Outer Dowsing Offshore Wind

Environmental Statement

Volume 3, Appendix 13.1 Marine and Intertidal Archaeology Technical Report

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Acronyms & Terminology

Abbreviations / Acronyms

Abbreviation / Acronym	Description
AD	Anno Domini
AEZ	Archaeological Exclusion Zone
AfL	Agreement for Lease
ANS	Artificial Nesting Structures
BEIS	Department for Business, Energy & Industrial Strategy (now the Department for Energy Security and Net Zero (DESNZ))
BGS	British Geological Survey
BP	Before Present
BSF	Below Seafloor
CIfA	Chartered Institute for Archaeologists
CITiZAN	Coastal and Intertidal Zone Archaeological Network
COWRIE	Collaborative Offshore Wind Energy Research into the Environment
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 & 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 Onshore ECC)
EIA	Environmental Impact Assessment
ES	Environmental Statement
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
HLC	Historic Landscape Character
HSC	Historic Seascape Characterisation
JNAPC	Joint Nautical Archaeology Policy Committee
ka	Kiloannum (one thousand years)
LAT	Lowest Astronomical Tide
LGM	Last Glacial Maximum
MA	Maritime Archaeology Ltd.
MAG	Magnetometer
MBES	Multi-Beam Echo Sounder
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MS	Method Statement
MSL	Mean Sea Level
NPS	National Policy Statement
NRHE	National Record of Historic Environment

Abbreviation / Acronym	Description
NSPRMF	North Sea Prehistory Research and Management Framework
nT	nanotesla
NSPRMF	North Sea Prehistory Research Management Framework
O&M	Operation and Maintenance
ODOW	Outer Dowsing Offshore Wind (The Project)
ORCP	Offshore Reactive Compensation Platforms
OSS	Offshore Substation
PAD	Protocol for Archaeological Discoveries
PAS	Portable Antiquities Scheme
PEIR	Preliminary Environmental Information Report
RAF	Royal Airforce
ROV	Remotely Operated Vehicle
SBP	Sub-bottom Profiler
SoS	Secretary of State
SSS	Side Scan Sonar
SSSI	Site of Special Scientific Interest
TCE	The Crown Estate
UHRS	Ultra-high Resolution Seismic
UKHO	United Kingdom Hydrographic Office
UXO	Unexploded ordnance
WGS84	World Geodetic System 1984
WSI	Written Schemes of Investigation
WTG	Wind Turbine Generator
WWI	World War One
WWII	World War Two

Terminology

Term	Definition
AfL Array area	The area of the seabed awarded to GT R4 Ltd. through an Agreement for Lease (AfL) for the development of an offshore windfarm, as part of The Crown Estate's Offshore Wind Leasing Round 4.
Archaeological Exclusion Zone (AEZ)	A spatially defined zone around a Historic Environment receptors 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. As per EN-1 (March 2023), "there will be archaeological interest in a heritage asset if it holds, or may potentially hold, evidence of past human activity worthy of expert investigation at some point".
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

Term	Definition
	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 which the generating station (including wind turbine generators (WTG) and inter array cables), offshore accommodation platforms, offshore transformer substations and associated cabling will be 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.
Decommissioning	The period during which a development and its associated processes are removed from active operation.
Deemed Marine Licence (dML)	A marine licence set out in a Schedule to the Development Consent Order and deemed to have been granted under Part 4 (marine licensing) of the Marine and Coastal Access Act 2009.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP).
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 o 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 the impact with the sensitivity of the 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 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.

Term	Definition
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 that 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 showing the historic character deriving from human activity in the marine environment.
Impact	An impact to the receiving environment is defined as any change to its baseline condition, either adverse or beneficial.
Intertidal	The area between Mean High Water Springs (MHWS) and Mean Low Water Springs (MLWS)
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 cables and fibre optic cables 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 ES Array Area, Offshore ECC up to MHWS and surrounded by a 1km buffer, artificial nesting structure areas surrounded by a 1km buffer and the biogenic reef area.
Marine Written Schemes of Investigation (WSI)	A document forming the agreement between the client, the appointed archaeological, 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 are. An Outline Marine WSI, specific for the offshore area and developed during the EIA process will form frameworks for mitigation strategies that will 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.

Term	Definition
Mitigation	Mitigation measures 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.
Outer Dowsing Offshore Wind (ODOW)	The Project.
Offshore Export Cable Corridor (ECC)	The Offshore Export Cable Corridor (Offshore ECC) is the area within the Order Limits within which the export cable running from the array to landfall will be situated.
Offshore Reactive Compensation Platform (ORCP)	A structure attached to the seabed by means of a foundation, with one or more decks and a helicopter platform (including bird deterrents) housing electrical reactors and switchgear for the purpose of the efficient transfer of power in the course of HVAC transmission by providing reactive compensation
Offshore Substation (OSS)	A structure attached to the seabed by means of a foundation, with one or more decks and a helicopter platform (including bird deterrents), containing— (a) electrical equipment required to switch, transform, convert electricity generated at the wind turbine generators to a higher voltage and provide reactive power compensation; and (b) housing accommodation, storage, workshop auxiliary equipment, radar and facilities for operating, maintaining and controlling the substation or wind turbine generators
Order Limits	The area subject to the application for development consent, the limits shown on the works plans within which the Project may be carried out.
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.
Preliminary Environmental Information Report (PEIR)	The PEIR was written in the style of a draft Environmental Statement (ES) and provided information to support and inform the statutory consultation process during the pre-application phase.

Term	Definition
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.
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.
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.
Spudcan	Spudcans are the base cones on mobile-drilling jack-up platform. These inverted cones are mounted at the base of the jack-up and provide stability to lateral forces on the jack-up rig when deployed into ocean-bed systems.
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, Tota Energies 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, an offshore wind generating station together with associated onshore and offshore infrastructure.
United Kingdom Hydrographic Office database	Database of known wrecks and obstruction held and maintained by the UKHO.

Term	Definition
Ultra-High Resolution Seismic	An acoustic system used to image submerged buried features shallow water.
Wind turbine generator (WTG)	A structure comprising a tower, rotor with three blades connected at the hub, nacelle and ancillary electrical and other equipment which may include J-tube(s), transition piece, access and rest platforms, access ladders, boat access systems, corrosion protection systems, fenders and maintenance equipment, helicopter landing facilities and other associated equipment, fixed to a foundation.

13 Marine and Intertidal Archaeology Technical Report

13.1 Introduction

1. This Marine and Intertidal Archaeology Technical Report identifies known and potential Historic Environment receptors within the offshore elements of Outer Dowsing Offshore Wind (ODOW) ('the Project') and the marine archaeology study area. This Technical Report accompanies Volume 1, Chapter 13: Marine and Intertidal Archaeology (document reference 6.1.13).

13.1.1 Project Background

2. GT R4 Ltd (trading as Outer Dowsing Offshore Wind) hereafter referred to as 'the Applicant', is proposing to develop the Project. The Project offshore generating station 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, Offshore Reactive Compensation Platforms (ORCPs), onshore cables, connection to the electricity transmission network, ancillary and associated development and areas for the delivery of up to two Artificial Nesting Structures (ANS) and the creation of a biogenic reef (if these compensation measures are deemed to be required by the Secretary of State) (see Volume 1, Chapter 3: Project Description (document reference 6.1.3) for full details).
3. Maritime Archaeology Ltd. (MA) was commissioned to undertake this Technical Report encompassing the offshore part of the Order Limits for the Project.

13.1.2 Aims and Objectives

4. The key objectives of the marine archaeology assessment are to:
   - Undertake ongoing consultation with Historic England and other key stakeholders, as required, in order to develop all aspects of the approach and identify Historic Environment receptors and mitigate impacts;
   - Undertake a review of the known Historic Environment receptors within the marine archaeology study area;
   - Summarise the environmental context and archaeological potential of the marine archaeology study area;
   - Assess and review geophysical data to identify previously unknown sites of archaeological potential;
   - Provide an impact assessment and recommendation for embedded mitigation measures for all identified marine archaeological and cultural heritage receptors (included in Volume 1, Chapter 13);

- Develop an agreed Outline Marine Written Scheme of Investigation (WSI) setting out the archaeological requirements pre- and post-consent (document reference 8.8 Marine Archaeological WSI); and
- Provide a Project-specific Outline Protocol for Archaeological Discoveries (PAD) outlining the protocol and reporting chain to be followed during the pre-construction, construction, operation and maintenance, and decommissioning phases in case of any unexpected archaeological finds (see Annex A of document 8.8).

13.2 Methodology

13.2.1 Introduction

5. MA is a Registered Organisation with the Chartered Institute for Archaeologists (CIfA); all work conducted by MA is in accordance with the guidance and principles set out in CIfA's Code of Conduct (2014a) and Code of Professional Conduct (2019).
6. The following legislation, guidance and best practice has been consulted as part of this assessment:
   - Archaeological Written Schemes of Investigation for Offshore Windfarm Projects (The Crown Estate, 2021);
   - Commercial Renewable Energy Development and the Historic Environment: Historic England Advice Note 15 (Historic England, 2021);
   - Deposit Modelling and Archaeology: Guidance for Mapping Buried Deposits, (Historic England, 2020);
   - East Inshore and East Offshore Marine Plans (HM Government, 2014);
   - Environmental Archaeology: A guide to the theory and practice of methods from sampling and recovery to post-excavation (Historic England, 2011); and
   - Historic Environment Guidance for Offshore Renewable Energy Sector, Collaborative Offshore Wind Research into the Environment (COWRIE, 2007);
   - Historic Seascape Characterisation (HSC): Demonstrating the Method (SeaZone, 2011);
   - JNAPC Code of Practice for Seabed Development, Joint Nautical Archaeology Policy Committee (JNAPC, 2006);
   - Marine Geophysical Data Acquisition, Processing and Interpretation (English Heritage, 2013).
   - Offshore Geotechnical Investigation and Historic Environment Analysis: Guidance for the Offshore Renewable Energy Sector (COWRIE, 2011);
   - Protocol for Archaeological Discoveries: Offshore Renewables Projects (The Crown Estate 2014);

- Standard and Guidance for Commissioning Work on, or Providing Consultancy Advice on, Archaeology and the Historic Environment (CIfA, 2014c);
- Standard and Guidance for Historic Environment Desk-Based Assessment, Chartered Institute for Archaeologists (CIfA, 2014b);
- The Role of the Human Osteologist in an Archaeological Fieldwork Project (Historic England, 2018);
- Overarching National Policy Statement for Energy (EN-1) (Department for Energy Security & Net Zero, 2023)
- NPS for Renewable Energy Infrastructure EN-3 (Department for Energy Security & Net Zero, 2023); and
- UK Marine Policy Statement (Department for environment food rural affairs, 2011).

13.2.2 Marine Archaeology Study Area

7. A marine archaeology study area has been established for the purposes of collating a characterising baseline data as part of this Technical Report. The marine archaeology study area is defined as the Array Area, the Offshore Export Cable Corridor (ECC), Offshore Reactive Compensation Platforms (ORCP) areas, a 1km buffer up to Mean High Water Springs (MHWS) surrounding the Array Area and ECC, artificial nesting structure areas, buffered by 1km and the biogenic reef area (Figure 13.1). Prior to ES stage, the AfL Array Area was used within the marine archaeology study area but it has since been refined.
8. The additional 1km buffers are industry standard and allows for the consideration of direct and indirect effects on marine archaeological and cultural heritage receptors where seabed preparation or the instalment of structures is expected. It is designed to accommodate the potential imprecision of historic marine positions and the strong tides which can cause the scattering of shipwreck artefacts and eroded archaeological material over considerable distances. As no seabed preparation is expected as a result of the biogenic reef area, a buffer has not been applied around these areas.
9. Shipwrecks located in the Array area and/or Offshore ECC and/or ANS areas 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 and/or ANS, Volume 1, Chapter: 7 Marine Physical Processes (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 impact on marine archaeological and cultural heritage receptors in Volume 1, Chapter: 13 (document reference 6.1.13).
10. The area from MHWS landward is covered by the onshore archaeology chapter, Volume 1, Chapter 20: Onshore Archaeology and Cultural Heritage (document reference 6.1.20).

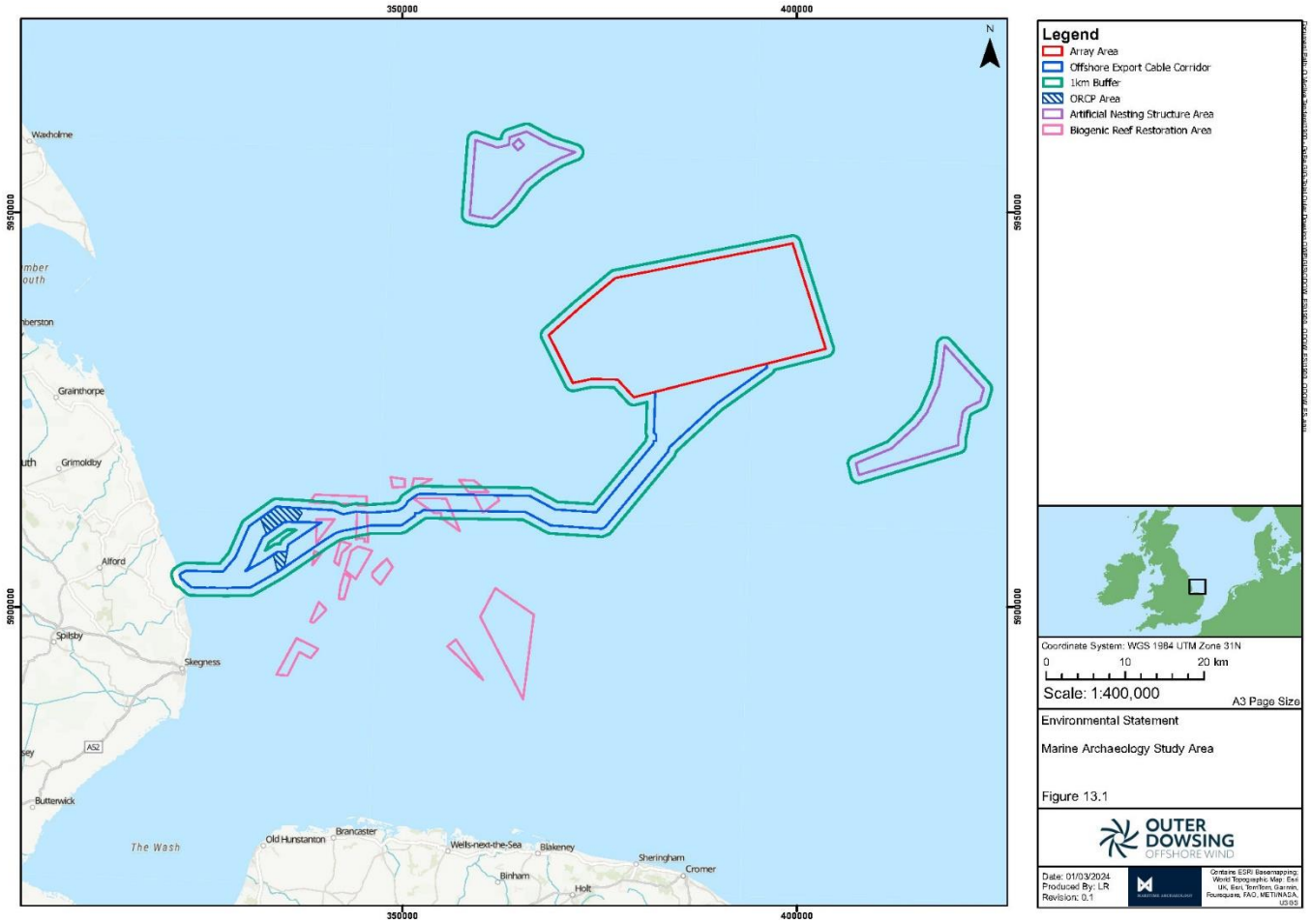

Figure 13.1 Marine Archaeology Study Area

13.2.3 Compensation Areas

11. There are three compensation areas included within the marine archaeology study area which include, an area for the re-creation of biogenic reef (if deemed to be required by the Secretary of State) and areas for up to two artificial nesting structures (ANS). These compensation areas are shown Figure 13.1.
12. No site-specific data has been provided for the compensation areas; therefore all baseline characterisations have been undertaken on the basis of publicly available data only.
13. A gazetteer of recorded sites, wrecks and obstructions within the compensation areas are presented in Annex D.

13.2.4 Baseline Assessment Methodology

14. A baseline review of the Historic Environment receptors located within the marine archaeology study area is presented in Section 13.3. The data sources used to collate the information for this Technical Report are detailed in Table 13.1.

Table 13.1: Key Sources used for the Marine and Intertidal Archaeology Assessment

Source	Summary	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)	Records of known wrecks and obstructions held by the UKHO and available via Admiralty Maritime Data Solutions: Marine Data Portal. Admiralty charts and historic mapping relevant to the defined marine archaeology study area.	Coverage of the marine archaeology study area up to MLWS.
Lincolnshire Historic Environment Record (HER)	Point data derived from Historic Environment Record 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.
North Sea Palaeolandscape Project (NSPP) (University of Birmingham, 2011).	Palaeolithic and Mesolithic landscape mapping of the North Sea.	Partial coverage of the marine archaeology study area, though the detailed study provides useful characterisation of the directly adjacent subzone.
North Sea Prehistory Research and Management Framework (NSPRMF)	Provides a large-scale systematic and interdisciplinary study of the sedimentary and archaeological record now submerged beneath the shallow waters of the North Sea and	Full coverage of the marine archaeology study area.

Source	Summary	Coverage of study area
	English Channel, (Ongoing consultation).	
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 palaeoenvironmental 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. No records of peat are found within the marine archaeology study area, however there are six within relative proximity of the marine archaeology study area, with the closest located 2km south of the Offshore ECC.
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 mean low water springs (MLWS).
England's Historic Seascapes: Withernsea to Skegness Pilot Study (Museum of	Description of palaeolandscape and marine archaeological potential in the offshore zone from Southwold to Clacton.	Broadscale data with regional coverage.

Source	Summary	Coverage of study area
London Archaeology Service, 2009)		
ODOW geophysical and geotechnical survey data from the ODOW Array Area and Offshore ECC (2021/2022)	Geophysical surveys which include Multi-Beam Echo Sounder (MBES), Side Scan Sonar (SSS), magnetometer (MAG) and Sub-bottom profiler (SBP) data collection and geotechnical works which include boreholes and vibrocoring.	Partial coverage of the marine archaeology study area. Full geophysical survey of the Array Area and Offshore ECC but did not include ANS and reef areas. Initial geotechnical works will mainly be designed around engineering requirements, with archaeological input provided during the planning stages of site investigation works. Geoarchaeological campaigns utilising both the already collected material as well as archaeologically specific cores will be undertaken and analysed following submission of specific Method Statement (MS) to Historic England.
Wrecksite.eu	Records of known wrecks and obstructions. Admiralty charts and historic mapping relevant to the defined marine archaeology study area.	Full coverage of the marine archaeology study area up to MLWS.

15. Where there are spatial data discrepancies between different sources, the coordinates provided by UKHO are used (as per Dellino-Musgrave and Heamagi, 2010). Datasets that were provided in the British National Grid co-ordinate system were transformed to World Geodetic System 1984 (WGS84) using the OSTN02 v7 transformation, the most appropriate transformation for working with marine data (Dellino-Musgrave and Heamagi, 2010).
16. Known and identified features within the marine environment typically fall into two categories: wrecks and obstructions. Definitions of these terms, as used by the UKHO, are provided below:
    - Wreck: The remains of a stranded or sunken vessel or aircraft which has been rendered useless; and
    - Obstruction: In marine navigation, anything that hinders or prevents movement, particularly anything that endangers or prevents passage of a vessel. The term is usually used to refer to an isolated danger to navigation. ‘Fouls’ (areas safe to navigate over but which should be avoided for anchoring, taking the ground, or ground fishing) listed by the UKHO are included within this category.
17. Wrecks and obstructions are further 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 that 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.

18. The record of England's archaeological and architectural sites held by the NRHE is being developed into the National Marine Heritage Record but is not complete at time of writing (September 2023).
19. The NRHE data utilised for the assessment of Historic Environment receptors within this Technical Report contains data classified as:
    - Wreck: Remains of vessels and aircraft;
    - Fishermen's fasteners: Unidentified obstructions reported by fishermen;
    - Named locations: Locations where a wrecking event has been reported but not confirmed; and
    - Site/find and event: Find spots and locations for historical events such as battles.
20. Protective legislation for heritage features includes the *Protection of Wrecks Act* 1973, which seeks to secure the protection of known wrecks and wreck sites in territorial waters from interference by unauthorised persons, *Protection of Military Remains Act* 1986 where remains associated with any wartime aviation are and the *Ancient Monuments and Archaeological Areas Act* 1979 which seeks to protect monuments and sites of national importance and public interest due to historic, architectural, traditional, artistic, or archaeological significance.
21. The interest and significance of a site is not defined by the protection it is currently under, as knowledge and data of wrecks and sites is constantly evolving (See Volume 1, Chapter 13 for details).

13.2.5 Geophysical Data Collection Methodology

22. Enviros Survey & Consultancy Ltd (Enviros) was contracted by the Applicant to acquire shallow geophysical and Ultra-High Resolution Seismic (UHRS) data across areas being considered for development at the Project's Array Area.
23. The offshore portion of the survey was undertaken by the survey vessel MV *Guard Celena* for Phase I and Phase II (geophysical and Unexploded ordnance (UXO) surveys) during the survey period of 15 August 2021 to 2 January 2022. The shallow water portion (less than 10m depth) of the survey within Area A was conducted by the DSV *Curtis Marshall* as a part of Phase I (geophysical and UXO surveys) between 17 October and 20 November 2021.
24. The survey programme covered an area of approximately 600km^2 to overlap the AfL Array area of 436km^2. The survey area was divided into 3 Areas; A, B and C. This division was done to aid with data management and the issuance of deliverables. The geophysical survey comprised 656 mainlines and 47 crosslines that vary in length from 6 -17km.
25. The survey was conducted in a single pass mode with the UHRS, MBES, SSS, SBP and MAG were acquired concurrently.

26. GEOxyz was contracted by the Applicant to carry out an environmental, geophysical and geotechnical survey of the Outer Dowsing Offshore Windfarm (OWF) AfL Array area, Funnel area approach and Export Cable Corridor. The ECC route is divided into 17 separate blocks. The corridor is 2km wide and main lines have been planned spaced every 50m and crosslines have also been included every 1km. *Geo Ocean III* was utilised to conduct all aspects of the survey April-June 2022.
27. The data quality, for archaeological purposes, of the SSS, MBES and SBP (Array Area only) was assessed as Good, the exception to this was the MAG data, which was assessed as Adequate, as described below.

- Good: Clear data which has been unaffected or only slightly affected by conditions such as weather, sea state or background noise in which anomalies can be clearly identified and interpreted. Upstanding or partially buried wrecks, debris fields and small, isolated anomalies as well as subtle reflectors within the SBP data are clearly discernible. Data of this quality provide the highest probability for marine archaeological and cultural heritage receptors to be identified;
- Adequate: Data which has been moderately affected by conditions such as weather, sea state or background noise, in which anomalies can been seen but are difficult to identify and interpret. Upstanding wrecks and larger debris fields are discernible, however the identification and interpretation of dispersed or partially buried wrecks, small, isolated anomalies, and continuous reflectors within SBP datasets may be difficult. Data of this quality is considered usable, but the clear identification of marine archaeological and cultural heritage receptors may be impaired;
- Dissatisfactory: Data which has been significantly affected by conditions such as weather, sea sate or background noise, in which only large anomalies such as relatively intact upstanding wrecks can be suitably identified and interpreted. The identification and interpretation of dispersed or partially buried wrecks, small, isolated anomalies and small palaeogeographic features will be impaired; and
- Variable: Where the quality of data between individual lines varied leading to a variation in confidence in the identification and interpretation of marine archaeological and cultural heritage receptors within the dataset.

Side Scan Sonar Data

28. Within the AfL Array area, an Edgetech 4200 dual-frequency SSS towfish system was used to collect SSS data simultaneously on both port and starboard of the ship. The SSS was run at a low and high frequencies of 300 and 600 kHz with a range of 50m to provide 100% coverage via the Edgetech Discover SSS acquisition software. Data were recorded in XTF format and was processed in the SonarWiz software package.
29. Within the ECC, an Edgetech 4205 MP/MT was used to collect SSS data. The SSS was run at a low and high frequencies of 300 and 600 kHz with a range of 75m. Data were recorded in XTF format and was processed in the SonarWiz software package.

30. Following processing, the SSS data quality was considered Good (as defined above), and seabed anomalies could be clearly identified and interpreted.
31. The SSS data were reviewed on a line-by-line basis by a qualified marine archaeologist. All anomalies were identified and assessed for archaeological potential as per Table 13.2 Target reports were developed and exported as ESRI shapefiles into ArcGIS Pro for synthesis with other data sets.
32. All SSS anomalies were assigned feature IDs ranging between MA2000 – MA2763.

Echo Sounder (Multi-Beam System) Data

33. Within the AfL Array Area, a Dual Teledyne RESON 7125 (400 kHz) hull mounted MBES was used to provide MBES. The system was run in a 190 - 400 kHz configuration. The MBES data was processed with a cell size of 0.25 x 0.25 m.
34. During survey operations multibeam settings were constantly monitored to ensure optimal performance. Swath angle and vessel speed were monitored and reduced in deeper waters to focus the same number of receive beams over a smaller seabed area to ensure hit count was maintained.
35. MBES data were received as ungridded ASCII files, and .asc grids reduced to LAT. The data were visualised using the Fledermaus 7 suite; DMagic to produce a digital terrain model (DTM) gridded at 0.25m according to the highest resolution xyz data received and hillshaded. These were exported for interpretation into Fledermaus with a 32-step colour map overlaid to aid interpretation and later into ArcGIS Pro for synthesis with other data.
36. Within the ECC, R2Sonic 2400 with an angled dual head 420kHz / 370kHz with a range of 70m. Sector coverage was initially 80° fixed providing 120° total swathe, then changed on the 30th to 100° fixed, providing 140° swathe, then changed to dynamic settings from 90-120° per head.
37. Following processing, the MBES data quality was considered Good (as defined above), and seabed anomalies could be clearly identified and interpreted.
38. Backscatter (BS) data have also been recorded, measuring the intensity of the echo sounder pings which are assigned a grey-scale value and gridded. This provides an acoustic intensity map that is similar in appearance to SSS data, but without shadows to highlight relief. The data are useful for the interpretation of bathymetric anomalies and enables an understanding of material type for discrete features, and sediment classification of shallow deposits.
39. The MBES and BS data were reviewed by a qualified marine archaeologist for targets identified during the assessment of other datasets and information regarding the length, width and anomaly height above the seabed was cross-referenced with side scan and SBP results where these features possessed a surface expression.
40. Target imagery was captured, and feature IDs were assigned, ranging between MA4000 – MA4375.

Magnetic Data

41. Within the Array Area, for the MAG data a Geometrics G882 (piggyback on the SSS) was used, this has a sensitivity of 1 nanotesla (nT). The data were acquired using the Maglog lite software.
42. Within the ECC, a Geometrics G882 (piggyback on the SSS) was also used, with a sensitivity of 0.1 nT.
43. Magnetic data were then assessed using the Geosoft Montaj, MagPick and SonarWiz software packages. Raw xyz profile text files were assessed on a line-by-line basis and only smoothed using low and/or high pass filters where necessary. Data were also gridded from the analytic signal to produce a spatial distribution map of anomalies. Interpreted magnetic targets were identified by combining a manual assessment of the magnetic profiles with a visual assessment of the gridded data.
44. Following processing, the magnetic data quality was considered adequate (as defined above) due to being moderately affected by conditions such as the weather, sea state and background noise. Magnetic anomalies could be seen but identification and interpretation were more difficult.
45. Magnetic anomalies greater than 5nT have been accepted as a standard for the smallest change in magnetic field reliably detected (Dix *et al*., 2008). It has been argued that a minimum detectable deflection of 5nT may be on the conservative side and that, where the data are relatively noise free, 3nT or even 2nT may be practical depending on noise levels, instrument type, data rate and purpose of investigation (Camidge *et al*., 2010).
46. Objects giving a 5nT return from a six-meter distance are likely to be ferrous objects of around 100kg (for example, a small anchor) (Camidge *et al*., 2010). Anomalies smaller than this are not likely to be discernible from signal noise unless passed over directly by the fish at extremely short range (c. 2m). Such signals are not expected to be of archaeological interest, constituting isolated debris or single instances of ferrous anthropogenic material.
47. These surveys, like most MAG surveys of large areas, are of variable sensitivity (Camidge *et al*., 2010:62). At 6m range, run lines directly over targets are able to detect a target with a mass of around 100kg, whereas the line spacing for this survey varies with the average line spacing at 75 or 150m. At 150m line spacing the slant range can be up to 80m, which means that only objects of more than 100 tonnes will be discernible at 5nT deflection at this range. Benefiting the data collection for this case is that the run lines were cross lined which can reduce the large differential sensitivity (Camidge *et al*., 2010:63).
48. All magnetic targets over 5nT were exported into ArcGIS Pro for comparative analysis with other geophysical datasets and data identified during the baseline review.
49. Target reports were developed for all magnetic anomalies correlating with high and medium potential SSS anomalies. Feature IDs for all magnetic anomalies were as-signed IDs ranging between MA5000 – MA7309.

Sub-bottom Profiler Data

50. An Innomar SES-2000 side mounted parametric SBP was used onboard the survey vessels MV *Guard Celena* and DSV *Curtis Marshall* for Phase I and Phase II. The SBP was operated on a frequency of 100kHz Primary and 4-15kHz Secondary. The parametric system has a narrow beam and is based on low frequency sound generation from two high-intensity sound beams at emitting at higher frequencies.
51. Interpretation of SBP data of the Array Area was undertaken on a line-by-line basis by a qualified marine archaeologist using the SonarWiz software package.
52. The data were received in SEGY format and imported and visualised using SonarWiz. Lines were bottom tracked and gain corrected, and then reviewed in numerical order with features digitised continuously. Features were picked by digitising reflectors and horizons of potential archaeological interest. Discrete reflectors consist of point hyperbolae and blanking effects indicative of potential buried archaeological deposits, such as wreck and debris.
53. Following processing, the SBP data quality was considered Good (as defined above), and channels and sub seafloor features could be identified and interpreted.
54. There were limitations within the Offshore ECC with the Sub Bottom profile data. Due to the high confidence in the interpretation presented in the GeoXYZ report (2023), this was used alongside core data to understand the Sub Bottom profile of the Offshore ECC. The Phase One Geoarchaeological report demonstrates that data gaps were filled by the assessment of cores (Volume 3, Appendix 13.2 Geoarchaeological Phase 1 Report ECC (document reference: 6.3.13.2) and Appendix 13.3 Geoarchaeological Phase 1 Report OWF (document reference: 6.3.13.3)).
55. Feature IDs for all away area SBP anomalies were assigned ID's ranging between MA3000 – MA3007.

13.2.6 Methodology Geophysical Data Interpretation

56. The archaeological assessment of geophysical data has been undertaken by a qualified and experienced marine archaeologist. Following delivery of the survey data as specified above, the raw data were processed and interpreted as per guidance in Marine Geophysics Data Acquisition, Processing and Interpretation (English Heritage, 2013).
57. All anomalies of archaeological potential were assessed against the criteria in Table 13.2 and the results of the assessment of all datasets were further reviewed against the baseline data collated for the marine archaeology study area, as detailed in Section 13.3.

Table 13.2: Definition of Archaeological Potential

Archaeological Potential	Archaeological Definition
High	Anomalies considered to map material of archaeological interest such as wreck or aviation crash sites, buried and confirmed palaeolandscapes and their margins. As per

Archaeological Potential	Archaeological Definition
	EN-1 (March 2023), “there will be archaeological interest in a heritage asset if it holds, or may potentially hold, evidence of past human activity worthy of expert investigation at some point”.
Medium	Anomalies that consist of defined structural outlines or coherent material distributions with strong backscatter, or clearly upstanding objects with shadow, or pronounced scour features; or a combination of these, interpreted as of possible archaeological interest but where further investigation would be required for more detailed interpretation.
Low	Anomalies considered to be of anthropogenic origin but likely related to modern activity with little or no archaeological interest or significance such as modern debris, ropes, chains or fishing gear.

13.2.7 Embedded Mitigation Methodology

58. Mitigation measures that were identified and adopted as part of the development of the Project design (embedded into the Project design) and that are relevant to Offshore and Intertidal Archaeology, listed in Table 13.3, include project design measures, compliance with elements of good practice and use of standard protocols. This approach is further detailed in Volume 1, Chapter 13 and will be reflected in the DCO requirements and/or deemed Marine Licence (dML) conditions.

59. The embedded mitigation measures for the Project are formulated where Historic Environment receptors and anomalies are identified in the desk-based assessment and/or geophysical assessments. The embedded mitigation measures are based on guidance set out in Historic Environment Guidance for Offshore Renewable Energy Sector (COWRIE, 2007) and Archaeological Written Schemes of Investigation for Offshore Windfarm Projects (The Crown Estate, 2021).

Table 13.3: Embedded Mitigation Relating to Marine and Intertidal Archaeology

Mitigation Measure Embedded into the Project Design	Description of Mitigation
Marine Written Schemes of Investigation	A Outline Marine WSI document has been produced to accompany the ES to outline defined mitigation measures necessary for this stage and further archaeological campaigns for the Project which builds on the baseline characterisation completed to date for the entire proposed development. The methodological approaches to survey data capture standards and analysis that will best support archaeological analysis and interpretation. The use of in-situ mitigation measures such as AEZs, as are presently spatially identified, with clear instruction that the Outline Marine WSI provides the basis for steering the proposed project post consent to be produced pre-construction in accordance with the dML and submitted to the MMO for approval.

Mitigation Measure Embedded into the Project Design	Description of Mitigation
Archaeological Exclusion Zones (AEZ)	All intrusive activities undertaken during the life of the Project will be routed and microsited to avoid any identified Historic Environment receptors pre-construction, with AEZs as detailed in the Marine WSI unless other mitigation is agreed with Historic England. AEZs are buffers around Historic Environment receptors that are to be avoided during construction works. The avoidance of AEZs must also consider that the use of anchors and lines, which could impact upstanding features, are adequately taken into account in the planning of operations.
Protocol for Archaeological Discoveries (PAD)	Additional unknown or unexpected archaeological and cultural heritage receptors identified during the Project stages will be reported utilising the Project specific PAD. The application of a PAD, as well as applicable to any defined project stages, will also be applicable to any post-consent and pre-construction phase.
Archaeological assessment of available data	Offshore geophysical surveys (including 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. All Archaeological assessment of available data must be in association with a WSI produced in consultation with Historic England.
Post-construction monitoring plan	A post-construction monitoring plan as per the Outline Marine WSI will be produced. The post-construction monitoring plan will monitor areas or sites deemed to be of high archaeological interest recommended for further investigation and outline how post-construction monitoring campaigns will collect, assess in order to report on changes to Historic Environment receptors that may have occurred during the construction phase.

13.3 Baseline Review

13.3.1 Environmental Context

60. The area of seabed that the marine archaeology study area covers was previously a large swathe of dryland that was inhabited during the Pleistocene and early Holocene (Mesolithic). 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 repeat (re)colonization and abandonment of these landscapes.

61. 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 which 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 been eroded or reworked by younger landscapes (Cohen et al., 2017). The environmental context and the results of the geoarchaeological assessments are further discussed in section 13.5.

62. A wide variety of monuments and artefacts representing the period of time since the last glaciation have potential to be found within the marine archaeology study area and wider regional context. These may include maritime related features such as fish weirs, jetties, fish and shellfish tanks, revetments, piers, harbour installations, lifeboat stations, coastguard buildings, wreck sites, as well as others relating to agricultural practices, residential or leisure activity, and industrial processes. Similarly, artefacts may be found which relate to shipping, fishing, hunting, domestic activity, or craft/industrial occupations, covering many periods (Humber Field Archaeology, 2009). These have been described, and examples included where possible, in the sections below and a gazetteer taken from the Historic England Peat Database of the 10 peat deposits recorded in the marine archaeology study area as well as 33 from an offshore context within the North Sea which provide regionally contextual relevance has been included as Annex E (Historic England, 2023).

13.3.2 Maritime Activity

Introduction

63. The following sections provide a broad contextual overview of the past human activity within the region, focusing on maritime activity. This enables an assessment of the potential for archaeology within the marine archaeology study.

64. The marine archaeological resource can be characterised into the following five main categories of sites and features:

- Submerged prehistoric landscapes related to fluctuations in past sea-level. Such landscapes may contain significant evidence of prehistoric human occupation and/or environmental change;
- Archaeological remains of vessels deposited after a wrecking event at sea or abandoned in an intertidal context;
- Thousands of aircraft are likely to have been lost in UK territorial waters during the 20th 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;

- Structural remains other than watercraft, such as defensive structures, lighthouses or sites lost to the sea as a result of coastal erosion, may be found within the intertidal zone (between MLWS and MHWS); and
- Historic Seascape Character: the historic character deriving from human activity in the marine environment, its use and its ability to accommodate change.

65. There are a wide range of heritage sites without formal protection which have been identified and outlined below and in Section 13.3.
66. The baseline assessment has also determined that:
    - 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;
    - There are currently no Marine Antiquities Scheme finds recorded within the marine archaeology study area (The Crown Estate, 2016); and
    - There are currently no conservation areas within the marine archaeology study area. However, where the Offshore ECC makes landfall there is one site that is designated as a Site of Special Scientific Interest (SSSI), while there are currently no recorded archaeological sites or finds at Chapel Point to Wolla Bank SSSI, but preserved palaeoenvironmental deposits that consist of Holocene sediments and special geological features have been recorded.

Palaeolithic (c. 800,000 To 12,000 BP)

67. The potential for submerged landscapes within the marine archaeological study area is high. To the south of the marine archaeology study area, at Happisburg and Pakefield, the earliest evidence of hominin occupation of northern Europe (c. 900 kiloannum (ka) to 800 ka) comes from sites, features, and finds within the coastal and marine zone (Parfitt *et al*., 2005, 2010; Bynoe, 2018).
68. The Quaternary (Pleistocene and Holocene) was a period of fluctuating climate corresponding with oscillations in sea level. During interglacial periods sea levels were relatively high, sometimes comparable to the present day.
69. There have been numerous glacial cycles resulting in periods of lower and higher sea-level compared to today. 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 more than likely from periods when the sea level was lower.
70. 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 had not yet been eroded or reworked by younger landscapes (Cohen *et al*., 2017).

71. The deposits laid down in the marine zone during glacial cycles during the last 500,00 years are of great importance for understanding the localised geomorphological changes of the Lincolnshire coastline. The archaeological and palaeoenvironmental potential of the offshore deposits from the North Sea basin 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.

Mesolithic (c. 12,000 To 6,000 BP)

72. During the Early Mesolithic (approximately 10,000 BP) the melting northern ice sheet caused sea levels to rise cutting of Britain's dry-land connections with continental Europe and causing a flourishing forested environment to spread throughout the region. Human settlement and behaviour had to adapt to the changing conditions. Human settlement patterns around the North Sea and associated river inlets suggest the use of vessels. Examples of this include evidence of wood clearing and settlements close to rivers such as the Little Ouse. Although there is currently no archaeological evidence for boat building at this time within this region, there is contemporary evidence in the Netherlands and France that wood working took place for a variety of equipment, such as watercraft (Limpenny *et al*., 2011).
73. Most early prehistoric finds from the North Sea will be from the late Upper Palaeolithic and earlier Mesolithic, post-dating the Last Glacial Maximum (LGM) (Devensian) and representing the period of recolonisation of southern Britain by anatomically modern humans from c. 12,500 BP. This followed a period of approximately 10,000 years of glaciation (during which there is no current evidence of human habitation or continuity - Jacobi, 2004).
74. 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.

Neolithic (c. 6,000 To 4,600 BP)

75. Neolithic watercraft, much like their Mesolithic counterparts, are likely to comprise skin/hide boats or logboats (summary in McGrail, 2004: 172-183). In general, the former craft are more likely to be capable of open water journeys, whereas the latter were likely restricted to sheltered waters.
76. The rate of sea-level change had slowed considerably by c. 6,000 Before Present (BP) for much of the British Isles and much of the land mass connecting the UK and continental Europe was permanently inundated.

77. There are two types of boats known from England during the Neolithic, however there are currently no known examples from the Neolithic. Logboats, or monoxylous craft, are made from hollowed-out tree trunks, often with rounded ends, but sometimes the stern included a fitted transom. Logboats would have been paddled and suitable for travelling along the North Sea coast and deltas under favourable circumstances. It is probable that Prehistoric settlers exploited the landscape using craft such as logboats.
78. The second type of craft known archaeologically is the sewn-plank boat which are constructed from large oak timbers with bevelled edges; planks are sewn or stitched together using twine or withies made of fibres from the yew tree. The planked hull was caulked with moss, making it relatively watertight and a system of cleats, which were integral to the keel- and side-strake planks, or isle planks, through which transverse timbers were passed, provided rigidity to the hull (Sturt and Van Noort via Research Framework, 2022).
79. Sewn-plank boats were more likely to have been used for seafaring journeys than logboats and would also have been paddled. Designed to be more capable at sea, and due to their size of up to 18m they had the capacity for a crew of 20 or more. The find locations of sewn-plank boats, exclusively on the coast or in estuarine situations, supports the argument that this type of craft was used for coastal journeys and sea crossings (Van de Noort, 2006). Examples of sewn-plank boats have been found near Brigg in Lincolnshire's Ancholme valley, North Ferriby in the intertidal Humber, and Kilnsea.
80. 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. In particular, 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).
81. The landscape of the region from the Neolithic through to the Bronze Age encompassed the clearing of broad areas of woodland with settlement amongst the rich marshlands and estuarine environments (Limpenny *et al*., 2011).

Bronze Age (c. 4,600 To 2,200 BP)

82. The earliest examples of British Middle to Late Bronze Age watercraft represent a functional development of adapting timber into planks to utilise the varying environments for the owners' benefits, either for ferrying within fast-flowing estuaries or simply searching for foodstuffs within quiet upper reaches and creeks (McGrail, 2004). Examples of log boats within the region include the Appleby logboat dated to 3,500 BP and one found in the Witham River dated to 4,000 BP.
83. 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.

84. 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.

Iron Age (c. 1,800 BP To AD 43)

85. 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.
86. The Iron Age that followed (700 BC to Anno Domini (AD) 43) would see a similar structure of lifestyle to that of the Late Bronze Age, with a low density of activity along river valleys and sustained woodland clearance around the east coast (Bryant, 1997). Late Iron Age artefacts of European significance from the La Tène I to III cultures that were deposited as offerings have all been discovered within wet contexts to the west (Bryant, 1997). This not only represents a further connection to the Continent through trade, but also a community motivated towards water environments for more than simply transport and subsistence (Hegarty and Newsome, 2004).

Roman (c. 43 To 410)

87. A closer unity between Britain and the southern North Sea margin was established during the Romano-British period (AD 43 – AD 410), which expanded and further diversified trade with the Continent. By AD 50 the port of Londinium attracted a vast density of shipping and merchant carriers (Merrifield, 1983).
88. 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 marine archaeology study 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.

89. Direct maritime archaeological evidence also represents diverse cultural impacts and impressions during the Romano-British period, exemplified by a number of vessels discovered around England which illustrate cross-Channel contacts through the manner of the constructional traditions utilised.
90. As the Roman dominance of Europe diminished, opportunistic seafaring communities from the east began to threaten vulnerable areas along the coast. This saw the establishment of Roman garrisons along the Norfolk and Suffolk coast, known as the "Saxon Shore" sea defence. Indeed, the fortified sites of Caister and Burgh Castle are well documented (Darling and Gurney, 1993; Gurney, 2005). A network of trade and migration routes that extended throughout the southern North Sea was introduced by the Saxon settlers who established themselves after the Roman occupation. This is evidenced by Scandinavian-style clinker-built vessels during the Early Medieval period (AD 410–1066).
91. Examples of vessels during this period include a wooden boat discovered in an old watercourse close to Ashby Dell thought to be from the 4th or 5th century and similar in type to the Nydam 2 ship from Jutland (AD 310 and AD 350); the Sutton Hoo 2 dated to approximately AD 630, which is similar the Norwegian Kvalsund Ship (AD 700) (McGrail, 2004). The Nydam 2 boat and the Sutton Hoo 2 boat may not be representative of ocean-going cargo vessels, however, they represent the shipbuilding technology of the time and ability of shipwrights to build strong sailable vessels.

Medieval (c. 410 To 1540)

92. 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.
93. Viking raids during the Early Medieval period let to settlements forming along the eastern shores of England, bringing new cultural influences on the vibrant Saxon communities of East Anglia.
94. Ship and casualty losses from this period were documented and indicate the international nature of shipping networks from the Baltic to Mediterranean passing through the southern North Sea area. This proximity to rich marine resources led to Norfolk and Suffolk establishing the largest fleet of ships compared to any other region of England at this time, with the towns of Dunwich, Southwold, Lowestoft, and Great Yarmouth as particular examples of this prosperity (Williams, 1988).

95. New trans-oceanic networks between the North Sea and the East and West Indies became established during the late 15th and early 16th centuries. Within a century the advance in shipbuilding technological capabilities and cheap ordnance meant that conflicts at sea became organised, larger in scale and more destructive.
96. Within the marine archaeology study area, there is one record of a potsherd (MLI41601) from the medieval period listed in the Lincolnshire HER with its status currently unknown in the records.

Post-Medieval (c. 1540 To 1901)

97. 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.
98. Towards the end of the post-medieval period the Agricultural Revolution followed by the Industrial Revolution led to great expansion of trading and economy. Local industries of ironworks, lime works (for building and fertilising) and brickworks emerged in order to supply the demand for local developments. Much of this had to be transported by water, until a reliable railway network was developed by the 1860s (Gould, 1997). The established ports of Grimsby and Hull along with the newly developed rail system played roles in the growth of fishing and shipping industries, leading to a greater inland accessibility to fresh fish and other maritime imports.
99. Generally, timber-built vessels continued to be dominant, with iron structural elements and fittings becoming more popular as the nineteenth century progressed. Fundamental changes in shipbuilding traditions occurred through the technological innovations of the Industrial Revolution with the development of steam propulsion together with iron and steel constructed hulls (Greenhill, 1993). Three sailing vessels (UKHO9339 SV *Excelsior*, UKHO9341 SV *Dauntless* and UKHO8868 *Norfolk*) within the marine archaeological study area are dated to the post-medieval period (Figure 13.2).

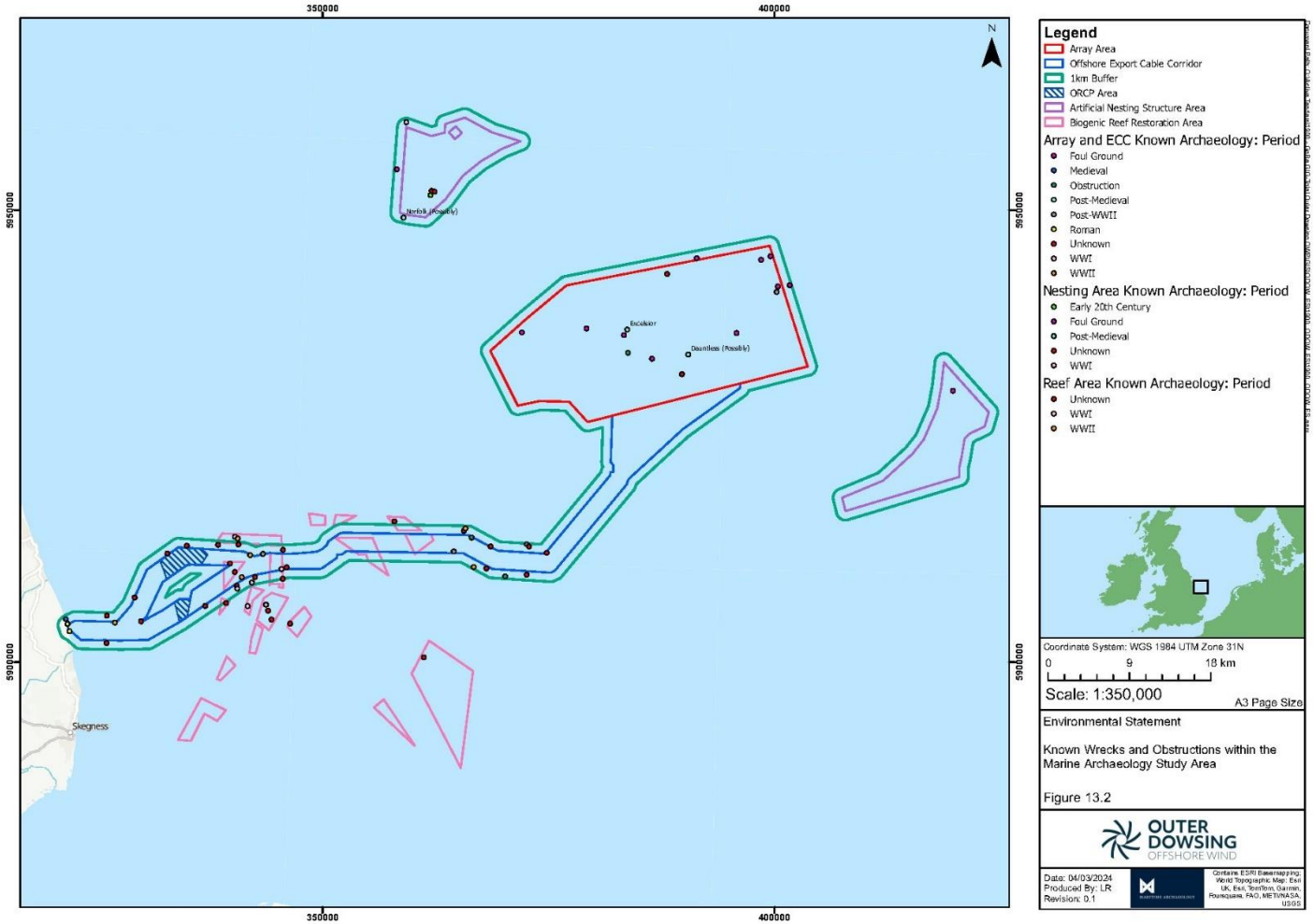

Figure 13.2 Known Wrecks and Obstructions within the Marine Archaeology Study Area

Modern (c. 1901 To Present)

100. 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 liners in favour of cruise ships and newly developed passenger aircraft in the mid-1900s, and planes becoming the primary method of intercontinental travel.

101. During WWI the necessary continuation of the movement of cargo to and from London meant the east coast was *en route* from the industrial heartland and northern coalfields throughout WWI and WWII. Different strategies with which to disrupt shipping, based around the available technologies of the time, were adopted during each conflict.

102. The east coast witnessed a large proportion of maritime wartime casualties during both conflicts. During WWI, German U-Boat and minefields were the primary cause of shipping losses, compared with the natural elements of weather and navigational hazards. The British Navy established convoy networks with escorting minesweepers that were usually local fishing trawlers acquired and customised by the Admiralty to combat these losses (Limpenny *et al*., 2011).

103. Recorded losses from WWI are predominantly recorded along the UK coastline, and in particular the major ports, and potentially reveal the German strategy in the southern North Sea (Limpenny *et al*., 2011).

104. During WWII, convoy vessels were lost by torpedoes from submarines, with the additional threat of German motor torpedo boats, known as E-Boats, and fighter/bomber aircraft (Larn and Larn, 1997). There are a high number of aviation losses attributed to WWII from the Royal Airforce (RAF), American and German aircraft along the east coast.

105. The archaeological record of the east coast has a disproportionate focus towards twentieth-century shipping losses that, although important, are not representative of the technological advances of shipbuilding made in the previous century. Within the marine archaeology study area, there are 19 recorded wrecks attributed to the modern period.

Date Unknown

106. There are 34 recorded losses of unknown dates within the marine archaeology study area recorded in the UKHO and NRHE (there were none recorded within the Lincolnshire HER). Two of these 34 records are within the Array Area. These are further detailed in Section 13.3.

13.3.3 Known Wrecks and their Archaeological Interest

107. Known wrecks are listed in order of their UKHO or NRHE number and are described in the following sections (illustrated in Figure 13.2).

108. The assessment of archaeological interest has been completed for the records within the Array Area, Offshore ECC and associated 1km buffer, outlined below. This information could be used by Historic England, to determine significance in accordance with their published Conservation Principles. The interest of a wreck does not directly dictate the size of the assigned AEZ as this is based on the potential, rather than interest but it can sometimes contribute to it.

109. As per EN-1 (March 2023), *"there will be archaeological interest in a heritage asset if it holds, or may potentially hold, evidence of past human activity worthy of expert investigation at some point"*.

110. There are 21LIVE wrecks, seven DEAD wrecks, and 23 UNKNOWN or unconfirmed wrecks, within the marine archaeology study area. Unless otherwise indicated, the size of each wreck is presented as: length x width x depth m. The recorded sites, wrecks and obstructions within the marine archaeology study area and their locations where known, are listed in Annex C.

111. Two wrecks, SS *Ahamo* a British tanker (NRHE943166, UKHO9328) and SS *Fireglow* an English collier (NRHE1456746, UKHO9313), are both NRHE records located within the marine archaeology study area but are associated with UKHO records that are both located outside of the marine archaeology study area (1.47km and 23.29km away from their NRHE locations, respectively). The locations listed within the UKHO data has been used as per Section 13.2 and these wrecks have not been included in the assessment below.

112. There are a total of 10 High interest, 3 Medium interest, 3 Low interest and 22 Unknown interest Historic Environment receptors which are further detailed below.

13.3.4 Archaeological Interest of Known Wrecks within the Array Area

UKHO9339 SV Excelsior

113. A 64-ton sailing vessel which sank on 26 August 1882 after a collision with the smack *Scottish Chief*. No other details are listed about the life or loss of SV *Excelsior*.

114. The wreck is currently listed as DEAD and was not identified in the Project's geophysical data.

Baseline Archaeological Interest

115. Sailing vessels in the 1800's were going through technical advancements alongside the development of contemporary steam powered ships but sail was still commonly used, especially for quicker transport of cargo using ships of the Clipper type. As limited information is available on SV *Excelsior*, and the vessels has never been located in this position, it is deemed to be of MEDIUM archaeologically interest (Table 13.4). However, there is the potential that further information may change this assessment.

Table 13.4: Archaeological Interest of UKHO9339 SV *Excelsior*

Criteria	Archaeological Interest
Period	Medium
Rarity	Medium
Documentation	Medium
Group value	High
Survival/condition	Unknown
Fragility/vulnerability	Unknown
Diversity	Medium
Potential	Medium
Overall	MEDIUM

UKHO9341 SV *Dauntless* (possibly)

116. A British sailing vessel with a gross tonnage of 54 was lost on 1 August 1892. No further details are listed about its life or loss. The wreck was recorded in the 1980's and confirmed as lying in 19m of water with debris 100m southeast but has not been seen since.

117. The wreck is currently listed as LIVE and was not identified in the Project's geophysical data.

Baseline Archaeological Interest

118. Sailing vessels in the 1800's were going through technical advancements alongside the development of contemporary steam powered ships but sail was still commonly used, especially for quicker transport of cargo using ships of the Clipper type. As limited information is available on SV *Dauntless*, and the vessel has not been seen since 1989 when it was measured as 12m x 4m with no magnetic signature, it is deemed to be of MEDIUM archaeologically interest (Table 13.5), despite the likelihood that the measurements would indicate a smaller vessel, possibly used for fishing. However, there is the potential that further information may change this assessment.

Table 13.5: Archaeological Interest of UKHO9341 SV *Dauntless* (possibly)

Criteria	Archaeological Interest
Period	Medium
Rarity	Medium
Documentation	Medium
Group value	Medium
Survival/condition	Unknown
Fragility/vulnerability	Unknown
Diversity	Medium
Potential	Medium
Overall	MEDIUM

UKHO9417 MV *Basto*

119. An Antiguan and Barbudan steel motor cargo ship built in 1965 by Schiffswerft Niederelbe (Hugo Peters & Co.), Wewelsfleth, Germany with dimensions of 64.6 x 10.1 x 3.7m with a diesel engine, single shaft and screw, and a gross tonnage of 499. Owned at the time of loss by Arn Thielen.

120. On 8 January 1988 on passage from Kalundborg for Guinness with a cargo of wheat, MV *Basto* took on a severe list and was abandoned, then later sank while under tow to Humber.

121. The wreck is currently listed as LIVE and was identified in the Project's geophysical data (MA0005).

Baseline Archaeological Interest

122. The position and identity of the wreck has been confirmed and the site has been investigated multiple times, it was located and swept clear at 9m in 1988 and again at 12.9m in 1989 when it was described as broken up into two parts. In 1990 it was commissioned to be dispersed and was following dispersal swept at 16.5m. It is not surprising therefore that the wreck remains visible in the geophysical data and is noted as scattered debris and sheathing of a large wreck.

123. Despite its clear remains on the seabed and the information available the wreck is assessed as of LOW archaeological potential (Table 13.6). However, there is the potential that further information may change this assessment.

Table 13.6: Archaeological Interest of UKHO9417 MV *Basto*

Criteria	Archaeological Interest
Period	Low
Rarity	Low
Documentation	Medium
Group value	Low
Survival/condition	Medium
Fragility/vulnerability	Medium
Diversity	Low
Potential	Low
Overall	LOW

UKHO9426 Unknown

124. An unknown vessel originally detected in 1989 with no further detail listed about its life or loss. Measured during surveys in 1989 as having dimensions of 120 x 15 x 2.1m. In 1995 the location was interpretated as an area of boulders, however the report also notes that the mound visible may be sediment build-up around a wreck.

125. The wreck is currently listed as LIVE and was identified in the Project's geophysical data (MA0018).

Baseline Archaeological Interest

126. As an unknown vessel the archaeological interest cannot be determined based on the information available. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

UKHO9440 Unknown

127. An unknown fishing trawler with a single boiler of 300 gross tonnage originally detected in 1989 with no further details listed about its life or loss.

128. The wreck is currently listed as LIVE and was identified in the Project's geophysical data (MA0003).

Baseline Archaeological Interest

129. As an unknown fishing trawler vessel with limited information available, this vessel is deemed to be of MEDIUM archaeologically interest (Table 13.7). However, there is the potential that further information may change this assessment.

Table 13.7: Archaeological Interest of UKHO9440 Unknown

Criteria	Archaeological Interest
Period	Medium
Rarity	Unknown
Documentation	Medium
Group value	Low
Survival/condition	High
Fragility/vulnerability	Medium
Diversity	Low
Potential	High
Overall	MEDIUM

13.3.5 Archaeological Interest of Known Wrecks within the Offshore ECC

UKHO8614 Unknown

130. An unidentified wreck or obstruction with no further details about its life or loss and was last recorded in 1962 and is reported as causing the loss of fishing gear over several years.

131. The wreck is currently listed as LIVE and was not identified in the Project's geophysical data.

Baseline Archaeological Interest

132. As an unknown vessel the archaeological interest cannot be determined based on the information available. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

UKHO8617 MV *Arduity*

133. A British steel motor coaster of 304 tons with dimensions of 35.4 x 7.9 x 2.7m was built in 1935 by George Brown & company, Greenock for F T Everard & Sons. MV *Arduity* was powered with a three-cylinder diesel powered oil engine of 84HP, and a single shaft, built by Newbury Diesel Co. Ltd. Recorded in the NHRE database (NRHE913040).

134. On the 16 May 1942 while carrying a cargo of coal MV *Arduity* was mined and sunk five miles off Mablethorpe while on passage from Keadby to Cantley.

135. The wreck is categorised as a dangerous wreck lying at a depth of 7.3 meters. It was dived in 1952 where the wreckage was recorded to be scattered over a fairly wide area and last detected in 1954.

136. The wreck is currently listed as LIVE and was identified in the Project's geophysical data (MA2682).

Baseline Archaeological Interest

137. MV *Arduity* is one of many cargo and transport vessels lost at sea during the WWII. The site has the potential to be of HIGH archaeological interest based on the time period (Table 13.8). However, there is the potential that further information may change this assessment.

Table 13.8: Archaeological Interest of UKHO8617 MV *Arduity*

Criteria	Archaeological Interest
Period	High
Rarity	Medium
Documentation	High
Group value	Medium
Survival/condition	Low
Fragility/vulnerability	Unknown
Diversity	Medium
Potential	High
Overall	HIGH

UKHO8626 SS *Argo*

138. The Norwegian iron steam cargo ship of 1,261 tons and dimensions of 234.9 x 34.1 x 16.8m was built in 1883 by Martens, Olsen & Co. and owned at the time of loss by Wrangell H. M. & Co. SS *Argo* was powered by a two-cylinder compound steam engine and two single boilers, with one shaft and one screw and a 142HP engine. Recorded in the NHRE dataset (NRHE913042).

139. On 28 January 1917 when on a voyage from Hull to Rouen with a cargo of coal, SS *Argo* was struck by a mine from the German submarine UC-26 (Matthias Graf von Schmettow), 1.5 miles southeast of the Inner Dowsing Light Vessel. The crew abandoned the ship and the vessel drifted with the tide before going down. Nine persons were lost.

140. The wreck is currently listed as LIVE and lies at a depth of 16.2 meters. It was last examined in 2001 where the wreckage was recorded as being broken. The wreck was not identified in the Project's geophysical data.

Baseline Archaeological Interest

141. As a WWI vessel with an international crew and substantial human loss, the site has the potential to be of HIGH archaeological interest (Table 13.9). However, there is the potential that further information may change this assessment.

Table 13.9: Archaeological Interest of UKHO8626 SS *Argo*

Criteria	Archaeological Interest
Period	High
Rarity	Medium
Documentation	Medium
Group value	High
Survival/condition	Low
Fragility/vulnerability	Unknown
Diversity	Medium
Potential	High
Overall	HIGH

UKHO8629 Unknown

142. The wreck of an unknown vessel with no further details about its loss, however UKHO survey data reports it as large vessel, partially buried measuring 100 x 15 x 8m, partially buried in an area of sand waves, lying at a depth of 17.1 meters.

143. The wreck is currently listed as LIVE and was not identified in the Project's geophysical data.

Baseline Archaeological Interest

144. As an unknown vessel the archaeological interest cannot be determined based on the information available. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

UKHO8630 SS *Konstantinos Hadjipateras*

145. A Greek steel steam cargo ship of 5,962 tons built in 1913 by J. L. Thompson & Sons Ltd., North Sands, Sunderland as the *Den of Ewne*. Renamed in 1916 as *Pinemore*, in 1923 as *Lesreaulx*, in 1927 *Calandplein*, and in 1935 *Konstantinos Hadjipateras* for John C. and Adamantios C. Hadjipateras, Piræus, Greek. Recorded in the NHRE dataset (NRH).

146. On the 24 October 1939 SS *Konstantinos Hadjipateras* was mined by German submarine U-19 near the Inner Dowsing Light Vessel, when *en route* from Boston for Tyne carrying 8,412 tons of scrap iron. All survivors along with those onboard MV *Deodata* (UKHO8641) and SS *Capitaine Edmond Laborie* (UKHO8635, below) who all struck the same minefield, were picked up by *Louise Stephens*, a Gorleston lifeboat. Four persons were lost.

147. The wreck was dispersed by Admiralty salvage in July 1947 using 600 depth charges. The wreck was last seen in 2001 and is recorded as broken wreckage measuring 170 x 27m, lying in 13.9 meters of water. SS *Konstantinos Hadjipateras* is currently listed as LIVE and was identified in the Project's geophysical data (MA2635).

Baseline Archaeological Interest

148. As part of the WWII narrative this site has the potential to be of HIGH archaeological interest (Table 13.10). However, there is the potential that further information may change this assessment.

Table 13.10: Archaeological Interest of UKHO8630 SS *Konstantinos Hadjipateras*

Criteria	Archaeological Interest
Period	High
Rarity	Medium
Documentation	Medium
Group value	High
Survival/condition	Low
Fragility/vulnerability	Unknown
Diversity	Medium
Potential	High
Overall	HIGH

UKHO8632 SS *Fane*

149. A Norwegian steel steam cargo collier vessel with dimensions of 69.6 x 10.8 x 4.8m built by Bergens Mekaniske Verksteder A/S., Bergen in 1901 with a gross tonnage of 1,119. Powered by a three-cylinder triple expansion steam engine of 101HP with a single shaft and screw. Owned at the time of loss by Torkildsen Vilhelm, Bergen. Recorded in the NHRE dataset (NRHE1459776).

150. On 6 August 1917 on a voyage from Rouen to Sunderland in ballast, SS *Fane* was sunk by a mine from the German submarine UC-63 and lies in 18.6 meters of water.

151. The wreck was recorded as being "well defined" wreck in 2001 and dived in 2015 where a silver spoon engraved with the vessels name was recovered.

152. The wreck is currently listed as LIVE but was not covered by the Project's geophysical data as it sits within the ECC buffer.

Baseline Archaeological Interest

153. As part of the WWII narrative this site has the potential to be of HIGH archaeological interest (Table 13.11). However, there is the potential that further information may change this assessment.

Table 13.11: Archaeological Interest of UKHO8632 SS *Fane*

Criteria	Archaeological Interest
Period	High
Rarity	Medium
Documentation	Medium
Group value	High
Survival/condition	High
Fragility/vulnerability	Unknown
Diversity	Medium
Potential	High
Overall	HIGH

UKHO8633 SS *Costanza*

154. An Italian iron sail and steam cargo ship built in 1883 by Oswald Mordaunt & co., Southampton with dimensions of 94.8 x 11.9 x 8.2m, a two-cylinder compound steam 307 HP engine, two single boilers, six corrugated furnaces, GS 128, a single shaft, one screw and a schooner rigging. Originally named *Test* from 1883 to 1885, then renamed to *Caxton* from 1885 to 1895, to *Mendota* from 1895 to 1990, to *Angiolina* from 1900 to 1905, to *Citta Di New York* from 1905 to 1908, and finally to SS *Costanza* in 1908. Owned at the time of loss by Palazio G. – Soc. Anon. Marittima La Figurense, Genoa.

155. Lost on 14 August 1917 on a voyage from Tyne to Livorno with a cargo of coal, when torpedoed and sunk by German submarine UC-63 (Karsten von Heydebreck) 3.5 miles southeast of the Inner Dowsing Light Vessel. There were no casualties.

156. The wreck was located during a survey in 1964 where good sonar contact was made but it "did not much resemble a wreck" possible indicating that it is dispersed on the seabed which coincides with the vessel being torpedoed.

157. The wreck is currently listed as LIVE but was not found during the latest survey in 2001 and was not identified in the Project's geophysical data.

Baseline Archaeological Interest

158. As a WWI vessel with an international crew and circumstance of loss the site has the potential to be of HIGH archaeological interest (Table 13.12). However, there is the potential that further information may change this assessment.

Table 13.12: Archaeological Interest of UKHO8633 SS *Costanza*

Criteria	Archaeological Interest
Period	High
Rarity	Medium
Documentation	Medium
Group value	High

Criteria	Archaeological Interest
Survival/condition	Low
Fragility/vulnerability	Unknown
Diversity	Medium
Potential	High
Overall	HIGH

UKHO8635 SS *Capitaine Edmond Laborie*

159. A French steel steam cargo vessel built in 1923 by Ateliers & Chantiers de la Seine Maritime with dimensions of 95.6 x 14.2 x 6.1m a 149HP triple expansion engine and one screw. Owned at the time of loss by Etablissements Odon De Lubersac.

160. On 21 October 1939 on passage from Bordeaux for the Tyne, SS *Capitaine Edmond Laborie* struck a mine laid on October 17th by U-19 (Meckel) two miles east of the Inner Dowsing Light Vessel and sank. All survivors were picked up by the lifeboat *Louise Stephens*, along with those of the MV *Deodata* and *Konstantinos Hadjipateras*.

161. The wreck was surveyed in 1993 and was discovered at a depth of 17 meters and recorded as a broken wreckage lying silted up on the sandy seabed.

162. The wreck is currently listed as LIVE and was identified in the Project's geophysical data (MA2701).

Baseline Archaeological Interest

163. As part of the WWII narrative this site has the potential to be of HIGH archaeological interest (Table 13.13). However, there is the potential that further information may change this assessment.

Table 13.13: Archaeological Interest of UKHO8635 SS *Capitaine Edmond Laborie*

Criteria	Archaeological Interest
Period	High
Rarity	Medium
Documentation	Medium
Group value	High
Survival/condition	Low
Fragility/vulnerability	Unknown
Diversity	Medium
Potential	High
Overall	HIGH

UKHO8636 MFV *Lindy Sue*

164. A small fishing motor vessel with a length of 10.7m, a diesel engine, single shaft and screw. Lost on 31 August 1965 with no further details about its life or loss.

165. The wreck is currently listed as DEAD and was not identified in the Project's geophysical data.

Baseline Archaeological Interest

166. As a relatively modern vessel with limited information available, this vessel is deemed to be of LOW archaeologically interest (Table 13.14). However, there is the potential that further information may change this assessment.

Table 13.14: Archaeological Interest of UKHO8636 MFV *Lindy Sue*

Criteria	Archaeological Interest
Period	Medium
Rarity	Low
Documentation	Low
Group value	Low
Survival/condition	Unknown
Fragility/vulnerability	Unknown
Diversity	Low
Potential	Low
Overall	LOW

UKHO8638 Unknown

167. A sailing ship lost in April 1917 with no further details about its life or loss and was not found during a survey in 1993.

168. The wreck is currently listed as LIVE and was identified in the Project's geophysical data (MA4384).

Baseline Archaeological Interest

169. As an unknown vessel the archaeological interest cannot be determined based on the information available. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

UKHO8639 Unknown

170. Previously thought to be the wreck of SS *Fane* before the location of said wreck was confirmed. Measured as having dimensions of 74 x 32 x 2.9m, with no further details about its life or loss. The wreck was recorded as a broken wreck during the latest survey in 2001, lying in 15.5 meters of water.

171. The wreck is currently listed as LIVE and was not identified in the Project's geophysical data.

Baseline Archaeological Interest

172. As an unknown vessel the archaeological interest cannot be determined based on the information available. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

UKHO8646 SS *Carrier*

173. A Norwegian steel steam cargo vessel built in 1921 with the dimensions of 70 x 14.1 x 6.3m, a triple-cylinder triple expansion steam engine of 266 HP, two single boilers, six corrugated furnaces, and a single shaft and screw as *Capitaine Bonelli* at Ateliers & Chantiers de la Seine Maritime, Le Trait, France for the French Government.

174. Sold in 1923 to Soc. Anon. De Nav. Les Armateurs Français, Le Havre, and to Anglo D/S A/S (Vlademar Skogland), Haugesund in November 1936 and renamed SS *Carrier*.

175. On 19 January 1945 while on voyage from London to Tyne, SS *Carrier* was mined and sunk. The crew of 33 were saved by the escort vessel HMS *Blencathra*.

176. The vessel lies in 17.5 meters of water and was reported as being “scattered broken wreckage” in a survey in 2016.

177. The wreck is currently listed as LIVE and was not identified in the Project’s geophysical data.

Baseline Archaeological Interest

178. As part of the WWII narrative and the vessels international connections, this site has the potential to be of HIGH archaeological interest (Table 13.15). However, there is the potential that further information may change this assessment.

Table 13.15: Archaeological Interest of UKHO8646 SS *Carrier*

Criteria	Archaeological Interest
Period	High
Rarity	Medium
Documentation	Medium
Group value	High
Survival/condition	Low
Fragility/vulnerability	Unknown
Diversity	Medium
Potential	High
Overall	HIGH

UKHO8998 Unknown

179. An unknown vessel originally detected in 1980 with no further details about its life or loss. Recorded in the NHRE dataset (NRHE913207).

180. The wreck is currently listed as LIVE and was identified in the Project's geophysical data (MA2683).

Baseline Archaeological Interest

181. As an unknown vessel the archaeological interest cannot be determined based on the information available. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

UKHO8999 Unknown

182. An unknown vessel originally detected in 1980 with no further details about its life or loss. Recorded in the NHRE dataset (NRHE913203).

183. The wreck is currently listed as LIVE and was not identified in the Project's geophysical data.

Baseline Archaeological Interest

184. As an unknown vessel the archaeological interest cannot be determined based on the information available. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

UKHO9093 Tanker Trailers

185. Two of four road tanker trails that were lost overboard from the Swedish Ro-Ro MV *Nordic Pride* one mile north east of Dudgeon Shoals while proceeding to Immingham in May 1991. Two of the four were washed ashore on Norfolk Beach.

186. The wreck is currently listed as DEAD but was not found in the most recent survey in 2017 and was not identified in the Project's geophysical data.

Baseline Archaeological Interest

187. As modern tanker trailers, with limited information available, they are deemed to be of LOW archaeologically interest (Table 13.16). However, there is the potential that further information may change this assessment.

Table 13.16: Archaeological Interest of UKHO9093 Tanker Trailers

Criteria	Archaeological Interest
Period	Low
Rarity	Low
Documentation	Medium
Group value	Low
Survival/condition	Unknown

Criteria	Archaeological Interest
Fragility/vulnerability	Unknown
Diversity	Low
Potential	Low
Overall	LOW

UKHO9171 Unknown

188. An unknown vessel originally detected in 1993 with no further details about its life or loss. Measured in survey as having dimensions of 70 x 20 x 1m, lying in 17.6 meters of water and in two parts within its own scour.

189. The wreck is currently listed as LIVE and was not identified in the Project's geophysical data.

Baseline Archaeological Interest

190. As an unknown vessel the archaeological interest cannot be determined based on the information available. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

UKHO9314 Unknown

191. An unknown vessel originally detected in 1963 with no further details about its life or loss. Measured in 2017 survey as having dimensions of 23.8 x 17.7 x 2.1m, broken in three parts and lying in 21 meters of water.

192. The wreck is currently listed as LIVE and was not identified in the Project's geophysical data.

Baseline Archaeological Interest

193. As an unknown vessel the archaeological interest cannot be determined based on the information available. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

UKHO9320 SS *Chatwood* (possibly)

194. A British steel steam cargo vessel built in 1929 by Austin S. P. & Son Ltd., Sunderland with dimensions of 93 x 13.4 x 5.8m with a three-cylinder triple expansion 220HP engine, single shaft. Single screw, two boilers and machinery aft. Owned at time of loss by Tyne & Wear Shipping – W. France, Fenwick & Co. Coastwise Colliers Ltd., London.

195. Lost *en route* from Tyne for London with a cargo of 3950 tons of coal when mined. In 1994. The *Desert Star* attempted salvage.

196. The wreck in 21.7 meters of water and is defined as broken but well defined.

197. The wreck is currently listed as LIVE and was not identified in the Project's geophysical data.

Baseline Archaeological Interest

198. As part of the WWII narrative, this site has the potential to be of HIGH archaeological interest (Table 13.17). However, there is the potential that further information may change this assessment.

Table 13.17: Archaeological Interest of UKHO9320 SS *Chatwood* (possibly)

Criteria	Archaeological Interest
Period	High
Rarity	Medium
Documentation	Medium
Group value	High
Survival/condition	Medium
Fragility/vulnerability	Unknown
Diversity	Medium
Potential	High
Overall	HIGH

UKHO9324 La Combattante (possibly)

199. An unnamed French iron steam powered destroyer with a listed length of 85m. Originally HMS *Haldon*, renamed *La Combattante* a hunt-class destroyed before being loaned to the French forces that was lost on 23 February 1945 when mined.

200. The wreck is currently listed as LIVE and was identified in the Project's geophysical data (MA2473 and MA2477).

201. Based on the SSS, it is evident that the vessel is intact, however the UKHO records the wreck as being broken and partially buried in a survey in 2017.

Baseline Archaeological Interest

202. As part of the WWII narrative and the vessels international connections and military past, this site has the potential to be of HIGH archaeological interest (Table 13.18). However, there is the potential that further information may change this assessment.

Table 13.18: Archaeological Interest of UKHO9324 *La Combattante* (possibly)

Criteria	Archaeological Interest
Period	High
Rarity	Medium
Documentation	Medium
Group value	High
Survival/condition	Medium
Fragility/vulnerability	Unknown

Criteria	Archaeological Interest
Diversity	Medium
Potential	High
Overall	HIGH

UKHO9502 Unknown

203. An unknown vessel originally detected in 1992 with no further details listed about its life or loss. The wreck was however located and investigated in 1992, 1993 and 2016 when the position was amended by 17m.

204. The wreck is lying in 17.4 meters of water and reported as being a well-defined intact wreck in 2017.

205. The wreck is currently listed as LIVE and was not identified in the Project's geophysical data.

Baseline Archaeological Interest

206. As an unknown vessel the archaeological interest cannot be determined based on the information available. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

UKHO81902 Unknown

207. An unknown vessel originally detected in 2014 with no further details listed about its life or loss. Described during survey as a small craft having dimensions of 15 x 3.5 x 2m. The wreck was recorded as being intact and partially buried, lying in 7.9 meters of water in 2014.

208. The wreck is currently listed as UNKNOWN and was not identified in the Project's geophysical data.

Baseline Archaeological Interest

209. As an unknown vessel the archaeological interest cannot be determined based on the information available. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

UKHO85316 Unknown

210. An unknown vessel originally detected in 2016 with no further details listed about its life or loss. Measured during a survey as having dimensions of 48 x 16.4 x 1.5m.

211. The wreck is currently listed as UNKNOWN and was identified in the Project's geophysical data (MA2683).

Baseline Archaeological Interest

212. As an unknown vessel the archaeological interest cannot be determined based on the information available. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

UKHO92149 Unknown

213. An unknown vessel originally detected in 2019 with no further details listed about its life or loss. Measured during a survey as having dimensions of 7.6 x 4.8 x 1.2m, lying in 21.4 meters of water and recorded as distributed remains of a possible buried wreck.

214. The wreck is currently listed as UNKNOWN and was identified in the Project's geophysical data (MA2503).

Baseline Archaeological Interest

215. As an unknown vessel the archaeological interest cannot be determined based on the information available. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

UKHO92757 Unknown

216. An unknown vessel originally detected in 2019 with no further details listed about its life or loss. Measured during a survey as the remains of a wreck, possibly upside down with dimensions of 33 x 15 x 1.7m with two cylindrical structures lying in 15.3 meters of water.

217. The wreck is currently listed as UNKNOWN and was not identified in the Project's geophysical data.

Baseline Archaeological Interest

218. As an unknown vessel the archaeological interest cannot be determined based on the information available. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

UKHO93354 Unknown

219. An unknown vessel originally detected in 2020 with no further details listed about its life or loss. Measured during a survey as having dimensions of 21.5 x 6.2 x 0.9m lying in 19.5 meters of water.

220. The wreck is currently listed as UNKNOWN and was identified in the Project's geophysical data (MA2705).

Baseline Archaeological Interest

221. As an unknown vessel the archaeological interest cannot be determined based on the information available. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

UKHO93355 Unknown

222. An unknown vessel originally detected in 2020 with no further details listed about its life or loss. Measured during a survey as having dimensions of 14.9 x 14.8 x 2.6m, lying in 14.2 meters of water.

223. The wreck is currently listed as UNKNOWN and was identified in the Project's geophysical data (MA2751).

Baseline Archaeological Interest

224. As an unknown vessel the archaeological interest cannot be determined based on the information available. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

UKHO93359 Unknown

225. An unknown vessel originally detected in 2020 with no further details listed about its life or loss. Measured during a survey as having dimensions of 25.2 x 5.7 x 1.7m, lying in 18.7 meters of water and is classified as a dangerous wreck.

226. The wreck is currently listed as UNKNOWN and was identified in the Project's geophysical data (MA2392).

Baseline Archaeological Interest

227. As an unknown vessel the archaeological interest cannot be fully determined based on the information available. Based on the SSS, it is evident that the vessel is in-tact and looks to be relatively modern. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

Table 13.19: Archaeological Interest of UKHO93359 Unknown

Criteria	Archaeological Interest
Period	Unknown
Rarity	Unknown
Documentation	Unknown
Group value	Unknown
Survival/condition	High
Fragility/vulnerability	Unknown
Diversity	Unknown
Potential	Low
Overall	Unknown

UKHO93634 Unknown

228. An unknown vessel originally detected in 2020 with no further details listed about its life or loss. Measured during a survey as having dimensions of 71.9 x 17.5 x 2.6m, lying in 9.5 meters of water.

229. The wreck is currently listed as UNKNOWN and was identified in the Project's geophysical data (MA2361).

Baseline Archaeological Interest

230. As an unknown vessel the archaeological interest cannot be determined based on the information available. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

UKHO93877 Unknown

231. An unknown vessel originally detected in 2020 with no further details listed about its life or loss. Measured during a survey as having dimensions of 22 x 4.8 x 0.5m, lying in 26.3 meters of water.

232. The wreck is currently listed as UNKNOWN and was identified in the Project's geophysical data (MA2684).

Baseline Archaeological Interest

233. As an unknown vessel the archaeological interest cannot be determined based on the information available. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

UKHO93878 Unknown

234. An unknown vessel originally detected in 2020 with no further details listed about its life or loss. Measured during a survey as having dimensions of 4.5 x 1.9 x 1.5, lying in 25.3 meters of water.

235. The wreck is currently listed as UNKNOWN and was identified in the Project's geophysical data (MA2398).

Baseline Archaeological Interest

236. As an unknown vessel the archaeological interest cannot be determined based on the information available. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

UKHO94444 Unknown

237. An unknown vessel originally detected in 2020 with no further details listed about its life or loss. Measured during a survey as having dimensions of 6.1 x 3.4 x 0.7m and lying in 12.1 meters of water.

238. The wreck is currently listed as UNKNOWN and was identified in the Project's geophysical data (MA4385).

Baseline Archaeological Interest

As an unknown vessel the archaeological interest cannot be determined based on the information available. When and if further information becomes available it may be possible to undertake a full assessment of its archaeological interest.

13.3.6 Aviation Remains

239. Aviation remains include aircraft, airships, other dirigibles deriving from crash sites as either coherent assemblages or scattered material. Remains located in the offshore environment are often the result of WWII or passenger air casualties, particularly during the peak of seaplane activity during the inter-war period.

240. Considering the well-documented record of military air force activity in the United Kingdom (UK) throughout the 20th century, the exact number and positioning of such a significant heritage resource is still poorly understood. It is, however, reasonable to estimate that losses from WWII provide the majority of such aviation sites.

241. The east coast of England has a large potential for aircraft remains, especially with respect to the strategic positioning of airfields in Norfolk and Suffolk for the bombing raids of both combatants during WWII. The Lincolnshire coastline has a recorded 118 RAF aircraft losses as well as ten German aircraft losses as further detailed in Aircraft Crash Sites at Sea (Wessex Archaeology, 2008).

242. Where remains associated with any wartime aviation losses are found, they will be archaeologically significant and protected under the *Protection of Military Remains Act* 1986.

13.3.7 Recorded Losses

243. There are currently no additional recorded losses within the marine archaeology study area for which there are no corresponding UKHO records or seabed remains, and for which only a general position is given.

13.3.8 Fishermen's Fasteners

244. Records classed as fishermen's fasteners, or which otherwise remain unidentified and are not associated with vessel or structural remains (including records classified as DEAD by the UKHO). They are unidentified obstructions reported by fishermen, possibly indicative of a wreck or submerged feature. No other baseline information is available for any of these obstructions, and while they may well represent archaeological remains, this is not possible to ascertain from the existing sources.

245. There are currently two records classed as fishermen's fasteners recorded by the UKHO within the marine archaeology study area; UKHO9482 and UKHO9483 and both seen in the magnetometer data.

13.3.9 Unlocated Marine Archaeological and Cultural Heritage Receptors

246. There is always a possibility that not yet identified marine archaeological and cultural heritage receptors are located within the marine archaeology study area. Unlocated marine archaeological and cultural heritage receptors are of unknown archaeological potential and heritage interest 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 interest 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 13.6.

13.3.10 Historic Seascape Characterisation

247. Historic Seascape Characterisation (HSC) has been used as a measure in this assessment to provide a contextual and regional approach to the marine archaeology study area. This narrative and all associated data are drawn from the National Historic Seascape Characterisation Consolidation 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 Windfarm and Triton Knoll. Historic seascapes cannot be destroyed or damaged but impacts to them can change their historical character.

248. The historic character of a seascape can be defined by its dynamic nature and ability to accommodate change. The intertidal and marine zones are ever changing due to physical processes such as currents, tidal range, and sediment mobility, as well as cultural influences. 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. Character is drawn from different elements that make up a landscape or seascape, including not only built heritage but other recognition of human influences, like geography and cultural heritage.

249. Changes to the character of the sea surface of the historic seascape as a direct result of the construction, operations and maintenance, and decommissioning phases will result from the addition of new infrastructure such as foundations and wind turbine generators (WTGs) as well as ongoing activity from installation and maintenance vessels.

250. 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 Seascape, Landscape and Visual (document reference 6.1.17) and therefore this section only considers the historic aspects of Seascape Characterisation.

251. The HSC assessment draws on Historic Seascape Characterisation: England's Historic Seascape: HSC Method Consolidation (Cornwall Council, 2008) and England's Historic Seascape: Demonstrating the Method (SeaZone, 2011), along with the Historic England's National Database (LUC, 2018), the Historic Seascape Characterisation Thesaurus (Historic England, 2017) and the more regionally specific England's Historic Seascapes: Withernsea to Skegness Pilot Study (Museum of London Archaeology Service, 2009).

252. The marine environment presents some characteristic differences in comparison with the land for historic character assessment. HSC considers the multi-dimensional aspects of the marine environment which is broken down by levels outlined below (Cornwall Council, 2008):

- Sub-seafloor HSC: identifying the historic character beneath the seafloor;
- Seafloor HSC: identifying the historic character within or directly on the seafloor;
- Water column HSC: identifying the historic character across the vertical height of the water column;
- Sea surface HSC: identifying the historic character of the surface of the water;
- Coastal land HSC: identifying those areas of coastal land above MLWS which have a distinctly maritime historic character; and
- Previous HSC (where information is available).

253. The sub-seafloor, seafloor and water column have been assessed for archaeological potential and interest in detail in this report, using a wide suite of geophysical datasets and historical resources.

254. HSC in nearby areas has been undertaken by Museum of London Archaeology Services on behalf of English Heritage (Museum of London Archaeology Services, 2009). A consolidated national database with regional data was completed on behalf of Historic England in 2018 (LUC, 2018). These have been used to inform the assessment below.

255. The HSC considers the added impact 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 further detailed below.

256. The existing marine archaeology study area is known for its marine and intertidal historic character utilised mainly for Navigation, Industry, Fishing, and Cultural Topography.

257. The study identifies the area as holding the Broad Historic Character Types as summarised below.

Navigation

258. English waters have been used for navigation since prehistoric times and such activity contributes considerably to the character of the seascape. Even though craft themselves leave no permanent mark on the sea surface, watercraft have a diversity of associated features on and offshore and are responsible for the wrecks and related materials such as debris surviving on the seabed as further discussed in section 13.3. The Navigation character type is seen at all levels, the extent which can be seen in Figure 13.3, Figure 13.4, Figure 13.5, Figure 13.6 and Figure 13.7.

259. Historical navigational activity taking place in the Humber Estuary related predominantly to fishing and other cargo trading industries, as well as general transportation. Traffic volume to this area increased during the 1800s with the exponential growth of the trawling trade, due to the development of sail trawling technology consequently leading to the Hull and Grimsby ports to becoming the world's biggest fishing ports by the end of the 1800s (Museum of London Archaeology Services, 2009).

260. The Humber Estuary is a highly dynamic environment, with heavily sediment movement within its waters. This continuous sediment movement causes the shape of channels in the Estuary to be in constant flux and the creation of semi-permanent islands contributing to its history of being very treacherous. Consequently, the Estuary has many examples of shipwrecks, many of which are clustered in the most historically treacherous locations and are considered navigational hazards. There have been recent attempts to stabilise some of the channels through dredging and training works (Museum of London Archaeology Services, 2009).

261. Offshore evidence for historic navigation activities has fewer tangible features to contribute to its perception, however in some cases wreck distribution around certain seabed features suggests the use of certain navigational routes.

Navigation Activities

262. Navigation routes via the sea and rivers, some of which were developed during prehistoric periods, provided chief economical means of transporting large quantities of goods for any significant distance before the creation of effective inland road and railway systems.

263. English society was built on the maritime movements of goods, people, and ideas. This can be seen expressed in imagery from Roman coins, mosaics, and sculptures. Although there was a decline in maritime trade during the post-Roman period, a resurgence of commercial trading with continental Europe occurred from the late 6th century is reflected in the presence of urban settlements along the east coast (Museum of London Archaeology Services, 2009).

264. This area along the east coast and out towards the North Sea has historically been an area of much of England's navigation activities and as such has demonstrated its capacity to accommodate change and growth over time. Historically, the Humber Estuary has been primarily maintained for navigational activities. This usage has been documented by historical sources as far back as the 9th century when Grimsby was founded and first grew into a port. There is also documented evidence for the foundation of Hull as a trading port in the 12th century, at the junction of the rivers Hull and Humber. Examples of changes to the historic seascape throughout time can be through the active management of navigation routes.

265. Archaeological sources have identified navigational activities within the HSC study area as far back as the Bronze Age through the discovery of the Bronze Age boats on the foreshore at North Ferriby.

266. Additionally, anchorage areas where vessels and craft frequently anchor, often due to shelter provided by the coast have enhanced archaeological potential as their regular occupation increases the likelihood of finding vessels that have succumbed to bad weather or discarded debris.

267. The Navigation character type represents human activities directly relating to the passage of shipping traffic, including navigation channels or navigation routes, ferry crossings, and anchorages. There is not always physical demarcation of these areas, and their definition may be largely by legal designation or custom and use. Navigation activities are seen in the sub seafloor, seafloor, water column, sea surface and coastal levels of the seascape as defined in the multi-dimensional aspects of the marine environment.

268. The historical seascape character of navigation activities is assessed not to change during the construction, O&M and decommissioning of phases of the Project.

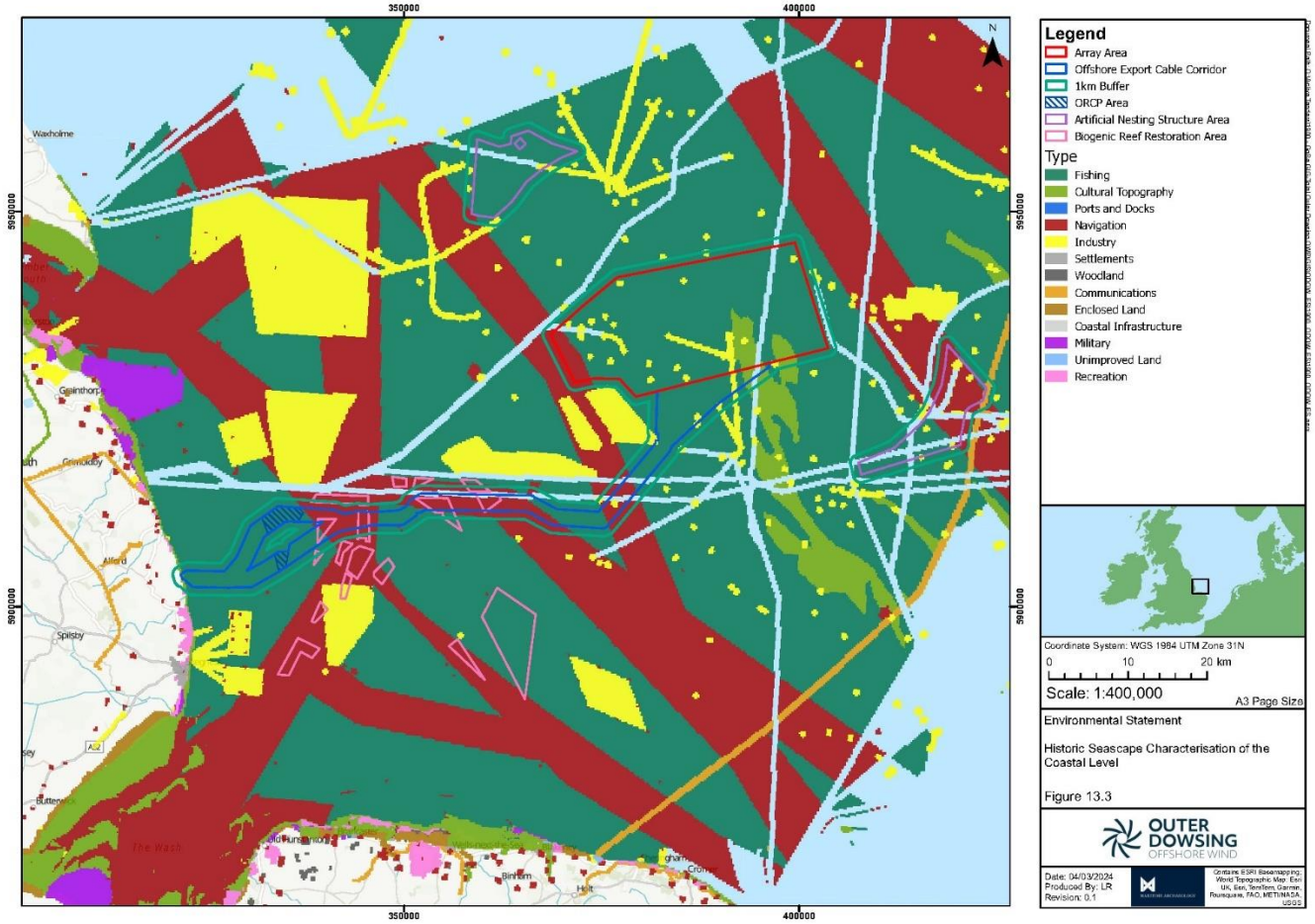

Figure 13.3 Historic Seascape Characterisation of the Coastal Level

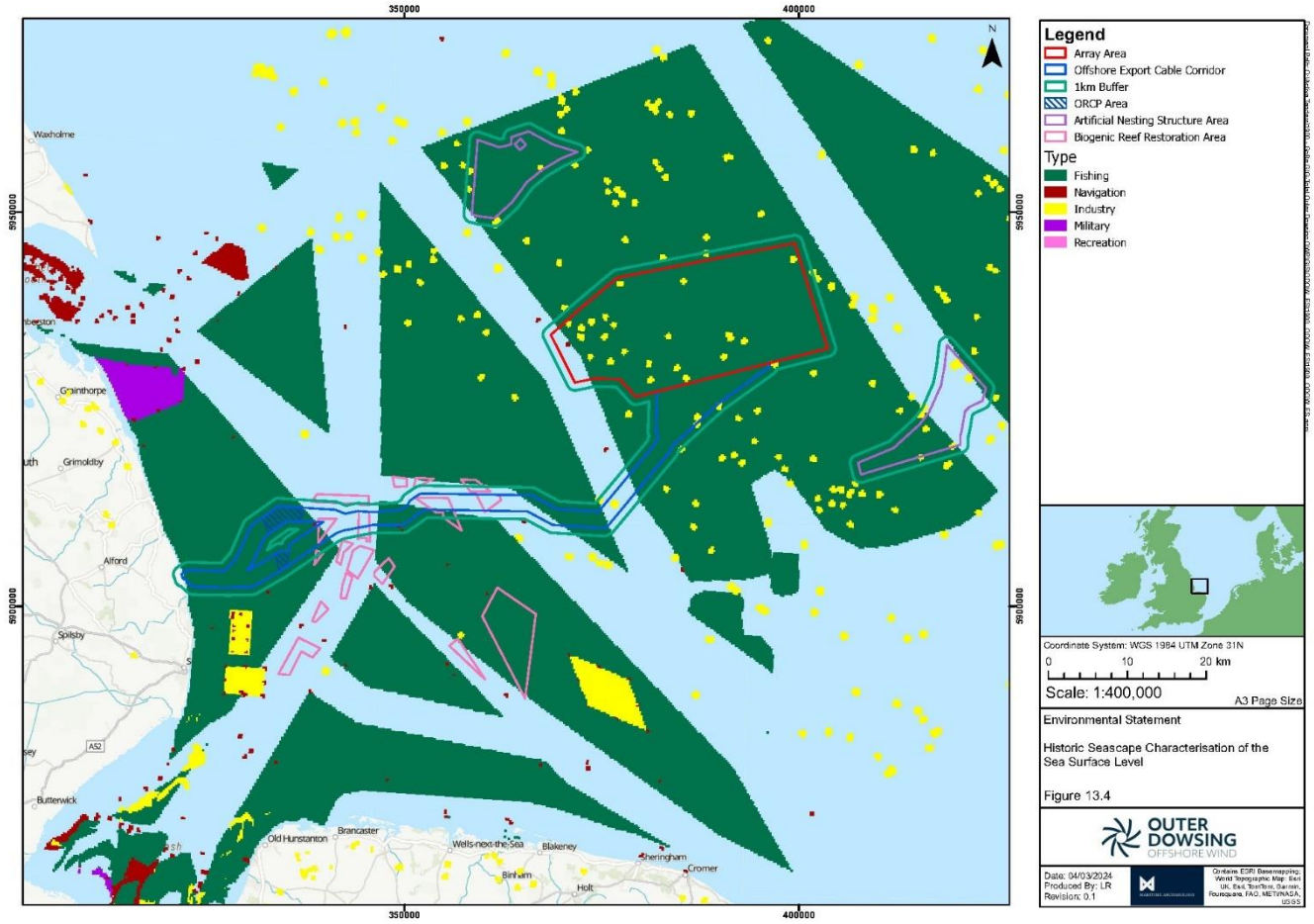

Figure 13.4 Historic Seascape Characterisation of the Sea Surface Level

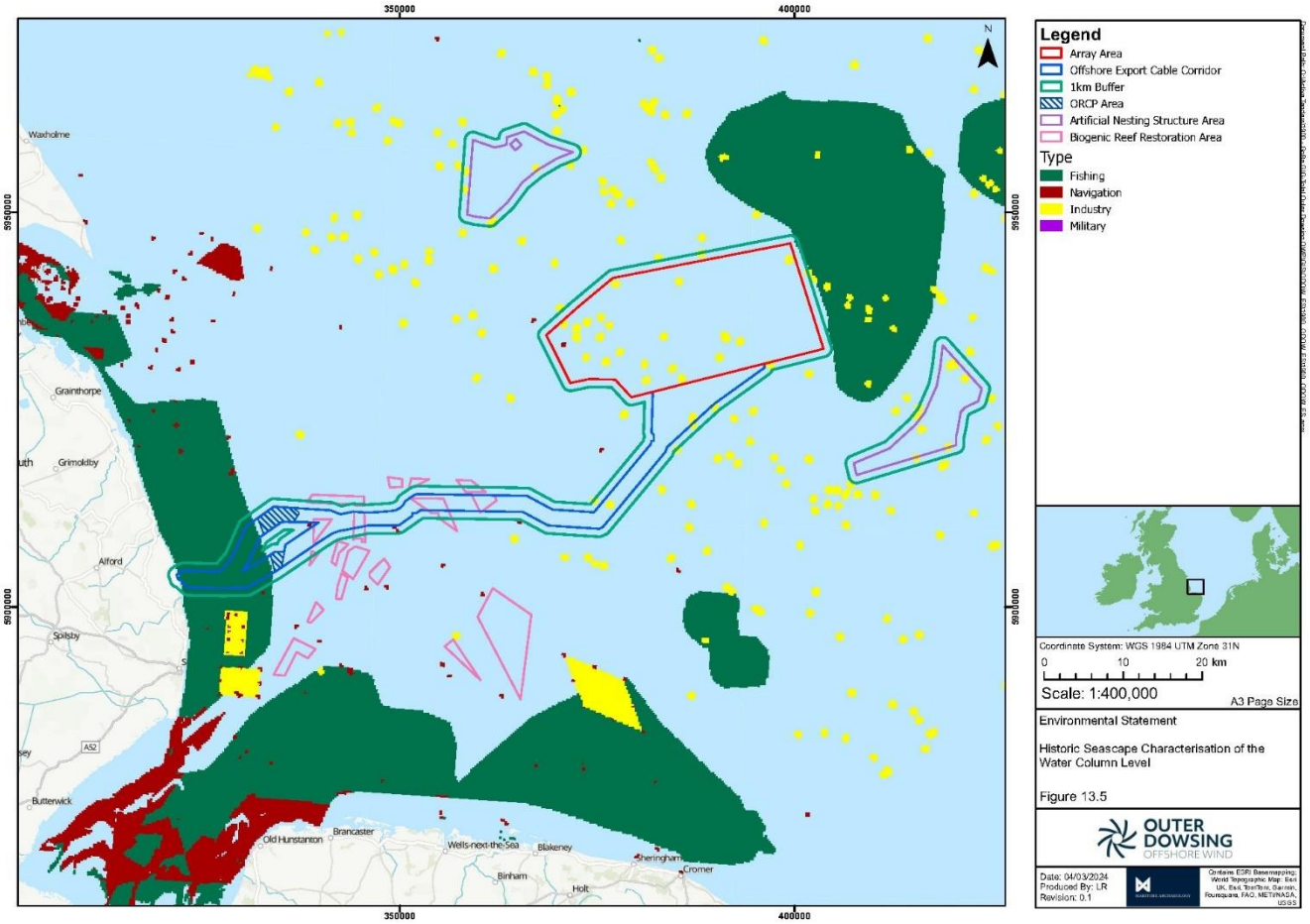

Figure 13.5 Historic Seascape Characterisation of the Water Column Level

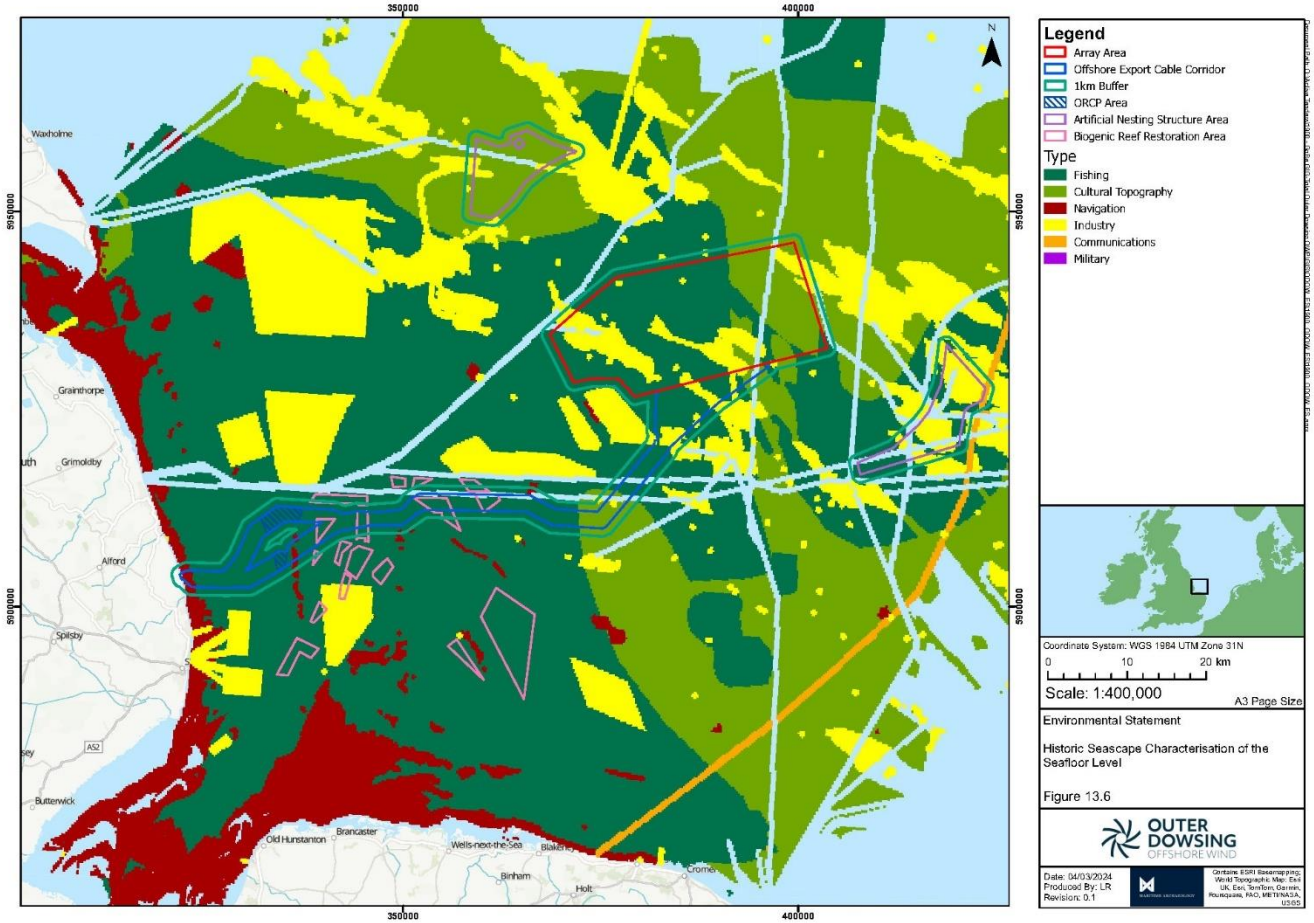

Figure 13.6 Historic Seascape Characterisation of the Seafloor Level

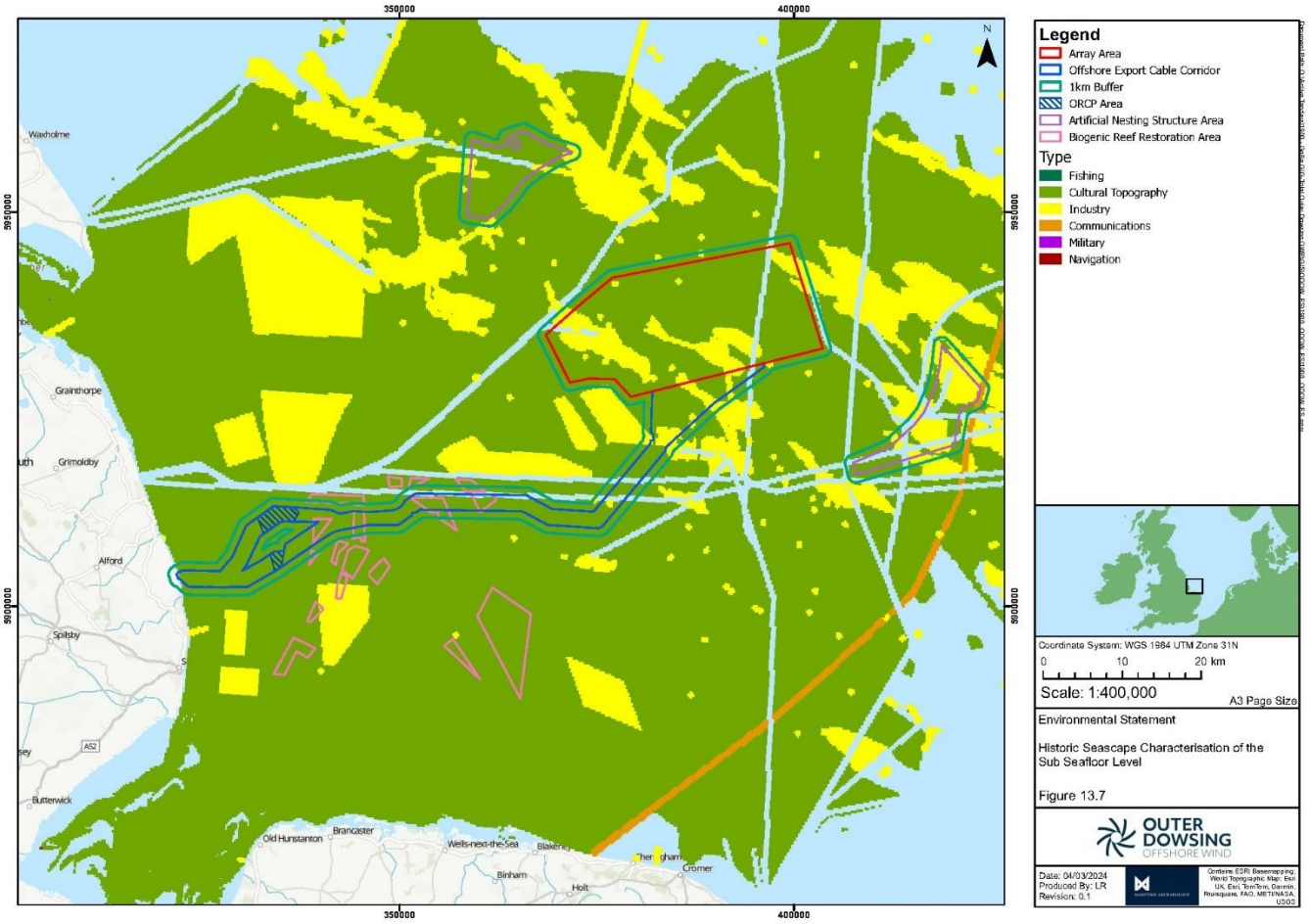

Figure 13.7 Historic Seascape Characterisation of the Sub Seafloor Level

Maritime Safety

269. Maritime safety features include areas containing features usually erected at dangerous or important coastal points to provide warning or guidance for mariners. Some features are found further inland, such as church spires or towers, which can serve as more generalized place-finders and daymarks. These are features not built primarily for use in maritime safety but have been adopted as such. Maritime safety features are commonly seen in the sea surface and coastal and conflated levels of the seascape as defined in the multi-dimensional aspects of the marine environment, an example of which is the Grade II listed lighthouse (1171495) at Hunstanton, south of the marine archaeology study area.

270. The use of landmarks and navigation aids has helped facilitate the development of surveying techniques and the drafting of maritime charts and coastal profiles. Terrestrial markers are becoming increasingly disused as traditional methods are replaced with radio, satellite navigation, digital marine charts and seismic technologies. They are also vulnerable to coastal erosion processes and extreme weather conditions.

271. The current historical seascape character of maritime safety is assessed not to change during the construction, O&M and decommissioning phases of the Project.

Navigation Hazards

272. Navigational hazards are an integral part of the cultural seascape character of many areas, expressed directly through their records on charts and highly visible maritime safety installations. They are also present culturally in the vast store of myths, legends, traditions and stories of the sea and its dangers that pertain to most coastal communities. Navigation hazards are seen in the seafloor, water column and sea surface levels of the seascape as defined in the multi-dimensional aspects of the marine environment.

273. Navigation hazards include areas which contain serious risks to watercraft which may lead to their damage or loss, often in the form of wreck hazards or maritime debris, and rock outcrops. The large number of anchorages and long-standing use of navigation routes are also contributors to maritime debris.

274. Navigation hazards are prominent in the seascape due to the danger associated with them. The Humber Estuary is known to be perilous for navigational hazards and contains many wrecks as evidence of these hazards and further contributing to hazardous waters. The creation of nautical and maritime charts helped record hazards and other dangers associated with the sea.

275. The increased infrastructure built within the seascape as a result of the Project may contribute to safer navigation because of the lights affixed to the WTGs. This new infra-structure will be referred to in new nautical and maritime charts, along with any newly identified wrecks or updated positions of known wrecks, which may contribute to increased awareness of potential navigation hazards (this is detailed further in Volume 1, Chapter 15).

276. Navigation hazards is assessed to positively change during the construction, O&M and decommissioning phases of the Project. The potential increase available data following geophysical surveys and any potential unexpected discoveries reported through the PAD may contribute to more accurate locations of dangerous wrecks and obstructions.

Industry

277. Industry 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 (Figure 13.3). There are many visible and unquantifiable reminders of England's rich and varied mining and industrial past along our coastline, both directly and in the infrastructure. The remains of these industrial processes on the present seascape can generate complex and mixed feelings in different regions and places. The extent of the industry character type can be seen in in Figure 13.3, Figure 13.4, Figure 13.5 Figure 13.6 and Figure 13.7.

278. The banks of the Humber are heavily industrialised, with the offshore area of the HSC study area significantly characterised by activities relating to industry and navigation. There are a number of licensed aggregate dredging areas as well as active channel dredging in the Humber Estuary. Other industrial activity includes important inshore and offshore fisheries; hydrocarbon extraction on the Amethyst, Pickering and Sole Gas Fields with major pipeline terminals at Easington and Theddlethorpe; offshore windfarms including Inner Dowsing Windfarm and Lynn Windfarm; and major shipping lanes for craft using the ports of Grimsby, Immingham and Hull.

279. Listed examples of Industry within the HSC study area include Anton's Gowt Lock (1062085), in Fishtoft and a warehouse (1063112) in Grainthrope, both grade II.

Extractive Industry

280. Marine aggregate deposits are sands and gravels of economic value found on the seabed after being deposited there through fluctuation in sea-levels over the past two million years. Extractive mineral dredging from the seafloor is a prevalent example of industry in this area. Extractive industries are seen in the sub-seafloor, seafloor and coastal levels of the seascape as defined in the multi-dimensional aspects of the marine environment.

281. Most of the offshore extractive industry is relatively modern and only occurred on a large scale in the past 50 or so years. These industries have fewer long term historic links with some of the local settlements but have come to dominate the character of coastal areas since the industrial revolution.

282. In many cases oil and gas pipe directly to terminals on the shore, such as at Easington and Theddlethorpe and, like aggregate dredging are less perceptible components of the seascape to those not directly involved with these industries.

283. Marine aggregate deposits, such as sand and gravels are used primarily for building and construction, and much of the UK's aggregate resources are extracted from marine areas. The North Sea is one of two main areas identified for their potential within the UK, with 16 active UK aggregate areas within 50km of the Project.

284. The current historical seascape character of the extractive industry through the established aggregate dredging enterprises in the area is assessed not to change during the construction, O&M and decommissioning phases as the industry in the area are unlikely to be altered or contributed to by the Project.

Energy Industry

The energy industry concerned with the extraction, processing and/or storage of hydrocarbons (oil, oil derivatives, and gas, but not coal) as well as installations relating to all forms of renewable energy generation, by wind, wave or tide, and power stations of all fuels, together with their associated transmission facilities and directly associated transport facilities. The production of hydrocarbons in Lincolnshire dates to the 1940s, however, general policy trends show an expansion of renewable energy with an encouragement of wind power, especially in offshore locations where more consistent strong wind speeds are available. Within this context, recognition of existing historic environment considerations in planning future windfarms is expressed, for example, by the development of the Collaborative Offshore Wind Research Into the Environment (COWRIE) and in Advice Note 15, Commercial Renewable Energy Development and the Historic Environment (Historic England, 2021).

285. Energy industries are seen in the sub-seafloor, seafloor, sea surface and coastal levels of the seascape as defined in the multi-dimensional aspects of the marine environment.

286. In recent years there has been an increase in renewable energy projects alongside the established hydrocarbon industry. Wind power is the fastest growing form of global electricity generation and has become increasingly important following government climate commitments.

287. There are four Offshore Energy developments within the HSC study area..

288. The current historical seascape character of the energy industry is assessed not to change during the construction, O&M and decommissioning phases of the Project but rather contribute to it.

Processing Industry

289. The processing industry relates to the transformation of raw materials in the production and manufacture of goods, and more indirectly to their consumption. Areas occupied by processing industries have evolved over time, often leaving traces of earlier technologies, either via material remains or as influences. Remains can include settlements formed around such industries and fields pre-dating the industrial complexes. Processing industries are seen in the sea surface and coastal levels of the seascape as defined in the multi-dimensional aspects of the marine environment.

290. The condition of coastal processing industry varies considerably from almost total destruction to excellent preservation. Where modern processing plants become redundant, they are generally quickly cleared and re-presented as areas ripe for new development. Historic coastal remains from these industries are prime targets for public-awareness initiatives in the context of the coastal access requirements from the Marine and Coastal Access Act 2009.

291. Salt production is one of the oldest examples of industry in this area and is known to have taken place along the Lincolnshire coast for millennia and many of the early medieval settlements along the coast have been founded on saltern mounds. The scheduled monument of Medieval salt workings (1004930) at Wainfleet St Mary is a prevailing example of this industry.

292. Before the 18th century almost all salt used in England was produced by various methods of boiling brine, most derived directly or indirectly from seawater. The resulting coastal bias in salt production was enhanced from the medieval period by the excessive use of salt for preservation of fish for inland markets and export.

293. The current historical seascape character of the processing industry is assessed not to change during the construction, O&M and decommissioning phases of the Project as there is no direct impact associated.

Shipping Industry

294. There are many activities relating to the non-recreational use, maintenance, storage and administration of shipping in this area. The shipping industry is seen in the sea surface and coastal levels of the seascape as defined in the multi-dimensional aspects of the marine environment.

295. Commercial shipping routes adapt as new technologies and commercial competition are introduced. The development of the of ports of Grimsby, Immingham and Hull are examples of this.

296. Trade networks have existed along the east coast since at least the Bronze Age between Britain and continental Europe and modern commercial routes continue to have a substantial direct socio-economic impact as a trade facilitator across all sectors of the economy.

297. Major lanes of shipping traffic and high levels of commercial shipping activity are recorded across the area (Figure 13.4). Additional vessel traffic due to the construction and operation of the Project would occur in active commercial shipping routes.

298. The current historical seascape character of the shipping industry is assessed not to change during the construction, O&M and decommissioning phases of the Project. One of the dominant character types in the UK and this region, it has the capacity to accommodate the additional traffic resulting from activities relating to the Project.

Fishing

299. The fishing industry of the Eastern England region has been evidenced since prehistoric times. Early methods of fishing include net-fishing and shellfish collection. Oyster consumption around coastal England can be seen from prehistoric evidence of shells found in middens.

300. The earliest documented date of coastal fishing areas is 1840, but historical sources and archaeological evidence shows that these areas have been in use for as long as communities have lived along the coastline. Although technological advances have altered fishing types, many techniques remain relatively unchanged today such as the crab and lobster potting area of the East Riding coast (Museum of London Archaeology Services, 2009).

301. Current fishing patterns can be traced back to the advent of commercial trawling in the 1800s, which dramatically increased the yield of catch. This in turn was related to the advent of the railways, which could transport these large amounts of fresh fish around the country quickly. So, although these same fishing areas have been fished for a long period of time, it is only in the past 200 years that they have been commercially fished and affected the nature of development in places like Hull and Grimsby.

302. The livelihoods of fishing communities are intimately tied to the productivity of the seas, and there are deep cultural attachments associated with fishing. The fishing character types are seen in the sub-seafloor, seafloor, water column, sea surface and coastal levels of the seascape as defined in the multi-dimensional aspects of the marine environment. The extent of the fishing character type can be seen in Figure 13.3, Figure 13.4, Figure 13.5, Figure 13.6 and Figure 13.7.

303. Many of the inshore fisheries are an important part of the local and national economy and fishing and fishing related industries play an important part in community life in the coastal zone. As a result, these coastal industries have a temporal and historic depth and relate closely to the Settlement character type.

304. From the advent of steam powered fishing vessels at the beginning of the 1900s to the introduction of diesel-powered boats with powered net-winding drums in the 1930s, row-sail boats began to disappear and the extent of areas available to fish grew.

305. Offshore fishing is remote from the coast and only visible on clear days, so it does not connect so directly with the local tourist economy. Today, the North Sea continues to be one of

the world's more important fishing grounds for both international and UK fishing fleets.

306. There are four grade II listed buildings within the HSC study area, all processing and smoking factories in Grimsby, which stand as examples of the fishing industry: GH Abernethie Limited (1379882; MTL Medal Fisheries (1379834); Petersons (1379848); and Keith Graham Limited (1379883).

307. The current historical seascape character of the fishing is assessed not to change during the construction, O&M and decommissioning phases of the Project as any restrictions to fishing areas during construction and O&M will be temporary.

Ports and Docks

308. Forming an interface between land and marine transport and distribution system, ports and docks relate to the Navigation, Industry, Fishing and Communication character types. The Ports and Docks character type is seen in the coastal levels of the seascape as defined in the multi-dimensional aspects of the marine environment.

309. The Eastern England region contains numerous examples of small hards (consolidated loading platforms), quays and landing places and major ports including docks, wet docks and civilian dockyards as well as links to recreational and leisure activities such as sailing and wildlife watching. The extent of the ports and docks character type can be seen in Figure 13.3.

310. Notable ports include the ports of Grimsby, Immingham and Hull. The Port of Grimsby began development in the late 1700s, and underwent further development in the 1840s onwards, however sea trade out of Grimsby has occurred from at least the medieval period. The Ports of Grimsby and Immingham count as examples of the largest in the UK.

311. The Port of Hull represents maritime trade dating to at least the 13th century. Originally, trade was mainly conducted at the outfall of the River Hull, known as The Haven, or later as the Old Harbour. In 1773 Hull's first dock was built on the land where the town walls had previously been, followed by a ring of docks around the Old Town on the site of former fortifications over the next 50 years. These were known as the Town Docks, and included The Dock (built in 1778), (or The Old Dock, known as Queen's Dock after 1855), Humber Dock (built in 1809), Junction Dock (built in 1829) and Railway Dock (built in 1846).

312. The Port of Immingham was completed in 1912 and served as a base for British D class submarines during WWI and as the Royal Navy's headquarters for the Humber during WWII The port was initially constructed as a modern outlet for the rail system in the east of England and has continued to be used as one of the largest trading ports in the UK.

313. The current historical seascape character of ports and docks as an important element in trade and recreation is assessed not to change during the construction, O&M and decommissioning phases of the Project as these industries and their uses will continue without significant impact.

Coastal Infrastructure

314. The modern coastline has been formed by a complicated mix of different coastal processes, which continue to act upon it in specific ways. As a result of this, some parts of the HSC study area consist of land reclaimed from the sea during the medieval and post-medieval periods (specifically around the Humber Estuary). In many other areas villages have been lost to the advancing sea over the last century. The situation is complicated by the fact that some areas that are now being eroded only emerged from the sea or salt marsh during the last five hundred years. In more agricultural areas like Lincolnshire, land use has changed little over the past five hundred years and, as a result of reclamation, many areas which were once coastal with associated coastal land uses are no longer coastal but situated miles inland (Museum of London Archaeology Services, 2009).

315. Many areas of the east coast within the HSC study area are currently eroding away, such as Holderness and the beaches between Mablethorpe and Skegness, while other areas are accreting, such as between Cleethorpes and Mablethorpe and Skegness to Gibraltar Point.

Military

316. Military activity has been responsible for deposition of many WWI and WWII wrecks and WWII aircraft wrecks immediately offshore. There are eight WWI and six WWII losses within the marine archaeology study area (these are detailed in Section 13.3)

317. Many features still exist as evidence of the military nature of the coast and seascape from Roman to modern times.

Military Defence and Fortification

318. Military coastal defences and military bases can be found along the eastern coast of England, although there is a tendency to find them concentrated around the main ports. The Military character type is seen at all levels of the seascape as defined in the multi-dimensional aspects of the marine environment.

319. In addition to the long-appreciated heritage value of most medieval and earlier fortifications, post-medieval military defences are increasingly being perceived as part of the overall historic legacy of the landscape as well.

320. Evidence of military activity can be seen from the many scheduled and listed sites and monuments within the coastal area within the HSC study area. Roman examples include two scheduled monument forts (1003983 and 1003903) and a signal station (1003955). However, the majority of examples are from the WWI and WWII, including: a scheduled monument WWI acoustic mirror 335m north east of Kilnsea Grange (1020989); the grade II listed pillbox Howden's Pullover (1445083); WWI pillbox and associated WWII anti-tank cubes at Sea View, Saltfleetby (1445091); and the grade II listed WWI pillbox and WWII pillbox and anti-tank cubes, Merrikin's Pullover (1443966).

321. There is a large offshore military training area based around the Donna Nook Firing Range, contributing to the military nature of the seascape.

322. In English waters, there are military vessels (including aircraft) which are protected as war graves under the *Protection of Military Remains Act* 1986. The primary reason for designation as a 'war grave' is to preserve the site as the last resting place of UK servicemen (or other nationals). There are several documented aircraft crash losses recorded in the area further detailed in section 13.3. The extent of the military character type can be seen in Figure 13.3, Figure 13.4, Figure 13.5, Figure 13.6 and Figure 13.7.

323. The current historical seascape character of military is assessed not to change during the construction, O&M and decommissioning phases of the Project.

Cultural Topography

324. The North Sea is a large marine basin with numerous tidal rivers flowing into it from all directions: the Elbe and Rhine to the east, the Forth and Humber from the north, and the Thames from the south. Such rivers have commanded the flow and transport of people and their belongings over many thousands of years. These rivers extended beyond present-day shorelines onto the continental shelf for much of the Pleistocene. These river systems are often submerged extensions of presently existing rivers, and would have acted as drainage systems, having potential to contain an array of evidence of past hominin occupation and use.

325. The east coast of England is known to have some of the earliest known sites and *in situ* remains. Key periods of occupation through the Palaeolithic to Mesolithic are found in deposits and finds particularly from Pakefield and Happisburg, as well as within existing aggregate extraction areas, and inundated and eroded terrestrial sites (Limpenny *et al*., 2011). Palaeolithic artefacts including hand axes, cores and flakes and peat and wood fragments indicating Mesolithic land surfaces exemplify the occupation and use of the area.

326. As a result of erosion and coastal sedimentary movement prehistoric land surfaces buried under the boulder clay deposited during the last ice age, or the marine silts deposited during the marine transgression of the Mesolithic and Neolithic periods, are now being uncovered in some areas where coastal erosion is at its more severe. This is particularly evident along the flat Lincolnshire coast where land surfaces are exposed and then become susceptible to erosion. The extent of the cultural topography character type can be seen in Figure 13.3, Figure 13.6and Figure 13.7.

Palaeolandscape Component

327. Palaeolandscapes are areas of former human habitat with evidence for past topographical and ecological regimes, shaping much earlier human cultural activity and landscape perceptions. The palaeolandscape character type is seen in the sub-seafloor and seafloor levels of the seascape as defined in the multi-dimensional aspects of the marine environment.

328. Happisburg and Pakefield on the Norfolk and Suffolk coasts to the south of the HSC study area provide evidence of the earliest occupation in Britain, with evidence including hand axes, flint flakes and large mammals suggesting occupation as early as 970,000 BP (Parfitt *et al.*, 2010). These finds are generally associated with fluviatile and estuarine deposits of Early Pleistocene Ancaster and Bytham river systems in both primary and secondary contexts.

329. Palaeochannels identified through previous research outlined in the North Sea Prehistory Research Management Framework (NSPRMF) and including the survey work for the Project (Plate 13.9), show evidence for the network of prehistoric landscapes and their changes over time. Increasing our understanding of where they are and the evidence for former habitats which they contain may lead to a greater appreciation of their importance.

330. The entire marine archaeology study area has been dry land at varying points before and since the last glaciation and holds high potential for prehistoric finds. The area contributes significantly to the understanding of the Palaeolithic in the UK as a whole through evidence of patterns of habitation and migration, tool technologies and environmental context.

331. The potential for survival of palaeolandscape components and submerged archaeology in the marine topography and deposits in the study area is further discussed in section 13.3. The cultural topography landward is discussed in detail in Volume 1, Chapter 20.

332. The current historical seascape character of palaeolandscapes is assessed to positively change during the construction, operations and maintenance, and decommissioning phases of the Project through an increase in research following archaeological surveys.

Summary

333. At the coastal level character types include Industry, Navigation, Fishing, Ports and Docks, Communications, Coastal Infrastructure, Military, Settlements, Recreation and Cultural Topography, (Figure 13.3). The dominant types are Fishing, Industry and Navigation which relate to historic and modern economies.

334. 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 the water column are dominated by Fishing and Industry. The sea surface also comprises offshore infrastructure such as renewables, gas, oil, navigational markers, and ocean survey equipment.

335. 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 Industry, Fishing and Cultural Topography. Cultural topography and recreation may undergo a positive change with the increase in understanding of palaeolandscapes, peat deposits as well as artefacts and wrecks identified in the geophysical and geotechnical surveys undertaken for the Project. The impact on identified marine archaeological and cultural heritage receptors is discussed in Volume 1, Chapter 13.

336. With regards to the outlined Broad Historic Character Types, no significant change in the multiple characters and dimensions of the marine environment as a result of the Project in isolation or cumulatively with neighbouring developments is identified.

337. It has been established that HSC was developed to be a positive force in informing change as well as recognising that landscape and seascape are both a product of that inevitable change. Developments should therefore respect and retain cultural distinctiveness and legibility wherever possible (Cornwall Council, 2008).

13.4 Archaeological Assessment of Geophysical Data

338. The archaeological assessment of geophysical data of the Array Area, Offshore ECC and associated 1km buffer is presented below and summarised in Table 13.20. All geophysical anomalies have been cross-referenced with records of marine archaeological and cultural heritage receptors identified during the baseline assessment (see above). The archaeological potential of the anomalies identified was determined following the methodology and criteria stated in Table 13.2.

339. Shallow geophysical and Ultra-High Seismic (UHSR) data was collected across the AfL Array Area and Offshore ECC. There were limitations within the Offshore ECC with the Sub Bottom profile data. Due to the high confidence in the interpretation presented in the GeoXYZ report (2023), this was used alongside core data to understand the Sub Bottom profile of the Offshore ECC. The Phase One Geoarchaeological report demonstrates that data gaps were filled by the assessment of cores (Annexe F and G, Volume 2, Appendix 13.1).. The results of the geophysical assessment area are summarised below.

340. All anomalies could represent archaeological materials and will continue to be a key factor in all future planning for this project. The location of the anomalies identified in geophysical assessments will be considered for future surveys and seabed impacts.

341. These results do not include the compensation areas as they have not yet undergone geophysical survey.

Table 13.20: Summary of Archaeological Anomalies within the Marine Archaeology Study Area as Seen in the Geophysical Data

Archaeological Potential	Number of Geophysical Anomalies
High	23
Medium	166
Low	2,228
	2,417

13.4.1 High Potential Anomalies

342. 23 anomalies have been assessed as having High archaeological potential, as they have been seen in SSS, MBES and MAG data, or they correlate with recorded locations of wrecks.

343. The 23 anomalies with High archaeological potential are summarised below (Table 13.21) and detailed in Annex A and Annex B. Of the 23 anomalies summarised below, 20 correlate with UKHO records (see Section 13.3).

Table 13.21: High Potential Anomalies Identified within the Geophysical Data

MA ID	Geophysical ID	Description
MA0001	SSS: MA2007 MBES: MA4002 MAG: MA5001	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: MA5006	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: MA5035	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 MAG: MA5228	Debris from the unknown UKHO9440 wreck, seen in SSS as linear hard reflectors; seen in MBES as a raised feature measuring 2.5x5m; magnetic return of 68.86nT (19.78m north east).
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 measing 8.5m x 0.85m.
MA0020	MBES: MA4079	Obstruction (UKHO9429), seen in the MBES as a debris field, potential rock dump.
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 measing 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).
MA1193	SSS: MA2361, MBES: MA4306, MAG: MA6050	Isolated ovate area of small hard reflectors with shadow; location of UKHO93634.

MA ID	Geophysical ID	Description
MA1194	SSS: MA2392, MBES: MA4309, MAG: MA6073, MA6077, MA6078	Distinct outline of a small wreck with adjacent debris to west; location of UKHO93359.
MA1195	SSS: MA2398, MBES: MA4310, MAG: MA6084	Isolated rectangular hard reflector with extended shadow and scour; location of UKHO93878.
MA1196	SSS: MA2473, MBES: MA4316, MAG:	Clear outline of wreck with ovate outline and linear hard reflectors with shadow; location of UKHO9324.
MA1197	SSS: MA2503, MBES: MA4325, MAG:	Isolated soft reflector with shadow; location of unknown wreck UKHO92149.
MA1198	SSS: MA2635, MBES: MA4348, MAG: MA6030, MA6033, MA6049, MA6070, MA6113	Large area of densely scattered linear hard reflectors with shadow; location of wreck of Konstantinos Hadjipateras UKHO8630.
MA1199	SSS: MA2683	Isolated linear hard reflector with shadow; location of unknown wreck UKHO85316.
MA1200	SSS: MA2701, MBES: MA4352, MAG: MA6038, MA6039, MA6040	Area of densely scattered linear and rectangular hard reflectors with extended shadow; location of Capitaine Edmond Laborie UKHO8635.
MA1201	SSS: MA2705, MBES: MA4354, MAG: MA6961	Ovate arrangement of small hard reflectors with shadow; location of UKHO93354.
MA1202	SSS: MA2751, MBES: MA4376, MAG: MA6048, MA6091, MA6094, MA6095, MA6100	Ares of densely scattered linear hard reflectors with shadow; location of unknown wreck UKHO93355.
MA1203	SSS: MA2684, MBES: MA4351, MAG: MA6102	Linear ridge of narrow hard reflector with shadow; location of unknown wreck UKHO93877.

13.4.2 Medium Potential Anomalies

344. 166 anomalies of Medium archaeological potential are summarised below (Table 13.22) and detailed in Annex A and Annex B. While these did not relate directly with any known UKHO/NRHE/Lincolnshire HER sites, some are in a close proximity and may represent debris associated with the recorded wrecks above.

Table 13.22: Medium Potential Anomalies Identified within the Geophysical Data

MA ID	Geophysical ID	Description
MA0005	SSS: MA2220 MBES: MA4072 MAG: MA5000	Wreck of the *Basto* (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).
MA0006	SSS: MA2027 MBES: MA4006 MAG: MA5574	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; magnetic return of 32.85nT (163.34m south).
MA0007	SSS: MA2028 MBES: MA4007 MAG: MA5946	Potential anthropogenic assemblage or debris seen in SSS as multiple linear and curvilinear reflectors; seen in the MBES as a raised feature measuring 6m x 2m; magnetic return of 14.4nT (5.17m south).
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 3.5m 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 4.5m 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 6.5m x 4m.
MA0013	SSS: MA2218 MBES: MA4071	Potential wreck debris seen in the SSS as a complex assemblage of reflectors associated with the *Basto* (UKHO9417); seen in the MBES as a raised feature measuring 7.5m x 8.5m.
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.

MA ID	Geophysical ID	Description
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.
MA0084	MAG: MA5070	Magnetic anomaly with a magnetic return of 104.12nT.
MA0085	MAG: MA5071	Magnetic anomaly with a magnetic return of 103.67nT.
MA1204	MAG: MA6010	Magnetic anomaly with a magnetic return of 49481.7nT.
MA1205	SSS: MA2320	Area of seabed disturbance with angular hard reflectors; potential anthropogenic debris.
MA1206	SSS: MA2342, MBES: MA4305	Pair of round hard reflectors with shadow and scour with surrounding small hard reflectors; possible anthropogenic debris.
MA1207	SSS: MA2477, MBES: MA4317	Irregular hard reflector with shadow 75m at 280' from UKHO9324; probable wreck debris.
MA1208	SSS: MA2536, MAG: MA6083	Seabed disturbance of linear reflectors with shadow; possible partially buried anthropogenic debris.
MA1209	SSS: MA2682, MAG: MA7163	Close to site of Arduity UKHO8617
MA1210	SSS: MA2686, MAG: MA6051, MA6052	Linear hard reflector with triangular shadow surrounded by small hard reflectors; potential anthropogenic debris.
MA1211	SSS: MA2722, MBES: MA4360, MAG: MA6096	Isolated curved reflector with shadow; possible anthropogenic debris.
MA1212	SSS: MA2753, MBES: MA4377, MAG: MA6088, MA6097	Isolated rectangular rough textured hard reflector with shadow; potential anthropogenic debris.
MA1213	SSS: MA2757, MBES: MA4378,	Isolated cluster of small linear hard reflectors with shadow in area of sand waves; potential anthropogenic debris.

MA ID	Geophysical ID	Description
	MAG: MA6121, MA6912	
MA1214	MAG: MA6011	Magnetic anomaly with a magnetic return of 49481.7nT.
MA1215	MAG: MA6012	Magnetic anomaly with a magnetic return of 49431.1nT.
MA1216	MAG: MA6013	Magnetic anomaly with a magnetic return of 49431.1nT.
MA1217	MAG: MA6014	Magnetic anomaly with a magnetic return of 45000.5nT.
MA1218	MAG: MA6015	Magnetic anomaly with a magnetic return of 45000.5nT.
MA1219	MAG: MA6016	Magnetic anomaly with a magnetic return of 28610.4nT.
MA1220	MAG: MA6017	Magnetic anomaly with a magnetic return of 28610.4nT.
MA1221	MAG: MA6018	Magnetic anomaly with a magnetic return of 27118.8nT.
MA1222	MAG: MA6019	Magnetic anomaly with a magnetic return of 22580.5nT.
MA1223	MAG: MA6020	Magnetic anomaly with a magnetic return of 19361nT.
MA1224	MAG: MA6021	Magnetic anomaly with a magnetic return of 19361nT.
MA1225	MAG: MA6022	Magnetic anomaly with a magnetic return of 19113.4nT.
MA1226	MAG: MA6023	Magnetic anomaly with a magnetic return of 19113.4nT.
MA1227	MAG: MA6024	Magnetic anomaly with a magnetic return of 12877.4nT.
MA1228	MAG: MA6025	Magnetic anomaly with a magnetic return of 12877.4nT.
MA1229	MAG: MA6026	Magnetic anomaly with a magnetic return of 10000nT.
MA1230	MAG: MA6027	Magnetic anomaly with a magnetic return of 10000nT.
MA1231	MAG: MA6028	Magnetic anomaly with a magnetic return of 8637.5nT.
MA1232	MAG: MA6029	Magnetic anomaly with a magnetic return of 8637.5nT.
MA1233	MAG: MA6031	Magnetic anomaly with a magnetic return of 8402nT.
MA1234	MAG: MA6032	Magnetic anomaly with a magnetic return of 8402nT.
MA1235	MAG: MA6034	Magnetic anomaly with a magnetic return of 7087.6nT.
MA1236	MAG: MA6035	Magnetic anomaly with a magnetic return of 7087.6nT.
MA1237	MAG: MA6036	Magnetic anomaly with a magnetic return of 7060nT.
MA1238	MAG: MA6037	Magnetic anomaly with a magnetic return of 7060nT.
MA1239	MAG: MA6041	Magnetic anomaly with a magnetic return of 5344.1nT.
MA1240	MAG: MA6042	Magnetic anomaly with a magnetic return of 5344.1nT.
MA1241	MAG: MA6043	Magnetic anomaly with a magnetic return of 4103.9nT.
MA1242	MAG: MA6044	Magnetic anomaly with a magnetic return of 4018.4nT.
MA1243	MAG: MA6045	Magnetic anomaly with a magnetic return of 4018.4nT.
MA1244	MAG: MA6046	Magnetic anomaly with a magnetic return of 3237.2nT.
MA1245	MAG: MA6047	Magnetic anomaly with a magnetic return of 3237.2nT.
MA1246	MAG: MA6053	Magnetic anomaly with a magnetic return of 2586.7nT.
MA1247	MAG: MA6054	Magnetic anomaly with a magnetic return of 2586.7nT.
MA1248	MAG: MA6056	Magnetic anomaly with a magnetic return of 2327.7nT.
MA1249	MAG: MA6057	Magnetic anomaly with a magnetic return of 2327.7nT.
MA1250	MAG: MA6058	Magnetic anomaly with a magnetic return of 2088.9nT.
MA1251	MAG: MA6059	Magnetic anomaly with a magnetic return of 1779.2nT.
MA1252	MAG: MA6060	Magnetic anomaly with a magnetic return of 1779.2nT.
MA1253	MAG: MA6061	Magnetic anomaly with a magnetic return of 1587.1nT.
MA1254	MAG: MA6062	Magnetic anomaly with a magnetic return of 1587.1nT.
MA1255	MAG: MA6063	Magnetic anomaly with a magnetic return of 1548.2nT.
MA1256	MAG: MA6064	Magnetic anomaly with a magnetic return of 1547.8nT.

MA ID	Geophysical ID	Description
MA1257	MAG: MA6065	Magnetic anomaly with a magnetic return of 1547.8nT.
MA1258	MAG: MA6067	Magnetic anomaly with a magnetic return of 1252.5nT.
MA1259	MAG: MA6068	Magnetic anomaly with a magnetic return of 1252.5nT.
MA1260	MAG: MA6071	Magnetic anomaly with a magnetic return of 1041.2nT.
MA1261	MAG: MA6075	Magnetic anomaly with a magnetic return of 906.2nT.
MA1262	MAG: MA6076	Magnetic anomaly with a magnetic return of 906.2nT.
MA1263	MAG: MA6079	Magnetic anomaly with a magnetic return of 603.7nT.
MA1264	MAG: MA6080	Magnetic anomaly with a magnetic return of 533.8nT.
MA1265	MAG: MA6081	Magnetic anomaly with a magnetic return of 533.8nT.
MA1266	MAG: MA6085	Magnetic anomaly with a magnetic return of 429nT.
MA1267	MAG: MA6086	Magnetic anomaly with a magnetic return of 415.9nT.
MA1268	MAG: MA6087	Magnetic anomaly with a magnetic return of 372.8nT.
MA1269	MAG: MA6089	Magnetic anomaly with a magnetic return of 361.7nT.
MA1270	MAG: MA6090	Magnetic anomaly with a magnetic return of 361.7nT.
MA1271	MAG: MA6092	Magnetic anomaly with a magnetic return of 347.8nT.
MA1272	MAG: MA6093	Magnetic anomaly with a magnetic return of 347.8nT.
MA1273	MAG: MA6098	Magnetic anomaly with a magnetic return of 334.7nT.
MA1274	MAG: MA6099	Magnetic anomaly with a magnetic return of 334.7nT.
MA1275	MAG: MA6101	Magnetic anomaly with a magnetic return of 322nT.
MA1276	MAG: MA6103	Magnetic anomaly with a magnetic return of 295.5nT.
MA1277	MAG: MA6104	Magnetic anomaly with a magnetic return of 293.1nT.
MA1278	MAG: MA6105	Magnetic anomaly with a magnetic return of 293.1nT.
MA1279	MAG: MA6106	Magnetic anomaly with a magnetic return of 284.7nT.
MA1280	MAG: MA6107	Magnetic anomaly with a magnetic return of 266.6nT.
MA1281	MAG: MA6108	Magnetic anomaly with a magnetic return of 255.6nT.
MA1282	MAG: MA6109	Magnetic anomaly with a magnetic return of 254.9nT.
MA1283	MAG: MA6110	Magnetic anomaly with a magnetic return of 249.2nT.
MA1284	MAG: MA6111	Magnetic anomaly with a magnetic return of 243.9nT.
MA1285	MAG: MA6112	Magnetic anomaly with a magnetic return of 243.9nT.
MA1286	MAG: MA6114	Magnetic anomaly with a magnetic return of 225.4nT.
MA1287	MAG: MA6115	Magnetic anomaly with a magnetic return of 222nT.
MA1288	MAG: MA6116	Magnetic anomaly with a magnetic return of 219nT.
MA1289	MAG: MA6117	Magnetic anomaly with a magnetic return of 216nT.
MA1290	MAG: MA6118	Magnetic anomaly with a magnetic return of 214.1nT.
MA1291	MAG: MA6119	Magnetic anomaly with a magnetic return of 213.2nT.
MA1292	MAG: MA6120	Magnetic anomaly with a magnetic return of 199.6nT.
MA1293	MAG: MA6122	Magnetic anomaly with a magnetic return of 184.8nT.
MA1294	MAG: MA6123	Magnetic anomaly with a magnetic return of 183.4nT.
MA1295	MAG: MA6124	Magnetic anomaly with a magnetic return of 174.6nT.
MA1296	MAG: MA6125	Magnetic anomaly with a magnetic return of 169.4nT.
MA1297	MAG: MA6126	Magnetic anomaly with a magnetic return of 169.4nT.
MA1298	MAG: MA6127	Magnetic anomaly with a magnetic return of 165.4nT.
MA1299	MAG: MA6128	Magnetic anomaly with a magnetic return of 165.4nT.
MA1300	MAG: MA6129	Magnetic anomaly with a magnetic return of 165.3nT.
MA1301	MAG: MA6130	Magnetic anomaly with a magnetic return of 160nT.

MA ID	Geophysical ID	Description
MA1302	MAG: MA6131	Magnetic anomaly with a magnetic return of 151.9nT.
MA1303	MAG: MA6132	Magnetic anomaly with a magnetic return of 147.1nT.
MA1304	MAG: MA6133	Magnetic anomaly with a magnetic return of 142nT.
MA1305	MAG: MA6134	Magnetic anomaly with a magnetic return of 142nT.
MA1306	MAG: MA6135	Magnetic anomaly with a magnetic return of 141.8nT.
MA1307	MAG: MA6136	Magnetic anomaly with a magnetic return of 140nT.
MA1308	MAG: MA6137	Magnetic anomaly with a magnetic return of 137.7nT.
MA1309	MAG: MA6138	Magnetic anomaly with a magnetic return of 137.7nT.
MA1310	MAG: MA6139	Magnetic anomaly with a magnetic return of 135.4nT.
MA1311	MAG: MA6140	Magnetic anomaly with a magnetic return of 134.5nT.
MA1312	MAG: MA6141	Magnetic anomaly with a magnetic return of 133nT.
MA1313	MAG: MA6142	Magnetic anomaly with a magnetic return of 132.3nT.
MA1314	MAG: MA6143	Magnetic anomaly with a magnetic return of 131.3nT.
MA1315	MAG: MA6144	Magnetic anomaly with a magnetic return of 131nT.
MA1316	MAG: MA6145	Magnetic anomaly with a magnetic return of 128nT.
MA1317	MAG: MA6146	Magnetic anomaly with a magnetic return of 126.8nT.
MA1318	MAG: MA6147	Magnetic anomaly with a magnetic return of 126.8nT.
MA1319	MAG: MA6148	Magnetic anomaly with a magnetic return of 125.8nT.
MA1320	MAG: MA6149	Magnetic anomaly with a magnetic return of 125.4nT.
MA1321	MAG: MA6150	Magnetic anomaly with a magnetic return of 123.6nT.
MA1322	MAG: MA6151	Magnetic anomaly with a magnetic return of 123.2nT.
MA1323	MAG: MA6152	Magnetic anomaly with a magnetic return of 123.2nT.
MA1324	MAG: MA6153	Magnetic anomaly with a magnetic return of 121.6nT.
MA1325	MAG: MA6154	Magnetic anomaly with a magnetic return of 121.5nT.
MA1326	MAG: MA6155	Magnetic anomaly with a magnetic return of 120.5nT.
MA1327	MAG: MA6156	Magnetic anomaly with a magnetic return of 111.1nT.
MA1328	MAG: MA6157	Magnetic anomaly with a magnetic return of 109.5nT.
MA1329	MAG: MA6158	Magnetic anomaly with a magnetic return of 108nT.
MA1330	MAG: MA6159	Magnetic anomaly with a magnetic return of 105.3nT.
MA1331	MAG: MA6160	Magnetic anomaly with a magnetic return of 103.7nT.
MA1332	MAG: MA6161	Magnetic anomaly with a magnetic return of 103.7nT.
MA1333	MAG: MA6162	Magnetic anomaly with a magnetic return of 103.4nT.
MA1334	MAG: MA6163	Magnetic anomaly with a magnetic return of 103.4nT.
MA1335	MAG: MA6164	Magnetic anomaly with a magnetic return of 102.6nT.
MA1336	MAG: MA6165	Magnetic anomaly with a magnetic return of 100.8nT.
MA1337	MAG: MA6166	Magnetic anomaly with a magnetic return of 100.6nT.

345. While the magnetometer data in isolation cannot confirm if the object detected is of archaeological potential, a precautionary approach of avoidance is recommended for these 166 targets of 50m. All areas of impact will be further investigated as stated in Table 13.3 and outlined in the Offshore WSI (document reference 8.5). After such survey, the anomaly be removed from the list of constraints if proved not of archaeological potential or be given an updated exclusion zone.

13.4.3 Low Potential Anomalies

346. There are 2,228 Low potential anomalies have been characterised as a mixture of isolated small features, often boulder-like, or isolated linear features and potentially modern debris such as rope, chain, fishing gear or lost equipment.

347. Magnetic anomalies between 5nT and 100nT with no corresponding records or data in any of the assessed geophysical datasets or research resources have also been assigned low archaeological potential (Figure 13.8)

348. There is a degree of uncertainty with low potential anomalies as they have the potential to be unknown fouls, obstructions or even wrecks. Maritime losses records are not always accurate or complete, therefore we must take precautions. Maritime aircraft losses are widely unknown and can sometimes have a magnetic value of as little as 6nT. Rock outcrops with no other clear anthropogenic features can even been included as potential debris within the geophysical targets with low archaeological potential as they could potentially be of archaeological interest, with rocks and stones historically used as ballast, therefore potentially being indicative of buried wreck remains.

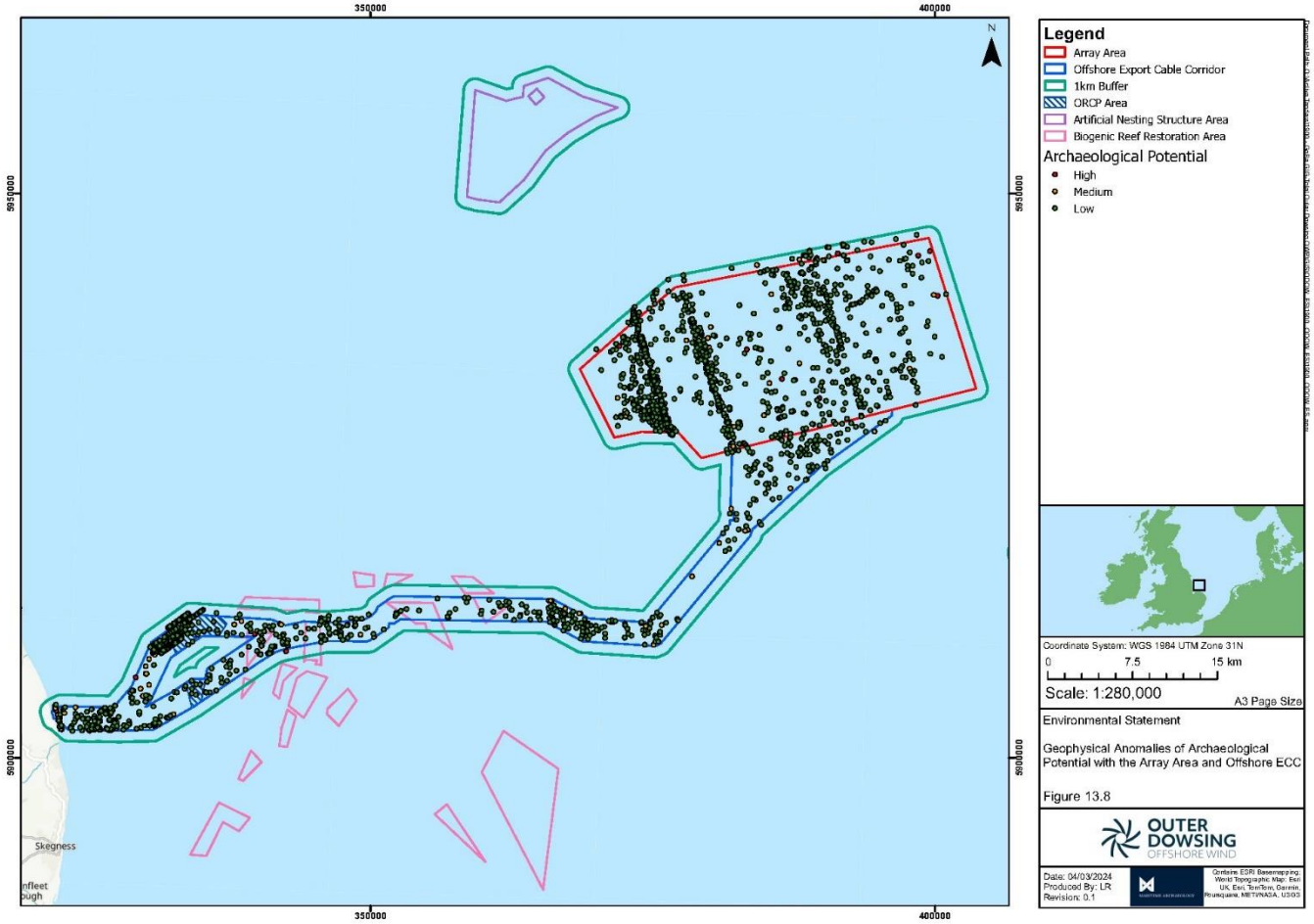

Figure 13.8 Geophysical Anomalies of Archaeological Potential with the Array Area and Offshore ECC

13.5 Geoarchaeological Assessment of Geophysical Data

349. This section presents preliminary deposit models which are to be refined following the further assessment of geotechnical data. The SBP data, where available was assessed as per methodology outlined in section 13.2. The results are presented in the context of current understanding of the complex prehistoric landscapes and the correlation between the marine and terrestrial sediment phases.

350. Knowledge of, as well as our understanding of, submerged prehistory is developing rapidly as a positive outcome of collaboration and data sharing between offshore developers, curators and researchers. Research included in the NSPRMF (March 2023), will be utilised and referenced where relevant when available.

351. The nature, extent and distribution or 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. This will continue to be assessed as per the phased approach outlined in Offshore Geotechnical Investigations and Historic Environment Analysis (COWRIE, 2011)

352. The data will contribute to two of the four themes and research questions within the NSPRMF: stratigraphy, chronology, landscapes and palaeogeography and Palaeoenvironmental records as well as potentially answering research questions; particularly in category E (NSPRMF).

13.5.1 Current Understanding

353. The assessment of SBP data and geotechnical data within the Array Area show that the seafloor morphology is made up of bedforms including, mega ripples, sand waves and sandbanks as well as deeper areas such as bathymetric depressions, also known as tunnel valleys.

354. Background data from the theme of stratigraphy, chronology, landscapes and palaeogeography within the NSPRMF is useful in aiding our current understanding of the landscape with the collation of data from other projects within the area.

355. One of the prominent features within the submerged landscape in the area is the Outer Silver Pit which lies east of the marine archaeology study area. The Outer Silver Pit is a significant depression probably formed during quaternary sub glacial processes (Praeg 2003), or as a result of a catastrophic drainage event (Wingfield 1990). While not within the area of focus for this report, the landscape around Outer Silver Pit is dominated by channels flowing into the feature and other smaller valleys. The landscape is thought to have been a wetland or peatland with the Outer Silver Pit representing an estuarine environment from the end of the Pleistocene until the early Holocene, when the area was flooded at around 10,000BP (Gaffney and Fitch, 2022).

356. One tunnel valley is partly visible (MA3007) within the study area. The tunnel valleys are assessed within the Europe's Lost Frontiers project and are thought to contain lacustrine features during the Mesolithic. The tunnel valleys, also visible in the bathymetric data across the Array Area are likely to be deeper than suggested and contain Pleistocene materials. During the Holocene these could also have contained lakes (Gaffney and Fitch, 2022). The Inner Silver Pit glacial tunnel valley is located approximately 15km west of the Array Area with the Offshore ECC crossing the valley at its shallowest part as it stretches from the Wash out towards the North Sea. Sediments within the Inner Silver Pit are known for their ecological importance on a surface level and have further shown that sediments collected from cores within the Inner Silver Pit feature have the potential to contain preserved foraminifera which indicate a Middle Pleistocene (MIS 9) environment. Demonstrating glaciomarine shallow water conditions, followed by a transitional zone with slightly higher temperatures, however still subarctic climate, followed by a true interglacial succession (also known as the Inner Silver Pit Interglacial) where increased faunal diversity and a high content of warm water species is noted. The topography gets shallower towards the end of the interglacial succession. Followed by a return to high arctic glacial marine conditions (Kudsen and Sejru, 1998).

357. The internationally important Europe's Lost Frontiers project is the largest, directed archaeological research project undertaken in Europe to investigate the inundated landscapes of the early Holocene North Sea and as part of the Project, 78 vibrocores were collected in the southern North Sea.

358. While none of the cores are located within the Array Area, one (ELF002) is located within the Offshore ECC and others were taken outside the marine archaeology study area, south towards the Norfolk coast (Gaffney and Fitch, 2022). The results of the assessment of the core material shows that while ELF002 contained reddish brown silty fine sand and clay, ELF007 and ELF2009 both contained dark brown/black peat of high geoarchaeological potential illustrating the importance of early archaeological involvement in geotechnical campaigns at large infrastructure projects.

359. Therefore, further discussion on recommended sampling strategies, based on previous research and results as well as aiming to answer research questions outlined by the newly published NSPRMF will be presented in the phased geoarchaeological reports, and relevant archaeological MSs.

360. Cores collected to date as part of the Project, within the AfL Array Area and the ECC are summarised below where they have spatial overlap or are likely to be associated with the channel systems identified. A full assessment of the geoarchaeological potential of the vibrocores collected to date is presented in two separate Phase One geoarchaeological reports (Annexe F and G).

13.5.2 Archaeological Assessment of Sub-bottom Data

361. The archaeological assessment of the SBP data collected for the Array Area has aimed to:

- Locate and map channel and valley features present within the marine archaeology study area;
- Identify and describe stratigraphic units within these channels and valleys;
- Link the features identified from the SBP data to known offshore and terrestrial landscape features; and
- Develop an outline deposit model based on the information gathered.

Array Area results

362. The sediments identified within the AfLArray Area from the SBP data geoarchaeological assessment include Holocene gravely sand, silt and clays (Unit A) and Quaternary sediments, Unit B, Unit C, Unit D and Unit E (Table 13.23). The features are described in detail below and illustrated in Plate 13.10.

363. Further, a clear palaeochannel system was identified, the palaeochannels are cut into the base of Unit A and seen incising the underlying Quaternary sediments, Unit B and Unit C (Table 13.23).

364. The Palaeochannel systems are generally stretching across the marine archaeology study area in the Array Area in a north north-west to south south-east direction and can reach depths up to 32m Below Seafloor (BSF). No blanking, indication of peat or shallow gas was noted.

365. These results contribute directly to two of the key themes in the NSPRMF including stratigraphy, chronology, landscapes and palaeogeography and Palaeoenvironmental records by enhancing the knowledge of past landscapes and palaeochannels as well as raw core data.

MA3000

366. MA3000 is a channel, 15km long and 4.5km at the widest point with possible narrower tributaries running in a north north-west to south south-east direction. While not overlapping previous data, it is located perpendicular to a fluvial Lower Palaeolithic, possibly Holocene channel identified by NSPP (University of Birmingham, 2011) and parallel to wetlands identified by NSPP (University of Birmingham, 2011) as well as a tunnel valley. One VC was collected within the channel feature (R4C-VC-07R) The core penetrated down to 3.3m and recovered 0.20m of gravels and 3.1m of dark CLAY interpreted as Unit C (Table 13.23Table 13.23). Further two cores, R4C-VC-16 and R4C-VC-11A are located on the edges of MA3000, both recovered Unit A and C and have been recommended for further recording.

MA3001

367. MA3001 is an area of 1.5km by 0.5km stretching in a north north-west to south south-east direction, west of MA3000. This could be an extension of a fluvial Lower Palaeolithic, possibly Holocene channel identified by NSPP (University of Birmingham, 2011) which comes in from the east and thus connecting MA3000 and MA3001 to the wider channel systems previously identified in the area. The feature is up to eight meters deep with shallow sloping sides and uneven slightly rounded base. No VCs were collected within this feature, however R4C-VC-11A is located on the edge of MA3001 where Units A and C were recovered, this VC has been recommended for further recording.

MA3002

368. MA3002 covers an area of 3.6km by 2.8km in an area of sandbanks and does not overlap with the data from NSPP (University of Birmingham, 2011) but shows similar character to a wetland or lake environment as seen both north and south of MA3002. The feature shows gently sloping sides and a slight rounded base. The feature is generally 2 to 8 meters deep but has a dip in the middle which stretches down 16m. One VC was collected within the feature (R4C-VC-15) which penetrated down to 4.7m but only recovered Unit A and has therefore not been recommended for the Phase Two assessment.

MA3003

369. MA3003 is 4km by 4.2km, west of the southernmost part of MA3000 in an area of sand waves. The feature does not overlap with the data from NSPP (University of Birmingham, 2011) but shows similar character to a wetland or lake environment as seen both north and south of MA3003. The feature is up to 20m deep but has mostly sloping banks and is only between 2m and 8m deep around the perimeter. The eastern side of the feature is shallower than the western. No VCs have been collected within the extent of the feature or within 1km of its edges.

MA3004

370. MA3004 is a channel 9km long and 0.6km wide. The channel is located north north-west to south south-east to the west of MA3005 and a fluvial Lower Palaeolithic, possibly Holocene channel identified by NSPP (University of Birmingham, 2011). The channel is approximately 6m deep with relatively steps banks. No cores were collected within the channel; however, one VC (R4B-VC-18) located between MA3004 and MA3005 has been recommended for the Phase Two assessment.

MA3005 and MA3006

371. MA3006 stretches over 12km by 1.3km NNW to SSE and overlays perfectly with a fluvial Lower Palaeolithic, possibly Holocene channel identified by NSPP (University of Birmingham, 2011). However, the project data extends this channel feature another 5.6km south (MA3005). The channel system has relatively steep banks but is in places very shallow and seen close to the seafloor. The channel base is mostly rounded but in deeper sections uneven reflectors are noted indicating a change in sediments. The channel system can be up to 20m deep but is in the majority approximately 4m deep.

MA3007

372. MA3007, while not overlying geographically with previously identified channels, this feature seems to be a northern extension of a shallow lake or wide river. It also partly overlies one of the tunnel valleys within the marine archaeology area and is therefore likely to contain material of geoarchaeological interest, however the SBP data does not penetrate the infill sediment within the tunnel valley, but it is likely that the southern extension of this feature (Plate 13.10) is present deeper within the sediments. One VC was collected within the tunnel valley and within the extent of previously identified wetland deposits, but outside the extent of the palaeofeature noted within the SBP data. R4A-VC-07 recovered Unit A, SAND with bands of clay overlaying brown gravelly SAND, reaching Unit C at 2m BSB which stretches until the end of the Vibrocore at 3.35 BSB. R4A-VC-07 has been recommended for the Phase Two assessment.

Outline Deposit Model

373. The use of a deposit model is crucial for the understanding of the local and regional context of the Project area, supporting the archaeological interpretation. As outlined by COWRIE (2011:39) “An archaeological deposit model can illuminate the character and nature of buried sediments and deposits, their vertical extents, their relationship across the area being studied, and their individual levels of archaeological interest”. Guidance on Deposit Modelling and Archaeology (Historic England, 2020) has also been considered, although the guidance does not cover the marine zone.

374. A full assessment of the geoarchaeological potential of the vibrocores collected to date are presented in the two Phase One geoarchaeological reports. The outline deposit model presented below has been developed based on the results of the geotechnical campaign and SBP assessment within the Array Area but only includes the geoarchaeological assessment and not the assessment of SBP within the ECC.

375. The outline deposit model will be further refined following additional phased geoarchaeological assessments (see document 8.8).

Table 13.23: Outline Deposit Model

Unit	Stratigraphy	Description	Epoch	Geoarchaeological potential
Unit A	Holocene mobile sands	Mobile loose to medium gravelly or silty SAND, in places GRAVEL or CLAY.	Holocene	Sedimentary low geoarchaeological potential, however archaeological artefacts may be located within these sediments
Unit B	Botney Cut Formation	Laminated fine SAND with very soft to soft CLAY	Quaternary, Marine Isotope Stage 2	Potential to contain material of geoarchaeological interest
Unit C	Bolders Bank Formation	Fine to medium SAND and soft to stiff CLAY with sand, gravel chalk and pebbles. At base GRAVEL	Quaternary, Marine Isotope Stage 3-2	Potential to contain material of geoarchaeological interest

Unit D	Egmond Ground Formation	Medium to fine SAND and gravels	Quaternary, Marine Isotope Stage 11	Limited potential to contain material of geoarchaeological interest
Unit E	Swarte Bank Formation	Stiff to very stiff CLAY	Quaternary Marine Isotope Stage 12	Potential to contain material of geoarchaeological interest
Unit F	Bedrock Formation	Cretaceous CHALK	Cretaceous	No geoarchaeological interest

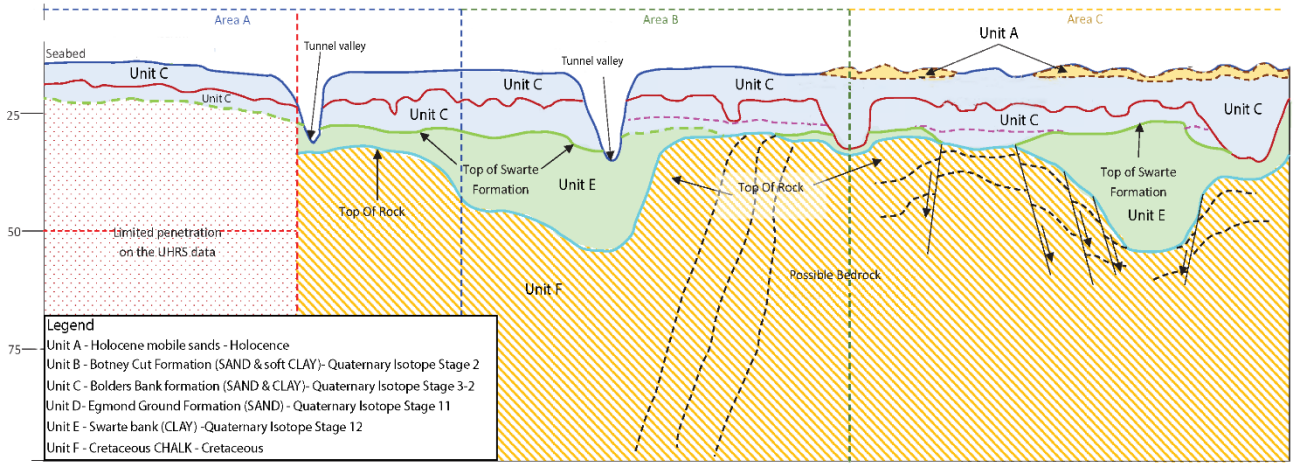

Plate 13.13.1: Illustrated outline deposit model (Array Area). Adapted from Outer Dowsing Offshore Windfarm Geophysical UHRS And Light Geotechnical Survey East Anglia, Offshore UK, ENVIROS Survey & Consultancy Limited, 2022.

Offshore ECC results

376. Sub-bottom data for the Offshore ECC has not been included in this assessment, further the NSPP data does not extend into the majority of the ECC, therefore the colour and composition of sediments, as well as descriptions recognised in the core logs, were used as the primary indicators of geoarchaeological potential.

377. A Phase One assessment of available cores logs has been undertaken and established that the Offshore ECC is primarily composed of mobile sandy and gravelly surface deposits, formed into sand waves and ripples, overlying fine sands and soft clay representing the Botney Cut Formation, which was not seen in the Array Area. Below the Botney cut Formation a complex Boulder Bank Formation is noted, represented of firm to stiff clays and in places gravels.

378. The Egmond Ground Formations have also been observed in the UHRS data (GEOxyz, 2023) across the whole Offshore ECC and is believed to be represented by sand and gravels. The Egmond Ground Formation is underlain by the Swarte Bank Formation in localised cannels along the Offshore ECC and is seen as sand and clay within the UHRS data.

379. Bedrock in the form of Cretaceous Chalk is seen along the ECC and is in places seen just below the Holocene sands.

380. The Phase One geoarchaeological assessment concluded that three cores indicate organic material (B11-VC-003, B12-VC-004a and B12-VC-006). Organic deposits, especially Peat can have similar appearance to shallow gas on SBP which has been noted across the ECC (GeoXYZ, 2023). The presence of organic material can therefore have a wider extent than what is seen within the core material.

381. In 17 of the cores assessed, Unit B (Table 13.23Table 13.23: Outline Deposit Model), the Botney Cut Formation was noted, the deposit is assumed to be present within infilled glacial valleys that have eroded into the Bolders Bank Formation. Channels filled with Botney Cut Formation have been noted on the SBP as present across the ECC in several places (GEOxyz, 2023). In two of the cores (B13-VC-007 and B13-VC-008) Unit B could be associated with a wetland environment as also noted in the NSPP data.

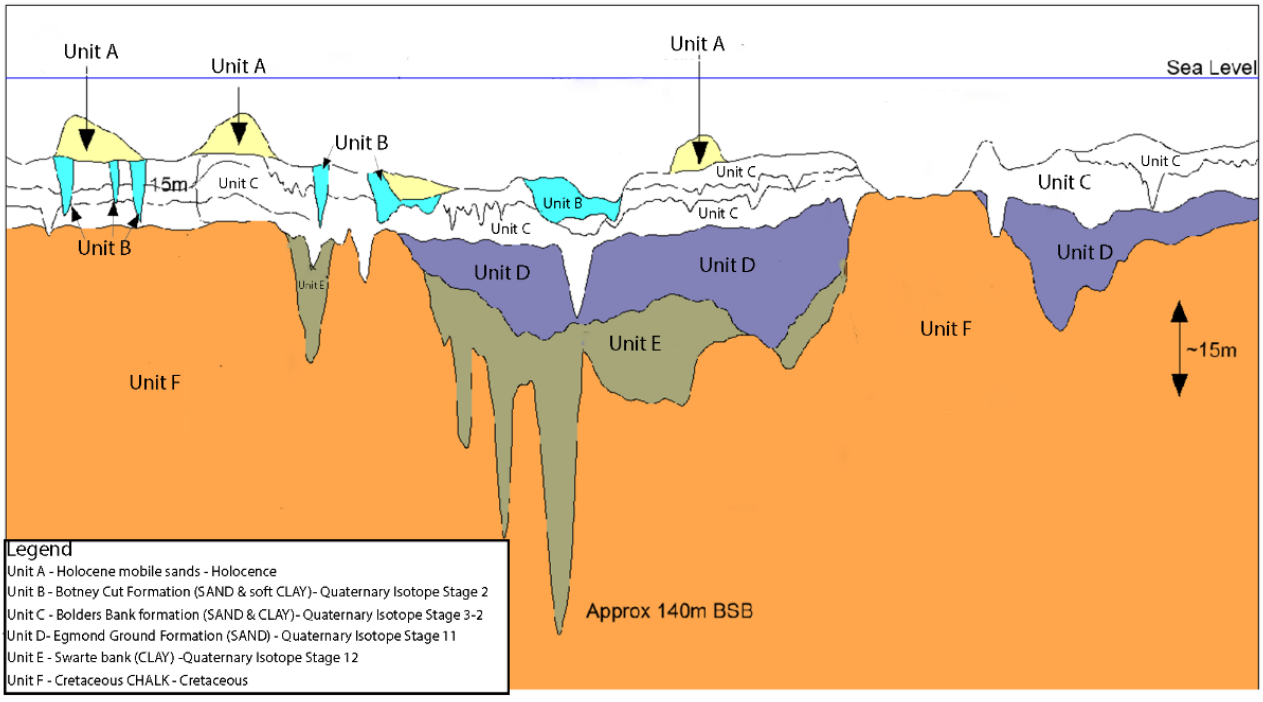

Plate 13.2: Illustrated outline deposit model (ECC). Adapted from Offshore & Nearshore Geophysical & Geotechnical Results & Charts (Vol. 5). GEOxyz, 2023. Mitigation

13.6 Mitigation

13.6.1 Introduction

382. The embedded mitigation outlined in Table 13.3 and detailed below have been designed to reduce or eliminate direct impact on known, unknown and potential marine archaeological and cultural heritage receptors. This approach is further detailed in Volume 1, Chapter 13 and is expected to be reflected in the DCO requirements and/or dML conditions.

13.6.2 Mitigation for Known Wrecks and Obstructions

383. There are 75 wrecks and obstructions recorded in the UKHO, NRHE and Lincolnshire HER dataset within the marine archaeology study area.

384. AEZs are recommended for all Historic Environment receptors, as illustrated in Figure 13.10Of the 75 recorded wrecks and obstructions within the marine archaeology study area, 16 are within the Array Area and associated buffers, 39 are within the ECC and associated buffers and 20 are within the compensation areas and associated buffers. Records correspond with anomalies identified in the geophysical data and have been assigned AEZs due to being of archaeological potential (further detailed in Annex A and Annex B). The records for wrecks, fouls and obstructions not identified in the geophysical data, are covered by a precautionary AEZ based around their recorded location (further detailed in Annex A and Annex B) as they may represent heritage assets, however, further study such as ROV would be needed to confirm this. While the magnetometer data in isolation cannot confirm if the object detected is of archaeological potential, a precautionary approach of avoidance is recommended for these targets of 50m. Where a confirmed recorded wreck or obstruction overlays a geophysical anomaly, the larger AEZ will take precedence. All areas on impact will be further investigated as per the commitments in Table 13.3 and outlined in the Offshore WSI. After such survey, the anomaly be removed from the list of constraints if proved not of archaeological potential or be given an updated exclusion zone.

385. The Project has presently not identified any designated marine archaeological and cultural heritage receptors such as Designated or Protected Wreck Sites or other sites subject to the provisions of the *Protection of Military Remains Act* 1986 within the marine archaeology study area.

386. The commitment to avoid all Historic Environment receptors and to further investigate the area of impacts ensuring that unknown receptors are located, and impact mitigated will ensure preservation *in situ*, which is in keeping with current best practice.

387. Where marine archaeological and cultural heritage receptors cannot be preserved *in situ*, justification for continued archaeological work including potential impacts will be clearly outlined in the relevant MSs outlined in the Marine Written Scheme of Investigation (WSI) produced ahead of any archaeological works and following agreement with Historic England.

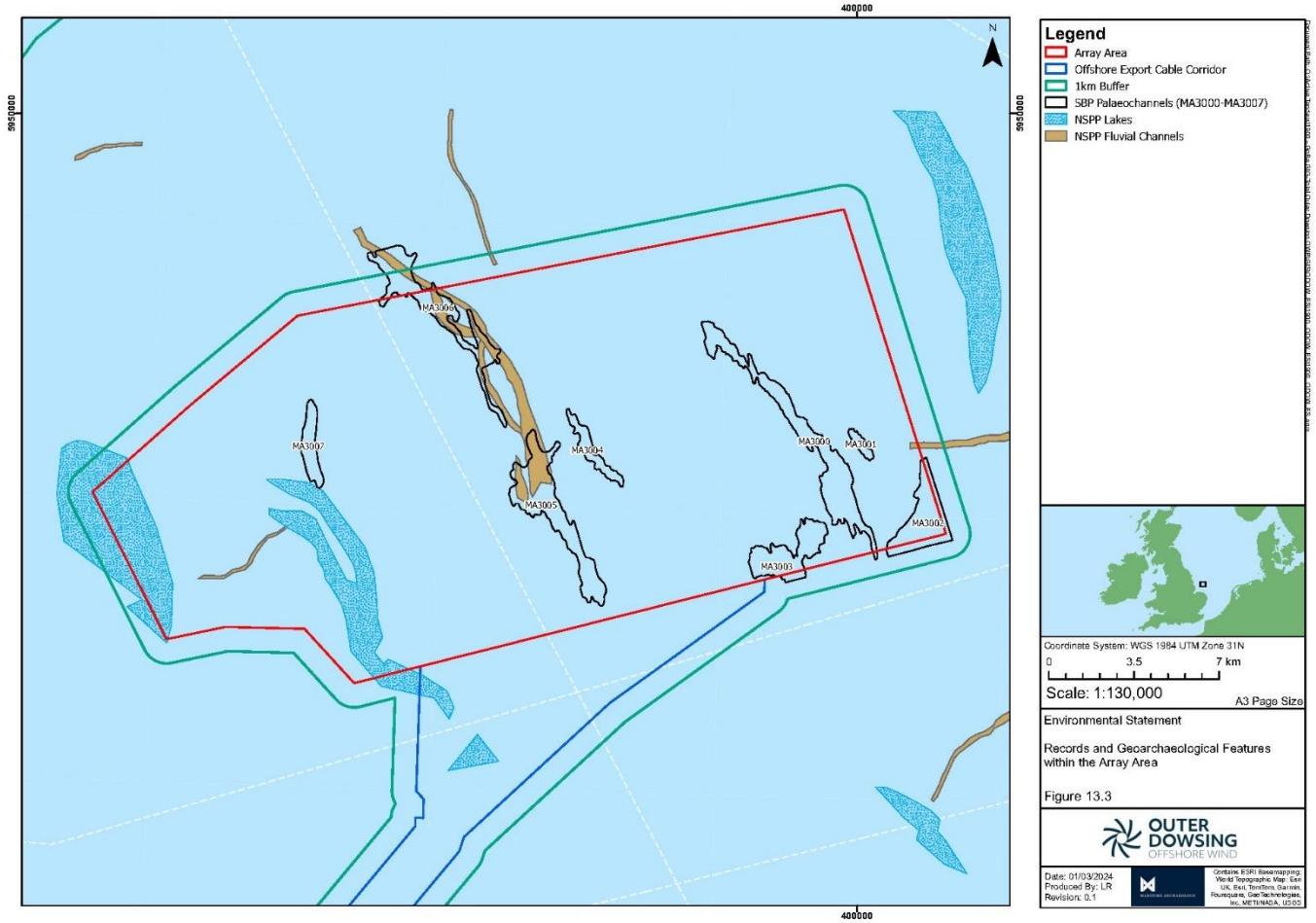

Figure 13.9 Records and Geoarchaeological Features within the Array Area

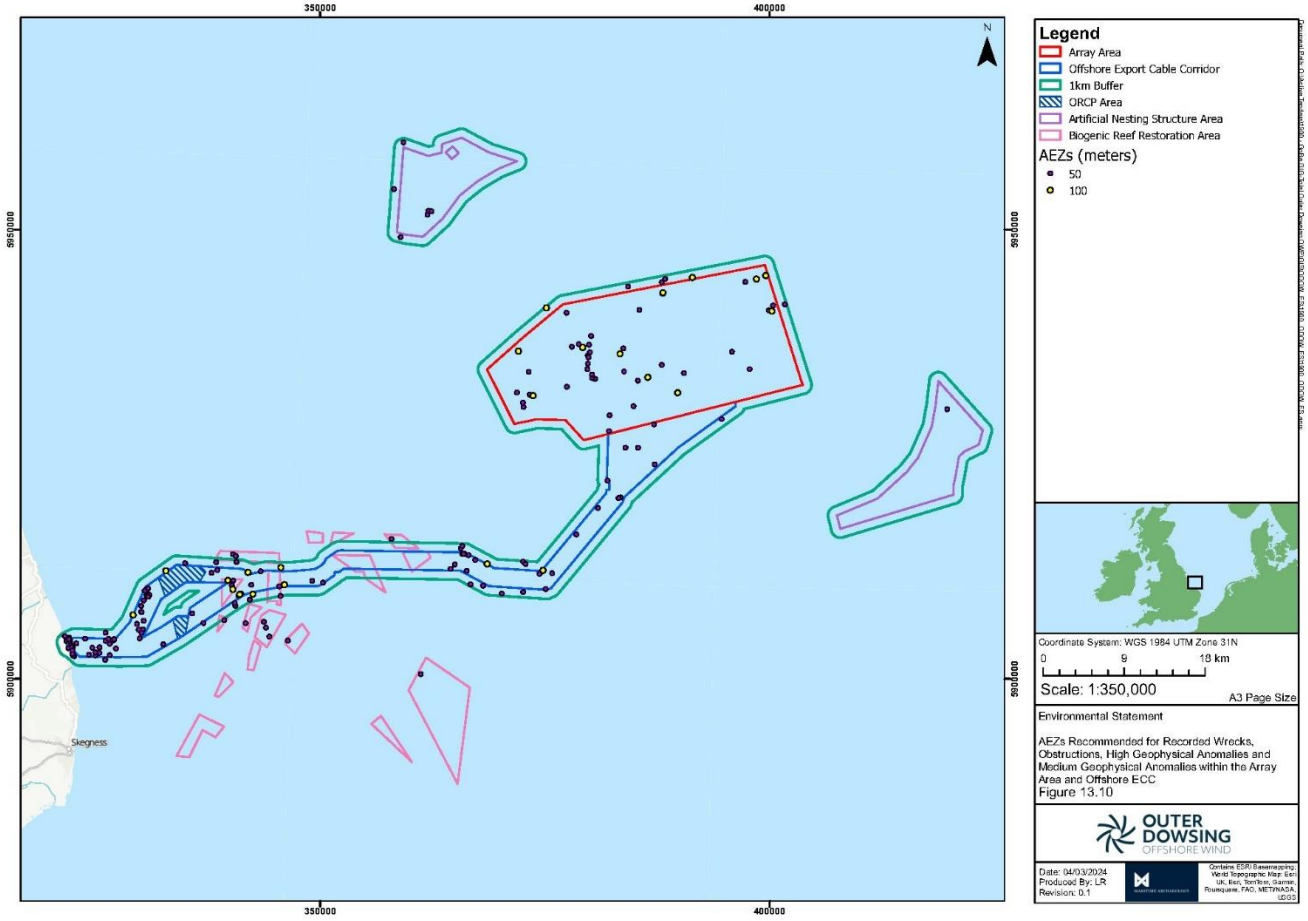

Figure 13.10 AEZs Recommended for Recorded Wrecks, Obstructions, High Geophysical Anomalies and Medium Geophysical Anomalies

13.6.3 Mitigation for Unlocated Marine Archaeological and Cultural Heritage Receptors

388. There is always a possibility that yet unlocated marine archaeological and cultural heritage receptors will be located within the marine archaeology study area. Unlocated marine archaeological and cultural heritage receptors are of unknown archaeological potential and heritage interest but might still be impacted by indirect or direct impact caused by project activities. In recent years large offshore renewable developments have located several previously unknown and unlocated sites of High archaeological interest within marine archaeology study area, even after construction.

389. Further geophysical and geotechnical investigations followed by archaeological campaigns are essential to developing effective mitigation within the Array Area and Offshore ECC. The combination of geophysical and geotechnical surveys completed to a standard where they can be archaeologically assessed and with archaeological objectives work effectively by increasing the likelihood of marine archaeological and cultural heritage receptors becoming identified and ultimately protected. Detailed archaeological assessments aim to ensure that to the extent possible, areas of impact are clear of marine archaeological and cultural heritage receptors ahead of any intrusive works or further mitigation and archaeological campaigns are taken.

390. All mitigation methods are outlined in the Marine WSI produced ahead of any archaeological works and following agreement with Historic England.

391. The Outline Marine Archaeological WSI (document reference 8.8) has presented mitigation measures based on the archaeological assessments undertaken in preparation of the Project's ES to accompany the DCO application. This document forms the framework for mitigation which will inform the Marine Archaeological WSI that will be developed post consent and submitted to the MMO for approval.

392. Avoidance is considered the most effective form of protection, as per the NPS for Overarching National Policy Statement for Energy (EN-1) (DESNZ, 2023) and NPS for Renewable Energy Infrastructure EN-3 (DESNZ, 2023). In the case of previously unlocated marine archaeological and cultural heritage receptors being identified during survey or construction works, Temporary Exclusion Zones (TEZs) will be established via the use of the PAD reporting until further investigation can be undertaken to determine the character of the discovery.

393. These TEZs may be lifted following further investigation and in consultation with the Archaeological Curator(s) if the features are determined to be non-archaeological, or they may form the basis of an AEZ, to avoid further disturbance long-term.

394. The project specific Outline PAD (see Annex A of document 8.8) will be applied during any work where unknown archaeology may be encountered and is designed to operate when it is not practical or safe for an archaeologist to be present. The Outline PAD (see Annex A of document 8.8) does not replace the process of archaeological assessment and evaluation but rather acts as a safety net in the event of unexpected discoveries during the course of works.

395. Implementation of the Outline PAD (see Annex A of document 8.8) helps to ensure that any adverse effects of the Project on sites, features or objects of potential archaeological interest encountered during project works are reduced by establishing rapid communication between key stakeholders, who are then able to implement appropriate mitigation. If any of the objects of known or possible archaeological interest require removal or relocation, the WSI will provide a methodological approach for all subsequent requirements in accordance with professional archaeological standards.

13.6.4 Mitigation for Geophysical Anomalies of Archaeological Potential

396. The combined geophysical data assessments undertaken to identify material of archaeological potential identified anomalies of Low, Medium, and High archaeological potential within the marine archaeology study area as detailed in Table 13..

397. While generally no active conservation strategy is proposed, anomalies assessed as being of Medium or High archaeological potential are probably of anthropogenic origin and/or archaeological interest and have therefore been assigned AEZs based on their archaeological potential, their archaeological interest and their size as understood from the geophysical data assessment. A gazetteer of the geophysical anomalies identified as High and Medium potential can be found in Annex A and Annex B.

398. Preservation *in situ* is ensured by the commitment to avoid all Historic Environment receptors and to further investigate areas of impacts increasing the potential for unknown receptors to be located.

399. Where items are being removed from the seabed, conservation strategies will be clearly outlined in the relevant MSs produced and submitted to the Archaeological Curator(s) (Historic England and Lincolnshire County Council) ahead of any archaeological works.

400. Anomalies of Low archaeological potential and magnetic anomalies <100nT without correlating seabed features have not been assigned AEZs due to the uncertainty of their archaeological potential. Further investigation of these sites will occur during future survey works, where possible, and avoidance of these features by micro-siting is recommended if there is potential for them to be impacted by the Project.

401. It is possible these anomalies could represent material from wreck sites or other marine archaeological and cultural heritage receptors of interest 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 Curator(s). Further assessment may be in the form of investigation undertaken in conjunction with a Remotely Operated Vehicle (ROV) or UXO surveys.

402. Works during the construction, operation and decommissioning phases of the project should implement the project specific Outline PAD (see Annex A of document 8.8) and any objects of archaeological potential should be reported, should an archaeologist not be present.

403. Within the Array Area and associated 1km buffer 23 High potential anomalies have been assigned 100m AEZs and 166 Medium potential anomalies have been assigned 50m AEZs (20 of these are magnetic anomalies which do not correspond with any other geophysical data records) (Figure 13.10). Where a High potential anomaly overlays another geophysical anomaly, the larger AEZ will take precedence.

13.6.5 Mitigation for Deposits of Geoarchaeological Potential

404. The baseline review, summarised in section 13.3, supported by the geophysical survey data assessment, summarised in section 13.4 has provided information on the location of palaeolandscapes and areas of geoarchaeological potential within the marine archaeology study area.

405. It is recognised that all phases of the Project may cause direct impact to deposits which have the potential to be of geoarchaeological interest, however, the impact to the mentioned sediments will be restricted to the required burial and penetration depths, as outlined in Volume 1, Chapter 13.

406. Any potential impact will be offset by the collection and analysis of geotechnical data, including forthcoming dedicated cores for archaeological analysis. The geoarchaeological assessment will be undertaken using a phased approach to assessment and analysis of the collected geotechnical data resulting in project reports and a deposit model as prescribed in COWRIE guidance (2011) and further outlined in section 13.4. This collection of geotechnical data and its subsequent geoarchaeological analysis will be used to contribute to seabed mapping and modelling of submerged prehistoric landscapes, resulting in a greater understanding of the prehistoric past and the use and habitation of submerged former terrestrial landscapes. The phased approach is ongoing and two separate geoarchaeological Phase One reports (Annexe F and G).

407. Specific archaeological sample locations will be recommended in addition to the geotechnical samples collected for the overarching geotechnical campaign, should consent be obtained. These will be outlined in specific MSs that will be produced before works commence, as detailed in the outline WSI.

13.6.6 Mitigation for Impacts Post-Construction

408. To confirm the effectiveness of the established AEZs and other recommended mitigation, and the stability of marine archaeological and cultural heritage receptors, it is expected that some marine archaeological and cultural heritage receptors identified during the pre-construction surveys will require further monitoring.

409. Priority will be given to features and locations of High archaeological interest located in proximity to installed infrastructure, particularly where archaeological interest has been established through direct observation.

410. In addition to wrecks or wreck assemblages, attention will also be given to a range of feature types including discrete objects (historic anchors, aircraft components), magnetic anomalies with some degree of surface expression, possible debris, and areas of seabed disturbance.

411. The archaeological post-construction monitoring plan will be developed and submitted to the relevant Archaeological Curator(s) and will outline the monitoring methodology and reporting structure.

13.6.7 Mitigation for Unexpected Archaeological Discoveries

412. Mitigation for unexpected archaeological discoveries is considered under the recommended archaeological objectives for geophysical and geotechnical surveys, and their subsequent archaeological review.

413. Additionally, any finds believed to be of archaeological potential that are identified and/or recovered by any operating vessels during construction, O&M or decommissioning phases and where an archaeologist is not present will be reported using the methodology outlined in the Project specific Outline PAD (see Annex A of document 8.8).

414. The Project specific Outline PAD (see Annex A of document 8.8) has been produced in reference to the TCE guidance (2014). The Outline PAD (see Annex A of document 8.8) aims to mitigate impact on the historic environment by enabling people working offshore to report their finds in an effective and convenient manner.

415. The Outline PAD (see Annex A of document 8.8) anticipates discoveries being made by Project staff who report to a Site Champion (potentially the Client Representative on the vessel or another manager appointed by the contractor), who then reports to the Project's nominated person to coordinate implementation of the Outline PAD (the Nominated Contact) (see Annex A of document 8.8).

416. All discoveries of archaeological material must be reported by the Project, in accordance with the communication plan, to the Nominated Contact, who will then inform the Retained Archaeologist. If the find constitutes 'wreck' within the terms of the Merchant Shipping Act 1995 then the Retained Archaeologist will produce a report to the Receiver of Wreck. Full contact details for all relevant parties are included in Annex A of document 8.8.

417. Any finds discovered will be safeguarded for instance, kept in water in a clean, covered container. It is not recommended to remove concretion, clean the finds, or in any other way interfere with them.

418. Following the application of the embedded environmental measures outlined above, there may be other discoveries during offshore works or geophysical data assessments that have not been previously characterised through the archaeological assessments. Any discoveries that are of archaeological potential may require TEZs to be established.

419. TEZs must be respected during all activities associated with the windfarm construction, O&M, and decommissioning phases. Measures will be put in place to communicate the position of TEZs to all contractors and to monitor compliance with the TEZs during construction, O&M, and decommissioning. As with AEZs, TEZs must also consider that the use of anchors and lines, which could impact upstanding features, are adequately considered in the planning of operations.

420. Following an assessment of the available data for the discovery, ground truthing or new information, the Retained Archaeologist will (in agreement with the curator, Historic England), provide advice on whether the TEZ may be lifted or will form the basis of a permanent AEZ and become applicable for all activities associated with the Project across all phases of the Project.

421. Further archaeological works required as a result of the discovery will be undertaken subject to a MSs and followed by archaeological reporting.

13.7 Conclusion

422. The baseline assessment has been undertaken in line with current guidance and best practice using the data and information available at time of writing and is therefore considered to be appropriate to inform the ES chapter.

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Appendices

14 Annex A

Gazetteer of High and Medium Geophysical Anomalies within the Array Area

MA ID	Name	Wreck ID	Geophysical ID (SSS, MBES, MAG)	Magnetic amplitude (nT)	Archaeological Potential	Classification	AEZ (m)	Location within MSA	X	Y
MA0001			SSS: MA2007, MBES: MA4002; raised linear feature measuring 14x1.5m., MAG: MA5001	1340.36nT (5.9m to NE)	High	Potential Wreck	100	Array Area	53.51745	1.094819
MA0002	Uncharted		SSS: MA2014, MBES: MA4004; ovate raised feature measuring 13x4m., MAG: MA5006	695.56nT (14.45m to NW)	High	Wreck	100	Array Area	53.60553	1.113291
MA0003	Unknown	UKHO 9440	SSS: MA2101, MBES: MA4030; outline of ovate raised feature measuring 35.5x5.5m with greater height seen at apparent stern of wreck, small raised features 18m NW and 10m SE., MAG: MA5035	136.8nT (29.78m to the W)	High	Wreck	100	Array Area	53.62335	1.308138

MA ID	Name	Wreck ID	Geophysical ID (SSS, MBES, MAG)	Magnetic amplitude (nT)	Archaeological Potential	Classification	AEZ (m)	Location within MSA	X	Y
MA0004			SSS: MA2102, MBES: MA4031; raised feature measuring 2.5x5m., MAG: MA5228	68.86nt (19.78m to NE)	High	Wreck Debris	100	Array Area	53.62354	1.308485
MA0014	Obstruction	UKHO 9441	MA4035; raised feature measuring 3x2.5m with scour to NW.		High	Debris	100	Array Area	53.63957	1.357318
MA0017	Obstruction	UKHO 9424	MA4077; small feature with scour around.		High	Obstruction	100	Array Area	53.56143	1.2387
MA0018	Unknown	UKHO 9426	MA4078; ovate raised feature measing 8.5x0.85m to the N.		High	Unknown	100	Array Area	53.52395	1.337033
MA0020	Obstruction	UKHO 9429	MA4079; debris field, potential rock dump.		High	Obstruction	100	Array Area	53.53867	1.286483
MA0022	Obstruction	UKHO 9443	MA4080; raised feature measuring 3.6x4.5m surrounded by scour located 14m E.		High	Obstruction	100	Array Area	53.63933	1.465033
MA0023	Obstruction	UKHO 9445	MA4081; small feature measing 1.5x1.5m with		High	Obstruction	100	Array Area	53.64308	1.480583

MA ID	Name	Wreck ID	Geophysical ID (SSS, MBES, MAG)	Magnetic amplitude (nT)	Archaeological Potential	Classification	AEZ (m)	Location within MSA	X	Y
			scour located 14m NW.							
MA0024	Obstruction	UKHO 9482	MAG: MA5680	25.68nT (133.7m to E)	High	Obstruction	100	Array Area	53.56143	1.068167
MA0025	Obstruction	UKHO 9483	MAG: MA5016	209.2nT (116.01m to SE)	High	Obstruction	100	Array Area	53.56698	1.175917
MA0005	Basto	UKHO 9417	SSS: MA2220, MBES: MA4072; long ovate raised feature measuring 55x8m with small raised features in surround area., MAG: MA5000	4522.38nT (100m to W, however data gap for mag data in area covering wreck).	Medium	Wreck	50	Array Area	53.60765	1.492183
MA0006			SSS: MA2027, MBES: MA4006; pair of raised features surrounded by scour., MAG: MA5574	32.85nT (163.34m to S)	Medium	Debris	50	Array Area	53.60118	1.147353
MA0007			SSS: MA2028, MBES: MA4007: raised feature	14.4nT (5.17m to S)	Medium	Debris	50	Array Area	53.52715	1.15119

MA ID	Name	Wreck ID	Geophysical ID (SSS, MBES, MAG)	Magnetic amplitude (nT)	Archaeological Potential	Classification	AEZ (m)	Location within MSA	X	Y
			measuring 6x2m., MAG: MA5946							
MA0009			SSS: MA2096, MBES: MA4027; raised feature measuring 3.5x1.5m		Medium	Wreck Debris	50	Array Area	53.49162	1.298695
MA0010			SSS: MA2099, MBES: MA4028; pair of raised features in area measuring 6x2m		Medium	Debris	50	Array Area	53.63401	1.305998
MA0011			SSS: MA2103, MBES: MA4032; pair of raised linear features measuring 4.5x1.5m arranged perpendicular to each other with slight scour		Medium	Debris	50	Array Area	53.55136	1.309382
MA0012			SSS: MA2200, MBES: MA4065; pair of small raised features in scour measuring 6.5x4m		Medium	Complex assemblage	50	Array Area	53.54914	1.456821
MA0013			SSS: MA2218, MBES: MA4071; raised feature		Medium	Wreck Debris	50	Array Area	53.60835	1.486866

MA ID	Name	Wreck ID	Geophysical ID (SSS, MBES, MAG)	Magnetic amplitude (nT)	Archaeological Potential	Classification	AEZ (m)	Location within MSA	X	Y
			measuring 7.5x8.5m							
MA0027			MAG: MA5003	847.01	Medium	Magnetic Anomalies	50	Array Area	53.63735	1.311372
MA0028			MAG: MA5005	724.87	Medium	Magnetic Anomalies	50	Array Area	53.60583	1.269513
MA0031			MAG: MA5011	286.63	Medium	Magnetic Anomalies	50	Array Area	53.63638	1.446528
MA0032			MBES: MA4082; small feature measuring1.5x0.5m with scour located 14m to SE., MAG: MA5012	268.14	Medium	Magnetic Anomalies	50	Array Area	53.54116	1.086529
MA0033			MAG: MA5013	249.8	Medium	Magnetic Anomalies	50	Array Area	53.55895	1.184996
MA0034			MAG: MA5014	229.55	Medium	Magnetic Anomalies	50	Array Area	53.55087	1.185457
MA0035			MAG: MA5015	222.3	Medium	Magnetic Anomalies	50	Array Area	53.53585	1.197987
MA0038			MBES: MA4084; located in an area with many raised features, potential rock dump., MAG: MA5020	199.07	Medium	Magnetic Anomalies	50	Array Area	53.53662	1.193094
MA0046			MAG: MA5028	159.94	Medium	Magnetic Anomalies	50	Array Area	53.50587	1.079313

MA ID	Name	Wreck ID	Geophysical ID (SSS, MBES, MAG)	Magnetic amplitude (nT)	Archaeological Potential	Classification	AEZ (m)	Location within MSA	X	Y
MA0047			MBES: MA4083; small feature measuring 1.3x1.3m in scour located 14m S, MAG: MA5030	148.53	Medium	Magnetic Anomalies	50	Array Area	53.54529	1.184765
MA0048			MAG: MA5032	144.12	Medium	Magnetic Anomalies	50	Array Area	53.56222	1.188253
MA0050			MAG: MA5034	139.97	Medium	Magnetic Anomalies	50	Array Area	53.55711	1.186112
MA0051			MAG: MA5036	135.24	Medium	Magnetic Anomalies	50	Array Area	53.57859	1.189602
MA0056			MBES: MA4085; small feature measuring 1x1m located 12m NW., MAG: MA5042	126.52	Medium	Magnetic Anomalies	50	Array Area	53.49973	1.223969
MA0057			MAG: MA5043	125.74	Medium	Magnetic Anomalies	50	Array Area	53.51011	1.078127
MA0058			MAG: MA5044	125.2	Medium	Magnetic Anomalies	50	Array Area	53.54001	1.192642
MA0063			MAG: MA5049	120.71	Medium	Magnetic Anomalies	50	Array Area	53.51838	1.089325
MA0067			MAG: MA5053	117.2	Medium	Magnetic Anomalies	50	Array Area	53.52017	1.067641
MA0069			MBES: MA4086; two small reflectors in scour one located 10 m	112.64	Medium	Magnetic Anomalies	50	Array Area	53.5094	1.263571

MA ID	Name	Wreck ID	Geophysical ID (SSS, MBES, MAG)	Magnetic amplitude (nT)	Archaeological Potential	Classification	AEZ (m)	Location within MSA	X	Y
			to the NE and one located 26m to the SE. , MAG: MA5055							
MA0071			MAG: MA5057	109.98	Medium	Magnetic Anomalies	50	Array Area	53.53512	1.269918
MA0074			MAG: MA5060	108.75	Medium	Magnetic Anomalies	50	Array Area	53.5674	1.157773
MA0082			MAG: MA5068	105.43	Medium	Magnetic Anomalies	50	Array Area	53.56979	1.186289
MA0084			MAG: MA5070	104.12	Medium	Magnetic Anomalies	50	Array Area	53.62884	1.24938
MA0085			MAG: MA5071	103.67	Medium	Magnetic Anomalies	50	Array Area	53.56999	1.169267

15 Annex B

Gazetteer of High and Medium Geophysical Anomalies within the ECC

MA ID	Name	Wreck ID	Geophysical ID (SSS, MBES, MAG)	Magnetic amplitude (nT)	Archaeological Potential	Classification	AEZ (m)	Location within MSA	X	Y
MA1193	Unclassified	UKHO 93634	SSS: MA2361, MBES: MA4306, MAG: MA6050	2820	High	Unclassified	100	ECC	332842.118	5912010.075
MA1194	Unclassified	UKHO 93359	SSS: MA2392, MBES: MA4309, MAG: MA6073, MA6077, MA6078	954.4	High	Unclassified	100	ECC	342526.4089	5909434.926
MA1195	Unclassified	UKHO 93878	SSS: MA2398, MBES: MA4310, MAG: MA6084	437.6	High	Unclassified	100	ECC	345628.2802	5912414.469
MA1196	La Combattante (possibly)	UKHO 9324	SSS: MA2473, MBES: MA4316, MAG:		High	Wreck	100	ECC	368592.5621	5912785.415
MA1197	Unknown wreck	UKHO 92149	SSS: MA2503, MBES:		High	Wreck	100	ECC	374785.2527	5912081.082

MA ID	Name	Wreck ID	Geophysical ID (SSS, MBES, MAG)	Magnetic amplitude (nT)	Archaeological Potential	Classification	AEZ (m)	Location within MSA	X	Y
			MA4325, MAG:							
MA1198	Konstantinos Hadjipateras	UKHO 8630	SSS: MA2635, MBES: MA4348, MAG: MA6030, MA6033, MA6049, MA6070, MA6113	8594.2	High	Wreck	100	ECC	341061.8387	5909372.623
MA1199	Unknown wreck	UKHO 85316	SSS: MA2683		High	Wreck	100	ECC	329208.9318	5907118.355
MA1200	Capitaine Edmond Laborie	UKHO 8635	SSS: MA2701, MBES: MA4352, MAG: MA6038, MA6039, MA6040	6028.6	High	Wreck	100	ECC	342022.7516	5911823.339
MA1201	Unclassified	UKHO 93354	SSS: MA2705, MBES: MA4354, MAG: MA6961		High	Unclassified	100	ECC	339752.3548	5910908.805
MA1202	Unknown wreck	UKHO 93355	SSS: MA2751, MBES: MA4376, MAG:	3141.4	High	Wreck	100	ECC	340289.3945	5909981.906

MA ID	Name	Wreck ID	Geophysical ID (SSS, MBES, MAG)	Magnetic amplitude (nT)	Archaeological Potential	Classification	AEZ (m)	Location within MSA	X	Y
			MA6048, MA6091, MA6094, MA6095, MA6100							
MA1203	Unknown wreck	UKHO 93877	SSS: MA2684, MBES: MA4351, MAG: MA6102	100	High	Wreck	100	ECC	346024.7818	5910486.379
MA1204			MAG: MA6010	49481.7	Medium	Magnetic Anomalies	50	ECC	5903553.4	322493.66
MA1205			SSS: MA2320		Medium	Debris	50	ECC	322059.9048	5904347.387
MA1206			SSS: MA2342, MBES: MA4305		Medium	Debris	50	ECC	325463.9793	5902879.529
MA1207			SSS: MA2477, MBES: MA4317		Medium	Wreck debris	50	ECC	368487.7083	5912789.093
MA1208			SSS: MA2536, MAG: MA6083	437.6	Medium	Debris	50	ECC	337919.5622	5911797.38
MA1209			SSS: MA2682, MAG: MA7163		Medium	Wreck debris	50	ECC	326966.8097	5904334.316
MA1210			SSS: MA2686, MAG:	2738.9	Medium	Debris	50	ECC	322564.483	5903014.369

MA ID	Name	Wreck ID	Geophysical ID (SSS, MBES, MAG)	Magnetic amplitude (nT)	Archaeological Potential	Classification	AEZ (m)	Location within MSA	X	Y
			MA6051, MA6052							
MA1211			SSS: MA2722, MBES: MA4360, MAG: MA6096	338.2	Medium	Debris	50	ECC	367256.7396	5913216.169
MA1212			SSS: MA2753, MBES: MA4377, MAG: MA6088, MA6097	365.8	Medium	Debris	50	ECC	332562.0824	5903847.009
MA1213			SSS: MA2757, MBES: MA4378, MAG: MA6121, MA6912	194.2	Medium	Debris	50	ECC	335770.2027	5907286.341
MA1214			MAG: MA6011	49481.7	Medium	Magnetic Anomalies	50	ECC	5903553.4	322493.66
MA1215			MAG: MA6012	49431.1	Medium	Magnetic Anomalies	50	ECC	5903958.99	322892.45
MA1216			MAG: MA6013	49431.1	Medium	Magnetic Anomalies	50	ECC	5903958.99	322892.45
MA1217			MAG: MA6014	45000.5	Medium	Magnetic Anomalies	50	ECC	5904468.85	323878.58
MA1218			MAG: MA6015	45000.5	Medium	Magnetic Anomalies	50	ECC	5904468.85	323878.58

MA ID	Name	Wreck ID	Geophysical ID (SSS, MBES, MAG)	Magnetic amplitude (nT)	Archaeological Potential	Classification	AEZ (m)	Location within MSA	X	Y
MA1219			MAG: MA6016	28610.4	Medium	Magnetic Anomalies	50	ECC	5903349.14	322421.44
MA1220			MAG: MA6017	28610.4	Medium	Magnetic Anomalies	50	ECC	5903349.14	322421.44
MA1221			MAG: MA6018	27118.8	Medium	Magnetic Anomalies	50	ECC	5923859.96	387201.14
MA1222			MAG: MA6019	22580.5	Medium	Magnetic Anomalies	50	ECC	5904446.93	322082.24
MA1223			MAG: MA6020	19361	Medium	Magnetic Anomalies	50	ECC	5903741.54	322315.79
MA1224			MAG: MA6021	19361	Medium	Magnetic Anomalies	50	ECC	5903741.54	322315.79
MA1225			MAG: MA6022	19113.4	Medium	Magnetic Anomalies	50	ECC	5904520.49	322099.05
MA1226			MAG: MA6023	19113.4	Medium	Magnetic Anomalies	50	ECC	5904520.49	322099.05
MA1227			MAG: MA6024	12877.4	Medium	Magnetic Anomalies	50	ECC	5902525.07	322648.8
MA1228			MAG: MA6025	12877.4	Medium	Magnetic Anomalies	50	ECC	5902525.07	322648.8
MA1229			MAG: MA6026	10000	Medium	Magnetic Anomalies	50	ECC	5902600.25	325028.45
MA1230			MAG: MA6027	10000	Medium	Magnetic Anomalies	50	ECC	5902600.25	325028.45
MA1231			MAG: MA6028	8637.5	Medium	Magnetic Anomalies	50	ECC	5903376.06	322414.68
MA1232			MAG: MA6029	8637.5	Medium	Magnetic Anomalies	50	ECC	5903376.06	322414.68

MA ID	Name	Wreck ID	Geophysical ID (SSS, MBES, MAG)	Magnetic amplitude (nT)	Archaeological Potential	Classification	AEZ (m)	Location within MSA	X	Y
MA1233			MAG: MA6031	8402	Medium	Magnetic Anomalies	50	ECC	5903770.29	322308.62
MA1234			MAG: MA6032	8402	Medium	Magnetic Anomalies	50	ECC	5903770.29	322308.62
MA1235			MAG: MA6034	7087.6	Medium	Magnetic Anomalies	50	ECC	5904603.26	322069.51
MA1236			MAG: MA6035	7087.6	Medium	Magnetic Anomalies	50	ECC	5904603.26	322069.51
MA1237			MAG: MA6036	7060	Medium	Magnetic Anomalies	50	ECC	5903345.39	322422.35
MA1238			MAG: MA6037	7060	Medium	Magnetic Anomalies	50	ECC	5903345.39	322422.35
MA1239			MAG: MA6041	5344.1	Medium	Magnetic Anomalies	50	ECC	5904302	322130.5
MA1240			MAG: MA6042	5344.1	Medium	Magnetic Anomalies	50	ECC	5904302	322130.5
MA1241			MAG: MA6043	4103.9	Medium	Magnetic Anomalies	50	ECC	5909497	341224.5
MA1242			MAG: MA6044	4018.4	Medium	Magnetic Anomalies	50	ECC	5904392	322145.1
MA1243			MAG: MA6045	4018.4	Medium	Magnetic Anomalies	50	ECC	5904392	322145.1
MA1244			MAG: MA6046	3237.2	Medium	Magnetic Anomalies	50	ECC	5903813	322297.5
MA1245			MAG: MA6047	3237.2	Medium	Magnetic Anomalies	50	ECC	5903813	322297.5
MA1246			MAG: MA6053	2586.7	Medium	Magnetic Anomalies	50	ECC	5902535	322560.8

MA ID	Name	Wreck ID	Geophysical ID (SSS, MBES, MAG)	Magnetic amplitude (nT)	Archaeological Potential	Classification	AEZ (m)	Location within MSA	X	Y
MA1247			MAG: MA6054	2586.7	Medium	Magnetic Anomalies	50	ECC	5902535	322560.8
MA1248			MAG: MA6056	2327.7	Medium	Magnetic Anomalies	50	ECC	5903519	322376.9
MA1249			MAG: MA6057	2327.7	Medium	Magnetic Anomalies	50	ECC	5903519	322376.9
MA1250			MAG: MA6058	2088.9	Medium	Magnetic Anomalies	50	ECC	5911800	342098.5
MA1251			MAG: MA6059	1779.2	Medium	Magnetic Anomalies	50	ECC	5904193	322196.1
MA1252			MAG: MA6060	1779.2	Medium	Magnetic Anomalies	50	ECC	5904193	322196.1
MA1253			MAG: MA6061	1587.1	Medium	Magnetic Anomalies	50	ECC	5904204	322150.9
MA1254			MAG: MA6062	1587.1	Medium	Magnetic Anomalies	50	ECC	5904204	322150.9
MA1255			MAG: MA6063	1548.2	Medium	Magnetic Anomalies	50	ECC	5916067	378487.8
MA1256			MAG: MA6064	1547.8	Medium	Magnetic Anomalies	50	ECC	5903165	322471
MA1257			MAG: MA6065	1547.8	Medium	Magnetic Anomalies	50	ECC	5903165	322471
MA1258			MAG: MA6067	1252.5	Medium	Magnetic Anomalies	50	ECC	5904584	322076.7
MA1259			MAG: MA6068	1252.5	Medium	Magnetic Anomalies	50	ECC	5904584	322076.7
MA1260			MAG: MA6071	1041.2	Medium	Magnetic Anomalies	50	ECC	5906117	329637.1

MA ID	Name	Wreck ID	Geophysical ID (SSS, MBES, MAG)	Magnetic amplitude (nT)	Archaeological Potential	Classification	AEZ (m)	Location within MSA	X	Y
MA1261			MAG: MA6075	906.2	Medium	Magnetic Anomalies	50	ECC	5904403	327087
MA1262			MAG: MA6076	906.2	Medium	Magnetic Anomalies	50	ECC	5904403	327087
MA1263			MAG: MA6079	603.7	Medium	Magnetic Anomalies	50	ECC	5909243	340920.1
MA1264			MAG: MA6080	533.8	Medium	Magnetic Anomalies	50	ECC	5904381	327102
MA1265			MAG: MA6081	533.8	Medium	Magnetic Anomalies	50	ECC	5904381	327102
MA1266			MAG: MA6085	429	Medium	Magnetic Anomalies	50	ECC	5910905	349120
MA1267			MAG: MA6086	415.9	Medium	Magnetic Anomalies	50	ECC	5913911	365861.4
MA1268			MAG: MA6087	372.8	Medium	Magnetic Anomalies	50	ECC	5910000	375080.8
MA1269			MAG: MA6089	361.7	Medium	Magnetic Anomalies	50	ECC	5904379	327118.6
MA1270			MAG: MA6090	361.7	Medium	Magnetic Anomalies	50	ECC	5904379	327118.6
MA1271			MAG: MA6092	347.8	Medium	Magnetic Anomalies	50	ECC	5902680	324298.8
MA1272			MAG: MA6093	347.8	Medium	Magnetic Anomalies	50	ECC	5902680	324298.8
MA1273			MAG: MA6098	334.7	Medium	Magnetic Anomalies	50	ECC	5904404	322096.5
MA1274			MAG: MA6099	334.7	Medium	Magnetic Anomalies	50	ECC	5904404	322096.5

MA ID	Name	Wreck ID	Geophysical ID (SSS, MBES, MAG)	Magnetic amplitude (nT)	Archaeological Potential	Classification	AEZ (m)	Location within MSA	X	Y
MA1275			MAG: MA6101	322	Medium	Magnetic Anomalies	50	ECC	5922068	381957.4
MA1276			MAG: MA6103	295.5	Medium	Magnetic Anomalies	50	ECC	5913916	365808.3
MA1277			MAG: MA6104	293.1	Medium	Magnetic Anomalies	50	ECC	5902676	324299.7
MA1278			MAG: MA6105	293.1	Medium	Magnetic Anomalies	50	ECC	5902676	324299.7
MA1279			MAG: MA6106	284.7	Medium	Magnetic Anomalies	50	ECC	5927577	382129.7
MA1280			MAG: MA6107	266.6	Medium	Magnetic Anomalies	50	ECC	5905467	329841.4
MA1281			MAG: MA6108	255.6	Medium	Magnetic Anomalies	50	ECC	5909364	330987.4
MA1282			MAG: MA6109	254.9	Medium	Magnetic Anomalies	50	ECC	5910705	350317.7
MA1283			MAG: MA6110	249.2	Medium	Magnetic Anomalies	50	ECC	5920187	383425.8
MA1284			MAG: MA6111	243.9	Medium	Magnetic Anomalies	50	ECC	5904226	326159.7
MA1285			MAG: MA6112	243.9	Medium	Magnetic Anomalies	50	ECC	5904226	326159.7
MA1286			MAG: MA6114	225.4	Medium	Magnetic Anomalies	50	ECC	5913908	366053.4
MA1287			MAG: MA6115	222	Medium	Magnetic Anomalies	50	ECC	5909281	330714.3
MA1288			MAG: MA6116	219	Medium	Magnetic Anomalies	50	ECC	5906459	330386.5

MA ID	Name	Wreck ID	Geophysical ID (SSS, MBES, MAG)	Magnetic amplitude (nT)	Archaeological Potential	Classification	AEZ (m)	Location within MSA	X	Y
MA1289			MAG: MA6117	216	Medium	Magnetic Anomalies	50	ECC	5919021	380892.5
MA1290			MAG: MA6118	214.1	Medium	Magnetic Anomalies	50	ECC	5912732	364980.7
MA1291			MAG: MA6119	213.2	Medium	Magnetic Anomalies	50	ECC	5913910	365962.1
MA1292			MAG: MA6120	199.6	Medium	Magnetic Anomalies	50	ECC	5928908	394649
MA1293			MAG: MA6122	184.8	Medium	Magnetic Anomalies	50	ECC	5925735	383962.3
MA1294			MAG: MA6123	183.4	Medium	Magnetic Anomalies	50	ECC	5909893	330622.2
MA1295			MAG: MA6124	174.6	Medium	Magnetic Anomalies	50	ECC	5907444	330096.7
MA1296			MAG: MA6125	169.4	Medium	Magnetic Anomalies	50	ECC	5903461	324677.7
MA1297			MAG: MA6126	169.4	Medium	Magnetic Anomalies	50	ECC	5903461	324677.7
MA1298			MAG: MA6127	165.4	Medium	Magnetic Anomalies	50	ECC	5904272	326901.5
MA1299			MAG: MA6128	165.4	Medium	Magnetic Anomalies	50	ECC	5904272	326901.5
MA1300			MAG: MA6129	165.3	Medium	Magnetic Anomalies	50	ECC	5905498	330304.6
MA1301			MAG: MA6130	160	Medium	Magnetic Anomalies	50	ECC	5909932	330675.2
MA1302			MAG: MA6131	151.9	Medium	Magnetic Anomalies	50	ECC	5909738	330715.3

MA ID	Name	Wreck ID	Geophysical ID (SSS, MBES, MAG)	Magnetic amplitude (nT)	Archaeological Potential	Classification	AEZ (m)	Location within MSA	X	Y
MA1303			MAG: MA6132	147.1	Medium	Magnetic Anomalies	50	ECC	5908744	330389.2
MA1304			MAG: MA6133	142	Medium	Magnetic Anomalies	50	ECC	5904349	327105.1
MA1305			MAG: MA6134	142	Medium	Magnetic Anomalies	50	ECC	5904349	327105.1
MA1306			MAG: MA6135	141.8	Medium	Magnetic Anomalies	50	ECC	5909503	330817.4
MA1307			MAG: MA6136	140	Medium	Magnetic Anomalies	50	ECC	5911751	375797.4
MA1308			MAG: MA6137	137.7	Medium	Magnetic Anomalies	50	ECC	5902941	325007.6
MA1309			MAG: MA6138	137.7	Medium	Magnetic Anomalies	50	ECC	5902941	325007.6
MA1310			MAG: MA6139	135.4	Medium	Magnetic Anomalies	50	ECC	5907437	330160.5
MA1311			MAG: MA6140	134.5	Medium	Magnetic Anomalies	50	ECC	5909321	331035.7
MA1312			MAG: MA6141	133	Medium	Magnetic Anomalies	50	ECC	5910939	340335.6
MA1313			MAG: MA6142	132.3	Medium	Magnetic Anomalies	50	ECC	5905138	330135.6
MA1314			MAG: MA6143	131.3	Medium	Magnetic Anomalies	50	ECC	5909736	330685.7
MA1315			MAG: MA6144	131	Medium	Magnetic Anomalies	50	ECC	5902756	322461.8
MA1316			MAG: MA6145	128	Medium	Magnetic Anomalies	50	ECC	5910395	340181.7

MA ID	Name	Wreck ID	Geophysical ID (SSS, MBES, MAG)	Magnetic amplitude (nT)	Archaeological Potential	Classification	AEZ (m)	Location within MSA	X	Y
MA1317			MAG: MA6146	126.8	Medium	Magnetic Anomalies	50	ECC	5903510	325470.1
MA1318			MAG: MA6147	126.8	Medium	Magnetic Anomalies	50	ECC	5903510	325470.1
MA1319			MAG: MA6148	125.8	Medium	Magnetic Anomalies	50	ECC	5908111	330096.8
MA1320			MAG: MA6149	125.4	Medium	Magnetic Anomalies	50	ECC	5910395	340181.7
MA1321			MAG: MA6150	123.6	Medium	Magnetic Anomalies	50	ECC	5909134	330889.1
MA1322			MAG: MA6151	123.2	Medium	Magnetic Anomalies	50	ECC	5909811	330505.2
MA1323			MAG: MA6152	123.2	Medium	Magnetic Anomalies	50	ECC	5912106	338573.4
MA1324			MAG: MA6153	121.6	Medium	Magnetic Anomalies	50	ECC	5910469	342353.2
MA1325			MAG: MA6154	121.5	Medium	Magnetic Anomalies	50	ECC	5903905	326609.7
MA1326			MAG: MA6155	120.5	Medium	Magnetic Anomalies	50	ECC	5925731	385368.2
MA1327			MAG: MA6156	111.1	Medium	Magnetic Anomalies	50	ECC	5920113	383182.3
MA1328			MAG: MA6157	109.5	Medium	Magnetic Anomalies	50	ECC	5911679	374397.3
MA1329			MAG: MA6158	108	Medium	Magnetic Anomalies	50	ECC	5912037	332795.8
MA1330			MAG: MA6159	105.3	Medium	Magnetic Anomalies	50	ECC	5912015	366290.9

MA ID	Name	Wreck ID	Geophysical ID (SSS, MBES, MAG)	Magnetic amplitude (nT)	Archaeological Potential	Classification	AEZ (m)	Location within MSA	X	Y
MA1331			MAG: MA6160	103.7	Medium	Magnetic Anomalies	50	ECC	5904432	326472.7
MA1332			MAG: MA6161	103.7	Medium	Magnetic Anomalies	50	ECC	5904432	326472.7
MA1333			MAG: MA6162	103.4	Medium	Magnetic Anomalies	50	ECC	5903364	327300.7
MA1334			MAG: MA6163	103.4	Medium	Magnetic Anomalies	50	ECC	5903364	327300.7
MA1335			MAG: MA6164	102.6	Medium	Magnetic Anomalies	50	ECC	5910074	330874.1
MA1336			MAG: MA6165	100.8	Medium	Magnetic Anomalies	50	ECC	5902631	326606.5
MA1337			MAG: MA6166	100.6	Medium	Magnetic Anomalies	50	ECC	5904386	327105.7

16 Annex C

Gazetteer of Recorded Sites, Wrecks and Obstructions within the Marine Archaeology Study Area

UKHO ID	NRHE ID	LHER ID	Name	Period	Category	Status	Description	AEZ (m)	Location within MSA	Lat	Lon
9341	0		Dauntless (possibly)	Post-Medieval	Wreck	Live	Foundered in 1892. No magnetic signature, but two smaller pieces of debris.	50	Array Area	53.54367	1.34675
9417	0		Basto	Post-WWII	Wreck	Live	Built in 1965 and took on severe list, was abandoned, and later sank while under tow.	50	Array Area	53.60782	1.492
9424	0		Obstruction	Foul Ground	Obstruction	Live	Unclassified.	50	Array Area	53.56143	1.2387
9426	0		Unknown	Unknown	Wreck	Live	Scattered wreckage in area of boulders.	50	Array Area	53.52395	1.337033
9427	0		Obstruction	Foul Ground	Obstruction	Live	Unclassified.	50	Array Area	53.56617	1.426733

UKHO ID	NRHE ID	LHER ID	Name	Period	Category	Status	Description	AEZ (m)	Location within MSA	Lat	Lon
9429	0		Obstruction	Foul Ground	Obstruction	Live	Several objects, probably boulders. Lies in rock strewn area.	50	Array Area	53.53867	1.286483
9440	0		Unknown	Unknown	Wreck	Live	Wreck with slight port list and fairly intact; single boiler.	50	Array Area	53.62323	1.308283
9441	0		Obstruction	Foul Ground	Obstruction	Live	Small square-like object.	50	1 km Buffer	53.63962	1.357133
9442	0		Obstruction	Foul Ground	Obstruction	Live	Small object.	50	Array Area	53.61323	1.49395
9443	0		Obstruction	Foul Ground	Obstruction	Live	Small object.	50	Array Area	53.63933	1.465033
9445	0		Obstruction	Foul Ground	Obstruction	Live	Small object.	50	Array Area	53.64308	1.480583
9482	0		Obstruction	Foul Ground	Obstruction	Live	Unclassified.	50	Array Area	53.56143	1.068167
9483	0		Obstruction	Foul Ground	Obstruction	Live	Unclassified.	50	Array Area	53.56698	1.175917
9536	0		Foul Ground	Obstruction	Foul	Live	Unclassified.	50	Array Area	53.54393	1.2462
9339	0		Excelsior	Post-Medieval	Wreck	Dead	Foundered after collision with Smack 'Scottish Chief'	50	Array Area	53.56698	1.243983

UKHO ID	NRHE ID	LHER ID	Name	Period	Category	Status	Description	AEZ (m)	Location within MSA	Lat	Lon
							position for filing only.				
8630	913043		Konstantinos Hadjipateras	WWII	Wreck	Live	Built in 1913 and mined in 1939.	50	Offshore ECC	53.30983	0.6145
8999	913203		Unknown	Unknown	Wreck	Live	Unclassified.	50	Offshore ECC	53.26257	0.4502
8998	913207		Unknown	Unknown	Wreck	Live	Unclassified.	50	Offshore ECC	53.2859	0.437983
8633	0		Costanza	WWI	Wreck	Dead	Built in 1883 and torpedoed and sunk in 1917.	50	Offshore ECC	53.31923	0.6799
9093	0		Obstruction	Post-WWII	Obstruction	Dead	Two of four road tanker trailers lost overboard from Swedish Ro-Ro MV Nordic Pride en route to Immingham. Other two washed ashore on Norfolk Beach.	50	Offshore ECC	53.34202	0.964867
8635	0		Capitaine Edmond Laborie	Post-WWII	Wreck	Live	Built in 1923 and mined in 1939.	50	Offshore ECC	53.33208	0.62715

UKHO ID	NRHE ID	LHER ID	Name	Period	Category	Status	Description	AEZ (m)	Location within MSA	Lat	Lon
9162	0		Obstruction	Obstruction	Obstruction	Live	Possible well-head with scouring all around.	50	Offshore ECC	53.35623	0.993983
92149	0		Unknown	Unknown	Wreck	Unknown	Distributed remains of a possible buried wreck.	50	Offshore ECC	53.34312	1.119267
93354	0		Unknown	Unknown	Wreck	Unknown	Unclassified.	50	Offshore ECC	53.32302	0.5941
93355	0		Unknown	Unknown	Wreck	Unknown	Unclassified.	50	Offshore ECC	53.31483	0.602633
93877	0		Unknown	Unknown	Wreck	Unknown	Unclassified.	50	Offshore ECC	53.3211	0.688383
94444	0		Unknown	Unknown	Wreck	Unknown	Unclassified.	50	Offshore ECC	53.33923	0.521467
0	355931	MLI41602	Find Spot	Roman	Find	Unknown	A Romano-British potsherd was found near the high-water mark at Anderby.		Offshore ECC	53.2501	0.33222
0	0	MLI41607	Find Spot	Roman	Find	Unknown	A 3rd century Roman (43 AD to 409 AD) potsherd found in clay at mid-tide level at Anderby.		Offshore ECC	53.25725	0.328561

UKHO ID	NRHE ID	LHER ID	Name	Period	Category	Status	Description	AEZ (m)	Location within MSA	Lat	Lon
8617	913040		Arduity	WWII	Wreck	Live	Built in 1935 and mined in 1942.	50	Offshore ECC	53.26033	0.406883
8639	913045		Unknown	Unknown	Wreck	Live	Broken up wreck previously thought to be Fane.	50	1km Buffer	53.34228	0.607267
8626	913042		Argo	WWI	Wreck	Live	Built in 1883 and mined in 1917	50	1km Buffer	53.29835	0.607683
8632	1459776		Fane	WWI	Wreck	Live	Built in 1901 and struck by a mine lad by UC-63 in 1917.	50	1km Buffer	53.30488	0.6316
9444	0		Obstruction	Foul Ground	Obstruction	Live	Most probably an uncovered cable or pipe.	50	1km Buffer	53.61477	1.513817
8636	0		Lindy Sue	Post-WWII	Wreck	Dead	Sunk in 1965.	50	1km Buffer	53.33367	0.648233
9163	0		Unknown	Unknown	Obstruction	Dead	Unclassified.	50	1km Buffer	53.36262	0.980817
9316	0		Obstruction	Obstruction	Obstruction	Dead	Unclassified.	50	1km Buffer	53.31868	1.051517
8614	0		Unknown	Unknown	Wreck	Live	Has caused fishing gear losses of several years.	50	1km Buffer	53.23978	0.3941

UKHO ID	NRHE ID	LHER ID	Name	Period	Category	Status	Description	AEZ (m)	Location within MSA	Lat	Lon
8629	0		Unknown	Unknown	Wreck	Live	Partially buried wreck in area of sandwaves.	50	1km Buffer	53.30965	0.68265
9171	0		Unknown	Unknown	Wreck	Live	Well broken up in two parts and lies in own scour.	50	1km Buffer	53.30107	0.6066
9314	0		Unknown	Unknown	Wreck	Live	Wreck is broken in three parts.	50	1km Buffer	53.32605	1.020017
9320	0		Chatwood (possibly)	WWII	Wreck	Live	Built in 1929 and mined in 1942.	50	1km Buffer	53.327	0.998783
9324	0		La Combattante (possibly)	Unknown	Wreck	Live	Well broken iron wreck originally thought to be La Combattante.	50	1km Buffer	53.34795	1.025917
9325	0		Foul Ground	Obstruction	Foul	Live	Rusted debris most probably abandoned during pipeline works and positively identified when	50	1km Buffer	53.35118	1.085683

UKHO ID	NRHE ID	LHER ID	Name	Period	Category	Status	Description	AEZ (m)	Location within MSA	Lat	Lon
							brought up in a trawl.				
9502	0		Unknown	Unknown	Wreck	Live	Well defined intact wreck lying in area of sand and gravelly ripples.	50	1km Buffer	53.32077	1.087083
81902	0		Unknown	Unknown	Wreck	Unknown	Strong magnetic anomaly, partially buried, believed to be a small craft.	50	1km Buffer	53.28005	0.555583
85316	0		Unknown	Unknown	Wreck	Unknown	Unclassified.	50	1km Buffer	53.26703	0.39315
92757	0		Unknown	Unknown	Wreck	Unknown	Remains of wreck, possibly upside down; two cylindrical structures.	50	1km Buffer	53.34892	1.089667
93359	0		Unknown	Unknown	Wreck	Unknown	Unclassified.	50	1km Buffer	53.31043	0.63635
93634	0		Unknown	Unknown	Wreck	Unknown	Unclassified.	50	1km Buffer	53.33078	0.489733
8646	0		Carrier	WWII	Wreck	Dead	Built in 1921 and mined in 1945.	50	1km Buffer	53.36522	0.9834

UKHO ID	NRHE ID	LHER ID	Name	Period	Category	Status	Description	AEZ (m)	Location within MSA	Lat	Lon
8638	0		Unknown	Unknown	Wreck	Live	Unclassified.	50	1km Buffer	53.34117	0.573233
93878	0		Unknown	Unknown	Wreck	Unknown	Unclassified.	50	1km Buffer	53.33835	0.6814
0	0	MLI41601	Find Spot	Medieval	Find	Unknown	The base of a green glazed Medieval (1066 AD to 1539 AD) pot was found at the high water mark at Anderby.		1km Buffer	53.2619	0.325365

17 Annex D

Gazetteer of Recorded Sites, Wrecks and Obstructions within the Compensation Areas

UKHO ID	MA ID	Name	Period	Category	Status	Description	AEZ (m)	Location	Lat	Lon
9479				Foul ground		Area of large magnetic deflections and disturbed seabed indicating debris of low elevation - presumed to be seabed debris left after the departure of a jack-up drilling rig.	50	Artificial nesting structure area (south)	53.512836	1.789446
9041			Unknown	Dangerous wreck		Trawler. In general depth of 25m. Scour 0.5m deep. Height 4m. Poorly defined.	50	Artificial nesting structure area (north)	53.698906	0.915379
9040			Unknown	Dangerous wreck		Steam ship. In general depth of 25m. Scour 0.5m deep. Height 8.5m. Intact, lies well over to starboard.	50	Artificial nesting structure area (north)	53.699462	0.910657
8903		Larchwood (Possibly)	Early 20th Century	Dangerous wreck		Steam ship. Built in 1924 by Osbourne, Graham & Co Ltd, Sunderland. Owned at time of loss by Joseph	50	Artificial nesting structure area (north)	53.695296	0.908991

UKHO ID	MA ID	Name	Period	Category	Status	Description	AEZ (m)	Location	Lat	Lon
						Consantine SS Line Ltd. One boiler, triple expansion engine of 131hp, Single shaft. Passage Leith Fo.				
9043				Foul ground		Area of debris and wreck fragment 1m high.	50	Artificial nesting structure area (north) - buffer	53.72001667	0.851233333
8868		Norfolk (Possibly)	WWI	Dangerous wreck		Sailing vessel in two parts. Sonar length 94m, sonar width 25m, shadow height 4.6m.	50	Artificial nesting structure area (north) - buffer	53.67215	0.864916667
8913		Ajax	Post-Medieval	Non-dangerous wreck	Dead	Trawler with a cargo of ballast and a tonnage of 120 tons.	50	Artificial nesting structure area (north) - buffer	53.76695	0.864833333
8624			Unknown	Dangerous wreck	Dead	Wreck with two masts and forecastle visible.	50	Biogenic reef restoration area	53.283673	0.589909
8622		Heimland	WWI	Dangerous wreck		Steam ship – cargo coal. Built in 1913 by Freidrikstad M V, Freidricstad. Owned at time of loss by A/S D/S	50	Biogenic reef restoration area	53.28135	0.625883

UKHO ID	MA ID	Name	Period	Category	Status	Description	AEZ (m)	Location	Lat	Lon
						Heimland, Norway. One boiler, triple expansion engine of 41hp, single shaft. On port side, stern missing.				
93682			Unknown	Dangerous wreck		Dangerous wreck located in 2020 in 19.8m of water.	50	Biogenic reef restoration area	53.268683	0.666067
94486			Unknown	Dangerous wreck		Wreck located in 2020 in 21m of water. Length 8m, width 5.6m, height 1.2m.	50	Biogenic reef restoration area	53.2775	0.65995
8623		Freidig (Possibly)	WWI	Dangerous wreck		steam ship – cargo of animals (land & sea) and birds,ferrous elements and ores: unrefined and refined Ex-Osiria, Ex-La Hneck. Built Of Iron In 1882. Owned At Time Of Loss By J Jens Salvensens, Rederi Akties. One Boiler, Compound Expansion Engine Of 65hp, Single Shaft. Passage Middlesbrough	50	Biogenic reef restoration area	53.2833	0.6562

UKHO ID	MA ID	Name	Period	Category	Status	Description	AEZ (m)	Location	Lat	Lon
						Partially Buried, Some Superstructure				
93683			Unknown	Unknown wreck		Wreck located in 2020. Sonar length 26.3m, sonar width 7.8m, shadow height 1.2m.	50	Biogenic reef restoration area	53.268683	0.666067
8613			Unknown	Dangerous wreck		Steam ship. Wreck located in 1963 in general depth of 52ft. Lies on very flat seabed and gives a good sonar response from up to 1500yds. Sonar length 61.1m, sonar width 18.1m, shadow height 5.5m.	50	Biogenic reef restoration area	53.235833	0.920283
8642		Vernon	WWI	Dangerous wreck	Dead	Steam ship – cargo coal. Built in 1878 by J Blumber & Co, Sunderland. Owned at time of loss by cory Colliers Ltd. One boiler, compound expansion engine of 128 nhp, single shaft. Machinery by T Clarke & Co, Newcastle.	50	Biogenic reef restoration area	53.349777	0.601015
8648			Unknown	Dangerous wreck		Sailing vessel.	50	Biogenic reef	53.34978	0.601015

UKHO ID	MA ID	Name	Period	Category	Status	Description	AEZ (m)	Location	Lat	Lon
						Located in 1963 in 71 foot of water. Sonar length 75.5m, sonar width 13.4m, shadow height 8.1m.		restoration area		
8641		Deodata	WWII	Dangerous wreck	Dead	Tanker. Sank in 1939. Well Dispersed, Bow Standing 4-5mtrs. Sonar length 90m, sonar width 32m, shadow height 5.4m.	50	Biogenic reef restoration area	53.348117	0.605767
8633		Costanza	WWI	Foul ground	Dead	Steam ship. Sank in 1917. Length 94.8m, Width 11.9m.	50	Biogenic reef restoration area (also in ECC)	53.319227	0.679897
93354			Unknown	Dangerous wreck		Originally detected 2020. Sonar length 21.49m, sonar width 6.17m, shadow height 0.93m.	50	Biogenic reef restoration area (also in ecc)	53.323017	0.5941
93355			Unknown	Unknown wreck		Originally detected 2020. Sonar length 14.9m, sonar width 14.81m, shadow height 2.62m.	50	Biogenic reef restoration area (also in ECC)	53.314833	0.602633

18 Annex E

Peat Records

Location	ID	Description	Depth of Deposit	Age	Database
Anderby Creek	365	Lower peat bed exposure. Tree stumps and trunks (dominated oak, but also alder, ash, willow/poplar present).	Unlisted	4,480-4,625 ± 55	Historic England Peat Database
Chapel Point	107	Two coastal peat beds: lower forest bed (with oak stools) on boulder clay and upper fen-wood peat. Separated by 1.83m thick clay layer.	From -2.44 to -2.13m OD	Unlisted	Historic England Peat Database
Chapel Point	108	Saltmarsh sequence of Swinnerton (1931) was dated – lower wood/peat to saltmarsh clay to Phragmites upper peat.	Unlisted	2,630 ±-1,390 BC	Historic England Peat Database
Chapel Point	109	Saltmarsh peat containing Salix and Taxus wood, on Phragmites clay, on basal peat. Upper peat contains remains of salt-making industry (start of Iron Age).	Unlisted	1,390 BC	Historic England Peat Database
Chapel Point	110	Neolithic implements, probably contemporaneous with Lower Peat.	Unlisted	2,000-1,400 BC	Historic England Peat Database
Chapel Six Marshes	116	Stratigraphy as at Wolla Bank i.e., Mid-Holocene and Iron Age peat layers.	Unlisted	Unlisted	Historic England Peat Database
Chapel St Leonard's	427	Unlisted	Unlisted	Unlisted	Historic England Peat Database
Lincolnshire coast	268	Peat and submerged forest. On till, and below soft grey clay. Indicates low sea level prior to around 4,000 years ago. Neolithic artefacts; Higher peat layer suggests later regression.	Near low tide mark; between tide marks	Unlisted	Historic England Peat Database

Location	ID	Description	Depth of Deposit	Age	Database
		Salt workings and associated Late Bronze Age and early Iron Age.			
Wolla Bank	111	Lower pear bed exposure. Tree stumps and trunks (dominated by alder and ash, but also oak, willow/poplar, birch present).	Unlisted	4,865 ± 65-4,500 ±5 5	Historic England Peat Database
Wolla Bank	115	Mid-Holocene peat and forest bed (whole oak stumps) exposed on beach (c. 80cm thick). Also, an upper Iron Age peat layer (c. 30cm thick).	Visible at low tide. (Mid-Holocene peat/	5,290 ± 240 cal. years BP; 4,850 ± 110 cal. years BP; 5,350-5,450 ± 1610 cal. years BP; 2,470 ± 270; 2730 ± 240; 2,500-2,710 ± 330	Historic England Peat Database
Between Leman and Ower Bank	342	Peat lumps (moorlog) trawled up. Barbed bone weapon tip embedded in a lump of peat (early Boreal), 40km from coast in 19-20 fathoms.	Unlisted	Unlisted	Historic England Peat Database
Between Leman and Ower Bank	449	Peat bed. Mesolithic barbed point embedded in the peat.	Unlisted	8,422 ± 170	Historic England Peat Database
Between Leman and Ower Bank	464	Antler/bone	Unlisted	-21.0	Historic England Peat Database
Between Leman and Ower Bank	560	Moorlog. Maglemose-type harpoon dredged up by The Colinda, skipper PE Lockwood. Now at Norwich Castle Museum.	Unlisted	Unlisted	Historic England Peat Database
Brown Bank	100	35km-long, narrow ridge, 19m under water. Unsure if former beach barrier, spit or barrier island. Along the ridge, deep gullies cut into clay and peat layers. Unworked animal bones, oldest of which are Weichselian. Mesolithic worked bones and stone also found (dated typologically), mainly by fishermen. Also, evidence of dog gnawing.	Unlisted	Unlisted	Historic England Peat Database

Location	ID	Description	Depth of Deposit	Age	Database
Dogger Bank	78	Peat remains – birch, willow and hazel. Mineralised animal bones; antler/bone artefact	Unlisted	c. 6050 cal. BC	Historic England Peat Database
Dogger Bank	79	Tree stumps	40-50m	Unlisted	Historic England Peat Database
Dogger Bank	80	Thin silt peat layer (4cm thick), formed under saltmarsh conditions during relatively slow marine transgression.	-31.06m OD (top of peat layer)	-26.63	Historic England Peat Database
Dogger Bank	81	Moorlog peat deposit retrieved by fishermen.	Unlisted	Unlisted	Historic England Peat Database
Dogger Bank	82	Peat and moorlog deposits. Descriptions of numerous implements.	Unlisted	Unlisted	Historic England Peat Database
Dogger Bank	84	Peat deposits 9,500-9,00 year – Late Preboreal,	-46m	Unlisted	Historic England Peat Database
Dogger Bank	651	Peat.	39m	9,300 14C years BP	Historic England Peat Database
Flemish Bight	103	Basal peat in Elbow Formation. Contains coastal bivalve *Spisula subtruncata*. Holocene.	Unlisted	Unlisted	Historic England Peat Database
Frigg Island	102	Frigg Island, thought to be inundated about 12,000 years ago. Context indicates late glacial age. Small, retouched flake considered to be anthropogenic.	Unlisted	Unlisted	Historic England Peat Database
Indefatigable	104	Elbow Formation (early Holocene clay and peat) 5-20m thick mapped in SE half of BGS sheet. Holocene.	Unlisted	Unlisted	Historic England Peat Database

Location	ID	Description	Depth of Deposit	Age	Database
Leman Bank	90	Core 53/+01?1567	Unlisted	-28.88	Historic England Peat Database
Leman Bank	650	Peat.	Unlisted	8,400 years BP	Historic England Peat Database
Noah's woods	101	Reference to peat and wood findings indicating that the North Sea was once dry land.	Unlisted	Unlisted	Historic England Peat Database
North Sea	508	Moorlog deposits – pollen analysis done on samples.	32.92-53.04m	Unlisted	Historic England Peat Database
North Sea	519	Peat.	Unlisted	Unlisted	Historic England Peat Database
North Sea	575	Two peat layers within core.		9,210-8,720 ± 90 BP	Historic England Peat Database
North Sea	576	Dredged peat.	-21.5-35m NAP	10,900-8,500 cal. year BP	Historic England Peat Database
North Sea	577	Peat.	-51m below mean sea level.	11,667-10. =,214 cal. years BP	Historic England Peat Database
North Sea	578	Peat.	-39m below MSL.	9,300 ± 100.	Historic England Peat Database
North Sea	579	Peat.	-24.5 NAP	Unlisted	Historic England Peat Database

Location	ID	Description	Depth of Deposit	Age	Database
North Sea	580	Peat Early Preboreal,	-47m OD	Unlisted	Historic England Peat Database
North Sea	582	Unlisted	-38.19m below MSL	9,822-8,618	Historic England Peat Database
Off North Norfolk	343	11 cm of silt peat overlain by 5m clay, in Core 52/+01/2699.	-22.87m OD	7,975 ± 55 14C years BP – 7,580 ± 70 14C years BP	Historic England Peat Database
Off North Norfolk	419	LOIS cores – show basal peat overlain by up to 14m thick silts and clayey silts. Peat is often thin (a few cms) and contains *Pediastrum alga* (freshwater).	Unlisted	Unlisted	Historic England Peat Database
Sandettie-Fairy Bank	98	One core retrieved early Holocene deposit (with basal transgressive Pre-Boreal peat layer), on top of Weichselian fluvatile layer, on cold-water marine Eemian sediments.	Unlisted	Unlisted	Historic England Peat Database
Sandettie-Fairy Bank	99	Two peat blocks, thought to be from same horizon as layer (Record 98)	Unlisted	9,374 ± 90-9,949 ± 125 BP	Historic England Peat Database
Sheringham Shoal	478	Offshore windfarm site – vibrocores contain peat.	24.33-21.42m below sea level	Unlisted	Historic England Peat Database
Well Bank	91	Suite of cores containing organic deposits at similar depths.	-39-37m	11,325-8,995 ± 85 14C years BP	Historic England Peat Database

Location	ID	Description	Depth of Deposit	Age	Database
North Sea (1.03067, 53.29457)	65079542	Grey, brown mottled peaty silt with organic detritus including wood fragments and monocots. Troels Smith component, Ag2 Sh1 Dg1 DI+.	1.28–1.34m	Unlisted	British Geological Survey
North Sea (1.03753, 53.29578)	65085687	well humified silty peat. Very sharp boundary. Troels Smith component, SH3 Ag1.	0.30–0.36m	Unlisted	British Geological Survey
North Sea (1.50392, 53.32866)	65085696	Black, brown well humified silt peat with wood fragments. Troels Smith component, Sh2 Ag1 Dg1.	1.36-1.44m	Unlisted	British Geological Survey
North Sea (1.50371, 53.32875)	65091982	Silty peat. Troels Smith component, Sh2 Ag2.	1.85-2.00m	Unlisted	British Geological Survey
North Sea (1.02913, 53.29397)	65095122	Brown well humified silty peat with fine sands. Troels Smith component, Sh2 Ag1 Gmin1.	0.50-0.60m	Unlisted	British Geological Survey

Location	ID	Description	Depth of Deposit	Age	Database
North Sea (1.03768, 53.29682)	65082648	Dark grey, brown peaty silt with humified organics. Troels Smith component, Ag2 Sh2 Dg+.	2.34-2.44m	Unlisted	British Geological Survey

19 Annex F