact on known and unknown marine archaeological and cultural heritage receptors identified has been undertaken according to the methodology outlined in Section 13.8. The results of the assessments, including setting in the context of Historic Seascape Characterisation (HSC), are detailed in</p>



Legislation/policy	Key provisions	Section where comment addressed
	<p><i>the examination of the application any designation records, including those on the National Heritage List for England</i> <sup>234</sup></p> <ul style="list-style-type: none"> <li>▪ <i>historic landscape character records</i></li> <li>▪ <i>the relevant Historic Environment Record(s), and similar sources of information</i></li> <li>▪ <i>representations made by interested parties during the examination process</i></li> <li>▪ <i>expert advice, where appropriate, and when the need to understand the significance of the heritage asset demands it</i></li> </ul>	<p>Volume 2, Appendix 13.1 and are summarised in Section 13.4.</p>
<p>Draft NPS EN-1 (2023)</p>	<p>Paragraph 5.9.22  <i>“In considering the impact of a proposed development on any heritage assets, the Secretary of State should take into account the particular nature of the significance of the heritage assets and the value that they hold for this and future generations. This understanding should be used to avoid or minimise conflict between their conservation and any aspect of the proposal.”</i></p> <p>"234 See <a href="https://historicengland.org.uk/listing/the-list/">https://historicengland.org.uk/listing/the-list/</a>"</p>	<p>The significance of the known marine archaeological and cultural heritage receptors within the offshore zone and potential impact on known and unknown marine archaeological and cultural heritage receptors identified has been undertaken according to the methodology outlined in Section 13.8. The results of the assessments, including the heritage significance of the known receptors as well as the potential to locate marine archaeological and cultural heritage receptors of heritage significance during works are detailed in Volume 2, Appendix 13.1.</p>
<p>Draft NPS EN-1 (2023)</p>	<p>Paragraph 5.9.23  <i>“The Secretary of State should consider the desirability of sustaining and, where appropriate, enhancing the significance of heritage assets, the contribution of their settings and the positive contribution that their conservation can make to sustainable</i></p>	<p>This provision is not directly applicable to marine archaeological and cultural heritage receptors, the embedded mitigation measure for the archaeological assessment of data as outlined in Table 13.9 and Volume 2,</p>

Legislation/policy	Key provisions	Section where comment addressed
	<p><i>communities, including to their quality of life, their economic vitality, and to the public’s enjoyment of these assets.<sup>236</sup></i></p> <p><i>"236 This can be by virtue of: heritage assets having an influence on the character of the environment and an area’s sense of place; heritage assets having a potential to be a catalyst for regeneration in an area, particularly through leisure, tourism and economic development; heritage assets being a stimulus to inspire new development of imaginative and high quality design; and the mixed and flexible patterns of land use in historic areas that are likely to be, and remain, sustainable."</i></p>	<p>Appendix 13.1 is expected to be reflected in the Development Consent Order (DCO) requirements or deemed marine licence (dML) conditions. Positive contributions to knowledge and understanding of the historic environment can be realised through data gathering, interpretation and publication. The works will contribute to current research frameworks in the region and will be further detailed in forthcoming relevant Method Statements, which will consider relevant research frameworks to reflect and enhance the ongoing research in the area.</p>
Draft NPS EN-1 (2023)	<p>Paragraph 5.9.24</p> <p><i>"The Secretary of State should also consider the desirability of the new development making a positive contribution to the character and local distinctiveness of the historic environment. The consideration of design should include scale, height, massing, alignment, materials, use and landscaping (for example, screen planting)."</i></p>	<p>As detailed in the Outline Marine WSI (see document 8.5) which is secured through embedded mitigation (Table 13.9) and is expected to be reflected in the DCO requirements or DML conditions, positive contributions to knowledge and enhancement of understanding of the historic environment can be realised through data gathering, interpretation and publication. The works will contribute to current research frameworks in the region and will be further detailed in forthcoming Method Statements.</p>
Draft NPS EN-1 (2023)	<p>Paragraph 5.9.25</p> <p><i>"When considering the impact of a proposed development on the significance of a designated heritage asset, the Secretary of State</i></p>	<p>No impact on marine archaeological and cultural heritage receptors is expected to lead to harm or total loss of significance.</p>

Legislation/policy	Key provisions	Section where comment addressed
	<p><i>should give great weight to the asset’s conservation. The more important the asset, the greater the weight should be. This is irrespective of whether any potential harm amounts to substantial harm, total loss, or less than substantial harm to its significance.”</i></p>	<p>AEZs (as per Table 13.9) have been applied to all known wrecks and obstructions, and anomalies of high and medium archaeological potential. The commitment to avoid all known marine archaeological and cultural heritage receptors and to further investigate the area of impacts ensuring that unknown marine archaeological and cultural heritage receptors are located, and impact mitigated will ensure preservation <i>in situ</i> (see document 8.5). Where marine archaeological and cultural heritage receptors are directly impacted or removed from the seabed, justification will be clearly outlined in the relevant Method Statements produced ahead of any archaeological works and following agreement with Historic England.</p>
Draft NPS EN-1 (2023)	<p>Paragraph 5.9.28  <i>“Substantial harm to or loss of significance of assets of the highest significance, including Scheduled Monuments; Protected Wreck Sites; Registered Battlefields; grade I and II* Listed Buildings; grade I and II* Registered Parks and Gardens; and World Heritage Sites, should be wholly exceptional.”</i></p>	<p>No impact on marine archaeological and cultural heritage receptors is expected to lead to harm or total loss of significance. AEZs (as per Table 13.9) have been applied to all known wrecks and obstructions, and anomalies of high and medium archaeological potential. The commitment to avoid all known marine archaeological and cultural heritage receptors and to further investigate the area of impacts ensuring that unknown marine archaeological and cultural heritage</p>

Legislation/policy	Key provisions	Section where comment addressed
		<p>receptors are located, and impact mitigated will ensure preservation <i>in situ</i> (see document 8.5). Where marine archaeological and cultural heritage receptors are directly impacted or removed from the seabed, justification will be clearly outlined in the relevant Method Statements produced ahead of any archaeological works and following agreement with Historic England.</p>
Draft NPS EN-1 (2023)	<p>Paragraph 5.9.29  <i>“Where the proposed development will lead to substantial harm to (or total loss of significance of) a designated heritage asset the Secretary of State should refuse consent unless it can be demonstrated that the substantial harm to, or loss of, significance is necessary to achieve substantial public benefits that outweigh that harm or loss, or all the following apply:</i></p> <ul style="list-style-type: none"> <li>▪ <i>the nature of the heritage asset prevents all reasonable uses of the site</i></li> <li>▪ <i>no viable use of the heritage asset itself can be found in the medium term</i></li> <li>▪ <i>through appropriate marketing that will enable its conservation</i></li> <li>▪ <i>conservation by grant-funding or some form of not for profit, charitable or public ownership is demonstrably not possible</i></li> <li>▪ <i>the harm or loss is outweighed by the benefit of bringing the site back into use”</i></li> </ul>	<p>No impact on marine archaeological and cultural heritage receptors is expected to lead to harm or total loss of significance. AEZs (as per Table 13.9) have been applied to all known wrecks and obstructions, and anomalies of high and medium archaeological potential. The commitment to avoid all known marine archaeological and cultural heritage receptors and to further investigate the area of impacts ensuring that unknown marine archaeological and cultural heritage receptors are located, and impact mitigated will ensure preservation <i>in situ</i> (see document 8.5). Where marine archaeological and cultural heritage receptors are directly impacted or removed from the seabed, justification will be clearly outlined in the relevant Method Statements produced ahead of any archaeological works and following agreement with Historic England.</p>

Legislation/policy	Key provisions	Section where comment addressed
Draft NPS EN-1 (2023)	<p><i>Paragraph 5.9.30</i></p> <p><i>“Where the proposed development will lead to less than substantial harm to the significance of the designated heritage asset, this harm should be weighed against the public benefits of the proposal, including, where appropriate securing its optimum viable use.”</i></p>	<p>As detailed in the Outline Marine WSI (see document 8.5) which is secured through embedded mitigation (Table 13.9) and is expected to be reflected in the DCO requirements or DML conditions, positive contributions to knowledge and enhancement of understanding of the historic environment can be realised through data gathering, interpretation and publication. The works will contribute to current research frameworks in the region and will be further detailed in forthcoming Method Statements.</p>
Draft NPS EN-1 (2023)	<p><i>Paragraph 5.9.31</i></p> <p><i>“In weighing applications that directly or indirectly affect non-designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset.”</i></p>	<p>No impact on marine archaeological and cultural heritage receptors is expected to lead to harm or total loss of significance. AEZs (as per Table 13.9) have been applied to all known wrecks and obstructions, and anomalies of high and medium archaeological potential. The commitment to avoid all known marine archaeological and cultural heritage receptors and to further investigate the area of impacts ensuring that unknown marine archaeological and cultural heritage receptors are located, and impact mitigated will ensure preservation <i>in situ</i> (see document 8.5). Where marine archaeological and cultural heritage receptors are directly impacted or removed from the seabed, justification will be clearly outlined in the</p>

Legislation/policy	Key provisions	Section where comment addressed
		relevant Method Statements produced ahead of any archaeological works and following agreement with Historic England.
Draft NPS EN-1 (2023)	<p>Paragraph 5.9.33  <i>“Where there is evidence of deliberate neglect of, or damage to, a heritage asset, the Secretary of State should not take its deteriorated state into account in any decision.”<sup>237</sup></i></p> <p><i>“237 Historic Environment Good Practice Advice in Planning 2 provides further advice on managing significance in decision-taking in the historic environment, available online at: See <a href="https://historicengland.org.uk/imagesbooks/publications/gpa2-managing-significance-in-decision-taking/">https://historicengland.org.uk/imagesbooks/publications/gpa2-managing-significance-in-decision-taking/</a>”</i></p>	All known wreck sites, their archaeological significance, condition, and vulnerability, where known, is described in Section 3 of Volume 2, Appendix 13.1.
Draft NPS EN-1 (2023)	<p>Paragraph 5.9.34  <i>“When considering applications for development affecting the setting of a designated heritage asset, the Secretary of State should give appropriate weight to the desirability of preserving the setting such assets and treat favourably applications that preserve those elements of the setting that make a positive contribution to, or better reveal the significance of, the asset. When considering applications that do not do this, the Secretary of State should give great weight to any negative effects, when weighing them against the wider benefits of the application. The greater the negative impact on the significance of the designated heritage asset, the greater the benefits that will be needed to justify approval.”<sup>238</sup></i></p> <p><i>“238 See the Infrastructure Planning (Decisions) Regulations 2010”</i></p>	The significance of the known marine archaeological and cultural heritage receptors within the offshore zone and potential impact on known and unknown marine archaeological and cultural heritage receptors identified has been undertaken according to the methodology outlined in Section 13.8. The results of the assessments, including setting in the context of Historic Seascape Characterisation (HSC), are detailed in Volume 2, Appendix 13.1 and are summarised in Section 13.4.

Legislation/policy	Key provisions	Section where comment addressed
National Policy Statement for Renewable Energy Infrastructure (NPS EN-3) (2011)	<p>1.6.139</p> <p><i>“Heritage assets can be affected by offshore wind farm development in two principal ways:</i></p> <ul style="list-style-type: none"> <li>▪ <i>from the direct effect of the physical siting of the development itself such as the installation of the wind turbine foundations and electricity cables or the siting of plant required during the construction period; and</i></li> <li>▪ <i>from indirect changes to the physical marine environment (such as scour, coastal erosion or sediment deposition) caused by the proposed infrastructure itself or its construction (see the policy on physical environment starting at paragraph 2.6.189 of this NPS).”</i></li> </ul>	Potential direct and indirect impacts on marine archaeological and cultural heritage receptors are discussed in Section 13.7 and Section 13.9. Mitigation to avoid or offset any impacts as a result of the Project is detailed in Volume 2, Appendix 13.1 and Table 13.9.
NPS EN-3 (2011)	<p>Paragraph 2.6.140</p> <ul style="list-style-type: none"> <li>▪ <i>“Consultation with the relevant statutory consultees (including English Heritage...) should be undertaken by the applicants at an early stage of the development.”</i></li> </ul>	Consultations with Historic England and other stakeholders throughout the development are outlined in Section 13.3.
NPS EN-3 (2011)	<p>Paragraph 2.6.141</p> <p><i>“Assessment should be undertaken as set out in Section 5.8 of EN-1. Desk-based studies should take into account any geotechnical or geophysical surveys that have been undertaken to aid the wind farm design.”</i></p>	Volume 2, Appendix 13.1 presents and details the archaeological desk based assessment (DBA) and the archaeological assessment of geophysical data collected for the array area. The results are further summarised in Section 13.5.
NPS EN-3 (2011)	<p>Paragraph 2.6.142</p> <p><i>“Assessment should also include the identification of any beneficial effects on the historic marine environment, for example through improved access or the contribution to new knowledge that arises from investigation.”</i></p>	Potential beneficial effects on marine archaeological and cultural heritage receptors as a result of the Project activities are discussed in Table 13.9 and will ensure data and information collected is assessed for archaeological potential and significance and reported, which will enhance our

Legislation/policy	Key provisions	Section where comment addressed
		understanding by gathering, researching and presenting new information and will lead to a publication.
NPS EN-3 (2011)	Paragraph 2.6.143 <i>“Where elements of an application (whether offshore or onshore) interact with features of historic maritime significance that are located onshore, the effects should be assessed in accordance with the policy at Section 5.8 in EN-1.”</i>	The onshore and offshore archaeological resources have been cross-referenced and technical reports have been shared between archaeological contractors.
NPS EN-3 (2011)	Paragraph 2.6.144 <i>“The IPC should be satisfied that offshore wind farms and associated infrastructure have been designed sensitively taking into account known heritage assets and their status, for example features designated as Protected Wrecks.”</i>	Volume 2, Appendix 13.1 presents and details the archaeological DBA and the archaeological assessment of geophysical data collected to date. The results are further summarised in Section 13.5. AEZs (as per Table 13.9) have been applied to all known wrecks and anomalies of high and medium archaeological potential identified in the geophysical data, as outlined Section 13.5. The embedded mitigations are further detailed in Table 13.9.
NPS EN-3 (2011)	Paragraph 2.6.145 <i>“Avoidance of important heritage assets, including archaeological sites and historic wrecks, is the most effective form of protection and can be achieved through the implementation of exclusion zones around such heritage assets which preclude development activities within their boundaries.”</i>	AEZs as per Table 13.9 have been applied to all known wrecks and anomalies of high and medium archaeological potential identified in the geophysical data, as outlined Section 13.5. The embedded mitigations are further detailed Table 13.9.
NPS EN-3 (2011)	Section 2.6.146 <i>“As set out in paragraphs 2.6.44 and 2.6.45 above, where requested by applicants, the IPC should consider granting consents that allow for micrositing to be undertaken within a</i>	Where possible, all intrusive activities will be routed and microsited to avoid any identified marine archaeological and cultural heritage



Legislation/policy	Key provisions	Section where comment addressed
	<p><i>specified tolerance. This allows changes to be made to the precise location of infrastructure during the construction phase so that account can be taken of unforeseen circumstances such as the discovery of marine archaeological remains.”</i></p>	<p>receptors with AEZs as per mitigation outlined in Table 13.9.</p>
<p>Draft National Policy Statement for Renewable Energy Infrastructure (NPS EN-3) (2023)</p>	<p>Paragraph 3.8.183  <i>“Applicants should consult with the relevant statutory consultees, such as Historic England or Cadw, on the potential impacts on the marine historic environment at an early stage of development during preapplication, taking into account any applicable guidance (e.g., offshore renewables protocol for archaeological discoveries<sup>55</sup>”</i></p> <p><i>“55 See <a href="https://www.wessexarch.co.uk/our-work/offshore-renewables-protocol-archaeologicaldiscoveries">https://www.wessexarch.co.uk/our-work/offshore-renewables-protocol-archaeologicaldiscoveries</a>”</i></p>	<p>Consultations with Historic England and other stakeholders throughout the development are outlined in Section 13.3.</p>
<p>Draft NPS EN-3 (2023)</p>	<p>Paragraph 3.8.184  <i>“Assessment of potential impacts upon the historic environment should be considered as part of the Environmental Impact Assessment process undertaken to inform any application for consent.”</i></p>	<p>Potential impacts on marine archaeological and cultural heritage receptors are discussed in Section 13.7 and Section 13.9. Mitigation to avoid or offset any impacts as a result of the Project is detailed in Volume 2, Appendix 13.1 and Table 13.9.</p>
<p>Draft NPS EN-3 (2023)</p>	<p>Paragraph 3.8.185  <i>“Desk based studies to characterise the features of the historic environment that may be affected by a proposed development and assess any likely significant effects should be undertaken by competent archaeological experts.”</i></p>	<p>Volume 2, Appendix 13.1 presents and details the archaeological desk based assessment (DBA) and the archaeological assessment of geophysical data collected for the array area. The results are further summarised in Section 13.5.</p>
<p>Draft NPS EN-3 (2023)</p>	<p>Paragraph 3.8.186  <i>“These studies should consider any geotechnical or geophysical surveys that have been undertaken to aid the wind farm design.”</i></p>	<p>Volume 2, Appendix 13.1 presents and details the archaeological desk based assessment (DBA) and the archaeological assessment of</p>

Legislation/policy	Key provisions	Section where comment addressed
		geophysical data collected for the array area. The results are further summarised in Section 13.5.
Draft NPS EN-3 (2023)	Paragraph 3.8.188 “Applicants are required to determine how any known heritage assets might best be avoided.”	AEZs as per Table 13.9 have been applied to all known wrecks and anomalies of high and medium archaeological potential identified in the geophysical data, as outlined Section 13.5. The embedded mitigations are further detailed Table 13.9.
Draft NPS EN-3 (2023)	Paragraph 3.8.189 “The applicant will be expected to conduct all necessary examination	Volume 2, Appendix 13.1 presents and details the archaeological desk based assessment (DBA) and the archaeological assessment of geophysical data collected for the array area. The results are further summarised in Section 13.5.
Draft NPS EN-3 (2023)	Paragraph 3.8.190 “Once a site has been chosen, it may be necessary to undertake further archaeological assessment, including field evaluation, to identify as yet unknown heritage assets when considering the options for detailed site development, which may also include ancillary matters, such as those described in Section 5.9 of EN-1.”	<p>Embedded mitigations relevant to marine archaeological and cultural heritage receptors are set out in Table 13.9 and detail how data will be collected and assessed to ensure that as yet undiscovered marine archaeological and cultural heritage receptors are identified throughout the life of the Project.</p> <p>Future works will be clearly outlined in the relevant Method Statements produced ahead of any archaeological works and following agreement with Historic England (see document 8.5).</p>

Legislation/policy	Key provisions	Section where comment addressed
		The embedded mitigations are expected to be reflected in the DCO requirements or DML conditions.
Draft NPS EN-3 (2023)	Paragraph 3.8.191 <i>“Assessment may also include the identification of any beneficial effects on the marine historic environment, for example through improved access or the contribution to new knowledge that arises from investigation.”</i>	Potential beneficial effects on marine archaeological and cultural heritage receptors as a result of the Project activities are discussed in Table 13.9 and will ensure data and information collected is assessed for archaeological potential and significance and reported, which will enhance our understanding by gathering, researching and presenting new information and will lead to a publication.
Draft NPS EN-3 (2023)	Paragraph 3.8.192 <i>“Where elements of a proposed project (whether offshore or onshore) may interact with historic environment features that are located onshore, the effects should be assessed in accordance with the policy at Section 5.9 in EN-1.”</i>	The onshore and offshore archaeological resources have been cross-referenced and technical reports have been shared between archaeological contractors. Relevant sections of 5.9 from EN-1 are included in this table.
Draft NPS EN-3 (2023)	Paragraph 3.8.270 <i>“The avoidance of important heritage assets to ensure their protection in situ, is the most effective form of protection.”</i>	AEZs as per Table 13.9 have been applied to all known wrecks and anomalies of high and medium archaeological potential identified in the geophysical data, as outlined Section 13.5. The embedded mitigations are further detailed Table 13.9.
Draft NPS EN-3 (2023)	Paragraph 3.8.271 <i>“This can be achieved through the implementation of exclusion zones around known and potential heritage assets which preclude development activities within their boundaries.”</i>	AEZs as per Table 13.9 have been applied to all known wrecks and anomalies of high and medium archaeological potential identified in the geophysical data, as outlined Section

Legislation/policy	Key provisions	Section where comment addressed
		13.5. The embedded mitigations are further detailed Table 13.9.
Draft NPS EN-3 (2023)	Paragraph 3.8.272 <i>“These boundaries can be drawn around either discrete sites or more extensive areas identified in the Environmental Statement produced to support an application for consent.”</i>	AEZs as per Table 13.9 have been applied to all known wrecks and anomalies of high and medium archaeological potential identified in the geophysical data, as outlined Section 13.5. The embedded mitigations are further detailed Table 13.9.
Draft NPS EN-3 (2023)	Paragraph 3.8.273 <i>“The ability of the applicants to microsite specific elements of the proposed development during the construction phase should be an important consideration by the Secretary of State when assessing the risk of damage to archaeology.”</i>	Where possible, all intrusive activities will be routed and micrositied to avoid any identified marine archaeological and cultural heritage receptors with AEZs as per mitigation outlined in Table 13.9.
Draft NPS EN-3 (2023)	Paragraph 3.8.274 <i>“Where requested by the applicant, the Secretary of State should consider granting consents which allow for micrositing/microrouting (Draft NPS EN-3 (2023) paragraph 2.8.89 ) within a specified tolerance.”</i>	Where possible, all intrusive activities will be routed and micrositied to avoid any identified marine archaeological and cultural heritage receptors with AEZs as per mitigation outlined in Table 13.9.
Draft NPS EN-3 (2023)	Paragraph 3.8.275 <i>“This allows changes to be made to the precise location of infrastructure during the construction phase so that account can be taken of unforeseen circumstances such as the discovery of marine archaeological remains.”</i>	Where possible, all intrusive activities will be routed and micrositied to avoid any identified marine archaeological and cultural heritage receptors with AEZs as per mitigation outlined in Table 13.9.
Draft NPS EN-3 (2023)	Paragraph 3.8.343 <i>“The Secretary of State should be satisfied that any proposed offshore wind farm project has appropriately considered and mitigated for any impacts to the historic environment, including both known heritage assets, and discoveries that may be made during the course of development.”</i>	Volume 2, Appendix 13.1 presents and details the archaeological DBA and the archaeological assessment of geophysical data collected to date. The results are further summarised in Section 13.5.

Legislation/policy	Key provisions	Section where comment addressed
		<p>AEZs (as per Table 13.9) have been applied to all known wrecks and anomalies of high and medium archaeological potential identified in the geophysical data, as outlined Section 13.5. The embedded mitigations are further detailed in Table 13.9.</p>

### 13.3 Consultation

- 13.3.1 Consultation is a key part of the DCO application process. Consultation regarding marine and intertidal archaeology has been conducted through the Evidence Plan Process (EPP) Expert Topic Group (ETG) meetings and the EIA scoping process (ODOW, 2022). An overview of the Project consultation processes presented within Volume 1, Chapter 6: Consultation (PEIR document reference 6.1.6).
- 13.3.2 Responses to scoping were received in September 2022 (Table 13.2). The key issues arising from the Planning Inspectorate (the Inspectorate) Scoping Opinion were concerning the scope of the marine archaeology study area, agreement to scope out transboundary impacts, clarifications on the impact assessment and agreement with the necessary assessment of geophysical and geotechnical data.
- 13.3.3 The key issues arising from consultation via the ETGs focused on similar points. Additionally, there was a focus on the assessment of HSC, the correct implementation of both the Outline Marine WSI and PAD documents, the assessment of geophysical and geotechnical data by a qualified marine archaeologist, and the importance of inclusion of archaeological objective when conducting survey campaigns.
- 13.3.4 A summary of the key issues raised during consultation to date, specific to marine and intertidal archaeology, is outlined in Table 13.2 below, together with how these issues have been considered in the production of this PEIR.

Table 13.2: Summary of Consultation Relating to Marine and Intertidal Archaeology

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
11 July 2022 Pre-Scoping ETG Historic England	Historic England raised the point in relation to embedded mitigation and recognising the difference between adaptive/ further mitigation.	The EIA will take into account the embedded mitigation and apply further adaptive mitigation where required to minimise the risk to marine archaeological and cultural heritage receptors. The current mitigation proposed is outlined in Section 13.7 and Table 13.9.
11 July 2022 Pre-Scoping ETG Historic England	Historic England requests that there be cohesion between the onshore and offshore chapters to cover the cable routes within the intertidal zone.	The marine archaeology study area consists of everything seaward of MHWS and therefore covers the intertidal area. The marine archaeology study area is defined in Section 13.4. Meetings and discussions are currently ongoing between the onshore and offshore chapters to ensure cohesion.
9 September 2022 Scoping Opinion The Inspectorate on behalf of the Secretary of State (SoS)	<i>“... the Inspectorate agrees that transboundary impacts on marine archaeology are unlikely and can be scoped out from further assessment. However, the ES should clearly describe the findings and any mitigation relied upon.”</i>	Transboundary impacts have been scoped out of this assessment and are further described in Section 13.12.
9 September 2022 Scoping Opinion The Inspectorate on behalf of the SoS	<i>“The Scoping Report describes the study area but does not explain why the area chosen is sufficient to reflect the likely ZoI for the Proposed Development. The ES should be based on a defined study area, which is sufficient to identify the likely significant effects of the Proposed Development, including any potential effects caused by changes to marine physical processes. The ES should also confirm whether the study area aligns with relevant policy and guidance and provide justification for any divergences.”</i>	The marine archaeology study area includes a 1km buffer up to MHWS around both the array area and the Offshore Export Cable Corridor (ECC) and is further defined in Section 13.4. This 1km buffer has been designed to accommodate the potential imprecision of historic marine positioning.

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
9 September 2022 Scoping Opinion The Inspectorate on behalf of the SoS	<i>“The Scoping Report describes both penetration and compression impacts to the seabed from construction activities. The Applicant should ensure that these effects are fully explained in the ES, in order to explain the nature of compression impacts and establish whether there is potential for two different types of effect.”</i>	Compression and penetration impacts have been considered separately and are outlined in Section 13.7 and Section 13.9.
9 September 2022 Scoping Opinion The Inspectorate on behalf of the SoS	“The Inspectorate considers that in addition to use of this information (geophysical and geotechnical information) to inform the assessment, the opportunity for this information to also identify areas of high archaeological potential is considered in the development of the design and explained in the ES.”	The Baseline Environment (Section 13.4) outlines the known marine archaeological and cultural heritage receptors as well as the potential for unknown receptors not yet located and is further detailed in Section 3 of Volume 2, Appendix 13.1.
9 September 2022 Scoping Opinion Historic England	<i>“Historic England concur with the impacts that have been scoped into this report to be assessed in the production of a PEIR and subsequent ES. We welcome the embedded mitigation that has been set out and we look forward to continued engagement during the Pre-Application phase of this project.”</i>	All impacts are outlined in Section 13.7, Section 13.9 and all embedded mitigation is outlined in Section 13.7 and Table 13.9.
9 September 2022 Scoping Opinion Historic England	<i>“Historic England would point out that the Rapid Coastal Zone Assessment for Yorkshire and Lincolnshire should also be used to further inform the Baseline data.”</i>	The Rapid Coastal Zone Assessment for Yorkshire and Lincolnshire has been assessed and included in the assessment methodology (Section 13.8).
9 September 2022 Scoping Opinion Historic England	<i>“We note that the peat database will be analysed further during the PEIR stage and that previously, two examples of peat were recovered within the ECC AoS in 2015 during trawling and will be further analysed during PEIR stage. Historic England encourages the Applicant to corroborate desk-based sources of information, such as held in the peat database, with technical survey data acquired for this project.”</i>	The potential for peat within the marine archaeology study area is summarised in Section 13.4 and further discussed in Section 3 of Volume 2, Appendix 13.1 along with a gazetteer of the peat records for within the marine archaeology study area and surrounding regional context of the North Sea (Annex C of Volume 2, Appendix 13.1). These



Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
		records will be used to further inform the assessment of the geoarchaeological potential within the marine archaeological study area.
9 September 2022 Scoping Opinion Historic England	<i>“Historic England would request that the Applicant define what ‘Compression effects’ are, as mentioned in Table 7.7.5, this is in the interest of clarification and should be included in the PEIR.”</i>	Compression and penetration impacts have been separated and are outlined in Section 13.7 and Section 13.9.
9 September 2022 Scoping Opinion Historic England	<i>“In order to assess the design scenario and the impacts on all known and newly identified marine archaeological and cultural heritage receptors, we suggest that the Applicant considers how such newly acquired datasets may also be able to determine areas of high archaeological potential. For example, if a known wreck is considered to be heavily dispersed and, in a location, close to proposed development, does the possibility of a wider spread of wreck material exist, which may need to be investigated earlier in the design planning process, to inform effective mitigation.”</i>	An assessment of geophysical data for the array area has been completed and is outlined in Section 13.5 and is further detailed in Section 4, Volume 2, Appendix 13.1.  An assessment of the geophysical data for the Offshore ECC will be conducted during ES.
9 September 2022 Scoping Opinion Historic England	<i>“We note that the Applicant has stated that the Outline WSI document and the PAD documents will be appended to the PEIR and final ES documents, Historic England welcomes this action from the Applicant. However, they should ensure that both documents follow industry guidance, for instance the former should align with The Crown Estate (2021), Archaeological Written Schemes of Investigation for OWF Projects.”</i>	The archaeological methodology and embedded mitigation follow all guidance documents, outlined Section 13.8.
9 September 2022 Scoping Opinion Historic England	<i>“It was good to see the inclusion of resources such as the Historic England Peat Database (paragraphs 7.7.16-18). However, it was disappointing to see that this was only considered from the marine aspect. To ensure a successful project it is crucial that a holistic approach is taken to ensure the results of study across marine,</i>	The potential for peat within the marine archaeology study area is summarised in Section 13.4 and further discussed in Section 3 of Volume 2, Appendix 13.1 along with a gazetteer of the peat records for within the

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
	<p><i>intertidal and terrestrial zones are considered from the start with an integrated approach. Presently the sections on marine and terrestrial do not really gel, and this risks an incoherent EIA that fails to adequately achieve its objectives.”</i></p>	<p>marine archaeology study area and surrounding regional context of the North Sea (Appendix C of Volume 2, Appendix 13.1).</p> <p>Meetings and discussions are currently ongoing between the onshore and offshore chapters to ensure cohesion.</p>
<p>9 September 2022 Scoping Opinion Historic England</p>	<p><i>“We also noticed that neither the Marine Archaeology or Archaeology and Cultural Heritage chapters appeared to give attention to the East Midlands Historic Environment Research Framework (EMHERF). This is an important resource that covers both marine and terrestrial environments, and we recommend it is included as it will help in understanding the significance of the archaeology it is expected to encounter. Its use will also help provide a tool to frame appropriate and proportionate questions further as work progresses.”</i></p>	<p>EMHERF has been assessed and included in this PEIR chapter and is outlined in Section 13.8.</p>
<p>10 October 2022 Post-Scoping ETG Historic England</p>	<p><i>Historic England confirm the participation in a clear method statement to inform each stage of the programme of survey work is extremely helpful in terms of how the work is progressed so that the geoarchaeological work is built in as early as possible. Historic England would wish to see optimisation for this work, noting that the earlier archaeological input can feed in will assist in. In terms of the design and delivery of the Project, Historic England would encourage more integration and participation for the archaeological consultants in terms of the programme of surveying and analysis.</i></p>	<p>Geoarchaeological PAD training has been provided to contractors ahead of all geotechnical campaigns (construction purposes) that have been conducted to date to ensure that lines of communications are clear should deposits of high geoarchaeological potential be located. All core logs from these previous campaigns will be used to inform a Geoarchaeology Stage 1 Report.</p>

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
10 October 2022 Post-Scoping ETG Historic England	<i>Historic England want to understand which specific sources will be used in order to provide meaningful consultation. Historic England are concerned that the timing of the PEIR will not enable enough time to respond to comments to undertake work, or there may be an absence of detail. Historic England confirmed early engagement is required to ensure the organisation can comment on adequacy of work and where opportunities or risk lie.</i>	Data sources are fully outlined in Table 13.3 and guidance documents and research frameworks are outlined in Section 13.8.
10 October 2022 Post-Scoping ETG Historic England	<i>Historic England confirmed it would be useful to understand the full engineering parameters of the Project and the Rochdale Envelope. Any information the Project can include on the worst case scenarios and what geophysical work will be necessary subsequently would be considered helpful.</i>	A realistic worst case scenario has been fully outlined in Section 13.7 and the assessment of geophysical data for the array area is outlined in Section 13.5 as well as further detailed in Section 4 of Volume 2, Appendix 13.1.  A complete assessment of the geophysical data for the Offshore ECC will be conducted during ES.
10 October 2022 Post-Scoping ETG Historic England	<i>Historic England queried if the vibrocore logs provided adequate information on the geoarchaeological analysis works which should later on in the Project.</i>	The core logs from the previous geotechnical campaigns will be utilised alongside geophysical data to determine where archaeological specific cores should be collected during future campaigns. This information will be compiled in a Geoarchaeology Stage 1 Report.
10 October 2022 Post-Scoping ETG Historic England	<i>Historic England confirm the embedded mitigation measures are appropriate approach for known features. For unknown features, a crucial element is adaptive mitigation. A system will be required by the Project for refining the survey work for the resolution to enable the Project to identify anomalies. The most highly sensitive sites will</i>	The EIA will take into account the embedded mitigation and apply further adaptive mitigation where required to minimise the risk to marine archaeological and cultural heritage receptors. The current mitigation

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
	<i>be those which are dispersed and fragmentary sites. Engagement and a two-way flow between archaeological consultants and the engineers/survey contracts is essential to ensure a sensible approach to adaptive mitigation.</i>	proposed is outlined in Section 13.7 and Table 13.9.
31 January 2023 Pre-PEIR ETG Historic England	<i>“Regrading Preliminary Environmental Information Report (PEIR) consultation, which is planned for Q2 2023, we request that an ETG is convened for post PEIR consultation to discuss matters as relevant for preparation of any ES and associated documentation as might accompany a DCO application.”</i>	A post PEIR ETG is scheduled for July 25, 2023, to discuss matters relevant to the preparation of the ES.
31 January 2023 Pre-PEIR ETG Historic England	<i>“I noticed on the slide “Surveys – Offshore” that in 2021 “Offshore Campaign/Lab testing of vibrocores” was completed. It would be helpful to know if the “lab testing” was conducted so that any recommended geo-archaeological analysis was conducted on viable samples and if the write-up of this work will be included in the PEIR? We also noted that in 2022 the “Potential ECC geophysical” survey was completed. It would be helpful to know if those data generated will be subject to archaeological analysis and interpretation for inclusion in the PEIR?”</i>	Geotechnical investigation will be conducted during ES along with the assessment of geophysical data for the Offshore ECC.
31 January 2023 Pre-PEIR ETG Historic England	<i>“... reference to North Sea Prehistory Research and Management Framework (NSPRMF) requires clarification. The NSPRMF, is not a “large-scale systematic study”; what it represents is the collation of research questions and suggested delivery strategies which is supported by the research community. It is relevant and applicable to all activities as might encounter palaeoenvironmental features, whether linked to development assessment obligations or pure research. This same comment is applicable to how the EMHERF should be used to inform production of the PEIR.”</i>	The NSPRMF and the EMHERF have both been assessed within this PEIR chapter and are outlined in Section 13.8.

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
31 January 2023 Pre-PEIR ETG Historic England	<i>“England’s Historic Seascapes Marine HSC Pilot Study: Withernsea to Skegness (produced in 2010) is superseded by the National Historic Seascape Characterisation Consolidation exercise<sup>1</sup>, which should be applied when producing the PEIR.”</i>	HSC has been outlined within the existing environment (Section 13.4) and is further detailed in Section 3.7, Volume 2, Appendix 13.1.
31 January 2023 Pre-PEIR ETG Historic England	<i>“The detail provided about a geotechnical Investigation in 2021 (i.e., fifty 6m vibro-cores) and geophysical Investigation in 2022 is important to demonstrate the action taken to corroborate desk-based sources of information with dedicated survey work commissioned specifically for this proposed development. We therefore expect to see geo-archaeological interpretation of these data included at PEIR.”</i>	Geotechnical investigation will be conducted during ES, which is forthcoming and will be further detailed in a Geoarchaeology Stage 1 report.
31 January 2023 Pre-PEIR ETG Historic England	<i>“Regarding the geotechnical investigations to be conducted in the array area during 2023. The use of a “toolbox talk” is useful to explain procedures if finds of potential archaeological interest are encountered. We understand that processing of geotechnical material and conducting of geo-archaeological investigations will not be in time for the proposed PEIR consultation. However, we hope that the planning of this survey allows for a coring methodology that safeguards samples in the best condition to optimise geo-archaeological investigation. Such an approach should follow published guidance and agreed objectives as set out in a method statement produced in consultation with Historic England. We recommend that it is a survey objective that the output of the work conducted in 2023 informs the “larger scale” geotechnical survey to be conducted in 2024, but to be clear, the obtaining of “Archaeological input” is to be in accordance with a programme of investigation, discussed with Historic England, and which is conducted by accredited, experienced and professional geoarchaeological consultants.”</i>	Geotechnical investigations, including all coring activity will be detailed in the ES. Geoarchaeological PAD training will be conducted prior to any works taking place (see Section 13.7).

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
31 January 2023 Pre-PEIR ETG Historic England	<i>“Please confirm if a UK Hydrographic Office wreck report has been submitted for the anomaly encountered (unreferenced in the accompanying slide pack). We note your confirmation of known wreck location of Basto (undated) and that you will want to explain within the PEIR the strategy adopted to avoid these locations.”</i>	The wreck was added to the gazetteer in Volume 2, Appendix 13.1 and an appropriate AEZ was recommended in order to mitigate potential impact to this location. Avoidance of these locations are outlined in the WSI (document reference 8.5).
31 January 2023 Pre-PEIR ETG Historic England	<i>““Designated Sites and Key Receptors” slide – we highlight that all military aircraft crash sites are automatically designated under the Protection of Military Remains Act 1986. Regarding “Structural remains other than watercraft”, we add that there are important elements of historic landscape continuity and use that exist between the present terrestrial area and the intertidal area of the Wash embayment in recognition of historic land claim which may encompass marine archaeological and cultural heritage.”</i>	<p>The marine archaeology study area, further defined in Section 13.4, does not cover the Wash embayment, but covers the intertidal zone up to MHWS where the Offshore ECC makes landfall. Volume 1, Chapter 20 Onshore Archaeology and Cultural Heritage (PEIR document reference 6.1.20) covers the Wash embayment within the onshore study area.</p> <p>All known protected sites and other marine archaeological and cultural heritage receptors have been outlined in the Baseline Environment (Section 13.4) and further outlined in Section 3 document 8.5 and embedded mitigation (Table 13.9) has been established for any unknown marine archaeological and cultural heritage receptors.</p>
31 January 2023 Pre-PEIR ETG Historic England	<i>“We note that the archaeological analysis and assessment of geophysical data collected for the array area will be presented in the PEIR. It is therefore relevant that the PEIR also sets out the mitigation strategy to be adopted by this project in consideration of “key</i>	Embedded mitigation has been outlined in Section 13.7 which includes an Offshore Marine WSI (see document 8.5) that has been

Date and consultation phase/ type	Consultation and key issues raised	Section where comment addressed
	<i>receptors” presently identified, which should also qualify other anomalies of possible archaeological interest.”</i>	produced with this chapter and will further detail the mitigation strategies.
31 January 2023 Pre-PEIR ETG Historic England	<i>“We are concerned to see that the archaeological assessment of geophysical data collected for the Offshore ECC will not be included in the PEIR and therefore we will not be in a position to offer advice regarding mitigation strategies. It is therefore very important that post PEIR data analysis is adequately completed to inform the content of any ES subsequently produced.”</i>	The assessment of the Offshore ECC is ongoing and will be detailed in the ES.
31 January 2023 Pre-PEIR ETG Historic England	<i>“...it is a very important matter that all parties understand that all subsequent work will be in accordance with an Archaeological WSI and specified as a condition within any draft dML and not through any separate “commitments register process”.”</i>	It is acknowledged that the geoarchaeological analysis will take place in accordance with an Outline Marine WSI and as a condition for the granting of a Marine Licence.

## 13.4 Baseline Environment

### Marine Archaeology Study Area

- 13.4.1 This chapter covers both the offshore and intertidal zone of the Project. A marine archaeology study area has been established for the purposes of collating and characterising baseline data as part of this PEIR. The marine archaeology study area is defined as the array area, the Offshore ECC, and a 1km buffer up to MHWS (Figure 13.1).
- 13.4.2 The additional 1km buffer is industry standard and allows for the consideration of direct and indirect effects on marine archaeological and cultural heritage receptors and is designed to accommodate the potential imprecision of historic marine positioning and the strong tides which can cause the scattering of shipwreck artefacts and eroded archaeological material over considerable distances.
- 13.4.3 Shipwrecks located in the array area and/or Offshore ECC may have been recorded as lost outside the area or they may have been lost and drifted or dragged before settling on the seabed. While no impact of the Project is expected outside the array area and/or Offshore ECC, Volume 1, Chapter 7: Marine Processes (PEIR document reference 6.1.7), outlines how tidal ranges and seabed movements can be affected by the Project. This is further discussed in terms of impacts on marine archaeological and cultural heritage receptors in Section 13.7 and Section 13.9.
- 13.4.4 The area from MHWS landward is covered by Volume 1, Chapter 20: Onshore Archaeology and Cultural Heritage (PEIR document reference 6.1.20)
- 13.4.5 It is important to note that the marine archaeology study area may be reviewed and amended for ES in response to such matters as refinement of the Offshore ECC, feedback from consultees, and/or the identification of additional constraints (environmental and/or engineering).

### Compensation Areas

- 13.4.6 There are three compensation areas which include, an offshore reactive compensation platforms (ORCPs) search area, a compensation area for benthic (biogenic reef) and compensation areas for offshore ornithology (artificial nesting structures (ANS)). These compensation areas are shown in Figure 13.1 and have not been assessed as part of the baseline but will be assessed within the ES following refinement of the proposed areas and once details of the works to be undertaken have been finalised.



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### Legend

- Array Area
- Offshore Export Cable Corridor
- Marine Archaeology Study Area
- ORCP Search Area
- Artificial Nesting Structure Search Area
- Biogenic Reef Restoration Search Area

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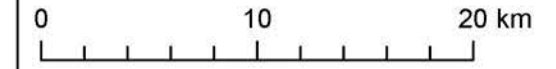
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Coordinate System: WGS 1984 UTM Zone 31N



Scale: 1:350,000

Preliminary Environmental Information Report

Marine Archaeology Study Area

Figure 13.1



Date: 28/04/2023  
Produced By: LN  
Revision: 2.0



Contains ESRI Basemapping,  
World Ocean Base: OceanWise,  
Esri, DeLorme, NaturalVue

## Potential Marine Archaeological and Cultural Heritage Receptors

13.4.7 The scope of the assessment has enabled the identification of marine archaeological and cultural heritage receptors potentially being affected by the Project. The marine archaeological and cultural heritage receptors are defined as remains or resources of heritage significance or interest and include:

- Physical resources such as shipwrecks, aviation remains, archaeological sites, archaeological finds and material including prehistoric deposits;
- Archival documents and oral accounts recognised as of historical/archaeological or cultural significance; and
- Historic seascape character and the changes perceived through historic use of this seascape.

### Data Sources

13.4.8 The following data sources detailed in Table 13.3 were collated and consulted for this chapter in order to undertake a desk-based review of the known marine archaeological and cultural heritages receptors and likely significant impacts.

Table 13.3: Key Sources of Data Regarding Marine Archaeological and Cultural Heritage Receptors

Source	Summary	Spatial Coverage of Study Area
National Record of the Historic Environment (NRHE)	Point and polygon data in relation to wrecks and palaeoenvironmental evidence via Archaeology Data Service (ADS) ArchSearch.	Full coverage of the marine archaeology study area.
United Kingdom Hydrographic Office (UKHO) wrecks and obstructions (Admiralty Maritime Data Solutions) (wrecksite.eu)	Records of known wrecks and obstructions held by the UKHO and available via Admiralty Maritime Data Solutions: Marine Data Portal (2022) and wrecksite.eu.	Full coverage of the marine archaeology study area up to MLWS.
UKHO Admiralty Charts	Admiralty charts and historic mapping relevant to the defined marine archaeology study area.	Full coverage of the marine archaeology study area.
Lincolnshire HER	Point data of local historic environments from Lincolnshire derived from HER held by Lincolnshire HER Office.	Limited coverage of the marine archaeology study area, though the detailed study provides useful characterisation of the directly adjacent subzone.
The North Sea Palaeolandscapes Project (NSPP) (Gaffney <i>et al.</i> , 2007)	Palaeolithic and Mesolithic landscape mapping of the North Sea.	Partial coverage of the marine archaeology study area and provides useful characterisation of the directly adjacent subzone.

Source	Summary	Spatial Coverage of Study Area
Europe's Lost Frontiers (Gaffney and Fitch, 2022)	A continuation of the NSPP. Building on the mapping of Palaeolithic and Mesolithic landscapes of the North Sea, using paleoenvironmental data and ancient DNA. Potential submerged Neolithic landscapes will also be explored.	Volume 1 of this project has been published and has partial coverage of the marine archaeology study area with useful characterisation of the directly adjacent subzone and palaeoenvironmental context of the region.
Technical Report for Strategic Environmental Assessment (SEA) Area 3 (Flemming, 2002)	Description of palaeolandscape potential of the North Sea basin.	Broadscale data with regional coverage.
Coastal and Intertidal Zone Archaeological Network (CITIZAN)	Interactive mapping of intertidal heritage in England.	Limited coverage of the marine archaeology study area, though the detailed study provides useful characterisation of the directly adjacent subzone.
Historic England Peat Database	Database of all intertidal and coastal peats containing location, nature, age and related archaeology.	Limited data within the marine archaeology study area, though peats have been found along the Lincolnshire coast and to the south along the Norfolk coast. Ten records are listed along the Lincolnshire coast within the marine archaeology study area, with an additional 33 records with unspecified locations within the North Sea.
British Geological Survey (BGS)	Database of a range of marine geoscience data held within the National Geoscience Data Centre (NGDC). Primarily shallow geology and geophysics data collected as either part of regional or local mapping work or provided by third parties.	Full coverage of the marine archaeology study area. There are no records of peat found within the marine archaeology study area, but there are contextual finds of peat within the region with the closest being 2km from the marine archaeology study area.
National Historic Seascape Characterisation (NHSC) Database	Database and thesaurus of all intertidal and offshore historic seascapes in the UK	Full coverage of the marine archaeology study area up to MLWS.
ODOW geophysical and geotechnical survey data from the ODO array area	Geophysical surveys which include bathymetry, side scan sonar, sub-bottom and magnetometer data collection and geotechnical works	Full geophysical survey coverage of the marine archaeology study area. Initial geotechnical works will mainly be designed around engineering

Source	Summary	Spatial Coverage of Study Area
and Offshore ECC (2021/2022)	which include boreholes and vibrocoring.	requirements, with archaeological input provided during the planning stages of site investigation works. Geoarchaeological campaigns utilising both the already collected material as well as archaeology specific cores will be undertaken following the submission of Method Statements to Historic England.

## Existing Environment

13.4.9 The offshore marine archaeological resource can be attributed to five main categories of sites or features:

- Submerged prehistoric landscapes resulting from changes to sea-level and eventual stabilisation of sea-level at or near the present position. Such landscapes may contain highly significant evidence of prehistoric human occupation and/or environmental change;
- Archaeological remains of watercraft deposited when such vessels sank while at sea or became abandoned in an inter-tidal context which subsequently became inundated;
- Remains of aircraft crash sites, either coherent assemblages or scattered material, usually the result of World War Two (WWII) military conflict, but also numerous passenger casualties, particularly during the peak of seaplane activity during the World War One (WWI), though these rarely survive in the archaeological record;
- Structural remains other than watercraft, including such elements as fish traps, abandoned quays, hards, defensive structures or sites lost to coastal erosion may be found within the intertidal zone (between MHWS and MLWS). Marine archaeological and cultural heritage receptors located seaward of MHWS have been considered in this section; and
- Historic Seascape Character: the historic cultural influences which shape present perception of seascapes, its uses and its ability to accommodate change.

13.4.10 The marine archaeology study area has been assessed and described as a whole for the baseline, however the geophysical assessment for the array area, Offshore ECC and 1km buffer have been assessed separately. A summary of the records within the array area, Offshore ECC and 1km buffer are described below.

### Array Area

- 13.4.11 Within the array area there are 15 records for wrecks and obstructions (Figure 13.2). Of these three wrecks and five obstructions have been identified in the geophysical data (SSS, MBES, and MAG). One additional wreck not previously recorded has been identified within the array. Further eight paleochannel features were identified from the sub-bottom profiler data.
- 13.4.12 In addition to this PEIR chapter, a technical report (Volume 2, Appendix 13.1) and an Outline Marine WSI (see document 8.5) were produced to further detail the findings outlined within this section.

### Offshore Export Cable Corridor

- 13.4.13 Within the Offshore ECC there are 15 records for wrecks, aircraft, obstructions, foul ground and sites (Figure 13.2). At the time of writing, the assessment of the geophysical data covering the Offshore ECC is currently ongoing. The full assessment of the Offshore ECC will be provided within the ES.
- 13.4.14 In addition to this PEIR chapter, the technical report (Volume 2, Appendix 13.1) and Outline Marine WSI (see document 8.5) will be updated following a review of the geophysical data covering the Offshore ECC so that the documents cover the entirety of the marine archaeology study area. A review of the key findings from a DBA of the archaeological potential within the Offshore ECC has been incorporated into the description of the existing environment below.

### 1km Buffer

- 13.4.15 Within the 1km buffer up to MHWS there are 26 records for wrecks, aircraft, obstruction, foul ground and sites (Figure 13.2). Of these none have been identified in the geophysical data available for the 1km buffer surrounding the array area. At the time of writing, the assessment of the geophysical data covering the Offshore ECC is currently ongoing. The full assessment of the Offshore ECC and 1km buffer will be provided within the ES.
- 13.4.16 In addition to this PEIR chapter, the technical report (Volume 2, Appendix 13.1) and Outline Marine WSI (see document 8.5) will be updated following a review of the geophysical data covering the Offshore ECC and its associated buffer so that the documents cover the entirety of the marine archaeology study area. A review of the key findings from a DBA of the archaeological potential within the Offshore ECC has been incorporated into the description of the existing environment below.

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### Legend

- Array Area
  - Offshore Export Cable Corridor
  - Marine Archaeology Study Area
  - ORCP Search Area
- Period
- Post-WWII (4)
  - WWII (5)
  - WWI (3)
  - Post-Medieval (2)
  - Medieval (1)
  - Roman (2)
  - Unknown (25)
  - Foul Ground (10)
  - Obstruction (4)

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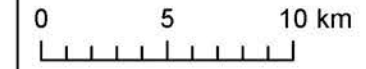
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Coordinate System: WGS 1984 UTM Zone 31N



Scale: 1:300,000

Preliminary Environmental Information Report

Known Wrecks and Obstructions within the Marine Archaeology Study Area

Figure 13.2



Date: 28/04/2023  
Produced By: LN  
Revision: 2.0

**GoBe** Contains ESRI Basemapping, World Ocean Base: OceanWise, Esri, DeLorme, NaturalVue

## Environmental Context and Maritime Activity

- 13.4.17 The area of seabed that the marine archaeology study area covers was previously a large swathe of dry land that was inhabited during the Pleistocene and early Holocene (Mesolithic). There have been numerous glacial cycles resulting in periods of lower and higher sea-level compared to today. The dynamic processes of climate and landscape change throughout the Pleistocene as a result of warming and cooling cycles and fluctuations in sea-level resulted in repeated (re)colonisation and abandonment of these landscapes (Cohen *et al.*, 2017). Large swathes of land that are now submerged would have been inhabited and exploited by our human ancestors, and any archaeological finds from the Palaeolithic period in the offshore zone are likely to be from periods when the sea-level was lower.
- 13.4.18 The potential for submerged landscapes within the marine archaeological study area is high. To the south of the marine archaeology study area, at Happisburgh and Pakefield, the earliest evidence of hominin occupation of northern Europe (c. 900 kiloannus (ka) to 800 ka) comes from sites, features, and finds within the coastal and marine zone (Parfitt *et al.*, 2005, 2010; Bynoe, 2018).
- 13.4.19 Due to the effects of ice scouring during each successive glacial period, the North Sea Basin has the highest potential for Palaeolithic material from within the last 100,000 years and increases significantly following the last glacial maximum, at the onset of the Holocene (Flemming, 2002). This is because these former Pleistocene land surfaces have not yet been eroded or reworked by younger landscapes (Cohen *et al.*, 2017).
- 13.4.20 The deposits laid down in the marine zone during glacial cycles during the last 500,000 years are of great importance for understanding the localised geomorphological changes of the Lincolnshire coastline.
- 13.4.21 The archaeological and palaeoenvironmental potential of the offshore deposits from the North Sea is demonstrated by the wealth of artefacts, faunal remains and peat evidence that have been identified to date. However, *in situ* offshore finds are rare, with most artefacts within the marine zone being found on the seabed in a secondary context.
- 13.4.22 There are no *in situ* finds from the region, although the potential for the preservation of such material is well attested in similar contexts based on finds from development such as aggregate dredging area 240 approximately 98km south of the marine archaeology study area, off the coast of Norfolk (Tizzard *et al.*, 2014) where an assemblage of Middle Palaeolithic tools has been recovered.
- 13.4.23 The rate of sea-level change had slowed considerably by c. 6,000 BP for much of the British Isles and much of the land mass connecting the UK and continental Europe was permanently inundated.
- 13.4.24 From around 4,500 BP the operation of maritime networks linking Britain across the North Sea, the Channel and the Irish Sea are shown in the long-distance exchange of exotic objects and artefacts. These included finds of Beaker pottery, copper and bronze weapons and tools, flint daggers, arrowheads and jewellery, or other adornments of gold, amber, faience, jet, and tin (Sturt and Van Noort via Research Framework, 2022).

- 13.4.25 The potential for substantial submerged landscape deposits offshore is further reduced in the Bronze Age due to the increasing stability in sea levels. However, with increasingly sedentary populations, both on the coast and inland, there came an inevitable rise in increased communications along the coast and waterways of the region.
- 13.4.26 There is substantial potential for *in situ* archaeological remains in the intertidal zone. These would include occupational material, ritual deposits, burials, and structures relating to coastal marine practices, such as jetties, causeways, and fish traps; however, there is also potential for secondary context material from eroded deposits in the inshore and intertidal zone.
- 13.4.27 By the Iron Age, sea level change no longer had a significant effect on the geomorphology of the coastline and was replaced by coastal erosion as the key factor in coastline changes. Maritime trade networks were further developed, with evidence of cross-channel, coastal and inland trade. From the late Iron Age there is much clearer evidence for increasing levels of contacts, trade, and exchange across the Channel. This evidence includes a wider range of materials than in the Bronze Age, including coins, pottery, and foodstuffs from the western Mediterranean, France and Belgium, and a range of other traded and imported Roman material.
- 13.4.28 The Roman occupation of the British Isles had an inherent maritime aspect due to the cross-Channel contact and connectivity that occurred both before and after the conquest. There is some uncertainty about the extent of coastal regression and transgression on the British coastline during the Roman period, however along the north and northeast coasts of Norfolk, to the south of the proposed development area, a Roman coast extending approximately 2km further seawards has been theorised (Walsh and Brockman *et al.*, via Research Frameworks, 2022), increasing the potential of Roman artefacts to be found across the marine archaeology study area. Caistor and Lincoln were towns developed during the Roman occupation, with evidence of overseas trade. To the south, Brancaster housed a possible 'Saxon Shore Fort'. Two pot sherds recorded in the Lincolnshire HER (MLI41602 and MLI41607) are recorded within the intertidal zone of the marine archaeology study area.
- 13.4.29 There was a decline in maritime activity in the Early Medieval period, after the fall of the Roman Empire, until the late 6th century when there was a resurgence of trade with continental Europe which continued until the 9th century. As with the Roman period, the variety of maritime activities meant an extensive range of vessels were used. These vessels continued to increase in size and complexity, however smaller craft were still commonly used, especially for coastal and inshore activities. Within the marine archaeology study area, there is one record for a pot (MLI41601) from the medieval period listed in the Lincolnshire HER.
- 13.4.30 In the post-medieval period, there was a marked increase in detailed historical records, which meant that known maritime losses began to be recorded. There was also a continued increase in trade and maritime activity, and with this expansion of shipping activity and traffic came an ever-greater number of wrecking events. Within the marine archaeological study area two sailing vessels (UKHO9339, *Excelsior* and UKHO9341 *Dauntless*) are attributed to the post-medieval period. These records are detailed in Section 3.3 of Volume 2, Appendix 13.1.



13.4.31 The rapid pace of technological development in the beginning of the twentieth century had a great impact on the broad pattern of maritime activity. Wartime innovation led to the increase in use of new types of vessels and technologies, and a transformation of a growing global shipping trade. Globalisation also expanded into the leisure industry, with a decrease in the use of ocean liner in favour of cruise ships and newly developed passenger aircraft in the mid-1900s, and planes becoming the primary method of intercontinental travel. There are 12 recorded wrecks within the marine archaeology study area attributed to the modern period. These are detailed in Section 3.3 of Volume 2, Appendix 13.1.

#### Known Wrecks and Obstructions

13.4.32 Wrecks and obstructions are classified by the UKHO as:

- LIVE: wreck considered to exist as a result of detection through survey;
- DEAD: not detected over repeated surveys, therefore not considered to exist in that location;
- LIFT: wreck has been salvaged;
- UNKNOWN: the state of the wreck is unknown or unconfirmed; and
- ABEY: existence of wreck in doubt and therefore not shown on charts.

13.4.33 Records from the NRHE were checked against the UKHO records and any duplications were removed. Where the recorded wrecks were not also seen in the geophysical data the locations listed in the UKHO data were used.

13.4.34 The archaeological assessment of geophysical data combined with the baseline conditions has identified 21 LIVE wrecks, five DEAD wrecks, 12 UNKNOWN or unconfirmed, along with one previously unrecorded wreck within the marine archaeology study area (Figure 13.1). Of the wrecks recorded in the UKHO and NRHE baseline data assessment, three were identified within the geophysical data of the array area.

#### Aviation Remains

13.4.35 Thousands of aircraft are likely to have been lost in UK territorial waters during the 20<sup>th</sup> century primarily during the World Wars. A high proportion of these losses are likely to be combat losses or accidental losses of military aircraft that occurred during WWII, but aviation remains could also include aircraft, airships, and other dirigibles dating to WWI, although these rarely survive in the archaeological record.

13.4.36 The Lincolnshire coastline has 118 Royal Air Force (RAF) aircraft losses recorded (Wessex Archaeology, 2008) however there are currently no reported losses of aircraft within the study area. Because of the concentration of military activity in the area there is a high potential for aircraft remains. Where *in situ* remains associated with any military aviation losses are found, they will be archaeologically significant and protected under the Protection of Military Remains Act 1986.

#### Recorded Losses

13.4.37 There are currently no additional recorded losses within the boundary for which there are no corresponding UKHO records or seabed remains, and for which only a general position is given.

### Fisherman's Fasteners

- 13.4.38 Fishermen's fasteners are unidentified obstructions reported by fishermen with often very little information on accurate positioning or archaeological potential. The recorded positions might be indicative of a wreck or submerged feature, but they remain unidentified and are not associated with any known vessels or structural remains (including records classified as DEAD by the UKHO).
- 13.4.39 Within the marine archaeology study area, there are currently two records classed as fishermen's fasteners recorded, UKHO9482 and UKHO9483.

### Unlocated Marine Archaeological and Cultural Heritage Receptors

- 13.4.40 There is always a possibility that not yet identified marine archaeological and cultural heritage receptors are location within the marine archaeology study area. Unlocated marine archaeological and cultural heritage receptors are of unknown archaeological potential and heritage significance but might still be impacted by indirect or direct impacts caused by project activities. Large offshore renewable developments have over several years located previously unknown and unlocated sites of high archaeological significance within the various site boundaries, even after completing pre-construction surveys. Mitigation for unlocated marine archaeological and cultural heritage receptors is further discussed in Section 13.7.

### Designated Sites

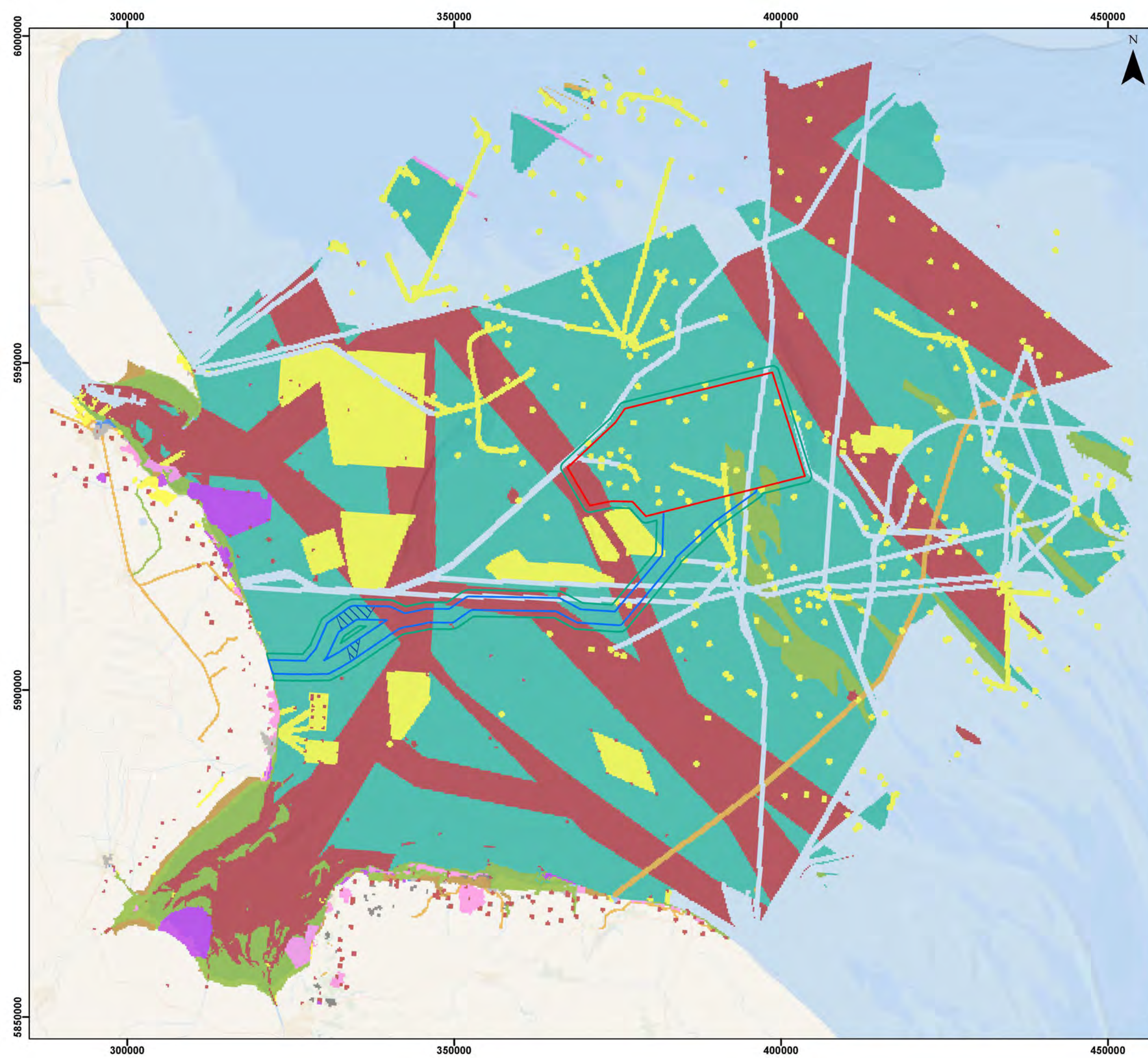
- 13.4.41 There are currently no marine archaeological and cultural heritage receptors within the marine archaeology study area that are designated under the Protection of Wrecks Act 1973, or any other site designation or statutory protection.
- 13.4.42 There are a total of 118 RAF losses that have been documented off the coast of Lincolnshire (Wessex, 2008), but the locations are currently unknown. These aircrafts would automatically be designated under the Protection of Military Remains Act 1986 if any were uncovered within the marine archaeology study area.
- 13.4.43 Along the Lincolnshire coast, where the Offshore ECC makes landfall there is one site that is designated as a Site of Special Scientific Interest (SSSI), Chapel Point to Wolla Bank SSSI. There are currently no recorded archaeological sites or finds designated at Chapel Point to Wolla Bank SSSI. However, the SSSI contains preserved palaeoenvironmental deposits that consist of Holocene sediments and special geological features which can provide a greater understanding of the palaeoenvironmental landscape from onshore to offshore.

### Historic Seascape Characterisation

- 13.4.44 HSC has been used as a measure in this assessment to provide a contextual and regional approach to the historic perception of the marine archaeology study area. This narrative and all associated data are drawn from the NHSC which was undertaken in eight separate implementations projects dating from 2008 to 2015 (LUC, 2018 via Historic England). The assessment of the HSC data is therefore for contextual purposes and does not contain all modern infrastructure such as the Lincs Wind Farm and Triton Knoll. Historic seascapes cannot be destroyed or damaged but impacts on them can change their historical character and the perception of this. Impacts on the current seascape are further detailed in Volume 1, Chapter 17: Seascape, Landscape and Visual (PEIR document reference 6.1.17).

- 13.4.45 Changes to the character of the sea surface and the perception of the historic seascape as a direct result of the construction, O&M and decommissioning phases will result from the addition of new infrastructure, such as foundations and Wind Turbine Generators (WTG), as well as ongoing activity from installation and maintenance vessels. The seascape is dynamic and a product of change, both historic and continual as is the perception of its character.
- 13.4.46 The HSC assessment draws on the consolidated NHSC database (LUC, 2018 via Historic England), Historic Seascape Characterisation: England's Historic Seascape: HSC Method Consolidation (Cornwall Council, 2008), and England's Historic Seascape: Demonstrating the Method (SeaZone, 2011).
- 13.4.47 The HSC can be defined by its dynamic nature and its ability to accommodate change. Perceptions of seascapes are also dynamic and subject to the public awareness, time, and place. The intertidal marine zones are ever-changing due to physical processes such as currents, tidal range, and sediment mobility. Considering this dynamism and the multi-dimensions defined by the HSC, people create complex spatial relationships within and across all marine levels, which is reflected within sites of cultural activity and their material imprints.
- 13.4.48 Potential changes to the HSC are expressed as a narrative description of the seascape character, how it is perceived by the public, and how these perceptions could be affected by the Project, which may or may not be considered important from a historic perspective.
- 13.4.49 The HSC regards the historic dimension of the present day seascape and considers the added effect of the Project within the multiple dimensions of the marine environment (sub seafloor, seafloor, water column, sea surface, coastal land and previous historic character) in combination with the existing activity within the Broad Historic Character types (Navigation, Industry, Fishing, Port and Docks, Coastal Infrastructure, Communications, Military, Settlements, Recreation, Cultural Topography, Woodland, Enclosed Land and Unimproved Land) as further detailed in Volume 2, Appendix 13.1, and summarised below.
- 13.4.50 Within the coastal and conflated level, character types include Navigation, Industry, Fishing, Port and Docks, Coastal Infrastructure, Communications, Military, Settlements, Recreation, Cultural Topography, Woodland, Enclosed Land and Unimproved Land (Figure 13.3). In this area the activities are dominated by Navigation, Industry, Fishing and Military character types. Activities on the coast are varied and most easily perceived. The perception of the character types within the coastal and conflated level is not assessed to change following the development of the Project. This is discussed further in Navigation, Industry, Fishing, Port and Docks, Coastal Infrastructure, Communications, Military, Settlements, Recreation, Cultural Topography, Woodland, Enclosed Land and Unimproved Land.
- 13.4.51 Within the sea surface and water column, character types include Navigation, Industry, Fishing, Military and Recreation (Figure 13.4 and Figure 13.5). Activities on the sea surface and water column are dominated by modern and historic fishing areas. The sea surface also comprises offshore infrastructure such as renewables, gas, oil, navigational markers, and ocean survey equipment. The perception of the water column and sea surface regarding Navigation and Industry is likely to be impacted by the Project following construction due to the presence of navigational aids and the visual impact of the WTGs. This is discussed further in Volume 1, Chapter 17.

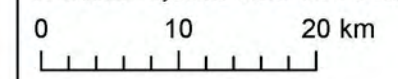
- 13.4.52 Within the seafloor and sub seafloor, character types include Navigation, Industry, Fishing, Communications, Military and Cultural Topography (Figure 13.6 and Figure 13.7). Activities on the seafloor and sub seafloor are dominated by Fishing and Cultural Topography. The sub seafloor and seafloor are less likely to enter the perceptions of the public due to their remoteness compared with other dimensions and the perception of use within these levels is often peripheral rather than from participation. The perception of Cultural Topography may be positively improved with an increase in understanding and awareness of palaeolandscapes, peat deposits, as well as artefacts and wrecks identified in the geophysical surveys and forthcoming geotechnical surveys undertaken by the Project. The impact on marine archaeological and cultural heritage receptors is further discussed in Section 13.9.
- 13.4.53 The value and perception of the Broad Historic Character types include the increased attention of the wider public to modern aquaculture and the benefits and disadvantages of renewable energy, subsea communication cables and marine global trading. People's perception of the sea and its value also include the biodiversity, the archaeological potential, and fishing and transport heritage.



- Legend**
- Array Area
  - Offshore Export Cable Corridor
  - Marine Archaeology Study Area
  - ORCP Search Area
- Type
- Navigation
  - Industry
  - Fishing
  - Ports and Docks
  - Coastal Infrastructure
  - Communications
  - Military
  - Settlements
  - Recreation
  - Cultural Topography
  - Woodland
  - Enclosed Land
  - Unimproved Land



Coordinate System: WGS 1984 UTM Zone 31N



Scale: 1:550,000

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Historic Seascape Characterisation of the Coastal Level

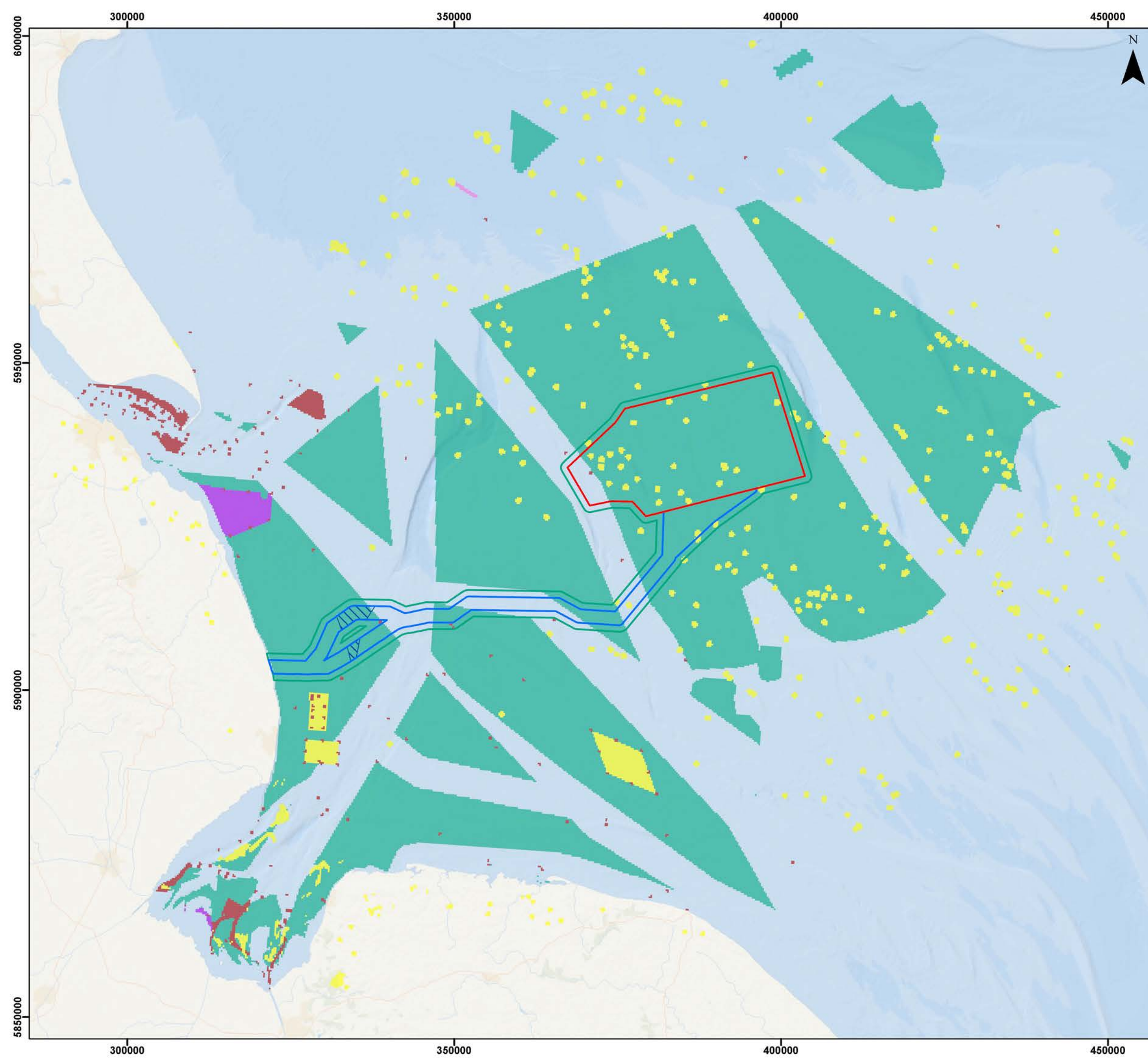
Figure 13.3



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World Ocean Base: OceanWise,  
Esri, GEBCO, DeLorme,  
NaturalVue



**Legend**

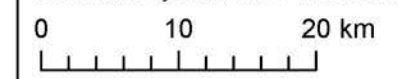
- Array Area
- Offshore Export Cable Corridor
- Marine Archaeology Study Area
- ORCP Search Area

Type

- Navigation
- Industry
- Fishing
- Military
- Recreation



Coordinate System: WGS 1984 UTM Zone 31N



Scale: 1:550,000

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Historic Seascape Characterisation of the Sea Surface Level

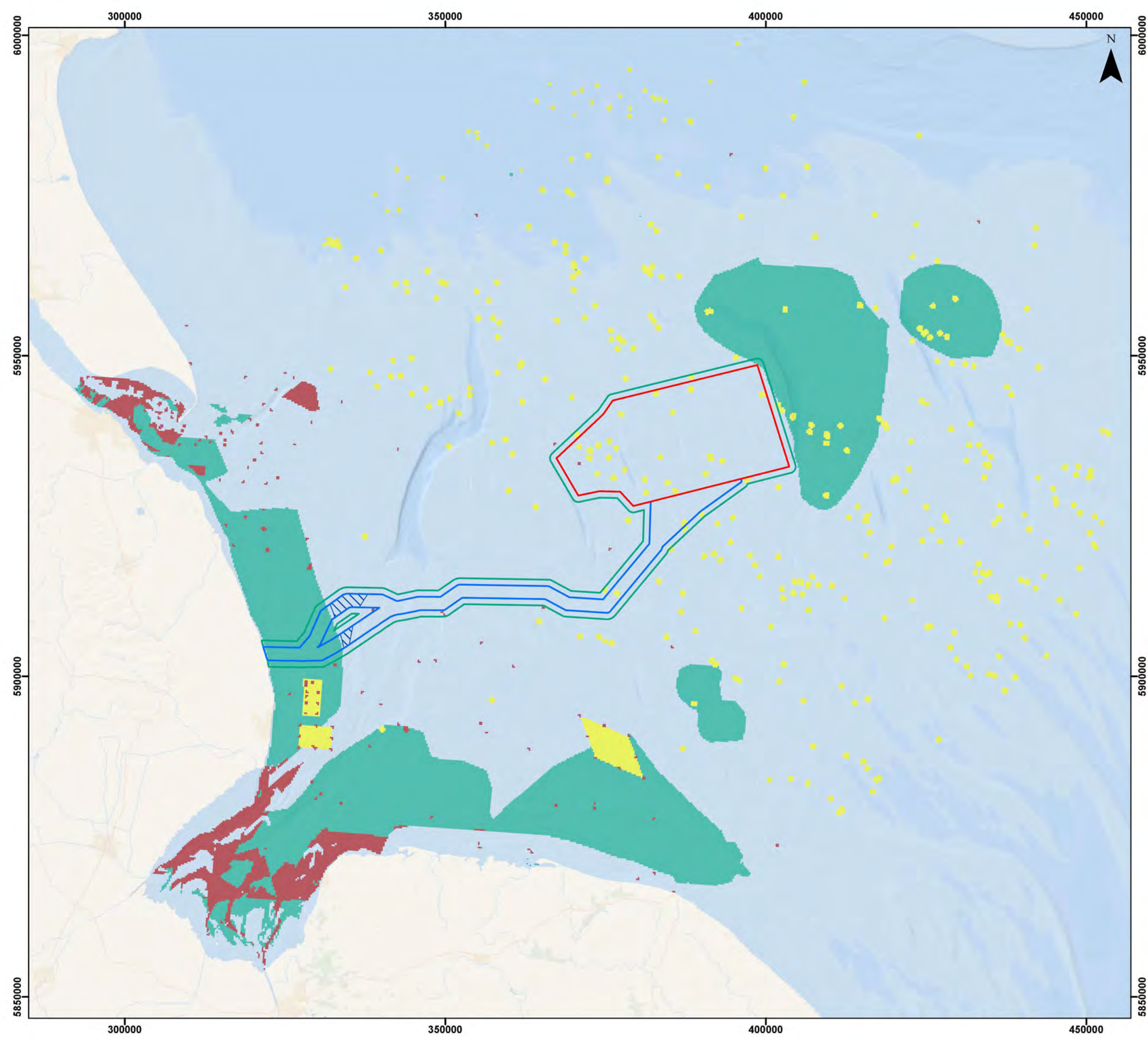
Figure 13.4



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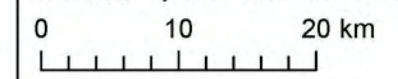
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 Esri, GEBCO, DeLorme,  
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- Legend**
- Array Area
  - Offshore Export Cable Corridor
  - Marine Archaeology Study Area
  - ORCP Search Area
- Type
- Navigation
  - Industry
  - Fishing
  - Military



Coordinate System: WGS 1984 UTM Zone 31N



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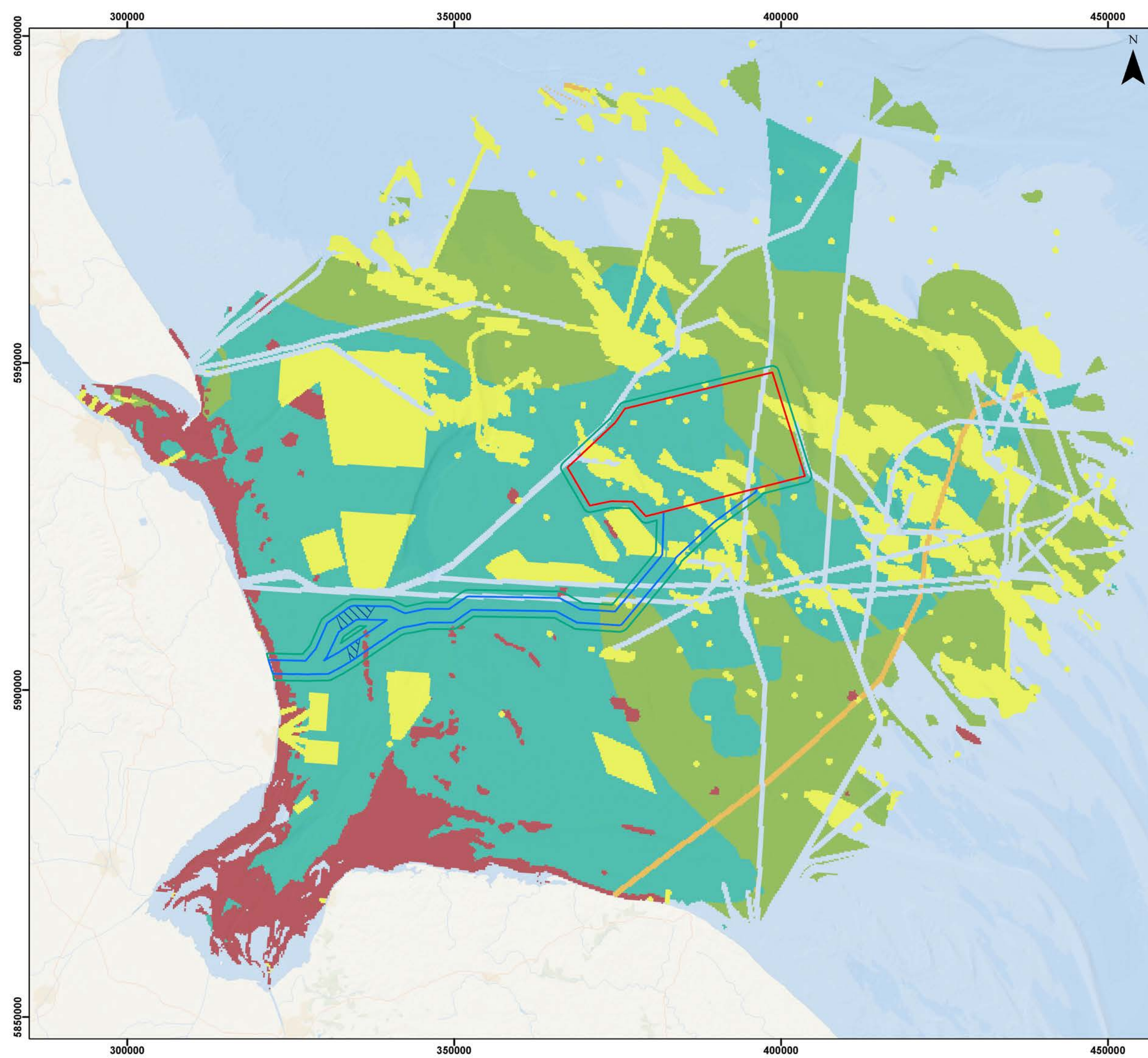
Historic Seascape Characterisation of the Water Column Level

Figure 13.5



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**Legend**

- Array Area
- Offshore Export Cable Corridor
- Marine Archaeology Study Area
- ORCP Search Area

Type

- Navigation
- Industry
- Fishing
- Communications
- Military
- Cultural Topography



Coordinate System: WGS 1984 UTM Zone 31N

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Historic Seascape Characterisation of the Seafloor Level

Figure 13.6

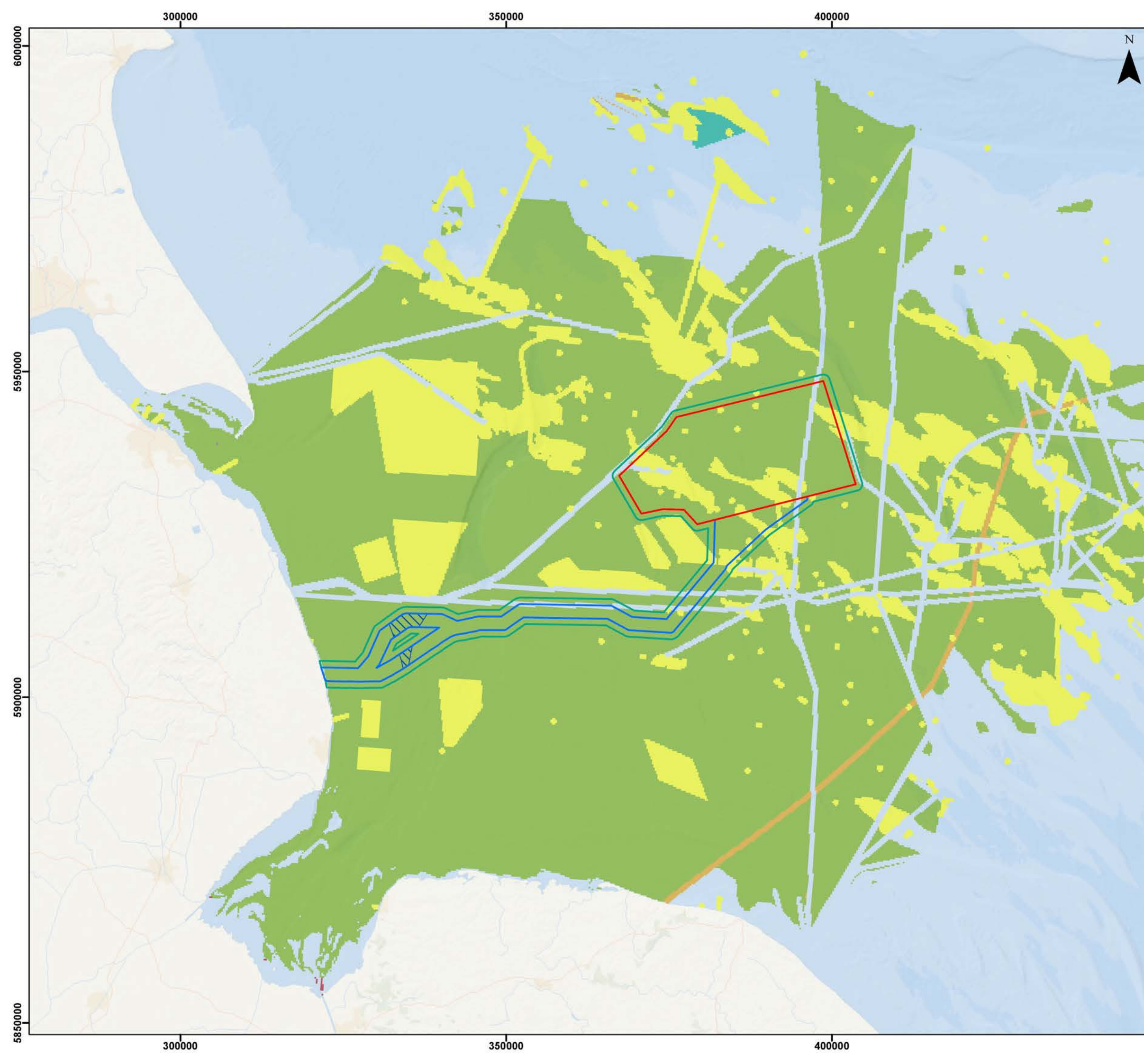


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**Legend**

- Array Area
- Offshore Export Cable Corridor
- Marine Archaeology Study Area
- ORCP Search Area

Type

- Navigation
- Industry
- Fishing
- Communications
- Military
- Cultural Topography



Coordinate System: WGS 1984 UTM Zone 31N

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Preliminary Environmental Information Report

Historic Seascape Characterisation of the Sub Seafloor Level

Figure 13.7



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## Future Baseline

- 13.4.54 Should the Project not go ahead, the existing environment, outlined above, is expected to remain relatively unaltered over the next 50-100 years. However, there are a number of proposed and active infrastructure projects planned in the vicinity (see Table 13.19) that have the potential to cause adverse, direct impacts on marine archaeological and cultural heritage receptors or contribute with beneficial impacts such as large-scale enhanced understanding of the archaeological resource through large area geophysical and geotechnical survey data released to public domain or the enhanced knowledge of key characteristics, features or elements deriving from site-specific survey and investigations.
- 13.4.55 In the case of exposed metal or wooden wrecks and archaeological debris on the seabed, there would continue to be a slow degradation and erosion of material. Due to the mobile sediments in the area, shifting sands would cause marine archaeological and cultural heritage receptors to cyclically become exposed and reburied.
- 13.4.56 In the case of wrecks and other marine archaeological and cultural heritage receptors that are buried and protected from exposure, the rate of degradation would be slower.

## 13.5 Archaeological Assessment of Geophysical Data

- 13.5.1 The archaeological assessment of geophysical data of the array area and associated 1km buffer is presented below, and the results are summarised in Table 13.4. All geophysical anomalies have been cross-referenced with records of marine archaeological and cultural heritage receptors identified during the baseline assessment (see above). The definition of the archaeological potential of the anomalies is further defined in Volume 2, Appendix 13.1.
- 13.5.2 Shallow geophysical and Ultra-High Seismic (UHSR) data was collected across the array area and Offshore ECC. The assessment of the Offshore ECC is currently ongoing and therefore will not be included at this stage, but the full assessment will be presented in ES. The results of the geophysical assessment of the array area, however, are summarised below.
- 13.5.3 The data quality of the SSS, MBES and SBP was assessed as good, meaning suitable, clear data in which anomalies can be clearly identified and interpreted and which provides the highest probability for marine archaeological and cultural heritage receptors to be identified. The exception to this was the magnetometer (MAG) data, which was assessed as adequate, meaning data which has been moderately affected by conditions such as weather, sea state or background noise, in which anomalies can be seen but are difficult to identify and interpret. The definition of survey data quality for archaeological interpretation is further detailed in Section 2.4 of Volume 2, Appendix 13.1.

Table 13.4: Summary of Archaeological Anomalies within the Marine Archaeology Study Area Seen in the Geophysical Data

Number of Anomalies	Archaeological Potential
13	High
33	Medium
1,107	Low (excluding magnetic anomalies)
<b>1,153</b>	<b>Total</b>

## High Potential Anomalies

13.5.4 13 anomalies have been assessed as having High potential, as seen in SSS, MBES and MAG data, or correlating with recorded locations of wrecks.

The 13 anomalies with High archaeological potential are summarised below in Table 13.5 and further detailed in Volume 2, Appendix 13.1. Of the 13 anomalies summarised below, ten correlate with UKHO/NRHE/Lincolnshire HER records (Figure 13.2 and Figure 13.8).

Table 13.5: High Potential Anomalies Seen in Geophysical Data

MA ID	Geophysical ID	Description
MA0001	SSS: MA2007 MBES: MA4002 MAG: ID1120	Potential wreck debris seen in SSS as two linear reflectors measuring 13.5m and 10.7m, with additional debris visible on other lines; seen in MBES as a raised linear feature measuring 14 x 1.5m; magnetic return of 1340.36nT.
MA0002	SSS: MA2014 MBES: MA4004 MAG: ID1354	The remains of an uncharted wreck found during geophysical survey in 2022, seen in SSS as a strong linear reflector with extended shadow; seen in MBES as an ovate raised feature measuring 13 x 4m.; magnetic return of 695.56nT.
MA0003	SSS: MA2101 MBES: MA4030 MAG: ID1882	Wreck of an unknown vessel (UKHO9440), seen in SSS as an ovate hard reflector, apparent outline of a small wreck with small hard and linear reflectors seen in area surrounding it; seen in MBES as the outline of ovate raised feature measuring 35.5 x 5.5m with greater height seen at apparent stern of wreck, with a small, raised features 18m NW and 10m SE; magnetic return of 136.8nT.
MA0004	SSS: MA2102 MBES: MA4031	Debris from the unknown UKHO9440 wreck, seen in SSS as linear hard reflectors; seen in MBES as a raised feature measuring 2.5x5m.
MA0005	SSS: MA2220 MBES: MA4072 MAG: ID3686	Wreck of the <i>Basto</i> (UKHO9417), seen in SSS as an assemblage of linear hard reflectors, apparent scattered debris and sheathing of a large wreck; seen in the MBES as a long ovate raised feature measuring 55 x 8m with small, raised features in surrounding area; magnetic return of 4522.38nT (100m west, however there is currently a data gap for MAG data in area covering wreck).
MA0014	SSS: MA2126 MBES: MA4035	Obstruction (UKHO9441), seen in the SSS as a linear reflector and raised seabed, potential debris or seabed feature, and seen in the MBES as a raised feature measuring 3x2.5m with scour.
MA0017	MBES: MA4077	Obstruction (UKHO9424), seen in the MBES as a small feature with scour around it.
MA0018	MBES: MA4078	Unknown Wreck (UKHO9426), seen in the MBES as an ovate raised feature measuring 8.5m x 0.85m.
MA0020	MBES: MA4079	Obstruction (UKHO9429), seen in the MBES as a debris field, potential rock dump.

MA ID	Geophysical ID	Description
MA0022	MBES: MA4080	Obstruction (UKHO9443), seen in the MBES as a raised feature measuring 3.6x4.5m surrounded by scour.
MA0023	MBES: MA4081	Obstruction (UKHO9445), seen in the MBES as a small feature measuring 1.5m x 1.5m with scour.
MA0024	MAG: MA5680	Fisherman's Fastener (UKHO9482), with a magnetic return of 25.68nT (133.7m east).
MA0025	MAG: MA5016	Fisherman's Fastener (UKHO9483), with a magnetic return of 209.2nT (116m south).

## Medium Potential Anomalies

33 anomalies of Medium archaeological potential were identified in the geophysical data. These are summarised below in Table 13.6 (Figure 13.8). These anomalies did not correlate with any known UKHO/NRHE/Lincolnshire HER records but may represent debris associated with the recorded wrecks listed above.

Table 13.6: Medium Potential Anomalies Seen in Geophysical Data

MA ID	Geophysical ID	Description
MA0006	SSS: MA2027 MBES: MA4006	Potential anthropogenic assemblage or debris seen in SSS as an irregular reflector; seen in the MBES as a pair of raised features surrounded by scour.
MA0007	SSS: MA2028 MBES: MA4007 MAG: ID1369	Potential anthropogenic assemblage or debris seen in SSS as multiple linear and curvilinear reflectors; seen in the MBES as a raised feature measuring 6 x 2m; magnetic return of 14.4nT.
MA0008	SSS: MA2048	Potential wreck debris seen in the SSS as an angular reflector.
MA0009	SSS: MA2096 MBES: MA4027	Potential wreck material and debris seen in the SSS as complex hard reflectors and shadow; seen in the MBES as a raised feature measuring 3.5 x 1.5m.
MA0010	SSS: MA2099 MBES: MA4028	Potential wreck debris or a large boulder cluster, seen in the SSS as large hard reflectors and shadow; seen in the MBES as a pair of raised features in area measuring 6 x 2m.
MA0011	SSS: MA2103 MBES: MA4032	Potential wreck material seen in the SSS as curvilinear debris; seen in the MBES as a pair of raised linear features measuring 4.5 x 1.5m arranged perpendicular to each other with slight scour.
MA0012	SSS: MA2200 MBES: MA4065	Potential anthropogenic assemblage or concentrated debris seen in the SSS as multiple reflectors; seen in the MBES as a pair of small, raised features in scour measuring 6.5 x 4m.
MA0013	SSS: MA2218 MBES: MA4071	Potential wreck debris seen in the SSS as a complex assemblage of reflectors associated with the <i>Basto</i> (UKHO9417); seen in the MBES as a raised feature measuring 7.5 x 8.5m.

MA ID	Geophysical ID	Description
MA0027	MAG: MA5003	Magnetic anomaly with a magnetic return of 847nT.
MA0028	MAG: MA5005	Magnetic anomaly with a magnetic return of 724.87nT.
MA0031	MAG: MA5011	Magnetic anomaly with a magnetic return of 286.63nT.
MA0032	MBES: MA4082 MAG: MA5012	Magnetic anomaly seen in the MBES as a small feature measuring 1.5m x 0.5m with scour; magnetic return of 268.14nT.
MA0033	MAG: MA5013	Magnetic anomaly with a magnetic return of 249.8nT.
MA0034	MAG: MA5014	Magnetic anomaly with a magnetic return of 229.55nT.
MA0035	MAG: MA5015	Magnetic anomaly with a magnetic return of 222.3nT.
MA0038	MBES: MA4084 MAG: MA5020	Magnetic anomaly seen in the MBES as an area with many raised features, potential rock dump; magnetic return of 199.07nT.
MA0046	MAG: MA5028	Magnetic anomaly with a magnetic return of 159.94nT.
MA0047	MBES: MA4083 MAG: MA5030	Magnetic anomaly seen in the MBES as a small feature measuring 1.3m x 1.3m in scour; magnetic return of 148.43nT.
MA0048	MAG: MA5032	Magnetic anomaly with a magnetic return of 144.12nT.
MA0050	MAG: MA5034	Magnetic anomaly with a magnetic return of 139.97nT.
MA0051	MAG: MA5036	Magnetic anomaly with a magnetic return of 135.24nT.
MA0056	MBES: MA4085 MAG: MA5042	Magnetic anomaly seen in the MBES as a small feature measuring 1m x 1m; magnetic return of 126.52nT.
MA0057	MAG: MA5043	Magnetic anomaly with a magnetic return of 125.74nT.
MA0058	MAG: MA5044	Magnetic anomaly with a magnetic return of 125.2nT.
MA0063	MAG: MA5049	Magnetic anomaly with a magnetic return of 120.71nT.
MA0067	MAG: MA5053	Magnetic anomaly with a magnetic return of 117.2nT.
MA0069	MBES: MA4086 MAG: MA5055	Magnetic anomaly seen in the MBES as two small reflectors in scour one located 10 m to the NE and one located 26m to the SE; magnetic return of 112.64nT.
MA0071	MAG: MA5057	Magnetic anomaly with a magnetic return of 109.98nT.
MA0074	MAG: MA5060	Magnetic anomaly with a magnetic return of 108.75nT.
MA0082	MAG: MA5068	Magnetic anomaly with a magnetic return of 105.43nT.
MA0083	MAG: MA5069	Magnetic anomaly with a magnetic return of 105.37nT.
MA0084	MAG: MA5070	Magnetic anomaly with a magnetic return of 104.12nT.
MA0085	MAG: MA5071	Magnetic anomaly with a magnetic return of 103.67nT.

## Low Potential Anomalies

- 13.5.5 1,107 anomalies of Low archaeological potential were identified in the geophysical data. These anomalies have been characterised as a mixture of small features, often boulder-like, or isolated linear features and modern debris such as rope, chain, fishing gear or lost equipment.
- 13.5.6 Magnetic anomalies between 5nT and 100nT with no corresponding records or research resources and no corresponding anomalies in any of the assessed geophysical datasets have also been assigned low archaeological potential.

400000



### Legend

- ▭ Array Area
- ▭ Offshore Export Cable Corridor
- ▭ Marine Archaeology Study Area
- Archaeological Potential
- High (13)
- Medium (33)
- Low (1107)

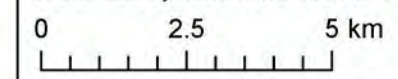
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Coordinate System: WGS 1984 UTM Zone 31N



Scale: 1:130,000

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Geophysical Anomalies of Archaeological Potential

Figure 13.8



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## 13.6 Ge archaeological Assessment of Geophysical Data

- 13.6.1 The nature, extent, and distribution of preserved palaeolandscapes is being mapped and understood as survey methods are developing. The contextual relationship between channels, micro and macro fauna, submerged forests, and identified and potential sites, both in the marine zone and terrestrial area, are becoming more apparent as the volume of data is increasing and this should continue to be assessed as per the phased approach outlined in Offshore Geotechnical Investigation and Historic Environment Analysis (COWRIE, 2011).
- 13.6.2 The assessment of sub-bottom data shows that the seafloor morphology is made up of bedforms including, mega ripples, sand waves and sandbanks and deeper areas such as bathymetric depressions, also known as tunnel valleys. The seafloor morphology is likely to be the result of the flow of currents and tide movements.
- 13.6.3 From a geoarchaeological point of view, the sediments identified include Holocene gravelly sand, silt, and clays (Unit A) and Quaternary sediments, Unit B, Unit C and Unit D.
- 13.6.4 Further, a clear system of palaeochannels were identified. The palaeochannels are cut into the base of Unit A and seen incising the underlying Quaternary sediments, Unit B and Unit C. No blanking or indication of peat or shallow gas was noted within the array area.
- 13.6.5 The paleochannel systems are generally stretching across the marine archaeology study area in a north northwest to south-southeast direction and can reach depths up to 32m Below Seafloor (BSF) as illustrated on Figure 13.9.
- 13.6.6 The outline deposit model presented in Table 13.7 will be further refined following a phased geoarchaeological assessment as detailed in the Outline Marine WSI (see document 8.5).

Table 13.7: Outline Deposit Model

Unit	Stratigraphy	Description	Epoch	Geoarchaeological potential
Unit A	Holocene mobile sands	Mobile loose to medium gravelly sand overlying stiff CLAY with silt and Sand, in places. Loose to medium dense gravelly sand overlying stiff CLAY with silt and sand	Holocene	Sedimentary low geoarchaeological potential, however archaeological artefacts may be located within these sediments.
Unit B	Bolders Bank formation	Stiff CLAY with silt and sand with inclusions of chalk, mudstone and/ or sandstone.	Quaternary Isotope Stage 3-2	Potential to contain material of geoarchaeological interest
Unit C	Bolders Bank formation	Medium dense to dense SAND and gravels with clay and silt	Quaternary, Isotope Stage 3-2	Potential to contain material of geoarchaeological interest
Unit D	Swarte bank	Stiff to very stiff CLAY	Quaternary Marine Isotope Stage 12	Potential to contain material of geoarchaeological interest

Unit	Stratigraphy	Description	Epoch	Gearchaeological potential
Unit E	Bedrock formation	Probable Mudstone	Mesozoic	Not of geoarchaeological potential



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- Legend**
- ▭ Array Area
  - ▭ Offshore Export Cable Corridor
  - ▭ Marine Archaeology Study Area
  - ▭ Channels with Geoarchaeological Potential
  - ▭ NSPP Lakes
  - ▭ NSPP Fluvial Channels

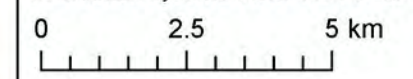
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Records and Geoarchaeological Features within the Array Area

Figure 13.9



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## 13.7 Basis of Assessment

### Scope of the Assessment

- 13.7.1 The array area of the Project will cover approximately 500km<sup>2</sup>. The Offshore ECC runs west from the array area and covers approximately 233km<sup>2</sup>, up to and including the intertidal zone as defined as ending at MHWS. The landfall will be made between Sandilands and Chapel St Leonards.
- 13.7.2 As outlined in Section 13.4 the marine archaeology study area includes a 1km buffer around the array area and Offshore ECC up to MHWS (Figure 13.1).

### Impacts Scoped In for Assessment

- 13.7.3 The following impacts have been scoped into this assessment:
- Construction:
    - Impact 1: Direct impact of sediment removal containing undisturbed archaeological contexts during seabed preparation ahead of construction activities leading to the total or partial loss of marine archaeological and cultural heritage receptors;
    - Impact 2: Direct impact by penetration of piling foundations leading to the total or partial loss of marine archaeological and cultural heritage receptors;
    - Impact 3: Direct impact by compression of piling foundations leading to the total or partial loss of marine archaeological and cultural heritage receptors;
    - Impact 4: Direct impact by penetration leading to disturbance of stratigraphic context containing archaeological material from the combined weight of the WTGs or Offshore Platforms leading to total or partial loss of marine archaeological and cultural heritage receptors;
    - Impact 5: Direct impact by compression leading to disturbance of stratigraphic context containing archaeological material from the combined weight of the WTGs or Offshore Platforms leading to total or partial loss of marine archaeological and cultural heritage receptors;
    - Impact 6: Direct impact by penetration of cable laying operations leading to total or partial loss of marine archaeological and cultural heritage receptors;
    - Impact 7: Direct impacts by compression of cable laying operations leading to total or partial loss of marine archaeological and cultural heritage receptors;
    - Impact 8: Direct impacts by penetration effects of jack-up barges and anchoring of construction vessels during various activities leading to total or partial loss of marine archaeological and cultural heritage receptors;
    - Impact 9: Direct impacts by compression effects of jack-up barges and anchoring of construction vessels during various activities leading to total or partial loss of marine archaeological and cultural heritage receptors;

- Impact 10: Indirect impacts causing disturbance of sediment containing potential marine archaeological and cultural heritage receptors (material and context) leading to the exposure of those marine archaeological and cultural heritage receptors to natural, chemical, or biological processes and indirectly causing or accelerating their loss; and
- Impact 11: Indirect impacts causing changes to the Historic Seascape Character as a result of construction and survey vessel activities and the addition of cables, foundations, Offshore Platforms and WTGs indirectly leading to changes to the perceived historic use of the seascape during the construction phase.
- Operation and maintenance:
  - Impact 12: Direct impact by penetration leading to disturbance effects of maintenance activities at WTGs, Offshore Platforms and along all cables leading to total or partial loss of marine archaeological and cultural heritage receptors;
  - Impact 13: Direct impact by compression leading to disturbance effects of maintenance activities at WTGs, Offshore Platforms and along all cables leading to total or partial loss of marine archaeological and cultural heritage receptors;
  - Impact 14: Direct impacts by penetration effects of jack-up barges and anchoring of O&M vessels during various activities at WTGs, Offshore Platforms and along all cables leading to total or partial loss of marine archaeological and cultural heritage receptors;
  - Impact 15: Direct impacts by compression effects of jack-up barges and anchoring of O&M vessels during various activities at WTGs, Offshore Platforms and along all cables leading to total or partial loss of marine archaeological and cultural heritage receptors.
  - Impact 16: Indirect impacts causing disturbance of sediment containing potential marine archaeological and cultural heritage receptors during maintenance activities leading to the exposure of those marine archaeological and cultural heritage receptors to natural, chemical, or biological processes and indirectly causing or accelerating their loss;
  - Impact 17: Indirect impacts causing scour effects as a result of the presence of WTGs, Offshore Platforms and the exposure of cables or the use of cable protection measures leading to the exposure of those marine archaeological and cultural heritage receptors to natural, chemical or biological processes causing or accelerating their loss; and
  - Impact 18: Indirect impacts causing changes to the Historic Seascape Character as a result of O&M vessel activities and the presence of the completed windfarm indirectly leading to changes to the perceived historic use of the seascape during the operation phase.

- Decommissioning:
  - Impact 19: Direct impacts by penetration effects of jack-up barges and anchoring of decommissioning vessels leading to total or partial loss of marine archaeological and cultural heritage receptors;
  - Impact 20: Direct impacts by compression effects of jack-up barges and anchoring of decommissioning vessels leading to total or partial loss of marine archaeological and cultural heritage receptors;
  - Impact 21: Indirect impacts creating draw-down of sediment into voids left by removed WTG foundations or Offshore Platforms leading to loss of sediment or destabilisation of archaeological sites and contexts indirectly exposing marine archaeological and cultural heritage receptors to natural, chemical, or biological processes and causing or accelerating loss of the same; and
  - Impact 22: Indirect impacts causing changes to the Historic Seascape Character as a result of decommissioning activities and the removal of windfarm components indirectly leading to changes to the perceived historic use of the seascape during the decommissioning phase.

### Impacts Scoped Out for Assessment

- 13.7.4 In line with the Scoping Opinion (The Inspectorate, 2022), and based on the receiving environment, expected parameters of the Project (Volume 1, Chapter 3), and expected scale of impacts/potential for a pathway for effect on the environment, the only impact to be scoped out of the assessment is potential transboundary effects.
- 13.7.5 It should be noted that, while all potential transboundary impacts are proposed to be scoped out, should wrecks or aircrafts of non-British nationality be affected by the Project, further archaeological investigations may be warranted and in line with the procedures that will be outlined in the Outline Marine WSI (see document 8.5). Further discussions on protection should include the relevant organisation in the country of relevance. There is also a potential for paleochannels and palaeolandscapes within the North Sea to stretch beyond international boundaries. The impact on submerged landscapes in those cases is expected to be local within the Project and will be mitigated and offset by archaeological assessments of geotechnical data.

### Realistic Worst Case Scenario

- 13.7.6 The following section identified the MDS in environmental terms, defined by the project design envelope. This is to establish the maximum potential impact associated with the Project on marine archaeological and cultural heritage receptors. The engineering parameters of the project design envelope are defined in Volume 1, Chapter 3.
- 13.7.7 The maximum impact table (Table 13.8) assumes:
- Up to 93 WTGs and associated foundations;
  - Up to four OSSs and associated foundations;
  - Up to two ORCPs and associated foundations;
  - One accommodation platform;

- The use of monopile, gravity base structure (GBS), pin piled jacket, and/or suction bucket jacket foundations for WTGs, ORCP, accommodation platforms and OSSs;
- The use of scour protection at foundations and cable protection;
- 351km maximum length of inter-array cables;
- Maximum length of offshore interlink cables of 123.75km;
- Up to four offshore export cables may be installed with a maximum length per cable of 128.7km and a total length of 514.8km;
- For decommissioning the inter-array, Interlink and export cables, scour and cable protection is assumed to be left *in situ*; and
- For decommissioning the Project will consider the best environmental option at the time. For the purpose of this impact assessment, removal of structures is expected to involve the approximate reverse of the installation process.

13.7.8 The Design Envelope approach has been adopted to include sufficient flexibility within the project design to allow for further refinement during detailed design assuming the DCO application is successful. Therefore, parameters and options are presented here as well as in Volume 1, Chapter 3. Following PEIR submission and consultation, the design will be refined prior to the consent application and submission. The final design will be developed from within the parameters stated after consent has been granted.

Table 13.8: Maximum Design Scenario for Marine and Intertidal Archaeology for the Project Alone

Potential Effect	Maximum Design Scenario Assessed	Justification
<b>Construction</b>		
Impact 1: Direct impact of sediment removal containing undisturbed archaeological contexts during seabed preparation ahead of construction activities leading to the total or partial loss of marine archaeological and cultural heritage receptors.	<p>Total maximum impact of seabed preparation</p> <ul style="list-style-type: none"> <li>93 WTG foundations (suction bucket jacket) up to 8,200m<sup>2</sup> per foundation total impact, 762,600m<sup>2</sup></li> <li>Seven OSS foundations (4 OSS, 2 ORCP and 1 accommodation platform) (suction bucket jacket) up to 19,600m<sup>2</sup> per foundation total impact, 137,200m<sup>2</sup></li> </ul> <p>Maximum seabed preparation spoil volume</p> <ul style="list-style-type: none"> <li>93 WTG Foundations (GBS) up to 36,300m<sup>3</sup> per foundation, total impact 3,375,900m<sup>3</sup></li> <li>Seven OSS foundations (GSB) up to 48,500m<sup>3</sup> per foundation, total impact 339,500m<sup>3</sup></li> </ul> <p>Total volume of sediment disturbed by sand wave clearance</p> <ul style="list-style-type: none"> <li>Array cables; 10,108,800m<sup>3</sup> m<sup>3</sup></li> <li>Interlink cables 3,564,000m<sup>3</sup></li> <li>Offshore export cables (array area) 1,572,480 m<sup>3</sup></li> <li>Offshore export cables (Offshore ECC) 5,840,640m<sup>3</sup></li> </ul> <p>Maximum volume of sand wave clearance spoil</p> <ul style="list-style-type: none"> <li>Array area; 15,245,280m<sup>3</sup></li> <li>Offshore export corridor; 5,840,640m<sup>3</sup></li> </ul>	The maximum assessment assumptions represent the maximum seabed disturbance by sediment removal that could potentially affect marine archaeological and cultural heritage receptors located within the proposed development.
Impact 2: Direct impact by penetration of piling foundations leading to the total or partial loss of	<p>Total maximum impact of seabed preparation</p> <ul style="list-style-type: none"> <li>93 WTG foundations (suction bucket jacket) up to 8,200m<sup>2</sup> per foundation total impact, 762,600m<sup>2</sup></li> </ul>	The maximum assessment assumptions represent the maximum disturbance by piling that could potentially affect marine archaeological and cultural

Potential Effect	Maximum Design Scenario Assessed	Justification
marine archaeological and cultural heritage receptors.	<ul style="list-style-type: none"> <li>▪ Seven OSS foundations (suction bucket jacket) up to 19,600m<sup>2</sup> per foundation total impact, 137,200m<sup>2</sup></li> </ul> Maximum scour protection volume <ul style="list-style-type: none"> <li>▪ WTG foundations (GBS), per foundation 37,500m<sup>3</sup></li> <li>▪ OSS foundations (suction bucket jacket), per foundation 51,150m<sup>3</sup></li> </ul>	heritage receptors located within the proposed development.
Impact 3: Direct impact by compression of piling foundations leading to the total or partial loss of marine archaeological and cultural heritage receptors.	Total maximum impact of seabed preparation <ul style="list-style-type: none"> <li>▪ 93 WTG foundations (suction bucket jacket) up to 8,200m<sup>2</sup> per foundation total impact, 762.600m<sup>2</sup></li> <li>▪ Seven OSS foundations (suction bucket jacket) up to 19,600m<sup>2</sup> per foundation total impact, 137,200m<sup>2</sup></li> </ul> Maximum scour protection volume <ul style="list-style-type: none"> <li>▪ WTG foundations (GBS), per foundation 37,500m<sup>3</sup></li> <li>▪ OSS foundations (suction bucket jacket), per foundation 51,150m<sup>3</sup></li> </ul>	<p>The maximum assessment assumptions represent the maximum disturbance by piling that could potentially affect marine archaeological and cultural heritage receptors located within the proposed development.</p> <p>It is anticipated that the maximum pressure of the structures (WTG and OSS) will be assessed within the ES. This assessment is not included within PEIR.</p>
Impact 4: Direct impact by penetration leading to disturbance of stratigraphic context containing archaeological material from the combined weight of the WTGs or Offshore Platforms leading to total or partial loss of marine archaeological and cultural heritage receptors.	Total maximum impact of seabed preparation <ul style="list-style-type: none"> <li>▪ 93 WTG foundations (suction bucket jacket) up to 8,200m<sup>2</sup> per foundation total impact, 762,600m<sup>2</sup></li> <li>▪ Seven OSS foundations (suction bucket jacket) up to 19,600m<sup>2</sup> per foundation total impact, 137,200m<sup>2</sup></li> </ul> Maximum scour protection volume <ul style="list-style-type: none"> <li>▪ WTG foundations (GBS), per foundation 37,500m<sup>3</sup></li> <li>▪ OSS foundations (suction bucket jacket), per foundation 51,150m<sup>3</sup></li> </ul> Maximum pressure of structures <ul style="list-style-type: none"> <li>▪ WTG</li> <li>▪ OSS</li> </ul>	<p>The maximum assessment assumptions represent the maximum disturbance by combined weight that could potentially affect marine archaeological and cultural heritage receptors located within the proposed development.</p> <p>It is anticipated that the maximum pressure of the structures (WTG and OSS) will be assessed within the ES. This assessment is not included within PEIR.</p>

Potential Effect	Maximum Design Scenario Assessed	Justification
<p>Impact 5: Direct impact by compression leading to disturbance of stratigraphic context containing archaeological material from the combined weight of the WTGs or Offshore Platforms leading to total or partial loss of marine archaeological and cultural heritage receptors.</p>	<p>Maximum pressure of structures</p> <ul style="list-style-type: none"> <li>▪ WTG</li> <li>▪ OSS</li> </ul>	<p>The maximum assessment assumptions represent the maximum disturbance by combined weight that could potentially affect marine archaeological and cultural heritage receptors located within the proposed development.</p> <p>It is anticipated that the maximum pressure of the structures (WTG and OSS) will be assessed within the ES. This assessment is not included within PEIR.</p>
<p>Impact 6: Direct impact by penetration of cable laying operations leading to total or partial loss of marine archaeological and cultural heritage receptors.</p>	<p>Cable installation:</p> <ul style="list-style-type: none"> <li>▪ 351km maximum length of inter-array cables</li> <li>▪ Maximum length of offshore interlink cables, 123.75km</li> <li>▪ Up to four offshore export cables may be installed with a maximum length per cable of 128.7km and a total length of 514.8km;</li> </ul> <p>Total volume of sediment disturbed by sand wave clearance:</p> <ul style="list-style-type: none"> <li>▪ Array cables; 10,108,800m<sup>3</sup></li> <li>▪ Interlink cables 3,564,000m<sup>3</sup></li> <li>▪ Offshore export cables (array area) 1,572,480 m<sup>3</sup></li> <li>▪ Offshore export cables (Offshore ECC) 5,840,640m<sup>3</sup></li> </ul> <p>Maximum width of seabed disturbed during installation:</p> <ul style="list-style-type: none"> <li>▪ Array cables 30m</li> <li>▪ Offshore export cables 30m</li> </ul>	<p>The maximum assessment assumptions represent the maximum disturbance by cable laying activities that could potentially affect marine archaeological and cultural heritage receptors located within the proposed development.</p>



Potential Effect	Maximum Design Scenario Assessed	Justification
	<p>Cable burial depth:</p> <ul style="list-style-type: none"> <li>▪ Array cables 3m</li> <li>▪ Offshore export cables 3m</li> </ul> <p>Maximum volume of sand wave clearance spoil:</p> <ul style="list-style-type: none"> <li>▪ Array area; 15,245,280m<sup>3</sup></li> </ul> <p>Offshore export corridor; 5,840,640m<sup>3</sup></p> <p>Total area of seabed disturbed by Pre-Lay Grapnel Run:</p> <ul style="list-style-type: none"> <li>▪ Expected to be within the same footprint as the sand wave and boulder clearance</li> </ul> <p>Maximum area of seabed covered by cable protection:</p> <ul style="list-style-type: none"> <li>▪ Operational rock placement would not exceed 25% of the estimated rock volume and would occur in areas where rock placement was in place (i.e. no new areas of cable protection above what is deployed during construction)</li> <li>▪ Cable protection area, inter-array and Interlink cables, 1,899,000m<sup>2</sup></li> <li>▪ Cable protection area offshore export cable, 2,059,200m<sup>2</sup></li> </ul> <p>Rock dumping volume for cable protection:</p> <ul style="list-style-type: none"> <li>▪ Inter-array and Interlink cables, 2,136,375m<sup>3</sup></li> <li>▪ Offshore export cable, 2,316,000m<sup>3</sup></li> </ul> <p>Total area of seabed disturbed by boulder clearance:</p> <ul style="list-style-type: none"> <li>▪ Array area, 16.6km<sup>2</sup></li> <li>▪ Offshore ECC 7.2km<sup>2</sup></li> </ul>	

Potential Effect	Maximum Design Scenario Assessed	Justification
	Cable/pipe crossings: rock berm: <ul style="list-style-type: none"> <li>▪ Array cables, 180,000m<sup>3</sup></li> <li>▪ Interlink cables, 108,000m<sup>3</sup></li> <li>▪ Export cables, 180,000m<sup>3</sup></li> </ul> Up to six HDD exit pits, maximum trenchless exit pit excavated material volume is expected to be 5,000m <sup>3</sup> .	
Impact 7: Direct impacts by compression of cable laying operations leading to total or partial loss of marine archaeological and cultural heritage receptors.	Cable installation <ul style="list-style-type: none"> <li>▪ 351km maximum length of inter-array cables;</li> <li>▪ Maximum length of offshore interlink cables, 123.75km</li> <li>▪ Up to four offshore export cables may be installed with a maximum length per cable of 128.7km and a total length of 514.8km;</li> </ul> Total volume of sediment disturbed by sand wave clearance: <ul style="list-style-type: none"> <li>▪ Array cables; 10,108,800m<sup>3</sup> m<sup>3</sup></li> <li>▪ Interlink cables 3,564,000m<sup>3</sup></li> <li>▪ Offshore export cables (array area) 1,572,480 m<sup>3</sup></li> <li>▪ Offshore export cables (Offshore ECC) 5,840,640m<sup>3</sup></li> </ul> Maximum width of seabed disturbed during installation: <ul style="list-style-type: none"> <li>▪ Array cables 30m</li> <li>▪ Offshore export cables 30m</li> </ul> Cable burial depth: <ul style="list-style-type: none"> <li>▪ Array cables 3m</li> <li>▪ Offshore export cables 3m</li> </ul>	The maximum assessment assumptions represent the maximum disturbance by cable laying activities that could potentially affect marine archaeological and cultural heritage receptors located within the proposed development.

Potential Effect	Maximum Design Scenario Assessed	Justification
	<p>Maximum volume of sand wave clearance spoil:</p> <ul style="list-style-type: none"> <li>▪ Array area; 15,245,280m<sup>3</sup></li> </ul> <p>Offshore export corridor; 5,840,640m<sup>3</sup>            Total area of seabed disturbed by Pre-Lay Grapnel Run            Expected to be within the same footprint as the sand wave and boulder clearance</p> <p>Maximum area of seabed covered by cable protection            Operational rock placement would not exceed 25% of the estimated rock volume and would occur in areas where rock placement was in place (i.e. no new areas of cable protection above what is deployed during construction):</p> <ul style="list-style-type: none"> <li>▪ Cable protection area, inter-array and Interlink cables, 1,899,000m<sup>2</sup></li> <li>▪ Cable protection area offshore export cable, 2,059,200m<sup>2</sup></li> <li>▪ Rock dumping volume for cable protection, inter-array and Interlink cables 2,136,375m<sup>3</sup></li> <li>▪ Rock dumping volume for cable protection, Offshore export cable, 59,459,400m<sup>3</sup></li> </ul> <p>Total area of seabed disturbed by boulder clearance:</p> <ul style="list-style-type: none"> <li>▪ Array area, 16.6km<sup>2</sup></li> <li>▪ Offshore ECC 7.2km<sup>2</sup></li> </ul> <p>Cable/pipe crossings: rock berm:</p> <ul style="list-style-type: none"> <li>▪ Array cables, 180,000m<sup>3</sup></li> <li>▪ Interlink cables, 108,000m<sup>3</sup></li> </ul>	

Potential Effect	Maximum Design Scenario Assessed	Justification
	<ul style="list-style-type: none"> <li>▪ Export cables, 180,000m<sup>3</sup></li> </ul> Up to six HDD exit pits, maximum trenchless exit pit excavated material volume is expected to be 5,000m <sup>3</sup> .	
Impact 8: Direct impacts by penetration effects of jack-up barges and anchoring of construction vessels during various activities leading to total or partial loss of marine archaeological and cultural heritage receptors.	Maximum volume of sediment disturbed for all jack-up operations during construction is assuming up to six legs with an average spudcan area of 250m <sup>2</sup> per foot, a maximum of 475 operations totalling a maximum disturbance area of 1,500m <sup>2</sup> per jack-up operation and a total of 712,500m <sup>2</sup>  Total impact of anchor footprints during construction: <ul style="list-style-type: none"> <li>▪ WTG, 800m<sup>2</sup> per operation (Anchor dimension of 10x10m, eight anchors per jack-up, total of 380,000m<sup>2</sup>)</li> </ul>	The maximum assessment assumptions represent the maximum disturbance by vessel activities that could potentially affect marine archaeological and cultural heritage receptors located within the proposed development.
Impact 9: Direct impacts by compression effects of jack-up barges and anchoring of construction vessels during various activities leading to total or partial loss of marine archaeological and cultural heritage receptors.	Maximum volume of sediment disturbed for all jack-up operations during construction is assuming up to six legs with an average spudcan area of 250m <sup>2</sup> per foot, a maximum of 475 operations totalling a maximum disturbance area of 1,500m <sup>2</sup> per jack-up operation and a total of 712,500m <sup>2</sup>  Total impact of anchor footprints during construction: <ul style="list-style-type: none"> <li>▪ WTG, 800m<sup>2</sup> per operation (Anchor dimension of 10x10m, eight anchors per jack-up, total of 380,000m<sup>2</sup>)</li> </ul>	The maximum assessment assumptions represent the maximum disturbance by combined pressure that could potentially affect marine archaeological and cultural heritage receptors located within the proposed development.
Impact 10: Indirect impacts causing disturbance of sediment containing potential marine archaeological and cultural heritage	Total maximum impact of seabed preparation: <ul style="list-style-type: none"> <li>▪ 93 WTG foundations (suction bucket jacket) up to 8,200m<sup>2</sup> per foundation total impact, 762,600m<sup>2</sup></li> <li>▪ Seven OSS foundations (suction bucket jacket) up to 19,600m<sup>2</sup> per foundation total impact, 137,200m<sup>2</sup></li> </ul>	The maximum assessment assumptions represent the maximum disturbance by sediment disturbance that could potentially affect marine archaeological and cultural heritage receptors located within the proposed development.

Potential Effect	Maximum Design Scenario Assessed	Justification
<p>receptors (material and context) leading to the exposure of those marine archaeological and cultural heritage receptors to natural, chemical or biological processes and indirectly causing or accelerating their loss.</p>	<p>Maximum seabed preparation spoil volume:</p> <ul style="list-style-type: none"> <li>▪ 93 WTG Foundations (GBS) up to 36,300m<sup>3</sup> per foundation, total impact 3,375,900m<sup>3</sup></li> <li>▪ Seven OSS foundations (GSB) up to 48,500m<sup>3</sup> per foundation, total impact 339,500m<sup>3</sup></li> </ul> <p>Total volume of sediment disturbed by sand wave clearance:</p> <ul style="list-style-type: none"> <li>▪ Array cables; 10,108,800m<sup>3</sup> m<sup>3</sup></li> <li>▪ Interlink cables 3,564,000m<sup>3</sup></li> <li>▪ Offshore export cables (array area) 1,572,480 m<sup>3</sup></li> <li>▪ Offshore export cables (Offshore ECC) 5,840,640m<sup>3</sup></li> </ul> <p>Maximum volume of sand wave clearance spoil:</p> <ul style="list-style-type: none"> <li>▪ Array area; 15,245,280m<sup>3</sup></li> </ul> <p>Offshore export corridor; 5,840,640m<sup>3</sup></p> <p>Total area of seabed disturbed by boulder clearance:</p> <ul style="list-style-type: none"> <li>▪ Array area, 16.6km<sup>2</sup></li> <li>▪ Offshore ECC 7.2km<sup>2</sup></li> </ul> <p>Up to six HDD exit pits, maximum trenchless exit pit excavated material volume is expected to be 5,000m<sup>3</sup>.</p> <p>Maximum volume of sediment disturbed for all jack-up operations during construction is assuming up to six legs with an average spudcan area of 250m<sup>2</sup> per foot, a maximum of 475 operations totalling a maximum disturbance area of 1,500m<sup>2</sup> per jack-up operation and a total of 712,500m<sup>2</sup>.</p>	

Potential Effect	Maximum Design Scenario Assessed	Justification
	<p>Total impact of anchor footprints during construction WTG, 800m<sup>2</sup> per operation (Anchor dimension of 10x10m, eight anchors per jack-up, total of 380,000m<sup>2</sup>).</p>	
<p>Impact 11: Indirect impacts causing changes to the Historic Seascape Character as a result of construction and survey vessel activities and the addition of cables, foundations, Offshore Platforms and WTGs indirectly leading to changes to the perceived historic use of the seascape during the construction phase.</p>	<ul style="list-style-type: none"> <li>▪ Total maximum permanent seabed area, 25/30MW WTG (GBS) 14,900m<sup>2</sup></li> <li>▪ Maximum 93 WTGs generating capacity of 1500MW (1.5GW)</li> <li>▪ Maximum rotor diameter 340m</li> <li>▪ Maximum blade tip height above LAT 403m</li> <li>▪ Up to four OPs, maximum height above LAT 100m, maximum structure size 110x160m, topside area 17,600m<sup>2</sup></li> <li>▪ Minimum spacing of infrastructure, 2.5RD from tip to tip or 3.5RD from centre to centre</li> <li>▪ 351km maximum length of inter-array cables;</li> <li>▪ Maximum length of offshore interlink cables, 123.75km</li> <li>▪ Up to four offshore export cables may be installed with a maximum length per cable of 128.7km and a total length of 514.8km</li> <li>▪ Maximum number of vessels (all construction activities), 139 with 4,843 maximum number of return trips</li> </ul>	
<b>Operation and Maintenance</b>		
<p>Impact 12: Direct impact by penetration leading to disturbance effects of maintenance activities at WTGs, Offshore Platforms and along all cables leading to total or</p>	<p>Maximum footprint of seabed disturbance of cable repairs:</p> <ul style="list-style-type: none"> <li>▪ Array cables 15,000m<sup>2</sup> per event</li> <li>▪ Offshore export cables 15,000m<sup>2</sup> per event</li> </ul> <p>WTG activities, maximum footprint of seabed disturbance:</p> <ul style="list-style-type: none"> <li>▪ Component replacement 1,500m<sup>2</sup></li> <li>▪ J-tube repair/ replacement 1,500m<sup>2</sup></li> </ul>	<p>The maximum assessment assumptions represent the maximum disturbance by O&amp;M activities that could potentially affect marine archaeological and cultural heritage receptors located within the proposed development.</p>

Potential Effect	Maximum Design Scenario Assessed	Justification
<p>partial loss of marine archaeological and cultural heritage receptors.</p>	<p>Maximum footprint of temporary seabed disturbance per event:</p> <ul style="list-style-type: none"> <li>▪ 155,000m<sup>2</sup> for export cables</li> </ul> <p>200,000m<sup>2</sup> for Interlink cables</p> <p>Array, Interlink cables and export cable repair activities:</p> <ul style="list-style-type: none"> <li>▪ Remedial burial, maximum width of disturbed seabed 30m</li> <li>▪ Maximum cable trench width 10m</li> <li>▪ Maximum length of cable repair per event, 1,500m</li> </ul> <p>Maximum footprint of jack-up during repairs</p> <ul style="list-style-type: none"> <li>▪ Array and Interlink cables 1,500m<sup>2</sup> per event</li> <li>▪ Offshore export cables 1,500m<sup>2</sup> per event</li> </ul> <p>Maximum rock berm volume during repairs</p> <ul style="list-style-type: none"> <li>▪ Array and Interlink cables 32,000m<sup>3</sup></li> <li>▪ Offshore export cables 32,000m<sup>3</sup></li> </ul>	
<p>Impact 13: Direct impact by compression leading to disturbance effects of maintenance activities at WTGs, Offshore Platforms and along all cables leading to total or partial loss of marine archaeological and cultural heritage receptors.</p>	<p>Maximum footprint of seabed disturbance of cable repairs,</p> <ul style="list-style-type: none"> <li>▪ Array and Interlink cables 1,500m<sup>2</sup> per event</li> <li>▪ Offshore export cables 1,500m<sup>2</sup> per event</li> </ul> <p>WTG activities, maximum footprint of seabed disturbance</p> <ul style="list-style-type: none"> <li>▪ Component replacement 1,500m<sup>2</sup></li> <li>▪ J-tube repair/ replacement 1,500m<sup>2</sup></li> </ul> <p>Maximum footprint of temporary seabed disturbance per event</p> <ul style="list-style-type: none"> <li>▪ 155,000m<sup>2</sup> for export cables</li> </ul> <p>200,000m<sup>2</sup> for Interlink cables</p>	<p>The maximum assessment assumptions represent the maximum disturbance by O&amp;M activities that could potentially affect marine archaeological and cultural heritage receptors located within the proposed development.</p>

Potential Effect	Maximum Design Scenario Assessed	Justification
	<p>Array, Interlink cables and export cable repair activities</p> <ul style="list-style-type: none"> <li>▪ Remedial burial, maximum width of disturbed seabed 30m</li> <li>▪ Maximum cable trench width 10m</li> <li>▪ Maximum length of cable repair per event, 1,500m</li> </ul> <p>Maximum footprint of jack-up during repairs</p> <ul style="list-style-type: none"> <li>▪ Array and Interlink cables 1,500m<sup>2</sup> per event</li> <li>▪ Offshore export cables 1,500m<sup>2</sup> per event</li> </ul> <p>Maximum rock berm volume during repairs</p> <ul style="list-style-type: none"> <li>▪ Array and Interlink cables 32,000m<sup>3</sup></li> <li>▪ Offshore export cables 32,000m<sup>3</sup></li> </ul>	
<p>Impact 14: Direct impacts by penetration effects of jack-up barges and anchoring of O&amp;M vessels during various activities at WTGs, Offshore Platforms and along all cables leading to total or partial loss of marine archaeological and cultural heritage receptors.</p>	<p>Maximum offshore visits</p> <ul style="list-style-type: none"> <li>▪ Up to 1,339 WTG visits</li> <li>▪ Up to 409 WTG foundation visits</li> <li>▪ Maximum number of seabed survey events per lifetime, 38</li> </ul> <p>Number of vessels</p> <ul style="list-style-type: none"> <li>▪ Up to 10 CTVs</li> <li>▪ Up to 2 SOVs</li> <li>▪ Up to 12 supply vessels</li> <li>▪ Up to 4 JUVs</li> </ul>	<p>The maximum assessment assumptions represent the maximum disturbance by vessel activities during O&amp;M activities that could potentially marine archaeological and cultural heritage receptors located within the proposed development.</p>
<p>Impact 15: Direct impacts by compression effects of jack-up barges and anchoring of O&amp;M vessels during various activities</p>	<p>Maximum offshore visits</p> <ul style="list-style-type: none"> <li>▪ Up to 1,339 WTG visits</li> <li>▪ Up to 409 WTG foundation visits</li> </ul>	<p>The maximum assessment assumptions represent the maximum disturbance by O&amp;M activities that could potentially affect marine archaeological and</p>



Potential Effect	Maximum Design Scenario Assessed	Justification
<p>at WTGs, Offshore Platforms and along all cables leading to total or partial loss of marine archaeological and cultural heritage receptors.</p>	<p>Maximum number of seabed survey events per lifetime, 38</p> <p>Number of vessels:</p> <ul style="list-style-type: none"> <li>▪ Up to 10 CTVs</li> <li>▪ Up to 2 SOVs</li> <li>▪ Up to 12 supply vessels</li> <li>▪ Up to 4 JUVs</li> </ul>	<p>cultural heritage receptors located within the proposed development.</p>
<p>Impact 16: Indirect impacts causing disturbance of sediment containing potential marine archaeological and cultural heritage receptors during maintenance activities leading to the exposure of those marine archaeological and cultural heritage receptors to natural, chemical or biological processes and indirectly causing or accelerating their loss;</p>	<p>Maximum footprint of seabed disturbance of cable repairs:</p> <ul style="list-style-type: none"> <li>▪ Array and Interlink cables 1,500m<sup>2</sup> per event</li> <li>▪ Offshore export cables 1,500m<sup>2</sup> per event</li> </ul> <p>WTG activities, maximum footprint of seabed disturbance:</p> <ul style="list-style-type: none"> <li>▪ Component replacement 1,500m<sup>2</sup></li> <li>▪ J-tube repair/ replacement 1,500m<sup>2</sup></li> </ul> <p>Maximum footprint of temporary seabed disturbance per event:</p> <ul style="list-style-type: none"> <li>▪ 155,000m<sup>2</sup> for export cables</li> <li>200,000m<sup>2</sup> for Interlink cables</li> </ul> <p>Array, Interlink cables and export cable repair activities:</p> <ul style="list-style-type: none"> <li>▪ Remedial burial, maximum width of disturbed seabed 30m</li> <li>▪ Maximum cable trench width 10m</li> <li>▪ Maximum length of cable repair per event, 1,500m</li> </ul> <p>Maximum footprint of jack-up during repairs:</p> <ul style="list-style-type: none"> <li>▪ Array and Interlink cables 1,500m<sup>2</sup> per event</li> <li>▪ Offshore export cables 1,500m<sup>2</sup> per event</li> </ul>	<p>The maximum assessment assumptions represent the maximum sediment disturbance during O&amp;M that could potentially affect marine archaeological and cultural heritage receptors located within the proposed development.</p>

Potential Effect	Maximum Design Scenario Assessed	Justification
	<p>Maximum rock berm volume during repairs:</p> <ul style="list-style-type: none"> <li>▪ Array and Interlink cables 32,000m<sup>3</sup></li> </ul> <p>Offshore export cables 32,000m<sup>3</sup></p> <p>Maximum offshore visits:</p> <ul style="list-style-type: none"> <li>▪ Up to 1,339 WTG visits</li> <li>▪ Up to 409 WTG foundation visits</li> </ul> <p>Maximum number of seabed survey events per lifetime, 38</p> <p>Number of vessels:</p> <ul style="list-style-type: none"> <li>▪ Up to 10 CTVs</li> <li>▪ Up to 2 SOVs</li> <li>▪ Up to 12 supply vessels</li> <li>▪ Up to 4 JUVs</li> </ul>	
<p>Impact 17: Indirect impacts causing scour effects as a result of the presence of WTGs, Offshore Platforms and the exposure of cables or the use of cable protection measures leading to the exposure of those marine archaeological and cultural heritage receptors to natural, chemical or biological</p>	<p>Up to 93 WTGs and associated foundations;            Up to four OSSs and associated foundations;            Up to two ORCPs and associated foundations;            One accommodation platform and associated foundations;</p> <p>Maximum scour protection volume:</p> <ul style="list-style-type: none"> <li>▪ WTG foundations (GBS) per foundation 37,500m<sup>3</sup></li> <li>▪ OSS foundations (suction bucket jacket) per foundation 51,150m<sup>3</sup></li> </ul> <p>Maximum area of seabed covered by cable protection            Operational rock placement would not exceed 25% of the estimated rock volume and would occur in areas where rock placement was in place (i.e. no new areas of cable protection above what is deployed during construction)</p>	<p>The maximum assessment assumptions represent the maximum sediment disturbance during O&amp;M that could potentially affect marine archaeological and cultural heritage receptors located within the proposed development.</p>

Potential Effect	Maximum Design Scenario Assessed	Justification
<p>processes causing or accelerating their loss.</p>	<ul style="list-style-type: none"> <li>▪ Cable protection area, inter-array and Interlink cables, 1,899,000m<sup>2</sup></li> <li>▪ Cable protection area offshore export cable, 2,059,200m<sup>2</sup></li> </ul> <p>Rock dumping volume for cable protection:</p> <ul style="list-style-type: none"> <li>▪ Array and Interlink cables 2,136,37 m<sup>3</sup></li> <li>▪ Offshore export cable, 2,316,000 m<sup>3</sup></li> </ul> <p>Array cable repair activities:</p> <ul style="list-style-type: none"> <li>▪ Remedial burial, maximum width of disturbed seabed 30m</li> <li>▪ Maximum cable trench width 10m</li> <li>▪ Maximum length of cable repair per event, 1,500m</li> </ul>	
<p>Impact 18: Indirect impacts causing changes to the Historic Seascape Character as a result of O&amp;M vessel activities and the presence of the completed windfarm indirectly leading to changes to the perceived historic use of the seascape during the operation phase.</p>	<ul style="list-style-type: none"> <li>▪ Total maximum permanent seabed area, 25/30MW WTG (GBS) 14,900m<sup>2</sup></li> <li>▪ Maximum 93 WTGs generating capacity of 1500MW (1.5GW)</li> <li>▪ Maximum rotor diameter 340m</li> <li>▪ Maximum blade tip height above LAT 403m</li> <li>▪ Up to four OPs, maximum height above LAT 100m, maximum structure size 110x160m, topside area 17,600m<sup>2</sup></li> <li>▪ Minimum spacing of infrastructure, 2.5RD from tip to tip or 3.5RD from centre to centre</li> <li>▪ 351km maximum length of inter-array cables;</li> <li>▪ Maximum length of offshore interlink cables, 123.75km</li> <li>▪ Up to four offshore export cables may be installed with a maximum length per cable of 128.7km and a total length of 514.8km</li> <li>▪ Maximum number of seabed survey events per lifetime, 38</li> </ul>	<p>The MDS represents construction activities that could potentially affect perception of the HSC.</p>

Potential Effect	Maximum Design Scenario Assessed	Justification
	<p>Maximum offshore visits during O&amp;M</p> <ul style="list-style-type: none"> <li>▪ Up to 1,339 WTG visits</li> <li>▪ Up to 409 WTG foundation visits</li> </ul> <p>Number of vessels during O&amp;M:</p> <ul style="list-style-type: none"> <li>▪ Up to 10 CTVs</li> <li>▪ Up to 2 SOVs</li> <li>▪ Up to 12 supply vessels</li> <li>▪ Up to 4 JUVs</li> </ul>	
<b>Decommissioning</b>		
<p>Impact 19: Direct impacts by penetration effects of jack-up barges and anchoring of decommissioning vessels leading to total or partial loss of marine archaeological and cultural heritage receptors.</p>	<p>It is anticipated that all the offshore structures above the seabed level, together with all subsea cables, will be completely removed. The decommissioning sequence will generally be the reverse of the construction sequence (reverse lay) and involve similar types and numbers of vessels and equipment.</p>	<p>The MDS represents the maximum seabed disturbance by vessels activities that could potentially affect marine archaeological and cultural heritage receptors during decommissioning.</p>
<p>Impact 20: Direct impacts by compression effects of jack-up barges and anchoring of decommissioning vessels leading to total or partial loss of marine archaeological and</p>	<p>Maximum volume of sediment disturbed for all jack-up operations during construction is assuming up to six legs with an average spudcan area of 250m<sup>2</sup> per foot, a maximum of 475 operations totalling a maximum disturbance area of 1,500m<sup>2</sup> per jack-up operation and a total of 712,500m<sup>2</sup>, same or similar impact is expected during decommissioning.</p> <p>Total impact of anchor footprints during construction</p>	<p>The MDS represents the maximum sediment disturbance that could potentially affect marine archaeological and cultural heritage receptors during decommissioning.</p>

Potential Effect	Maximum Design Scenario Assessed	Justification
cultural heritage receptors.	<ul style="list-style-type: none"> <li>▪ WTG, 800m<sup>2</sup> per operation (anchor dimension of 10x10m, eight anchors per jack-up), total of 380,000m<sup>2</sup>.</li> </ul>	
Impact 21: Indirect impacts creating draw-down of sediment into voids left by removed WTG foundations or Offshore Platforms leading to loss of sediment or destabilisation of archaeological sites and contexts indirectly exposing marine archaeological and cultural heritage receptors to natural, chemical, or biological processes and causing or accelerating loss of the same.	<p>Total maximum impact of removal of structures:</p> <ul style="list-style-type: none"> <li>▪ 93 WTG foundations (suction bucket jacket) up to 8,200m<sup>2</sup> per foundation total impact, 762,600m<sup>2</sup></li> <li>▪ Seven OSS foundations (suction bucket jacket) up to 19,600m<sup>2</sup> per foundation total impact, 137,200m<sup>2</sup></li> </ul>	The MDS represents the maximum sediment disturbance that could potentially affect marine archaeological and cultural heritage receptors during decommissioning.
Indirect impacts causing changes to the Historic Seascape Character as a result of decommissioning activities and the removal of windfarm components indirectly leading to	<ul style="list-style-type: none"> <li>▪ Total maximum permanent seabed area, 25/30MW WTG (GBS) 14,900m<sup>2</sup></li> <li>▪ Maximum 93 WTGs generating capacity of 1500MW (1.5GW)</li> <li>▪ Maximum rotor diameter 340m</li> <li>▪ Maximum blade tip height above LAT 403m</li> <li>▪ Up to four OPs, maximum height above LAT 100m, maximum structure size 110x160m, topside area 17,600m<sup>2</sup></li> </ul>	The MDS represents decommissioning activities that could potentially affect perception of the HSC.

Potential Effect	Maximum Design Scenario Assessed	Justification
<p>changes to the perceived historic use of the seascape during the decommissioning phase.</p>	<ul style="list-style-type: none"> <li>▪ Minimum spacing of infrastructure, 2.5RD from tip to tip or 3.5RD from centre to centre</li> <li>▪ 351km maximum length of inter-array cables;</li> <li>▪ Maximum length of offshore interlink cables, 123.75km</li> <li>▪ Up to four offshore export cables may be installed with a maximum length per cable of 128.7km and a total length of 514.8km</li> <li>▪ Maximum number of vessels (all construction activities), 139 with 4,843 maximum number of return trips</li> </ul>	

## Embedded Mitigation

- 13.7.9 The embedded measures contained in Table 13.9 are mitigation measures or commitments that have been identified and adopted as part of the evolution of the project design of relevance to marine and intertidal archaeology, and include project design measures, compliance with elements of good practice and the use of standard protocols.
- 13.7.10 The mitigation measures described below are embedded in the sense that they are secured through the Outline Marine WSI (see document 8.5). The measures are also required to be agreed with relevant stakeholders and may be a condition of any future deemed Marine License (dML). The exact mitigation design may evolve through the pre-construction development process and will be updated to reflect any further study and in consultation with the Archaeological Curators.
- 13.7.11 Wherever possible mitigation will be proactive in the identification of potential marine archaeological and cultural heritage receptors and reactive in measures to minimise impact and risk on known and recently located receptors.

Table 13.9: Embedded Mitigation Relating to Marine and Intertidal Archaeology

Project phase	Mitigation Measures Embedded into the Project Design
WSI	An Outline Marine WSI document has been produced to accompany the PEIR to outline the AEZs and establish the basis for mitigation measures and further archaeological campaigns for the project. This will be developed to form the Draft Marine WSI followed by the Agreed Marine WSI.
AEZs	All intrusive activities undertaken during the life of the Project will be routed and microsited to avoid any identified marine archaeological and cultural heritage receptors pre-construction, with AEZs as detailed in the Outline Marine WSI unless other mitigation is agreed with Historic England.
PAD	Additional unknown or unexpected marine archaeological and cultural heritage receptors identified during the Project stages will be reported utilising the Project specific PAD.
Archaeological assessment of available data	Offshore geophysical surveys (including unexploded ordnance (UXO) surveys) and offshore geotechnical campaigns undertaken pre-construction will be subject to full archaeological review, where relevant in consultation with Historic England. Areas with geoarchaeological potential will be targeted during the geotechnical sampling campaigns and results published will aim to enhance the palaeogeographic knowledge and understanding of the area.
Post-construction monitoring plan	A post-construction monitoring plan as per the Outline Marine WSI will be produced. The post-construction monitoring plan will identify areas or sites of high archaeological significance recommended for further investigation and outline how post-construction monitoring campaigns will collect, assess and report on changes to marine archaeological and cultural heritage receptors that may have occurred during the construction phase.

## Written Schemes of Investigation

- 13.7.12 The Outline Marine WSI (see document 8.5) sets out the recommended AEZ for geophysical anomalies, provides information about areas of archaeological potential and where further geotechnical works may provide evidence of archaeological interest. The Outline Marine WSI also sets out adaptive mitigation for further works that will require archaeological input even when their main purpose is non-archaeological, so that the potential for information and efficiency is maximised.
- 13.7.13 Throughout the lifetime of the Project, the Marine WSI will evolve from the current Outline Marine WSI (see document 8.5) to the Draft Marine WSI, through to the final Agreed Marine WSI. These documents will be produced in line with The Crown Estate (TCE) guidance (2021). The mitigation set out in the Marine WSI will be discussed and agreed in consultation with the Archaeological Curators. Note that the implementation of this Marine WSI is mitigation, rather than the document itself.

## Archaeological Exclusion Zones

- 13.7.14 AEZ are recommended around all recorded wrecks and obstructions, as well as those assessed as high and medium archaeological potential identified in the geophysical assessment. The avoidance of marine heritage assets remaining *in situ* follows best archaeological practice, and impact by the Project will be avoided through the implementation of buffers around the known extents of sites. All development and related activities that could impact the seabed are microsited within the boundaries of an AEZ.
- 13.7.15 The final development layout of the Project will consider the locations of all AEZs. Where it is deemed that impacts cannot be avoided, measures to reduce, remedy or offset disturbances will be agreed.
- 13.7.16 AEZs have the potential to be amended (enlarged or reduced) or removed at a later date, subject to further data and review. Any changes to the AEZs which may occur will be agreed with the Archaeological Curators.
- 13.7.17 AEZs of 50m are recommended around anomalies of medium archaeological potential (Table 13.6) and records for wrecks and obstructions which did not correlate with geophysical anomalies. For anomalies of high archaeological potential identified in the geophysical (Table 13.5) data AEZs of 100m are recommended. The extent of the AEZs is based around the visible extent of the anomaly, where it can be identified, or in the case of recorded anomalies not identified in the geophysical data and anomalies identified only in the MAG data the buffer can be based around the centre point of the recorded location.
- 13.7.18 For anomalies assessed as low archaeological potential no AEZs have been recommended at this time. However, avoidance of these features by micrositing is recommended if potential impacts during project works is expected.
- 13.7.19 It is possible these low potential anomalies could represent material from wreck sites or other marine heritage assets of significance but are not currently identifiable as such. If these anomalies are likely to be impacted, they should be assessed on a case-by-case basis, in agreement with the Archaeological Curators. Further assessment may be in the form of investigation undertaken in conjunction with remotely operated vehicles (ROV) or UXO surveys.



13.7.20 The methodology for assessing anomalies is set out in Section 8 of document 8.5.

### Protocol for Archaeological Discoveries

- 13.7.21 There is potential for previously unknown sites or material of archaeological potential to be encountered during development works. As per the Outline Marine WSI, a Project specific PAD will be adopted to ensure impacts to these unexpected discoveries can be reduced.
- 13.7.22 The PAD document acts as a safety net alongside other mitigation measures to ensure reactive and effective reporting of any unexpected finds of archaeological potential so that they can be investigated and assessed to avoid further impacts.
- 13.7.23 Temporary exclusion zones (TEZ) may be established around areas of possible archaeological potential until further investigation and assessment can be conducted.

### Archaeological Assessment of Available Data

- 13.7.24 Offshore geophysical surveys (including UXO surveys) undertaken during the life of the Project will be subject to full archaeological review, where relevant. Archaeological review will be in consultation with Historic England.
- 13.7.25 Offshore geotechnical surveys prior to construction will be undertaken following early discussions with Historic England. Areas with geoarchaeological potential will be targeted during geotechnical sampling campaigns and the results of the geoarchaeological assessment will be presented in phased geoarchaeological reports inclusive of publication. The published results will aim to enhance the palaeogeographic knowledge and understanding of the area.
- 13.7.26 Specialist archaeological input will be incorporated, as a proactive measure, into the survey methodologies and techniques through to the identification of anomalies and subsequent avoidance strategies and mitigation.
- 13.7.27 The marine archaeology study area is of known importance for historic military and merchant activity as well as of for geoarchaeology. Any features of potential archaeological interest or significance will be avoided where possible or, where impacts cannot be avoided, will be further investigated and risk of impacts managed. Any locations of potential geoarchaeological interest or significance will be targeted where possible during geotechnical works to contribute to the characterisation of the palaeoenvironment and deposit model. Additional archaeologically specific cores will also be collected.

### Post-Construction Monitoring Plan

- 13.7.28 A post-construction monitoring plan will be produced within the Agreed Marine WSI (the iteration of the Outline Marine WSI (see document 8.5) which will be developed post-consent and pre-construction). The post-construction monitoring plan will set out areas or sites of high archaeological interest and/or significance and outline proposed measures to avoid or monitor such sites. It will also outline how any post-construction monitoring campaigns will collect, assess, and report on changes to marine archaeological and cultural heritage receptors that may have occurred during the construction phase.

## 13.8 Assessment Methodology

13.8.1 The assessment methodology for marine archaeology takes into consideration the following guidance document for offshore developments pertaining to marine archaeology:

- Standard and Guidance for Historic Environment Desk-Based Assessment, Chartered Institute for Archaeologists (CIfA) (2014a, 2014b and 2014c);
- Historic Environment Guidance for Offshore Renewable Energy Sector, Collaborative Offshore Wind Research into the Environment (COWRIE) (2007);
- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy, COWRIE (2008);
- Our Seas – A shared resource: High level marine objectives, Department for Environment, Food and Rural Affairs (DEFRA) (2009);
- Code of Practice for Seabed Development, Joint Nautical Archaeology Policy Committee (JNAPC) (2006);
- Commercial Renewable Energy Development and the Historic Environment, Historic England Advice Note 15 (2021);
- Historic Seascape Characterisation (HSC): Demonstrating the Method, SeaZone (2011);
- National Historic Seascape Characterisation Consolidation, Land Use Consultants (LUC) (2017);
- Deposit Modelling and Archaeology: Guidance for Mapping Buried Deposits, Historic England (2020);
- Environmental Archaeology: A guide to the theory and practice of methods from sampling and recovery to post-excavation, English Heritage (2011);
- Marine Geophysical Data Acquisition, Processing and Interpretation, English Heritage (2013);
- Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects, TCE (2021); and
- Protocol for Archaeological Discoveries: Offshore Renewables Projects, TCE (2014).

13.8.2 The assessment methodology for marine archaeology takes into consideration the following research frameworks for offshore developments pertaining to marine archaeology:

- The North Sea Prehistory Research Management Framework (NSPRMF), Research Framework Network (2023);
- East Midlands Historic Environment Research Framework (EMHERF), Research Framework Network (2022);
- A Maritime Archaeological Research Agenda for England, Research Framework Network (2022); and

- Rapid Coastal Zone Assessment for Yorkshire and Lincolnshire, Humber Field Archaeology (2022).

13.8.3 This section outlines the method used to assess the significance of effect on marine archaeological and cultural heritage receptors up to MHWS.

13.8.4 The criteria for determining this significance is based on both the magnitude of impact (Table 13.10) and the sensitivity (value) of those receptors (Table 13.11) as a result of potential impacts. Professional judgement based on the guidance set out by the Department for Culture, Media and Sport (2013) has also been applied. Section 13.9 and 0 outline the significance of effect on marine archaeological and cultural heritage receptors of each identified potential impact.

13.8.5 The magnitude of the impact is defined in Table 13.10.

Table 13.10: Impact Magnitude Definitions

Magnitude	Description/Reason
High	Adverse, major, and substantial or irreversible change to marine archaeological and cultural heritage receptors resulting in long term, permanent and significant alteration, inhibiting interpretation of some key characteristics, sub-features or components.
	While major impact is likely to be on a local level, loss of archaeological data may have implications on an international level.
	Beneficial impacts of High magnitude include large-scale enhanced understanding of the archaeological resource inversely proportional to the scale of the adverse effect, for example benefit through large area geophysical/geotechnical survey data released to public domain.
Medium	Adverse and moderate level of change to marine archaeological and cultural heritage receptors potentially resulting in long term, permanent and clear alteration, inhibiting interpretation of some key characteristics, sub-features, or components.
	While moderate impact is likely to be on a local level, loss of archaeological data may have implications on an international level.
	Beneficial impacts of Medium magnitude include the addition of, key characteristics, features or elements, deriving from site-specific survey and investigations such as diver/ROV or ground-truthing of marine archaeological and cultural heritage receptors leading to an enhancement of disseminated knowledge.
Low	Adverse, minor level of change to marine archaeological and cultural heritage receptors resulting in long term, permanent alteration, inhibiting interpretation of some key characteristics, sub-features, or components.
	While minor impact is likely to be on a local level, loss of archaeological data may have implications on an international level.
	Beneficial impacts of Low magnitude can include minor benefit to, or addition of, one or more key characteristics, features or elements through enhanced

Magnitude	Description/Reason
	knowledge and understanding of marine archaeological and cultural heritage receptors not disseminated or made publicly available.
Negligible	Negligible level of change and indistinguishable from natural variation that do not change archaeological sites or materials, and do not affect key characteristics, sub-features, or components or their environment or context.
	There are no beneficial impacts of Negligible magnitude because it would not contribute to or enhanced knowledge/

13.8.6 The sensitivity/importance of the receptor is defined in Table 13.11.

Table 13.11: Sensitivity/Importance of the Environment

Receptor Sensitivity/Importance	Definition
High	<p>High importance and rarity of an international/national scale.</p> <p>Unique with regards to period, rarity, level of documentation, group value, condition, vulnerability, diversity, and/or archaeological potential.</p> <p>Examples include; designated and non-designated heritage assets, protected wreck sites, aviation remains, palaeoenvironmental features or deposits with evidence of <i>in situ</i> finds.</p>
Medium	<p>Medium importance and rarity of a regional scale with limited potential for substitution.</p> <p>Regionally rare with regards to period, rarity, level of documentation, group value, condition, vulnerability, diversity, and/ or archaeological potential.</p> <p>Examples include; non-designated live wreck sites, geophysical anomalies of high and medium potential, recorded wrecks not confirmed by survey, palaeoenvironmental features or deposits.</p>
Low	<p>Low importance and rarity, local scale.</p> <p>Low or no recognised value with regards to period, rarity, level of documentation, group value, condition, vulnerability, diversity, and/or archaeological potential.</p> <p>Examples include; fouls and obstructions, geophysical anomalies of low potential.</p>
Negligible	<p>Very low to no archaeological importance and rarity, local scale.</p> <p>The nature of the receptor is in very poor condition and survival and is therefore not considered a receptor.</p> <p>Examples include; dead wrecks, dead fouls or obstructions, geophysical anomalies of negligible potential such as cables.</p>

13.8.7 Assessment of the significance of potential effects on marine archaeological and cultural heritage receptors is described in Table 13.12.

Table 13.12: Matrix to Determine Effect Significance

		Magnitude of Impact			
		<i>Negligible</i>	<i>Low</i>	<i>Medium</i>	<i>High</i>
Sensitivity of Receptor	<i>Negligible</i>	Negligible (Not significant)	Negligible (Not significant)	Minor (Not significant)	Minor (Not significant)
	<i>Low</i>	Negligible (Not significant)	Minor (Not significant)	Minor (Not significant)	Moderate (Significant)
	<i>Medium</i>	Minor (Not significant)	Minor (Not significant)	Moderate (Significant)	Major (Significant)
	<i>High</i>	Minor (Not significant)	Moderate (Significant)	Major (Significant)	Major (Significant)

## Assumptions and Limitations

- 13.8.8 While the geophysical data received to date has predominantly been of good quality and suitable for archaeological interpretation (further defined in Section 2.4 of Volume 2, Appendix 13.1), there are currently data gaps for this document within the Offshore ECC where the geophysical data is still undergoing archaeological assessment.
- 13.8.9 In consideration of the high number of baseline records within the Offshore ECC and the marine archaeology study area around it, precautionary AEZs of 50m will be applied around any records in the areas still undergoing assessment, as well as the areas of geophysical data already assessed.
- 13.8.10 There is a likelihood that previously unidentified sites or features of archaeological interest or significance may be present in the areas where the data is still undergoing assessment.
- 13.8.11 These geophysical data gaps are expected to be filled following PEIR and the Project is aware of the importance of full assessment of the proposed development area to reduce uncertainties and the risk of later design modifications.
- 13.8.12 At this time there have been no offshore geotechnical surveys undertaken for archaeological assessment, however, these are planned post consent. Geoarchaeological sub-sampling will be included and informed by the results of the sub-bottom data analysis and previous geoarchaeological assessment of the area.

## 13.9 Impact Assessment

### Construction

- 13.9.1 Activities associated with the construction phase that have the potential to impact marine archaeological and cultural heritage receptors directly or indirectly are considered within this section. The magnitude of all outlined impacts on marine archaeological and cultural heritage receptors has been assessed according to the criteria outlined in Table 13.10 and is taking into account the embedded mitigations as outlined in Table 13.9. The assumed MDS design scenario table (Table 13.8), demonstrates that potential direct and indirect impact during the construction phase is possible within the marine archaeology study area and outlines relevant parameters.
- 13.9.2 If, as a result of the construction phase activities, any marine archaeological and cultural heritage receptors are subject to increased sedimentation that covers and so protects the receptor, the marine archaeological and cultural heritage receptors might benefit from the conditions which could provide a higher level of preservation *in situ* and therefore a beneficial magnitude of impact.
- 13.9.3 The sensitivity (value) of the marine archaeological and cultural heritage receptors are assessed in Volume 2, Appendix 13.1. This impact assessment takes into account both the impact of magnitude (Table 13.10) and the sensitivity (Table 13.11) of those receptors as a result of potential impacts during the construction phase. Professional judgement based on the guidance set out by the Department for Culture, Media and Sport (2013) has also been applied, as per Volume 2, Appendix 13.1.
- 13.9.4 The sensitivity of the known marine archaeological and cultural heritage receptors potentially impacted during the construction phase are detailed in Table 13.13. It is important to note that at this stage only geophysical data for within the array area has been assessed and there are data gaps that will be filled which will inform the identification and potential archaeological significance of the records within the full marine archaeology study area.

Table 13.13: Receptor Sensitivity (value): Construction Phase

No.	Marine Archaeological and Cultural Heritage Receptors	Receptor (Value)	Sensitivity
13	High potential anomalies	High	
33	Medium potential anomalies	Medium	
1107	Low potential anomalies	High to Low	
10	High significance (archaeological term) known wrecks	High	
3	Medium significance (archaeological term) known wrecks	High/Medium	
3	Low significance (archaeological term) known wrecks	High/Medium	
22	Unknown significance (archaeological term) known wrecks	Unknown	

No.	Marine Archaeological and Cultural Heritage Receptors	Receptor (Value)	Sensitivity
8	Channels, valleys and deposits of geoarchaeological potential	High to Low	

13.9.5 This section presents the assessment of impacts arising from the construction phase of the Project.

#### Impact 1

13.9.6 Direct impact of sediment removal containing undisturbed archaeological contexts during seabed preparation ahead of construction activities leading to the total or partial loss of the marine archaeological and cultural heritage receptors.

#### *Magnitude of Impact*

13.9.7 Impacts of sediment removal on marine archaeological and cultural heritage receptors may lead to direct impact and total or partial loss of marine archaeological and cultural heritage receptors. If a direct impact occurs, it will generally be local, major, and adverse or irreversible and result in a permanent change to the receptor meaning high magnitude of impact as detailed in Table 13.10.

#### *Sensitivity of the Receptor*

13.9.8 The sensitivity of the marine archaeological and cultural heritage receptors potentially impacted by sediment removal activities and identified within the marine archaeology study area is considered to be negligible to high as defined in Table 13.11. The sensitivity of the known marine archaeological and cultural heritage receptors potentially impacted by sediment removal is detailed in Table 13.13.

#### *Significance of Effect*

13.9.9 As per the embedded mitigation outlined in Table 13.9 locations on the seabed of potential and confirmed marine archaeological and cultural heritage receptors are informed by the archaeological assessment of geophysical and geotechnical data and AEZs have been recommended (see document 8.5).

13.9.10 Mitigation by avoidance aims to ensure that there is no direct, indirect or permanent impact on marine archaeological and cultural heritage receptors within the marine archaeology study area meaning a negligible magnitude of impact as defined in Table 13.10.

13.9.11 Where avoidance is not possible or in case of not yet located marine archaeological and cultural heritage receptors further mitigation and archaeological works are detailed in the Outline Marine WSI (see document 8.5), and associated documents to ensure negligible magnitude of impact as defined in Table 13.10.

13.9.12 It is predicted that the sensitivity of known heritage receptors impacted by sediment removal is negligible to high (Table 13.13).

13.9.13 Considering the magnitude of impact and receptor sensitivity within the significance of effect matrix (Table 13.12) on marine archaeological and cultural heritage receptors potentially effected by sediment removal, the magnitude of impact is assessed a negligible and the sensitivity of the receptor as negligible to high. The significance of effect has therefore been assessed as minor to negligible and the effect is consequently considered **not significant** in EIA terms.

## Impact 2

13.9.14 Direct impact by penetration of piling foundations leading to the total or partial loss of marine archaeological and cultural heritage receptors.

### *Magnitude of Impact*

13.9.15 Impacts of penetration during piling activities on marine archaeological and cultural heritage receptors may lead to direct impact and total or partial loss of marine archaeological and cultural heritage receptors. If a direct impact occurs it will generally be local, major, and adverse or irreversible and result in a permanent change to the receptor meaning high impact of magnitude as detailed in Table 13.10.

### *Sensitivity of the Receptor*

13.9.16 The sensitivity of the marine archaeological and cultural heritage receptors potentially impacted by penetration during piling activities and identified within the marine archaeology study area is considered to be negligible to high as defined in Table 13.11. The sensitivity of the known marine archaeological and cultural heritage receptors potentially impacted by penetration during piling activities is detailed in Table 13.13.

### *Significance of Effect*

13.9.17 As per embedded mitigation outlined in Table 13.9 locations on the seabed of potential and confirmed marine archaeological and cultural heritage receptors are informed by the archaeological assessment of geophysical and geotechnical data and AEZs have been recommended (see document 8.5).

13.9.18 Mitigation by avoidance aims to ensure that there is no direct, indirect, or permanent impact on marine archaeological and cultural heritage receptors within the marine archaeology study area meaning a negligible magnitude of impact as defined in Table 13.10.

13.9.19 Where avoidance is not possible or in case of not yet located marine archaeological and cultural heritage receptors, further mitigation and archaeological works are detailed in the Outline Marine WSI (see document 8.5)), and associated documents to ensure negligible magnitude of impact as defined in Table 13.10.

13.9.20 It is predicted that the sensitivity of known marine archaeological and cultural heritage receptors impacted by penetration during piling activities is negligible to high (Table 13.13).

13.9.21 Considering the magnitude of impact and receptor sensitivity within the significance of effect matrix (Table 13.12) on marine archaeological and cultural heritage receptors potentially effect by penetration during piling activities, the magnitude of impact is assessed as negligible, and the sensitivity of the receptor is negligible to high. The significance of effect has therefore been assessed as minor to negligible and the effect is consequently considered **not significant** in EIA terms.



### Impact 3

13.9.22 Direct impact by compression of piling foundations leading to the total or partial loss of marine archaeological and cultural heritage receptors.

#### *Magnitude of Impact*

13.9.23 Impacts of compression during piling activities on marine archaeological and cultural heritage receptors may lead to direct impact and total or partial loss of marine archaeological and cultural heritage receptors. If a direct impact occurs it will generally be local, major and adverse or irreversible and result in a permanent change to the receptor meaning high impact of magnitude as detailed in Table 13.10.

#### *Sensitivity of the Receptor*

13.9.24 The sensitivity of the marine archaeological and cultural heritage receptors potentially impacted by compression during piling activities and identified within the marine archaeology study area is considered to be negligible to high as defined in Table 13.11. The sensitivity of the known marine archaeological and cultural heritage receptors potentially impacted by penetration during piling activities is detailed in Table 13.13.

#### *Significance of Effect*

13.9.25 As per embedded mitigation outlined in Table 13.9 locations on the seabed of potential and confirmed marine archaeological and cultural heritage receptors are informed by the archaeological assessment of geophysical and geotechnical data and AEZs have been recommended (see document 8.5).

13.9.26 Mitigation by avoidance aims to ensure that there is no direct, indirect or permanent impact on marine archaeological and cultural heritage receptors within the marine archaeology study area meaning a negligible magnitude of impact as defined in Table 13.10.

13.9.27 Where avoidance is not possible or in case of not yet located marine archaeological and cultural heritage receptors, further mitigation and archaeological works are detailed in the Outline Marine WSI (see document 8.5)), and associated documents to ensure negligible magnitude of impact as defined in Table 13.10.

13.9.28 It is predicted that the sensitivity of known marine archaeological and cultural heritage receptors impacted by compression during piling activities is negligible to high (Table 13.13).

13.9.29 Considering the magnitude of impact and receptor sensitivity within the significance of effect matrix (Table 13.12) on marine archaeological and cultural heritage receptors potentially effected by compression during piling activities, the magnitude of impact is assessed as negligible, and the sensitivity of the receptor is negligible to high. The significance of effect has therefore been assessed as minor to negligible and the effect is consequently considered **not significant** in EIA terms.

### Impact 4

13.9.30 Impact 4: Direct impact by penetration leading to disturbance of stratigraphic context containing archaeological material from the combined weight of the WTGs or Offshore Platforms leading to total or partial loss of marine archaeological and cultural heritage receptors.

### *Magnitude of Impact*

13.9.31 Impacts by penetration from combined weight on marine archaeological and cultural heritage receptors may lead to direct impact and total or partial loss of marine archaeology receptors. If a direct impact occurs, it will generally be local, major and adverse or irreversible and result in a permanent change to the receptor meaning high impact of magnitude as detailed in Table 13.10.

### *Sensitivity of the Receptor*

13.9.32 The sensitivity of the marine archaeological and cultural heritage receptors potentially impacted by penetration from combined weight and identified within the marine archaeology study area is considered to be negligible to high as defined in Table 13.11. The sensitivity of the known marine archaeological and cultural heritage receptors potentially resulting from penetration caused by combined weight is detailed in Table 13.13.

### *Significance of Effect*

13.9.33 As per embedded mitigation outlined in Table 13.9 locations on the seabed of potential and confirmed marine archaeological and cultural heritage receptors are informed by the archaeological assessment of geophysical and geotechnical data and AEZs have been recommended (see document 8.5).

13.9.34 Mitigation by avoidance aims to ensure that there is no direct, indirect, or permanent impact on marine archaeological and cultural heritage receptors within the marine archaeology study area meaning a negligible magnitude of impact as defined in Table 13.10.

13.9.35 Where avoidance is not possible or in case of not yet located marine archaeological and cultural heritage receptors, further mitigation and archaeological works are detailed in the Outline Marine WSI (see document 8.5), and associated documents to ensure negligible magnitude of impact as defined in Table 13.10.

13.9.36 It is predicted that the sensitivity of known marine archaeological and cultural heritage receptors impacted by penetration from combined weight is negligible to high (Table 13.13).

13.9.37 Considering the magnitude of impact and receptor sensitivity within the significance of effect matrix (Table 13.12) on marine archaeological and cultural heritage receptors potentially affected by penetration from the combined weight, the magnitude of impacts is assessed as negligible, and the sensitivity of the receptor is negligible to high. The significance of effect has therefore been assessed as minor to negligible and the effect is consequently considered **not significant** in EIA terms.

### **Impact 5**

13.9.38 Direct impact by compression leading to disturbance of stratigraphic context containing archaeological material from the combined weight of the WTGs or Offshore Platforms leading to total or partial loss of marine archaeological and cultural heritage receptors.

### *Magnitude of Impact*

13.9.39 Impacts by compression from combined weight on marine archaeological and cultural heritage receptors may lead to direct impact and total or partial loss of marine archaeology receptors. If a direct impact occurs, it will generally be local, major and adverse or irreversible and result in a permanent change to the receptor meaning high impact of magnitude as detailed in Table 13.10.

### *Sensitivity of the Receptor*

13.9.40 The sensitivity of the marine archaeological and cultural heritage receptors potentially impacted by compression from combined weight and identified within the marine archaeology study area is considered to be negligible to high as defined in Table 13.11. The sensitivity of the known marine archaeological and cultural heritage receptors potentially resulting from penetration caused by combined weight is detailed in Table 13.13.

### *Significance of Effect*

13.9.41 As per embedded mitigation outlined in Table 13.9 locations on the seabed of potential and confirmed marine archaeological and cultural heritage receptors are informed by the archaeological assessment of geophysical and geotechnical data and AEZs have been recommended (see document 8.5).

13.9.42 Mitigation by avoidance aims to ensure that there is no direct, indirect, or permanent impact on marine archaeological and cultural heritage receptors within the marine archaeology study area meaning a negligible magnitude of impact as defined in Table 13.10.

13.9.43 Where avoidance is not possible or in case of not yet located marine archaeological and cultural heritage receptors, further mitigation and archaeological works are detailed in the Outline Marine WSI (see document 8.5), and associated documents to ensure negligible magnitude of impact as defined in Table 13.10.

13.9.44 It is predicted that the sensitivity of known marine archaeological and cultural heritage receptors impacted by compression from combined weight is negligible to high (Table 13.13).

13.9.45 Considering the magnitude of impact and receptor sensitivity within the significance of effect matrix (Table 13.12) on marine archaeological and cultural heritage receptors potentially affected by compression from the combined weight, the magnitude of impacts is assessed as negligible, and the sensitivity of the receptor is negligible to high. The significance of effect has therefore been assessed as minor to negligible and the effect is consequently considered **not significant** in EIA terms.

### **Impact 6**

13.9.46 Direct impact by penetration of cable laying operations leading to total or partial loss of marine archaeological and cultural heritage receptors.

### *Magnitude of Impact*

13.9.47 Impacts of penetration effects as a result of cable laying operations on marine archaeological and cultural heritage receptors may lead to direct impact and total or partial loss of marine archaeological and cultural heritage receptors. If a direct impact occurs, it will generally be local major and adverse or irreversible and result in a permanent change to the receptor meaning high impact of magnitude as detailed in Table 13.10.

### *Sensitivity of the Receptor*

13.9.48 The sensitivity of the marine archaeological and cultural heritage receptors potentially impacted by sediment removal activities and identified within the marine archaeology study area is considered negligible to high as defined in Table 13.11. The sensitivity of the known marine archaeological and cultural heritage receptors potentially impacted by penetration effects as a result of cable laying operations is detailed in Table 13.13.

### *Significance of Effect*

13.9.49 As per embedded mitigation outlined in Table 13.9 locations on the seabed of potential and confirmed marine archaeological and cultural heritage receptors are informed by the archaeological assessment of geophysical and geotechnical data and AEZs have been recommended (see document 8.5).

13.9.50 Mitigation by avoidance aims to ensure that there is no direct, indirect, or permanent impact on marine archaeological and cultural heritage receptors within the marine archaeology study area meaning a negligible magnitude of impact as defined in Table 13.10.

13.9.51 Where avoidance is not possible or in case of not yet located marine archaeological and cultural heritage receptors, further mitigation and archaeological works are detailed in the Outline Marine WSI (see document 8.5), and associated documents to ensure negligible magnitude of impact as defined in Table 13.10.

13.9.52 It is predicted that the sensitivity of known marine archaeological and cultural heritage receptors impacted by penetration effects from cable laying activities is negligible to high (Table 13.13).

13.9.53 Considering the magnitude of impact and receptor sensitivity within the significance of effect matrix (Table 13.12) on marine archaeological and cultural heritage receptors potentially effected by penetration from cable laying activities, the magnitude of impact is assessed as negligible and the sensitivity of the receptor as negligible to high. The significance of effect has therefore been assessed as minor to negligible and the effect is consequently considered **not significant** in EIA terms.

### *Impact 7*

13.9.54 Direct impacts by compression of cable laying operations leading to total or partial loss of marine archaeological and cultural heritage receptors.

### *Magnitude of Impact*

13.9.55 Impacts of compression effects as a result of cable laying operations on marine archaeological and cultural heritage receptors may lead to direct impact and total or partial loss of marine archaeological and cultural heritage receptors. If a direct impact occurs, it will generally be local major and adverse or irreversible and result in a permanent change to the receptor meaning high impact of magnitude as detailed in Table 13.10.

### *Sensitivity of the Receptor*

13.9.56 The sensitivity of the marine archaeological and cultural heritage receptors potentially impacted by sediment removal activities and identified within the marine archaeology study area is considered negligible to high as defined in Table 13.11. The sensitivity of the known marine archaeological and cultural heritage receptors potentially impacted by penetration effects as a result of cable laying operations is detailed in Table 13.13.

### *Significance of Effect*

13.9.57 As per embedded mitigation outlined in Table 13.9 locations on the seabed of potential and confirmed marine archaeological and cultural heritage receptors are informed by the archaeological assessment of geophysical and geotechnical data and AEZs have been recommended (see document 8.5).

13.9.58 Mitigation by avoidance aims to ensure that there is no direct, indirect, or permanent impact on marine archaeological and cultural heritage receptors within the marine archaeology study area meaning a negligible magnitude of impact as defined in Table 13.10.

13.9.59 Where avoidance is not possible or in case of not yet located marine archaeological and cultural heritage receptors, further mitigation and archaeological works are detailed in the Outline Marine WSI (see document 8.5), and associated documents to ensure negligible magnitude of impact as defined in Table 13.10.

13.9.60 It is predicted that the sensitivity of known marine archaeological and cultural heritage receptors impacted by compression effects from cable laying activities is negligible to high (Table 13.13).

13.9.61 Considering the magnitude of impact and receptor sensitivity within the significance of effect matrix (Table 13.12) on marine archaeological and cultural heritage receptors potentially effected by compression from cable laying activities, the magnitude of impact is assessed as negligible and the sensitivity of the receptor as negligible to high. The significance of effect has therefore been assessed as minor to negligible and the effect is consequently considered **not significant** in EIA terms.

### **Impact 8**

13.9.62 Direct impacts by penetration effects of jack-up barges and anchoring of construction vessels during various activities leading to total or partial loss of marine archaeological and cultural heritage receptors.

### *Magnitude of Impact*

13.9.63 Penetration impacts as a result of vessel operations on marine archaeological and cultural heritage receptors may lead to direct impact and total or partial loss of marine archaeological and cultural heritage receptors. If a direct impact occurs, it will generally be local, major, and adverse or irreversible and result in a permanent change to the receptor meaning high impact of magnitude as detailed in Table 13.10.

### *Sensitivity of the Receptor*

13.9.64 The sensitivity of the marine archaeological and cultural heritage receptors potentially impacted by sediment removal activities and identified within the marine archaeology study area is considered to be negligible to high as defined in Table 13.11. The sensitivity of the known marine archaeological and cultural heritage receptors potentially impacted by penetration effect from vessel operations is detailed in Table 13.13.

### *Significance of Effect*

13.9.65 As per embedded mitigation outlined in Table 13.9 locations on the seabed of potential and confirmed marine archaeological and cultural heritage receptors are informed by the archaeological assessment of geophysical and geotechnical data and AEZs have been recommended (see document 8.5).

13.9.66 Mitigation by avoidance aims to ensure that there is no direct, indirect, or permanent impact on marine archaeological and cultural heritage receptors within the marine archaeology study area meaning a negligible magnitude of impact as defined in Table 13.10.

13.9.67 Where avoidance is not possible or in case of not yet located marine archaeological and cultural heritage receptors, further mitigation and archaeological works are detailed in the Outline Marine WSI (see document 8.5), and associated documents to ensure negligible magnitude of impact as defined in Table 13.10.

13.9.68 It is predicted that the sensitivity of known marine archaeological and cultural heritage receptors impacted by penetration effects from vessel operations is negligible to high (Table 13.13).

13.9.69 Considering the magnitude of impact and receptor sensitivity within the significance of effect matrix (Table 13.12) on marine archaeological and cultural heritage receptors potentially effected by penetration effects from vessel operations, the magnitude of impact is assessed as negligible and the sensitivity of the receptor as negligible to high. The significance of effect has therefore been assessed as minor to negligible and the effect is consequently considered **not significant** in EIA terms.

### **Impact 9**

13.9.70 Direct impacts by compression effects of jack-up barges and anchoring of construction vessels during various activities leading to total or partial loss of marine archaeological and cultural heritage receptors.

### *Magnitude of Impact*

13.9.71 Compression impacts as a result of vessel operations on marine archaeological and cultural heritage receptors may lead to direct impact and total or partial loss of marine archaeological and cultural heritage receptors. If a direct impact occurs, it will generally be local, major, and adverse or irreversible and result in a permanent change to the receptor meaning high impact of magnitude as detailed in Table 13.10.

### *Sensitivity of the Receptor*

13.9.72 The sensitivity of the marine archaeological and cultural heritage receptors potentially impacted by sediment removal activities and identified within the marine archaeology study area is considered to be negligible to high as defined in Table 13.11. The sensitivity of the known marine archaeological and cultural heritage receptors potentially impacted by compression effect from vessel operations is detailed in Table 13.13.

### *Significance of Effect*

13.9.73 As per embedded mitigation outlined in Table 13.9 locations on the seabed of potential and confirmed marine archaeological and cultural heritage receptors are informed by the archaeological assessment of geophysical and geotechnical data and AEZs have been recommended (see document 8.5).

13.9.74 Mitigation by avoidance aims to ensure that there is no direct, indirect, or permanent impact on marine archaeological and cultural heritage receptors within the marine archaeology study area meaning a negligible magnitude of impact as defined in Table 13.10.

13.9.75 Where avoidance is not possible or in case of not yet located marine archaeological and cultural heritage receptors, further mitigation and archaeological works are detailed in the Outline Marine WSI (see document 8.5), and associated documents to ensure negligible magnitude of impact as defined in Table 13.10.

13.9.76 It is predicted that the sensitivity of known marine archaeological and cultural heritage receptors impacted by compression effects from vessel operations is negligible or high (Table 13.13).

13.9.77 Considering the magnitude of impact and receptor sensitivity within the significance of effect matrix (Table 13.12) on marine archaeological and cultural heritage receptors potentially effected by compression effects from vessel operations, the magnitude of impact is assessed as negligible and the sensitivity of the receptor as negligible to high. The significance of effect has therefore been assessed as minor to negligible and the effect is consequently considered **not significant** in EIA terms.

### **Impact 10**

13.9.78 Indirect impacts causing disturbance of sediment containing potential marine archaeological and cultural heritage receptors (material and context) leading to the exposure of those marine archaeological and cultural heritage receptors to natural, chemical or biological processes and indirectly causing or accelerating their loss.

### *Magnitude of Impact*

13.9.79 Magnitude of indirect impact on marine archaeological and cultural heritage receptors from sediment disturbance may lead to exposure of those marine archaeological and cultural heritage receptors to natural, chemical, or biological processes and indirectly cause or accelerate their loss. If an indirect impact occurs, it will generally be local, major, and adverse or irreversible and result in a permanent change to the receptor meaning high impact of magnitude as detailed in Table 13.9.

### *Sensitivity of the Receptor*

13.9.80 The sensitivity of the marine archaeological and cultural heritage receptors identified within the marine archaeology study area is considered to be negligible to high as defined in Table 13.11. The sensitivity of the known marine archaeological and cultural heritage receptors potentially impacted by sediment disturbance is detailed in Table 13.12.

### *Significance of Effect*

13.9.81 As per embedded mitigation outlined in Table 13.9 locations on the seabed of potential and confirmed marine archaeological and cultural heritage receptors are informed by the archaeological assessment of geophysical and geotechnical data and AEZs have been recommended (see document 8.5).

13.9.82 Mitigation by avoidance aims to ensure that there is no direct, indirect, or permanent impact on marine archaeological and cultural heritage receptors within the marine archaeology study area meaning a negligible magnitude of impact as defined in Table 13.10.

13.9.83 Where avoidance is not possible or in case of not yet located marine archaeological and cultural heritage receptors further mitigation and archaeological works are detailed in the Outline Marine WSI (see document 8.5), and associated documents to ensure negligible magnitude of impact as defined in Table 13.10.

13.9.84 It is predicted that the sensitivity of known marine archaeological and cultural heritage receptors impacted by sediment disturbance is negligible to high (Table 13.11).

13.9.85 Considering the magnitude of impact and receptor sensitivity within the significance of effect matrix (Table 13.12) on marine archaeological and cultural heritage receptors potentially effected by sediment disturbance, the magnitude of impact is assessed as negligible and the sensitivity of the receptor as negligible to high. The significance of effect has therefore been assessed as minor to negligible and the effect is consequently considered **not significant** in EIA terms.

### **Impact 11**

13.9.86 Indirect impacts causing changes to the Historic Seascape Character as a result of construction and survey vessel activities and the addition of cables, foundations, Offshore Platforms and WTGs indirectly leading to changes to the perceived historic use of the seascape during the construction phase.



### *Magnitude of Impact*

- 13.9.87 Magnitude of indirect impact on the HSC during the construction phase has been assessed according to the criteria outlined in Table 13.10 and is taking into account the embedded mitigations as outlined in Table 13.9.
- 13.9.88 HSC has been used in this assessment as a measure to provide a contextual and regional approach to the marine archaeology study area. Historic seascapes cannot be physically destroyed or damaged but impacts on them can change their historic character and the perception surrounding them.
- 13.9.89 The HSC can be defined by its dynamic nature and ability to accommodate change. Perceptions of the seascape are also dynamic and subject to public awareness, time, and place. The intertidal and marine zones are ever changing due to physical processes such as currents, tidal range, and sediment mobility. Considering this dynamism and the multiple dimensions defined by HSC, people create complex spatial relationships within and across all marine levels, reflected within the sites of cultural activity and their material imprints.
- 13.9.90 The presence of construction vessels is considered to be comparatively inconsequential considering the current marine activity within the marine archaeology study area. The inshore activities at landfall will be short term and small scale with temporary use of larger construction vessels, as outlined in the assumed maximum impact table (Table 13.8).
- 13.9.91 The addition of cables on the sub seafloor and seafloor is unlikely to enter the perception of the public, and therefore are unlikely to change the public perception of seascape. Foundations within the water column and sea surface will likely contribute to a change in people's perception of the HSC. This can be a positive, negative, or neutral change which is dependent on personal experience of the area and will continue to be a subjective perception over time.
- 13.9.92 The magnitude of impact on marine archaeological and cultural heritage receptors on HSC, specifically the installation of cables on the sub seafloor and seafloor, foundations within the water column and sea surface and WTGs above the sea surface during the construction phase is likely to contribute to minor to negligible and indistinguishable level of change and the magnitude of impact is therefore assessed as low to negligible (Table 13.10).
- 13.9.93 It should be noted that changes to the visible elements of the shore and the sea surface have been assessed further in Volume 1, Chapter 17, and therefore this chapter only considers the historic aspects of Seascape Characterisation.

### *Sensitivity of the Receptor*

- 13.9.94 The sensitivity of the Broad Historic Character Types identified within proposed development is assessed in terms of their ability to adapt to change, as outlined in Section 13.4.
- 13.9.95 The existing seascape within the marine archaeology study area is known for its marine and intertidal historic character utilised mainly for Navigation, Industry, Fishing, Ports and Docks, Coastal Infrastructure, Military, Cultural Topography, Settlements and Recreation.

13.9.96 HSC relates to the historic dimension of the present-day seascape and considers the added effect of the Project within the multiple dimensions of the marine environment (sub seafloor, seafloor, water column, sea surface, coastal land and previous historic character) in combination with the existing activity within the Broad Historic Character Types, as detailed in Section 13.4 and Volume 2, Appendix 13.1 and summarised in Table 13.14.

Table 13.14: Changes to the Historic Seascape Character (HSC) During Construction

Broad Character Types	Historic Character	Perception of the Historic Seascape Character	Changes to Perception (Sensitivity of the Receptor)
Navigation (activities, maritime safety, and hazards)		This area along the east coast has historically been an area of intensive navigation activities and as such has demonstrated its capacity to accommodate change and growth over time.	Positive perceived change: the addition of temporary vessel activities in a busy navigational area is not expected to contribute to change. However, the addition of safety infrastructure as part of the offshore windfarm has the potential to lead to safer navigation, (see Volume 2, Appendix 15.1 Navigational Risk Assessment (PEIR document reference 6.2.15.1)).
Industry (extractive, energy, processing, shipping)		Industry in its many forms has been and continues to be one of the dominant influences on the character across coastal, intertidal, and marine areas at all levels around the UK. There are 13 offshore windfarms covered in the cumulative effects assessment (CEA) (Table 13.19).	No perceived change: the addition the Project's infrastructure as a source of renewable energy would contribute to the existing perception of the HSC, adding to a sense of a modern and sustainable industry. See also Volume 1, Chapter 17.
Fishing		The fishing industry of the Eastern England region has been evidenced since prehistoric times. Commercial trawling since the 1800s has affected the nature of development in places like Hull and Grimsby, with deep economic and cultural attachments associated with fishing.	No perceived change: while some areas may be temporarily unavailable for fishing during the construction phase, in the long term no change to HSC as a result of the Project is expected in either local or offshore fishing industries. Also see Volume 1, Chapter 14 Commercial Fisheries (PEIR document reference 6.1.14).
Ports and Docks		The Eastern England contains numerous examples of small hards (consolidated loading platforms), quays and landing places and major ports including docks, ferry	No change perceived: the HSC of ports and docks is not expected to be altered during the construction phase of the Project.

Broad Character Types	Historic Perception of the Historic Seascape Character	Changes to Perception (Sensitivity of the Receptor)
	<p>terminals and car terminals. Although many of the port locations may be inaccessible to the public, the harbours contain an amenity value which is linked to recreational and leisure activities such as sailing and wildlife watching. The ports of Grimsby and Boston are covered in the CEA (Table 13.19).</p>	<p>Volume 1, Chapter 20 includes an assessment of the Historic Landscape Character (HLC) of quays. Volume 1, Chapter 17 includes baseline views of ports and quays.</p>
Coastal Infrastructure (flood and erosion defences)	<p>Sea, flood, and erosion defences are generally seen as essential for the preservation of settlements along the eastern coast of England for protecting property by preventing erosion and providing flood protection which conserves the economic value and provides residents with reassurance. Approaches vary from ‘hard’ defences such as sea walls, which absorb or reflect wave energy, and ‘soft’, nature-based solutions which encourage natural systems, such as beaches and salt marshes which protect the coast.</p>	<p>No perceived change: the HSC of the coastal infrastructure is not expected to be altered during the construction phase of the Project. Volume 1, Chapter 20 includes an assessment of the HLC of coastal infrastructure. Volume 1, Chapter 17 includes baseline views of coastal infrastructure.</p>
Communications (transport, telecommunications)	<p>Coastally specific and maritime-related infrastructure includes canals, motorways, main roads, railways, and airports which enable people to settle in and visit coastal regions. Railways were an important element in the early industrial period as they allowed more efficient transport of imported goods and fish around the country. They continue to be maintained and used for recreational activities. The presence of submarine telecommunication cables is likely to be known only to those who were directly involved in their construction and operation and</p>	<p>No perceived change: while railways are an integral part of the present social and cultural landscape their use and perception are now predominantly recreational rather than commercial or industrial. Modern society is dependent on submarine telecommunication cables; however, the current public perception of such infrastructure is understood to be minimal, and this is unlikely to change during the construction of the Project.</p>

Broad Character Types	Historic Perception of the Historic Seascape Character	Changes to Perception (Sensitivity of the Receptor)
	<p>the communications infrastructure. In spite of the importance of transport and telecommunications in the daily lives of the public, their perception of the communications type is limited and based on the results of communications rather than their presence.</p>	
<p>Military defence fortification)</p> <p>(military and</p>	<p>Military coastal defences and military bases can be found all along the eastern coast. Examples range from Roman forts to those currently in use, as well as numerous records of military and aircraft battle sites and wreck sites.</p>	<p>Positive perceived change: active bases and abandoned military heritage bear witness to the UK's important military history. However, the impacts on HSC during the construction phase of the Project can be positive, ensuring increased protection and mitigation of impact on heritage receptors. Effects arising through change to HLC to military sites and remains are covered in Volume 1, Chapter 20. Potential indirect and direct impacts on marine archaeological and cultural heritage receptors and recorded wrecks of military importance are assessed in Sections 13.9 to 0.</p>
<p>Settlements (urban)</p>	<p>The coastal area of the Eastern England region is densely populated. It includes a variety of coastal settlement types, major cities, tourist resorts and smaller fishing towns and villages.</p>	<p>Positive perceived change: the construction phase is not anticipated to alter public perception of the HSC but has the potential to contribute to the perception of how the seascape connects to our past and changes with our future.</p>
<p>Recreation sports, recreational swimming, watching)</p> <p>(water boating, diving, wildlife</p>	<p>Recreational enjoyment of the coast has a long history in the UK and tourism is an important source of income.</p>	<p>Positive perceived change: while some areas may be temporarily unavailable for recreational activities during the construction phase, these areas will be accessible once more in the long term. Additionally, there is</p>

Broad Character Types	Historic Perception of the Historic Seascape Character	Changes to Perception (Sensitivity of the Receptor)
		potential for improved public awareness of historic and recreational dive areas following the identification of wreck locations during archaeological surveys, leading to greater understanding, respect and enjoyment of the seascape. Potential indirect and direct impacts on marine archaeological and cultural heritage receptors, such as wrecks, within the marine archaeology study area are assessed in Sections 13.9 to 0.
Cultural Topography (palaeolandscape component)	The relevance of these to HSC is as areas of former human habitat with evidence for past topographical and ecological regimes. The contexts of these shaping much earlier human cultural activity and landscape perceptions.	Positive perceived change: the planned and undertaken geoarchaeological campaigns both in the offshore zone and on land will contribute to a greater understanding and appreciation of past topographical and ecological regimes. The potential for survival of palaeolandscape components and submerged archaeology in the marine environment and deposits in the study area is further discussed in Section 13.6. The cultural topography landward is discussed in Volume 1, Chapter 20.
Woodland	Coastal woodland has been important in providing timber and other materials for boat building and other coastally focussed activities. Patterns of woodland also form distinctive elements of the coastal landscape visible from the sea, aiding position-finding and natural navigation.	No perceived change: the HSC of woodlands is not expected to be altered during the construction phase of the Project. Volume 1, Chapter 20 includes an assessment of HLC of woodland. Volume 1, Chapter 17 includes baseline views of woodland.
Enclosed (reclaimed land)	Land Reclamation in this area is from tidal marsh, usually saltmarsh, or wetland, with some areas being returned to saltmarsh as a buffer	No perceived change: the HSC of enclosed lands is not expected to be altered during the construction phase of the Project.

Broad Character Types	Historic Perception of the Historic Seascape Character	Changes to Perception (Sensitivity of the Receptor)
	<p>against rising sea levels and storm surges.</p> <p>The current historical seascape perception of enclosed land is limited and more relevant in the perception of the HLC.</p>	<p>Volume 1, Chapter 20 includes an assessment of HLC of enclosed land.</p> <p>Volume 1, Chapter 17 includes baseline views of enclosed land.</p>
Unimproved Land	<p>The two main examples of unimproved land within the study area are scrub an intermediate stage between grassland and woodland which provides a habitat for many rare plant and animal species; and rough grassland, which is dominated by un-intensively managed grassland, often the result of long traditions of coastal rough grazing, but in some areas reintroduced as a conservation measure to prevent land reverting to scrub.</p> <p>The current historic seascape perception of enclosed land is limited and more relevant in the perception of the HLC.</p>	<p>No perceived change: the HSC of unimproved land is not expected to be altered during the construction phase of the Project.</p> <p>Volume 1, Chapter 20 includes an assessment of HLC of unimproved land.</p> <p>Volume 1, Chapter 17 includes baseline views of unimproved land.</p>

### *Significance of Effect*

- 13.9.97 The commitment to undertake further archaeological works throughout the life of the Project are detailed in the Outline Marine WSI (see document 8.5), and associated documents (Table 13.9). This includes ensuring that HSC assessments are included throughout the life of the Project, where relevant.
- 13.9.98 Considering the magnitude of impact and receptor sensitivity within the significance of effect matrix (Table 13.12) on the HSC, the magnitude of impact is assessed as low to negligible and the sensitivity of the receptor as negligible. The significance of effect has therefore been assessed as Negligible (Not significant) and the effect is consequently considered **not significant** in EIA terms.

## Operations and Maintenance

13.9.99 Activities associated with the operational phase that have the potential to impact marine archaeological and cultural heritage receptors directly or indirectly are considered here. The magnitude of all outline impacts on marine archaeological and cultural heritage receptors has been assessed according to the criteria outlined in Table 13.10 and is taking into account the embedded mitigation as outlined in Table 13.9. The assumed maximum impact table (Table 13.8), demonstrates that potential direct and indirect impact during the operational phase is possible within the marine archaeology study area and outlines relevant parameters.

13.9.100 If, as a result of the activities associated with the operational phase, any marine archaeological and cultural heritage receptors are subject to increased sedimentation that covers and so protects the receptor, the marine archaeological and cultural heritage receptors might benefit from the conditions which could provide a higher level of preservation *in situ* and therefore a beneficial magnitude of impact.

13.9.101 The sensitivity of the marine archaeological and cultural heritage receptors identified within the marine archaeology study area takes into account both the impact of magnitude (Table 13.10) and the sensitivity of those receptors as a result of potential impact during the operational phase. Professional judgement based on the guidance set out by the Department for Culture, Media and Sport (2013) has also been applied. The sensitivity of the known marine archaeological and cultural heritage receptors potentially impacted during the operation phase are detailed in Table 13.15.

13.9.102 This section presents the assessment of impacts arising from the operations and maintenance phase of the Project. It is important to note that at this stage only geophysical data for within the array area has been assessed and there are data gaps that will be filled which will inform the identification and potential archaeological significance of the records within the marine archaeology study area.

Table 13.15: Receptor Sensitivity (value): Operational Phase

No.	Marine Archaeological and Cultural Heritage Receptors	Receptor Sensitivity (Value)
13	High potential anomalies	High
33	Medium potential anomalies	Medium
1107	Low potential anomalies	High to Low
10	High significance (archaeological term) known wrecks	High
3	Medium significance (archaeological term) known wrecks	High/Medium
3	Low significance (archaeological term) known wrecks	High/Medium
22	Unknown significance (archaeological term) known wrecks	Unknown
8	Channels, valleys and deposits of geoarchaeological potential	High to Low

## Impact 12

13.9.103 Direct impact by penetration leading to disturbance effects of maintenance activities at WTGs, Offshore Platforms and along all cables leading to total or partial loss of marine archaeological and cultural heritage receptors.

### *Magnitude of Impact*

13.9.104 Direct impacts as a result of maintenance activities on marine archaeological and cultural heritage receptors may lead to direct impact and total or partial loss of marine archaeological and cultural heritage receptors. If a direct impact by penetration occurs, it will generally be local, major, and adverse or irreversible and result in a permanent change to the receptor, meaning high magnitude of impact as detailed in Table 13.10.

### *Sensitivity of the Receptor*

13.9.105 The sensitivity of the marine archaeological and cultural heritage receptors identified within the marine archaeology study area is considered to be negligible to high as defined in Table 13.11. The sensitivity of the known marine archaeological and cultural heritage receptors potentially impacted by maintenance activities is detailed in Table 13.15.

### *Significance of Effect*

13.9.106 As per embedded mitigations outlined in Table 13.9, locations on the seabed of potential and confirmed marine archaeological and cultural heritage receptors are informed by the archaeological assessment of geophysical and geotechnical data and AEZs have been recommended (see document 8.5).

13.9.107 Mitigation by avoidance aims to ensure that there is no direct, indirect, or permanent impact on marine archaeological and cultural heritage receptors within the marine archaeology study area meaning a negligible magnitude of impact as defined in Table 13.10.

13.9.108 Where avoidance is not possible or in case of not yet located marine archaeological and cultural heritage receptors further mitigation and archaeological works are detailed in the Outline Marine WSI (see document 8.5) and associated documents to ensure negligible magnitude of impact as defined in Table 13.10.

13.9.109 It is predicted that the sensitivity of known marine archaeological and cultural heritage receptors impacted by maintenance activities is negligible to high (Table 13.15).

13.9.110 Considering the magnitude of impact and receptor sensitivity within the significance of effect matrix (Table 13.12) on marine archaeological and cultural heritage receptors potentially effected by maintenance activities, the magnitude of impact is assessed as negligible and the sensitivity of the receptors as negligible to high. The significance of effect has therefore been assessed as minor to negligible and the effect is consequently considered **not significant** in EIA terms.

## Impact 13

13.9.111 Direct impact by compression leading to disturbance effects of maintenance activities at WTGs, Offshore Platforms and along all cables leading to total or partial loss of marine archaeological and cultural heritage receptors.



### *Magnitude of Impact*

13.9.112 Direct impacts as a result of maintenance activities on marine archaeological and cultural heritage receptors may lead to direct impact and total or partial loss of marine archaeology receptors. If a direct impact by compression occurs, it will generally be local, major and adverse or irreversible and result in a permanent change to the receptor, meaning high magnitude of impact as detailed in Table 13.10.

### *Sensitivity of the Receptor*

13.9.113 The sensitivity of the marine archaeological and cultural heritage receptors identified within the marine archaeology study area is considered to be negligible to high as defined in Table 13.11. The sensitivity of the known marine archaeological and cultural heritage receptors potentially impact by maintenance activities is detailed in Table 13.15.

### *Significance of Effect*

13.9.114 As per embedded mitigations outlined in Table 13.9, locations on the seabed of potential and confirmed marine archaeological and cultural heritage receptors are informed by the archaeological assessment of geophysical and geotechnical data and AEZs have been recommended (see document 8.5).

13.9.115 Mitigation by avoidance aims to ensure that there is no direct, indirect, or permanent impact on marine archaeological and cultural heritage receptors within the marine archaeology study area meaning a negligible magnitude of impact as defined in Table 13.10.

13.9.116 Where avoidance is not possible or in case of not yet located marine archaeological and cultural heritage receptors further mitigation and archaeological works are detailed in the Outline Marine WSI (see document 8.5), and associated documents to ensure negligible magnitude of impact as defined in Table 13.10.

13.9.117 It is predicted that the sensitivity of known marine archaeological and cultural heritage receptors impacted by maintenance activities is negligible to high (Table 13.15).

13.9.118 Considering the magnitude of impact and receptor sensitivity within the significance of effect matrix (Table 13.12) on marine archaeological and cultural heritage receptors potentially effected by maintenance activities, the magnitude of impact is assessed as negligible and the sensitivity of the receptors as negligible to high. The significance of effect has therefore been assessed as minor to negligible and the effect is consequently considered **not significant** in EIA terms.

### **Impact 14**

13.9.119 Direct impacts by penetration effects of jack-up barges and anchoring of O&M vessels during various activities at WTGs, Offshore Platforms and along all cables leading to total or partial loss of marine archaeological and cultural heritage receptors.

### *Magnitude of Impact*

13.9.120 Direct impacts as a result of vessel activities on marine archaeological and cultural heritage receptors may lead to direct impact and total or partial loss of marine archaeological and cultural heritage receptors. If a direct impact occurs, it will generally be local, major, and adverse or irreversible and result in a permanent change to the receptor, meaning high magnitude of impact as detailed in Table 13.10.

### *Sensitivity of the Receptor*

13.9.121 The sensitivity of the marine archaeological and cultural heritage receptors identified within the marine archaeology study area is considered to be negligible to high as defined in Table 13.11. The sensitivity of the known marine archaeological and cultural heritage receptors potentially impacted by vessel activities is detailed in Table 13.15.

### *Significance of Effect*

13.9.122 As per embedded mitigations outlined in Table 13.9, locations on the seabed of potential and confirmed marine archaeological and cultural heritage receptors are informed by the archaeological assessment of geophysical and geotechnical data and AEZs have been recommended (see document 8.5).

13.9.123 Mitigation by avoidance aims to ensure that there is no direct, indirect, or permanent impact on marine archaeological and cultural heritage receptors within the marine archaeology study area meaning a negligible magnitude of impact as defined in Table 13.10.

13.9.124 Where avoidance is not possible or in case of not yet located marine archaeological and cultural heritage receptors further mitigation and archaeological works are detailed in the Outline Marine WSI (see document 8.5), and associated documents to ensure negligible magnitude of impact as defined in Table 13.10.

13.9.125 It is predicted that the sensitivity of known heritage receptors impacted by vessel activities is negligible to high (Table 13.15).

13.9.126 Considering the magnitude of impact and the receptor sensitivity within the significance of effect matrix (Table 13.12) on marine archaeological and cultural heritage receptors potentially effected by vessel activities, the magnitude of impact is assessed as negligible, and the sensitivity of the receptor is negligible to high. The significance of effect has therefore been assessed as minor to negligible and the effect is consequently considered **not significant** in EIA terms.

### **Impact 15**

13.9.127 Direct impacts by compression effects of jack-up barges and anchoring of O&M vessels during various activities at WTGs, Offshore Platforms and along all cables leading to total or partial loss of marine archaeological and cultural heritage receptors.

### *Magnitude of Impact*

13.9.128 Direct impacts as a result of vessel activities on marine archaeological and cultural heritage receptors may lead to direct impact and total or partial loss of marine archaeological and cultural heritage receptors. If a direct impact occurs, it will generally be local, major and adverse or irreversible and result in a permanent change to the receptor, meaning high magnitude of impact as detailed in Table 13.10.

### *Sensitivity of the Receptor*

13.9.129 The sensitivity of the marine archaeological and cultural heritage receptors identified within the marine archaeology study area is considered to be negligible to high as defined in Table 13.11. The sensitivity of the known marine archaeological and cultural heritage receptors potentially impacted by vessel activities is detailed in Table 13.15.

### *Significance of Effect*

13.9.130 As per embedded mitigations outlined in Table 13.9, locations on the seabed of potential and confirmed marine archaeological and cultural heritage receptors are informed by the archaeological assessment of geophysical and geotechnical data and AEZs have been recommended (see document 8.5).

13.9.131 Mitigation by avoidance aims to ensure that there is no direct, indirect, or permanent impact on marine archaeological and cultural heritage receptors within the marine archaeology study area meaning a negligible magnitude of impact as defined in Table 13.10.

13.9.132 Where avoidance is not possible or in case of not yet located marine archaeological and cultural heritage receptors further mitigation and archaeological works are detailed in the Outline Marine WSI (see document 8.5), and associated documents to ensure negligible magnitude of impact as defined in Table 13.10.

13.9.133 It is predicted that the sensitivity of known heritage receptors impacted by vessel activities is negligible to high (Table 13.15).

13.9.134 Considering the magnitude of impact and the receptor sensitivity within the significance of effect matrix (Table 13.12) on marine archaeological and cultural heritage receptors potentially effected by vessel activities, the magnitude of impact is assessed as negligible, and the sensitivity of the receptor is negligible to high. The significance of effect has therefore been assessed as minor to negligible and the effect is consequently considered **not significant** in EIA terms.

### **Impact 16**

13.9.135 Indirect impacts causing disturbance of sediment containing potential marine archaeological and cultural heritage receptors during maintenance activities leading to the exposure of those marine archaeological and cultural heritage receptors to natural, chemical, or biological processes and indirectly causing or accelerating their loss.

### *Magnitude of Impact*

13.9.136 Magnitude of indirect impact on marine archaeological and cultural heritage receptors of sediment disturbance during maintenance activities may lead to exposure of those marine archaeological and cultural heritage receptors to natural, chemical, or biological processes and indirectly cause or accelerate their loss. If an indirect impact occurs, it will generally be local, major, and adverse or irreversible and result in a permanent change to the receptor meaning high magnitude of impact as detailed in Table 13.10.

### *Sensitivity of the Receptors*

13.9.137 The sensitivity of the marine archaeological and cultural heritage receptors identified within the marine archaeology study area is considered to be negligible to high as defined in Table 13.11. The sensitivity of the known marine archaeological and cultural heritage receptors potentially impacted by sediment disturbance during maintenance activities is detailed in Table 13.15.

### *Significance of Effect*

13.9.138 As per embedded mitigations outlined in Table 13.9, locations on the seabed of potential and confirmed marine archaeological and cultural heritage receptors are informed by the archaeological assessment of geophysical and geotechnical data and AEZs have been recommended (see document 8.5).

13.9.139 Mitigation by avoidance aims to ensure that there is no direct, indirect, or permanent impact on marine archaeological and cultural heritage receptors within the marine archaeology study area meaning a negligible magnitude of impact as defined in Table 13.10.

13.9.140 Where avoidance is not possible or in case of not yet located marine archaeological and cultural heritage receptors further mitigation and archaeological works are detailed in the Outline Marine WSI (see document 8.5), and associated documents to ensure negligible magnitude of impact as defined in Table 13.10.

13.9.141 It is predicted that the sensitivity of known heritage receptors impacted during the operations phase is negligible to high (Table 13.15).

13.9.142 Considering the magnitude of impact and the receptor sensitivity within the significance of effect matrix (Table 13.12) on marine archaeological and cultural heritage receptors potentially effected during the operations phase, the magnitude of impact is assessed as negligible, and the sensitivity of the receptor is negligible to high. The significance of effect has therefore been assessed as minor to negligible and the effect is consequently considered **not significant** in EIA terms.

### **Impact 17**

13.9.143 Indirect impacts causing scour effects as a result of the presence of WTGs, Offshore Platforms and the exposure of cables or the use of cable protection measures leading to the exposure of those marine archaeological and cultural heritage receptors to natural, chemical or biological processes causing or accelerating their loss.

### *Magnitude of Impact*

13.9.144 Magnitude of indirect impact on marine archaeological and cultural heritage receptors of sediment disturbance as a result of scour may lead to exposure of those marine archaeological and cultural heritage receptors to natural, chemical or biological processes and indirectly cause or accelerate their loss. If an indirect impact occurs, it will generally be local, major, and adverse or irreversible and result in a permanent change to the receptor meaning high magnitude of impact as detailed in Table 13.10.

### *Sensitivity of the Receptor*

13.9.145 The sensitivity of the marine archaeological and cultural heritage receptors identified within the marine archaeology study area is considered to be negligible to high as defined in Table 13.11. The sensitivity of the known marine archaeological and cultural heritage receptors potentially impacted by sediment disturbance as a result of scour is detailed in Table 13.15.

### *Significance of Effect*

13.9.146 As per embedded mitigations outlined in Table 13.9, locations on the seabed of potential and confirmed marine archaeological and cultural heritage receptors are informed by the archaeological assessment of geophysical and geotechnical data and AEZs have been recommended (see document 8.5).

13.9.147 Mitigation by avoidance aims to ensure that there is no direct, indirect, or permanent impact on marine archaeological and cultural heritage receptors within the marine archaeology study area meaning a negligible magnitude of impact as defined in Table 13.10.

13.9.148 Where avoidance is not possible or in case of not yet located marine archaeological and cultural heritage receptors further mitigation and archaeological works are detailed in the Outline Marine WSI (see document 8.5), and associated documents to ensure negligible magnitude of impact as defined in Table 13.10.

13.9.149 It is predicted that the sensitivity of known heritage receptors impacted by scour effects is negligible to high (Table 13.15).

13.9.150 Considering the magnitude of impact and the receptor sensitivity within the significance of effect matrix (Table 13.12) on marine archaeological and cultural heritage receptors potentially effected by scour effects, the magnitude of impact is assessed as negligible, and the sensitivity of the receptor is negligible to high. The significance of effect has therefore been assessed as minor to negligible and the effect is consequently considered **not significant** in EIA terms.

### **Impact 18**

13.9.151 Indirect impacts causing changes to the Historic Seascape Character as a result of O&M vessel activities and the presence of the completed windfarm indirectly leading to changes to the perceived historic use of the seascape during the operation phase.

### *Magnitude of Impact*

13.9.152 Magnitude of indirect impact on the HSC during the operations phase has been assessed according to the criteria outlined in Table 13.10 and is taking into account the embedded mitigations as outlined in Table 13.9.

- 13.9.153 HSC has been used in this assessment as a measure to provide a contextual and regional approach to the marine archaeology study area. Historic seascapes cannot be physically destroyed or damaged but impacts to them can change their historical character and the perception surrounding them.
- 13.9.154 The HSC can be defined by its dynamic nature and ability to accommodate change. Perceptions of the seascape are also dynamic and subject to public awareness, time, and place. The intertidal and marine zones are ever changing due to physical processes such as currents, tidal range, and sediment mobility. Considering this dynamism and the multiple dimensions defined by the HSC, people create complex spatial relationships within and across all marine levels. Reflected within the sites of cultural activity and their material imprints.
- 13.9.155 The presence of O&M vessels is considered to be comparatively inconsequential considering the current marine activity within the marine archaeology study area. The inshore activities at landfall will be short term and small scale with temporary use of larger construction vessels, as outlined in the assumed maximum impact table (Table 13.8).
- 13.9.156 The presence of cables on the sub seafloor and seafloor is unlikely to enter the perception of the public and therefore unlikely to change the public perception of seascape. Foundations within the water column and sea surface will likely contribute to a change in people's perception of the HSC. This can be a positive, negative, or neutral change, which is dependent on the personal experience of the area and will continue to be a subjective perception over time.
- 13.9.157 The magnitude of impact on marine archaeological and cultural heritage receptors on HSC, specifically the presence of cables on the sub seafloor and seafloor, foundations within the water column and sea surface and WTGs above the during the operational phase is likely to contribute to minor to negligible and indistinguishable level of change and the magnitude of impact is therefore assessed as low to negligible (Table 13.10).
- 13.9.158 It should be noted that changes to the visible elements of the shore and sea surface have been further assessed in Volume 1, Chapter 17, and therefore this chapter only considers the historic aspects of the seascape characterisation.

#### *Sensitivity of the Receptor*

- 13.9.159 The sensitivity (value) of the Broad Historic Character types identified within the proposed development is assessed in terms of their ability to adapt to change as outlined in Section 13.4.
- 13.9.160 The existing seascape of the marine archaeology study area is known for its marine and intertidal historic character utilised mainly for Navigation, Industry, Fishing and Cultural Topography.
- 13.9.161 HSC refers to the historic dimension of the present-day seascape and considers the added effect of the Project within the multiple dimensions of the marine environment (sub seafloor, seafloor, water column, sea surface, coastal land and historic character) in combination with the existing activity within the Broad Historic Character types, as detailed in Section 13.4 and Volume 2, Appendix 13.1 and summarised in Table 13.16.

Table 13.16: Changes to the Historic Seascape Characterisation (HSC) During Operation

Broad Character Types	Historic Character	Perception of the Historic Seascape Character	Changes to Perception (Sensitivity of the Receptor)
Navigation (activities, maritime safety and hazards)		This area along the east coast has historically been an area of intensive navigation activities and as such has demonstrated its capacity to accommodate change and growth over time.	Positive perceived change: the presence of OSSs and WTGs will alter the navigational routes slightly, but all infrastructure will be fitted with navigational aids, such as warning lights, facilitating easier navigation. Further the addition of temporary vessel activities during the O&M phase in a busy navigational area is not expected to contribute to changes to the HSC (see Volume 1, Chapter 15: Shipping and Navigation (PEIR document reference 6.1.15)).
Industry (extractive, energy, shipping)	(extractive, processing, shipping)	Industry in its many forms has been and continues to be one of the dominant influences on the character across coastal, intertidal, and marine areas at all levels around the UK. There are 13 offshore windfarms covered in the CEA (Table 13.19).	No perceived change: the addition the Project's infrastructure as a source of renewable energy would contribute to the existing perception of the HSC, adding to a sense of a modern and sustainable industry. See also Volume 1, Chapter 17.
Fishing		The fishing industry of the Eastern England region has been evidenced since prehistoric times. Commercial trawling since the 1800s has affected the nature of development in places like Hull and Grimsby, with deep economic and cultural attachments associated with fishing.	No perceived change: while some areas may be temporarily unavailable for fishing during the O&M phase, in the long term no change to HSC as a result of the Project is expected in either local or offshore fishing industries. Also see Volume 1, Chapter 14.
Ports and Docks		The Eastern England contains numerous examples of small hard (consolidated loading platforms), quays and landing places and major ports including docks, ferry terminals and car terminals. Although many of the port locations may be inaccessible to the public, the harbours contain an amenity value which is linked to	No change perceived: the HSC of ports and docks is not expected to be altered during the O&M phase of the Project. Volume 1, Chapter 20 includes an assessment of the HLC of quays. Volume 1, Chapter 17 includes baseline views of ports and quays.

Broad Character Types	Historic Perception of the Historic Seascape Character	Changes to Perception (Sensitivity of the Receptor)
	<p>recreational and leisure activities such as sailing and wildlife watching. The ports of Grimsby and Boston are covered in the CEA (Table 13.19).</p>	
<p>Coastal Infrastructure (flood and erosion defences)</p>	<p>Sea, flood and erosion defences are generally seen as essential for the preservation of settlements along the eastern coast of England for protecting property by preventing erosion and providing flood protection which conserves the economic value and provides local residents with reassurance. Approaches vary from ‘hard’ defences such as sea walls, which absorb or reflect wave energy, and ‘soft’, nature-based solutions which encourage natural systems, such as beaches and salt marshes which protect the coast.</p>	<p>No perceived change: the HSC of the coastal infrastructure is not expected to be altered during the O&amp;M phase of the Project. Volume 1, Chapter 20 includes an assessment of the HLC of coastal infrastructure. Volume 1, Chapter 17 includes baseline views of coastal infrastructure.</p>
<p>Communications (transport, telecommunications)</p>	<p>Coastally specific and maritime-related infrastructure includes canals, motorways, main roads, railways, and airports which enable people to settle in and visit coastal regions. Railways were an important element in the early industrial period as they allowed more efficient transport of imported goods and fish around the country. They continue to be maintained and used for recreational activities. The presence of submarine telecommunication cables is likely to be known only to those who were directly involved in their construction and operation and the communications infrastructure. Despite the importance of transport and telecommunications in the daily lives of the public, their perception</p>	<p>No perceived change: while railways are an integral part of the present social and cultural landscape their use and perception are now predominantly recreational rather than commercial or industrial. Modern society is dependent on submarine telecommunication cables; however, the current public perception of such infrastructure is understood to be minimal, and this is unlikely to change following the construction of the Project.</p>



Broad Character Types	Historic Perception of the Historic Seascape Character	Changes to Perception (Sensitivity of the Receptor)
	of the communications type is limited and based on the results of communications rather than their presence.	
Military defence and fortification)	(military and Military coastal defences and military bases can be found all along the eastern coast. Examples range from Roman forts to those currently in use, as well as numerous records of military and aircraft battle sites and wreck sites.	Positive perceived change: active bases and abandoned military heritage bear witness to the UK's important military history. However, the impacts on HSC during the O&M phase of the Project can be positive, ensuring increased protection and mitigation of impact on heritage receptors. Effects arising through change to HLC to military sites and remains are covered in Volume 1, Chapter 20. Potential indirect and direct impacts on marine archaeological and cultural heritage receptors and recorded wrecks of military importance are assessed in Section 13.7.
Settlements (urban)	The coastal area of the Eastern England region is densely populated. It includes a variety of coastal settlement types, major cities, tourist resorts and smaller fishing towns and villages.	Positive perceived change: the O&M phase is not anticipated to alter public perception of the HSC but has the potential to contribute to the perception of how the seascape connects to our past and changes with our future.
Recreation sports, recreational swimming, watching)	(water boating, diving, wildlife Recreational enjoyment of the coast has a long history in the UK and tourism is an important source of income.	Positive perceived change: while some areas may be temporarily unavailable for recreational activities during the O&M phase, these areas will be accessible once more in the long term. Additionally, there is potential for improved public awareness of historic and recreational dive areas following the identification of wreck locations during archaeological surveys, leading to

Broad Character Types	Historic Perception of the Historic Seascape Character	Changes to Perception (Sensitivity of the Receptor)
		<p>greater understanding, respect and enjoyment of the seascape. Potential indirect and direct impacts on marine archaeological and cultural heritage receptors, such as wrecks, within the marine archaeology study area are assessed in Sections 13.9 to 0.</p>
<p>Cultural Topography (palaeolandscape component)</p>	<p>The relevance of these to HSC is as areas of former human habitat with evidence for past topographical and ecological regimes. The contexts of these shaping much earlier human cultural activity and landscape perceptions.</p>	<p>Positive perceived change: the planned and undertaken geoarchaeological campaigns both in the offshore zone and on land will contribute to a greater understanding and appreciation of past topographical and ecological regimes. The potential for survival of palaeolandscape components and submerged archaeology in the marine environment and deposits in the study area is further discussed in Section 13.6. The cultural topography landward is discussed in Volume 1, Chapter 20.</p>
<p>Woodland</p>	<p>Coastal woodland has been important in providing timber and other materials for boat building and other coastally focussed activities. Patterns of woodland also form distinctive elements of the coastal landscape visible from the sea, aiding position-finding and natural navigation.</p>	<p>No perceived change: the HSC of woodlands is not expected to be altered during the O&amp;M phase of the Project. Volume 1, Chapter 20 includes an assessment of HLC of woodland. Volume 1, Chapter 17 includes baseline views of woodland.</p>
<p>Enclosed (reclaimed land)</p>	<p>Reclamation in this area is from tidal marsh, usually saltmarsh, or wetland, with some areas being returned to saltmarsh as a buffer against rising sea levels and storm surges. The current historical seascape perception of enclosed land is limited and more relevant in the perception of the HLC.</p>	<p>No perceived change: the HSC of enclosed lands is not expected to be altered during the O&amp;M phase of the Project. Volume 1, Chapter 20 includes an assessment of HLC of enclosed land. Volume 1, Chapter 17 includes baseline views of enclosed land.</p>

Broad Character Types	Historic Perception of the Historic Seascape Character	Changes to Perception (Sensitivity of the Receptor)
Unimproved Land	<p>The two main examples of unimproved land within the study area are scrub an intermediate stage between grassland and woodland which provides a habitat for many rare plant and animal species; and rough grassland, which is dominated by un-intensively managed grassland, often the result of long traditions of coastal rough grazing, but in some areas reintroduced as a conservation measure to prevent land reverting to scrub.</p> <p>The current historic seascape perception of enclosed land is limited and more relevant in the perception of the HLC.</p>	<p>No perceived change: the HSC of unimproved land is not expected to be altered during the O&amp;M phase of the Project.</p> <p>Volume 1, Chapter 20 includes an assessment of HLC of unimproved land.</p> <p>Volume 1, Chapter 17 includes baseline views of unimproved land.</p>

### *Significance of Effect*

13.9.162 The commitment to undertake further archaeological works throughout the life of the project will be a requirement under the Outline Marine WSI (see document 8.5) and associated documents (Table 13.9). This includes ensuring that HSC assessments where relevant are included throughout the life of the Project.

13.9.163 Considering the magnitude of impact and receptor sensitivity within the significance of effect matrix (Table 13.12) on the HSC, the magnitude of impact is assessed as low to negligible and the sensitivity of the receptor as negligible. The significance of effect has therefore been assessed as Negligible (Not significant) and the effect is consequently considered **not significant** in EIA terms.

### **Decommissioning**

13.9.164 Activities associated with the decommissioning phase that have the potential to impact marine archaeology and cultural heritage receptors directly or indirectly are considered here. The magnitude of all outlined impacts on marine archaeological and cultural heritage receptors has been assessed according to the criteria outlined in Table 13.10 and is taking into account the embedded mitigations as outlined in Table 13.9. The assumed maximum impact table (Table 13.8), demonstrates that potential direct and indirect impact during the operational phase is possible within the marine archaeology study area and outlines relevant parameters.

13.9.165 If, as a result of the activities associated with the decommissioning phase, any marine archaeological and cultural heritage receptors are subject to increased sedimentation that covers and so protects the receptor, the marine archaeological and cultural heritage receptors might benefit from the conditions which could provide a higher level of preservation *in situ* and therefore a beneficial magnitude of impact.

13.9.166 The sensitivity of the marine archaeological and cultural heritage receptors identified within the marine archaeology study area takes into account both the magnitude of impact (Table 13.10) and the sensitivity of those receptors as a result of potential impacts during the operational phase. Professional judgement based on the guidance set out by the Department for Culture, Media and Sport (2013) has also been applied. The sensitivity of the known marine archaeological and cultural heritage receptors potentially impacted during the decommissioning phase are detailed in Table 13.17.

13.9.167 This section presents the assessment of impacts arising from the decommissioning phase of the Project. It is important to note that at this stage only geophysical data for within the array area has been assessed and there are data gaps that will be filled which will inform the identification and potential archaeological significance of the records within the marine archaeology study area.

Table 13.17: Receptor Sensitivity (value): Decommissioning Phase

No.	Marine Archaeological and Cultural Heritage Receptors	Receptor Sensitivity (Value)
13	High potential anomalies	High
33	Medium potential anomalies	Medium
1107	Low potential anomalies	High to Low
10	High significance (archaeological term) known wrecks	High
3	Medium significance (archaeological term) known wrecks	High/Medium
3	Low significance (archaeological term) known wrecks	High/Medium
22	Unknown significance (archaeological term) known wrecks	Unknown
8	Channels, valleys and deposits of geoarchaeological potential	High to Low

### Impact 19

13.9.168 Direct impacts by penetration effects of jack-up barges and anchoring of decommissioning vessels leading to total or partial loss of marine archaeological and cultural heritage receptors.

### *Magnitude of Impact*

13.9.169 Direct penetration impacts from decommissioning activities on marine archaeological and cultural heritage receptors may lead to direct impact and total or partial loss of marine archaeological and cultural heritage receptors. If a direct impact occurs, it will generally be local, major, and adverse or irreversible and result in a permanent change to the receptor, meaning high magnitude of impact as detailed in Table 13.10.

### *Sensitivity of the Receptor*

13.9.170 The sensitivity of the marine archaeological and cultural heritage receptors identified within the marine archaeology study area is considered to be negligible to high as defined in Table 13.11. The sensitivity of the known marine archaeological and cultural heritage receptors potentially impacted by the decommissioning activities is detailed in Table 13.15.

### *Significance of Effect*

13.9.171 As per embedded mitigations outlined in Table 13.9, locations on the seabed of potential and confirmed marine archaeological and cultural heritage receptors are informed by the archaeological assessment of geophysical and geotechnical data and AEZs have been recommended (see document 8.5).

13.9.172 Mitigation by avoidance aims to ensure that there is no direct, indirect, or permanent impact on marine archaeological and cultural heritage receptors within the marine archaeology study area meaning a negligible magnitude of impact as defined in Table 13.10.

13.9.173 Where avoidance is not possible or in case of not yet located marine archaeological and cultural heritage receptors further mitigation and archaeological works are detailed in the Outline Marine WSI (see document 8.5), and associated documents to ensure negligible magnitude of impact as defined in Table 13.10.

13.9.174 It is predicted that the sensitivity of known heritage receptors impacted by decommissioning activities is negligible to high (Table 13.15).

13.9.175 Considering the magnitude of impact and the receptor sensitivity within the significance of effect matrix (Table 13.12) on marine archaeological and cultural heritage receptors potentially effected by decommissioning activities, the magnitude of impact is assessed as negligible, and the sensitivity of the receptor is negligible to high. The significance of effect has therefore been assessed as minor to negligible and the effect is consequently considered **not significant** in EIA terms.

### **Impact 20**

13.9.176 Direct impacts by compression effects of jack-up barges and anchoring of decommissioning vessels leading to total or partial loss of marine archaeological and cultural heritage receptors.

### *Magnitude of Impact*

13.9.177 Direct compression impacts from decommissioning activities on marine archaeological and cultural heritage receptors may lead to direct impact and total or partial loss of marine archaeological and cultural heritage receptors. If a direct impact occurs, it will generally be local, major, and adverse or irreversible and result in a permanent change to the receptor, meaning high magnitude of impact as detailed in Table 13.10.

### *Sensitivity of the Receptor*

13.9.178 The sensitivity of the marine archaeological and cultural heritage receptors identified within the marine archaeology study area is considered to be negligible to high as defined in Table 13.11. The sensitivity of the known marine archaeological and cultural heritage receptors potentially impacted by the decommissioning activities is detailed in Table 13.15.

### *Significance of Effect*

13.9.179 As per embedded mitigations outlined in Table 13.9, locations on the seabed of potential and confirmed marine archaeological and cultural heritage receptors are informed by the archaeological assessment of geophysical and geotechnical data and AEZs have been recommended (see document 8.5).

13.9.180 Mitigation by avoidance aims to ensure that there is no direct, indirect, or permanent impact on marine archaeological and cultural heritage receptors within the marine archaeology study area meaning a negligible magnitude of impact as defined in Table 13.10.

13.9.181 Where avoidance is not possible or in case of not yet located marine archaeological and cultural heritage receptors further mitigation and archaeological works are detailed in the Outline Marine WSI (see document 8.5), and associated documents to ensure negligible magnitude of impact as defined in Table 13.10.

13.9.182 It is predicted that the sensitivity of known heritage receptors impacted by decommissioning activities is negligible to high (Table 13.15).

13.9.183 Considering the magnitude of impact and the receptor sensitivity within the significance of effect matrix (Table 13.12) on marine archaeological and cultural heritage receptors potentially effected by decommissioning activities, the magnitude of impact is assessed as negligible, and the sensitivity of the receptor is negligible to high. The significance of effect has therefore been assessed as minor to negligible and the effect is consequently considered **not significant** in EIA terms.

### *Impact 21*

13.9.184 Indirect impacts creating draw-down of sediment into voids left by removed WTG foundations or Offshore Platforms leading to loss of sediment or destabilisation of archaeological sites and contexts indirectly exposing marine archaeological and cultural heritage receptors to natural, chemical, or biological processes and causing or accelerating loss of the same.

### *Magnitude of Impact*

13.9.185 Magnitude of indirect impact on marine archaeological and cultural heritage receptors from sediment disturbance as a result of draw-down effects may lead to exposure of those marine archaeological and cultural heritage receptors to natural, chemical or biological processes and indirectly cause or accelerate their loss. If an indirect impact occurs, it will generally be local, major, and adverse or irreversible and result in a permanent change to the receptor, meaning high magnitude of impact as detailed in Table 13.10.

### *Sensitivity of the Receptor*

13.9.186 The sensitivity of the marine archaeological and cultural heritage receptors identified within the marine archaeology study area is considered to be negligible to high as defined in Table 13.11. The sensitivity of the known marine archaeological and cultural heritage receptors potentially impacted by sediment disturbance as a result of draw-down effects is detailed in Table 13.15.

### *Significance of Effect*

13.9.187 As per embedded mitigations outlined in Table 13.9, locations on the seabed of potential and confirmed marine archaeological and cultural heritage receptors are informed by the archaeological assessment of geophysical and geotechnical data and AEZs have been recommended (see document 8.5).

13.9.188 Mitigation by avoidance aims to ensure that there is no direct, indirect, or permanent impact on marine archaeological and cultural heritage receptors within the marine archaeology study area meaning a negligible magnitude of impact as defined in Table 13.10.

13.9.189 Where avoidance is not possible or in case of not yet located marine archaeological and cultural heritage receptors further mitigation and archaeological works are detailed in the Outline Marine WSI (see document 8.5), and associated documents to ensure negligible magnitude of impact as defined in Table 13.10.

13.9.190 It is predicted that the sensitivity of known heritage receptors impacted by draw-down effects is negligible to high (Table 13.15).

13.9.191 Considering the magnitude of impact and the receptor sensitivity within the significance of effect matrix (Table 13.12) on marine archaeological and cultural heritage receptors potentially effected by draw-down effects, the magnitude of impact is assessed as negligible, and the sensitivity of the receptor is negligible to high. The significance of effect has therefore been assessed as minor to negligible and the effect is consequently considered **not significant** in EIA terms.

### **Impact 22**

13.9.192 Indirect impacts causing changes to the Historic Seascape Character as a result of decommissioning activities and the removal of windfarm components indirectly leading to changes to the perceived historic use of the seascape during the decommissioning phase.

### *Magnitude of Impact*

- 13.9.193 Magnitude of indirect impact on the HSC during the decommissioning phase has been assessed according to the criteria outlined in Table 13.10 and is taking into account the embedded mitigations as outlined in Table 13.9.
- 13.9.194 HSC has been used in this assessment as a measure to provide a contextual and regional approach to the marine archaeology study area. Historic seascapes cannot be physically destroyed or damaged but impacts on them can change their historical character and the perception surrounding them.
- 13.9.195 The HSC can be defined by its dynamic nature and ability to accommodate change. Perceptions of the seascape are also dynamic and subject to public awareness, time, and place. The intertidal and marine zones are ever changing due to physical processes such as currents, tidal range and sediment mobility. Considering this dynamism and the multiple dimensions defined by HSC, people create complex spatial relationships within and across all marine levels, reflected within the sites of cultural activity and their material imprints.
- 13.9.196 The presence of decommissioning vessels is considered to be comparatively inconsequential considering the current marine activity within the marine archaeology study area. The inshore activities at landfall will be short term and small scale with temporary use of larger decommissioning vessels, as outlined in the assumed maximum impact table (Table 13.8).
- 13.9.197 The presence of cables on the sub seafloor and seafloor is unlikely to enter the perception of the public, and therefore are unlikely to change the public perception of seascape. Any activities on cables will be short term and therefore insignificant to public perception. The removal of the foundations from the water column and sea surface will likely contribute to a change in people's perception of the HSC. This can be a positive, negative, or neutral change which is dependent on personal experience of the area and will continue to be a subjective perception over time.
- 13.9.198 The magnitude of impact on marine archaeological and cultural heritage receptors on HSC, specifically the presence of cables on the sub seafloor and seafloor, removal of foundations from the water column and sea surface and WTGs above the sea surface during the decommissioning phase is likely to contribute to minor to negligible and indistinguishable level of change and the magnitude of impact is therefore assessed as low to negligible (Table 13.10).
- 13.9.199 It should be noted that changes to the visible elements of the shore and the sea surface have been assessed further in Volume 1, Chapter 17, and therefore this chapter only considers the historic aspects of Seascape Characterisation.

### *Sensitivity of the Receptor*

- 13.9.200 The sensitivity (value) of the Broad Historic Character types identified within proposed development is assessed in terms of their ability to adapt to change, as outlined in Section 13.4.
- 13.9.201 The existing seascape of the marine archaeology study area is known for its marine and intertidal historic character utilised mainly for Navigation, Industry, Fishing, Military and Cultural Topography.



13.9.202HSC relates to the historic dimension of the present-day seascape and considers the added effect of the Project within the multiple dimensions of the marine environment (sub seafloor, seafloor, water column, sea surface, coastal land and previous historic character) in combination with the existing activity within the Broad Historic Character types, as detailed in Section 13.4.and Volume 2, Appendix 13.1 and summarised in Table 13.18.

Table 13.18: Changes to the Historic Seascape Characterisation (HSC) During Decommissioning

Broad Historic Character Types	Perception of the Historic Seascape Character	Changes to Perception (Sensitivity of the Receptor)
Navigation (activities, maritime safety and hazards)	This area along the east coast has historically been an area of intensive navigation activities and as such has demonstrated its capacity to accommodate change and growth over time.	No change perceived: the addition of temporary vessel activities in a busy navigational area is not expected to contribute with change (see Volume 1, Chapter 15).
Industry (extractive, energy, processing, shipping)	Industry in its many forms has been and continues to be one of the dominant influences on the character across coastal, intertidal and marine areas at all levels around the UK. There are 13 offshore windfarms covered in the CEA (Table 13.19).	No perceived change: the addition the Project's infrastructure as a source of renewable energy would contribute to the existing perception of the HSC, adding to a sense of a modern and sustainable industry. See also Volume 1, Chapter 17.
Fishing	The fishing industry of the Eastern England region has been evidenced since prehistoric times. Commercial trawling since the 1800s has affected the nature of development in places like Hull and Grimsby, with deep economic and cultural attachments associated with fishing.	No perceived change: while some areas may be temporarily unavailable for fishing during the decommissioning phase, in the long term no change to HSC as a result of the Project is expected in either local or offshore fishing industries. Also see Volume 1, Chapter 14.
Ports and Docks	The Eastern England contains numerous examples of small hard (consolidated loading platforms), quays and landing places and major ports including docks, ferry terminals and car terminals. Although many of the port locations may be inaccessible to the public, the harbours contain an amenity value which is linked to recreational and leisure activities such as sailing and wildlife watching. The ports of Grimsby and Boston are covered in the CEA (Table 13.19).	No change perceived: the HSC of ports and docks is not expected to be altered during the decommissioning phase of the Project. Volume 1, Chapter 20 includes an assessment of the HLC of quays. Volume 1, Chapter 17 includes baseline views of ports and quays.

Broad Types	Historic Character	Perception of the Historic Seascape Character	Changes to Perception (Sensitivity of the Receptor)
Coastal Infrastructure (flood and erosion defences)		Sea, flood and erosion defences are generally seen as essential for the preservation of settlements along the eastern coast of England for protecting property by preventing erosion and providing flood protection which conserves the economic value and provides local residents with reassurance. Approaches vary from 'hard' defences such as sea walls, which absorb or reflect wave energy, and 'soft', nature-based solutions which encourage natural systems, such as beaches and salt marshes which protect the coast.	No perceived change: the HSC of the coastal infrastructure is not expected to be altered during the decommissioning phase of the Project. Volume 1, Chapter 20 includes an assessment of the HLC of coastal infrastructure. Volume 1, Chapter 17 includes baseline views of coastal infrastructure.
Communications (transport, telecommunications)		Coastally specific and maritime-related infrastructure includes canals, motorways, main roads, railways, and airports which enable people to settle in and visit coastal regions. Railways were an important element in the early industrial period as they allowed more efficient transport of imported goods and fish around the country. They continue to be maintained and used for recreational activities. The presence of submarine telecommunication cables is likely to be known only to those who were directly involved in their construction and operation and the communications infrastructure. Despite the importance of transport and telecommunications in the daily lives of the public, their perception of the communications type is limited and based on the results of communications rather than their presence.	No perceived change: while railways are an integral part of the present social and cultural landscape their use and perception are now predominantly recreational rather than commercial or industrial. Modern society is dependent on submarine telecommunication cables; however, the current public perception of such infrastructure is understood to be minimal, and this is unlikely to change during the decommissioning phase of the Project.
Military (military defence and fortification)		Military coastal defences and military bases can be found all along the eastern coast. Examples range	Positive perceived change: active bases and abandoned military heritage bear witness to the UK's

Broad Types	Historic Character	Perception of the Historic Seascape Character	Changes to Perception (Sensitivity of the Receptor)
		<p>from Roman forts to those currently in use, as well as numerous records of military and aircraft battle sites and wreck sites.</p>	<p>important military history. However, the impacts on HSC during the decommissioning phase of the Project can be positive, ensuring increased protection and mitigation of impact on heritage receptors. Effects arising through change to HLC to military sites and remains are covered in Volume 1, Chapter 20. Potential indirect and direct impacts on marine archaeological and cultural heritage receptors and recorded wrecks of military importance are assessed in Section 13.9.</p>
Settlements (urban)		<p>The coastal area of the Eastern England region is densely populated. It includes a variety of coastal settlement types, major cities, tourist resorts and smaller fishing towns and villages.</p>	<p>Positive perceived change: the decommissioning phase is not anticipated to alter public perception of the HSC but has the potential to contribute to the perception of how the seascape connects to our past and changes with our future.</p>

Broad Types	Historic Character	Perception of the Historic Seascape Character	Changes to Perception (Sensitivity of the Receptor)
Recreation (water sports, boating, recreational swimming, watching)	(water sports, recreational diving, wildlife)	Recreational enjoyment of the coast has a long history in the UK and tourism is an important source of income.	<p>Positive perceived change: while some areas may be temporarily unavailable for recreational activities during the decommissioning phase, these areas will be accessible once more in the long term.</p> <p>Additionally, there is potential for improved public awareness of historic and recreational dive areas following the identification of wreck locations during archaeological surveys, leading to greater understanding, respect, and enjoyment of the seascape.</p> <p>Potential indirect and direct impacts on marine archaeological and cultural heritage receptors, such as wrecks, within the marine archaeology study area are assessed in Sections 13.9 and 0.</p>
Cultural (palaeolandscape component)	Topography	The relevance of these to HSC is as areas of former human habitat with evidence for past topographical and ecological regimes. The contexts of these shaping much earlier human cultural activity and landscape perceptions.	<p>Positive perceived change: the planned and undertaken geoarchaeological campaigns both in the offshore zone and on land will contribute to a greater understanding and appreciation of past topographical and ecological regimes.</p> <p>The potential for survival of palaeolandscape components and submerged archaeology in the marine environment and deposits in the study area is further discussed in Section 13.6. The cultural topography landward is discussed in Volume 1, Chapter 20.</p>
Woodland		Coastal woodland has been important in providing timber and other materials for boat building and other coastally focussed activities. Patterns of	No perceived change: the HSC of woodlands is not expected to be altered during the decommissioning phase of the Project.

Broad Types	Historic Character	Perception of the Historic Seascape Character	Changes to Perception (Sensitivity of the Receptor)
		<p>woodland also form distinctive elements of the coastal landscape visible from the sea, aiding position-finding and natural navigation.</p>	<p>Volume 1, Chapter 20 includes an assessment of HLC of woodland. Volume 1, Chapter 17 includes baseline views of woodland.</p>
Enclosed Land (reclaimed land)		<p>Reclamation in this area is from tidal marsh, usually saltmarsh, or wetland, with some areas being returned to saltmarsh as a buffer against rising sea levels and storm surges. The current historical seascape perception of enclosed land is limited and more relevant in the perception of the HLC.</p>	<p>No perceived change: the HSC of enclosed lands is not expected to be altered during the decommissioning phase of the Project. Volume 1, Chapter 20 includes an assessment of HLC of enclosed land. Volume 1, Chapter 17 includes baseline views of enclosed land.</p>
Unimproved Land		<p>The two main examples of unimproved land within the study area are scrub an intermediate stage between grassland and woodland which provides a habitat for many rare plant and animal species; and rough grassland, which is dominated by un-intensively managed grassland, often the result of long traditions of coastal rough grazing, but in some areas reintroduced as a conservation measure to prevent land reverting to scrub. The current historic seascape perception of enclosed land is limited and more relevant in the perception of the HLC.</p>	<p>No perceived change: the HSC of unimproved land is not expected to be altered during the decommissioning phase of the Project. Volume 1, Chapter 20 includes an assessment of HLC of unimproved land. Volume 1, Chapter 17 includes baseline views of unimproved land.</p>

### *Significance of Effect*

- 13.9.203 The commitment to undertake further archaeological works throughout the life of the project will be a requirement (see document 8.5), and associated documents (Table 13.9). This includes ensuring that HSC assessments where relevant are included throughout the life of the Project.
- 13.9.204 Considering the magnitude of impact and receptor sensitivity within the significance of effect matrix (Table 13.12) on the HSC, the magnitude of impact is assessed as low to negligible and the sensitivity of the receptor as negligible. The significance of effect has therefore been assessed as Negligible (Not significant) and the effect is consequently considered **not significant** in EIA terms.

## **13.10 Cumulative Impact Assessment**

- 13.10.1 The cumulative impact assessment for Marine and Intertidal Archaeology has been undertaken in accordance with the methodology provided in Volume 2, Appendix 5.1 Offshore Cumulative Effects Assessment (PEIR document reference 6.2.5.1).
- 13.10.2 The projects and plans selected as relevant to the assessment of impacts to marine and intertidal archaeology are based upon an initial screening exercise undertaken on a long list. Each project, plan or activity has been considered and scoped in or out on the basis of effect-receptor pathway, data confidence and the temporal and spatial scales involved within Zone of Influence (Zoi).
- 13.10.3 For marine archaeological and cultural heritage receptors, cumulative impacts may occur with other planned projects and developments within the marine archaeology study area.
- 13.10.4 Zoi of 50km from the marine archaeology study area has been applied for the cumulative impacts assessment to ensure direct and indirect cumulative effects can be appropriately identified and assessed.
- 13.10.5 The allocation of ‘tiers’ is described in detail in Volume 2, Appendix 5.1 and refers to the development stage of the projects assessed. For marine and intertidal archaeology Tier 1 has been adapted to include operational projects due to the potential impacts of the operational projects on marine archaeological and cultural heritage receptors within the marine archaeology study area. Projects that are built and operational at the time of the collection of survey data are not included in the existing environment but are outlined within Table 13.19, because of the potential for sediment movement and scour.
- Tier 1 includes: operational projects, projects under construction; consented projects (not yet under construction); and projects with consent applications but not yet determined;
  - Tier 2 includes: projects on the Inspectorate’s Programme of Projects where a Scoping Report has been submitted; and
  - Tier 3 includes: projects on the Inspectorate’s Programme of Projects where a Scoping Report has not been submitted; projects identified in the relevant Development Plan; and projects identified in other plans and programmes which set the framework for further development consents/approvals, where such development is reasonably likely to come forward.

Table 13.19: Projects Considered Within the Marine and Intertidal Archaeology Cumulative Effect

Development Type	Project	Status	Data Confidence Assessment/Phase	Tier
Cables and Pipelines	<ul style="list-style-type: none"> <li>▪ Dudgeon OFTO</li> <li>▪ Sheringham Shoal OFTO</li> <li>▪ Race bank OFTO</li> <li>▪ Lincs OFTO</li> <li>▪ Lynn</li> <li>▪ Inner Dowsing</li> <li>▪ Lincs</li> <li>▪ Triton Knoll</li> <li>▪ Hornsea 1 OFTO</li> <li>▪ Hornsea Project 2 OFTO</li> <li>▪ Humber Gateway OFTO</li> </ul>	Active/In Operation	High - Third party project details published in the public domain and confirmed as being 'accurate' by the developer.	Tier 1
Cables and Pipelines	<ul style="list-style-type: none"> <li>▪ Hornsea 3 Transmission Asset</li> </ul>	Consented	High - Third party project details published in the public domain and confirmed as being 'accurate' by TCE	Tier 1
Cables and Pipelines	<ul style="list-style-type: none"> <li>▪ Hornsea Project 4 (HOW04) OFTO</li> </ul>	Under Review – Decision due July 2023	High - Third party project details published in the public domain and confirmed as being 'accurate' by the developer.	Tier 1
Military, Aviation and Radar	<ul style="list-style-type: none"> <li>▪ D323D Southern MDA</li> <li>▪ D307 Donna Nook</li> </ul>	Active	High - Third party project details published in the public domain and confirmed as being 'accurate' by the developer.	Tier 1
Shipping	<ul style="list-style-type: none"> <li>▪ Grimsby</li> <li>▪ Boston</li> </ul>	Active	High - Third party project details published in the public domain and confirmed as being 'accurate' by the developer.	Tier 1
Aggregates and Disposal	<ul style="list-style-type: none"> <li>▪ Westminster Gravels (515/2)</li> <li>▪ Westminster Gravels (515/1)</li> <li>▪ Hanson Aggregates Marine Ltd (400)</li> </ul>	Operation	High - Third party project details published in the public domain and confirmed as being 'accurate' by the developer.	Tier 1



Development Type	Project	Status	Data Confidence Assessment/Phase	Tier
	<ul style="list-style-type: none"> <li>▪ Tarmac Marine Ltd (493)</li> <li>▪ Tarmac Marine Ltd (197)</li> <li>▪ Hanson Aggregates Marine Ltd (106/2)</li> <li>▪ Hanson Aggregates Marine Ltd (106/1)</li> <li>▪ CEMEX UK Marine Ltd (514/1)</li> <li>▪ CEMEX UK Marine Ltd (514/4)</li> <li>▪ DEME Building Materials Ltd (484)</li> <li>▪ CEMEX UK Marine Ltd (514/2)</li> <li>▪ DEME Building Materials Ltd (506)</li> <li>▪ DEME Building Materials Ltd (484)</li> <li>▪ DEME Building Materials Ltd (483)</li> <li>▪ Tarmac marine Ltd (481/1)</li> <li>▪ Tarmac Marine Ltd (481/2)</li> </ul>			
Aggregates and Disposal	<ul style="list-style-type: none"> <li>▪ Race bank OWF</li> <li>▪ Hornsea Disposal Area 1</li> <li>▪ Boston Deep</li> <li>▪ Well Beneficial use site2</li> <li>▪ Boston 7</li> <li>▪ Wells Outer Harbour site B1</li> <li>▪ Wells Outer Harbour site A</li> <li>▪ Wells Outer Harbour site C</li> <li>▪ West Stones</li> <li>▪ Humber 2</li> <li>▪ Sunk Dredge Channel Window</li> <li>▪ CEMEX UK Marine Ltd (514/3)</li> <li>▪ Humber 1A</li> </ul>	Open	High - Third party project details published in the public domain and confirmed as being 'accurate' by the developer.	Tier 1

Development Type	Project	Status	Data Confidence Assessment/Phase	Tier
Oil and Gas	<ul style="list-style-type: none"> <li>▪ BGS – Galahad TEE</li> <li>▪ EXXONMOBIL – Malory</li> <li>▪ SHELL UK – Barque PB</li> <li>▪ EXXONMOBIL – Excalibur EA</li> <li>▪ PERENCO – Excalibur EA</li> <li>▪ SHELL UK – Barque PL</li> <li>▪ PERENCO – West Sole A (6 LEG)</li> <li>▪ PERENCO – West Sole A (8LEG)</li> <li>▪ PERENCO – West Sole A PP</li> <li>▪ PERENCO – West Sole A SP</li> <li>▪ SPIRIT ENERGY – Seven Seas VCS</li> <li>▪ EXXONMOBIL – Lancelot A</li> <li>▪ PERENCO – West Sole B</li> <li>▪ PERENCO – Waveney Step-out Tee</li> <li>▪ SHELL – Clipper PH</li> <li>▪ SHELL UK – Clipper PW</li> <li>▪ SHELL UK – Clipper PT</li> <li>▪ SHELL UK – Clipper PC</li> <li>▪ PERENCO – West Sole C</li> <li>▪ SHELL UK – Clipper PR</li> <li>▪ SHELL UK – Clipper PM</li> <li>▪ PERENCO – Waveney</li> <li>▪ SHELL UK – Galleon PG</li> <li>▪ PERENCO – Hoton</li> <li>▪ CONCOPHILLIPS – MIMAS MN</li> <li>▪ CONCOPHILLIPS – Anglia YD</li> </ul>	Active	Medium - Third party project details published in the public domain but not confirmed as being 'accurate'	Tier 1

Development Type	Project	Status	Data Confidence Assessment/Phase	Tier
	<ul style="list-style-type: none"> <li>▪ GDF BRITAIN – Anglia A</li> <li>▪ RWE – Clipper South</li> <li>▪ PERENCO - Hyde</li> <li>▪ ALPHA PETROLEUM – Helvellyn Manifold</li> <li>▪ ALPHA PETROLEUM – Helvellyn Wellhead 47/10-7Y</li> <li>▪ SHELL UK – Skiff</li> <li>▪ SHELL UK – Galleon PN</li> <li>▪ IOG PLC – Blythe Jacket</li> <li>▪ SPIRIT ENERGY – Ceres Well</li> <li>▪ PERENCO – Mercury Manifold</li> <li>▪ SPIRIT ENERGY – Mercury Tie In Skid</li> <li>▪ NEO ENERGY – Babbage</li> <li>▪ HARBOUR ENERGY PLC – 43/27A-5</li> <li>▪ HARBOUR ENERGY PLC – 43/27-4</li> <li>▪ PERENCO – PL253 Southern Tee</li> <li>▪ SPIRIT ENERGY – Eris Well</li> <li>▪ HARBOUR ENERGY PLC – Johnston</li> <li>▪ PERENCO – Ravenspurn North CC</li> <li>▪ PERENCO – Ravenspurn North CCW</li> <li>▪ SEAFISH – Well 48/29-9:398</li> <li>▪ PERENCO - Neptune</li> <li>▪ PERENCO – Ravenspurn South A</li> <li>▪ CONCOPHILLIPS – E+ Wellhead (Vixen)</li> <li>▪ PERENCO – Ravenspurn North ST2</li> <li>▪ PERENCO – Apollo Manifold</li> </ul>			

Development Type	Project	Status	Data Confidence Assessment/Phase	Tier
	<ul style="list-style-type: none"> <li>▪ CENTRICA – Rough BP</li> <li>▪ CENTRICA – Rough BD</li> <li>▪ CENTRICA – Rough CD</li> <li>▪ ATP – Wenlock NUI</li> <li>▪ PETROFAC – 48/29C</li> <li>▪ PETROFAC – 48/29B</li> <li>▪ UNKNOWN – Theddlethorpe Gas Terminal</li> </ul>			
Oil and Gas	<ul style="list-style-type: none"> <li>▪ PERENCO – Pickerill B</li> <li>▪ PERENCO – Pickerill A</li> </ul>	In Active - Precommission	Medium - Third party project details published in the public domain but not confirmed as being 'accurate'	Tier 1
Offshore Energy	<ul style="list-style-type: none"> <li>▪ Triton Knoll</li> <li>▪ Dudgeon</li> <li>▪ Hornsea Project One (HOW01)</li> <li>▪ Hornsea Project Two (HOW02)</li> <li>▪ Race Bank</li> <li>▪ Sheringham Shoal</li> <li>▪ Lincs</li> <li>▪ Humber Gateway</li> <li>▪ Inner Dowsing</li> <li>▪ Lynn</li> </ul>	Active/In Operation	High - Third party project details published in the public domain and confirmed as being 'accurate' by TCE	Tier 1
Offshore Energy	<ul style="list-style-type: none"> <li>▪ Dudgeon Extension</li> <li>▪ Sheringham Shoal Extension</li> </ul>	Under Examination	High - Third party project details published in the public domain and confirmed as being 'accurate' by The Crown Estate	Tier 1
Offshore Energy	<ul style="list-style-type: none"> <li>▪ Hornsea Project Four (HOW04)</li> </ul>	Under Review – Decision due July 2023	High - Third party project details published in the public domain and confirmed as being 'accurate' by TCE	Tier 1

Development Type	Project	Status	Data Confidence Assessment/Phase	Tier
Carbon Capture Storage	<ul style="list-style-type: none"> <li>▪ Endurance</li> </ul>	Area for Lease	Medium - Third party project details published in the public domain but not confirmed as being 'accurate'	Tier 3

## Cables and Pipelines

- 13.10.6 There are 13 developments associated with Cables and Pipelines, all considered Tier 1, within the ZoI as outlined in Table 13.19.
- 13.10.7 The construction of these developments can cause both direct and indirect impacts from penetration and compression, as well as disturbance of seabed sediments and cumulative sediment changes during all the Project phases. The long term or permanent presence of subsea cables and pipelines may also result in the loss or accumulation of sediment over time.
- 13.10.8 In addition, maintenance operations of subsea cables and pipelines, if undertaken, may alter or destabilise marine archaeological and cultural heritage receptors or archaeological sites and contexts. Including paleoenvironmental information and exposing such material to natural, chemical, or biological processes, and causing or accelerating loss of the same.
- 13.10.9 There is currently limited detail on archaeological data and impact assessments undertaken ahead of the installation of the subsea cables and pipelines detailed in Table 13.19 and therefore it is not possible to make a comprehensive assessment of the significance of their effect. However, given that construction activities do not overlap and disturbance from O&M of the Project is expected to be short term and localised within the marine archaeology study area no direct or indirect cumulative impacts on marine archaeological and cultural heritage receptors within the marine archaeology study area are expected.

## Military, Aviation and Radar

- 13.10.10 There are two sites associated with Military, Aviation and Radar within the ZoI, as outlined in Table 13.19. Both Military, Aviation and Radar developments are currently active and are therefore considered to be in Tier 1.
- 13.10.11 Activities at the Military, Aviation and Radar sites can include bombing, live firing, air firing, demolition of UXO, high energy manoeuvres and the use of unmanned aircraft systems.
- 13.10.12 Some of the Military, Aviation and Radar activities have the potential to cause seabed disturbance and the cumulative sediment changes during all Project phases could result in either the loss or accumulation of sediment. This disturbance has the potential to alter or destabilise marine archaeological and cultural heritage receptors within the marine archaeology study area, including paleoenvironmental material and expose such material to natural, chemical, or biological processes, causing or accelerating loss of the same.
- 13.10.13 It should be noted that a marine licence is not required for activities carried out in defence of the realm by or on behalf of naval, military or air forces of The Crown (including reserve forces and the Royal Fleet Auxiliary) and a visiting force. The exemption does not apply to constructing, altering, and improving works or dredging and disposal of waste, where an impact assessment should be undertaken ahead of any intrusive works. There is therefore currently limited detail on archaeological data and impact assessments undertaken ahead of activities carried out by The Crown and how they would potentially have a cumulative impact on marine archaeological or cultural heritage receptors.

13.10.14 No direct cumulative impacts on marine archaeological and cultural heritage receptors within the marine archaeology study area have been identified or are expected. The Military, Aviation and Radar activity areas outlined in Table 13.20 do not have spatially overlapping boundaries.

## Shipping

13.10.15 There are two working ports within the Zol; Grimsby and Boston as outlined in Table 13.19, both of which are designated as active and are therefore in Tier 1.

13.10.16 Cumulative sediment changes from port related activities such as dredging, during all Project phases and activities within the port area could result in either the loss or accumulation of sediment. This disturbance could alter or destabilise marine archaeological and cultural heritage receptors within the marine archaeology study area. Including paleoenvironmental material and expose such material to natural, chemical, or biological processes, causing or accelerating loss of the same.

13.10.17 No direct or indirect cumulative impacts on marine archaeological and cultural heritage receptors within the marine archaeology study area are expected; the ports of Grimsby and Boston do not have spatially overlapping boundaries.

## Aggregates and Disposal

13.10.18 There are 28 Aggregate and disposal areas (all Tier 1), 16 are in operation, with the other 12 being open to operation when needed, within the Zol, as outlined in Table 13.19

13.10.19 Indirect impacts from cumulative sediment changes during all the Project phases and the presence of active aggregate production areas and sea disposal sites in the locality, as set out in Table 13.20 may result in loss or accumulation of sediment, thereby altering or destabilising marine archaeological and cultural heritage receptors within the marine archaeology study area, including paleoenvironmental material, and exposing such material to natural, chemical, or biological processes, causing or accelerating loss of the receptor.

13.10.20 Despite the intrusive nature of dredging operations and disposal activities on the seafloor, no direct or indirect cumulative impacts on marine archaeological and cultural heritage receptors within the marine archaeological study area are expected as there is no spatial overlap with aggregate production areas and the Project.

13.10.21 The British Marine Aggregate Producers Association (BMAPA) ensures that proportionate planning is undertaken which provides a framework to enable delivery of a 'licence to operate' for all dredging activities and operations. A Guidance Note is produced and agreed which considers the sensitivity of heritage assets within proposed and active dredging areas (TCE, 2017). The Guidance Note also ensures that known and unlocated marine archaeological and cultural heritage receptors are addressed at every stage of marine aggregate development and production.

13.10.22 Therefore, no direct cumulative impacts on marine archaeological and cultural heritage receptors within the marine archaeology study area are expected cumulatively with the Project and the relevant dredging activities.

## Oil and Gas

- 13.10.23 There are 74 Oil and Gas development areas present within the ZoI (all Tier 1), as outlined in Table 13.19.
- 13.10.24 Active and decommissioned well heads and other infrastructure related to the oil and gas industry are located within the array area and Offshore ECC. Guidelines have been recently drafted to promote the consideration of marine archaeological and cultural heritage receptors for offshore gas and oil, however historically this was not a requirement (Department for Business, Energy & Industrial Strategy, 2022). The Project will adhere to all 500m safety zone around sub-sea installations established under the Petroleum Act 1987 which will avoid direct impacts cumulatively with oil and gas activities. Further, full consideration has been given to oil and gas activities in Volume 5, Appendix 9.1: Navigational Risk Assessment.
- 13.10.25 Direct or indirect impacts from penetration, compression, and disturbance or cumulative sediment changes during all Project phases and the presence of Oil and Gas developments as outlined in Table 13.20 may result in the loss or accumulation of sediment over time. This disturbance could alter or destabilise marine archaeological and cultural heritage receptors or archaeological sites and contexts. Including paleoenvironmental material and expose such material to natural, chemical, or biological processes, causing or accelerating loss of the same.
- 13.10.26 Indirect impacts from sediment plumes from operation and maintenance activities are generally short-lived, with major maintenance works infrequent. Any impacts from operational oil and gas activities are therefore likely to be short-lived and of localised extent, with limited opportunity to overlap with Project related activities (further outlined in Volume 1, Chapter 7).
- 13.10.27 Further, cumulative impacts of oil and gas developments may prevent access to marine archaeological and cultural heritage receptors (material and context) by creating physical barriers or imposing no-go zones that could inhibit further research and interpretation opportunities over a large swath of the seabed. Embedded mitigation for such events is the agreement of project specific Outline Marine WSI (see document 8.5) which must outline how potential impacts will be offset by data gathering and archaeological assessments.
- 13.10.28 Acknowledging the spatial overlap, no cumulative impacts on marine archaeological and cultural heritage receptors are expected because of applied safety zones around established structures, offset of data gathering and no indirect impacts from sediment plumes which are deemed to be localised and short-lived.

## Offshore Energy

- 13.10.29 There are 13 Offshore Energy developments within the ZoI (nine of these are operational at the time of writing and the remaining four are in pre-application through to construction stages (all Tier 1)), as outlined in Table 13.19.
- 13.10.30 Offshore Energy developments normally consist of subsea cables and permanent structures on the seabed. It is expected that the construction phases of all Offshore Energy developments, as well as the O&M phases, have the potential to cause seabed disturbance as cables and foundation structures require regular planned and unplanned maintenance.



- 13.10.31 Therefore, cumulative sediment changes during all Project phases could result in the loss or accumulation of sediment. This disturbance could alter or destabilise marine archaeological and cultural heritage receptors or archaeological sites and contexts. Including paleoenvironmental material and expose such material to natural, chemical, or biological processes, causing or accelerating loss of the same.
- 13.10.32 Further, cumulative impacts of large-scale projects may prevent access to marine archaeological and cultural heritage receptors (material and context) by creating physical barriers or imposing no-go zones that could inhibit further research and interpretation opportunities over a large swath of the seabed. Mitigation for such event is the agreement of project specific Outline Marine WSI (see document 8.5) which must outline how potential impacts will be offset by data gathering and archaeological assessments.
- 13.10.33 No direct or indirect cumulative impacts on marine archaeological and cultural heritage receptors within the marine archaeology study area are expected; the Offshore Energy developments outlined in Table 13.19 do not have spatially overlapping boundaries.
- 13.10.34 Offshore Energy developments are considered NSIPs and therefore require a development consent; as part of the application process each Offshore Energy development has or will undertake a marine archaeology impact assessment that outlines and confirms mitigation strategies and ensures that marine archaeological and cultural heritage receptors have or will either be avoided or further investigated.

### Carbon Capture Storage

- 13.10.35 There is one Carbon Capture Storage development within the ZOI as outlined in Table 13.19 that is Tier 3.
- 13.10.36 The Endurance Carbon Capture Storage development is expected to consist of a subsea pipeline feeding the wellhead.
- 13.10.37 Carbon Capture Storage developments are required, as a part of the application process to undertake a marine archaeology impact assessment, for Endurance, this is not yet available in the public domain.

### Cumulative Assessment Summary

- 13.10.38 The embedded mitigation, as outlined in Table 13.9 aims to avoid and mitigate direct, indirect, and permanent impact on marine archaeological and cultural heritage receptors (known or unlocated) within the marine archaeology study area and ensure that archaeological input is of paramount importance throughout the life of the Project.
- 13.10.39 Considering the magnitude of the cumulative effects during all phases of the Project and the other outlined developments (Table 13.19) as well as receptor sensitivity (value) (Table 13.11) within the significance of effect matrix Table 13.12 on marine archaeological and cultural heritage receptors potentially affected by the cumulative effects, the magnitude of impact is assessed as negligible and the sensitivity of the receptor as negligible to high. The significance of effect has therefore been assessed as minor to negligible and the effect is consequently considered **not significant** in EIA terms.
- 13.10.40 The cumulative MDS for the Project is outlined in Table 13.20.

Table 13.20: Cumulative MDS

Impact	Scenario	Justification
<p>Impact 23: Direct impact of sediment removal containing undisturbed archaeological contexts or by penetration, compression, and disturbance of sediment leading to total or partial loss of marine archaeological and cultural heritage receptors</p>	<p>Tier 1:</p> <ul style="list-style-type: none"> <li>▪ Cables and Pipelines</li> <li>▪ Military, Aviation and Radar</li> <li>▪ Aggregates and Disposal</li> <li>▪ Oil and Gas</li> <li>▪ Offshore Energy</li> </ul> <p>Tier 3:</p> <ul style="list-style-type: none"> <li>▪ Carbon Capture Storage</li> </ul>	<p>Intrusive seabed activities as well as vessel operations during the Project phases, along with cumulative activities undertaken by the projects listed in Table 13.19 have the potential to contribute direct impacts on marine archaeological and cultural heritage receptors.</p>
<p>Impact 24: Indirect impact causing disturbance of sediment containing potential marine archaeological and cultural heritage receptors (material and contexts) exposing the receptors to natural, chemical or biological processes and causing or accelerating loss of the same.</p>	<p>Tier 1:</p> <ul style="list-style-type: none"> <li>▪ Cables and Pipelines</li> <li>▪ Military, Aviation and Radar</li> <li>▪ Shipping</li> <li>▪ Aggregates and Disposal</li> <li>▪ Oil and Gas</li> <li>▪ Offshore Energy</li> </ul> <p>Tier 3:</p> <ul style="list-style-type: none"> <li>▪ Carbon Capture Storage</li> </ul>	<p>Seabed activities contributing to sediment movement or disturbance during the Project phases, cumulatively with activities undertaken by the projects listed in Table 13.19 have the potential to contribute indirect impacts on marine archaeological and cultural heritage receptors.</p>
<p>Impact 25: Indirect impacts of seabed infrastructure preventing access to marine archaeological and cultural heritage receptors (material and context) which creates physical barriers and no-go zones that could inhibit further research and interpretation of the above.</p>	<p>Tier 1</p> <ul style="list-style-type: none"> <li>▪ Cables and Pipelines</li> <li>▪ Aggregates and Disposal</li> <li>▪ Oil and Gas</li> <li>▪ Offshore Energy</li> </ul> <p>Tier 3</p> <ul style="list-style-type: none"> <li>▪ Carbon Capture Storage</li> </ul>	<p>Lack of access to marine archaeological receptors cumulatively with the projects listed in Table 13.19 have the potential to prevent further research opportunities.</p>
<p>Impact 26: Indirect impact causing changes to the Historic Seascape Character as a result of cumulative effects indirectly leading to changes to the perceived historic use of the seascape</p>	<p>Tier 1:</p> <ul style="list-style-type: none"> <li>▪ Cables and Pipelines</li> <li>▪ Military, Aviation and Radar</li> <li>▪ Shipping</li> <li>▪ Aggregates and Disposal</li> <li>▪ Oil and Gas</li> <li>▪ Offshore Energy</li> </ul>	<p>Indirect impact on the Historic Seascape Character during all project phases cumulatively with activities undertaken by the Project listed in Table 13.19 have the potential to change HSC. HSC has been used in this assessment as a measure to provide a contextual and regional approach to the marine archaeology study area. Historic seascapes cannot be</p>

Impact	Scenario	Justification
		physically destroyed or damaged but impacts on them can change their historical character and the perception surrounding them.

### 13.11 Inter-Relationships

- 13.11.1 The inter-relationships assessment considers likely significant effects from multiple impacts and activities from the construction, O&M and decommissioning phases on the same receptor, or group of marine archaeological and cultural heritage receptors.
- 13.11.2 The greatest potential for direct spatial impact on marine archaeological and cultural heritage receptors is likely to occur during contact with the seabed during both the construction and decommissioning phases. The individual impacts were assigned a significance of **negligible** due to the implementation of embedded mitigation measures.
- 13.11.3 While there is potential for some disturbance within the operational phase, these activities will apply the mitigation measures in Table 13.9. Impact on archaeological and cultural heritage receptors are therefore during the O&M phase not considered to contribute to inter-relationships.
- 13.11.4 It is concluded that there will be no integration of effect between construction and decommissioning phases as they are undertaken during separate temporal phases and therefore have not impact on inter-relationships of greater significance compared to the impacts considered alone.

### 13.12 Transboundary Effects

- 13.12.1 Due to the localised nature of any potential impacts on known marine archaeological and cultural heritage receptors, transboundary impacts are unlikely to occur and have been scoped out from all further consideration within the EIA.
- 13.12.2 However, it should be noted that should wrecks or aircrafts of non-British nationality be impacted by the Project further archaeological investigations may be warranted (see Volume 2, Chapter 13.1 and document 8.5) and further discussion on protection of non-British marine archaeological and cultural heritage receptors should include the pertinent organisation(s) in the country of relevance.
- 13.12.3 There is also a potential for palaeochannels and palaeolandscapes within the North Sea to stretch beyond international boundaries. The impact on submerged landscapes in those cases is expected to be local within the marine archaeology study area and will be mitigated and offset by archaeological assessment of available geophysical and geotechnical data.

### 13.13 Conclusions

- 13.13.1 Table 13.21 presents a summary of the assessment of significant effect on marine archaeological and cultural heritage receptors.

Table 13.21: Summary of effects for Offshore Archaeology and Cultural Heritage

Description of Impact	Effect	Additional Mitigation Measures	Residual Impact
<b>Construction</b>			
Impact 1: Direct impact of sediment removal containing undisturbed archaeological contexts during seabed preparation.	Total or partial loss of the marine archaeological and cultural heritage receptors	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Impact 2: Direct impact by penetration of piling foundations	Total or partial loss of marine archaeological and cultural heritage receptors	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Impact 3: Direct impact by compression of piling foundations.	Total or partial loss of marine archaeological and cultural heritage receptors	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Impact 4: Direct impact by penetration from the combined weight of the WTGs or Offshore Platforms.	Disturbance of stratigraphic context containing archaeological material leading to the total or partial loss of marine archaeological and cultural heritage receptors	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Impact 5: Direct impact by compression from the combined weight of the WTGs or Offshore Platforms.	Disturbance of stratigraphic context containing archaeological material leading to the total or partial loss of marine archaeological and cultural heritage receptors	Not Applicable – no additional mitigation identified	No significant adverse residual effects

Description of Impact	Effect	Additional Mitigation Measures	Residual Impact
Impact 6: Direct impact by penetration of cable laying operations.	Total or partial loss of marine archaeological and cultural heritage receptors	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Impact 7: Direct impacts by compression of cable laying operations.	Total or partial loss of marine archaeological and cultural heritage receptors	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Impact 8: Direct impacts by penetration effects of jack-up barges and anchoring of construction vessels during various activities.	Total or partial loss of marine archaeological and cultural heritage receptors	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Impact 9: Direct impacts by compression effects of jack-up barges and anchoring of construction vessels during various activities.	Total or partial loss of marine archaeological and cultural heritage receptors	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Impact 10: Indirect impacts causing disturbance of sediment containing potential marine archaeological and cultural heritage receptors (material and context) during construction activities.	Exposure of marine archaeological and cultural heritage receptors to natural, chemical or biological processes and indirectly causing or accelerating loss	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Impact 11: Indirect impacts causing changes to the Historic Seascape Character as a result of construction and survey vessel activities and the addition of	Changes to the perceived historic use of the seascape during the construction phase	Not Applicable – no additional mitigation identified	No significant adverse residual effects

Description of Impact	Effect	Additional Mitigation Measures	Residual Impact
cables, foundations, Offshore Platforms and WTGs.			
<b>Operation and Maintenance</b>			
Impact 12: Direct impact by penetration leading to disturbance effects of maintenance activities at WTGs, Offshore Platforms and along all cables.	Total or partial loss of marine archaeological and cultural heritage receptors	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Impact 13: Direct impact by compression leading to disturbance effects of maintenance activities at WTGs, Offshore Platforms and along all cables.	Total or partial loss of marine archaeological and cultural heritage receptors	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Impact 14: Direct impacts by penetration effects of jack-up barges and anchoring of O&M vessels during various activities at WTGs, Offshore Platforms and along all cables.	Total or partial loss of marine archaeological and cultural heritage receptors	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Impact 15: Direct impacts by compression effects of jack-up barges and anchoring of O&M vessels during various activities at WTGs, Offshore Platforms and along all cables.	Total or partial loss of marine archaeological and cultural heritage receptors	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Impact 16: Indirect impacts causing disturbance of sediment	Exposure of marine archaeological and cultural	Not Applicable – no additional mitigation identified	No significant adverse residual effects

Description of Impact	Effect	Additional Mitigation Measures	Residual Impact
containing potential marine archaeological and cultural heritage receptors (material and context) during maintenance activities.	heritage receptors to natural, chemical or biological processes and indirectly causing or accelerating loss		
Impact 17: Indirect impacts causing scour effects as a result of the presence of WTGs, Offshore Platforms and the exposure of cables or the use of cable protection measures.	Exposure of marine archaeological and cultural heritage receptors to natural, chemical or biological processes and indirectly causing or accelerating loss	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Impact 18: Indirect impacts causing changes to the Historic Seascape Character as a result of O&M vessel activities and the presence of the completed windfarm.	Changes in the perceived historic use of the seascape during the operation phase	Not Applicable – no additional mitigation identified	No significant adverse residual effects
<b>Decommissioning</b>			
Impact 19: Direct impacts by penetration effects of jack-up barges and anchoring of decommissioning vessels.	Total or partial loss of marine archaeological and cultural heritage receptors	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Impact 20: Direct impacts by compression effects of jack-up barges and anchoring of decommissioning vessels.	Total or partial loss of marine archaeological and cultural heritage receptors	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Impact 21: Indirect impacts creating draw-down of sediment	Exposure of marine archaeological and cultural	Not Applicable – no additional mitigation identified	No significant adverse residual effects

Description of Impact	Effect	Additional Mitigation Measures	Residual Impact
into voids left by removed WTG foundations or Offshore Platforms leading to loss of sediment or destabilisation of archaeological sites.	heritage receptors to natural, chemical or biological processes and indirectly causing or accelerating loss		
Impact 22: Indirect impacts causing changes to the Historic Seascape Character as a result of decommissioning activities and the removal of windfarm components.	Changes to the perceived historic use of the seascape during the decommissioning phase	Not Applicable – no additional mitigation identified	No significant adverse residual effects
<b>Cumulative</b>			
Impact 23: Direct impact of sediment removal containing undisturbed archaeological contexts or by penetration, compression, and disturbance of sediment.	Total or partial loss of marine archaeological and cultural heritage receptors	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Impact 24: Indirect impact causing disturbance of sediment containing potential marine archaeological and cultural heritage receptors (material and contexts).	Exposure of marine archaeological and cultural heritage receptors to natural, chemical or biological processes and indirectly causing or accelerating loss	Not Applicable – no additional mitigation identified	No significant adverse residual effects
Impact 25: Indirect impacts of seabed infrastructure preventing access to marine archaeological and cultural heritage receptors	Loss of access to archaeological and geoarchaeological material	Not Applicable – no additional mitigation identified	No significant adverse residual effects



Description of Impact	Effect	Additional Mitigation Measures	Residual Impact
(material and context) which creates physical barriers and no-go zones that could inhibit further research and interpretation of the above.			
Impact 26: Indirect impact causing changes to the Historic Seascape Character as a result of cumulative effects.	Changes to the perceived historic use of the seascape	Not Applicable – no additional mitigation identified	No significant adverse residual effects

## 13.14 Next Steps

13.14.1 The following steps will be undertaken in order to progress the marine and intertidal archaeology topic from PEIR stage to DCO Application stage:

- Completion of assessment of available geophysical data: Where data has been collected for the current gaps in the array area and Offshore ECC an archaeological assessment will be completed to enhance the understanding of the archaeological environment of the proposed development area;
- Consultation with statutory advisors: Regular engagement will continue in order to ensure that the assessment proceeds according to the regulators' recommendations and requirements;
- Production of an ES: An ES will be produced to present the full findings of the EIA and the results of the potential impacts of the Project on marine archaeological and cultural heritage receptors; and
- Production of an updated Outline Marine WSI document: An updated Outline Marine WSI will be developed based on the current iteration of the Outline Marine WSI (see document 8.5) submitted with this chapter, which will outline future archaeological work and mitigation measures embedded into the project design.

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