



FIVE ESTUARIES OFFSHORE WIND FARM ENVIRONMENTAL STATEMENT

VOLUME 6, PART 5, ANNEX 11.1: OFF-
SHORE ARCHAEOLOGY AND CULTURAL
HERITAGE TECHNICAL REPORT

Application Reference	EN010115
Application Document Number	6.5.11.1
Revision	A
APFP Regulation	5(2)(a)
Date	March 2024



Project	Five Estuaries Offshore Wind Farm
Sub-Project or Package	Environmental Statement
Document Title	Volume 6, Part 5, Annex 11.1: Offshore Archaeology and Cultural Heritage Technical Report
Application Document Number	6.5.11.1
Revision	A
APFP Regulation	5(2)(a)
Document Reference	005024246-01

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A	Mar-24	ES	Maritime	GoBe	VE OWFL



CONTENTS

1	Introduction	15
1.2	Project background.....	15
1.3	Aims and objectives.....	15
2	Methodology	16
2.1	Introduction.....	16
2.2	Marine archaeology study area	16
2.3	Baseline assessment methodology	17
2.4	Geophysical data collection methodology	20
	Side scan sonar data.....	21
	Echo sounder (multi-beam system) data.....	22
	Magnetic data.....	22
2.5	Sub-bottom profiler data	23
2.6	Methodology geophysical data interpretation	24
2.7	mitigation methodology.....	25
3	Baseline review.....	27
3.1	Environmental context.....	27
3.2	Maritime activity.....	27
	Introduction	27
	Palaeolithic (c. 800,000 to 12,000 BP)	28
	Mesolithic (c. 12,000 to 6,000 BP).....	28
	Neolithic (c. 6,000 to 4,200 BP).....	29
	Bronze Age (c. 4,600 to 2,200 BP).....	30
	Iron Age (c. 1,800 BP to AD 43).....	30
	Roman (c. AD 43 to 410).....	31
	Medieval (c. 410 to 1540)	32
	Post Medieval (c. 1540 to 1901).....	32
	Modern (c. 1901 to present).....	33
	Date unknown	34
3.3	Known wrecks and their archaeological significance.....	34
	UKHO 10915 FV <i>Marie Simone</i>	34
	UKHO 14444 Unknown	35
	UKHO 14458 SS <i>Selma</i>	35
	UKHO 14461 MV <i>Janny</i>	36
	UKHO 14462 Unknown.....	36
	UKHO 14464 HMT <i>Fleming</i>	36



UKHO 14468 Unknown	37
UKHO 14472 SS <i>Haytor</i>	38
UKHO 14475 Unknown	39
UKHO 14492 MV <i>Ingi</i>	39
UKHO 14513 SS <i>Nico</i>	40
UKHO 14514 HMS <i>ML-127</i> (possibly).....	40
UKHO 14517 SS <i>Simon Bolivar</i>	41
UKHO 14518 Unknown	42
UKHO 14519 Unknown	42
UKHO 14520 MV <i>Droffi</i>	42
UKHO 14522 Unknown	42
UKHO 14523 Unknown	43
UKHO 14525 SS <i>Morar</i>	43
UKHO 14527 SS <i>Wearside</i>	43
UKHO 14528 <i>Second Chance</i> (possibly)	44
UKHO 14529 SS <i>Palembang</i> (possibly).....	45
UKHO 14530 SS <i>Dynamo</i>	45
UKHO 14534 HMS <i>Lord St Vincent</i> (part of)	46
UKHO 14535 SS <i>Norhauk</i>	46
UKHO 14536 Foul ground.....	47
UKHO 14537 <i>Terukuni Maru</i>	47
UKHO 14540 HMS <i>Lord Vincent</i> (part of)	48
UKHO 14541 Unknown	49
UKHO 14543 SS <i>Marie Leonhardt</i> (probably)	49
UKHO 14544 HMSM <i>E-6</i>	50
UKHO 14545 MV <i>Bonnington Court</i>	50
UKHO 14546 SS <i>Michail Ontchoukoff</i>	51
UKHO 14548 HMS <i>Resono (FY1042)</i> (possibly).....	52
UKHO 14553 Unknown	52
UKHO 14555 SS <i>Vancouver</i>	53
UKHO 14576 Unknown	53
UKHO 14581 Unknown	53
UKHO 14587 SS <i>Fort Massac</i>	53
UKHO 14588 SS <i>Empire Bridge</i>	54
UKHO 14595 SS <i>Konigen Emma</i> (part of) (probably)	55
UKHO 14798 FV <i>Protinus</i> (possibly)	56
UKHO 14800 Unknown	56



UKHO 14802 SS <i>Koningen Emma</i> (possibly)	56
UKHO 14894 MFV <i>Paulette</i>	57
UKHO 14970 HMS <i>MAC-5</i> (possibly).....	58
UKHO 14983 HMSM <i>E-6</i>	58
UKHO 14996 Unknown	59
UKHO 15035 Unknown	59
UKHO 15074 Unknown	59
UKHO 15709 Unknown	59
UKHO 15819 SS <i>Willy</i>	59
UKHO 15864 Unknown	60
UKHO 70010 HMT <i>Scotch Thistle</i>	60
UKHO 70049 HMS <i>Hastfen</i>	61
UKHO 70300 Unknown	62
UKHO 82140 Unknown	62
UKHO 85403 Unknown	62
UKHO 87019 Unknown	62
UKHO 87021 Unknown	62
UKHO 87043 Unknown	62
UKHO 87044 Unknown	62
UKHO 98495 Unknown	62
UKHO 99186 Unclassified.....	62
UKHO 99963 Unclassified.....	62
UKHO 100626 Unclassified.....	62
UKHO 102229 Unclassified.....	63
UKHO 102231 Unclassified.....	63
UKHO 102232 Unclassified.....	63
UKHO 102346 Unclassified.....	63
UKHO 102362 Unclassified.....	63
Lifted wrecks	63
3.4 Aviation remains	63
UKHO 14995 Unknown	64
UKHO 15199 Unknown	64
3.5 Recorded losses.....	65
3.6 UKHO and NRHE Area records.....	65
3.7 Fishermen's fasteners	66
3.8 Historic seascape characterisation	66
Navigation	67



Industry	70
Fishing.....	73
Ports and docks.....	74
Coastal infrastructure	75
Communications.....	76
Military	76
Settlement	77
Recreation.....	77
Cultural topography	78
Woodland	79
Enclosed land.....	79
Unimproved land	80
Historic Landscape Characterisation (HLC)	80
Summary	80
4 Geophysical assessments	83
4.2 Anomalies of archaeological potential	83
High potential anomalies	83
Medium potential anomalies.....	87
Low potential anomalies.....	92
4.3 Geoarchaeological assessment of geophysical data.....	93
Current understanding.....	93
Archaeological assessment of sub-bottom data.....	94
Summary of geoarchaeological results	97
Outline deposit model.....	99
5 References.....	101
6 Figures	106
7 Appendix A gazetteer of geophysical anomalies.....	124
8 Appendix B gazetteer of recorded sites, wrecks and obstructions within the marine archaeology study area	166
9 Appendix B graphics of recorded receptors	182

TABLES

Table 2.1: Key sources used for the marine archaeology assessment.....	17
Table 2.2: Definition of archaeological potential	24
Table 2.3: Mitigation relating to Offshore Archaeology and Cultural Heritage.	25
Table 3.1: Archaeological significance of UKHO 10915 FV <i>Marie Simone</i>	34
Table 3.2: Archaeological significance of UKHO 14444	35
Table 3.3: Archaeological significance of UKHO 14458 SS <i>Selma</i>	35



Table 3.4: Archaeological significance of UKHO 14461 MV <i>Janny</i>	36
Table 3.5: Archaeological significance of UKHO 14461 HMT <i>Fleming</i>	37
Table 3.6 Archaeological significance of UKHO 14468	38
Table 3.7: Archaeological significance of UKHO 14472 SS <i>Haytor</i>	38
Table 3.8: Archaeological significance of UKHO 14475	39
Table 3.9: Archaeological significance of UKHO 14492 MV <i>Ingi</i>	39
Table 3.10: Archaeological significance of UKHO 14513 SS <i>Nico</i>	40
Table 3.11: Archaeological significance of UKHO 14514 HMS <i>ML-127</i>	41
Table 3.12 Archaeological significance of UKHO 14517 SS <i>Simon Bolivar</i>	41
Table 3.13: Archaeological significance of UKHO 14520 MV <i>Drofli</i>	42
Table 3.14: Archaeological significance of UKHO 14525 SS <i>Morar</i>	43
Table 3.15: Archaeological significance of UKHO 14527 SS <i>Wearside</i>	44
Table 3.16 Archaeological significance of UKHO 14528 <i>Second Chance</i>	44
Table 3.17: Archaeological significance of UKHO 14529 SS <i>Palembang</i>	45
Table 3.18: Archaeological significance of UKHO 14530 SS <i>Dynamo</i>	46
Table 3.19: Archaeological significance of UKHO 14535 SS <i>Norhauk</i>	47
Table 3.20: Archaeological significance of UKHO 14537 <i>Terukuni Maru</i>	48
Table 3.21: Archaeological significance of UKHO 14540 HMS <i>Lord Vincent</i>	49
Table 3.22 Archaeological significance of UKHO 14543 SS <i>Marie Leonhardt</i>	49
Table 3.23: Archaeological significance of UKHO 14544 HMSM <i>E-6</i>	50
Table 3.24: Archaeological significance of UKHO 14545 MV <i>Bonnington Court</i>	51
Table 3.25 Archaeological significance of UKHO 14546 SS <i>Michail Ontchoukoff</i>	51
Table 3.26: Archaeological significance of UKHO 14548 HMS <i>Resono</i>	52
Table 3.27: Archaeological significance of UKHO 14555 SS <i>Vancouver</i>	53
Table 3.28: Archaeological significance of UKHO 14587 SS <i>Fort Massac</i>	54
Table 3.29: Archaeological significance of UKHO 14588 SS <i>Empire Bridge</i>	55
Table 3.30 Archaeological significance of UKHO 14595 SS <i>Koningen Emma</i>	55
Table 3.31: Archaeological significance of UKHO 14798 FV <i>Protinus</i>	56
Table 3.32: Archaeological significance of UKHO 14802 SS <i>Koningen Emma</i>	57
Table 3.33 Archaeological significance of UKHO 14894 MFV <i>Paulette</i>	57
Table 3.34: Archaeological significance of UKHO 14960 HMS <i>MAC-5</i>	58
Table 3.35: Archaeological significance of UKHO 14983 HMSM <i>E-6</i>	59
Table 3.36: Archaeological significance of UKHO 15819 SS <i>Willy</i>	60
Table 3.37: Archaeological significance of UKHO 70010 HMT <i>Scotch Thistle</i>	61
Table 3.38 Archaeological significance of UKHO 70049 HMS <i>Hastfen</i>	61
Table 3.39: Archaeological significance of UKHO 14995	64
Table 3.40 Archaeological significance of UKHO 15199	65
Table 4.1: Outline deposit model	100

FIGURES

Figure 6.1 Marine Archaeology Study Area and ES proposed Order Limits	107
Figure 6.2 Changes to the VE proposed Order Limits from PEIR to ES	108
Figure 6.3 Geophysical data coverage	109
Figure 6.4 Recorded losses, obstructions and foul grounds within the marine archaeology study area.....	110
Figure 6.5 Historic Seascape Characterisation of the coastal level	111
Figure 6.6 Historic Seascape Characterisation of the sea surface level	112
Figure 6.7 Historic Seascape Characterisation of the water column level	113
Figure 6.8 Historic Seascape Characterisation of the sea floor level.....	114



Figure 6.9 Historic Seascape Characterisation of the sub sea floor level	115
Figure 6.10 Anomalies of archaeological potential identified in the geophysical data	116
Figure 6.11 Valleys and channels of geoarchaeological potential	117
Figure 6.12 Potential locations for geoarchaeological core collection	118
Figure 6.13 Archaeological Exclusion Zones recommended for geophysical anomalies...	119
Figure 6.14 Archaeological Exclusions Zones recommended for recorded losses	120
Figure 6.15 Archaeological Exclusion Zones within the nearshore Offshore ECC	121
Figure 6.16 Archaeological Exclusion Zones within the mid-section of the Offshore ECC	122
Figure 6.17 Archaeological Exclusion Zones within the offshore section of the Offshore ECC and Array areas	123



DEFINITION OF ACRONYMS

Term	Definition
AEZ (Archaeological Exclusion Zone)	A spatially defined zone around a known marine heritage receptor that will be avoided during intrusive works. The avoidance of AEZs must also consider that the use of anchors and lines, which could impact upstanding features, are adequately taken into account in the planning of operations.
BP (Before Present)	Time scale referring to the years before 1950.
Bronze Age	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. Archaeological period lasting from 4,600-2,200 BP.
DCO (Development Consent Order)	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP) from the Secretary of State (SoS).
Decommissioning	The period during which a development and its associated processes are removed from active operation.
dML (Deemed Marine Licence)	If a Development Consent Order (DCO) is granted, this will include provision deeming a marine licence to have been issued under Part 4 of the Marine and Coastal Access Act 2009.
Early Medieval	This dates from the breakdown of Roman rule in Britain to the Norman invasion in 1066 and is to be used for monuments of post Roman, Saxon and Viking date. Archaeological period lasting from AD 410 to 1066.
Early Prehistoric	For monuments which are characteristic of the Palaeolithic to Mesolithic but cannot be specifically assigned. Archaeological period lasting from 52,000 to 6,000 BP.
ECC (Export Cable Corridor)	The area(s) where the export cables will be located. Refer to either the offshore or on-shore ECC.
EIA (Environmental Impact Assessment)	The process of evaluating the likely significant environmental effects of a proposed



Term	Definition
	project or development over and above the existing circumstances (or 'baseline').
ES (Environmental Statement)	The documents that collate 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.
HLC (Historic Landscape Characterisation)	Maps and describes historic cultural influences within an area looking beyond individual heritage assets and interpreting the patterns and connections within a landscape, spatially and through time.
HSC (Historic Seascape Characterisation)	Maps and describes historic cultural influences which shape seascape perceptions across marine areas and coastal land.
Impact	The changes resulting from an action.
Intertidal	The area of the shoreline which is covered at high tide and uncovered at low tide.
Iron Age	This period follows on from the Bronze Age and is characterised by the use of iron for making tools and monuments such as hill-forts and oppida. The Iron Age is taken to end with the Roman invasion. Archaeological period lasting from 2,800 BP to AD 43.
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.
MAG (Magnetometer)	A device used to measure direction, strength, or relative change of a magnetic field at a particular location.
Marine archaeology study area	Defined as the ES proposed Order Limits up to MHWS and surrounded by a 1 km buffer.
Marine Heritage Receptors	Physical resources such as shipwrecks, remains of aircraft, archaeological sites, archaeological finds and material including pre-historic deposits as well as archival



Term	Definition
	documents and oral accounts recognised as of historical/ archaeological or cultural significance.
Marine WSI (Marine Written Scheme of Investigation)	The specific WSI formed to set out the agreement between client, the appointed archaeologists, contractors and relevant stakeholders which sets out methods to mitigate the effects on all the known and potential marine heritage receptors within the development area. This will develop throughout the life of the project beginning with the Outline Marine WSI through to the Draft Marine WSI and final Agreed Marine WSI.
Medieval	The Medieval period or Middle Ages begins with the Norman invasion and ends with the dissolution of the monasteries. Archaeological period lasting from AD 1066-1540.
Mesolithic	The Middle Stone Age, falling between the Palaeolithic and the Neolithic; marks the beginning of a move from a hunter gatherer society towards food producing society. Archaeological period lasting from 12,000-6,000 BP.
MMO (Marine Management Organisation)	MMO is an executive non-departmental public body, sponsored by the Department for Environment, Food & Rural Affairs. The MMO license, regulate and plan marine activities in the seas around England so that they're carried out in a sustainable way.
MBES (Multi-beam Echo Sounder)	A type of sonar used to map the seabed by emitting acoustic waves in a fan shape beneath its transceiver. The time it takes for the sound 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.
Neolithic	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. Archaeological period lasting from 6,000-4,200 BP.



Term	Definition
NRHE (Historic England National Record of the Historic Environment)	National database of known wrecks and reported losses held by Historic England. Currently (September 2022) being developed into the National Marine Heritage Record (NMHR).
nT (Nanotesla)	Measurement describing the magnetic field (flux) of ferrous materials as measured by a magnetometer. (One nanotesla equals 10 ⁻⁹ tesla)
Offshore	The sea further than two miles from the coast.
Offshore Wind Farm	An offshore wind farm is a group of wind turbines in the same location (offshore) in the sea which are used to produce electricity.
Outline WSI (Outline Marine Written Schemes of Investigation)	Outline Marine WSI, specific for the offshore area and developed during the EIA process to form frameworks for mitigation strategies that will be submitted with the DCO application. Followed by the Draft WSI (based on the Outline Marine WSI) and the final Agreed WSI (based on the Draft Marine WSI).
PAD (Protocol for Archaeological Discoveries)	A document detailing how unexpected finds made during the lifetime of the Proposed Development should be reported.
Palaeolithic	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. Archaeological period lasting from 52,000-12,000 BP.
PAS (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.
PEIR (Preliminary Environmental Information Report)	Preliminary Environmental Information Report. The PEIR is written in the style of a draft Environmental Statement (ES) and forms the basis of statutory consultation. Following that consultation, the PEIR documentation will be updated into the final ES



Term	Definition
	that will accompany the application for the Development Consent Order (DCO).
Post-medieval	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. Archaeological period lasting from AD 1540-1901.
Receiver of Wreck	Official of the British Government whose main task is to administer the law in relation to Wreck and Salvage.
Roman period	Traditionally begins with the Roman invasion in AD 43 and ends with the emperor Honorius directing Britain to look to its own defences in AD 410. Archaeological period lasting from AD 43-410.
Seascape	Landscapes with views of the coast or seas, and coasts and adjacent marine environments with cultural, historical and archaeological links with each other.
SSS (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.
SBP (Sub-Bottom Profiler)	An acoustic system used to determine physical properties of the sea floor and to image and characterise geological information a few metres below the sea floor.
UKHO (United Kingdom Hydrographic Office)	Database of known wrecks and obstructions held and maintained by the UKHO.
Ultra-High Resolution Seismic (UHRS)	An acoustic system used to image submerged and buried features in shallow water.
VE	Five Estuaries Offshore Wind Farm (the Project).
VE OWFL	Five Estuaries Offshore Wind Farm Limited (the Applicant).
WSI (Written Schemes of Investigation)	A document forming the agreement between the client, the appointed archaeologists, contractors, and the relevant stakeholders. The document sets out methods to mitigate the effects on all the known and potential marine heritage receptors within



Term	Definition
	the development area. For Offshore Archaeology and Cultural Heritage, a Marine WSI will be developed.
WTG	Wind Turbine Generator.



1 INTRODUCTION

1.1.1 This technical report identifies known and potential marine heritage receptors within the offshore part of Five Estuaries Offshore Wind Farm proposed development area and marine archaeology study area and suggests an approach to mitigation measures to avoid or minimise impact on marine heritage receptors. This technical report accompanies Environmental Statement (ES) Volume 6, Part 2, Chapter 11: Offshore Archaeology and Cultural Heritage.

1.2 PROJECT BACKGROUND

1.2.1 Five Estuaries Offshore Wind Farm (hereafter referred to as VE) is a proposed extension project to the operational Galloper Offshore Wind Farm (Galloper) off the coast of Essex (Figure 6.1).

1.2.2 VE's wind turbine generators (WTGs) will be situated within two array areas to the east of the operational Galloper OWF. The array areas will be located approximately 37 km off the coast of Suffolk at its closest point, England.

1.2.3 Maritime Archaeology (MA) was commissioned to undertake this offshore archaeology and cultural heritage technical report encompassing the offshore part of the ES Assessment Boundary for VE.

1.3 AIMS AND OBJECTIVES

1.3.1 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 marine heritage receptors and mitigate impacts;
- > undertake a review of the known marine heritage receptors within the proposed development area and marine archaeology study area;
- > summarise the environmental context and archaeological potential of the proposed development area;
- > assess and review geophysical data to identify previously unknown sites of archaeological potential;
- > provide an impact assessment and recommendation of mitigation measures for all identified marine heritage receptors (included in Volume 6, Part 2, Chapter 11);
- > develop an agreed Outline Marine Written Scheme of Investigation (WSI) setting out the archaeological requirements pre- and post-consent (Volume 9, Report 19: Outline Marine Written Scheme of Investigation); and
- > provide a project-specific Protocol for Archaeological Discoveries (PAD) (Appendix 1 of Volume 9, Report 19: Outline WSI) 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.



2 METHODOLOGY

2.1 INTRODUCTION

2.1.1 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).

2.1.2 The following legislation, guidance and best practice has been consulted as part of this assessment:

- > Archaeological Written Schemes of Investigation for Offshore Wind Farm 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);
- > South East Inshore Marine Plan (HM Government, 2021);
- > 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);

2.2 MARINE ARCHAEOLOGY STUDY AREA

2.2.1 The marine archaeology assessment study area is defined as the ES Assessment Boundary area up to Mean High Water Springs (MHWS) tide level and surrounded by a 1 km buffer. The extended area allows for the consideration of direct and indirect effects on marine heritage receptors and is to accommodate the potential imprecision of historic marine positioning and the strong tides which can cause the scattering of shipwreck artefacts and eroded archaeological material over considerable distances.



- 2.2.2 Shipwrecks lying in the ES Assessment Boundary 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 VE is expected outside the ES Assessment Boundary, Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical Processes, outlines how tidal ranges and seabed movements can be affected by the development. This is further discussed in terms of impact on archaeological receptors in Volume 6, Part 2, Chapter 11: Offshore Archaeology and Cultural Heritage.
- 2.2.3 The area from MLWS landward is covered by the onshore archaeology chapter, Volume 3, Part 6, Chapter 7: Onshore Archaeology and Cultural Heritage. There is an overlap of the onshore archaeology and marine archaeology study areas and any marine heritage receptors within this overlap have been considered by both topics. However, continued liaison with the Onshore Cultural Heritage authors has occurred to ensure that this overlap has not resulted in repetition between the two chapters.
- 2.2.4 Following the Preliminary Environmental Information Report (PEIR), the extent of the Assessment Boundary was reviewed and amended in response to such matters as refinement of the offshore components, the identification of additional impact pathways and in response to feedback from consultation. The changes from PEIR to ES in the Assessment Boundary can be seen in Figure 6.2.

2.3 BASELINE ASSESSMENT METHODOLOGY

- 2.3.1 A baseline review of the marine heritage receptors located within the marine archaeology study area is presented within Section 3. The data sources used to collate the information for this technical report are detailed in Table 2.1.

Table 2.1: Key sources used for the marine archaeology assessment

Source	Summary	Coverage of study area
United Kingdom Hydrographic Office (UKHO) wrecks and obstructions	Records of known wrecks and obstructions held by the UKHO and available via emapsite.com .	Coverage of the marine archaeology study area up to MLWS.
UKHO Admiralty Charts	Admiralty charts and historic mapping relevant to the defined marine archaeology study area.	Full coverage of the marine archaeology study area.
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.
Essex Historic Environment Record (HER)	Point data derived from Historic Environment Record held by Essex HER Office.	Coverage of the marine archaeology study area to MLWS.
Suffolk Historic Environment Record (HER)	The online Historic Environment Record for Suffolk.	No coverage of the marine archaeology study area, though the records provide useful characterisation of



Source	Summary	Coverage of study area
		the historic use of the region.
North Sea Palaeolandscape Project (NSPP)	Palaeolithic and Mesolithic landscape mapping of the North Sea.	No coverage of the marine archaeology study area, though the detailed study provides useful characterisation of the directly adjacent subzone.
Lost Frontiers Project (LFP)	A continuation of the NSPP. Building on the mapping of Palaeolithic and Mesolithic landscapes of the North Sea, using paleoenvironmental data and ancient DNA. Potential submerged Neolithic landscapes will also be explored.	Data is not yet published for this project but will be considered when this data becomes available.
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 English Channel, as well as a framework and agenda for the management of submerged prehistoric archaeological sites, features and landscapes.	Full coverage of the marine archaeology study area.
<i>Technical Report for Strategic Environmental Assessment (SEA) Area 3 (Flemming, 2002)</i>	Description of palaeolandscape potential of the North Sea basin.	Broadscale data with regional coverage.
<i>Galloper Wind Farm Project-Environmental Statement – Chapter 19: Archaeology and Cultural Heritage (Wessex Archaeology, 2011)</i>	Review of archaeological potential of the subzone.	Some overlap with the marine archaeology study area. The detailed study also provides useful characterisation of the directly adjacent subzone.
<i>England's Historic Seascapes Marine HLC Pilot Study: Southwold to Clacton (Oxford Archaeology, 2007)</i>	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
<i>Greater Gabbard Windfarm – Phase One: Offshore Turbine Area – Archaeological Desk Based Assessment</i> (Maritime Archaeology Ltd., 2005)	Review of archaeological potential of the subzone.	No coverage of the marine archaeology study area though the detailed study provides useful characterisation of the directly adjacent subzone.
<i>Greater Gabbard Windfarm – Phase Two: Export Cable Route and Onshore Works – Archaeological Desk Based Assessment</i> (Maritime Archaeology Ltd., 2005)	Review of archaeological potential of the subzone.	Minor overlap with the marine archaeology study area. The detailed study also provides useful characterisation of the directly adjacent subzone.
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.	No data within the marine archaeology study area though peats have been identified along the Essex coast.

2.3.2 Where there are spatial data discrepancies between different sources, the coordinates provided by United Kingdom Hydrographic Office (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).

2.3.3 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.

2.3.4 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.
- 2.3.5 The record of England's archaeological and architectural sites held by the National Record of the Historic Environment (NRHE) is being developed into the National Marine Heritage Record but is not complete at time of writing (October 2022).
- 2.3.6 The NRHE data utilised for the assessment of known marine heritage receptors within this ES 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.
- 2.3.7 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; 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; and the Protection of Military Remains Act 1986, which provides protection for the wreckage of military aircraft and certain military wrecks where access may be permitted but any operations which may disturb the site are illegal unless licensed by the Ministry of Defence.
- 2.3.8 The 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 6, Part 2, Chapter 11: Offshore Archaeology and Cultural Heritage for details.

2.4 GEOPHYSICAL DATA COLLECTION METHODOLOGY

- 2.4.1 Fugro was contracted by RWE Renewables UK Ltd to acquire shallow geophysical and Ultra-High Resolution Seismic (UHRS) data across areas being considered for development at the VE array and associated export cable route corridor.
- 2.4.2 The offshore portion of the survey was undertaken predominantly by the survey vessel *Fugro Seeker*. Vessel mobilization and calibrations for survey operations were undertaken between 6 August and 7 August 2021. The survey vessel *Fugro Mercator* surveyed two subblocks of the ECC on 27 October 2021.
- 2.4.3 The survey line spacing for *Fugro Seeker* was 15 – 25 m depending on water depth, with a survey speed of 4 knots. Two independent surface positioning systems were used ± 0.1 m horizontally (2-sigma, 95%) and ± 0.1 m vertically (2-sigma, 95%). (Fugro, 2022a).
- 2.4.4 The data quality, for archaeological purposes, across all shallow geophysical data sets has been defined as Good, 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 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 be 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 heritage receptors made be impaired;
- > **Dissatisfactory:** Data which has been significantly affected by conditions such as weather, sea state 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 heritage receptors within the dataset.

2.4.5 The geophysical survey covered the entire array area, parts of the preferred cable corridor within the ES Assessment Boundary and part of the marine archaeology study area. The areas where the North Falls OWF archaeological assessment of geophysical data has been used to fill gaps in the VE proposed Order Limits not covered by the VE geophysical survey can be seen in Figure 6.3.

2.4.6 The survey vessel and specifications used to collect the geophysical data on behalf of North Falls OWF were the same as those used for VE OWF (Wessex Archaeology, 2022), and considered of good quality and suitable for archaeological assessment.

SIDE SCAN SONAR DATA

2.4.7 An EdgeTech 4200 dual-frequency side scan sonar (SSS) system using an EdgeTech 4200 towfish was used to scan the seabed on either side of the ship's track. The frequency used was 300kHz/600 kHz with a range of 50 m providing 100% coverage (including nadirs). Throughout the survey both the high and low frequencies were recorded using the EdgeTech Discover recording software. Data were recorded in both XTF and JSF formats. The data were positioned using a Nexis EasyTrak Ultra Short Baseline (USBL) system, with a beacon attached to the towfish. The data were processed and analysed using EdgeTech Discover acquisition software.

2.4.8 The raw data were received in Triton XTF format and post-processed in SonarWiz, imported with a 'threshold' value calculated for the specifics of the instrumentation and the environment, bottom tracked and normalised using the Empirical Gain Normalisation (EGN) function.

2.4.9 Following processing, the SSS data quality was considered Good (as defined above), and seabed anomalies could be clearly identified and interpreted. In areas where the SSS data quality was found to be Dissatisfactory additional data covering the same area were provided by VE which was considered of Good quality.

2.4.10 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 2.2. Target reports were developed and exported as ESRI shapefiles into ArcGIS Pro for synthesis with other data sets.

2.4.11 All SSS anomalies were assigned feature IDs ranging between MA2000 – MA2999.



ECHO SOUNDER (MULTI-BEAM SYSTEM) DATA

- 2.4.12 A Dual Teledyne RESON 7125 (400 kHz) hull mounted multi-beam echo sounder was used to provide multibeam swath bathymetry data (MBES). The system was run in 400 kHz configuration with a maximum ping rate of 50 Hz at each head, with each ping producing 0.5° x 1.0° focused beams. During operation in high density, equidistant mode approximately 512 soundings were generated per ping per multibeam head.
- 2.4.13 Fugro used industry best practice to achieve the require 3 hits per 0.25 m bin over 95% over the site in the first instance by operating the multibeam echosounder at full rate dual head mode. 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. The effect of reducing swath was reduced seabed coverage and therefore reduced line spacing. No cross-system interference was present within the MBES dataset. Survey data were collected and monitored using the Starfix NG online grid and again from the onshore processing team for offline quality control (Fugro, 2022a).
- 2.4.14 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 0.25 m 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.
- 2.4.15 Following processing, the MBES data quality was considered Good (as defined above), and seabed anomalies could be clearly identified and interpreted.
- 2.4.16 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 side scan sonar 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.
- 2.4.17 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 sub-bottom results where these features possessed a surface expression.
- 2.4.18 Target imagery was captured, and feature IDs were assigned, ranging between MA4000 – MA4999.

MAGNETIC DATA

- 2.4.19 A Geometrics G-882 marine caesium vapour magnetometer (MAG) was soft towed independently from a dedicated winch on the stern of the vessel. The cable-out was shortened or lengthened as necessary to control the towfish altitude behind the SSS and positioned using a Nexus EasyTrak USBL system. A beacon was attached in front of the towfish at a measured distance along the tow cable. Magnetometer values in nanotesla (nT), depth and altitude values were collected at a 10 Hz update rate. The data were processed using Geometrics MagLog acquisition software, together with navigational information from the StarFix 2018 navigational software.



- 2.4.20 Magnetic data were assessed using Geometrics MagPick software package. 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.
- 2.4.21 Following processing, the magnetic data quality was considered Good (as defined above) and magnetic anomalies could be clearly identified and interpreted.
- 2.4.22 Magnetic anomalies greater than 5 nT 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 5 nT may be on the conservative side and that, where the data are relatively noise free, 3 nT or even 2 nT may be practical depending on noise levels, instrument type, data rate and purpose of investigation (Camidge *et al.*, 2010).
- 2.4.23 Objects giving a 5 nT return from a six-metre distance are likely to be ferrous objects of around 100 kg (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. 2 m). Such signals are not expected to be of archaeological interest, constituting isolated debris or single instances of ferrous anthropogenic material.
- 2.4.24 These surveys, like most magnetometer surveys of large areas, are of variable sensitivity (Camidge *et al.*, 2010:62). At 6 m range, run lines directly over targets are able to detect a target with a mass of around 100 kg, whereas the line spacing for this survey varies with the average line spacing at 75 or 150 m. At 150 m line spacing the slant range can be up to 80 m, which means that only objects of more than 100 tonnes will be discernible at 5 nT 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).
- 2.4.25 All magnetic targets over 5 nT were exported into ArcGIS Pro for comparative analysis with other geophysical datasets and data identified during the baseline review.
- 2.4.26 Correlation between magnetic targets and other datasets were based on a 50 m buffer due to the issues inherent in accurately positioning magnetic targets by their detectable magnetic field.
- 2.4.27 Target reports were developed for all magnetic anomalies correlating with high and medium potential SSS anomalies. Feature IDs for all magnetic anomalies were assigned IDs ranging between MA5000 – MA10460.

2.5 SUB-BOTTOM PROFILER DATA

- 2.5.1 An Innomar SES-2000 Medium parametric sub-bottom profiler (SBP) was used to collect sub-bottom data. The parametric system has a narrow beam and is based on low-frequency sound generation from two high-intensity sound beams at higher frequencies. The system provided resolution of up to 0.2 m, and penetration through unconsolidated sediments of between 5 m and 20 m, depending on geological conditions.



- 2.5.2 Innomar ping rate was automatically controlled by the SESWIN recording software and varied with record length. As a result, the ping rate of the recorded software varied with the water depth. During operations the record length was maintained as low as possible, whilst still maintaining penetration below seabed, to ensure as high a ping rate as possible.
- 2.5.3 All data were recorded digitally in the SESWIN 24-bit acquisition software along with positional data from the StarFix 2018 online navigation software. Duplicates in source coordinates were corrected using an interpolation method. The data were acquired in SES3 format and converted to SEG Y using the Innomar SESConvert software onboard the vessel.
- 2.5.4 Interpretation of SBP data was undertaken on a line-by-line basis by a qualified marine archaeologist using IHS Markit Kingdom.
- 2.5.5 The data were received in SEG Y format and imported and visualised using IHS Markit Kingdom. 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.
- 2.5.6 Following processing, the SBP data quality was considered Good (as defined above), and channels and sub seafloor features could be identified and interpreted.
- 2.5.7 Feature IDs for all sub-bottom anomalies were assigned ID's ranging between MA3000 – MA3999.

2.6 METHODOLOGY GEOPHYSICAL DATA INTERPRETATION

- 2.6.1 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).
- 2.6.2 All anomalies of archaeological potential were assessed against the criteria in Table 2.2 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 3.

Table 2.2: 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, as well as potential outcropping palaeolandscapes and their margins.
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.



Archaeological potential	Archaeological definition
Low	Anomalies considered to be of anthropogenic origin but likely related to modern activity with little or no archaeological significance such as modern debris, ropes, chains or fishing gear.

2.7 MITIGATION METHODOLOGY

- 2.7.1 Mitigation measures that were identified and adopted as part of the development of the project design and that are relevant to Offshore Archaeology and Cultural Heritage are listed in Table 2.3, these include project design measures, compliance with elements of good practice and use of standard protocols. It is expected that these will evolve over the development process as the EIA progresses and in response to consultation. This approach is further detailed in Volume 6, Part 2, Chapter 11: Offshore Archaeology and Cultural Heritage and is expected to be reflected in the DCO requirements and/ or Deemed Marine Licence (dML) conditions.
- 2.7.2 The mitigation set out in the Marine WSI (at every phase of the document) will be discussed and agreed in consultation with the Archaeological Curators. It is anticipated that the agreement of a final Agreed WSI will be a condition of the marine licence.
- 2.7.3 The mitigation measures for VE are formulated where marine heritage receptors and anomalies are identified in the desk-based assessment and/ or geophysical assessments. The 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 Wind Farm Projects (The Crown Estate, 2021).

Table 2.3: Mitigation relating to Offshore Archaeology and Cultural Heritage.

Project phase	Mitigation measures
General	
Outline Marine Written Schemes of Investigation (WSI)	An Outline Marine WSI document has been produced to accompany the ES to outline the AEZs and establish the basis for mitigation measures and further archaeological campaigns for the project. This will be developed to form the Draft Marine WSI followed by the Agreed Marine WSI.
Archaeological Exclusion Zones (AEZ)	All intrusive activities undertaken during the life of the project will be routed and microsited to avoid any identified marine heritage receptors pre-construction, with AEZs as detailed in the Outline Marine WSI unless other mitigation is agreed with Historic England.
Protocol for Archaeological Discoveries (PAD)	Additional unknown or unexpected cultural heritage and marine heritage receptors identified during the project stages will be reported utilising the project specific PAD.
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



Project phase	Mitigation measures
	Historic England. Areas with geoarchaeological potential will be targeted during the geotechnical sampling campaigns and results published will aim to enhance the palaeogeographic knowledge and understanding of the area.
Post-construction monitoring plan	A post-construction monitoring plan as per the Outline Marine WSI will be produced. The post-construction monitoring plan will identify any areas or sites of high archaeological significance recommended for further investigation and outline how post-construction monitoring campaigns will collect, assess and report on changes to marine heritage receptors that may have occurred during the construction phase.



3 BASELINE REVIEW

3.1 ENVIRONMENTAL CONTEXT

3.1.1 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. These periods of (re)colonization are typically associated with the retreat of icesheets following the last three lowland glaciations:

- > Devensian: c. 115,000 to 11,000 Before Present (BP);
- > Wolstonian: c. 350,000 to 130,000 BP; and
- > Anglian: c. 480,000 to 430,000 BP [Marine Isotope Stage (MIS) 12].

3.1.2 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 4.3.

3.2 MARITIME ACTIVITY

INTRODUCTION

3.2.1 The following sections provide a broad contextual overview of the past human activity within the region, focusing on maritime activity. This will enable an assessment of the potential for archaeology within the marine archaeology study area and an assessment of significance of any sites that may be within it.

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

1. Submerged prehistoric landscapes related to fluctuations in past sea-level. Such landscapes may contain significant evidence of prehistoric human occupation and/or environmental change.
2. Archaeological remains of vessels deposited after a wrecking event at sea or abandoned in an intertidal context.
3. Remains of aircraft crash sites, either coherent assemblages or scattered material, typically the result of Second World War military conflict, but also numerous passenger casualties. This category includes aircraft, airships and other dirigibles dating to the First World War; however, these rarely survive within the archaeological record.
4. 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 Mean Low Water Springs (MLWS) and MHWS).
5. Historic Seascape Character: the historic cultural influences which shape present perception of seascape, its use and its ability to accommodate change.

3.2.3 There are a wide range of heritage sites without formal protection which have been identified and outlined below and in Section 3.3.

3.2.4 The baseline assessment has also determined that:



- > There are currently no protected wrecks or scheduled ancient monuments within the marine archaeology study area, however there is one charted and recorded aircraft site which is assumed to become an automatically protected place under The Protection of Military Remains Act, 1986 even if the physical remains have not been confirmed as an aircraft;
- > There are currently no conservation areas within the marine archaeology study area; and
- > There are currently no Marine Antiquities Scheme finds recorded within the marine archaeology study area.

PALAEOLITHIC (C. 800,000 TO 12,000 BP)

- 3.2.5 The deposits laid down in the marine zone during glacial cycles during the last 500,000 years are of great importance for understanding the localised geomorphological changes of the Essex and Suffolk coasts. The Outer Thames Estuary is located between two significant Lower Palaeolithic sites of Clacton to the south of the study area and Pakefield to the north and has been known to produce evidence for some of the earliest occupation of the British Isles including stone tools and organic technologies (Emu *et al.*, 2009).
- 3.2.6 The archaeological and palaeoenvironmental potential of the offshore deposits from the southern end of 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. One record within the marine archaeology study area is listed in the Essex HER (MEX1040884) for a southern mammoth tooth found when dredging 19 km east of Walton-on-the-Naze.
- 3.2.7 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.
- 3.2.8 Changing routes of river systems during these periods of glaciation is exemplified in the terraces of the Thames-Medway rivers which originally occupied a more northerly course in Norfolk, but were pushed south to their current location approximately 450,000 BP. The remains of these channels and valleys under the current seabed, as interpreted from the available SPB data, is further discussed in Section 4.3.

MESOLITHIC (C. 12,000 TO 6,000 BP)

- 3.2.9 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).
- 3.2.10 The Naze, now a headland on the Essex coast, once formed the northern side of the major river valley which contained the Thames, Medway, Crouch, Colne and Blackwater and their minor tributaries. This coastal setting with major estuaries, high in marine resources, suggests the Naze would have been prime location for early human settlement but the area is likely to have been inundated by rising sea-levels around 10,000 BP.



- 3.2.11 The significant assemblage of microliths discovered at Stone Point, approximately 5.5 km to the north of the VE landfall, suggests Mesolithic activity in the area and that rising sea had by then reached their present levels. The discovery of Neolithic pottery and axe heads in this same area suggests settlement here was continuous over a long period (Oxford Archaeology, 2007).
- 3.2.12 Waterborne travel during the Mesolithic was likely carried out in logboats or skin/hide boats (as summarised in McGrail, 2001: 172-183). The vessels were able to operate in sheltered inshore waters, estuaries, and rivers but the extent to which Mesolithic vessels were capable of making repeated open sea voyages is less clear.
- 3.2.13 A viable model of significant maritime contact between and along the western coasts and islands of the British Isles during the Mesolithic and Neolithic has been proposed (Garrow and Sturt, 2011). Remains of early vessels are likely to occur in areas of formerly sheltered inshore waters (now further inundated and lying offshore), estuaries or rivers.
- 3.2.14 Associated artefacts, such as paddles or fishing equipment also have the potential to survive in the archaeological record from this period (for example, McGrail, 2001: 176). Within the Essex HER one record for the findspot of an axe and tranchet axe (MEX10124) is listed within the marine archaeology study area.

NEOLITHIC (C. 6,000 TO 4,200 BP)

- 3.2.15 Neolithic watercraft, much like their Mesolithic counterparts, are likely to comprise skin/hide boats or logboats (summary in McGrail, 2001: 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.
- 3.2.16 The rate of sea-level change had slowed considerably by c. 6,000 BP for much of the British Isles and much of the land mass connecting the UK and continental Europe was permanently inundated.
- 3.2.17 It is probable that Prehistoric settlers exploited the landscape using craft such as logboats, an example of which was seen at Walton strand in 1936 (Oxford Archaeology, 2007).
- 3.2.18 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.
- 3.2.19 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).



- 3.2.20 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 18 m 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).
- 3.2.21 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).
- 3.2.22 There is extensive evidence of Neolithic occupation including structural features, pits and large quantities of lithic and pottery finds in the intertidal zone of the Blackwater Estuary, approximately 6 km north of the VE landfall. While evidence of crop marks and henges in this region signify investment in the area and long-term interaction between people and the coastal environment (Emu *et al.*, 2009).
- 3.2.23 Finds and sites from the Neolithic recorded in the Essex HER include two findspots within the marine archaeology study area in the vicinity of Frinton-on-Sea, an axe or pick (MEX9975) and lithic implements (MEX9981).

BRONZE AGE (C. 4,600 TO 2,200 BP)

- 3.2.24 The potential for substantial submerged landscape deposits offshore is further reduced in the Bronze Age. However, with increasingly sedentary populations, both on the coast and inland, this inevitably gave rise to increased communications along the coast and waterways of the region.
- 3.2.25 There is potential for *in situ* archaeological remains in the intertidal zone. This 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.
- 3.2.26 Watercraft during this period still include skin/hide boats and logboats, however, there is a development of the later plank-built hull forms which were relatively complex in their construction, using large hewn planks fastened together with yew withies, as exemplified by the Dover Boat (Clark, 2004).

IRON AGE (C. 1,800 BP TO AD 43)

- 3.2.27 Sea-levels by the beginning of the Iron Age would closely have resembled what they are today. There is evidence of increasing numbers of settlements and forts found across Essex during the Iron Age. The Shoeburyness fort at Southend-on-Sea, shows an example of a more defensive form of settlement and fragments from a range of local and imported pottery vessels dating to the Middle Iron Age have been found at this site. The Red Hills that are the rubble remains of salt production are also seen along Essex coastline (these are discussed further in Section 3.8).



- 3.2.28 Despite the evidence of Bronze Age plank-built vessels, there is currently no archaeological evidence of Iron Age plank-built sea-going vessels. However, the above trading networks have some important implications for the types of watercrafts in use at the time, and remains of such have the potential to be present within the marine archaeology study area.
- 3.2.29 There is substantial evidence for the continued use of logboats within this period, with the best example being the c. 13 m long, complex logboat excavated from Hasholme and dated to c. 2,300 BP (McGrail, 2001). Whilst it remains possible that skin/hide boats were also still in use, the organic nature of these craft mean that there is currently no archaeological evidence of this (McGrail, 2001).
- 3.2.30 There is an absence of complete seagoing vessels, parts of vessels or even many images of boats from this time. This poses a key challenge to understanding how maritime traditions developed during Iron Age Britain. Evidence seems to suggest that sewn-plank vessels of the Bronze Age stopped being made at some point in this period, while hull-first plank-built vessels fixed with iron nails of the Romano-Celtic tradition were being constructed at the end of the Iron Age and into the Roman period. In contrast to the preceding centuries, there is also scarce evidence for continental European objects or other 'imports' for most of the Iron Age (Hill, Willis and Pacheco-Ruiz via Research Frameworks, 2022).
- 3.2.31 From the Late Iron Age there is more clear 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 and France/Belgium, and a range of other Roman material. The presence of such objects, along with literary evidence (notably Strabo Geography IV.v.2–3; Caesar, De Bello Gallico V.i.12), points to the changing scale and the social-political importance of trade and exchange of particular types of 'exotic' non-British objects in parts of south-east and southern England (Fitzpatrick, 2003).

ROMAN (C. AD 43 TO 410)

- 3.2.32 During the Romano-British period, there is clear evidence for seaborne and coastal activity along the Suffolk and Essex coastlines. Several important sites were established in Suffolk following the Roman invasion in AD 43, including Ipswich, as well as evidence of enclosures, trackways, and fields.
- 3.2.33 A range of vessel types would have been in use during the Romano-British period to facilitate activity along the East Coast. Watercraft used for less archaeologically visible pursuits such as fishing would have also been present.
- 3.2.34 The remains of vessels from this period range from large ocean-going merchant vessels (St Peter Port 1) to estuarine and riverine craft (Blackfriars 1 and Barlands Farm) and vessels more suited for inland navigation (Zwammerdam). These vessels were heavily framed, robustly built and it is clear could potentially have withstood the rigours of regular open water navigation. Alongside these vessels there would likely also have been continued use of log and skin boats.
- 3.2.35 Two findspots of Roman coins (MEX1033272 and MEX1033273) are listed in the Essex HER record.



MEDIEVAL (C. 410 TO 1540)

- 3.2.36 After the fall of the Roman Empire, there appeared to be a decline in maritime activity and trade in the Early Medieval period. However, there was an apparent resurgence in mercantile trade within continental Europe from the late 6th century, and the 8th and 9th centuries saw the greatest economic growth since the Roman period (James *et al.*, 2010).
- 3.2.37 Most of this trade relied on water transport and as a result there was an increased focus on building urban settlements along rivers and coastlines to facilitate this (Clarke, 1985).
- 3.2.38 As with the Romano-British period, an extensive range of vessel types must have been in use to facilitate this surge in mercantile trade with continental Europe and Ireland in the Early Medieval period. Viking longships, such as the Skuldelev 2, are known to have been built in Dublin and most probably operated in the waters of the North Sea and English Channel (Crumlin-Pedersen, 2010).
- 3.2.39 The later Medieval period vessels increased both in size and complexity. This is evidenced by the increasing number of ship types that are recorded in historical and archaeological sources. One of the best-preserved examples in Britain is the large clinker-built vessel found in Newport, Gwent, dating to the latter half of the 15th century and measuring some 35 m in length.
- 3.2.40 It is also possible that cogs, flat bottomed, sharp-ended, trading vessels that originated in southern Denmark and the Baltic during the 13th century (Ellmers, 1994; Crumlin-Pedersen, 2010), would have visited the Sussex region as these vessels were used extensively across northern Europe and were known to have been built and operated by English merchants and shipowners as well as the English Crown (Runyan, 1994).
- 3.2.41 No archaeological examples of cogs exist in British waters, but several, well-preserved examples come from the Netherlands (for example, Weski, 1999) and the Baltic (for example, Adams and Rönby, 2002) indicating the potential of such vessels to survive from this period. Towards the end of the period, ship types such as carracks and hulks were also in use and are likely to have been at least comparable in size to the Newport Ship and possibly larger (see Crumlin-Pedersen, 2010).
- 3.2.42 In addition to the large vessels discussed above, a range of much smaller craft would have been more common and would have been used to carry local trade along the coast. Wrecks such as the slate wreck at Pwll Fanog in the Menai Straits, a clinker-built vessel no more than 15 m in length (Gale and Fenwick, 1998), suggest the nature of such trade. Furthermore, myriad of small vessels would have been used for fishing, lightering, and inshore activities.

POST MEDIEVAL (C. 1540 TO 1901)

- 3.2.43 In the Post Medieval period, there is a drastic increase in historical sources with documents relating to trade and warfare providing detailed records. As a result, known maritime losses also began to be recorded, although these were fairly sparse from the 14th to 17th centuries and progressively became more comprehensive in the 18th and 19th centuries (Gale and Fenwick, 1998).



- 3.2.44 The expansion of the royal fleet under Henry VIII between 1536 to 1547, which continued under Elizabeth I, was the single greatest naval expansion ever seen at that time. This new focus on naval prowess continued into the 19th century (Historic England, 2016).
- 3.2.45 The establishment of the East India Company in 1600, and general expansion of international maritime trade not only greatly increased the tonnage of the English merchant fleet, but the trade and maritime activity along the English coastline. With this increased shipping and naval activity and traffic came increased wrecking events within the marine archaeology study area.
- 3.2.46 During the Second Anglo-Dutch war there were a number of battles fought at sea within the marine archaeology study area. Between 1-4 June 1666 the Thames Estuary witnessed a series of sea battles that are collectively known as 'The Four Days Battle'. These began off the Kent coast near North Foreland but progressed into the area of the Gabbards.
- 3.2.47 Several English ships ran aground on The Galloper Sand, most of which were re-floated, but the *Prince Royal* stuck fast. The Dutch attempt to re-float the *Prince Royal* after its capture was unsuccessful, so it was burnt and lost on the sand bank. The recorded wreck site of the *Prince Royal* is outside the marine archaeological study area.
- 3.2.48 This battle was followed shortly by the St. James' Day Battle, NRHE HOB_UID 1584743, (also known as the Battle of Orfordness, Battle of the North Foreland or the Two Days' Battle). The battle took place on 25-26 July 1666 and is recorded as an area within the marine archaeology study area (Figure 6.4). Debris or wreck remains from these events may be preserved within the seabed in this area.
- 3.2.49 The construction and composition of ships also underwent a transition at this time, especially from the 19th century when the main construction type and propulsion moved from wood and sail to iron and steam. The wreck of SS *Willy* (Section 3.3), built in 1891, is an example of a late post-medieval ship design when steam propulsion became the dominant type over sail.

MODERN (C. 1901 TO PRESENT)

- 3.2.50 The rapid pace of technological development in the beginning of the 20th century had a great impact on the broad pattern of maritime activity. Wartime innovations led to the increase in use of new types of vessels and technologies, and a transformation of a growing global shipping trade.
- 3.2.51 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.
- 3.2.52 Deriving from the Modern period (1900-present) there are a total of 39 known wrecks of ships or boats within the marine archaeology study area (13 of which are listed by the UKHO as DEAD) including two aircraft crash sites. Seven of these wrecks and one of the aircraft has been identified in the geophysical data (Figure 6.4). Vessels from this period range greatly in type, size, and use, though there is a bias towards vessels lost in the World Wars due to the sheer number of losses resulting from these conflicts. Additionally, there are two recorded aircraft losses and sites of aircraft components, further described below, all from the Modern period.



3.2.53 There are examples military defences, particularly anti-tank defences, from the First and Second World Wars along the coast in the Essex HER.

DATE UNKNOWN

3.2.54 There are 24 recorded wrecks of unknown dates within the marine archaeology study area recorded in the UKHO data. These are described in Section 3.3.

3.3 KNOWN WRECKS AND THEIR ARCHAEOLOGICAL SIGNIFICANCE

3.3.1 Known wrecks, listed in order of their UKHO number, described in the following sections are illustrated in Figure 6.4, with the exclusion zones recommended for them illustrated in Figure 6.14, Figure 6.15, Figure 6.16, Figure 6.17. The significance assessment matrix has been used where there is enough available data to assess the wreck and is based on the criteria for the assessment of archaeological significance, as set out by the Department for Culture Media and Sport (DCMS 2013). Where their identity has been recorded their name and prefix at time of loss have been included, they are otherwise named as Unknown.

3.3.2 There are 34 LIVE wrecks, 21 DEAD wrecks, six UNKNOWN or unconfirmed, and one wreck listed as not fully surveyed within the study area. Unless otherwise indicated, the size of each wreck is presented as: length x width x depth m.

UKHO 10915 FV MARIE SIMONE

3.3.3 A small British fishing boat lost on 24 October 1968, whose sinking was reported at the time of loss. The wreck is currently listed as DEAD and was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.4 As a modern vessel of no particular note, this vessel is not deemed to be archaeologically significant.

Table 3.1: Archaeological significance of UKHO 10915 FV *Marie Simone*

Criteria (DCMS 2013)	Archaeological significance
Period	Low
Rarity	Low
Documentation	Low
Group value	Low
Survival/condition	Unknown
Fragility/vulnerability	Low
Diversity	Low
Potential	Low
Overall	LOW



UKHO 14444 UNKNOWN

3.3.5 An unidentified fishing trawler with no further information about its loss. The wreck is currently listed as LIVE and reported by UKHO surveys to have a clear magnetic return and to be partly intact and mostly upright, however was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL POTENTIAL

3.3.6 As a modern vessel of no particular note, this vessel is not deemed to be archaeologically significant.

Table 3.2: Archaeological significance of UKHO 14444

Criteria (DCMS 2013)	Archaeological significance
Period	Low
Rarity	Low
Documentation	Low
Group value	Low
Survival/condition	Medium
Fragility/vulnerability	Low
Diversity	Low
Potential	Low
Overall	LOW

UKHO 14458 SS SELMA

3.3.7 A Norwegian steam ship with 1654 gross tonnage and dimensions listed as 82.3 x 11.9 x 5.5 m. SS *Selma* was lost when struck a mine and sank on 25 October 1915 and is currently listed as DEAD and was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.8 The SS *Selma* is one of many ships that served in essential merchant roles during the First World War, and one of many that were lost to mines. The site, should it be located, has the potential to be of medium archaeological significance.

Table 3.3: Archaeological significance of UKHO 14458 SS Selma

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Medium
Documentation	Low
Group value	Low
Survival/condition	Unknown
Fragility/vulnerability	Low



Criteria (DCMS 2013)	Archaeological significance
Diversity	Low
Potential	Medium
Overall	MEDIUM

UKHO 14461 MV JANNY

- 3.3.9 A Dutch steel coastal cargo ship with three-cylinder two stroke diesel engine of 248 gross tonnage built by Appingedammer Brons Motorenfabriek, and dimensions of 47 x 6.63 x 2.83 m. MV *Janny* was built in 1948 in Wirdum, the Netherlands, by A. Apol, C. V. Scheepsweef.
- 3.3.10 MV *Janny* was lost under Captain J. W. Niesing due to flooding from a water leakage on 26 January 1967 while on passage from Grimsby to Le Havre and carrying a cargo of 280 tonnes of titanium oxide. The crew of five were rescued by the Dutch coaster MS *Equator* and British ferry *Suffolk*.
- 3.3.11 The wreck is currently listed as LIVE and corresponds with geophysical anomaly MA0003.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

- 3.3.12 As a relatively modern vessel of no particular note, this vessel is not deemed to be archaeologically significant.

Table 3.4: Archaeological significance of UKHO 14461 MV *Janny*

Criteria (DCMS 2013)	Archaeological significance
Period	Low
Rarity	Low
Documentation	Low
Group value	Low
Survival/condition	Low
Fragility/vulnerability	Low
Diversity	Low
Potential	Low
Overall	LOW

UKHO 14462 UNKNOWN

- 3.3.13 The wreck of an unidentified vessel with no further details about its loss. The wreck is currently listed as DEAD and was not identified in the VE geophysical data.

UKHO 14464 HMT FLEMING

- 3.3.14 A British steel steam powered armed minesweeper, previously a trawler fishing vessel. Built in Hull in 1929 by Cook, Welton and Gemmell Ltd with dimensions of 42.7 x 7.5 x 4 m, a three-cylinder triple expansion engine, single shaft, one screw and one boiler.



- 3.3.15 On the 15 August 1934, while returning from Iceland, HMT *Fleming* rammed and sank fishing vessel *Boys Own* at full speed. All six crew of *FV Boys Own* were saved and *HMS Fleming* was later found to be at fault. In 1938 *HMS Fleming* was requisitioned by the Royal Navy and used as a minesweeper.
- 3.3.16 Lost under Captain Ernest George Gerney on 24 July 1940, while in company with HMT *Berberis* in the Thames Estuary, four German aircraft appeared from the clouds, two attacking each vessel. The HMT *Fleming* received a direct hit amidship and sank rapidly. The HMT *Berberis* continued with fire and saw one aircraft explode and another hit. The trawler HMT *Corena* picked up the survivors of the *HMS Fleming* but there were twenty-one casualties.
- 3.3.17 The wreck is currently listed as DEAD and was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

- 3.3.18 HMT *Fleming* is a good example of wartime minesweeper trawlers from the Second World War. The site, should it be located, has the potential to be archaeologically significant, especially if any of its minesweeping equipment is present. No indication within the VE geophysical data and no other UKHO surveys have located the wreck in this position.

Table 3.5: Archaeological significance of UKHO 14461 HMT *Fleming*

Criteria (DCMS 2013)	Archaeological significance
Period	Low
Rarity	Low
Documentation	Medium
Group value	Medium
Survival/condition	Unknown
Fragility/vulnerability	Unknown
Diversity	Medium
Potential	Medium
Overall	MEDIUM

UKHO 14468 UNKNOWN

- 3.3.19 The wreck of a potential German U-boat with no further details about its loss. It was first detected as an obstruction in 1918 but not located since. The wreck is currently listed as DEAD and was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

- 3.3.20 The site, should it be located, has the potential to be of high archaeological significance, especially should it be confirmed as a German U-boat from the First World War. No indication within the VE geophysical data and no other UKHO surveys have located the wreck in this position.



Table 3.6 Archaeological significance of UKHO 14468

Criteria (DCMS 2013)	Archaeological significance
Period	High
Rarity	High
Documentation	Low
Group value	High
Survival/condition	Unknown
Fragility/vulnerability	Unknown
Diversity	High
Potential	High
Overall	HIGH

UKHO 14472 SS HAYTOR

3.3.21 A British steel cargo steam ship, built in Sunderland in 1925 by John Crown and Sons Ltd, with one three-cylinder triple expansion engine, two boilers, four corrugated furnaces, a single shaft and one screw, a 1189 gross tonnage and dimensions of 67.1 x 10.7 x 4.5 m.

3.3.22 SS *Haytor* was lost on 26 July 1940 when mined *en route* from London to Blyth. There was one casualty. This wreck is currently listed as DEAD and was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.23 The SS *Haytor* has been assigned low archaeological significance as its condition is unknown, as well as its being a common and otherwise well-documented ship type. Despite this, should the vessel be located and preserved in good condition, it does have the potential to add to the archaeological record.

Table 3.7: Archaeological significance of UKHO 14472 SS Haytor

Criteria (DCMS 2013)	Archaeological significance
Period	Low
Rarity	Low
Documentation	Low
Group value	Low
Survival/condition	Unknown
Fragility/vulnerability	Unknown
Diversity	Low
Potential	Medium
Overall	LOW



UKHO 14475 UNKNOWN

3.3.24 The wreck of an unidentified vessel with no further details about its loss, however UKHO survey data reports it as a small, upturned vessel measuring 18 x 7 x 1.8 m. The wreck is currently listed as DEAD and was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.25 As an unidentified vessel of no particular note, this vessel is not deemed to be archaeologically significant. However; there is potential that further information may change this assessment.

Table 3.8: Archaeological significance of UKHO 14475

Criteria (DCMS 2013)	Archaeological significance
Period	Unknown
Rarity	Unknown
Documentation	Unknown
Group value	Unknown
Survival/condition	Unknown
Fragility/vulnerability	Unknown
Diversity	Unknown
Potential	Unknown
Overall	UNKNOWN

UKHO 14492 MV INGI

3.3.26 A Panamanian steel coastal cargo ship with three-cylinder diesel engine, formerly the Dutch MS *Temar*, built in 1929 by Scheepswerf Gideon V/H J. Koster Hzn.

3.3.27 MV *Ingi* foundered and capsized on 14 September 1972 *en route* from Vuren to Colchester with cargo of building bricks. The crew were rescued by German MS *Hedwig Pannbacker*.

3.3.28 This wreck is currently listed as LIVE and was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.29 As a relatively modern vessel of no particular note, this vessel is not deemed to be archaeologically significant.

Table 3.9: Archaeological significance of UKHO 14492 MV *Ingi*

Criteria (DCMS 2013)	Archaeological significance
Period	Low
Rarity	Low
Documentation	Low



Criteria (DCMS 2013)	Archaeological significance
Group value	Low
Survival/condition	Unknown
Fragility/vulnerability	Unknown
Diversity	Low
Potential	Medium
Overall	LOW

UKHO 14513 SS *NICO*

- 3.3.30 A Norwegian steel cargo steam ship built in Oslo in 1913 by Akers Mekaniske Verksted A/S with one three-cylinder triple expansion engine, a single shaft and single screw, a gross tonnage of 712 and dimensions of 56.1 x 9.2 x 4.4 m.
- 3.3.31 SS *Nico* was lost under Captain Jørgen Jørgensen on 18 December 1915 *en route* from Newcastle to Boulogne with a cargo of coke when hit by a mine from German U-boat *UB-3*. There were two casualties.
- 3.3.32 This wreck is currently listed as LIVE and corresponds with geophysical anomaly MA0002.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

- 3.3.33 The SS *Nico* is one of many ships that served in essential merchant roles during the First World War, and one of many that were torpedoed by German U-boats. The reported preservation suggests a good concentration of archaeological material which is why it is assessed as being of medium archaeological significance.

Table 3.10: Archaeological significance of UKHO 14513 SS *Nico*

Criteria (DCMS 2013)	Archaeological significance
Period	High
Rarity	Medium
Documentation	Medium
Group value	Medium
Survival/condition	High
Fragility/vulnerability	Medium
Diversity	Low
Potential	Medium
Overall	MEDIUM

UKHO 14514 HMS *ML-127* (POSSIBLY)

- 3.3.34 A British Fairmile B class motor launch boat with two diesel engines, built in Lowestoft in 1940 by Brookes Marine Ltd. with a wood and plywood construction, dimensions of 34.1 x 5.6 x 1.2 m, and armed with one 76 mm gun, two 20 mm machine guns and 12 depth charges.



- 3.3.35 HMS *ML-127* was lost under Captain Eric Kneen on 22 November 1940 when it struck a mine in the Thames Estuary resulting in 11 casualties.
- 3.3.36 The wreck is currently listed as LIVE and was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

- 3.3.37 The Fairmile B class is representative of the style of prefabricated motor launches used during the Second World War. Many of the Fairmile motor launches were retired for use as fishing vessels and houseboats following the war, and although they are well documented the survival of examples of this class is certainly rarer, which is why the wreck is assessed as of medium significance.

Table 3.11: Archaeological significance of UKHO 14514 HMS *ML-127*

Criteria (DCMS 2013)	Archaeological significance
Period	High
Rarity	High
Documentation	Medium
Group value	High
Survival/condition	Unknown
Fragility/vulnerability	Low
Diversity	Medium
Potential	Medium
Overall	MEDIUM

UKHO 14517 SS *SIMON BOLIVAR*

- 3.3.38 The wreck of a Dutch steel, steam powered ocean liner. Built in Rotterdam in 1927 by Rotterdamsche Droogdok Mij. N. V. with a four-cylinder quadruple expansion steam engine, four single boilers, 12 corrugated furnaces and a gross tonnage of 7906 and dimensions of 134 x 18.03 x 8.46 m.
- 3.3.39 On 18 November 1938 under Captain H. Voorspuly, while on voyage from Holland to Paramibo *Simon Bolivar* struck two mines off Harwich.
- 3.3.40 The wreck is currently listed as LIVE and was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

- 3.3.41 As a relatively modern vessel of no particular note, this vessel is not deemed to be archaeologically significant.

Table 3.12 Archaeological significance of UKHO 14517 SS *Simon Bolivar*

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Low



Criteria (DCMS 2013)	Archaeological significance
Documentation	Low
Group value	Low
Survival/condition	Unknown
Fragility/vulnerability	Unknown
Diversity	Low
Potential	Medium
Overall	LOW

UKHO 14518 UNKNOWN

3.3.42 The wreck of an unidentified vessel with no further details about its loss. The wreck is currently listed as DEAD and was not identified in the VE geophysical data.

UKHO 14519 UNKNOWN

3.3.43 The wreck of an unidentified vessel with no further details about its loss. The wreck is currently listed as DEAD and was not identified in the VE geophysical data.

UKHO 14520 MV *DROFLI*

3.3.44 The wreck of a leisure motor yacht lost 2 August 1956 with no further details about its loss. The wreck is currently listed as LIVE and was not identified in the VE geophysical data.

3.3.45 As a modern vessel of no particular note, this vessel is not deemed to be archaeologically significant.

Table 3.13: Archaeological significance of UKHO 14520 MV *Drofli*

Criteria (DCMS 2013)	Archaeological significance
Period	Low
Rarity	Low
Documentation	Low
Group value	Low
Survival/condition	Low
Fragility/vulnerability	Low
Diversity	Low
Potential	Low
Overall	LOW

UKHO 14522 UNKNOWN

3.3.46 The wreck of an unidentified vessel with no further details about its loss. The wreck is currently listed as DEAD and was not identified in the VE geophysical data.



UKHO 14523 UNKNOWN

3.3.47 The wreck of an unidentified vessel with no further details about its loss. The wreck is currently listed as DEAD and was not identified in the VE geophysical data.

UKHO 14525 SS MORAR

3.3.48 A British steel cargo steam ship built in Wallsend in 1924 by Swan, Hunter, and Wigham Richardson Ltd., with one three-cylinder triple expansion steam engine, two single boilers, four corrugated furnaces, a single shaft and one screw; dimensions of 73.1 x 11.3 x 5.4 m.

3.3.49 Originally named SS *Forestash* from 1924-1926, then SS *Cramlington* from 1926-1932 and SS *Herbert* from 1932-1934 and owned at the time of loss by the Western Navigation Company.

3.3.50 SS *Morar* was lost on the 27 of November 1943 under Captain James Joseph Shaw *en route* from London to Belfast when struck by a mine laid by German E-boats; the casualties included 11 crew and three gunners.

3.3.51 The wreck is currently listed as LIVE and corresponds with geophysical anomaly MA0022.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.52 The SS *Morar* is not of an uncommon type of vessel, and while it served an important wartime role, as did many others, due to the condition of the wreck it is certainly better served by other examples elsewhere. Despite this, it still remains a significant concentration of archaeological material.

Table 3.14: Archaeological significance of UKHO 14525 SS *Morar*

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Low
Documentation	Medium
Group value	Low
Survival/condition	Medium
Fragility/vulnerability	Low
Diversity	Low
Potential	Medium
Overall	MEDIUM

UKHO 14527 SS WEARSIDE

3.3.53 A British steel cargo steam ship built in 1899 in West Hartlepool by William Gray and Co. Ltd., with a gross tonnage of 3,560 and dimensions of 103 x 15.5 x 7.3 m, and a three-cylinder triple expansion steam engine, three boilers, nine regular furnaces, GS 135, HS 4680, a single shaft, single screw and four masts. SS *Wearside* was owned at the time of loss by The Hartlepool Seatonia SS Co. Ltd.



- 3.3.54 SS *Wearside* was lost on 25 October 1917 *en route* from Newcastle to Genoa with a cargo of coal when hit by a mine from German U-boat *UC-11* in the Thames Estuary. There were no casualties.
- 3.3.55 The wreck is currently listed as LIVE but was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

- 3.3.56 The SS *Wearside* is not of an uncommon type of vessel. It served an important war-time role during the First World War and also forms part of a wider narrative of the First World War U-boat activity. Should the remains be located it is expected that there will be a significant concentration of archaeological material on site.

Table 3.15: Archaeological significance of UKHO 14527 SS *Wearside*

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Medium
Documentation	Medium
Group value	Medium
Survival/condition	Unknown
Fragility/vulnerability	Low
Diversity	Medium
Potential	Medium
Overall	MEDUM

UKHO 14528 *SECOND CHANCE* (POSSIBLY)

- 3.3.57 A British wooden 11 m leisure boat that foundered on 30 October 1977 and was taken in tow by Walton lifeboat but cast adrift in sinking condition.
- 3.3.58 The wreck is currently listed as LIVE but was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

- 3.3.59 As a modern vessel of no particular note, this vessel is not deemed to be archaeologically significant.

Table 3.16 Archaeological significance of UKHO 14528 *Second Chance*

Criteria (DCMS 2013)	Archaeological significance
Period	Low
Rarity	Low
Documentation	Low
Group value	Low
Survival/condition	Unknown



Criteria (DCMS 2013)	Archaeological significance
Fragility/vulnerability	Low
Diversity	Low
Potential	Low
Overall	LOW

UKHO 14529 SS PALEMBANG (POSSIBLY)

- 3.3.60 A Dutch steel passenger and cargo steam ship built in 1911 in Rotterdam by Bonn and Mees N. V., with a gross tonnage of 6674 and dimensions of 131.7 x 16.6 x 10.4 m with triple expansion engines. SS *Palembang* was owned at the time of loss by N. V. Rotterdamsche Lloyd.
- 3.3.61 SS *Palembang* was lost under Captain Visser on 18 March 1916 *en route* from Rotterdam to Batavia when torpedoed by German U-boat *UC-10*. All crew were saved.
- 3.3.62 The wreck is currently listed as LIVE but was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

- 3.3.63 SS *Palembang* is not of an uncommon type of vessel. It served an important wartime role during the First World War and also forms part of a wider narrative of the First World War U-boat activity. Should the remains be located it is expected that there will be a significant concentration of archaeological material on site.

Table 3.17: Archaeological significance of UKHO 14529 SS *Palembang*

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Low
Documentation	Medium
Group value	Medium
Survival/condition	Unknown
Fragility/vulnerability	Low
Diversity	Low
Potential	Medium
Overall	MEDIUM

UKHO 14530 SS DYNAMO

- 3.3.64 The wreck of a British steel cargo steam ship built in 1920 in Workington by Williamson R. & Son with a gross tonnage of 809, dimensions of 56.8 x 9 x 3.8 m, a three-cylinder triple expansion steam engine, single shaft, single screw, single boiler and three plain furnaces.



3.3.65 *Dynamo* was lost on 17 April 1943 on a voyage from London to Hull with general cargo when hit by a mine. Seven lives were lost.

3.3.66 The wreck is currently listed as LIVE but was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.67 SS *Dynamo* uncommon type of vessel, and while it served an important wartime role, as did many others, due to the reported dispersed condition of the wreck it is certainly better served by other examples elsewhere.

Table 3.18: Archaeological significance of UKHO 14530 SS *Dynamo*

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Low
Documentation	Medium
Group value	Low
Survival/condition	Unknown
Fragility/vulnerability	Low
Diversity	Low
Potential	Medium
Overall	MEDIUM

3.3.68

UKHO 14534 HMS *LORD ST VINCENT* (PART OF)

3.3.69 The wreck of a British drifter with no further details about its loss. The wreck is currently listed as DEAD and was not identified in the VE geophysical data.

UKHO 14535 SS *NORHAUK*

3.3.70 A Norwegian steel cargo steam ship built in 1919 in Vancouver by G. M. Standifer Construction Corp. with a gross tonnage of 6,086, dimensions of 122.3 x 16.2 x 9.7 m, a three-cylinder triple expansion steam engine, single shaft, single screw, three steam boilers and nine corrugated furnaces. Originally named SS *Waban* from 1919-1940 under American ownership, then SS *Empire Sambar* from 1940-1941 under British ownership.

3.3.71 On 6 March 1941 the vessel suffered an explosion in the engine room while at sea and was then towed in, repaired and renamed SS *Empire Beaver*. SS *Norhauk* was owned at time of loss by Den Norske.



- 3.3.72 *SS Norhauk* was lost under Captain Thorvald Birger Lihaug on 21 December 1943 while carrying much needed war supplies including 6,800 tonnes of general cargo (comprising of 111 tonnes of flour, 863 tonnes of cheese, 100 tonnes of zinc, 727 tonnes of aluminium, 627 tonnes of military vehicles, 60 tonnes of tank parts, 95 tonnes of wireless sets, 236 tonnes of guns and aircraft, 500 tonnes of copper, 516 tonnes of ferro chrome and 103 tonnes of silico manganese) by a mine in Thames Estuary. The explosion caused the vessel to nearly sever in two.
- 3.3.73 The wreck was later heavily depth charged by the Admiralty Wreck Dispersal Department, after which the salvage company Risdon Beazley Ltd. recovered by grab 1,121 tonnes of copper, zinc and aluminium.
- 3.3.74 The wreck is currently listed as LIVE and corresponds with geophysical anomaly MA0020.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

- 3.3.75 *SS Norhauk* is not of an uncommon type of vessel. While it served an important war-time role, as did many others, the poor condition due to the dispersal activities means that the wreck is better represented by other examples elsewhere. Despite this, some concentration of archaeological material is expected on site.

Table 3.19: Archaeological significance of UKHO 14535 *SS Norhauk*

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Low
Documentation	Medium
Group value	Medium
Survival/condition	Low
Fragility/vulnerability	Low
Diversity	Low
Potential	Medium
Overall	MEDIUM

UKHO 14536 FOUL GROUND

- 3.3.76 During a salvage attempt steel plates and frames were recovered and disposed of in 1979 but no further details are recorded about the vessel or loss. Fragments of the wreckage supposedly remain on the seabed.
- 3.3.77 The wreck is currently listed as LIVE and was not identified in the VE geophysical data.

UKHO 14537 *TERUKUNI MARU*

- 3.3.78 A Japanese steel ocean liner built in 1929 by Mitsubishi Kobe shipyard with a gross tonnage of 11,930 and dimensions of 153.9 x 19.5 x 11.3 m, two ten-cylinder Sulzer diesel engines, two boilers, dual shaft and two screws. *Terukuni Maru* was owned at time of loss by Nippon Yusen Kaisha.



- 3.3.79 The ocean liner was lost on 21 November 1939 when *en route* from Yokohama via Casablanca to London when it detonated a magnetic mine at the mouth of the Thames; no lives were lost. The British and Germans have both accused each other of having laid the mine and it has never been clear who was responsible.
- 3.3.80 After the war the wreck was cleared with explosives and it is currently listed as buried LIVE, however it was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

- 3.3.81 Steel ocean liners such as *Terukuni Maru* was not of an uncommon type of vessel in the 1930's. The poor condition due to dispersal activities means that the wreck is better represented by other examples elsewhere. Despite this, some concentration of archaeological material is expected on site should it be located.

Table 3.20: Archaeological significance of UKHO 14537 *Terukuni Maru*

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Medium
Documentation	Medium
Group value	Low
Survival/condition	Unknown
Fragility/vulnerability	Unknown
Diversity	Low
Potential	Medium
Overall	LOW

UKHO 14540 HMS *LORD VINCENT* (PART OF)

- 3.3.82 A British steam steel armed patrol vessel, previously a fishing drifter built in 1929 by Chambers John Ltd., in Lowestoft with a gross tonnage of 115 and dimensions of 28 x 6.1 x 2.4 m, a three-cylinder, triple expansion steam engine, single boiler, two plain furnaces, and a single shaft and screw. HMS *Lord Vincent* operated as a seasonal trawler out of Padstow and Fleetwood before being requisitioned for war service on contraband control in 1939 and used as an Auxiliary Patrol Boat and Balloon Barrage Vessel and was owned at the time of loss by the Admiralty.
- 3.3.83 HMS *Lord Vincent* was lost on 7 July 1941 when hit by a mine off the northeast Gunfleet Buoy in the Thames Estuary, there was one casualty.
- 3.3.84 The wreck is currently listed as LIVE and was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

- 3.3.85 HMS *Lord Vincent* is not of an uncommon type of vessel, and while it served an important wartime role, so did many others. Despite this, should the vessel be located and preserved in good condition, it does have the potential to add to the archaeological record.



Table 3.21: Archaeological significance of UKHO 14540 HMS *Lord Vincent*

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Medium
Documentation	Medium
Group value	Medium
Survival/condition	Unknown
Fragility/vulnerability	Medium
Diversity	Medium
Potential	Medium
Overall	MEDIUM

UKHO 14541 UNKNOWN

3.3.86 The wreck of an unidentified vessel lost in 1916 with no further details about its loss. The wreck is currently listed as DEAD but correlates with magnetic anomaly MA6243.

UKHO 14543 SS *MARIE LEONHARDT* (PROBABLY)

3.3.87 One of two locations and UKHO IDs for a British steel cargo steam ship built in 1902 in Luebeck by Koch Henry A. G. with a gross tonnage of 1,466, dimensions of 76.5 x 11.3 x 4.9 m, a three-cylinder triple expansion steam engine, single shaft and one screw. Originally named SS *Wilhelm Oelssner* from 1902-1904, then SS *Anhalt* from 1904-1913 under German ownership and operated at the time of loss by the Admiralty.

3.3.88 SS *Marie Leonhardt* was lost on 14 February 1917 *en route* from Hartlepool to London with a cargo of coal when sunk by a mine from the German U-boat *UC-11*. Five lives were lost.

3.3.89 The wreck is currently listed as LIVE and was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.90 SS *Marie Leonhardt* is one of many ships that served in essential merchant roles during the First World War, and one of many that were lost to mines. Due to its slightly earlier building year and its colorful career, the site, should it be located, has the potential to be of medium archaeological significance.

Table 3.22 Archaeological significance of UKHO 14543 SS *Marie Leonhardt*

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Medium
Documentation	Medium
Group value	Low



Criteria (DCMS 2013)	Archaeological significance
Survival/condition	Unknown
Fragility/vulnerability	Low
Diversity	Low
Potential	Medium
Overall	MEDIUM

UKHO 14544 HMSM E-6

- 3.3.91 The first of two records for this British steel submarine. HMSM *E-6* was powered with diesel and battery propulsion. Commissioned on 17 October 1913, it had a short career in the First World War until it was lost on 26 December 1915.
- 3.3.92 HMSM *E6* was carrying out an anti-submarine patrol in the North Sea. A trawler had been sunk by a mine in the same position shortly before and a British torpedo boat signalled HMSM *E-6* to avoid the minefield. However, this warning was ignored and HMSM *E-6* struck a mine resulting in 31 casualties.
- 3.3.93 The wreck is currently listed as LIVE and was not identified in the VE geophysical data, also see UKHO 14983.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

- 3.3.94 As a very important feature in both naval and first war history, should this submarine be located it is likely to be of very high archaeological significance.

Table 3.23: Archaeological significance of UKHO 14544 HMSM E-6

Criteria (DCMS 2013)	Archaeological significance
Period	High
Rarity	High
Documentation	Medium
Group value	High
Survival/condition	Medium
Fragility/vulnerability	Medium
Diversity	High
Potential	High
Overall	HIGH

UKHO 14545 MV BONNINGTON COURT

- 3.3.95 A British steel cargo ship built in 1929 in Glasgow by Robert Duncan and Co. Ltd. for the Court Line, London. *MV Bonnington Court* had a gross tonnage of 4,009, dimensions of 127.8 x 16.92 x 7.9 m, and a six-cylinder 4 SCSA diesel engine, two double boilers, a single shaft and single screw.
- 3.3.96 The ship and two crew were lost on 19 January 1941 during a German air raid by Luftwaffe aircraft between Harwich and the Tyne.



3.3.97 The wreck is currently listed as LIVE and was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.98 MV *Bonnington Court* is one of many ships that served in essential merchant roles during the Second World War, and one of many that were lost to air raids. The site, should it be located, has the potential to be of medium archaeological significance.

Table 3.24: Archaeological significance of UKHO 14545 MV *Bonnington Court*

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Low
Documentation	Medium
Group value	Medium
Survival/condition	Unknown
Fragility/vulnerability	Low
Diversity	Low
Potential	Medium
Overall	MEDIUM

UKHO 14546 SS *MICHAIL ONTCHOUKOFF*

3.3.99 A Danish cargo steam ship. Built in 1905 in Glasgow by Clyde Shipbuilding and Engineering Co. Ltd., with a gross tonnage of 2,118, dimensions of 89.9 x 12.8 x 6.1 m, a triple expansion engine, two boilers, a single shaft and single screw. Owned at the time of loss by A/S Dansk Russiske Dampskibsselskabet.

3.3.100 Lost on 17 December 1916 *en route* from Rosario to Aarhus with a cargo of maize, when sunk by a mine from German U-boat *UC-11*. There were no casualties.

3.3.101 The wreck is currently listed as DEAD and was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.102 SS *Michail Ontchoukoff* is one of many ships that served in essential merchant roles during the First World War, and one of many that were lost to mines. The site, should it be located, has the potential to be of medium archaeological significance.

Table 3.25 Archaeological significance of UKHO 14546 SS *Michail Ontchoukoff*

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Medium
Documentation	Medium
Group value	Low



Criteria (DCMS 2013)	Archaeological significance
Survival/condition	Unknown
Fragility/vulnerability	Low
Diversity	Low
Potential	Medium
Overall	MEDIUM

UKHO 14548 HMS *RESONO* (FY1042) (POSSIBLY)

3.3.103 A British steel steam powered fishing vessel, used as a minesweeper during the First World War. Built in 1910 in Hull by Cook, Welton and Gemmell Ltd., with a gross tonnage of 230, dimensions of 37.5 x 6.7 x 3.7 m, and a three-cylinder triple expansion engine, single shaft, one screw and one boiler and owned at the time of loss by the Royal Navy.

3.3.104 Lost on 26 December 1915 when sunk by mine from German U-boat *UC-5*. Thirteen persons were lost.

3.3.105 The wreck is currently listed as LIVE and was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.106 HMS *Resono* is a good example of wartime minesweeper trawlers from the Second World War. The site, should it be located, has the potential to be archaeologically significant, especially if any of its minesweeping equipment is present. No indication within the VE geophysical data and no other UKHO surveys have located the wreck in this position.

Table 3.26: Archaeological significance of UKHO 14548 HMS *Resono*

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Medium
Documentation	Medium
Group value	Low
Survival/condition	Unknown
Fragility/vulnerability	Low
Diversity	Low
Potential	Medium
Overall	MEDIUM

UKHO 14553 UNKNOWN

3.3.107 The wreck of an unidentified vessel with no further details about its loss. The wreck is currently listed as LIVE and corresponds with geophysical anomaly MA0012.



UKHO 14555 SS VANCOUVER

- 3.3.108 A British armed steel tanker steam ship built in 1928 in Greenock by Greenock and Grangemouth Dockyard Co. Ltd., with a gross tonnage of 5,729, dimensions of 124.97 x 16.46 x 9.14 m, a three-cylinder triple expansion steam engine, single shaft, single screw, three single boilers, nine corrugated furnaces and machinery aft.
- 3.3.109 SS *Vancouver* was lost under Captain H. Farquhar on 21 September 1941 when it struck a mine which set fire to the cargo of gasoline. The SS *Vancouver* burned for several days as no one could approach due to the petrol spread on the water surface. Three people escaped, but the remaining crew of 34 and six gunners perished.
- 3.3.110 The wreck is currently listed as LIVE and corresponds with geophysical anomaly MA0578.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

- 3.3.111 SS *Vancouver* is not of an uncommon type of vessel, and while it served an important wartime role transporting gasoline, so did many others. The poor condition due to the fire means that the wreck is better represented by other examples elsewhere. Despite this, some concentration of archaeological material is expected on site.

Table 3.27: Archaeological significance of UKHO 14555 SS *Vancouver*

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Medium
Documentation	Medium
Group value	Low
Survival/condition	Low
Fragility/vulnerability	Low
Diversity	Low
Potential	Medium
Overall	MEDIUM

UKHO 14576 UNKNOWN

- 3.3.112 The wreck of an unidentified vessel with no further details about its loss. The wreck is currently listed as LIVE and corresponds with geophysical anomaly MA0007.

UKHO 14581 UNKNOWN

- 3.3.113 The wreck of an unidentified vessel with no further details about its loss. The wreck is currently listed as LIVE and corresponds with geophysical anomaly MA0008.

UKHO 14587 SS FORT MASSAC

- 3.3.114 A victory type British steel cargo steam ship built in 1943 in Vancouver by Burrard Drydock Co., with a gross tonnage of 7,157, dimensions of 134.7 x 17.4 x 10.6 m, a three-cylinder triple expansion steam engine, two water tube boilers, HS 9704, single shaft, one screw and a cruiser stern. Owned by the Ministry of War Transport (WWII).



- 3.3.115 SS *Fort Massac* was Lost on 1 February 1946 *en route* from Middlesbrough to Cape Town with a general cargo when coming into collision with the SS *Thornaby*.
- 3.3.116 On 9 April 1946, whilst salvaging the wreck of SS *Fort Massac*, the SS *Empire Bridge* (UKHO 14588) struck the wreck and sank. In 1949 the SS *Corcrest* was also wrecked on the SS *Fort Massac* but patched up and continued to drift until it was considered a total loss. The SS *Corcrest* is recorded as having sunk outside the marine archaeology study area.
- 3.3.117 The wreck is currently listed as LIVE and was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

- 3.3.118 SS *Fort Massac* is not of an uncommon type of vessel, but it served an important wartime role. Despite numerous dispersals, sweeping and clearance campaigns, there is expected to be some concentration of archaeological material on the seabed from the wrecks that sank in the same area.

Table 3.28: Archaeological significance of UKHO 14587 SS *Fort Massac*

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Medium
Documentation	Medium
Group value	Medium
Survival/condition	Unknown
Fragility/vulnerability	Low
Diversity	Medium
Potential	Medium
Overall	MEDIUM

UKHO 14588 SS *EMPIRE BRIDGE*

- 3.3.119 A Tudor Queen class British steel coastal cargo steam ship, built in 1941 in Northwich by W. J. Yarwood and Sons Ltd., with a gross tonnage of 348, dimensions of 38.7 x 7.6 x 3 m, a three-cylinder triple expansion steam engine, single boiler, two corrugated furnaces, GS 35, HS 1105, single shaft, single screw, machinery aft and cruiser stern. Owned by the Ministry of War Transport (WWII).
- 3.3.120 Lost, together with an Admiralty Pontoon, on 9 April 1946 when the SS *Fort Massac* (UKHO 14587) was struck during a salvage attempt.
- 3.3.121 The wreck is currently listed as LIVE and was not identified in the VE geophysical data.



BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.122 SS *Empire Bridge* is not of an uncommon type of vessel, but it served an important wartime role. Despite numerous dispersals, sweeping and clearance campaigns, there is expected to be some concentration of archaeological material on the seabed from the wrecks that sank in the same area.

Table 3.29: Archaeological significance of UKHO 14588 SS *Empire Bridge*

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Medium
Documentation	Medium
Group value	Medium
Survival/condition	Unknown
Fragility/vulnerability	Low
Diversity	Medium
Potential	Medium
Overall	MEDIUM

UKHO 14595 SS *KONINGEN EMMA* (PART OF) (PROBABLY)

3.3.123 One position and UKHO ID for a Dutch passenger and cargo steam ship built in 1913 in Rotterdam by Maatschappij Fijenoord N. V., with a gross tonnage of 9,181, dimensions of 143.3 x 17.4 x 10.7 m, and two quadruple expansion engines.

3.3.124 Lost on 22 September 1915 *en route* from Batavia to Amsterdam with passengers and general cargo when struck by a mine laid by German U-boat *UC-7*.

3.3.125 The wreck is currently listed as LIVE and was not identified in the VE geophysical data, also see UKHO 14802.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.126 SS *Koningen Emma* is one of many ships that served in essential passenger and merchant roles during the First World War, and one of many that were lost to mines. The site, should it be located, has the potential to be of medium archaeological significance, especially should the remains of the interesting quadruple expansion engines be found.

Table 3.30 Archaeological significance of UKHO 14595 SS *Koningen Emma*

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Medium
Documentation	Medium
Group value	Low

Criteria (DCMS 2013)	Archaeological significance
Survival/condition	Unknown
Fragility/vulnerability	Low
Diversity	Low
Potential	Medium
Overall	MEDIUM

UKHO 14798 FV *PROTINUS* (POSSIBLY)

3.3.127 A Dutch fishing trawler, machine gunned and bombed by a German plane on 8 March 1940, killing two crew members. The remainder of the crew took to the lifeboat and were later rescued by British submarine HMS *Unity*.

3.3.128 The wreck is currently listed as LIVE and was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.129 FV *Protinus* is one of the many fishing vessels lost at sea during the Second World War. The site, should it be located, has the potential to be of some archaeological significance.

Table 3.31: Archaeological significance of UKHO 14798 FV *Protinus*

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Low
Documentation	Medium
Group value	Low
Survival/condition	Unknown
Fragility/vulnerability	Low
Diversity	Low
Potential	Medium
Overall	MEDIUM

UKHO 14800 UNKNOWN

3.3.130 The wreck of an unidentified vessel with no further details about its loss. The wreck is currently listed as LIVE and was not identified in the VE geophysical data.

UKHO 14802 SS *KONINGEN EMMA* (POSSIBLY)

3.3.131 One position and UKHO ID for a Dutch passenger and cargo steam ship built in 1913 in Rotterdam by Maatschappij Fijenoord N. V., with a gross tonnage of 9,181, dimensions of 143.3 x 17.4 x 10.7 m, and two quadruple expansion engines.



3.3.132 SS *Koningen Emma* was lost 22 September 1915 *en route* from Batavia to Amsterdam with passengers and general cargo when struck by a mine laid by German U-boat UC-7.

3.3.133 The wreck is currently listed as LIVE and was not identified in the VE geophysical data, also see UKHO 14595.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.134 SS *Koningen Emma* is one of many ships that served in essential passenger and merchant roles during the First World War, and one of many that were lost to mines. The site, should it be located, has the potential to be of medium archaeological significance, especially should the remains of the interesting quadruple expansion engines be found.

Table 3.32: Archaeological significance of UKHO 14802 SS *Koningen Emma*

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Medium
Documentation	Medium
Group value	Low
Survival/condition	Unknown
Fragility/vulnerability	Low
Diversity	Low
Potential	Medium
Overall	MEDIUM

UKHO 14894 MFV *PAULETTE*

3.3.135 A Belgian motor fishing vessel with diesel engine and tonnage of 36. Lost with no casualties on 19 May 1950 when struck a mine.

3.3.136 The wreck is currently listed as DEAD and was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.137 As a relatively modern vessel of no particular note, this vessel is not deemed to be archaeologically significant.

Table 3.33 Archaeological significance of UKHO 14894 MFV *Paulette*

Criteria (DCMS 2013)	Archaeological significance
Period	Low
Rarity	Low
Documentation	Low
Group value	Low



Criteria (DCMS 2013)	Archaeological significance
Survival/condition	Unknown
Fragility/vulnerability	Low
Diversity	Low
Potential	Low
Overall	LOW

UKHO 14970 HMS MAC-5 (POSSIBLY)

3.3.138 A British wooden motor torpedo boat (MTB-5) used as a minesweeper attendant craft during the Second World War built in 1936 in Hythe by British Power Boat, with a surface displacement tonnage of 18, dimensions of 18.4 x 5.3 x 1.1 m, three petrol engines, three shafts and three screws.

3.3.139 Owned at time of loss by the Admiralty and lost under Captain Frank Leon Laloe on 26 December 1940 when mined off Gunfleet Sands. There were ten casualties.

3.3.140 The wreck is currently listed as LIVE and was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.141 Due to its experimental construction technique and its contribution to the war effort in combination with its only being survived by a few examples should this wreck be located it is of high archaeological significance.

Table 3.34: Archaeological significance of UKHO 14960 HMS MAC-5

Criteria (DCMS 2013)	Archaeological significance
Period	High
Rarity	High
Documentation	Medium
Group value	Medium
Survival/condition	Unknown
Fragility/vulnerability	Low
Diversity	Medium
Potential	Medium
Overall	HIGH

UKHO 14983 HMSM E-6

3.3.142 The second of two potential locations for the British E-class steel submarine built in 1912 in Barrow-in-Furness by Vickers, Son and Maxim Ltd., submerged displacement tonnage of 796, dimensions of 54.3 x 4.6 x 3.35 m, two 1,750 horsepower diesel and two 600 horsepower electric engines and two screws, armed with four 18-inch torpedo tubes, one each at the bow and stern and two at the beam.



3.3.143 Lost under Captain William John Foster when carrying out an anti-submarine patrol in the North Sea on 26 December 1915 when it struck a mine laid by German U-boat UC-5. Thirty-one persons were lost.

3.3.144 The wreck is currently listed as DEAD and was not identified in the VE geophysical data (also see UKHO14544).

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.145 As a very important feature in both naval and First World War history, should this submarine be located it is likely to be of very high archaeological significance.

Table 3.35: Archaeological significance of UKHO 14983 HMSM E-6

Criteria (DCMS 2013)	Archaeological significance
Period	High
Rarity	High
Documentation	Medium
Group value	High
Survival/condition	Medium
Fragility/vulnerability	Medium
Diversity	High
Potential	High
Overall	VERY HIGH

UKHO 14996 UNKNOWN

3.3.146 The wreck of an unidentified vessel with no further details about its loss. The wreck is currently listed as LIVE and corresponds with magnetic anomaly MA6650.

UKHO 15035 UNKNOWN

3.3.147 The wreck of an unidentified vessel with no further details about its loss. The wreck is currently listed as DEAD but corresponds with geophysical anomaly MA0014.

UKHO 15074 UNKNOWN

3.3.148 The wreck of an unidentified wooden vessel with no further details about its loss. The wreck is currently listed as LIVE and corresponds with geophysical anomaly MA0034.

UKHO 15709 UNKNOWN

3.3.149 The wreck of an unidentified vessel with no further details about its loss. The wreck is currently listed as DEAD and was not identified in the VE geophysical data.

UKHO 15819 SS WILLY

3.3.150 A Dutch steel cargo steam ship built in 1891 in Newcastle-upon-Tyne by Wood, Skinner and Co. Ltd., with a gross tonnage of 862, dimensions of 62.8 x 9.2 x 4.2 m, a three-cylinder triple expansion steam engine, single boiler, three corrugated furnaces, GS 54, HS 1890, a single shaft and one screw. Originally named SS *Tynemouth* from 1891-1900, then sold to Berghuys W. H. of Amsterdam and renamed.



3.3.151 Lost on 1 October 1911 *en route* from Newcastle-on-Tyne to Amsterdam with a cargo of coal when it foundered during a storm.

3.3.152 The wreck is currently listed as LIVE and was not identified in the VE geophysical data. SS *Willy* is the only example of post-medieval, 19th century ship design recorded within the marine archaeology study area.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.153 SS *Willy* is the only example of post-medieval ship design recorded within the marine archaeology study area and should the vessel be located and preserved in good condition; it does have the potential to add to the archaeological record.

Table 3.36: Archaeological significance of UKHO 15819 SS *Willy*

Criteria (DCMS 2013)	Archaeological significance
Period	High
Rarity	Medium
Documentation	Medium
Group value	Medium
Survival/condition	Unknown
Fragility/vulnerability	Low
Diversity	Medium
Potential	Medium
Overall	MEDIUM

UKHO 15864 UNKNOWN

3.3.154 The wreck of an unidentified vessel with no further details about its loss. The wreck is currently listed as LIVE and was not identified in the VE geophysical data.

UKHO 70010 HMT *SCOTCH THISTLE*

3.3.155 British drifter steam ship built in 1913 with a gross tonnage of 84, three-cylinder triple expansion engine, single shaft, one screw and one boiler. HMT *Scotch Thistle* was a Royal Navy drifter requisitioned in November 1939 and used as a mine recovery vessel. Lost on 7 October 1940 after running aground in the Thames Estuary *en route* from Lowestoft to Burnham Crouch and declared a constructive total loss.

3.3.156 The wreck is currently listed as DEAD and was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.157 HMT *Scotch Thistle* is a good example of wartime ships requisitioned during the Second World War. The site, should it be located, has the potential to be archaeologically significant, especially if any of its minesweeping equipment is present. No indication within the VE geophysical data and no other UKHO surveys have located the wreck in this position.



Table 3.37: Archaeological significance of UKHO 70010 HMT *Scotch Thistle*

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Low
Documentation	Medium
Group value	Low
Survival/condition	Unknown
Fragility/vulnerability	Low
Diversity	Low
Potential	Medium
Overall	MEDIUM

UKHO 70049 HMS *HASTFEN*

3.3.158 A British wooden drifter steam ship built in 1911 in Donegal by Killybegs Co., with a gross tonnage of 77, a three-cylinder triple expansion engine, single shaft, one screw and one boiler and hired at the time of loss by the Royal Navy.

3.3.159 The drifter and four persons were lost on 24 September 1917 when it struck a mine laid by German U-boat *UC-11*.

3.3.160 The wreck is currently listed as DEAD but corresponds with geophysical anomaly MA0232.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

3.3.161 HMS *Hastfen* is a good example of wartime ships requisitioned during the Second World War and lost to mines. Should the position be confirmed it does have the potential to contribute to the archaeological record.

Table 3.38 Archaeological significance of UKHO 70049 HMS *Hastfen*

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	Medium
Documentation	Medium
Group value	Low
Survival/condition	Low
Fragility/vulnerability	Low
Diversity	Medium
Potential	Medium
Overall	MEDIUM



UKHO 70300 UNKNOWN

3.3.162 The wreck of an unidentified vessel with no further details about its loss. The wreck is currently listed as DEAD and was not identified in the VE geophysical data.

UKHO 82140 UNKNOWN

3.3.163 The wreck of an unidentified vessel with no further details about its loss. The wreck is currently listed as UNKNOWN and was not identified in the VE geophysical data.

UKHO 85403 UNKNOWN

3.3.164 The wreck of an unidentified vessel thought to be a small wooden vessel, with no further details about its loss. The wreck is currently listed as UNKNOWN and was not identified in the VE geophysical data.

UKHO 87019 UNKNOWN

3.3.165 The wreck of an unidentified vessel with no further details about its loss. The wreck is currently listed as UNKNOWN and corresponds with geophysical anomaly MA0068.

UKHO 87021 UNKNOWN

3.3.166 The wreck of an unidentified vessel with no further details about its loss. The wreck is currently listed as UNKNOWN and corresponds with geophysical anomaly MA0703.

UKHO 87043 UNKNOWN

3.3.167 The wreck of an unidentified steam ship with no further details about its loss. The wreck is currently listed as UNKNOWN and corresponds with geophysical anomaly MA0704.

UKHO 87044 UNKNOWN

3.3.168 The wreck of an unidentified vessel with no further details about its loss. The wreck is currently listed as UNKNOWN and was not identified in the VE geophysical data.

UKHO 98495 UNKNOWN

3.3.169 The wreck of an unidentified vessel with no further details about its loss. The wreck is currently listed as not fully surveyed and was not identified in the VE geophysical data.

UKHO 99186 UNCLASSIFIED

3.3.170 Included in the UKHO Admiralty database (October 2023), however no additional details are currently available. The record was not identified in the VE geophysical data.

UKHO 99963 UNCLASSIFIED

3.3.171 Included in the UKHO Admiralty database (October 2023), however no additional details are currently available. The record was not identified in the VE geophysical data.

UKHO 100626 UNCLASSIFIED

3.3.172 Included in the UKHO Admiralty database (October 2023), however no additional details are currently available. The record was not identified in the VE geophysical data.



UKHO 102229 UNCLASSIFIED

3.3.173 Included in the UKHO Admiralty database (October 2023), however no additional details are currently available. The record was not identified in the VE geophysical data.

UKHO 102231 UNCLASSIFIED

3.3.174 Included in the UKHO Admiralty database (October 2023), however no additional details are currently available. The record was not identified in the VE geophysical data.

UKHO 102232 UNCLASSIFIED

3.3.175 Included in the UKHO Admiralty database (October 2023), however no additional details are currently available. The record was not identified in the VE geophysical data.

UKHO 102346 UNCLASSIFIED

3.3.176 Included in the UKHO Admiralty database (October 2023), however no additional details are currently available. The record was not identified in the VE geophysical data.

UKHO 102362 UNCLASSIFIED

3.3.177 Included in the UKHO Admiralty database (October 2023), however no additional details are currently available. The record was not identified in the VE geophysical data.

LIFTED WRECKS

3.3.178 There are currently no wrecks listed as LIFTED within the marine archaeology study area.

3.4 AVIATION REMAINS

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

3.4.2 Despite the low number of known aviation remains located on the seabed, the Essex coastline has a recorded 123 RAF aircraft losses as further detailed in Aircraft Crash Sites at Sea (Wessex Archaeology, 2008).

3.4.3 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.

3.4.4 There are two recorded losses of aircraft and sites of aircraft components within the study area.



UKHO 14995 UNKNOWN

- 3.4.5 The wreck of a Second World War Vickers Wellington aircraft with no further details about its loss. The wreck is currently listed as LIVE. A small piece of aircraft structure was recovered from the site in 1999 which confirmed the wreck as a Wellington. The recorded location corresponds with a low magnetic anomaly MA0029 (6.9 nT) seen as a cluster of small features in the SSS and MBES data. This site is assumed to become an automatically protected place under this Act even if the physical remains have not been confirmed as an aircraft.
- 3.4.6 The Vickers Wellingtons were British twin-engine, long-range medium bombers, designed during the mid-1930s. The remains of UKHO14995 are recorded approximated 6.4 km from the coast within the ECC (Figure 6.4) and was first located by a naval vessel in 1988 when it was measured to be 35 m long. The following year, a small piece of aircraft structure was reported as recovered by divers and confirmed as a distinctive 'geodetic' structure used in the Vickers Wellington aircrafts, a manufacturer's number confirmed this as the case. SSS, MBES and magnetometer data indicates that there some structural elements might still be present on the seafloor (MA0029), however, further investigation is needed to confirm whether MA0029 relates to the record for UKHO14995.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

- 3.4.7 Should the magnetic anomaly prove to be associated with the Vickers Wellington this would be a site of high archaeological significance.

Table 3.39: Archaeological significance of UKHO 14995

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	High
Documentation	Medium
Group value	High
Survival/condition	Low
Fragility/vulnerability	High
Diversity	High
Potential	High
Overall	HIGH

UKHO 15199 UNKNOWN

- 3.4.8 The remains of a FW 190 aircraft with no further details about its loss. Currently listed as LIVE and was not identified in the VE geophysical data.

BASELINE ARCHAEOLOGICAL SIGNIFICANCE

- 3.4.9 Should the remains of the LW 190 be located within the marine archaeology study areas this would be a site of high archaeological significance.



Table 3.40 Archaeological significance of UKHO 15199

Criteria (DCMS 2013)	Archaeological significance
Period	Medium
Rarity	High
Documentation	Medium
Group value	High
Survival/condition	Low
Fragility/vulnerability	High
Diversity	High
Potential	High
Overall	HIGH

3.5 RECORDED LOSSES

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

3.6 UKHO AND NRHE AREA RECORDS

3.6.1 Within the ECC there is one area (approximately 2.3 km x 1.8 km) identified as a dead wreck in the UKHO data but described as “an area of numerous magnetic anomalies” UKHO 15075, Figure 6.4. The area has been interpreted as possible buried cable or unexploded ordnance (UXO) based on magnetic returns but has not been investigated with a ROV. The area was surveyed but nothing was found in 2002, 2009 and 2012 and the location was amended to dead. The geophysical data collected for VE covers approximately 800x900m of UKHO area 15075 and contains 45 anomalies, two High (mag only) MA0129 165nT and MA0142 151nT. One Medium MA0291, linear hard reflector with shadow and scour; possible anthropogenic debris, 23.1nT. Forty-two Low, 39 (mag only) and three isolated reflectors identified on the SSS. The Marine Archaeology Study Area covered by UKHO area 15075 contains four UKHO records (58542 foul ground, dead, 58541 foul ground, dead, 59485 foul ground, dead, and 102346, unclassified). All four positions have been given precautionary AEZs of 50 m.

3.6.2 Within the ECC there is one NRHE site (NRHE HOB_UID 1584743) marking the potential area of the St James's Day fight, also known as St James's Day Battle 1666. The flight was a two-day sea battle which took place on 25-26 July 1666. The principal loss in the battle was the English ship *Resolution*, which was set alight by a Dutch fireship, other fireships were expended on both sides. The English were able to chase the Dutch back towards their own coast on the second day of the battle and the outcome was an English victory which prevented the Dutch attacking the Medway that year. The area visible on Figure 6.4 marks the start of the battle and contains 12 Low (mag only) anomalies.



3.7 FISHERMEN'S FASTENERS

3.7.1 There are currently no records classed as fishermen's fasteners recorded by the NRHE within the marine archaeology study area. Records classed as fishermen's fasteners, or which otherwise remain unidentified and are not known to be 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.

3.8 HISTORIC SEASCAPE CHARACTERISATION

3.8.1 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. Historic seascapes cannot be destroyed or damaged but impacts to them can change their historical character and the perception surrounding them.

3.8.2 The historic character of a seascape can be defined by its dynamic nature and ability to accommodate change. Perceptions of the seascape are also dynamic and subjective to the public and time. 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.

3.8.3 Changes to the character of the sea surface and the perception of the historic seascape as a direct result of the construction, operation, maintenance and decommissioning of VE will result from the addition of new infrastructure such as foundations and turbines as well as ongoing activity from installation and maintenance vessels.

3.8.4 It should be noted that changes to the visible elements of the shore and the sea surface have been assessed further in Volume 6, Part 2, Chapter 10: Seascape, Landscape and Visual Impact Assessment and therefore this section only considers the historic aspects of Seascape Characterisation.

3.8.5 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: Southwold to Clacton (Oxford Archaeology, 2007).

3.8.6 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 as detailed in Cornwall Council, 2008):

- > Sub-sea floor HSC: identifying the historic character beneath the sea floor;
- > Sea floor HSC: identifying the historic character within or directly on the sea floor;
- > 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 Mean Low Water (MLW) which have a distinctly maritime historic character; and
 - > Previous HSC (where information is available).
- 3.8.7 The sub-sea floor, sea floor and water column have been assessed for archaeological potential and significance in detail in this report, using a wide suite of geophysical datasets and historical resources.
- 3.8.8 Further anthropogenic studies have the potential to contribute to our understanding of how people have used and perceived the landscape/seascape in a variety of dynamic ways in the past.
- 3.8.9 A regional study of the HSC between Southwold and Clacton has been undertaken by Oxford Archaeology on behalf of English Heritage (Oxford Archaeology, 2007). 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.
- 3.8.10 The HSC considers the added impact of VE within the multiple dimensions of the marine environment (sub-sea floor, sea floor, 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.
- 3.8.11 Here impact is defined as any change to the HSC caused by VE; this may be ephemeral or sustained. Perception is defined as the public's awareness of the character types and how they interact with it, and change is defined as a sustained alteration to the perception of the HSC.
- 3.8.12 Potential changes to the HSC are expressed as a narrative description of the seascape character, how it is perceived by the public, and how those perceptions could be affected by the proposed VE wind farm, the perception of which may or may not be considered important from an historic perspective.
- 3.8.13 The existing VE marine archaeology study area is known for its marine and intertidal historic character utilised mainly for navigation, industry, fishing, ports and docks, coastal infrastructure, military, settlements and recreation.
- 3.8.14 The study identifies the area as holding the Broad Historic Character Types as summarised below.

NAVIGATION

- 3.8.15 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 3. The extent of the navigation character type can be seen in Figure 6.5, Figure 6.6, Figure 6.7, Figure 6.8, and Figure 6.9.
- 3.8.16 People perceiving the sea from land are unlikely to be aware of the scale of navigation and shipping activities that occur offshore but are often aware of the source of goods, income and employment it provides.



NAVIGATION ACTIVITIES

- 3.8.17 Navigation routes via the sea and rivers provided chief economical means of transporting large quantities of goods for any significant distance before the creation of effective inland road and railway systems, some of which were developed during prehistoric periods.
- 3.8.18 English society was built on maritime movements of goods, people and ideas, as is also 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 which is reflected in the presence of urban settlements.
- 3.8.19 Between the 8th and 11th centuries, Scandinavian influence spread across Europe, reflected in ship design as well as in social, political and economic impacts. Later during the medieval period, trade networks expanded, trading confederations emerged and an increase in hostilities influenced the development of shipping. England's navigation activities in the post-medieval and early modern periods expanded on a global scale, the evidence and impact of which is still perceived in the character of the UK and especially its coastal regions.
- 3.8.20 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 sea surface and coastal levels of the seascape as defined in the multi-dimensional aspects of the marine environment.
- 3.8.21 The effects of navigation on the current landscape and seascape are both historic and ongoing, having played a key role in the social, technological and political development of the UK. Its patterning has much to contribute to the perception about England's role and relationship with the wider world. Direct evidence for past navigational activity is relatively rare and vulnerable to disturbance from modern developments to accommodate new navigational needs.
- 3.8.22 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.
- 3.8.23 Examples of changes to the historic seascape throughout time can be the result of elongated mobile sandbanks, prompting the need for abandoning navigational channels or active management to maintain navigation. These banks are continuously extending seaward as more riverine silt is emptied into the Thames Estuary by the Thames, Medway and the rivers of Essex. Further change to navigational routes can be the need for port developments suitable for commercial shipping which need to maintain navigational accessibility. Historic wrecks can be used as an indication of previous navigation routes.
- 3.8.24 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.



MARITIME SAFETY

- 3.8.25 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.
- 3.8.26 Because of the historic and continued use and importance of maritime safety features, their character 'footprint' is greater than their physical footprint and they are intrinsic to seascape and landscape perceptions. Lighthouses, beacons and daymarks are iconic markers of place for many people viewing them both from land and sea. They bridge the perceptual boundaries between land and sea. There is often a strong emotional tie to them and have been seen as a source of inspiration and subject matter for many artists.
- 3.8.27 From the prehistoric into the medieval period, non-instrumental methods were generally used for navigation during sea voyages. Stars were used for course-steering and navigation. Naze Tower, built at Walton-on-the-Naze in 1720, was constructed as a navigational mark to aid shipping in and out of the busy port of Harwich. It originally housed a beacon and was the predecessor of the reflective lighthouse that became commonplace in the 19th century. The use of the tower varied over the years since its construction but remains an important marker for maritime safety and is currently a grade 2 listed building. Other historically important examples of maritime safety include the scheduled Dover lighthouses and causeway and the grade 2 listed old lifeboat house at Frinton and Walton, which house Walton's first lifeboat.
- 3.8.28 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.

NAVIGATION HAZARDS

- 3.8.29 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 sea floor, water column and sea surface levels of the seascape as defined in the multi-dimensional aspects of the marine environment.
- 3.8.30 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.



- 3.8.31 Navigation hazards have been prominent in the perception of a seascape due to the danger associated with them. The Thames Estuary is known to be perilous for navigational hazards, and contains many well-known sandbanks, like Kentish Knock. The creation of nautical and maritime charts helped record hazards and other dangers associated with the sea.
- 3.8.32 However, as with buried heritage assets on land which may not be readily appreciated by a casual observer, but retain a presence in the landscape, submerged heritage such as wreck sites are not part of the popular seascape perception
- 3.8.33 The increased infrastructure built within the seascape as a result of VE may contribute to safer navigation because of the lights affixed to the turbines. This new infrastructure 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 6, Part 2, Chapter 9: Shipping and Navigation)

INDUSTRY

- 3.8.34 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 6.5). There are many visible and unquantifiable reminders of England's rich and varied mining 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 Figure 6.5, Figure 6.6, Figure 6.7, Figure 6.8 and Figure 6.9.

EXTRACTIVE INDUSTRY

- 3.8.35 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-sea floor, sea floor and coastal levels of the seascape as defined in the multi-dimensional aspects of the marine environment.
- 3.8.36 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 Southern North Sea is one of two main areas identified for their potential within the UK, with 19 active UK aggregate areas within 50 km of the VE development area.

ENERGY INDUSTRY

- 3.8.37 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. 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 wind farms 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).



- 3.8.38 Energy industries are seen in the sub-sea floor, sea floor, sea surface and coastal levels of the seascape as defined in the multi-dimensional aspects of the marine environment.
- 3.8.39 Considerable numbers of hydrocarbon installations are founded on reclaimed land, often drained saltmarsh and mudflats, infilled from the late 19th century onwards. These buried deposits may have considerable potential for preserving palaeoenvironmental material, artefacts and features associated with estuarine environments.
- 3.8.40 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.
- 3.8.41 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. 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. Energy industries are seen in the sub-sea floor, sea floor, sea surface and coastal levels of the seascape as defined in the multi-dimensional aspects of the marine environment.
- 3.8.42 The Greater Gabbard Offshore Wind Farm, operational since 2012, London Array, operational since 2013, and North Falls Offshore Wind Farm, currently in the application process, are the closest examples contributing to the growing offshore renewable industry. Perceptions of renewable energy sources, such as wind farms, are generally more favourable than those of fossil fuels, with the increasing social and political emphasis on sustainable and renewable resources. However, expansion of offshore wind farms raises many concerns about seascape impacts, both visually and physically across the full depth of marine levels, where the material imprints occur which inform our understanding of marine historic character. These considerations are accommodated for particular wind farm proposals by the landscape considerations required to be included in their necessary Environmental Impact Assessments, in which the HSC has a particular role in informing on the historic cultural dimension of a seascape.
- 3.8.43 The perceptions associated with the energy industry tend to be varied and complex due to the essential need for sustainable energy production, and the scale of the high-profile and visually intrusive infrastructure needed to achieve this. The current and potential future visual perception of the seascape is discussed further in Volume 6, Part 2, Chapter 10: SLVIA. The development of VE is likely to contribute to this existing perception of energy industry in the area.

PROCESSING INDUSTRY

- 3.8.44 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.



- 3.8.45 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.
- 3.8.46 Salt production is one of the oldest examples of industry in this area, with Maldon being internationally renowned for its salt. Mounds of clay debris known as 'red hills' beside present and former coastlines of Essex and Suffolk are evidence of the extensive Roman salt production. 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.
- 3.8.47 There is a concentration of large complexes of processing industries along the Thames estuary near the greater London markets due to the ease of distribution of ship-borne resources, proximity to land based resources and density of population.
- 3.8.48 The rapid growth of towns and cities and development of industry by the early 19th century caused major problems concerning waste disposal and the mass outbreak of disease as there was no controlled method for the disposal of liquid waste effluent and rivers, streams, tidal estuaries and the sea were used to carry away waste. London responded by constructing enclosed interceptor sewers whose contents were pumped into the Thames downstream. Treatment at extensive sewage farms was also taking place in some towns and by the end of the 19th century sewage farms became overloaded due to population growth. As a result, more intensive handling methods requiring large amounts of land were developed. These methods were gradually replaced by the more space-efficient activated sludge technique (developed in the 1910s) and by the Second World War much of the land previously occupied by sewage farms had become redundant and was converted to use for housing, leisure facilities and industry. Sewage works represent an essential public amenity that is nevertheless generally perceived as unattractive and a cause or risk of sensory or physical pollution.

SHIPBUILDING INDUSTRY

- 3.8.49 The shipbuilding industry in England is widely expressed through its components such as docks; basins; wrecks; wharfs, quays, jetties and slipways; warehouses, offices, depots and travelling cranes; dockworkers' cottages; and specifically, associated transport systems (such as railways, roads, tramways). The shipbuilding industry is seen in the coastal levels of the seascape as defined in the multi-dimensional aspects of the marine environment.
- 3.8.50 Historically the development of new technologies in shipbuilding was driven by economic and political pressures. Ipswich was an important centre for naval shipbuilding during the period of wooden warships, but the advent of iron ships led to its decline.



3.8.51 Today, the shipbuilding industry can be seen as an expanding global business and linked to expanding recreational and leisure activities such as cruises and sailing. Historically used and now inoperative shipyards are sometimes converted for modern use, like yacht building and clubs. The listed building, Cinque Port Wreck House, a late 18th century warehouse in the James and Stone Shipyard, Brightlingsea is a rare example of this type of building.

SHIPPING INDUSTRY

3.8.52 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.

3.8.53 Commercial shipping routes adapt as new technologies and commercial competition are introduced. The development of the London Gateway Port project on the north bank of the Thames is one of the largest examples of this. 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.

3.8.54 Major lanes of shipping traffic and high levels of commercial shipping activity are recorded across the area (Figure 6.6). Additional vessel traffic due to the construction and operation of VE would occur in active commercial shipping routes.

3.8.55 Ipswich was an important centre for naval shipbuilding during the period of wooden warships, but the advent of iron ships led to its decline.

FISHING

3.8.56 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. Oyster beds on the Kentish flats, to the south of the VE development area, have been used since Roman times, and the town of Whitstable is still known for its oyster farming. By the 18th century, oyster fishery was flourishing in England, and peak oyster consumption was observed in the mid-19th century when oysters were common food for the poor. Shellfish-farming has a long tradition and is deeply engrained in the perception, identity, and economy of many coastal communities, including those surrounding the VE development area.

3.8.57 During the last quarter of the 19th century the most dynamic sector of the English fisheries was pelagic and bottom trawling in the North Sea. 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-sea floor, sea floor, 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 6.5, Figure 6.6, Figure 6.7, and Figure 6.8.

3.8.58 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.



- 3.8.59 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.
- 3.8.60 There are several examples of fishing types continue today in this area, however, the fishing industry has seen a decline since the Second World War, and much of the fishing character is associated with historical perceptions of the seascape. Aquaculture, fish and shellfish farming is still deeply engrained in the perception and economy of some communities in the region. As such, it is valued for the distinctiveness it affords such areas and as an important element in their local economy.

PORTS AND DOCKS

- 3.8.61 Forming an interface between land and marine transport and distribution system, ports and docks relate to the navigation, industry, and fishing character types. The ports and docks character type are seen in the coastal levels of the seascape as defined in the multi-dimensional aspects of the marine environment.
- 3.8.62 The Eastern England region contains numerous examples of small hards (consolidated loading platforms), quays and landing places and major ports including docks, ferry terminals and car terminals. Although many of the port locations may be inaccessible to the public, the harbours contain an amenity value which is linked to recreational and leisure activities such as sailing and wildlife watching. The extent of the ports and docks character type can be seen in Figure 6.5, Figure 6.6, Figure 6.7 and Figure 6.8.
- 3.8.63 Evidence of once prominent ports survive in the elaborate perpendicular gothic style churches of Blythburgh, Southwold and Walberswick, this newer style of architecture with emphasis on vertical lines led to higher ceilings and building that were an impressive sight on the surrounding saltmarsh countryside. These ports are still in use but are also reminders of their thriving historic use. Between 1300 and 1600 AD the increased size of trading ships prevented the use of smaller ports. Dunwich was East Anglia's premier port in the 11th century, with a population of 3,000. Between 1286 and 1326 the port and town were effectively destroyed following two major storms and gradual silting of the harbour. The Claremont Pier has undergone an evolution of use and perception within its lifetime. Built of wood between 1902 and 1903 it was a popular stopping point for steamers; it was then extended between 1912 and 1913 to accommodate a pavilion; it was then sectioned and used as a defence measure during the Second World War and used as an Army Training Centre, before being abandoned in 1948. It has since been privately owned, repaired and renovated to include recreational facilities.
- 3.8.64 The arrival of the railways established a number of shipping ports, including Felixstowe, now the largest container port in the UK and where the construction of container ships and roll-on/roll-off ferries technology was developed.



3.8.65 The ports of Harwich and Felixstowe are two of the biggest multi-purpose passenger and container ports in Europe, with Harwich acting as the main base of installation for the Greater Gabbard offshore wind farm. They show impact at national and international levels through their commercial trade links and transatlantic cruise businesses. The coastline has seen a return to importance in the modern period with the influence of war and proximity to Europe, particularly in container trade and passenger ferries. The ports of Ipswich and Colchester, although smaller, are well established trade links.

COASTAL INFRASTRUCTURE

FLOOD AND EROSION DEFENCES

- 3.8.66 Sea and flood defences in the region are characteristic for protecting agricultural land and coastal settlements where the coastline has been eroding for hundreds of years, and settlements surrounding those rivers which are prone to flooding. The coastal infrastructure character type is seen in the coastal levels of the seascape as defined in the multi-dimensional aspects of the marine environment. This character type has had an essential role in creating and maintaining areas of reclaimed land, especially in the Fens area of eastern England, from the Roman period.
- 3.8.67 Sea, flood and erosion defences are generally seen as essential for the preservation of settlements along eastern coast of England for protecting property by preventing erosion and providing flood protection which conserves the economic value and provides local residents with reassurance. Approaches vary from 'hard' defences, such as sea walls, which absorb or reflect wave energy, and 'soft', nature-based solutions (NBS) which encourage natural systems, such as beaches and salt marshes which protect the coast.
- 3.8.68 A major cause of erosion in this area is coastal squeeze – where the coastal margin is squeezed between the fixed landward boundary and the rising sea-level. Victorian sea defences were constructed in order to try and save the area from further erosion, including the 'Tamarisk Wall.' During World War II the area was mined and access restricted and the sea defences fell into disrepair and were almost completely destroyed by the 1953 storm surge. An earthen embankment was formed to supplement the sea defence, and other soft engineered structures are ongoing to protect the eroding coastline.
- 3.8.69 Regeneration and defence schemes have included flood defences from river overflow following storms, groynes, rock armour and beach regeneration to protect against both stormy weather and the perpetual erosion of the coastline. Sea walls, such as those in Tendring, are constantly repaired and maintained throughout their active lifetimes, giving them historical depth. These coastal erosion defences are discussed further in Volume 6, Part 3, Chapter 7: Archaeology and Cultural Heritage. The extent of the navigation character type can be seen in Figure 6.5, Figure 6.6, Figure 6.7 and Figure 6.8.
- 3.8.70 Much of the East Anglian and Kent coastline is protected by some form of sea defence, such as groynes, concrete piles, sea walls, grassy bunds, or shingle bank. Almost the entire Essex coastline is protected by sea walls (covering over 400 km). Most of the defences consist of flood embankments, but where shoreline and cliff erosion are taking place other forms of coastal defence are present. Sea defences are also common along the Suffolk and Kent coastlines (Adams and Flatman *et al.* via Research Framework, 2022).



COMMUNICATIONS

TRANSPORT

- 3.8.71 Coastally specific and maritime-related infrastructure such as canals, motorways, main roads, railways and airports which enabled people to settle in and visit coastal regions are covered by this broad character type. The transport character types are seen in the sea surface and coastal levels of the seascape as defined in the multi-dimensional aspects of the marine environment.
- 3.8.72 Canals were an important element in the early industrial period as they allowed for low-cost transport of bulk and raw materials. The use of many of these diminished following the construction of new railway lines, but are maintained for continued recreational use, such as the Chelmer and Blackwater Canal.
- 3.8.73 Many coastal settlements were established or developed as a direct result of the advent of the railway network, facilitating travel from growing urban areas inland. The construction of railways also initiated the development of coastal resorts on farmland and around pre-existing hamlets, as can be seen in East Anglia. The extent of the communications character type can be seen in Figure 6.5, Figure 6.8 and Figure 6.9.

TELECOMMUNICATIONS

- 3.8.74 Telecommunications cables have evolved from first carrying written communications, to voice communications, and now to data communication. All modern cables use optical fibre technology to carry telephone traffic, internet and private data traffic. The telecommunication character types are seen in the sub-sea floor and coastal levels of the seascape as defined in the multi-dimensional aspects of the marine environment.
- 3.8.75 Due to the character of submarine telecommunications cables, their presence in the marine environment is likely to be known only to those who were involved in laying them, and to people involved in communications infrastructure. Although highly dependent on them, the wider public are likely to know little about their location. However, their importance on public and private life cannot be underestimated due to the impact they have made for millions of internet and phone users.
- 3.8.76 The three active telecommunication cable routes closest to the VE development area are the Concer to South running from Thorpeness to Belgium, Concer to North running from Sizewell to the Netherlands and Farland North running from Aldeburgh to the Netherlands.

MILITARY

MILITARY DEFENCE AND FORTIFICATION

- 3.8.77 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 in the sea floor, water column and coastal levels of the seascape as defined in the multi-dimensional aspects of the marine environment.
- 3.8.78 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.



- 3.8.79 Roman forts existed at Walton but have since been lost to the sea. However, there are several scheduled monuments representing military defence and fortification particularly from the First and Second World Wars, including the heavy anti-aircraft gun site 350 m northeast of Little Oakley Hall, Shotley Battery and subterranean air raid shelters, Landguard Fort and its associated field works, and Beacon Hill fort, a late 19th century coastal artillery fortification. Seas off East Anglia have also been used as Royal Navy practice areas.
- 3.8.80 The Second-Anglo Dutch war was fought off the eastern coast of England in 1666 and battle sites include the 'The Four Days Battle' and St James' Day Battle (Figure 6.4).
- 3.8.81 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 recorded aircraft crash sites and a number of aircraft components recorded in the area further detailed in Section 3.2. The extent of the military character type can be seen in Figure 6.5, Figure 6.6, Figure 6.7, Figure 6.8 and Figure 6.9.

SETTLEMENT

- 3.8.82 Coastal settlements are where most people in the coastal region live and base their visits. As such, they are where most people develop their coastal perceptions. Some see the larger port cities as places of economic growth that support many local jobs and provide local income, contrasting with 'more tranquil' smaller fishing villages and the coastal resorts as areas of entertainment and holiday destinations. Coastal settlements hold a differing range of functions and historical trajectories which contribute to their present form. They are defined by both their capacity to accommodate change but also their continuity.
- 3.8.83 The East coast of England includes a variety of coastal settlement types including urban settlements, major cities, tourist resorts and smaller fishing towns and villages. The settlement character type is seen in the coastal levels of the seascape as defined in the multi-dimensional aspects of the marine environment. The extent of the settlement character type can be seen in Figure 6.5.
- 3.8.84 The Clacton area is particularly significant for Neolithic to Bronze Age habitation sites, evidencing the exploitation of coastal and estuarine resources. It is probable that Prehistoric settlers exploited the landscape using craft such as logboats, an example of which was seen at Walton strand in 1936. Settlement appears to be discontinued in this area of the coast after the Prehistoric period, though Red Hills were also found at Stone Point/ Walton.

RECREATION

- 3.8.85 Three scheduled monuments include two WWII bombing decoys at Kirby-le-Soken, and a post-medieval duck decoy pond situated at the western end of Horsey Island.



- 3.8.86 Recreational enjoyment of the coast has a long history in England with origins in the earliest expressions of the Romantic movement. The growth of industrial towns, the railway network and during the later 19th and early 20th centuries, the increase in public holidays and workers' purchasing power led to the rise and massive expansion of seaside resorts and their attendant accommodation and entertainment facilities along England's coastline. Later and current themes affecting the expression of 'recreation' include the post-war rise and later decline of the 'holiday park'. Post 1950s, there was a decline of the seaside resort due easier access to international travel, and since then various initiatives aimed at the regeneration of coastal resorts and market towns have been introduced. The recreation character types are seen in the sea floor, water column, sea surface and coastal levels of the seascape as defined in the multi-dimensional aspects of the marine environment.
- 3.8.87 Currently tourism is an important source of income and employment in the region. Walton-on-the Naze is famous as a beach resort, known as the 'Sunshine Coast'. Visitors are often involved in recreational activities such as walking, sunbathing, and golfing. The coastline attracts people in pursuit of open-air leisure activities, often centred around the scenery and maritime themes and houses Suffolk's Designated Heritage Coast and Area of Outstanding Natural Beauty (AONB). Popular water sport activities involve sea bathing, sailing, surfing, diving, leisure fishing, angling, water, and jet-skiing.
- 3.8.88 The value of coastal recreation and water related activities has a number of positive outcomes, including health benefits, social inclusion and quality of life, environmental protection and economic benefits. The extent of the recreation character type can be seen in Figure 6.5, Figure 6.6, Figure 6.7 and Figure 6.8.
- 3.8.89 Much of eastern England's foreshore is accessible to the public with the intertidal zone valued for its numerous and varied recreational opportunities. Where unmanaged, this zone is often subject to relatively low levels of visitors who enjoy its quiet and solitude as a source of relaxation and inspiration. Dive trails and virtual dive trails offer a way for the public to experience a greater understanding and connection to heritage while minimising the risk of disturbing them.

CULTURAL TOPOGRAPHY

- 3.8.90 The underlying geology has had an important influence on the character of the area. This comprises Eocene rocks, overlain by a London Clay, a sequence of Quaternary sands and gravels, Holocene sands and muds. Much of the sand today is created through erosion of the Red Crag cliffs which is also threatening the area.
- 3.8.91 The Naze once formed the northern side of the major river valley which contained the Thames, Medway, Crouch, Colne and Blackwater and their minor tributaries before rising sea-levels drowned them c. 8,000 years ago. The extent of the cultural topography character type can be seen in Figure 6.5, Figure 6.6, Figure 6.7, Figure 6.8 and Figure 6.9.

PALAEOLANDSCAPE COMPONENT

- 3.8.92 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-sea floor and sea floor levels of the seascape as defined in the multi-dimensional aspects of the marine environment.



- 3.8.93 Palaeochannels identified through previous research, including the survey work for VE (Figure 6.11), show evidence for the network of prehistoric landscapes and their changes over time. Submerged prehistoric landscapes often escape public perception because of their inaccessibility to many. However, 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.
- 3.8.94 The entire 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. East Anglia, to the north of the VE development area, is unique in having extensive deposits of Lowestoft Till, which acts as an accurate stratigraphic marker and can be used to help date sites. Remnants of channels and evidence for changes in water courses, such as the Thames which is thought to have entered the sea via the Suffolk coast during the Palaeolithic, have great potential for palaeolithic finds.
- 3.8.95 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 3.1. The cultural topography landward is discussed in detail in Volume 6, Part 3, Chapter 7: Archaeology and Cultural Heritage.

WOODLAND

- 3.8.96 During the Neolithic much of the UK was covered in wild woodland, including clearings and glades created by storms and maintained by grazing animals. The introduction of agricultural practices and development of metal tools during the Bronze Age led to significant clearing, and by the Iron Age woodland of the UK was reduced to half. After the First World War a need for woodland as a wartime reserve was recognised and regenerative planting began, with conservation movements to protect ancient woodland sites (woodland areas that have existed continuously since at least 1600) developing in the 1950s. Essex is the second least wooded county in England with only two surviving ancient woodland sites, Home Wood and Eseley Wood in Tilty.
- 3.8.97 Coastal woodlands were often important in providing timber and other materials for boat building and other coastally focused activities. Patterns of woodland also form distinctive elements of the coastal landscape visible from the sea, aiding position-finding from ships. The woodland character type is seen in the coastal level of the seascape as defined in the multi-dimensional aspects of the marine environment.
- 3.8.98 Those patterns are culturally defined and combine with variation in topography and other cultural features and aspects to give a sense of place and position to mariners and coastal users alike. The extent of the woodland character type can be seen in Figure 6.5.

ENCLOSED LAND

- 3.8.99 This character type relates to areas dominated by land enclosure usually for agricultural use, but diverse in its pattern, form and date. The relevance to the HSC is through coastal proximity, however the character type is explored in more detail in the Historic Landscape Characterisation (HLC) (Volume 6, Part 3, Chapter 7: Archaeology and Cultural heritage). The extent of the enclosed land character type can be seen in Figure 6.5



RECLAIMED LAND

- 3.8.100 Reclaimed land refers to areas of land enclosed, drained and taken in from coastal areas either directly from the sea, from tidal marsh or from previously tidal wetlands. This character type refers to the reclamation for mostly agricultural purposes and does not refer to land reclamation undertaken specifically for urban settlement or port expansion.
- 3.8.101 Reclamation in this area is from tidal marsh, usually saltmarsh, or wetland, with some areas being returned to saltmarsh as a buffer against rising sea-levels and storm surges.

UNIMPROVED LAND

- 3.8.102 This character type refers to areas of land that have not undergone agricultural improvement to convert their use for livestock, but are often used for grazing, recreation and wildlife conservation designations and un-intensively managed. The relevance to the HSC is through the distinctively coastal character of many areas and maritime connection, however the character type is explored in more detail in the HLC (Volume 6, Part 3, Chapter 7: Archaeology and Cultural Heritage).
- 3.8.103 The two main examples of unimproved land within the study area are heathland, which is dominated by dwarf shrubs including heathers and gorses and provides a habitat for many rare plant and animal species; and rough grassland, which is dominated by un-intensively managed grassland, often the result of long traditions of coastal rough grazing, but in some areas reintroduced as a conservation measure to prevent land reverting to scrub. The extent of the unimproved land character type can be seen in Figure 6.5

HISTORIC LANDSCAPE CHARACTERISATION (HLC)

- 3.8.104 There is some overlap between HSC and HLC in coastal and intertidal areas whose historic character has a distinctive maritime expression. The HSC may not match the perspective of the HLC. The HLC is detailed in Volume 6, Part 3, Chapter 7: Archaeology and Cultural Heritage. The extent of the HLC character type can be seen in Figure 6.5.

SUMMARY

- 3.8.105 The value and perception of the above Broad Historic Character Types include the increased attention of the wider general public of modern aquaculture and the benefits and disadvantages of renewable energy, sub-sea communication cables and marine global trading. People's perception of the sea and its value also include the biodiversity, the archaeological potential and fishing and transport heritage.



- 3.8.106 Within the sub-sea floor and sea floor character types include navigation, industry, fishing, communications, military, recreation and cultural topography. Activities on the sea floor and sub-sea floor are dominated by communications, fishing and cultural topography. The sub-sea floor and sea floor are less likely to enter the perceptions of the public due to their remoteness and inaccessibility compared with other dimensions. The perception of use within these levels is often peripheral rather than from participation, and there is therefore a greater capacity to accommodate change within these levels. The perception of cultural topography and recreation may undergo a positive change with the increase in understanding and awareness of palaeolandscapes, peat deposits as well as artefacts and wrecks identified in the geophysical and geotechnical surveys undertaken for VE. The impact on identified heritage receptors is discussed in Volume 6, Part 2, Chapter 11: offshore Archaeology and Cultural Heritage.
- 3.8.107 Within the water column and sea surface, character types include navigation, industry, fishing, communications, military and recreation. Activities on the sea surface and the water column are dominated by modern and current navigational routes in combination with historic shipping routes. The sea surface also comprises offshore infrastructure such as renewables, gas, oil, navigational markers and ocean survey equipment. The perception of the water column and sea surface in relation to navigation and industry is likely to be impacted by VE following construction due to the presence of navigational aids and the visual impact of the turbines. This is discussed further in Volume 6, Part 2, Chapter 10: Seascape, Landscape and Visual Assessment. Examples of these uses are both historic and current, and therefore the capacity to accommodate change is negligible as these changes have already occurred.
- 3.8.108 Within the coastal and conflated level, character types include navigation, industry, fishing, ports and docks, coastal infrastructure, communications, military, settlement, recreation and woodland. Activities on the coast are varied and are the most easily perceived. The perception of character types within the coastal and conflated level is not assessed to change following the development of VE. This is discussed further in Volume 6, Part 2, Chapter 10: Seascape, Landscape and Visual Impact Assessment.
- 3.8.109 Considering the perception of the above outlined Broad Historic Character Types (as well as the dynamic nature of people's perception of the sea and its value), no significant change in the multiple characters and dimensions of the marine environment as a result of VE in isolation or cumulatively with neighbouring developments is identified. Rather, VE will contribute to the existing perceptions of the seascape and use of the marine environment.
- 3.8.110 It has been established that HSC is value-neutral and 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).



CAPACITY TO ACCOMMODATE CHANGE

3.8.111 Five Estuaries offshore wind farm will contribute to an existing arrangement of off-shore wind farms along the east coast. Because of the previous installation of active wind farms in the seascape character, the impact to this character has already occurred, and the installation of turbines for Five Estuaries will contribute to, rather than alter this feature.



4 GEOPHYSICAL ASSESSMENTS

- 4.1.1 The archaeological assessment of geophysical data is presented below and summarised in Table . The archaeological potential of the anomalies identified was determined following the methodology and criteria stated in Table 2.2.
- 4.1.2 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 (Figure 6.10).

Table 4: Summary of archaeological anomalies within the marine archaeology study area seen in the geophysical data.

Number of anomalies	Archaeological potential
58	High
172	Magnetic anomalies of high potential (>100 nT not seen in SSS or MBES data)
4	Magnetic anomalies of high potential (>100 nT not seen in SSS or MBES data, but correlate with UKHO records)
98	Medium
471	Low (excluding magnetic anomalies)
4,114	Magnetic anomalies of low potential with no correlating data (<100nT)

- 4.1.3 Anomalies of high archaeological and medium archaeological potential have been recommended AEZ as per the mitigation outlined in Section 2.7 (Figure 6.13, Figure 6.15, Figure 6.16 and Figure 6.17).

4.2 ANOMALIES OF ARCHAEOLOGICAL POTENTIAL

HIGH POTENTIAL ANOMALIES

- 4.2.1 Two hundred and thirty-four (234) anomalies have been assessed as high archaeological potential, as seen in SSS and MBES data, showing a magnetic return of >100 nT or correlating with UKHO records. Of these, 172 have only been seen in the magnetic data and do not correlate with any records. There are four UKHO records that correlate with magnetic data which were not otherwise seen in SSS or MBES data. Graphics illustrating the UKHO records identified in the geophysical data can be found in Appendix B graphics of recorded receptors
- 4.2.2 The 58 anomalies with high archaeological potential seen in SSS and/ or MBES data and the four magnetic anomalies which correlate with UKHO records are summarised below and detailed in Appendix 1. Of the 62 anomalies summarised below, 28 correlate with UKHO/NRHE records (see Section 3.3).
- > **MA0001** – (SSS MA2003) a pair of isolated, slightly curved hard reflectors with extended shadow and some scour; probable anthropogenic or wreck debris associated with UKHO15865, an obstruction recorded 65 m north.
 - > **MA0002** – (SSS MA2119; MBES MA4034; MAG MA6002) an isolated, cylindrical hard reflector with extended shadow which correlates with the recorded location for the wreck of SS *Nico* (UKHO14513); magnetic return of 4,844 nT.



- > **MA0003** – (SSS MA2123; MBES MA4036; MAG MA6005) an area of scattered linear hard reflectors with shadow and scour; possibly the wreck of MV *Janny*, (UKHO14461) recorded 832 m southwest, potentially wreck debris; magnetic return of 3,106 nT.
- > **MA0004** – (SSS MA2129; MAG MA6055) a hard reflector with shadow and scour located 50 m from MA0003; potential wreck debris; magnetic return of 241 nT.
- > **MA0005** – (SSS MA2160; MBES MA4058; MAG MA6150) an angular hard reflector with scour; potential anthropogenic or wreck debris; magnetic return of 124 nT.
- > **MA0006** – (SSS MA2197; MBES MA4084; MAG MA6154) a semi-circular hard reflector with shadow; potential wheel; correlates with record for an unidentified wreck (UKHO14576); magnetic return of 120 nT.
- > **MA0007** – (SSS MA2198; MBES MA4085; MAG MA6154) a circular hard reflector in patch of scour with extended shadow; probable wreck debris associated with UKHO14576, wheel or anthropogenic debris; magnetic return of 120 nT.
- > **MA0008** – (SSS MA2199, MBES MA4086, MAG MA6003) an ovate hard reflector with shadow and scour with smaller linear hard reflectors; partially buried wreck with potential wreck debris, hull appears intact; correlates with record for unidentified wreck (UKHO14581); magnetic return of 4,705 nT.
- > **MA0009** – (SSS MA2240; MBES MA4289; MAG MA6015) an isolated linear soft reflector with shadow; possible partially buried anthropogenic debris; seen in MBES as a cross-shaped feature; magnetic return of 579 nT.
- > **MA0010** – (SSS MA2241; MBES MA4290; MAG MA6012) an isolated linear soft reflector with shadow; possible partially buried anthropogenic debris associated with MA0009; magnetic return of 737 nT.
- > **MA0011** – (SSS MA2244; MAG MA10481) three isolated linear hard reflectors with shadow arranged in a line; potential anthropogenic debris; magnetic return of 143.1 nT.
- > **MA0012** – (SSS MA2260; MBES MA4305; MAG MA6000) a dispersed area of hard reflectors with shadow; correlates with position for unidentified wreck (UKHO14553); magnetic return of 20,411 nT.
- > **MA0013** – (SSS MA2263; MBES MA4309) a hard reflector with shadow and scour with points of raised features across its length; potential wreck with rope; correlates with record for foul ground (UKHO14859); potentially associated with MA0264 located 27 m south.
- > **MA0014** – (SSS MA2270; MBES MA4315; MAG MA6786) an isolated angular hard reflector with shadow and scour; potential wreck or anthropogenic debris; correlates with record for unidentified wreck (UKHO15035); magnetic return of 27.7 nT.
- > **MA0015** – (SSS MA2279; MBES MA4321; MAG MA6089) an isolated linear hard reflector with shadow and scour; potential anthropogenic debris; magnetic return of 177 nT.
- > **MA0016** – (SSS MA2284; MBES MA4325; MAG MA6007) an isolated extended curvilinear hard reflector with notched shadow; probable chain; magnetic return of 1,151 nT.
- > **MA0017** – (SSS MA2286; MBES MA4327; MAG MA6140) a linear hard reflector with shadow and scour; possible anthropogenic or wreck debris associated with MA0016 which is found 65 m northeast; magnetic return of 129.9 nT.
- > **MA0018** – (SSS MA2289; MAG MA6014) a pair of linear hard reflectors with shadow and scour; potential anthropogenic or wreck debris; magnetic return of 677 nT.
- > **MA0019** – (SSS MA2310; MBES MA4345; MAG MA6160) an isolated semi-circular hard reflector with shadow and scour; potential anthropogenic debris; magnetic return of 117.4 nT.



- > **MA0020** – (SSS MA2314; MBES MA4349; MAG MA6001) an area of linear hard reflectors with scour and spikes of elongated shadows; correlates with record for the wreck of SS *Norhauk* (UKHO14535); magnetic return of 19,031.6 nT.
- > **MA0021** – (SSS MA2327; MBES MA4360; MAG MA6587) an angular hard reflector with linear hard reflector, both with shadow and scour; potential anchor associated with MA0285; correlates with record for foul ground (UKHO79309); magnetic return of 36.4 nT.
- > **MA0022** – (SSS MA2335; MBES MA4365; MAG MA6004) an area of scattered linear hard reflectors covering approximately 100 x 50 m; likely the broken up remains of a wreck, and correlating with the record for the wreck of SS *Morar* (UKHO14525); magnetic return of 3,936 nT.
- > **MA0023** – (SSS MA2342; MBES MA4371; MAG MA6011) an isolated hard reflector with shadow; potential anthropogenic or wreck debris; magnetic return of 755 nT.
- > **MA0024** – (SSS MA2358; MBES MA4383; MAG MA6053) an isolated linear hard reflector with shadow; potential anthropogenic or wreck debris; magnetic return of 244.8 nT.
- > **MA0025** – (SSS MA2359; MBES MA4384; MAG MA6076) an isolated soft reflector with scour; potential partially buried anthropogenic debris; magnetic return of 196.5 nT.
- > **MA0026** – (SSS MA2372; MBES MA4393; MAG MA6066) an isolated linear hard reflector with notched shadows; possible anthropogenic debris; magnetic return of 218 nT.
- > **MA0027** – (SSS MA2372; MBES MA4394; MAG MA6074) an isolated soft reflector with shadow and scour; potential anthropogenic debris correlating with unclassified record UKHO102363; magnetic return of 199 nT.
- > **MA0028** – (SSS MA2384; MAG MA6013) an isolated elongated curvilinear reflector with shadow; probable rope or chain; magnetic return of 726.5 nT.
- > **MA0029** – (SSS MA2397; MBES MA4228; MAG MA9137) a cluster of hard reflectors with shadow; potential anthropogenic debris; correlates with record for unidentified aircraft (UKHO14995); magnetic return of 6.9 nT.
- > **MA0030** – (SSS MA2456; MAG MA6191) an isolated linear hard reflector with shadow; potential anthropogenic debris; magnetic return of 102.7 nT.
- > **MA0031** – (SSS MA2459; MBES MA4274) an isolated hard reflector with linear hatching across the extent of the feature and circular debris; probable wreck or anthropogenic debris.
- > **MA0032** – (SSS MA2472; MAG MA6094) a pair of isolated hard reflectors with shadow; potential anthropogenic debris; magnetic return of 172.1 nT.
- > **MA0033** – (MBES MA4114; MAG MA9346) an area of scattered raised features covering approximately 38 x 11 m; correlates with record for foul ground (UKHO70092); magnetic return of 6 nT.
- > **MA0034** – (MBES MA4146; MAG MA6134) a small, raised feature in patch of scour; correlates with record for unidentified wreck (UKHO15074); magnetic return of 131 nT.
- > **MA0035** – (MBES MA4159; MAG MA6075) a small area of scour; magnetic return of 198 nT.
- > **MA0036** – (MBES MA4196; MAG MA6091) a raised features measuring approximately 6 x 4 m; magnetic return of 174 nT.
- > **MA0037** – (MBES MA4198; MAG MA10465) a linear hard reflector; probable anthropogenic debris, potential pipe debris; magnetic return of 490.7 nT.



- > **MA0038** – (SSS MA2594; MBES MA4201; MAG MA10469) seen in both SSS and MBES as a rectangular raised feature measuring approximately 10 x 3.6 m with linear features across the middle; probable wreck; magnetic return of 246.7 nT.
- > **MA0039** – (MBES MA4209; MAG MA6071) a small, raised feature in patch of scour; magnetic return of 200.7 nT.
- > **MA0040** – (SSS MA2647; MBES MA4428; MAG MA10470) an angular feature in patch of scour; magnetic return of 227.1 nT.
- > **MA0041** – (MBES MA4429; MAG MA10482) a pair of raised features; magnetic return of 142.5 nT.
- > **MA0042** – (MBES MA4430; MAG MA10484) a pair of raised features; magnetic return of 129.5 nT.
- > **MA0043** – (MBES MA4431; MAG10486) a small, raised feature; magnetic return of 375 nT.
- > **MA0062** – (SSS MA2544; MAG MA10467) an isolated small hard reflector with shadow; magnetic return of 375.9 nT located 30 m east.
- > **MA0063** – (MBES MA4423; MAG MA6025) a small, raised feature; magnetic return of 375 nT.
- > **MA0065** – (MBES MA4424, MAG MA6027) a raised feature measuring approximately 7.5 x 2.7 m; magnetic return of 370 nT.
- > **MA0068** – (MBES MA4437; MAG MA6030) a small, raised feature in area of sand waves; correlates with record for unidentified wreck (UKHO87019); 355 nT.
- > **MA0088** – (SSS MA2521; MAG MA10468) an isolated curvilinear hard reflector with shadow and scour; potential cable, chain or anthropogenic or fishing debris with a magnetic return of 259.4 nT.
- > **MA0094** – (MBES MA4425; MAG MA6057) a curvilinear feature; potential rope or chain with anchor; 237 nT.
- > **MA0124** – (MBES MA4426; MAG MA6090) a linear area of scour measuring approximately 116 x 3.5 m; 175 nT.
- > **MA0223** – (SSS MA2542; MAG MA10491) an isolated hard reflector with shadow; magnetic return of 103.7 nT, potential anthropogenic or fishing debris.
- > **MA0232** – (SSS MA2378; MBES MA4398) an isolated elongated curvilinear hard reflector; probable cable, rope or chain; correlates with record for HMS *Hastfen* (UKHO70049).
- > **MA0283** – (SSS MA2323; MBES MA4356) an area of linear hard reflectors with extended shadows; probable wreck debris associated with MA0020 (SS *Norhauk*, UKHO14535).
- > **MA0578** – (SSS MA2334) an isolated curvilinear hard reflector with shadow and scour; potential partially buried anthropogenic or wreck debris; correlates with record for wreck of SS *Vancouver* (UKHO14555).
- > **MA0602** – (SSS MA2380) an isolated hard reflector with shadow and scour; potential anthropogenic or wreck debris; located 273 m east from recorded location of submarine HMSM *E6* (UKHO14983); area not covered by MBES or Mag data.
- > **MA0703** – (MBES MA4144) a cluster of raised features surrounded by scattered smaller raised features over area measuring approximately 37 x 19 m; correlates with record for distributed remains of unidentified wreck (UKHO87021).
- > **MA0704** – (MBES MA4145) a small, raised feature in patch of scour; correlates with record for unidentified potential wreck (UKHO87043).



- > **MA0754** – (SSS MA2536; MBES MA4207; MAG MA10505) a patch of scour; correlates with record for unidentified patch of scour (UKHO87002); magnetic return of 12 nT.
- > **MA6243** – (MAG MA6243) magnetic anomaly with return of 83.3 nT; correlates with record for unidentified wreck (UKHO14541).
- > **MA6377** – (MAG MA6377) magnetic anomaly with return of 53.3 nT; correlates with record for foul ground (UKHO14532).
- > **MA6650** – (MAG MA6650) magnetic anomaly with return of 33.1 nT; correlates with record for unidentified wreck (UKHO14996).
- > **MA6677** – (MAG MA6677) magnetic anomaly with return of 31.8 nT; correlates with record for foul ground (UKHO14803).

MEDIUM POTENTIAL ANOMALIES

4.2.3 Ninety-eight anomalies of medium archaeological potential are summarised below and detailed in **Appendix 1**. These did not correlate with any known UKHO/ NRHE records but may represent debris associated with the recorded wrecks above.

- > **MA0233** – (SSS MA2050; MBES MA4048; MAG MA6347) an isolated hard reflector with shadow and scour; potential anthropogenic debris; magnetic return of 57 nT (MA6347) located 38 m west.
- > **MA0234** – (SSS MA2072; MBES MA4013; MAG MA7093) an isolated curvilinear hard reflector with shadow; possible anthropogenic debris; magnetic return of 20 nT (MA7093) located 29 m northwest.
- > **MA0235** – (SSS MA2090; MAG MA6539) an isolate linear hard reflector in patch of scour; possible anthropogenic debris; magnetic return of 40 nT.
- > **MA0236** – (SSS MA2097; MBES MA4021) an isolate soft reflector with scattered shadow, seen in MBES as raised feature in area of scour; possible anthropogenic debris or anchor; listed as possible anchor in the VE assessment of SSS data (file FE4 SSS).
- > **MA0237** – (SSS MA2101; MAG MA6643) an isolated linear hard reflector with shadow and scour; potential anthropogenic debris; magnetic return of 33 nT.
- > **MA0238** – (SSS MA2108; MBES MA4027; MAG MA6226) an isolated angular hard reflector with shadow and scour lying across sand wave; potential anthropogenic debris; magnetic return of 87 nT.
- > **MA0239** – (SSS MA2111; MBES MA4030; MAG MA7468) an isolated hard reflector with shadow in area of sand waves; possible anthropogenic debris; magnetic return of 15 nT.
- > **MA0240** – (SSS MA2117; MBES MA4032) parallel linear raised features extending over 110 m; probable anthropogenic debris.
- > **MA0241** – (SSS MA2121) a hard reflector with shadows and scour located 41 m north of MA0002; probable wreck debris associated with MA0002 (*Nico*, UKHO14513).
- > **MA0242** – (SSS MA2143, MBES MA4403; MAG MA7895) an isolated pair of hard reflectors with shadow and scour; possible anthropogenic debris; magnetic return of 11.5 nT.
- > **MA0243** – (SSS MA2148; MBES MA4052) an isolated curvilinear hard reflector with shadow and scour; potential anthropogenic debris.
- > **MA0244** – (SSS MA2153) three isolated linear hard reflectors; potential anthropogenic debris.
- > **MA0245** – (SSS MA2154, MBES MA4055; MAG MA9569) an isolated hard reflector with scour and extended shadow; possible anthropogenic debris; magnetic return of 6 nT (MA9569) located 20 m northeast.



- > **MA0246** – (SSS MA2158; MBES MA4057; MAG MA6206) a linear hard reflector with smaller hard reflectors approximately 20 m to the east and west; potential anthropogenic debris; magnetic return of 97 nT.
- > **MA0247** – (SSS MA2161; MBES MA4059) an isolated curvilinear hard reflector with shadow and scour with apparent attached linear hard reflectors; probable cable or rope.
- > **MA0248** – (SSS MA2179; MBES MA4072; MAG MA6464) an isolated hard reflector with shadow; possible anthropogenic debris; magnetic return of 45 nT (MA6464) located 21 m east.
- > **MA0249** – (SSS MA2181; MBES MA4107; MAG MA7442) an isolated linear soft reflector with shadow; possible anthropogenic debris; magnetic return of 15 nT (MA7442) located 22 m southwest.
- > **MA0250** – (SSS MA2212; MBES MA4094) an isolated linear hard reflector with shadow and scour; potential wreck debris associated with MA0008 (Unknown wreck, UKHO14581).
- > **MA0251** – (SSS MA2216; MBES MA4097) a cluster of hard reflectors next to a curvilinear hard reflector; potential anthropogenic debris with cable or rope.
- > **MA0252** – (SSS MA2217; MBES MA4098; MAG MA10235) a cluster of hard reflectors with shadow and scour over area covering 48 x 25 m; potential scattering of anthropogenic debris; magnetic return of 5 nT.
- > **MA0253** – (SSS MA2227) an isolated square hard reflector with linear features; probable anthropogenic debris.
- > **MA0254** – (SSS MA2231; MBES MA4106) an isolated V-shaped hard reflector with shadow and scour; probable anthropogenic debris.
- > **MA0255** – (SSS MA2242; MBES MA4291; MAG MA10497) an isolated soft reflector with scour; possible partially buried anthropogenic debris; seen in MBES as two patches of scour located 18 m apart; magnetic return of 92 nT (MA10497) located 35 m northwest.
- > **MA0256** – (SSS MA2253; MBES MA4299; MAG MA6220) an isolated hard reflector with shadow and scour; possible anthropogenic debris.
- > **MA0257** – (SSS MA2255; MBES MA4300; MAG MA6535) an isolated pair of linear hard reflectors with shadow and scour; potential anthropogenic debris; magnetic return of 40.3 nT.
- > **MA0258** – (SSS MA2256; MBES MA4301) a linear hard reflector with scour; potential wreck debris associated with MA0012 (Unknown wreck, UKHO14553) which is located 80 m east.
- > **MA0259** – (SSS MA2257; MBES MA4302) a cluster of hard reflectors with shadow; seen in MBES as linear feature in patch of scour; probable wreck debris associated with MA0012 (Unknown wreck, UKHO14553).
- > **MA0260** – (SSS MA2258; MBES MA4303) a hard reflector with shadow and scour; probable wreck debris associated with MA0012 (Unknown wreck, UKHO14553).
- > **MA0261** – (SSS MA2259; MBES MA4304) a curvilinear hard reflector with shadow and scour; seen in MBES as raised feature in patch of scour; probable wreck debris associated with MA0012 (Unknown wreck, UKHO14553).
- > **MA0262** – (SSS MA2261; MBES MA4306) a curvilinear hard reflector with shadow; seen as scour in MBES; potential wreck debris associated with MA0012 (Unknown wreck, UKHO14553).
- > **MA0263** – (SSS MA2262; MBES MA4307; MAG MA6265) an isolated linear hard reflector with shadow and scour; potential anthropogenic debris; magnetic return of 78.2 nT.



- > **MA0264** – (SSS MA2265; MBES MA4310) a semi-circular hard reflector with an extended linear hard reflector, both with shadow and scour; probable anchor and chain or wreck debris associated with MA0013 (currently recorded as foul ground, UKHO14859).
- > **MA0265** – (SSS MA2271; MBES MA4316; MAG MA6513) an isolated curvilinear hard reflector with shadow and scour; potential chain, rope or anthropogenic debris; magnetic return of 41.7 nT.
- > **MA0266** – (SSS MA2278; MBES MA4320; MAG MA9935) an isolated pair of hard reflectors adjacent to another softer reflector, all with shadow; seen in MBES as small, raised feature in patch of scour; potential anthropogenic debris; magnetic return of 5.6 nT.
- > **MA0267** – (SSS MA2280; MBES MA4322; MAG MA6895) an isolated hard reflector with shadow; potential anthropogenic debris; magnetic return of 24.3 nT.
- > **MA0268** – (SSS MA2281; MBES MA4323; MAG MA8493) a curvilinear soft reflector with shadow and a thin linear trail of shadow; possibly partially buried anthropogenic debris; magnetic return of 8.8 nT; potentially associated with and contained completely within the 100 m AEZ for MA0231, a complex magnetic anomaly not identified in SSS or MBES data.
- > **MA0269** – (SSS MA2285; MBES MA4326; MAG MA6688) an isolated angular hard reflector with shadow and scour; potential anthropogenic debris; magnetic return of 31.5 nT.
- > **MA0270** – (SSS MA2287; MAG MA6636) an isolated curvilinear hard reflector with shadow; possible anthropogenic debris; magnetic return of 33.8 nT.
- > **MA0271** – (SSS MA2291; MBES MA4328; MAG MA6207) an isolated curvilinear hard reflector with shadow; potential anthropogenic debris associated with MA0018 an unrecorded potential wreck located 19 m south; magnetic return of 97.1 nT.
- > **MA0272** – (SSS MA2293; MBES MA4330; MAG MA7755) an isolated hard reflector with shadow and scour; potential anthropogenic debris; magnetic return of 12.4 nT.
- > **MA0273** – (SSS MA2294; MBES MA4331; MAG MA6822) an isolated linear hard reflector with shadow and scour; possible anthropogenic debris; magnetic return of 26.3 nT.
- > **MA0274** – (SSS MA2302; MBES MA4337; MAG MA7236) an isolated linear hard reflector with extended shadow and scour; possible anthropogenic debris; magnetic return of 17.9 nT.
- > **MA0275** – (SSS MA2303; MBES MA4338; MAG MA7097) an isolated hard reflector with shadow and scour; possible anthropogenic debris; magnetic return of 20.1 nT.
- > **MA0276** – (SSS MA2306; MBES MA4341; MAG MA6545) an isolated triangular hard reflector with shadow in patch of scour; seen in MBES as small, raised feature in patch of scour; potential anthropogenic debris; magnetic return of 39.6 nT.
- > **MA0277** – (SSS MA2312; MBES MA4347; MAG MA6413) an isolated triangular hard reflector with shadow and scour; potential anthropogenic debris; seen in MBES as small, linear feature in patch of scour; magnetic return of 49.5 nT.
- > **MA0278** – (SSS MA2313; MBES MA4348) a triangular hard reflector with shadow and scour; probable wreck debris associated with MA0020 (*Norhauk*, UKHO14535) located 93 m east.
- > **MA0279** – (SSS MA2315; MBES MA4350) a curvilinear elongated hard reflector with shadow and scour; probable rope or chain associated with MA0020 (*Norhauk*, UKHO14535) located 73 m southeast.



- > **MA0280** – (SSS MA2318; MBES MA4352) a circular hard reflector in scour with shadow; probable wheel or wreck debris associated with MA0020 (*Norhauk*, UKHO14535) located 75 m west.
- > **MA0281** – (SSS MA2319; MBES MA4353) a circular hard reflector with shadow and scour; probable wheel or wreck debris associated with MA0020 (*Norhauk*, UKHO14535) located 51 m north.
- > **MA0282** – (SSS MA2320; MBES MA4354) an angular hard reflector with shadow and scour; potential wreck debris or anchor found 21 m south from the end of MA0279.
- > **MA0284** – (SSS MA2326; MBES4359) an isolated pair of hard reflectors next to each other; potential wreck or anthropogenic debris.
- > **MA0285** – (SSS2328) an extended linear hard reflector; probable cable, rope or chain; potentially associated with MA0021 (foul ground, UKHO79309).
- > **MA0286** – (SSS MA2336; MBES MA4366; MAG MA6267) a linear hard reflector with shadow and scour located approximately 150 m east northeast from MA0022 (*SS Morar*, UKHO14525); magnetic return of 77.9 nT.
- > **MA0287** – (SSS MA2339; MBES MA4368; MAG MA7045) an isolated angular hard reflector with shadow and scour; possible anthropogenic debris; magnetic return of 21 nT.
- > **MA0288** – (SSS MA2344; MBES MA4373; MAG MA6588) an isolated linear hard reflector with shadow lying across sand waves; potential anthropogenic debris; magnetic return of 36.3 nT.
- > **MA0289** – (SSS MA2348; MBES MA4376) an isolated curved soft reflector with shadow and scour; potential partially buried anthropogenic debris likely associated with MA0022 (*SS Morar*, UKHO14525).
- > **MA0290** – (SSS MA2352) an isolated hard reflector with extended shadow and scour; potential anthropogenic debris likely associated with MA0022 (*SS Morar*, UKHO14525).
- > **MA0291** – (SSS MA2354; MBES MA4379; MAG MA6945) a linear hard reflector with shadow and scour; possible anthropogenic debris; magnetic return of 23.1 nT.
- > **MA0292** – (SSS MA2356; MBES MA4381; MAG MA6934) an isolated hard reflector with shadow and scour in area of sand waves; potential anthropogenic debris; magnetic return of 23.5 nT.
- > **MA0293** – (SSS MA2360; MBES MA4171) an isolated pair of arrangements of linear hard reflectors with extended shadow; probable wreck or anthropogenic debris, potentially associated with MA0022 (*SS Morar*, UKHO14525) located 107 m northeast.
- > **MA0294** – (SSS MA2370; MAG MA6964) an isolated hard reflector with shadow and scour; potential anthropogenic debris; magnetic return of 22.6 nT.
- > **MA0295** – (SSS MA2371; MAG MA6357) an isolated linear hard reflector with shadow and scour; potential anthropogenic debris; magnetic return of 56.4 nT.
- > **MA0296** – (SSS MA2374; MBES MA4395; MAG MA6853) an isolated cluster of linear hard reflectors with shadow and scour; potential anthropogenic debris; magnetic return of 25.5 nT.
- > **MA0297** – (SSS MA2375; MBES MA4396; MAG MA6468) an isolated hard reflector with shadow and scour; potential anthropogenic debris, possibly associated with MA0602 (*HMSM E6*, UKHO14983), located 289 m southeast; magnetic return of 44.9 nT.
- > **MA0298** – (SSS MA2377; MAG MA6492) an isolated hard reflector with shadow and scour; potential anthropogenic debris; magnetic return of 43 nT.



- > **MA0299** – (SSS MA2382; MBES MA4212; MAG MA6485) an isolated elongated curvilinear soft reflector with shadow; probable cable, rope or chain; magnetic return of 43.5 nT.
- > **MA0300** – (SSS MA2396; MA4220) an isolated linear hard reflector with arm-like features; seen in MBES as raised feature; potential anchor.
- > **MA0301** – (SSS MA2398; MBES MA4229; MAG MA6883) a cluster of hard reflectors with shadow potentially debris associated with MA0029 (unidentified aircraft, UKHO14995) located 46 m north; magnetic return of 24.7 nT.
- > **MA0302** – (SSS MA2408; MBES MA4237) a circular patch of hard reflectors with shadow; potential anthropogenic debris.
- > **MA0303** – (SSS MA2409; MBES MA4238; MAG MA8524) an isolated linear hard reflector with shadow and scour; potential anthropogenic debris; magnetic return of 8.6 nT.
- > **MA0304** - (SSS MA2426; MBES MA4247) an isolated linear hard reflector with linear protrusions at the centre and an apparently curvilinear feature at the end; seen in MBES as small, raised feature in patch of scour; potential anchor.
- > **MA0305** – (SSS MA2432; MBES MA4251; MAG MA6862) an isolated hard reflector with extended shadow; potential anthropogenic debris; magnetic return of 25.2 nT.
- > **MA0306** – (SSS MA2435; MBES MA4254) an isolated linear hard reflector seen in some lines to have a multidirectional shadow; seen in MBES as raised feature with scour to south; potential anchor.
- > **MA0307** – (SSS MA2446; MBES MA4262; MAG MA7083) an area of small hard reflectors with shadow; potential anthropogenic debris or ballast; magnetic return of 20.3 nT.
- > **MA0308** – (SSS MA2460; MBES MA4275) a hard linear reflector with curvilinear feature lying adjacent at one end, with scour; potential anchor, located 50 m east northeast from MA0654 (described as probable cable, rope or chain).
- > **MA0309** – (SSS MA2466; MBES MA4280) an isolated ovate hard reflector with three smaller reflectors at the eastern side, all with shadow; potential anthropogenic or wreck debris.
- > **MA0310** – (SSS MA2467; MBES MA4281; MAG MA6739) an isolated curvilinear hard reflector with shadow and scour with potentially associated small hard reflectors in surrounding area; possible anthropogenic debris; magnetic return of 29.5 nT (MA6739) located 38 m southeast.
- > **MA0311** – (SSS MA2470; MBES MA4283; MAG MA7770) an isolated ovate hard reflector with shadow and scour; potential anthropogenic debris; magnetic return of 12.3 nT (MA7770) located 12 m northwest.
- > **MA0312** – (MBES MA4116; MAG MA6776) a line of three small, raised features; magnetic return of 28 nT.
- > **MA0313** – (MBES MA4125; MAG MA6713) a 19 m linear feature and cross-shaped raised feature; potential anchor; magnetic return of 30 nT.
- > **MA0314** – (MBES MA4127; MAG MA7629) a cluster of raised features with scour over an area measuring 28 x 11 m; magnetic return of 13 nT (MA7629) located 22 m north.
- > **MA0315** – (MBES MA4128; MAG MA6250) a curvilinear raised feature measuring 26 m, located 10 m north of MA0720; potential rope or chain with anchor (MA0720); magnetic return of 80 nT.
- > **MA0316** – (MBES MA4132; MAG MA8043) a small, raised feature in patch of scour measuring 60 x 60 m; magnetic return of 10.8 nT (MA8043) located 22 m northwest.



- > **MA0317** – (MBES MA4140; MAG MA7724) a raised feature measuring 15 x 11 m; magnetic return of 12 nT.
- > **MA0318** – (MBES MA4141; MAG MA7354) a raised feature measuring 14 x 14 m; located 34 m west northwest of MA0317; magnetic return of 16 nT.
- > **MA0319** – (MBES MA4142; MAG MA7228) a small, raised feature in area of seabed scarring; magnetic return of 18 nT.
- > **MA0320** – (MBES MA4173; MAG MA6328) an angular patch of scour; magnetic return of 60.4 nT.
- > **MA0321** – (MBES MA4187; MAG MA6349) a raised feature next to small patch of scour; magnetic return of 57 nT.
- > **MA0322** – (SSS MA2524; MBES MA4202; MAG MA10507) a pair of raised features with scour; probable wreck debris associated with MA0038, located 22 m northwest; magnetic return of 28.5 nT.
- > **MA0323** – (SSS MA2527; MBES MA4205; MAG MA10495) a linear hard reflector in area of scour; probable anthropogenic debris; magnetic return of 57.1 nT.
- > **MA0324** – (MBES MA4206; MAG MA10496) a raised feature with scour either side; magnetic return of 56.2 nT.
- > **MA0325** – (MBES MA4432; MAG MA10493) a small, angular raised feature; magnetic return of 89.1 nT.
- > **MA0326** – (MBES MA4433; MAG MA10498) a small, raised feature located 20 m northeast from MA0038; potential wreck debris; magnetic return of 31.1 nT.
- > **MA0327** – (MAG MA10494) magnetic anomaly with return of 67.2 nT, potentially associated with MA0538 (potential anthropogenic debris with a magnetic return of 9 nT, seen in SSS and MBES as an isolated linear reflector with scour) which is located 20 m northeast.
- > **MA0328** – (SSS MA2364; MBES MA4388; MAG MA6274) an isolated soft reflector with triangular scour and thin shadows; possible partially buried anthropogenic debris; magnetic return of 76.2 nT.
- > **MA0787** – (SSS2514) an area of scattered linear hard reflectors with shadow; possible anthropogenic debris.
- > **MA0789** – (SSS MA2516) an area of scattered linear hard reflectors with shadow and scour; potential anthropogenic or wreck debris.
- > **MA0796** – (SSS MA2526, MBES MA4450) a rectangular hard reflector with repeating parallel linear features across extent; probable anthropogenic, wreck or fishing debris.

LOW POTENTIAL ANOMALIES

- 4.2.4 The low potential anomalies have been characterised as a mixture of small features, often boulder like, or isolated linear features and modern debris such as rope, chain, fishing gear or lost equipment.
- 4.2.5 Magnetic anomalies under 100 nT with no corresponding records or data in any of the assessed geophysical datasets or research resources have also been assigned low archaeological potential (Figure 6.10).



4.3 GEOARCHAEOLOGICAL ASSESSMENT OF GEOPHYSICAL DATA

- 4.3.1 This section presents a preliminary deposit model which is to be refined following the assessment of forthcoming geotechnical data. The sub-bottom geophysical survey data was assessed as per methodology outlined in Section 2.5, and 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.
- 4.3.2 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 and will utilise and reference the North Sea Prehistory Research Management Framework (NSPRMF), currently in draft form, when available and where relevant.
- 4.3.3 The nature, extent, and distribution of preserved palaeolandscapes is being mapped and understood as survey methods are developing. The contextual relationship between channels, micro and macro fauna, submerged forests, and identified and potential sites, both in the marine zone and terrestrial area, are becoming more apparent as the volume of data is increasing and this should continue to be assessed as per the phased approach outlined in COWRIE, 2011 and per themes and research questions within the forthcoming NSPRMF.

CURRENT UNDERSTANDING

- 4.3.4 The marine archaeology study area covers an area that is dominated by the Thames-Medway rivers system which originally occupied a more northerly course than its current location but was pushed south by widespread glacial movements around 450,000 years ago.
- 4.3.5 Archaeological evidence from the pre-historic gravel terraces shows that the area was repeatedly utilised by people as shown by flakes and cores dated to the Middle Palaeolithic from the offshore area as well as a number of animal bones that have been recovered from the offshore zones indicating habitation both during cold and warm periods.
- 4.3.6 The river systems identified in the area have been mapped by a number of projects, as outlined below, to show an area of complex stages of deposit and erosion. However, dating the deposits has proved challenging despite evidence that the channels and river deposits in the area have preserved both organic deposits and a rich and significant Palaeolithic archaeological record (Wymer, 1999). The relationship between the assessment of sub-bottom data and previously identified channels is described below and relies on the following resources:
- > Thames REC- Emu *et al.* (2009);
 - > Dix and Sturt (2011);
 - > Maritime Archaeology (2013; 2017);
 - > Wessex Archaeology (2016); and
 - > Brown and Russell (2019).



- 4.3.7 The southern extension of the ice sheets during the Anglian glacial period is currently debated. However, a number of enclosed deeps in the Outer Thames Estuary, interpreted as glacial meltwater channels, formed in close proximity to the Anglian ice margin during MIS 12 have been mapped by the Thames REC (Emu *et al.* 2009; Dix and Sturt, 2011), suggesting ice extended further south than previously thought and it is likely that fluvial deposits associated with the submerged Thames-Medway river system dominate the Pleistocene and early Holocene sequence in this area (Emu *et al.* 2009).
- 4.3.8 Peat deposits preserved within palaeochannels located between 6 km and 12 km offshore of the north Kent coast were investigated to support the development of the London Array OWF and Nemo Link projects (Wessex Archaeology, 2016; Brown and Russell, 2019) resulting in dates between 10,170-9,760 cal. BP and later sequences dated to between 8,550-8,390 cal. BP and 7,840-7,670 cal. BP. These deposits, influenced by the rising sea-level, indicate that the potential to locate and date organic material and peat in the marine archaeology study area is high.
- 4.3.9 It is also highly probably that Middle Palaeolithic assemblages located outside the intertidal zone within aggregate deposits, found by local collectors and studied archaeology specific projects, originates from now submerged Pleistocene deposits where the post-Anglian (<MIS 12) rivers Thames, Medway and Blackwater would have been located.

ARCHAEOLOGICAL ASSESSMENT OF SUB-BOTTOM DATA

- 4.3.10 The archaeological assessment of the sub-bottom data collected in the offshore part of the ES Assessment Boundary 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 sub-bottom data to known offshore and terrestrial landscape features; and
 - > Develop an outline deposit model based on the information gathered.

RESULTS

- 4.3.11 The assessment of sub-bottom data has resulted in the identification of the features described in detail below and illustrated on Figure 6.11. Potential locations for the collection of archaeologically specific cores to sample and contribute to the deposit model and understanding of the palaeoenvironment are illustrated in Figure 6.12.

MA3000

- 4.3.12 An area of Pleistocene channels and valleys. Generally infilled by low amplitude reflectors indicating a higher sand content. Blanking is not commonly seen across the feature. Shows a combination of flat and rounded base with gently sloping sides generally to the west and steeper sides to the east. Overlain by a thin layer of mobile marine sediment. Stretches 1.5 km north-northwest to south-southeast with a smaller area of the same feature 500 m long 300 m to the west.

MA3001



4.3.13 This valley and large channel formation stretches south-southeast turning east. The valley covers an area of just over 3 km and is up to 600 m wide. The infill is represented by high amplitude reflectors indicating silt, clay or organics. Occasional blanking beneath the channel base is noted. The feature was possibly laid down during the Holocene and cuts through London Clay (Unit 3), with some braiding noted close to shore.

MA3002

4.3.14 A series of Holocene channels cutting through London Clay (Unit 3), located along the ECC, the channel infill is represented by high amplitude reflectors indicating silt, clay, or organics. In places acoustic blanking is noted below the channel base. The channel features stretch east-west over an area 6 km by 500 m. The channels are not continuously visible but are shallow and difficult to identify in places.

MA3003

4.3.15 Areas of acoustic blanking within or cut through London Clay, the blanking could possibly indicate organic or peaty channel infill or represent pockets of natural gas (Figure 6.15). These areas would be of high geoarchaeological potential should they contain organic material and should be further investigated.

MA3004

4.3.16 Shallow high-amplitude reflectors indicating silt, clay or organics underlying sand waves and uneven seabed sediment (Unit 5). Flat base and gentle sloping sides, covering an area of 8 km by 8 km by at the northern edge of the array area and is likely to continue north beyond the survey extent. The feature becomes shallower and fades to both east and west but is again visible in some lines further south (Figure 6.11) MA3004 has a similar composition to MA3006 and MA3007 may be part of the same channel or valley system.

MA3005

4.3.17 Generally high-amplitude reflectors indicating silt, clay or organics, in places represented by clear layers. The channel is underlying seabed sediment but, in this area, penetrating deeper than at MA3002, indicating a 1.5 km wide channel running 3.3 km north to south. The feature has mostly gently sloping sides which become steeper in the eastern part and a round base. The channel becomes faint and shallower and narrower to the east as well as west where it may extend beyond the survey extent.

MA3006

4.3.18 Shallow high-amplitude reflectors, indicating silt, clay or organics underlying flat seabed sediments (Unit 5). Flat base with a slight deeper dip in places and very gentle sloping sides, covering an area of 5 km by 1.5 km, where the cable route meets the northern array and only visible on survey lines collected in a north-northeast to south-southwest direction. MA3006 is likely to continue south-southeast beyond the survey extent. MA3006 has a similar composition to MA3004 and MA3007 and may be part of the same channel or valley system.

MA3007



4.3.19 Shallow high-amplitude reflectors, underlying flat seabed sediments (Unit 5). Flat base and very gentle sloping sides, covering an area of 1.5 km by 2 km at the north-east end of the southern array. The feature fades towards the west and is likely to stretch east beyond the survey extent. Similar composition to MA3004 and MA3006 located further north and may be an extension of the same channel or valley system.

MA3008

4.3.20 Deep high-amplitude reflectors within and in places above London Clay (Unit 3), penetrating deeper to Reading or Woolwich Formation (Unit 1) in places. Steep sides with a rounded base and generally presents as a depression rather than clear channel. Stretching north-northeast to south-southwest over 5 km by 1.5 km.

MA3009

4.3.21 A wide shallow channel or valley with slightly sloping edges and generally flat base. The infill is composed of low amplitude reflectors indicating a higher sand content, with a high-amplitude reflector seen at the base of the channel. Overlain by seabed sediment, possibly cut into older sediments indicating a Pleistocene cut and fill. Continuing over 5 km and generally 200 m wide but up to 1 km wide in places. Located at the south-western end of the southern array.

MA3010

4.3.22 Possible end of channel infilled by low-amplitude reflectors indicating a high sand content with steep edges and a round base. Overlain by mobile marine sediment (Unit 5) and overlying the Reading or Woolwich Formation (Unit 1), possible deposited during the Pleistocene. Located within the ECC, visible in two areas, both 200 m by 100 m.

MA3011

4.3.23 Narrow channel with rounded base and steep sides, infilled by low-amplitude reflectors indicating a high sand content. Only clearly visible in on a small number of survey lines. Overlain by mobile marine sediment (Unit 5), probably cutting through London Clay (Unit 3) and overlying the Reading or Woolwich Formation (Unit 1) possible deposited during the Pleistocene. Located within the ECC, covering an area of 200 by 200 m.

MA3012

4.3.24 Area of channels with mostly round base and steep edges, infilled by low-amplitude reflectors indicating a high sand content. Overlain by thick slightly dipping London clay (Unit 3), see MA3015 and blanking. Located along the ECC, over an area of 2 km by 1 km.

MA3013

4.3.25 Area of folding and possible shallow channels or dipping through London Clay (Unit 3) with rounded base and gentle sides infilled by high-amplitude reflectors indicating silt, clay, or organics. Located within the ECC close to but does not show the same composition as MA3002.

MA3014



4.3.26 Area of multiple complex channels with mostly round steep edges, infilled by low-amplitude reflectors indicating a high sand content (Unit 2). Overlain by thick, slightly dipping London clay (Unit 3), see MA3003, and blanking. Located along the ECC, over an area of 2 km by 500 km.

MA3015

4.3.27 While Holocene deposits are covering the majority of the study area, MA3015 represents an area of thick Holocene clays located within the ECC (Unit 3), slightly dipping in places, indicating a cut and fill feature. The cuts are shallower going west and the feature is underlain by older channels, see MA2012.

MA3016

4.3.28 MA3016 represents an area of clearly visible channels with a round base and steep sides infilled by high-amplitude reflectors indicating silt, clay, or organics. Located within the ECC, in close proximity to MA3000 and overlaying older channels such as MA3012 and MA3000. The feature is not visible further south but continues north, probably beyond the survey area.

MA3017

4.3.29 Two areas of channels with round base and steep sides, infilled by high-amplitude reflectors indicating silt, clay, or organics. Located within the ECC covering two areas of 500 m by 500 m and 600 m by 100 m respectively. Overlain by seabed sediment (Unit 5).

SUMMARY OF GEOARCHAEOLOGICAL RESULTS

4.3.30 As also seen in seismic data interpreted by Emu *et al.* (2009), the area is characterised by complex cross-cutting channels that can exceed 40 m thickness in places and the presence of shallow gas suggesting fine-grained or organic deposits may be preserved. This interpretation is very similar to the sub-bottom assessment of data for VE as described in detail above. Several of the channels indicate crosscutting features. Blanking is seen across large parts of the area, often in association with channel deposits, and so indicate that well preserved deposits with high geoarchaeological potential are extant within the study area.

4.3.31 The geoarchaeological assessment undertaken on behalf of the North Falls Offshore Wind Farm (North Falls Offshore Wind Farm, 2022) has been referenced in the geoarchaeological assessment below to contribute to a greater understanding of the geoarchaeological potential of the region.

4.3.32 While less evidence for both organic material and clear channel and valley features is seen within the two array areas of VE, the ECC does go through areas where geoarchaeological channels have previously been mapped and an increase of deposits of interest are noted (MA3000, to MA3003 and MA3010 to MA3017).

4.3.33 The channels and riverbeds identified by the Thames REC project (Emu *et al.*, 2009) within the array area correlate with the VE SBP data analysis as illustrated on Figure 6.11. See; MA3004, MA3005, MA3006 and MA3009.



- 4.3.1 Further channels and deposits of geoarchaeological potential were recently mapped by the North Falls Offshore Wind Farm Project (North Falls Offshore Wind Farm Project, 2022). There is minor spatial overlap between the VE Array areas and the North Falls array areas and the North Falls inter connector cable where only one of the features identified from the VE sub-bottom dataset (MA3009) and the North Falls Channel, have a clear geographical association.
- 4.3.2 MA3000 has been interpreted as a wide shallow channel or valley with slightly sloping edges and generally flat base. Overlain by seabed sediment, possibly cut into older sediments indicating a Pleistocene cut and fill. Continuing over 5 km and generally 200 m wide but up to 1 km wide in places. The feature is located at the south-western end of the southern array. The associated North Falls feature 7030 is described as possible palaeochannel feature of high archaeological potential and indicates an extension of the same feature stretching south outside the VE data (North Falls Offshore Wind Farm, 2022).
- 4.3.3 The channels along the ECC are also possibly associated or extensions of the features identified in the Thames REC project (Emu *et al.*, 2009), see MA3000, MA3013 MA3016.
- 4.3.4 As noted, this is an area of complex cross-cutting channels which may not be easily distinguishable across surveys, or even survey directions, as seen at MA3006, which is why the associations are not as clear as within the array areas.
- 4.3.5 Further channels and deposits of geoarchaeological potential were recently mapped by the North Falls Offshore Wind Farm Project (North Falls Offshore Wind Farm Project, 2022) along the two projects parallel running Offshore ECCs.
- 4.3.6 Channel feature MA3002 (Holocene channels cutting through London Clay with infill represented by high amplitude reflectors indicating silt, clay, or organics) is possibly associated with North Falls 7046, a broad and shallow channel feature characterised by a well-defined basal reflector and layered fill, possible buried fluvial feature.
- 4.3.7 MA3013 (an area of folding and possible shallow channels or dipping through London Clay, with rounded base and gentle sides infilled by high-amplitude reflectors indicating silt, clay, or organics) is associated with North Falls 7051, described as a possible channel feature cut into the underlying London Clay Formation.
- 4.3.8 Around the middle of the Offshore ECC MA3017 (areas of channels with a round base and steep sides, infilled by high-amplitude reflectors indicating silt, clay, or organics) is associated with North Falls 7052 and 7053, described as areas of complex channel deposits
- 4.3.9 MA3000 (areas of acoustic blanking within or cut through London Clay) and MA3016 (clearly visible channels with a round base and steep sides) are potentially associated with North Falls 7054 (a possible channel feature identified cutting into the underlying London Clay formation) or with North Falls features 7055, 7056 and 7057, all described as shallow cut and fill features cutting into the underlying London Clay formation.
- 4.3.10 MA3012 (area of channels with mostly round base and steep edges, infilled by low-amplitude reflectors indicating a high sand content) is possibly associated with North Falls feature 7058 while MA3015 (area of thick Holocene clays) maybe be associated with North Falls cut and fill feature 7059.



- 4.3.11 Further towards the shore the deposits identified from the sub-bottom assessment are more complex, as outlined below.
- 4.3.12 MA3003 (areas of acoustic blanking within or cut through London Clay) lines up with North Falls 7066, described as a cut and fill feature with a number of areas of acoustic blanking (7067, 7068, 7069, 7070).
- 4.3.13 MA3011 (narrow channel feature), is possibly associated with North Falls 7064, described as a distinct channel feature.
- 4.3.14 MA3014 (Area of multiple complex channels) is associated with North Falls 7062, described as an area of channel complex deposits.
- 4.3.15 As noted, this area demonstrated complex cross-cutting channels. The features are not easily identified across survey lines, or survey directions. As an example, this complexity is visible at feature MA3006 and explains why some of the channels along the ECC are not as easily associated with features identified in the Thames REC project (Emu *et al.*, 2009).
- 4.3.16 The blanking (MA3003) is interpreted as a slight reduction in amplitude with no evidence of peat within the site investigation report (Fugro, 2022b). However, the possibility of organic material cannot be eliminated as it is frequently seen across the whole study area and is likely to be associated with deposits previously identified and analysed, (Wessex Archaeology, 2016; Brown and Russell, 2019). Therefore, any future geoarchaeological assessments should focus on sampling and assessing this deposit.

SEABED SAMPLING

- 4.3.17 In addition to the geophysical survey a seabed sampling campaign consisting of 61 grab samples within the array and inter-array area and across the ECR was undertaken. Further at 11 stations, successful video footage was acquired while at nine additional stations there were very poor to no visibility due to local environmental conditions.
- 4.3.18 The integrated analysis of video and photographic data with geophysical data showed the sediments across the survey area were variable but identified two potentially sensitive habitats;
- > The Marine Conservation Zones Habitat Features of Conservation Importance 'Sub-tidal sands and gravels'; and
 - > The United Kingdom Biodiversity Action Plan listed priority habitat 'Peat and clay exposures with piddocks' which occurred patchily at five stations, one within the north array and four within the eastern offshore extents of the ECR (Fugro, 2022b). Where seen, this biotope was assigned to areas of firm clay amongst areas of mixed sediments (rather than peat). The habitat was recorded at stations FE4_01, FE4_02 and FE4_03 within the ECR (Fugro, 2022c) and FE1_01 in the north array (Fugro, 2022d).

OUTLINE DEPOSIT MODEL

- 4.3.19 As outlined in Table 4.1, the seabed in the marine archaeology study area is dominated by shallow mobile sands (Unit 5) overlaying London Clay (Unit 3) which in areas protrudes the seabed and is visible or just under the seabed sediments. A number of cut and fill features as well as channel sand valleys have been identified with the SBP data and are described below (Unit 4). Earlier sediments such as Harwich Formation (Unit 2) and Reading or Woolwich Formation (Unit 1) are also found across the area.



4.3.20 The outline deposit model will be further refined following a phased geoarchaeological assessment as detailed in the Outline Marine WSI.

Table 4.1: Outline deposit model

Unit	Sediment	Description	Epoch	Geoarchaeological potential
5	Mobile seabed sediments	Sand and gravel.	Holocene	No
4	Channel/Valley infill	Soft possibly peaty silt, clay or sand.	Late Pleistocene to Early Holocene	Yes
3	London Clay	Firm to hard silty clay.	Tertiary	Low
2	Harwich Formation	Silty clays and sandy clayey silts.	Ypresian (MIS 3)	Low
1	Reading or Woolwich Formation	Dark grey shelly clay, laminated clay and silt or fine- to coarse-grained sand.	Thanetian to Ypresian (MIS 4-3)	Low



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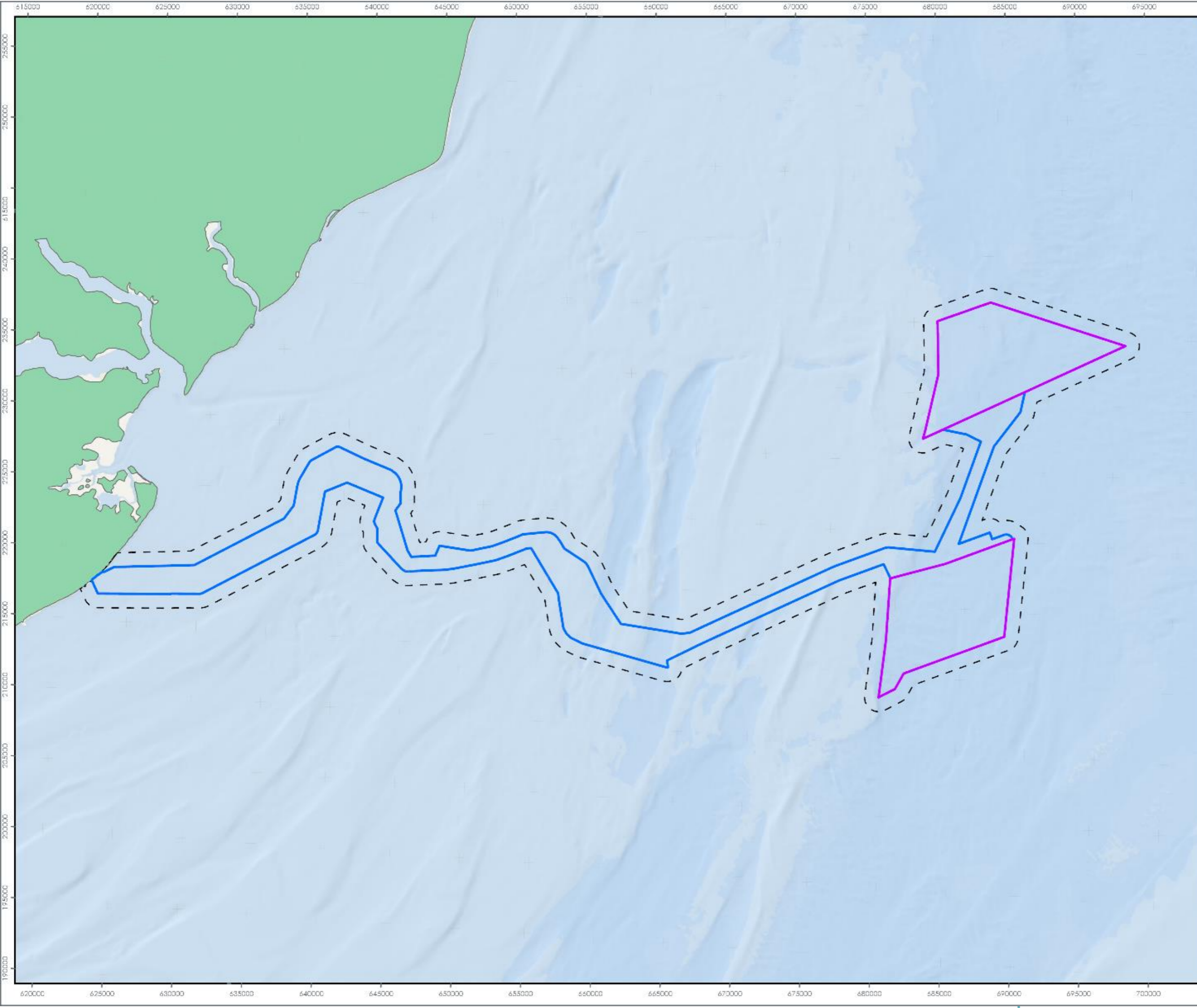


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6 FIGURES

6.1.1 Figures are provided on the following pages.



- LEGEND**
- Array Areas
 - Offshore Export Cable Corridor
 - Marine Archaeology Study Area



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FIVE ESTUARIES OFFSHORE WINDFARM

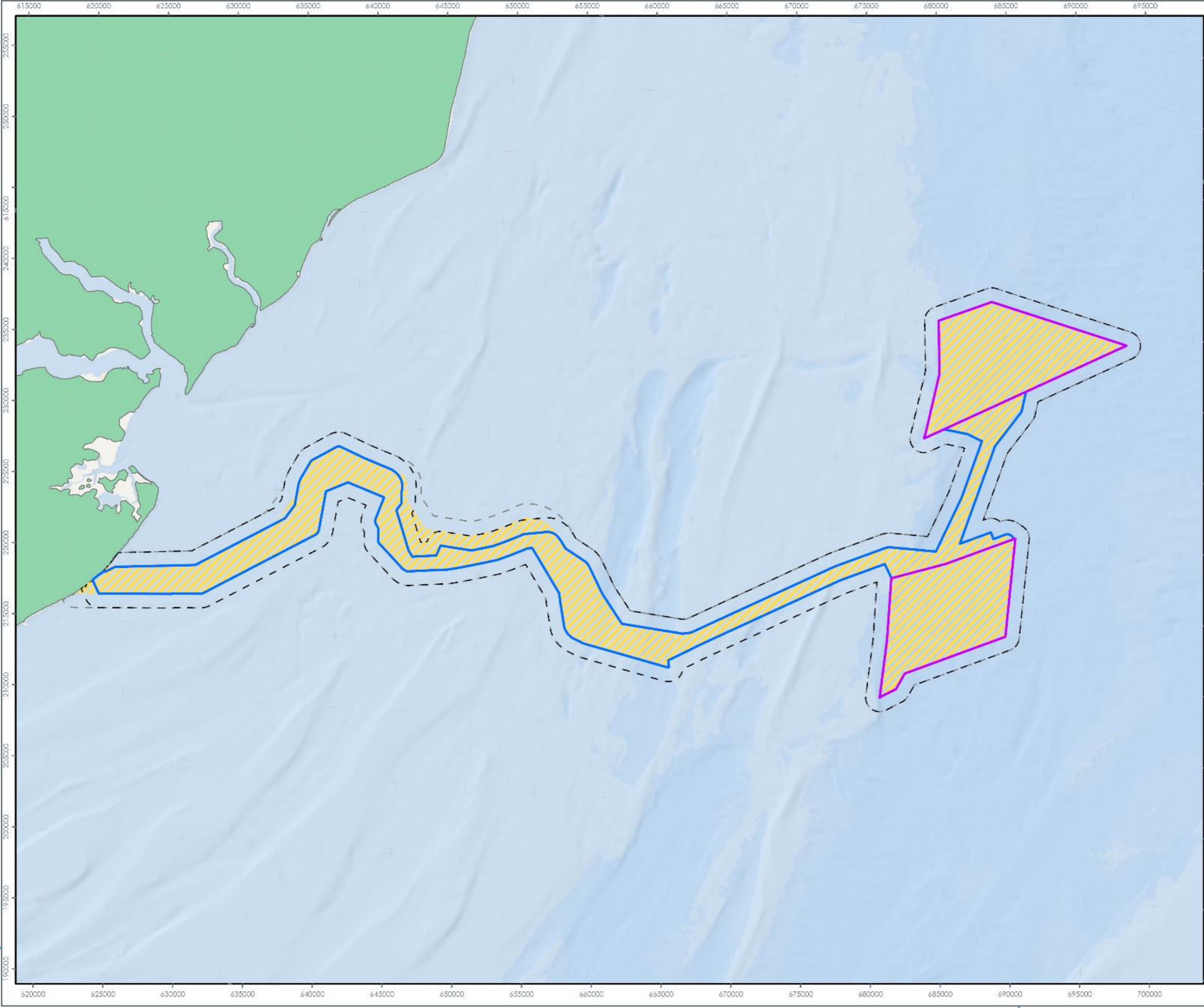
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 and ES proposed Order Limits**

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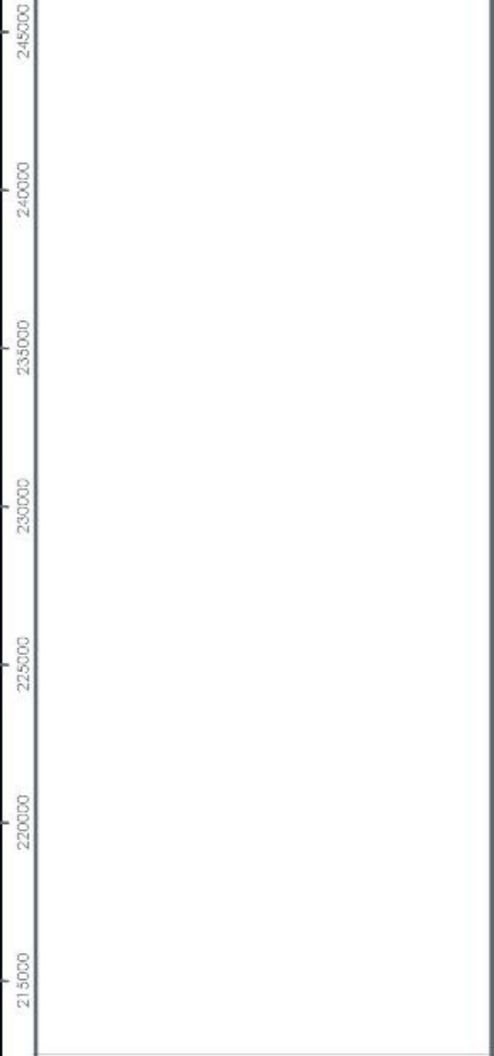
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- LEGEND**
-  Array Areas
 -  Offshore Export Cable Corridor
 -  Marine Archaeology Study Area
 -  PEIR Red Line Boundary
 -  PEIR Marine Archaeology Study Area



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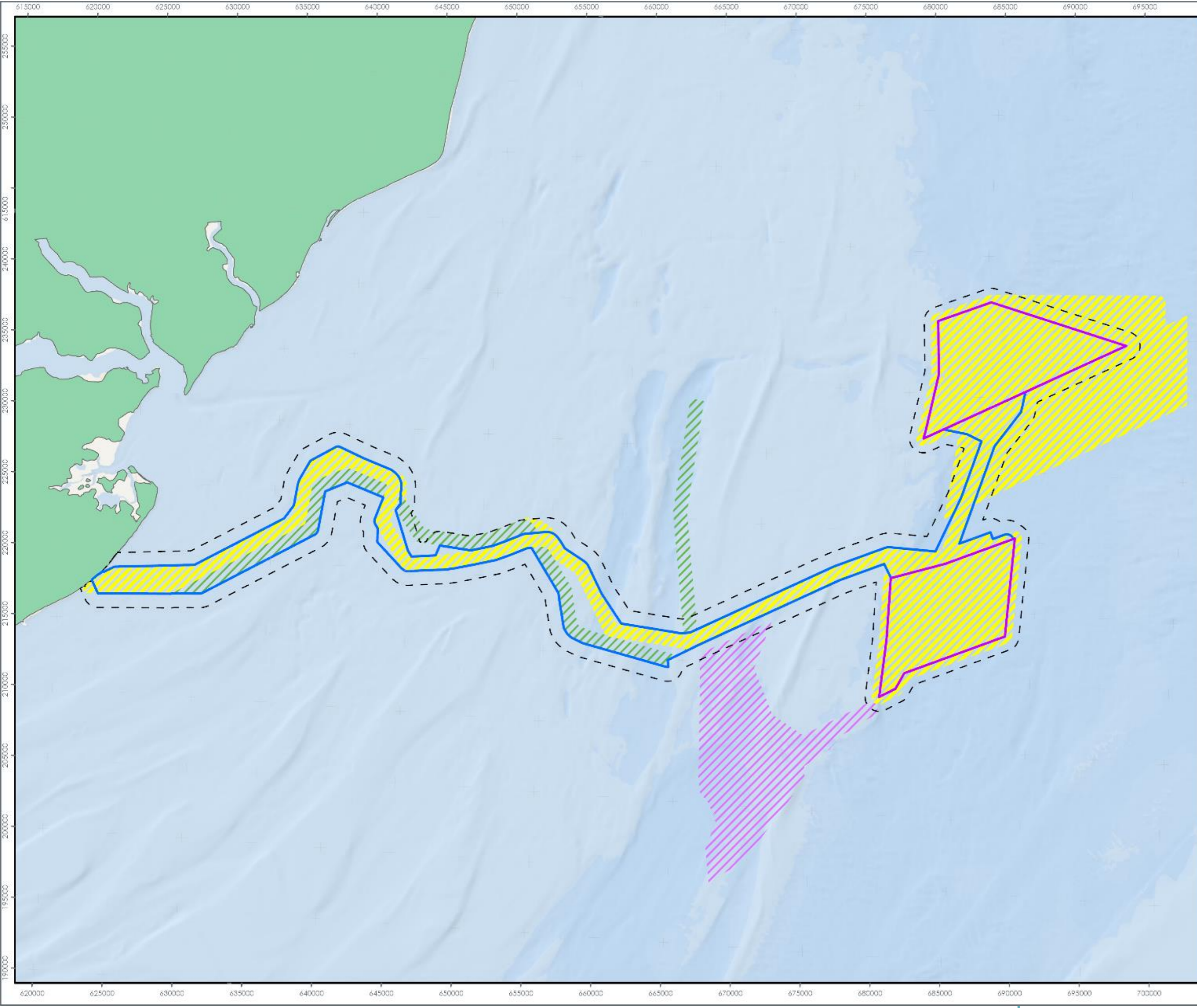
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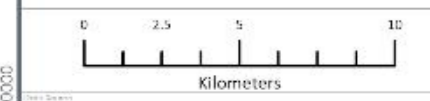
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 DRAWING: 11.1.2
 PREPARED BY: HMM





- LEGEND**
- Array Areas
 - Offshore Export Cable Corridor
 - Marine Archaeology Study Area
 - VE Geophysical Survey Extent
 - North Falls Offshore Array Boundary
 - North Falls Export Cable Route Boundary



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FIVE ESTUARIES OFFSHORE WINDFARM

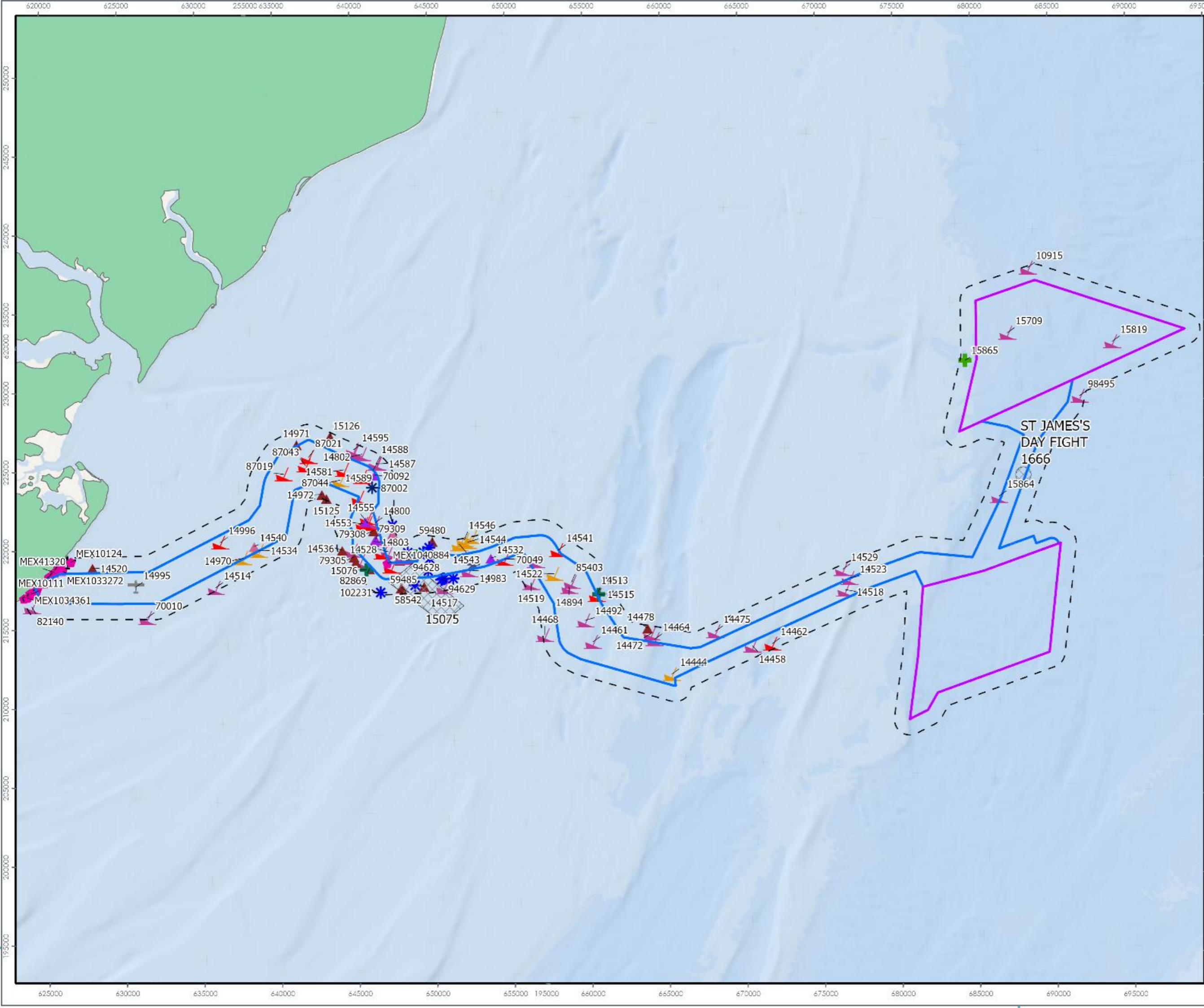
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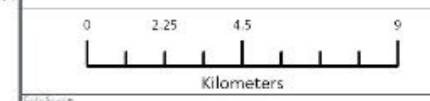
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TEAM	DESIGNER	CHECKED	DATE	PROJECT	UTM_ZONE





- LEGEND**
- Array Areas
 - Offshore Export Cable Corridor
 - Marine Archaeology Study Area
- UKHO and NRHE records
- ✚ aircraft
 - ✚ aircraft (seen in geophysical data)
 - ▲ foul ground
 - ▲ foul ground (seen in geophysical data)
 - ▲ foul ground (covered by North Falls data)
 - + obstruction
 - + obstruction (seen in geophysical data)
 - ✳ unknown
 - ✳ unknown (seen in geophysical data)
 - ✳ unknown (covered by North Falls)
 - ✚ wreck
 - ✚ wreck (seen in geophysical data)
 - ✚ wreck (covered by North Falls data)
 - ✚ HER records
 - UKHO and NRHE area records



PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WINDFARM

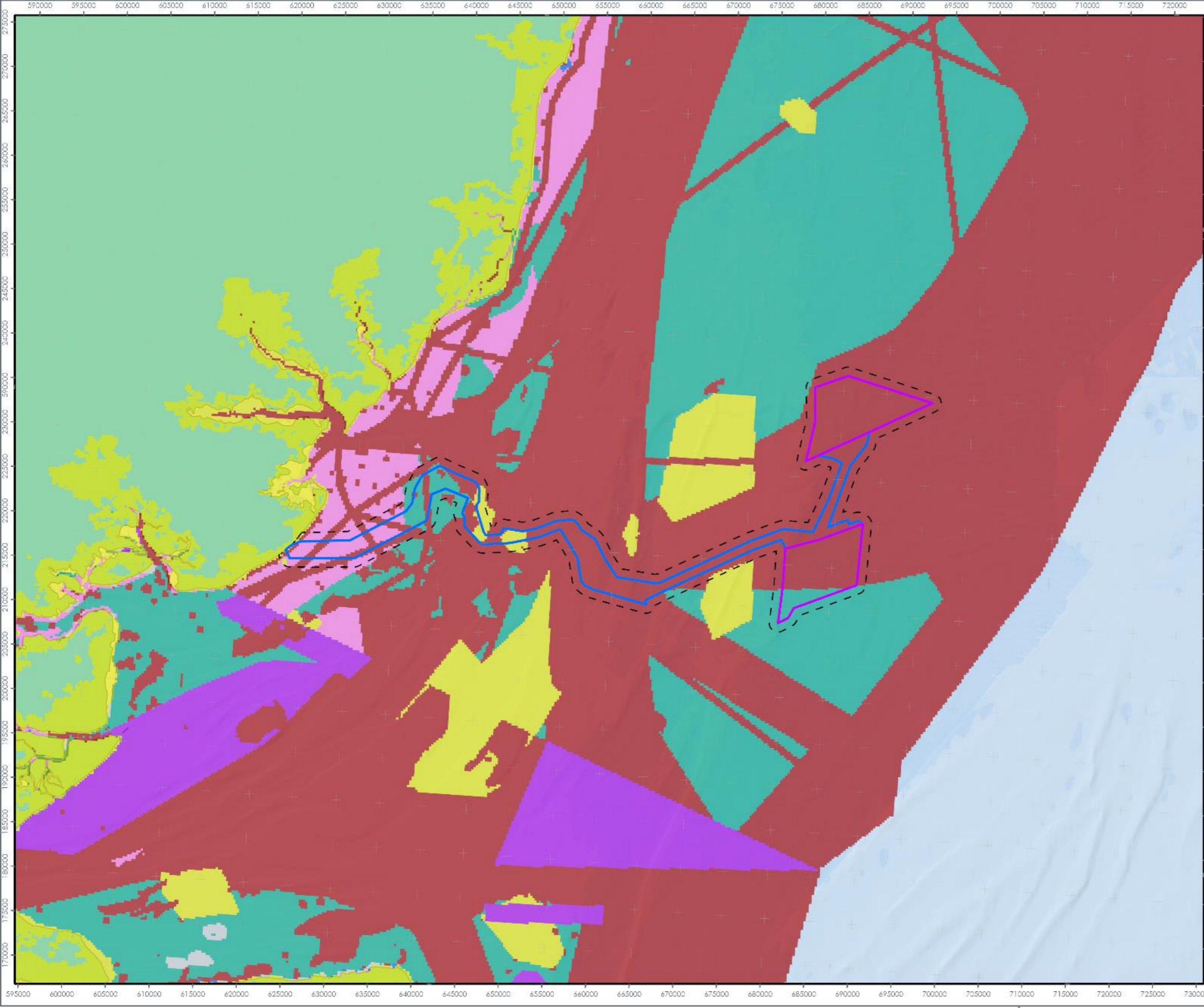
DRAWING TITLE:
Recorded losses, obstructions and foul grounds within the marine archaeology study area

VER	DATE	REMARKS	Drawn	Checked
1	30/01/2024	DRAFT	RA	CH

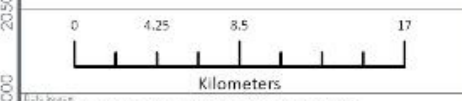
DRAWING NUMBER: 11.10

SCALE	PLOT SIZE	PAPER	PROJECTION
AS	A3	WGS84	UTM31N





- LEGEND**
- Array Areas
 - Offshore Export Cable Corridor
 - Marine Archaeology Study Area
- Type
- Fishing
 - Cultural Topography
 - Ports and Docks
 - Navigation
 - Industry
 - Coastal Infrastructure
 - Military
 - Recreation



ES&S Source:
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 Esri, DeLorme, Garmin, Ordnance Survey, NOAA, USGS, NOAA, Ordnance Survey, Esri, DeLorme, Garmin

PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WINDFARM

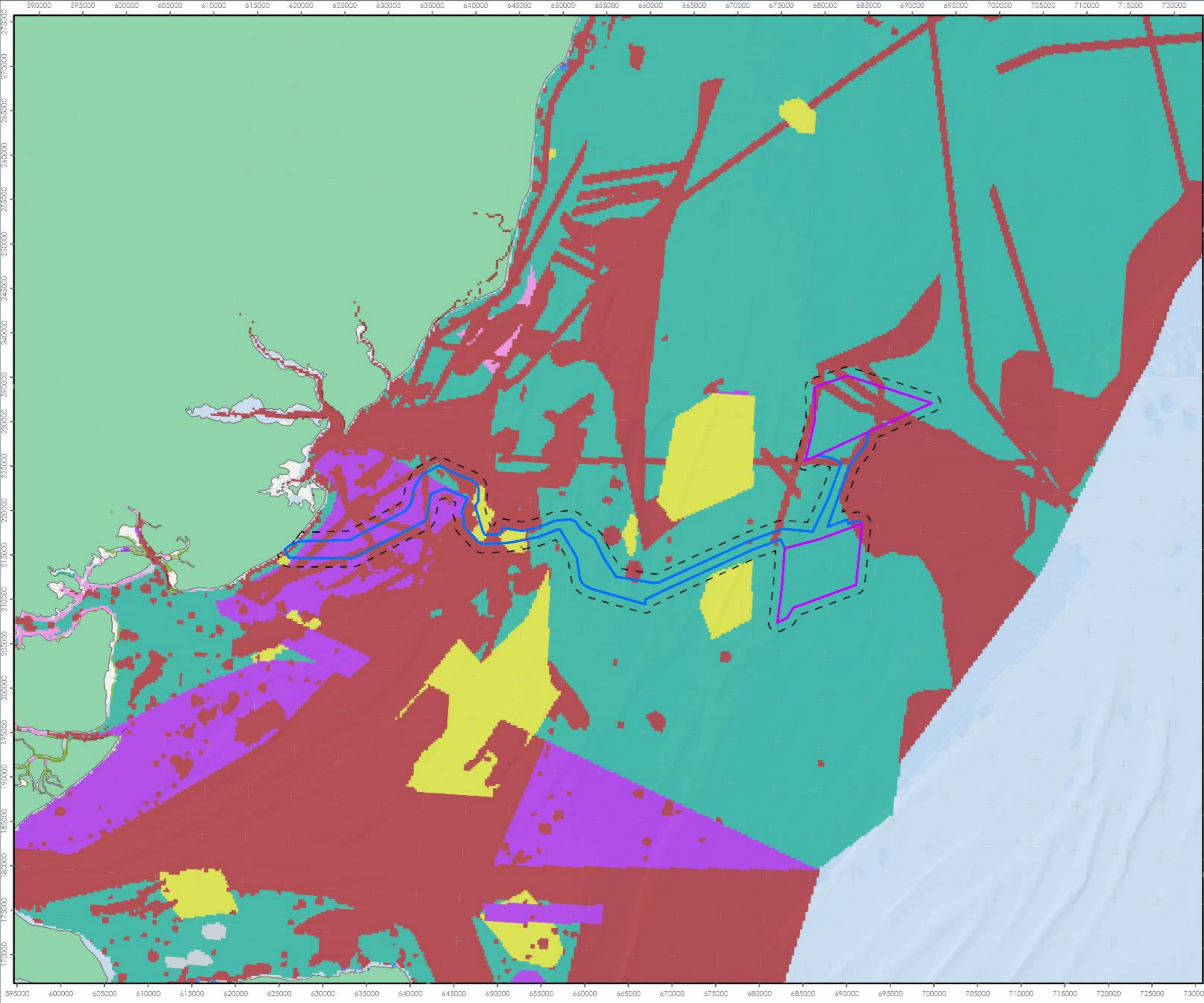
DRAWING TITLE:
**Historic Seascape Characterisation
 of the sea surface level**

VER	DATE	REMARKS	Drawn	Checked
1	29/01/2024	DRAFT	HA	CH

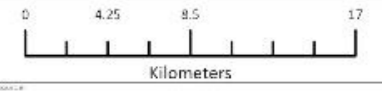
DRAWING NUMBER: 11.1.6

SCALE: 1:10000 AS Datum: WGS84 Projection: UTM21N





- LEGEND**
- Array Areas
 - Offshore Export Cable Corridor
 - Marine Archaeology Study Area
- Type
- Fishing
 - Cultural Topography
 - Ports and Docks
 - Navigation
 - Industry
 - Coastal Infrastructure
 - Military
 - Recreation



Data Source:
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PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WINDFARM

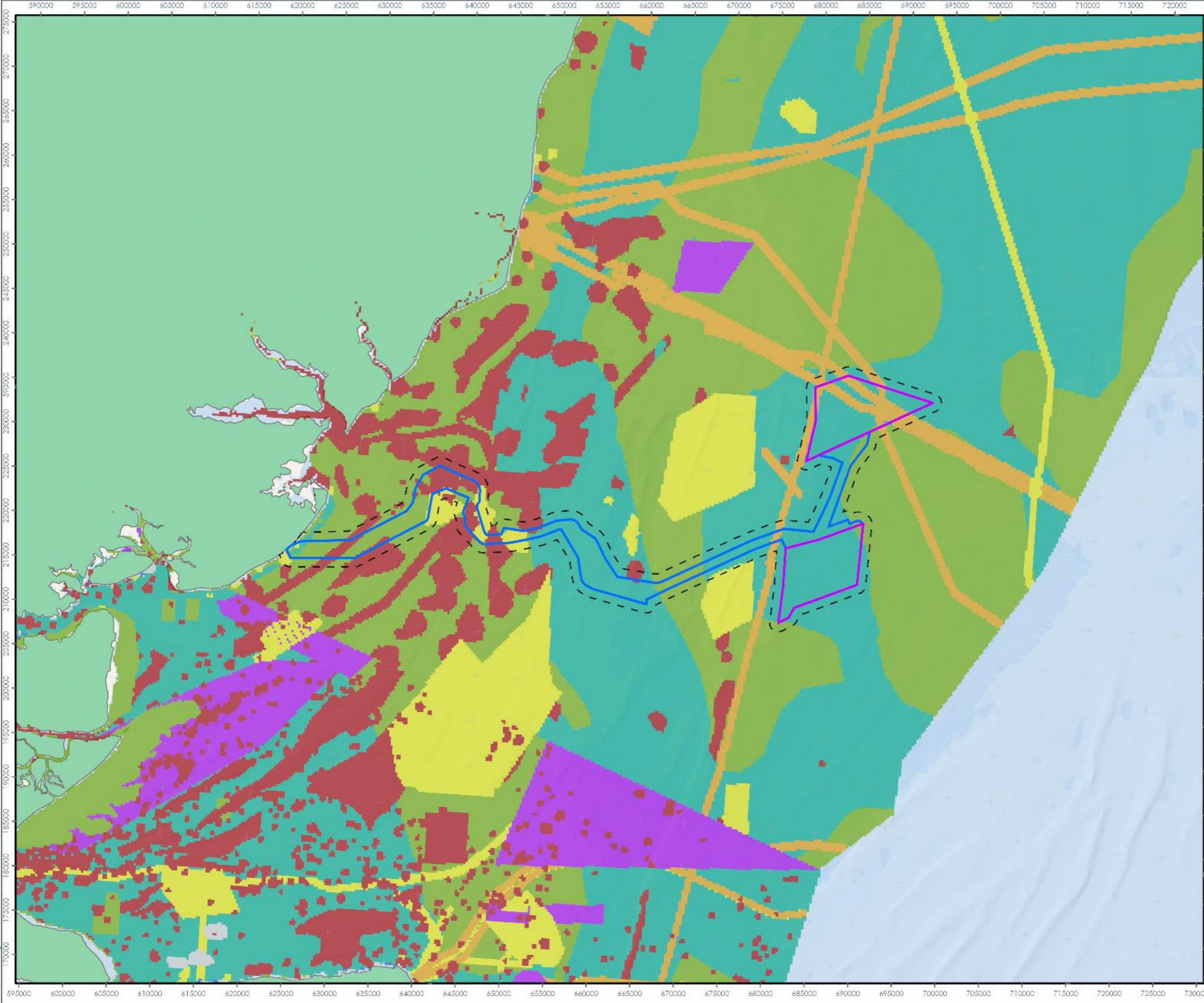
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**Historic Seascape Characterisation
of the water column level**

VER	DATE	REMARKS	Drawn	Checked
1	29/01/2024	DRAFT	HA	CH

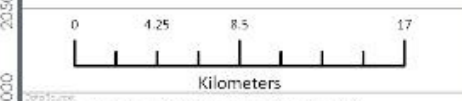
DRAWING NUMBER: 11.1.7

SCALE	FLOOR	SHEET	PROJECTION
1:10000	AS	WGS84	UTM30N





- LEGEND**
- Array Areas
 - Offshore Export Cable Corridor
 - Marine Archaeology Study Area
- Type
- Fishing
 - Cultural Topography
 - Ports and Docks
 - Navigation
 - Industry
 - Communications
 - Coastal Infrastructure
 - Military



PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WINDFARM

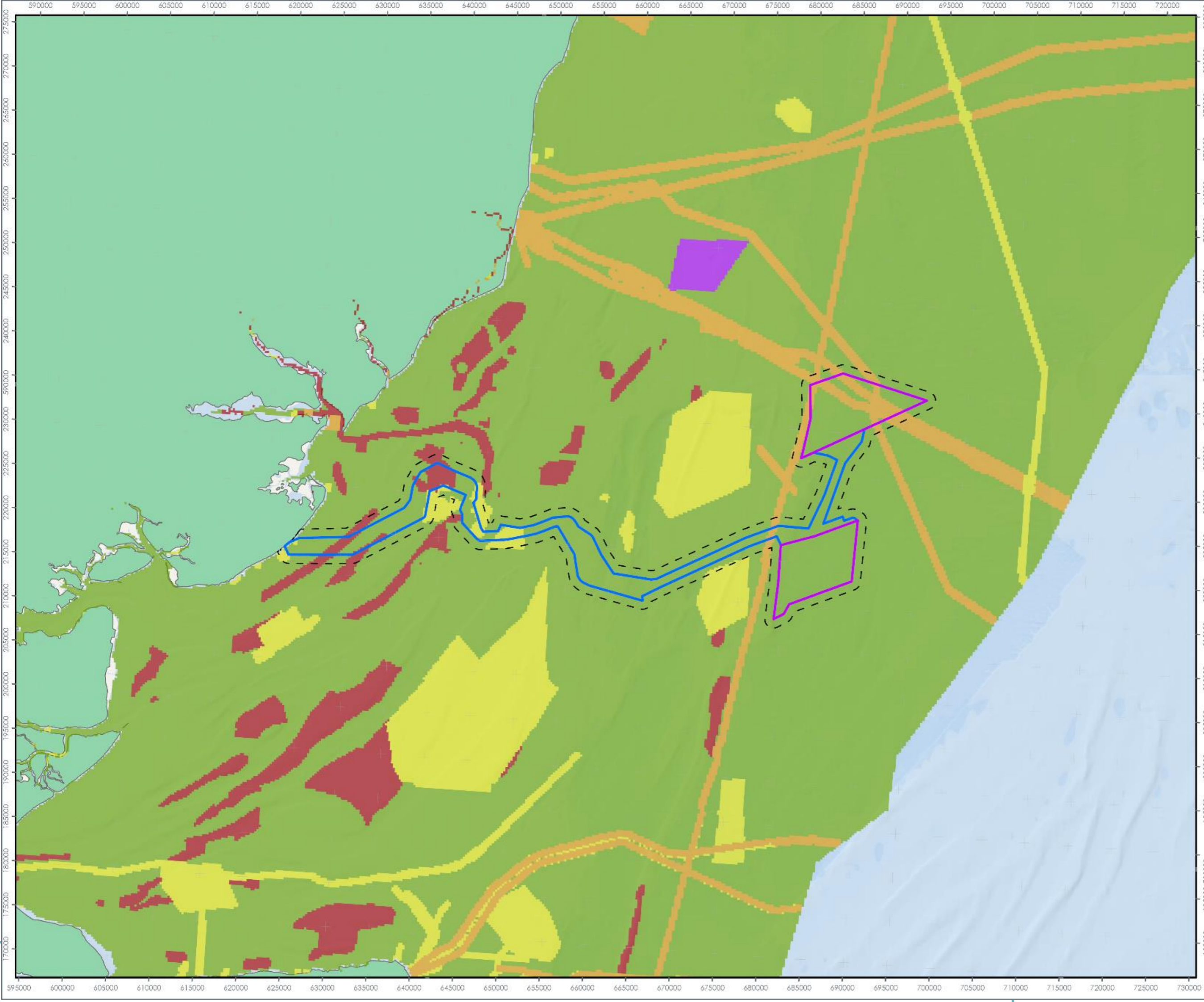
DRAWING TITLE:
Historic Seascape Characterisation of the sea floor level

VER	DATE	REMARKS	Drawn	Checked
1	29/01/2024	DRAFT	HA	CH

DRAWING NUMBER: 11.1.8

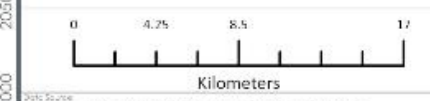
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1:50000	AS	WG584		UTM031





- LEGEND**
- Array Areas
 - Offshore Export Cable Corridor
 - Marine Archaeology Study Area

- Type
- Cultural Topography
 - Navigation
 - Industry
 - Communications
 - Military



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PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WINDFARM

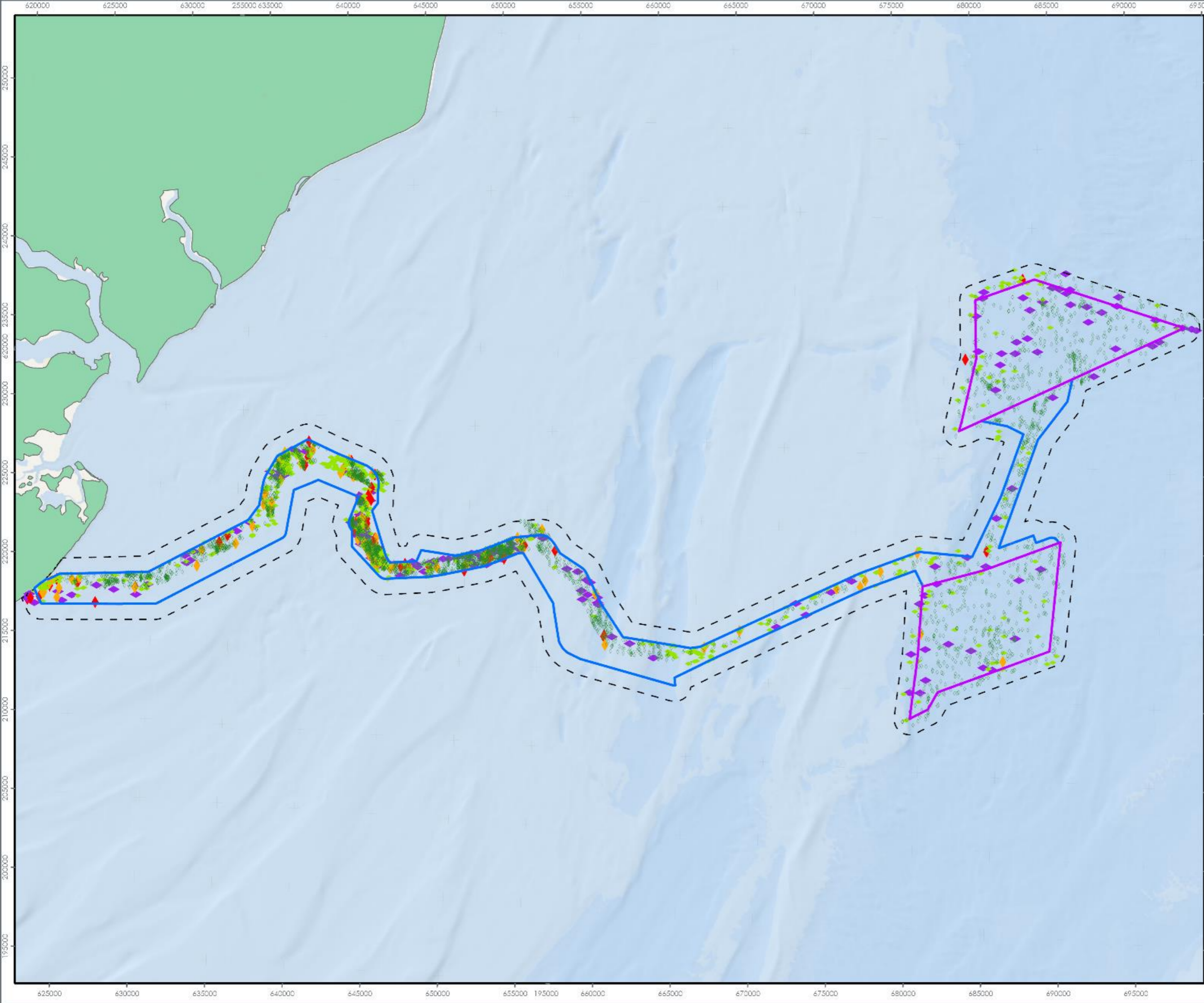
DRAWING TITLE:
**Historic Seascape Characterisation
of the sub-sea floor level**

VER	DATE	REMARKS	Drawn	Checked
1	29/01/2024	DRAFT	HA	CH

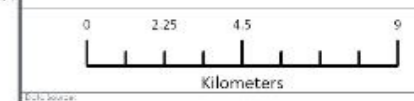
DRAWING NUMBER: 11.1.9

SCALE: 1:10000
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PROJ: UTM
PROJ: UTM





- LEGEND**
- Array Areas
 - Offshore Export Cable Corridor
 - Marine Archaeology Study Area
- Anomalies of archaeological potential
- ◆ High
 - ◆ High (mag only)
 - ◆ Medium
 - ◆ Low
 - ◇ Low (mag only)



ESIC Source:
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PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WINDFARM

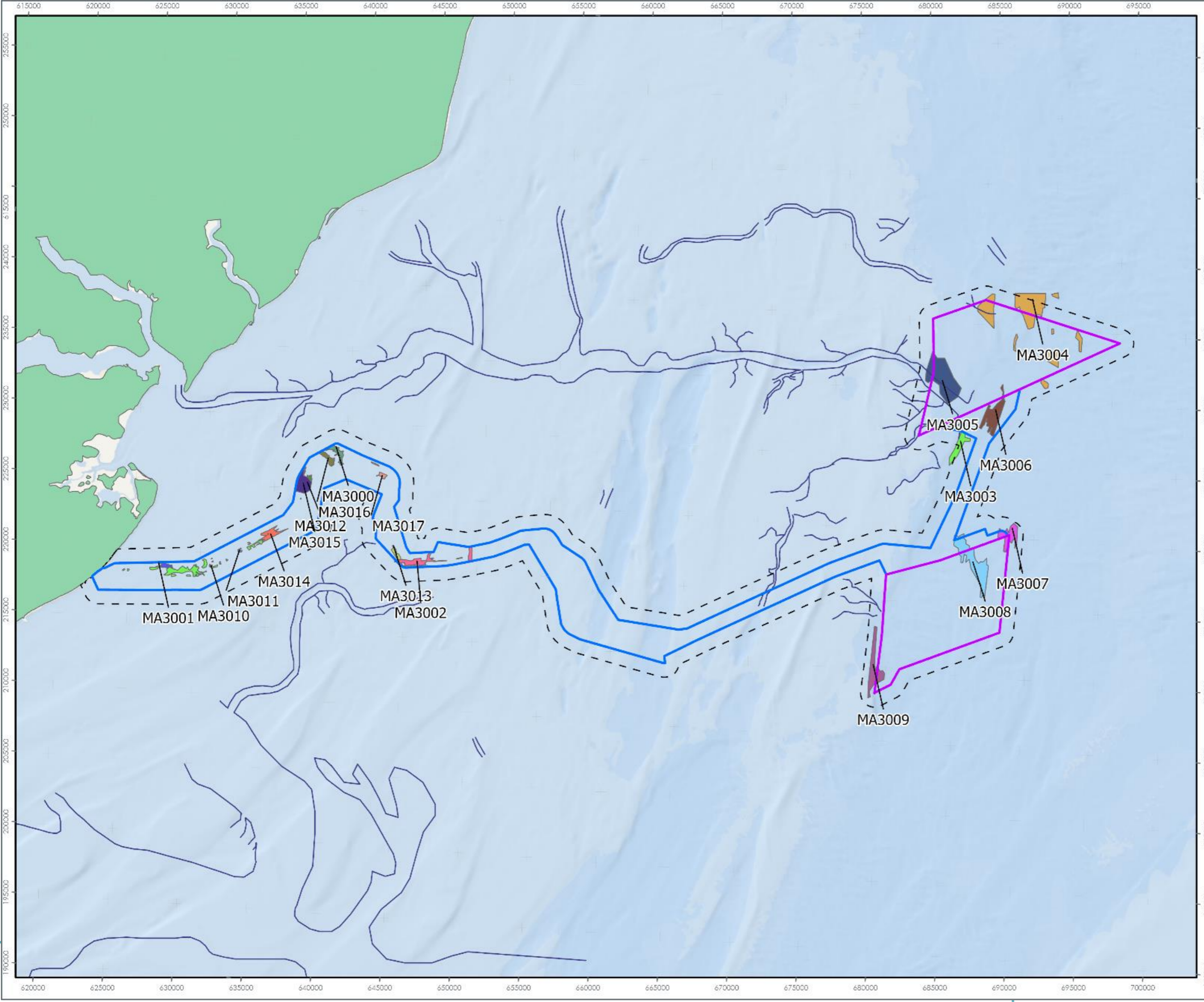
DRAWING TITLE:
Anomalies of archaeological potential identified in the geophysical data

VER	DATE	REMARKS	Drawn	Checked
1	29/01/2024	DRAFT	HA	CH

DRAWING NUMBER: **11.1.10**

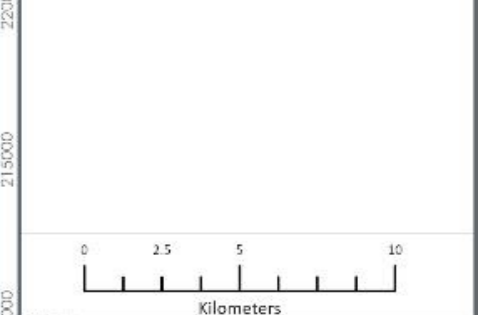
SCALE: varian PLOT SIZE: **A3** DATUM: **WGS84** PROJECT NO: **UMH51**





LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Marine Archaeology Study Area
- Interpreted channel systems (EMU, 2009)
- Channels with geospatial potential**
- MA3000
- MA3001
- MA3002
- MA3003
- MA3004
- MA3005
- MA3006
- MA3007
- MA3008
- MA3009
- MA3010
- MA3011
- MA3012
- MA3013
- MA3014
- MA3015
- MA3016
- MA3017



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 Project No. FOSW/2024-01/001. DRAFT. 2024-01-29. ES&S SOURCE: ES&S SOURCE: ES&S SOURCE

PROJECT TITLE:
 FIVE ESTUARIES OFFSHORE WINDFARM

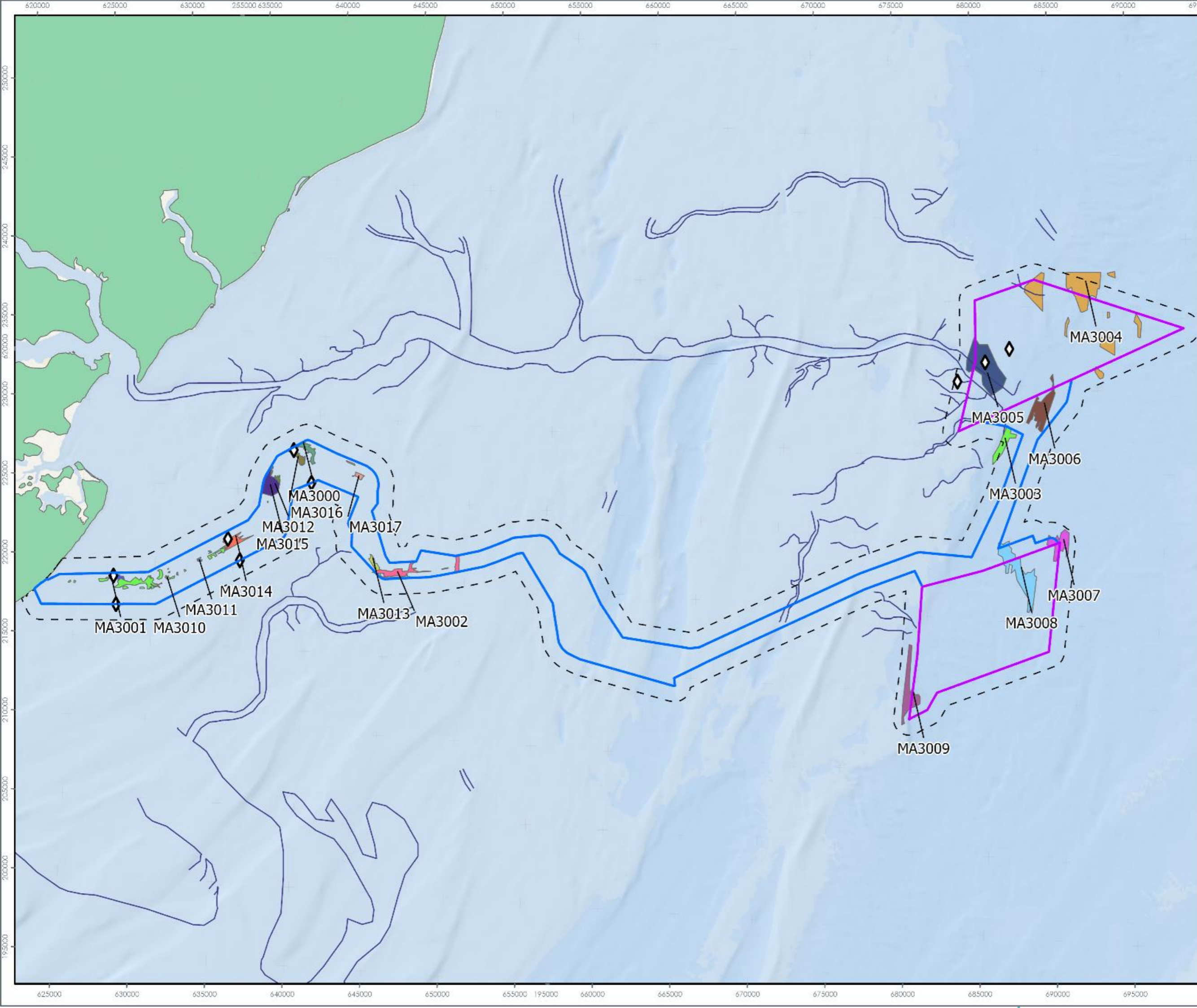
DRAWING TITLE:
 Valleys and channels of geospatial potential

VER	DATE	REMARKS	Drawn	Checked
1	29/01/2024	DRAFT	HA	CH

DRAWING NUMBER: 11.1.11

SCALE: 1:50000	PLOTTER: A3	DATABASE: WCS84	PROJECTOR: UTMWGS84
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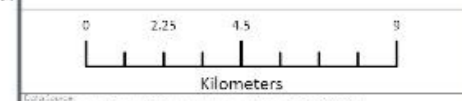


LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Marine Archaeology Study Area
- Potential geotechnical sample locations
- Interpreted channel systems (EMU, 2009)

Channels with geoarchaeological potential

- MA3000
- MA3001
- MA3002
- MA3003
- MA3004
- MA3005
- MA3006
- MA3007
- MA3008
- MA3009
- MA3010
- MA3011
- MA3012
- MA3013
- MA3014
- MA3015
- MA3016
- MA3017



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 ENU, UTM, WGS84, Spheroid, Transverse Mercator, UTM, WGS84, Spheroid, Transverse Mercator, UTM, WGS84, Spheroid, Transverse Mercator

PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WINDFARM

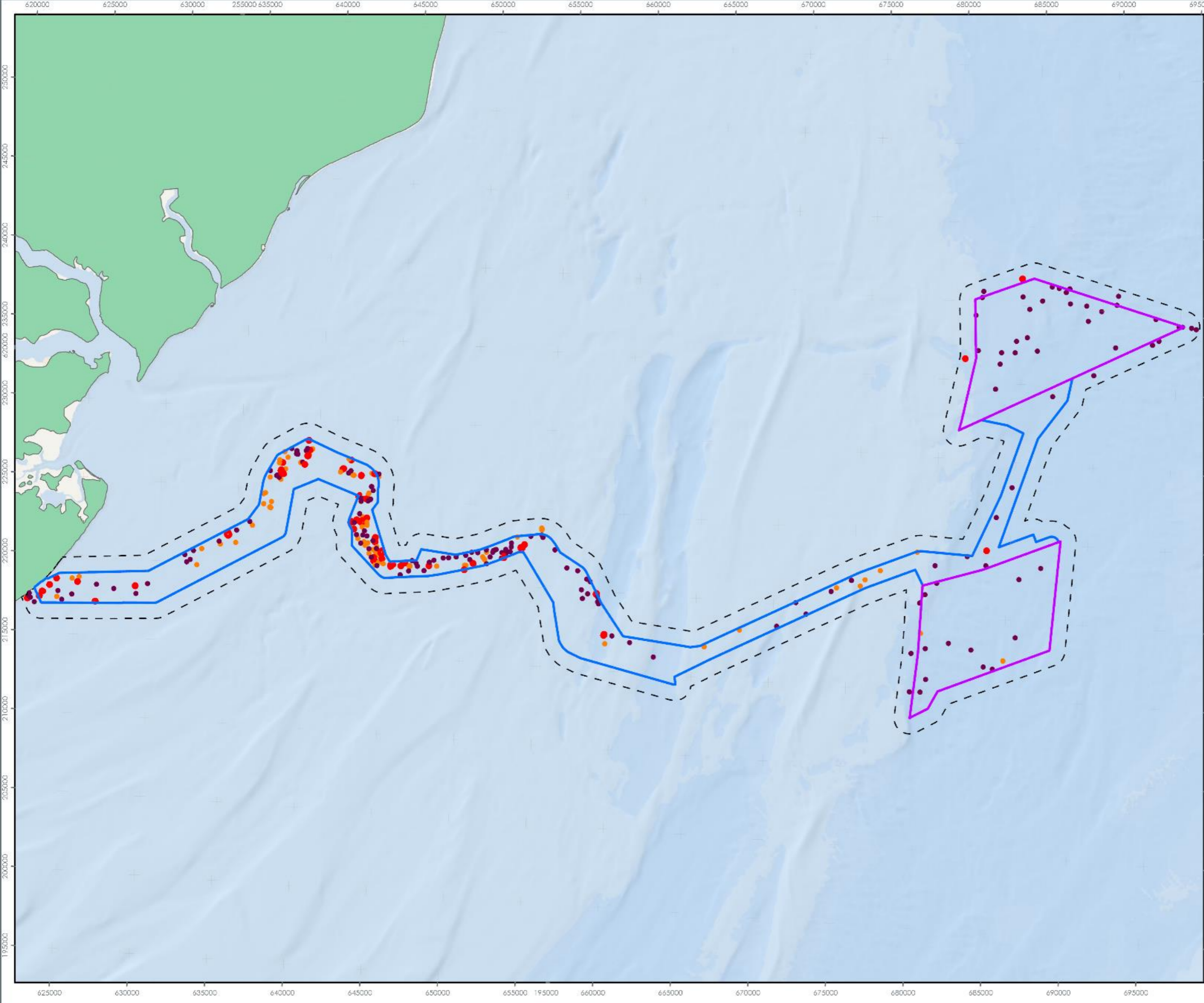
DRAWING TITLE:
Potential locations for geoarchaeological core collection

VER	DATE	REMARKS	Drawn	Checked
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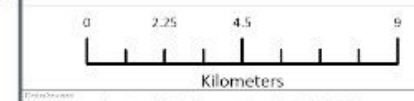
DRAWING NUMBER: 11.1.12

SCALE: 1:25000 PLOT SIZE: A3 DATUM: WGS84 PROJECTION: UTM32U





- LEGEND**
- Array Areas
 - Offshore Export Cable Corridor
 - Marine Archaeology Study Area
- Geophysical AEZ**
- High
 - High (mag only)
 - Medium



Drawn by: [Name]
 Project: [Name]
 Date: [Date]

PROJECT TITLE:
 FIVE ESTUARIES OFFSHORE WINDFARM

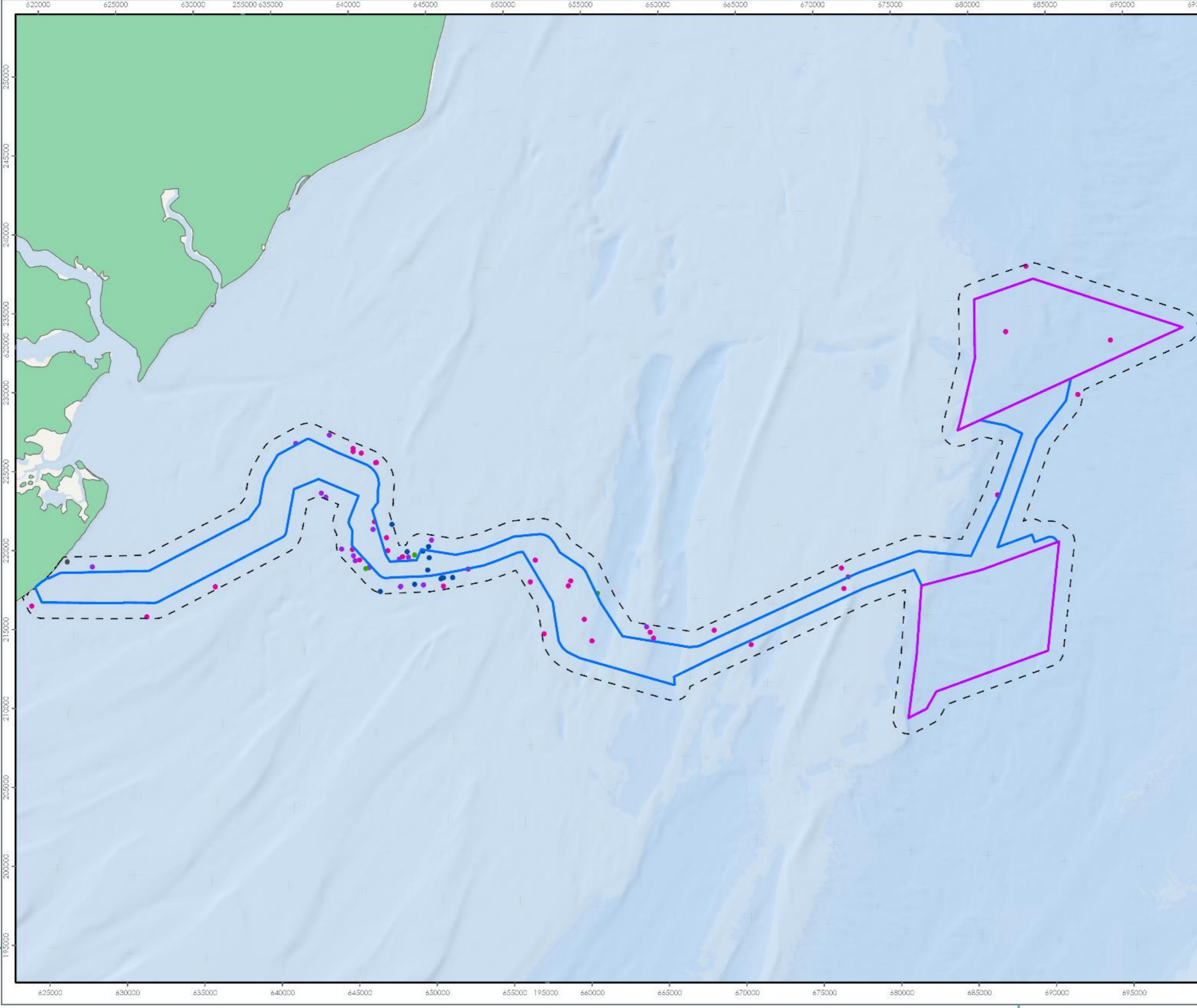
DRAWING TITLE:
 Archaeological Exclusion Zones
 recommended for geophysical anomalies

VER	DATE	REMARKS	Drawn	Checked
1	29/01/2024	DRAFT	HA	CH

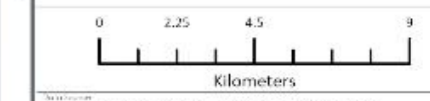
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SCALE	PROJECT	DATE	PROJECT	PROJECT
1:25000	AS	WGS84	UTM31	





- LEGEND**
- Array Areas
 - Offshore Export Cable Corridor
 - Marine Archaeology Study Area
- Recorded losses AEZ
- aircraft
 - foul ground
 - obstruction
 - unknown
 - wreck



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PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WINDFARM

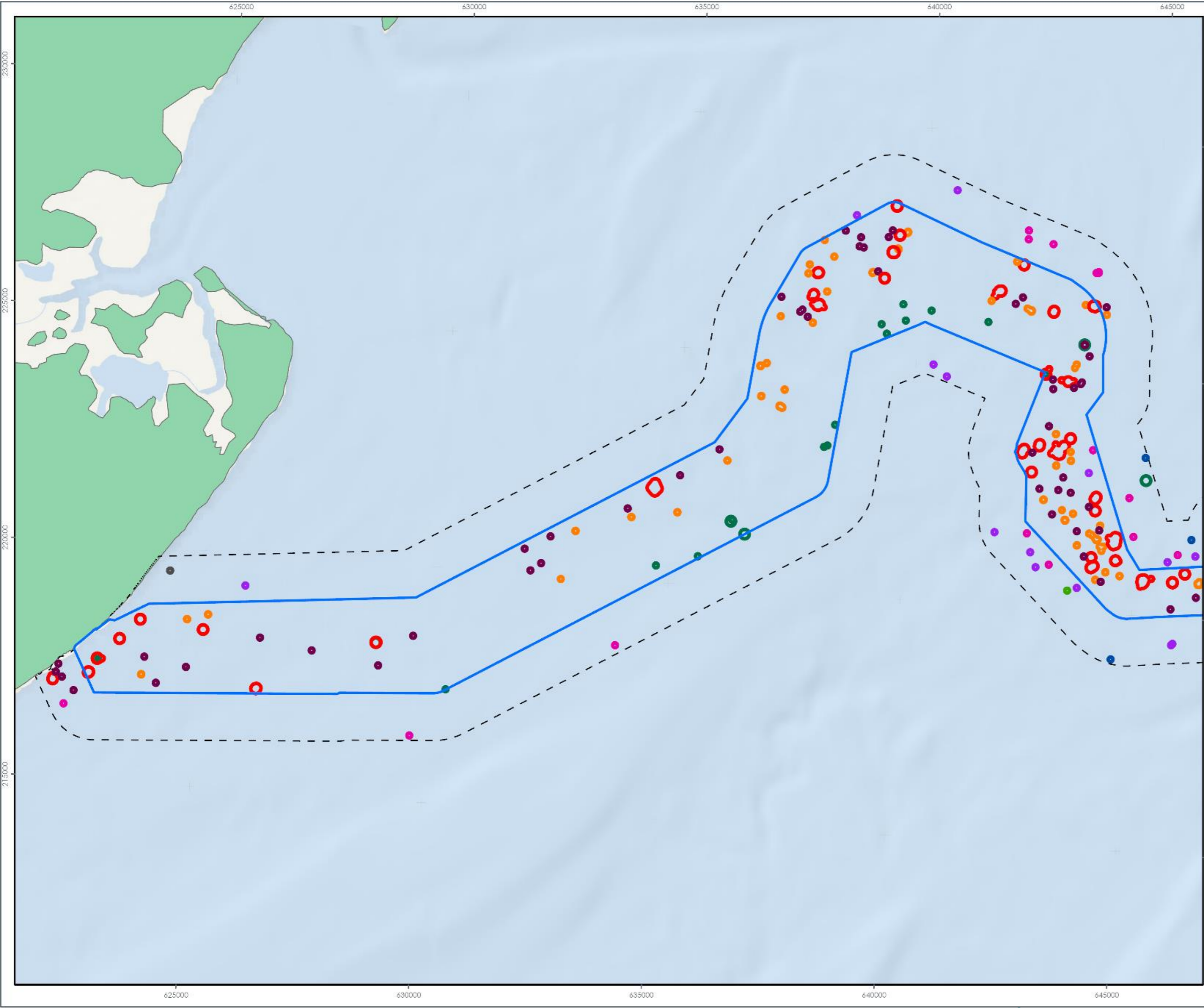
DRAWING TITLE:
**Archaeological Exclusion Zones
recommended for recorded losses**

VER	DATE	REMARKS	Drawn	Checked
1	30/01/2024	DRAFT	HA	CH

DRAWING NUMBER: **11.1.14**

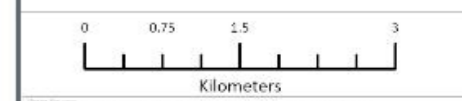
SCALE	TITLE	DATE	PROJECT	UTM
1:25,000	A3	03/01/2024	WGS84	UTM31U





LEGEND

- Offshore Export Cable Corridor
- Marine Archaeology Study Area
- Geophysical AEZ
 - High
 - High (mag only)
 - Medium
- Recorded losses AEZ
 - aircraft
 - foul ground
 - obstruction
 - unknown
 - wreck
 - North Falls AEZ



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PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WINDFARM

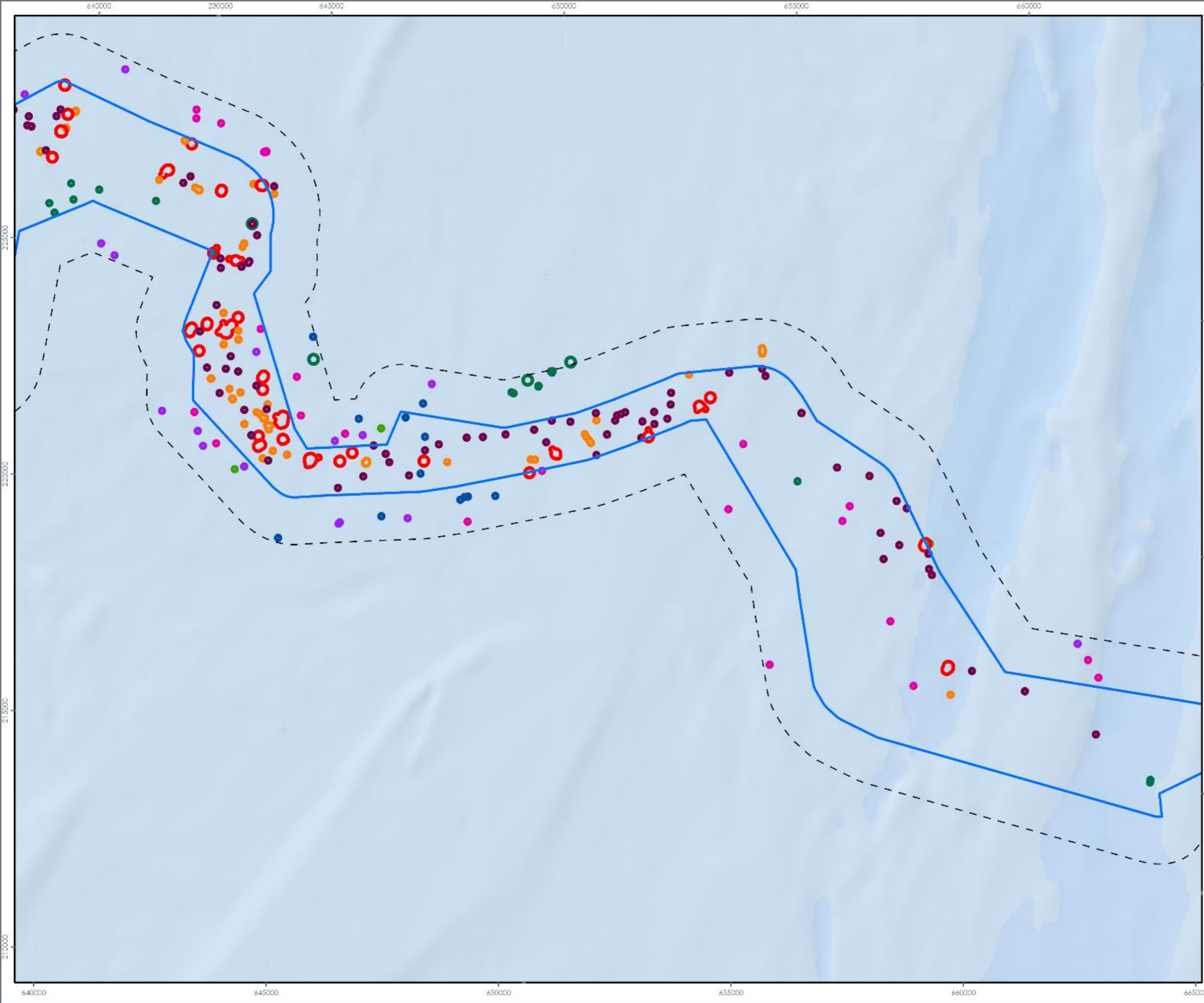
DRAWING TITLE:
**Archaeological Exclusion Zones within
the nearshore Offshore ECC**

VER	DATE	REMARKS	Drawn	Checked
1	30/01/2024	DRAFT	HA	CH

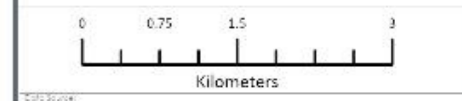
DRAWING NUMBER: 11.1.15

SCALE: 1:50000 PLOT SIZE: A3 DRAWN: WGS84 PROJECT NO: UTMN31





- LEGEND**
- Offshore Export Cable Corridor
 - Marine Archaeology Study Area
 - Geophysical AEZ
 - High
 - High (mag only)
 - Medium
 - Recorded losses AEZ
 - aircraft
 - foul ground
 - obstruction
 - unknown
 - wreck
 - North Falls AEZ



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PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WINDFARM

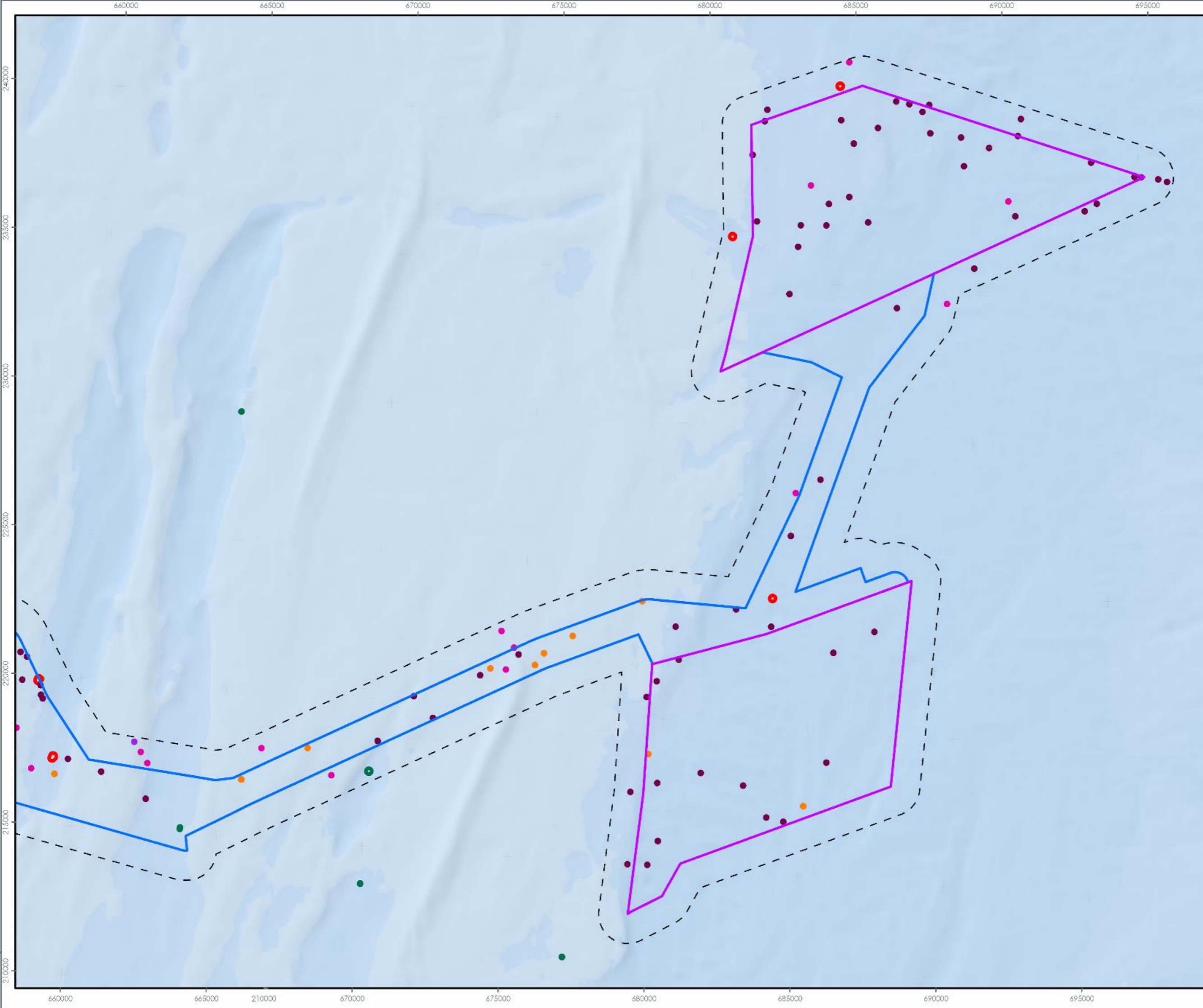
DRAWING TITLE:
**Archaeological Exclusion Zones within
the mid-section of the Offshore ECC**

VER	DATE	REMARKS	Drawn	Checked
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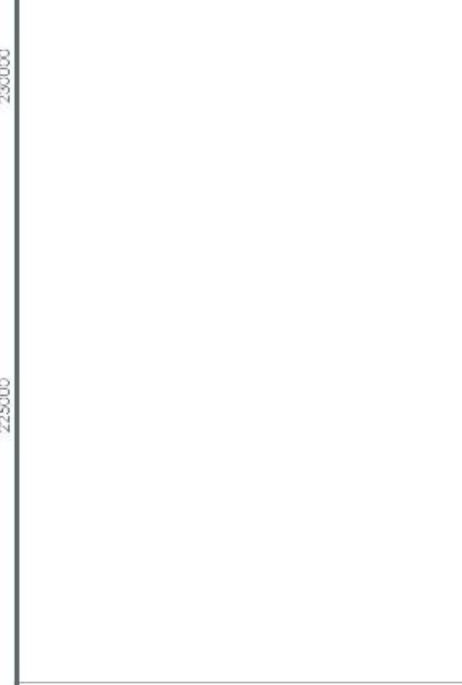
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SCALE	PROJID	PROJ43	PROJ44	PROJ45	PROJ46
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- LEGEND**
- Array Areas
 - Offshore Export Cable Corridor
 - Marine Archaeology Study Area
 - Geophysical AEZ
 - High
 - High (mag only)
 - Medium
 - Recorded losses AEZ
 - aircraft
 - foul ground
 - obstruction
 - unknown
 - wreck
 - North Falls AEZ



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 Data from: Ordnance Survey, British Geological Survey, and other sources.

PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:
Archaeological Exclusion Zones within the Array Areas the offshore section of the Offshore ECC

VER	DATE	REMARKS	Drawn	Checked
1	30/01/2024	DRAFT	HA	CH

DRAWING NUMBER: 11.1.17

SCALE: 1:50000 FOOTING: A3 DATA: WGS84 PROJECTION: UTM31N





7 APPENDIX A GAZETTEER OF GEOPHYSICAL ANOMALIES

MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
MA0001	Pair of isolated slightly curved hard reflectors with extended shadow and some scour; probable anthropogenic debris potential wreck or wreck debris UKHO 15865 65 m NE	-	UKHO obstruction	-	-	15865	MA2003	-	-	-	High	100	2.094507	51.95425
MA0002	Wreck of SS <i>Nico</i> ; seen in SSS as an isolated cylindrical hard reflector with extended shadow	SS <i>Nico</i>	-	18/12/1915	802453	14513	MA2119	MA4034	MA6002	4844	High	100	1.7517	51.81692
MA0003	Possibly MV <i>Janny</i> UKHO14461 (832 m NE of recorded location); seen in SSS as an area of scattered linear hard reflectors with shadow and scour; potential wreck or wreck debris; MA6005 3106 nT	MV <i>Janny</i>	-	26/01/1967	-	14461	MA2123	MA4036	MA6005	3106	High	100	1.759618	51.79367
MA0004	Hard reflector with shadow and scour 50 m at 10° from MA2123; potential wreck debris	-	-	-	-	-	MA2129	-	MA6055	241	High	100	1.759132	51.79325
MA0005	Angular hard reflector with scour;	-	-	-	-	-	MA2160	MA4058	MA6150	124	High	100	1.519976	51.89063



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	potential anthropogenic debris													
MA0006	Semi-circular hard reflector with shadow; potential wheel MA2198 is 19 m at 345°	Unknown	-	-	-	14576	MA2197	MA4084	MA6153	120	High	100	1.529682	51.88194
MA0007	Circular hard reflector in patch of scour with extended shadow; probable wreck debris associated with UKHO14576, wheel, potential fishing or anthropogenic debris	-	-	-	-	14576	MA2198	MA4085	MA6154	120	High	100	1.529577	51.88175
MA0008	Ovate hard reflector with shadow and scour with smaller linear hard reflectors; partially buried wreck with potential wreck debris hull appears intact	Unknown	-	-	-	14581	MA2199	MA4086	MA6003	4705	High	100	1.512831	51.88555
MA0009	Isolated linear soft reflector with shadow; possible partially buried anthropogenic debris; seen in MBES as cross shaped raised feature	-	-	-	-	-	MA2240	MA4289	MA6015	579	High	100	1.525884	51.85626
MA0010	Isolated linear soft reflector with	-	-	-	-	-	MA2241	MA4290	MA6012	737	High	100	1.525973	51.85654



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	shadow; possible partially buried anthropogenic debris close to MA2240													
MA001 1	Three isolated linear hard reflectors with shadow arranged in line; potential anthropogenic debris	-	-	-	-	-	MA2244	-	MA10481	143.1	High	100	1.534508	51.86859
MA001 2	Dispersed area of hard reflectors with shadow; remains of unidentified wreck	Unknown	-	-	-	14553	MA2260	MA4305	MA6000	2041 1	High	100	1.531979	51.85502 1
MA001 3	(UKHO14859 foul ground) Hard reflector with shadow and scour and points of raised features across length; potential wreck with rope and feature MA2265 potentially associated 27 m at 165	Foul ground	-	-	-	14859	MA2264	MA4309	-	-	High	100	1.533645	51.85622 9
MA001 4	Isolated angular hard reflector with shadow and scour; potential anthropogenic debris	Unknown	-	-	-	15035	MA2270	MA4315	MA6786	27.7	High	100	1.535593	51.85772 6
MA001 5	Isolated linear hard reflector with shadow and scour; potential	-	-	-	-	-	MA2279	MA4321	MA6089	177	High	100	1.542776	51.83322 5



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	anthropogenic debris													
MA0016	Isolated extended curvilinear hard reflector with notched shadow; probable chain; associated magnetic anomaly MA6007	-	-	-	-	-	MA2284	MA4325	MA6007	1151	High	100	1.520643	51.855178
MA0017	Linear hard reflector with shadow and scour; possible anthropogenic debris 65 m at 41° from MA2279	-	-	-	-	-	MA2286	MA4327	MA6140	129.9	High	100	1.543414	51.833652
MA0018	Isolated linear hard reflector with shadow and scour; potential anthropogenic debris with another linear feature 12 m at 92°	-	-	-	-	-	MA2289	-	MA6014	677	High	100	1.542751	51.835246
MA0019	Isolated semi-circular hard reflector with shadow and scour; potential anthropogenic debris	-	-	-	-	-	MA2310	MA4345	MA6160	117.4	High	100	1.550363	51.834687
MA0020	Wreck of SS <i>Norhauk</i> : seen in SSS and MBES as an area of linear hard reflectors with scour and	SS <i>Norhauk</i>	-	21/12/1943	-	14535	MA2314	MA4349	MA6001	1903 1.6	High	100	1.549796	51.83816



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	spikes of elongated shadows													
MA002 1	Angular hard reflector with linear hard reflector both with shadow and scour; potential anchor associated with MA2328	Foul ground	-	-	-	79309	MA2327	MA4360	MA6587	36.4	High	100	1.54348	51.84652
MA002 2	Wreck of SS <i>Morar</i> UKHO14525: 100 x 50 m area of scattered linear hard reflectors; broken up remains of wreck	SS <i>Morar</i>	-	27/11/1943	-	14525	MA2335	MA4365	MA6004	3936	High	100	1.558927	51.83077
MA002 3	Isolated hard reflector with shadow; potential anthropogenic debris, MA6011 33 m N	-	-	-	-	-	MA2342	MA4371	MA6011	755	High	100	1.572133	51.83243
MA002 4	Isolated linear hard reflector with shadow; potential anthropogenic debris	-	-	-	-	-	MA2358	MA4383	MA6053	244.8	High	100	1.568291	51.83077
MA002 5	Isolated soft reflector with scour; potential partially buried anthropogenic debris	-	-	-	-	-	MA2359	MA4384	MA6076	196.5	High	100	1.594569	51.83111
MA002 6	Isolated linear hard reflector with notched shadows;	-	-	-	-	-	MA2372	MA4393	MA6066	218	High	100	1.680342	51.84259



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	possible anthropogenic debris													
MA0027	Isolated soft reflector with shadow and scour; potential anthropogenic debris	-	-	-	-	-	MA2373	MA4394	MA6074	199	High	100	1.635845	51.83303
MA0028	Isolated elongated curvilinear reflector with shadow; probable rope or chain	-	-	-	-	-	MA2384	-	MA6013	726.5	High	100	1.265921	51.81778
MA0029	UKHO14995 dangerous wreck (aircraft): Cluster of hard reflectors with shadow; potential anthropogenic debris	Unknown aircraft	Recorded in UKHO data as unidentified aircraft	-	-	14995	MA2397	MA4228	MA9137	6.9	High	100	1.319983	51.81613
MA0030	Isolated linear hard reflector with shadow; potential anthropogenic debris	-	-	-	-	-	MA2456	-	MA6191	102.7	High	100	1.454422	51.88419
MA0031	Isolated hard reflector with linear hatching across extent of feature and circular debris; probable wreck or anthropogenic debris	-	-	-	-	-	MA2459	MA4274	-	-	High	100	1.455678	51.88831
MA0032	Pair of isolated hard reflectors with shadow;	-	-	-	-	-	MA2474	-	MA6094	172.1	High	100	2.116639	51.844775



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	potential anthropogenic debris													
MA0033	Scattered raised features across area of 38 x 11 m; probably associated with UKHO70092 (foul ground) recorded 50 m W	-	Foul ground	-	-	70092	-	MA4114	MA9346	6	High	100	1.542323	51.883008
MA0034	Small, raised feature in patch of scour	-	-	-	-	15074	-	MA4146	MA6134	131	High	100	1.527526	51.86992
MA0035	Small area of scour	-	-	-	-	-	-	MA4159	MA6075	198	High	100	1.479879	51.901275
MA0036	Raised feature measuring 6 x 4 m	-	-	-	-	-	-	MA4196	MA6091	174	High	100	1.683782	51.84423
MA0037	Seen in MBES as linear hard reflector; probable anthropogenic debris, potential pipe debris	-	-	-	-	-	-	MA4198	MA10465	490.7	High	100	1.219312	51.807717
MA0038	Rectangular raised feature measuring 10 x 36 m with linear features across middle; probable wreck - area not covered by SSS, covered by NF Mag overlap	Unknown	Probable wreck not previously identified in records	-	-	-	MA2521	MA4201	MA10469	246.7	High	100	1.23307	51.811844
MA0039	Small, raised feature in patch of scour	-	-	-	-	-	-	MA4209	MA6071	200.7	High	100	1.481005	51.895765



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
MA0040	Seen in SSS as an isolated linear hard reflector with shadow and scour; seen in MBES as angular feature in area of scour	-	-	-	-	-	MA2647	MA4428	MA10470	227.1	High	100	1.282816	51.80682
MA0041	Seen in MBES as pair of raised features	-	-	-	-	-	-	MA4429	MA10482	142.5	High	100	1.239929	51.81568
MA0042	Seen in MBES as pair of raised features	-	-	-	-	-	-	MA4430	MA10484	129.5	High	100	1.230412	51.80917
MA0043	Seen in MBES as small, raised feature	-	-	-	-	-	-	MA4431	MA10486	123.6	High	100	1.246278	51.81946
MA0044	Magnetic anomaly	-	-	-	-	-	-	-	MA6006	1658	High	100	1.331532	51.81753
MA0045	Isolated magnetic anomaly	-	-	-	-	-	-	-	MA10461	1072.7	High	100	1.219179	51.80801
MA0046	Isolated magnetic anomaly	-	-	-	-	-	-	-	MA10462	835.5	High	100	1.260821	51.81059
MA0047	Magnetic anomaly	-	-	-	-	-	-	-	MA6008	874	High	100	1.543816	51.8389
MA0048	Magnetic anomaly	-	-	-	-	-	-	-	MA6009	808	High	100	2.104061	51.97905
MA0049	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6010	783	High	100	1.666421	51.83902
MA0050	Isolated magnetic anomaly	-	-	-	-	-	-	-	MA10463	562.6	High	100	1.225915	51.80565
MA0051	Magnetic anomaly	-	-	-	-	-	-	-	MA6016	558	High	100	1.450272	51.88083



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MA005 2	Magnetic anomaly	-	-	-	-	-	-	-	MA6017	497	High	100	1.783647	51.78936
MA005 3	Isolated magnetic anomaly	-	-	-	-	-	-	-	MA10464	494.9	High	100	1.92098	51.80001
MA005 4	Magnetic anomaly	-	-	-	-	-	-	-	MA6018	492	High	100	1.538105	51.84017
MA005 5	Magnetic anomaly	-	-	-	-	-	-	-	MA6019	483	High	100	2.182011	51.99497
MA005 6	Magnetic anomaly	-	-	-	-	-	-	-	MA10466	427.2	High	100	1.320804	51.81175
MA005 7	Magnetic anomaly	-	-	-	-	-	-	-	MA6020	400	High	100	1.468826	51.89523
MA005 8	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6021	393	High	100	2.111115	51.99276
MA005 9	Magnetic anomaly	-	-	-	-	-	-	-	MA6022	391	High	100	2.125368	51.86377
MA006 0	Magnetic anomaly	-	-	-	-	-	-	-	MA6023	389	High	100	2.191975	51.99478
MA006 1	Magnetic anomaly	-	-	-	-	-	-	-	MA6024	385	High	100	1.93868	51.81373
MA006 2	Isolated small hard reflector with shadow; potential anthropogenic debris	-	-	-	-	-	MA2544	-	MA10467	375.9	High	100	1.538796	51.86849
MA006 3	Small, raised feature	-	-	-	-	-	-	MA4423	MA6025	375	High	100	1.40533	51.84661
MA006 4	Magnetic anomaly	-	-	-	-	-	-	-	MA6026	372	High	100	1.413828	51.84922
MA006 5	Raised feature measuring 7.5 x 2.7 m	-	-	-	-	-	-	MA4424	MA6027	370	High	100	2.147389	52.00015



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MA0066	Magnetic anomaly	-	-	-	-	-	-	-	MA6028	369	High	100	1.806044	51.78137
MA0067	Magnetic anomaly	-	-	-	-	-	-	-	MA6029	364	High	100	1.632685	51.83516
MA0068	Magnetic anomaly; correlates with recorded location for UKHO87019	-	-	-	-	87019	-	MA4437	MA6030	355	High	100	1.45422	51.88234
MA0069	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6031	352	High	100	2.273152	51.97785
MA0070	Magnetic anomaly	-	-	-	-	-	-	-	MA6032	347	High	100	1.634693	51.83379
MA0071	Magnetic anomaly	-	-	-	-	-	-	-	MA6033	343	High	100	2.236417	51.9857
MA0072	Magnetic anomaly	-	-	-	-	-	-	-	MA6034	339	High	100	2.1398	51.88094
MA0073	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6035	336	High	100	1.58259	51.83236
MA0074	Magnetic anomaly	-	-	-	-	-	-	-	MA6036	333	High	100	2.176949	51.93315
MA0075	Magnetic anomaly; UKHO15819 (Willy) recorded 554 m NW	-	-	-	-	-	-	-	MA6037	328	High	100	2.23557	51.96136
MA0076	Magnetic anomaly	-	-	-	-	-	-	-	MA6038	319	High	100	1.666272	51.84132
MA0077	Magnetic anomaly	-	-	-	-	-	-	-	MA6039	318	High	100	1.523736	51.85496
MA0078	Located 44 m SW of MA2343	-	-	-	-	-	-	-	MA6040	311	High	100	1.59914	51.83436



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MA0079	Magnetic anomaly	-	-	-	-	-	-	-	MA6041	310	High	100	1.546454	51.83732
MA0080	Magnetic anomaly	-	-	-	-	-	-	-	MA6042	293	High	100	2.208037	51.98505
MA0081	Magnetic anomaly	-	-	-	-	-	-	-	MA6043	280	High	100	1.648471	51.8329
MA0082	Magnetic anomaly	-	-	-	-	-	-	-	MA6044	269	High	100	1.283744	51.8165
MA0083	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6045	266	High	100	1.645308	51.83627
MA0084	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6046	264	High	100	1.640131	51.83914
MA0085	Magnetic anomaly	-	-	-	-	-	-	-	MA6047	263	High	100	1.738803	51.81409
MA0086	Magnetic anomaly	-	-	-	-	-	-	-	MA6048	262	High	100	2.2762	51.96542
MA0088	Isolated curvilinear hard reflector with shadow and scour; potential cable, chain or anthropogenic or fishing debris	-	-	-	-	-	-	MA2515	MA10468	259.4	High	100	1.222187	51.80817
MA0089	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6050	252	High	100	1.654686	51.84051
MA0090	Magnetic anomaly	-	-	-	-	-	-	-	MA6051	251	High	100	1.662653	51.83946
MA0091	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6052	247	High	100	1.679779	51.84182
MA0092	Magnetic anomaly	-	-	-	-	-	-	-	MA6054	241	High	100	1.648052	51.84089



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MA0093	Magnetic anomaly	-	-	-	-	-	-	-	MA6056	239	High	100	2.298215	51.97356
MA0094	Curvilinear feature; potential rope or chain with anchor	-	-	-	-	-	-	MA4425	MA6057	237	High	100	1.543701	51.8442
MA0095	Magnetic anomaly	-	-	-	-	-	-	-	MA6058	236	High	100	1.477474	51.89537
MA0096	Magnetic anomaly	-	-	-	-	-	-	-	MA6059	234	High	100	1.743641	51.8168
MA0097	Magnetic anomaly	-	-	-	-	-	-	-	MA6060	233	High	100	2.152554	51.96663
MA0098	Magnetic anomaly	-	-	-	-	-	-	-	MA6061	233	High	100	2.222106	51.98198
MA0099	Magnetic anomaly	-	-	-	-	-	-	-	MA6062	227	High	100	2.142407	51.96447
MA0100	Magnetic anomaly	-	-	-	-	-	-	-	MA6063	226	High	100	2.068521	51.83587
MA0102	Magnetic anomaly	-	-	-	-	-	-	-	MA6065	222	High	100	1.634322	51.83928
MA0103	Magnetic anomaly	-	-	-	-	-	-	-	MA10471	220.9	High	100	1.221027	51.81062
MA0104	Magnetic anomaly	-	-	-	-	-	-	-	MA10472	214.6	High	100	1.218915	51.80836
MA0105	Magnetic anomaly	-	-	-	-	-	-	-	MA6067	212	High	100	1.541963	51.83978
MA0106	Magnetic anomaly	-	-	-	-	-	-	-	MA6068	210	High	100	1.657232	51.84116
MA0107	Magnetic anomaly	-	-	-	-	-	-	-	MA6069	209	High	100	2.21535	51.94539



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MA0108	Magnetic anomaly	-	-	-	-	-	-	-	MA6072	199	High	100	1.6462	51.83562
MA0109	Magnetic anomaly	-	-	-	-	-	-	-	MA6073	199	High	100	2.106589	51.95891
MA0110	Magnetic anomaly	-	-	-	-	-	-	-	MA10473	197.3	High	100	1.948317	51.80722
MA0111	Magnetic anomaly	-	-	-	-	-	-	-	MA10474	195.1	High	100	1.538479	51.86816
MA0112	Magnetic anomaly	-	-	-	-	-	-	-	MA6077	195	High	100	1.671385	51.84279
MA0113	Magnetic anomaly	-	-	-	-	-	-	-	MA6078	195	High	100	2.061005	51.77089
MA0114	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6079	195	High	100	1.370994	51.83191
MA0115	Magnetic anomaly	-	-	-	-	-	-	-	MA10475	194.3	High	100	1.534509	51.86825
MA0116	Magnetic anomaly	-	-	-	-	-	-	-	MA6080	184	High	100	1.529876	51.86712
MA0117	Magnetic anomaly	-	-	-	-	-	-	-	MA6082	183	High	100	1.733959	51.82986
MA0118	Magnetic anomaly	-	-	-	-	-	-	-	MA6083	182	High	100	1.526185	51.84809
MA0119	Magnetic anomaly	-	-	-	-	-	-	-	MA6084	182	High	100	1.519834	51.88443
MA0120	Magnetic anomaly	-	-	-	-	-	-	-	MA6085	182	High	100	2.123277	51.7772
MA0121	Magnetic anomaly	-	-	-	-	-	-	-	MA6086	181	High	100	2.06034	51.78847
MA0122	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6087	181	High	100	1.654134	51.83954



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MA0123	Magnetic anomaly	-	-	-	-	-	-	-	MA6088	177	High	100	2.192649	51.98621
MA0124	Linear area of scour measuring 116 x 35 m	-	-	-	-	-	-	MA4426	MA6090	175	High	100	1.523599	51.85123
MA0125	Magnetic anomaly	-	-	-	-	-	-	-	MA6092	172	High	100	2.046009	51.76374
MA0126	Magnetic anomaly	-	-	-	-	-	-	-	MA6095	171	High	100	1.742569	51.82519
MA0127	Magnetic anomaly	-	-	-	-	-	-	-	MA6096	166	High	100	1.590012	51.82832
MA0128	Magnetic anomaly	-	-	-	-	-	-	-	MA6097	165	High	100	2.237843	51.99084
MA0129	Magnetic anomaly located 52 m N of MA0596	-	-	-	-	-	-	-	MA6098	165	High	100	1.575705	51.82796
MA0130	Magnetic anomaly	-	-	-	-	-	-	-	MA6099	165	High	100	2.154514	51.98284
MA0131	Magnetic anomaly	-	-	-	-	-	-	-	MA10476	164.8	High	100	1.535654	51.86857
MA0132	Magnetic anomaly	-	-	-	-	-	-	-	MA6100	164	High	100	1.478726	51.89665
MA0133	Magnetic anomaly	-	-	-	-	-	-	-	MA6101	162	High	100	2.148078	51.98988
MA0134	Magnetic anomaly	-	-	-	-	-	-	-	MA6102	162	High	100	1.63656	51.83252
MA0135	Magnetic anomaly	-	-	-	-	-	-	-	MA10477	161.2	High	100	1.541032	51.87349
MA0136	Magnetic anomaly	-	-	-	-	-	-	-	MA6103	161	High	100	1.469734	51.8933



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MA0137	Magnetic anomaly	-	-	-	-	-	-	-	MA6104	160	High	100	1.612873	51.83591
MA0138	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6105	157	High	100	1.533532	51.85034
MA0139	Magnetic anomaly	-	-	-	-	-	-	-	MA6106	154	High	100	1.662393	51.83634
MA0140	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6107	153	High	100	1.753983	51.81121
MA0142	Magnetic anomaly	-	-	-	-	-	-	-	MA6109	151	High	100	1.567845	51.82568
MA0143	Magnetic anomaly	-	-	-	-	-	-	-	MA6110	150	High	100	2.166487	51.98765
MA0144	Magnetic anomaly	-	-	-	-	-	-	-	MA6111	150	High	100	1.46401	51.89642
MA0145	Magnetic anomaly	-	-	-	-	-	-	-	MA6112	149	High	100	1.535951	51.84747
MA0146	Magnetic anomaly	-	-	-	-	-	-	-	MA6113	149	High	100	2.123253	51.93703
MA0147	Magnetic anomaly	-	-	-	-	-	-	-	MA6114	148	High	100	1.450978	51.88121
MA0148	Magnetic anomaly	-	-	-	-	-	-	-	MA6115	146	High	100	2.270173	51.9631
MA0149	Magnetic anomaly	-	-	-	-	-	-	-	MA6116	146	High	100	2.14722	51.82853
MA0150	Magnetic anomaly	-	-	-	-	-	-	-	MA6117	146	High	100	1.530265	51.84329
MA0151	Magnetic anomaly	-	-	-	-	-	-	-	MA6118	146	High	100	2.127275	51.95138
MA0152	Magnetic anomaly	-	-	-	-	-	-	-	MA6119	145	High	100	1.532073	51.84793



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MA0153	Magnetic anomaly	-	-	-	-	-	-	-	MA6120	145	High	100	1.544188	51.83855
MA0154	Magnetic anomaly	-	-	-	-	-	-	-	MA6121	144	High	100	1.457596	51.88175
MA0155	Magnetic anomaly	-	-	-	-	-	-	-	MA6122	144	High	100	1.689527	51.84905
MA0156	Magnetic anomaly located 42 m W of MA2252	-	-	-	-	-	-	-	MA10481	143.1	High	100	1.534696	51.86882
MA0157	Magnetic anomaly	-	-	-	-	-	-	-	MA6123	141	High	100	2.116092	51.83621
MA0158	Magnetic anomaly	-	-	-	-	-	-	-	MA6124	140	High	100	1.767012	51.79305
MA0159	Magnetic anomaly	-	-	-	-	-	-	-	MA6125	138	High	100	1.52878	51.86004
MA0160	Magnetic anomaly	-	-	-	-	-	-	-	MA6126	137	High	100	1.594843	51.83318
MA0161	Magnetic anomaly	-	-	-	-	-	-	-	MA6127	137	High	100	1.367707	51.83049
MA0162	Magnetic anomaly	-	-	-	-	-	-	-	MA6128	137	High	100	1.529722	51.86893
MA0163	Magnetic anomaly	-	-	-	-	-	-	-	MA6129	136	High	100	1.628857	51.83749
MA0164	Magnetic anomaly	-	-	-	-	-	-	-	MA6130	135	High	100	1.545875	51.83064
MA0165	Magnetic anomaly	-	-	-	-	-	-	-	MA10483	134.5	High	100	1.22025	51.80909
MA0166	Magnetic anomaly	-	-	-	-	-	-	-	MA6131	134	High	100	2.128509	51.95791
MA0167	Magnetic anomaly	-	-	-	-	-	-	-	MA6132	133	High	100	1.655963	51.84081



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MA0168	Magnetic anomaly	-	-	-	-	-	-	-	MA6133	132	High	100	1.468427	51.89349
MA0170	Magnetic anomaly	-	-	-	-	-	-	-	MA6136	130	High	100	2.141285	51.95795
MA0171	Magnetic anomaly	-	-	-	-	-	-	-	MA6137	130	High	100	1.619933	51.83649
MA0172	Magnetic anomaly	-	-	-	-	-	-	-	MA6138	130	High	100	2.162115	51.95902
MA0173	Magnetic anomaly	-	-	-	-	-	-	-	MA6139	129	High	100	1.752809	51.81524
MA0174	Magnetic anomaly	-	-	-	-	-	-	-	MA6141	129	High	100	1.546057	51.88287
MA0175	Magnetic anomaly	-	-	-	-	-	-	-	MA10485	128.2	High	100	1.528495	51.87091
MA0177	Magnetic anomaly	-	-	-	-	-	-	-	MA6143	127	High	100	1.583753	51.83076
MA0179	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6145	125	High	100	2.055923	51.76363
MA0180	Magnetic anomaly	-	-	-	-	-	-	-	MA6146	125	High	100	1.474403	51.88881
MA0181	Magnetic anomaly	-	-	-	-	-	-	-	MA6147	125	High	100	2.306743	51.973
MA0182	Magnetic anomaly	-	-	-	-	-	-	-	MA6148	125	High	100	1.753055	51.81234
MA0184	Magnetic anomaly	-	-	-	-	-	-	-	MA10487	122.6	High	100	1.251539	51.80743
MA0185	Magnetic anomaly	-	-	-	-	-	-	-	MA6151	120	High	100	2.14433	51.79527
MA0186	Magnetic anomaly	-	-	-	-	-	-	-	MA6152	120	High	100	2.188635	51.99268



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MA0187	Magnetic anomaly	-	-	-	-	-	-	-	MA6154	120	High	100	2.114769	51.77842
MA0188	Magnetic anomaly	-	-	-	-	-	-	-	MA6155	119	High	100	2.070261	51.8259
MA0189	Magnetic anomaly	-	-	-	-	-	-	-	MA10488	118.3	High	100	1.53626	51.86871
MA0190	Magnetic anomaly	-	-	-	-	-	-	-	MA6157	118	High	100	2.209673	51.97638
MA0191	Magnetic anomaly	-	-	-	-	-	-	-	MA6158	118	High	100	2.10306	51.788
MA0192	Magnetic anomaly	-	-	-	-	-	-	-	MA6159	118	High	100	1.453366	51.88365
MA0193	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6161	117	High	100	1.425948	51.8543
MA0194	Magnetic anomaly	-	-	-	-	-	-	-	MA6162	116	High	100	1.971518	51.82036
MA0195	Magnetic anomaly	-	-	-	-	-	-	-	MA6163	113	High	100	1.444335	51.88358
MA0196	Magnetic anomaly	-	-	-	-	-	-	-	MA10489	112	High	100	1.299962	51.81431
MA0197	Magnetic anomaly	-	-	-	-	-	-	-	MA6164	112	High	100	1.66461	51.83783
MA0198	Magnetic anomaly	-	-	-	-	-	-	-	MA6165	111	High	100	1.680204	51.84233
MA0199	Magnetic anomaly	-	-	-	-	-	-	-	MA6166	111	High	100	2.054504	51.81447
MA0200	Magnetic anomaly	-	-	-	-	-	-	-	MA6167	111	High	100	2.047036	51.78566
MA0201	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6168	111	High	100	1.365766	51.83459



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
MA0202	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6169	111	High	100	2.109886	51.98929
MA0203	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6170	110	High	100	2.175447	51.99574
MA0204	Magnetic anomaly	-	-	-	-	-	-	-	MA6171	110	High	100	2.098528	51.84135
MA0205	Magnetic anomaly	-	-	-	-	-	-	-	MA6172	109	High	100	2.311154	51.97224
MA0206	Magnetic anomaly	-	-	-	-	-	-	-	MA6173	108	High	100	1.72377	51.83135
MA0207	Magnetic anomaly	-	-	-	-	-	-	-	MA10490	107.3	High	100	1.247762	51.81235
MA0208	Magnetic anomaly	-	-	-	-	-	-	-	MA6174	107	High	100	1.644705	51.83683
MA0209	Magnetic anomaly	-	-	-	-	-	-	-	MA6175	107	High	100	2.059458	51.81925
MA0210	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6176	107	High	100	1.670424	51.84007
MA0211	Magnetic anomaly	-	-	-	-	-	-	-	MA6177	107	High	100	1.99048	51.82681
MA0212	Magnetic anomaly	-	-	-	-	-	-	-	MA6178	106	High	100	1.452651	51.87989
MA0213	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6179	106	High	100	1.517616	51.88317
MA0214	Magnetic anomaly	-	-	-	-	-	-	-	MA6180	105	High	100	2.187933	52.00386
FMA0215	Magnetic anomaly	-	-	-	-	-	-	-	MA6181	105	High	100	1.671463	51.84501
MA0216	Magnetic anomaly	-	-	-	-	-	-	-	MA6182	105	High	100	1.737719	51.81906



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
MA0217	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6183	105	High	100	1.545105	51.84041
MA0218	Magnetic anomaly	-	-	-	-	-	-	-	MA6184	104	High	100	1.700892	51.84855
MA0219	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6185	104	High	100	1.544731	51.83871
MA0220	Magnetic anomaly	-	-	-	-	-	-	-	MA6186	104	High	100	1.578745	51.83389
MA0221	Magnetic anomaly	-	-	-	-	-	-	-	MA6187	104	High	100	2.081904	51.79166
MA0222	Magnetic anomaly	-	-	-	-	-	-	-	MA6188	104	High	100	1.69979	51.8499
MA0223	Isolated hard reflector with shadow; magnetic return of 103.7 nT, potential anthropogenic or fishing debris	-	-	-	-	-	MA2542	-	MA10491	103.7	High	100	1.536524	51.87121
MA0224	Associated with MA0016; contained completely within the extent of AEZ for MA0016	-	-	-	-	-	-	-	MA6189	103	High	100	1.521021	51.8555
MA0225	Magnetic anomaly	-	-	-	-	-	-	-	MA6190	103	High	100	2.167525	51.83503
MA0226	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6192	102	High	100	1.607784	51.83573
MA0227	Magnetic anomaly	-	-	-	-	-	-	-	MA6193	101	High	100	1.745779	51.82383
MA0228	Magnetic anomaly	-	-	-	-	-	-	-	MA6194	101	High	100	1.373768	51.83704



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
MA0230	Magnetic anomaly	-	-	-	-	-	-	-	MA6196	101	High	100	2.294903	51.97366
MA0231	Complex magnetic anomaly	-	-	-	-	-	-	-	MA6197	101	High	100	1.540445	51.83539
MA0232	HMS <i>Hastfen</i> : Isolated elongated curvilinear hard reflector; probable cable rope or chain	HMS <i>Hastfen</i>	-	24/09/1917	-	70049	MA2378	MA4398	-	-	High	100	1.664755	51.83661
MA0283	Area of linear hard reflectors with extended shadows; potentially associated with MA2314; contained completely within extent of AEZ for MA0020	SS <i>Norhauk</i>	-	21/12/1943	-	14535	MA2323	MA4356	-	-	High	100	1.550099	51.83899
MA0578	Isolated curvilinear hard reflector with shadow and scour; potential partially buried anthropogenic debris; correlates with recorded location for UKHO14555	-	-	-	-	14555	MA2334	-	-	-	High	100	1.53573	51.85523
MA0602	Isolated hard reflector with shadow and scour; potential anthropogenic debris; located 273 m E from recorded location for	-	-	-	-	-	MA2380	-	-	-	High	100	1.627642	51.82927



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	UKHO14983 (dead wreck); not covered by Mag or MBES data													
UP-DATE AEZ MA0703	Pair of raised clusters of raised features with smaller raised features surrounding them in area measuring 37 x 19 m	-	distributed remains of wreck	-	-	87021	-	MA4144	-	-	High	100	1.479121	51.89249
MA0704	Small, raised feature in patch of scour	-	-	-	-	87043	-	MA4145	-	-	High	100	1.47645	51.887539
MA0754	Seen in SSS as an isolated linear hard reflector with shadow and scour; potential wreck debris; seen in MBES as patch of scour	-	-	-	-	87002	MA2536	MA4207	MA10505	12	High	100	1.539423	51.875633
MA6243	Magnetic anomaly; correlates with recorded location for UKHO14541	-	-	-	-	14541	-	-	MA6243	83.3	High	100	1.712361	51.84161
MA6377	Magnetic anomaly; correlates to recorded location for UKHO14532	-	-	-	-	14532	-	-	MA6377	53.3	High	100	1.65168	51.83685
MA6650	Magnetic anomaly; correlates with recorded location for UKHO14996	-	-	-	-	14996	-	-	MA6650	33.1	High	100	1.397676	51.84269



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
MA6677	Magnetic anomaly; correlates with recorded location for UKHO14803	-	-	-	-	14803	-	-	MA6677	31.8	High	100	1.541736	51.84484
MA0233	Isolated hard reflector with shadow and scour; potential anthropogenic debris; Magnetic anomaly MA6347 (57nT) located 38 m W	-	-	-	-	-	MA2050	MA4048	MA6347	57	Medium	50	2.055721	51.79716
MA0234	Isolated curvilinear hard reflector with shadow; possible anthropogenic debris; Magnetic anomaly MA7093 (20nT) located 29 m NW	-	-	-	-	-	MA2072	MA4013	MA7093	20	Medium	50	2.133074	51.78198
MA0235	Isolated linear hard reflector in patch of scour; possible anthropogenic debris	-	-	-	-	-	MA2090	-	MA6539	40	Medium	50	1.886196	51.79754
MA0236	Isolated soft reflector with scattered shadow, seen in MBES as raised feature in area of scour; possible anthropogenic debris or anchor listed as possible anchor in FE4 SSS	-	-	-	-	-	MA2097	MA4021	-	-	Medium	50	1.853441	51.78771



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
MA0237	Isolated linear hard reflector with shadow and scour; potential anthropogenic debris	-	-	-	-	-	MA2101	-	MA6643	33	Medium	50	1.97655	51.82246
MA0238	Isolated angular hard reflector with shadow and scour lying across sand wave; potential anthropogenic debris	-	-	-	-	-	MA2108	MA4027	MA6226	87	Medium	50	2.003167	51.82729
MA0239	Isolated hard reflector with shadow in area of sand waves; possible anthropogenic debris	-	-	-	-	-	MA2111	MA4030	MA7468	15	Medium	50	1.998727	51.82369
MA0240	Parallel linear raised features extending over 110 m; probable anthropogenic debris	-	-	-	-	-	MA2117	MA4032	-	-	Medium	50	1.699859	51.85337
MA0241	Hard reflector with shadow and scour 41 m at 0° from wreck of Nico; probable wreck debris; contained completely within extent of AEZ for MA0002	-	-	-	-	-	MA2121	-	-	-	Medium	50	1.75102	51.81709
MA0242	Isolated pair of hard reflectors with shadow and	-	-	-	-	-	MA2143	MA4403	MA7895	11.5	Medium	50	1.760549	51.7884



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	scour; possible anthropogenic debris													
MA024 3	Isolated curvilinear hard reflector with shadow and scour; potential anthropogenic debris	-	-	-	-	-	MA2148	MA4052	-	-	Medium	50	1.398875	51.84106
MA024 4	Three isolated linear hard reflectors; potential anthropogenic debris	-	-	-	-	-	MA2153	-	-	-	Medium	50	1.377253	51.82898
MA024 5	Isolated hard reflector with scour and extended shadow; possible anthropogenic debris; MA9569 (6 nT) located 20 m NE	-	-	-	-	-	MA2154	MA4055	MA9569	6	Medium	50	1.460577	51.89143
MA024 6	Linear hard reflector with smaller hard reflectors approximately 20 m at 80° and 280°; potential anthropogenic debris; completely contained within AEZ for MA6133	-	-	-	-	-	MA2158	MA4057	MA6206	97	Medium	50	1.468283	51.89395
MA024 7	Isolated curvilinear hard reflector with shadow and scour with linear hard reflectors potentially attached;	-	-	-	-	-	MA2161	MA4059	-	-	Medium	50	1.517916	51.89122



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	probable cable or rope													
MA0248	Isolated hard reflector with shadow; possible anthropogenic debris; magnetic anomaly MA6464 (45 nT) located 21 m E	-	-	-	-	-	MA2179	MA4072	MA6464	45	Medium	50	1.539534	51.88323
MA0249	Isolated linear soft reflector with shadow; possible anthropogenic debris; magnetic anomaly MA7442 (15nT) located 22 m SW	-	-	-	-	-	MA2181	MA4107	MA7442	15	Medium	50	1.54613	51.88144
MA0250	Isolated linear hard reflector with shadow and scour; potential wreck debris associated with UKHO14581	Unknown	Unknown wreck recorded in UKHO data	-	-	14581	MA2212	MA4094	-	-	Medium	50	1.51152	51.8853
MA0251	Cluster of hard reflectors next to a curvilinear hard reflector; potential anthropogenic debris and cable or rope	-	-	-	-	-	MA2216	MA4097	-	-	Medium	50	1.511143	51.88456
MA0252	Cluster of hard reflectors with shadow and scour over area of 48 x 25 m; potential	-	-	-	-	-	MA2217	MA4098	MA10235	5	Medium	50	1.522409	51.88192



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	scattering of anthropogenic debris													
MA0253	Isolated square hard reflector with linear features; probable anthropogenic debris	-	-	-	-	-	MA2227	-	-	-	Medium	50	1.510022	51.88364
MA0254	Isolated V shaped hard reflector with shadow and scour; probable anthropogenic debris	-	-	-	-	-	MA2231	MA4106	-	-	Medium	50	1.3815	51.83818
MA0255	Isolated soft reflector with scour; possible partially buried anthropogenic debris; seen in MBES as two patches of scour located 18 m apart; MA10497 (49 nT) located 35 m NW	-	-	-	-	-	MA2242	MA4291	MA10497	49.2	Medium	50	1.532412	51.86879
MA0256	Isolated hard reflector with shadow and scour; possible anthropogenic debris	-	-	-	-	-	MA2253	MA4299	MA6220	92	Medium	50	1.530986	51.858539
MA0257	Isolated pair of linear hard reflectors with shadow and scour; potential anthropogenic debris	-	-	-	-	-	MA2255	MA4300	MA6535	40.3	Medium	50	1.530986	51.85661



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
MA0258	Linear hard reflector with scour; potential wreck debris 80 m at 100° from UKHO14553	-	-	-	-	-	MA2256	MA4301	-	-	Medium	50	1.530228	51.855201
MA0259	Cluster of hard reflectors with shadow; probable wreck debris associated with MA	-	-	-	-	-	MA2257	MA4302	-	-	Medium	50	1.529656	51.854853
MA0260	Hard reflector with shadow and scour; probable wreck debris associated with MA0012; contained completely within extent of AEZ of MA0012	-	-	-	-	-	MA2258	MA4303	-	-	Medium	50	1.53155	51.855651
MA0261	Curvilinear hard reflector with shadow and scour; probable wreck debris associated with MA0012; contained completely within extent of AEZ of MA0012	-	-	-	-	-	MA2259	MA4304	-	-	Medium	50	1.531193	51.854443
MA0262	Curvilinear hard reflector with shadow; potential anthropogenic debris associated with MA0012; contained completely within	-	-	-	-	-	MA2261	MA4306	-	-	Medium	50	1.532442	51.855681



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	extent of AEZ of MA0012													
MA0263	Isolated linear hard reflector with shadow and scour; potential anthropogenic debris	-	-	-	-	-	MA2262	MA4307	MA6265	78.2	Medium	50	1.531289	51.852599
MA0264	Semi-circular hard reflector with extended linear hard reflector both with shadow and scour; probable anchor and chain or wreck debris associated with MA0013; contained completely within extent of AEZ for MA0013	-	-	-	-	-	MA2265	MA4310	-	-	Medium	50	1.533806	51.855926
MA0265	Isolated curvilinear hard reflector with shadow and scour; potential rope or anthropogenic debris	-	-	-	-	-	MA2271	MA4316	MA6513	41.7	Medium	50	1.527545	51.845949
MA0266	Isolated pair of hard reflectors adjacent to another softer reflector all with shadow; potential anthropogenic debris	-	-	-	-	-	MA2278	MA4320	MA9935	5.6	Medium	50	1.53825	51.837409
MA0267	Isolated hard reflector with shadow; potential	-	-	-	-	-	MA2280	MA4322	MA6895	24.3	Medium	50	1.544111	51.83103



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	anthropogenic debris													
MA0268	Curvilinear soft reflector with shadow and thin linear trail of shadow; possible partially buried anthropogenic debris; contained completely within extent of AEZ for MA0231	-	-	-	-	-	MA2281	MA4323	MA8493	8.8	Medium	50	1.540958	51.835624
MA0269	Isolated angular hard reflector with shadow and scour; potential anthropogenic debris	-	-	-	-	-	MA2285	MA4326	MA6688	31.5	Medium	50	1.534255	51.842245
MA0270	Isolated curvilinear hard reflector with shadow; possible anthropogenic debris	-	-	-	-	-	MA2287	-	MA6636	33.8	Medium	50	1.53335	51.844136
MA0271	Isolated curvilinear hard reflector with shadow; potential anthropogenic debris; contained completely within extent of AEZ for MA0018	-	-	-	-	-	MA2291	MA4328	MA6207	97.1	Medium	50	1.542771	51.835423
MA0272	Isolated hard reflector with shadow and scour; potential	-	-	-	-	-	MA2293	MA4330	MA7755	12.4	Medium	50	1.536951	51.843393



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	anthropogenic debris													
MA0273	Isolated linear hard reflector with shadow and scour; possible anthropogenic debris	-	-	-	-	-	MA2294	MA4331	MA6822	26.3	Medium	50	1.547079	51.832572
MA0274	Isolated linear hard reflector with extended shadow and scour; possible anthropogenic debris	-	-	-	-	-	MA2302	MA4337	MA7236	17.9	Medium	50	1.545891	51.836533
MA0275	Isolated hard reflector with shadow and scour; possible anthropogenic debris	-	-	-	-	-	MA2303	MA4338	MA7097	20.1	Medium	50	1.542922	51.839498
MA0276	Isolated triangular hard reflector with shadow in patch of scour; potential anthropogenic debris	-	-	-	-	-	MA2306	MA4341	MA6545	39.6	Medium	50	1.545484	51.837279
MA0277	Isolated triangular hard reflector with shadow and scour; potential anthropogenic debris	-	-	-	-	-	MA2312	MA4347	MA6413	49.5	Medium	50	1.551315	51.83455
MA0278	Triangular hard reflector with shadow and scour; probable wreck debris	-	-	-	-	-	MA2313	MA4348	-	-	Medium	50	1.548454	51.83804



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	associated with MA2313													
MA0279	Curvilinear elongated hard reflector with shadow and scour; probable rope or chain associated with MA2314	-	-	-	-	-	MA2315	MA4350	-	-	Medium	50	1.548886	51.8385
MA0280	Circular hard reflector in scour with shadow; probable wheel or wreck debris associated with MA2314; contained completely within extent of AEZ for MA0020	-	-	-	-	-	MA2318	MA4352	-	-	Medium	50	1.550884	51.8381
MA0281	Circular hard reflector with shadow and scour; probable wheel or wreck debris; contained completely within extent of AEZ for MA0020	-	-	-	-	-	MA2319	MA4353	-	-	Medium	50	1.549989	51.83771
MA0282	Angular hard reflector with shadow and scour; potential wreck debris or anchor found 21 m at 160° from the end of MA2315	-	-	-	-	-	MA2320	MA4354	-	-	Medium	50	1.548034	51.83913



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
MA0284	Isolated pair of linear hard reflectors next to each other; potential wreck debris or anthropogenic debris	-	-	-	-	-	MA2326	MA4359	-	-	Medium	50	1.535746	51.85368
MA0285	Extended linear hard reflector; probable cable rope or chain; potentially associated with MA0021; contained completely within extent of AEZ for MA0021	-	-	-	-	-	MA2328	-	-	-	Medium	50	1.544438	51.84684
MA0286	Linear hard reflector with shadow and scour approximately 150 m at 60° from MA2335; probable wreck debris associated with MA2335	-	-	-	-	-	MA2336	MA4366	MA6267	77.9	Medium	50	1.561523	51.83139
MA0287	Isolated angular hard reflector with shadow and scour; possible anthropogenic debris	-	-	-	-	-	MA2339	MA4368	MA7045	21	Medium	50	1.551662	51.83179
MA0288	Isolated linear hard reflector with shadow lying across sand waves; potential anthropogenic debris	-	-	-	-	-	MA2344	MA4373	MA6588	36.3	Medium	50	1.67699	51.84854



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
MA0289	Isolated curved soft reflector with shadow and scour; potential partially buried anthropogenic debris; contained completely within extent of AEZ for MA0022	-	-	-	-	-	MA2348	MA4376	-	-	Medium	50	1.558199	51.83048
MA0290	Possible wreck debris associated with SS <i>Morar</i> . Isolated hard reflector with extended shadow and scour; potential anthropogenic debris; contained completely within the extent of the AEZ for MA0022	-	-	-	-	-	MA2352	-	-	-	Medium	50	1.55874	51.83021
MA0291	Linear hard reflector with shadow and scour; possible anthropogenic debris	-	-	-	-	-	MA2354	MA4379	MA6945	23.1	Medium	50	1.576202	51.8306
MA0292	Isolated hard reflector with shadow and scour in area of sand waves; potential anthropogenic debris	-	-	-	-	-	MA2356	MA4381	MA6934	23.5	Medium	50	1.648231	51.83951
MA0293	Possible wreck debris associated with <i>Morar</i> : Isolated pair of	Morar	14525	27/11/1943	-	-	MA2360	MA4171	-	-	Medium	50	1.55824	51.8299



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	arrangements of linear hard reflectors with extended shadow; probable anthropogenic debris potential wreck debris													
MA029 4	Isolated hard reflector with shadow and scour; potential anthropogenic debris	-	-	-	-	-	MA2370	-	MA6964	22.6	Medium	50	1.627932	51.83182
MA029 5	Isolated linear hard reflector with shadow and scour; potential anthropogenic debris	-	-	-	-	-	MA2371	-	MA6357	56.4	Medium	50	1.646693	51.83517
MA029 6	Isolated cluster of linear hard reflectors with shadow and scour; potential anthropogenic debris	-	-	-	-	-	MA2374	MA4395	MA6853	25.5	Medium	50	1.629311	51.83181
MA029 7	Isolated hard reflector with shadow and scour; potential anthropogenic debris 289 m NW from UKHO14983	-	-	-	-	-	MA2375	MA4396	MA6468	44.9	Medium	50	1.681353	51.84256
MA029 8	Isolated hard reflector with shadow and scour; potential	-	-	-	-	-	MA2377	-	MA6492	43	Medium	50	1.682291	51.84201



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	anthropogenic debris													
MA0299	Isolated elongated curvilinear soft reflector with shadow; probable cable, rope or chain	-	-	-	-	-	MA2382	MA4212	MA6485	43.5	Medium	50	1.26072	51.81968
MA0300	Isolated linear hard reflector with arm-like features; potential anchor	-	-	-	-	-	MA2396	MA4220	-	-	Medium	50	1.428503	51.85222
MA0301	Cluster of hard reflectors with shadow 46 m at 15° from MA2397; potential anthropogenic debris; contained completely within extent of AEZ for MA0029	-	-	-	-	-	MA2398	MA4229	MA6883	24.7	Medium	50	1.319725	51.81573
MA0302	Circular patch of hard reflectors with shadow; potential anthropogenic debris	-	-	-	-	-	MA2408	MA4237	-	-	Medium	50	1.438219	51.87034
MA0303	Isolated linear hard reflector with shadow and scour; potential anthropogenic debris	-	-	-	-	-	MA2409	MA4238	MA8524	8.6	Medium	50	1.440143	51.8709
MA0304	Isolated hard linear hard reflector with linear protrusions at centre	-	-	-	-	-	MA2426	MA4247	-	-	Medium	50	1.458587	51.88477



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	and apparent curvilinear feature at end; probable anchor													
MA0305	Isolated hard reflector with extended shadow; potential anthropogenic debris	-	-	-	-	-	MA2432	MA4251	MA6862	25.2	Medium	50	1.267351	51.82068
MA0306	Isolated linear hard reflector seen in some lines to have multidirectional shadow; potential anchor	-	-	-	-	-	MA2435	MA4254	-	-	Medium	50	1.413215	51.84218
MA0307	Area of small hard reflectors with shadow; potential anthropogenic debris or ballast	-	-	-	-	-	MA2446	MA4262	MA7083	20.3	Medium	50	1.45429	51.87879
MA0308	Hard linear reflector with curvilinear feature lying adjacent at one end with scour; probable anchor 50 m at 75° from cable MA2445	-	-	-	-	-	MA2460	MA4275	-	-	Medium	50	1.457461	51.89457
MA0309	Isolated ovate hard reflector with three smaller reflectors on eastern side also with shadow; potential anthropogenic	-	-	-	-	-	MA2466	MA4280	-	-	Medium	50	1.445926	51.86593



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	debris or wreck material													
MA0310	Isolated curvilinear hard reflector with shadow and scour and potentially associated small hard reflectors in surrounding area; possible anthropogenic debris; magnetic anomaly MA6739 (29.5 nT) located 38 m SE	-	-	-	-	-	MA2467	MA4281	MA6739	29.5	Medium	50	1.452971	51.88984
MA0311	Isolated ovate hard reflector with shadow and scour; potential anthropogenic debris; magnetic anomaly MA7770 (12.3 nT) located 12 m NW	-	-	-	-	-	MA2470	MA4283	MA7770	12.3	Medium	50	1.452621	51.88815
MA0312	Line of three small, raised features	-	-	-	-	-	-	MA4116	MA6776	28	Medium	50	1.521373	51.882314
MA0313	Linear feature measuring 19 m and cross shaped raised feature; potential anchor	-	-	-	-	-	-	MA4125	MA6713	30	Medium	50	1.483499	51.896376
MA0314	Cluster of raised features with scour over area measuring 28 x 11 m; magnetic	-	-	-	-	-	-	MA4127	MA7629	13	Medium	50	1.472755	51.8886



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	anomaly MA7629 (13 nT) located 22 m N													
MA0315	Curvilinear raised feature measuring 26 m, located 10 m N from MA4164; potential rope or chain with anchor (MA4164)	-	-	-	-	-	-	MA4128	MA6250	80	Medium	50	1.480658	51.893039
MA0316	Small, raised feature in patch of scour measuring 60 x 60 m; magnetic anomaly MA8043 (10.8 nT) located 22 m NW	-	-	-	-	-	-	MA4132	MA8043	10.8	Medium	50	1.438617	51.864601
MA0317	Raised feature measuring 15 x 11 m	-	-	-	-	-	-	MA4140	MA7724	12	Medium	50	1.445201	51.86257
MA0318	Raised feature measuring 14 x 14 m; MA4140 located 34 m ESE	-	-	-	-	-	-	MA4141	MA7354	16	Medium	50	1.444583	51.86279
MA0319	Small, raised feature in area of seabed scarring	-	-	-	-	-	-	MA4142	MA7228	18	Medium	50	2.017333	51.832638
MA0320	Angular patch of scour	-	-	-	-	-	-	MA4173	MA6328	60.4	Medium	50	1.545361	51.841318
MA0321	Raised feature	-	-	-	-	-	-	MA4187	MA6349	57	Medium	50	2.051714	51.843468
MA0322	Pair of raised features with scour located 22 m SE from MA4201, probable wreck	-	-	-	-	-	MA2524	MA4202	MA10507	28.5	Medium	50	1.233299	51.811652



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	debris; contained completely within extent of AEZ for MA0038													
MA0323	Seen in SSS as an isolated linear hard reflector with shadow and scour; seen in MBES as linear hard reflector in area of scour; probable anthropogenic debris	-	-	-	-	-	MA2527	MA4205	MA10495	57.1	Medium	50	1.246887	51.808974
MA0324	Raised feature with scour either side	-	-	-	-	-	-	MA4206	MA10496	56.2	Medium	50	1.537035	51.871854
MA0325	Seen in MBES as small angular raised feature	-	-	-	-	-	-	MA4432	MA10493	89.1	Medium	50	1.234469	51.81181
MA0326	Seen in MBES as small, raised feature, located 20 m NE from MA4201; contained completely within extent of AEZ for MA0038	-	-	-	-	-	-	MA4433	MA10498	31.1	Medium	50	1.233375	51.81195
MA0327	Magnetic anomaly potentially associated with MA2252, located 20 m SW	-	-	-	-	-	-	-	MA10494	67.2	Medium	50	1.53635	51.86742
MA0328	Isolated soft reflector with triangular scour and thin shadows;	-	-	-	-	-	MA2364	MA4388	MA6274	76.2	Medium	50	1.602044	51.83105



MA ID	Description	Name	Information	Date lost	NRHE ID (HOB)	UKHO Wreck number	SSS ID	MBES ID	MAG ID	nT	Archaeological potential	AEZ (m)	X	Y
	possible partially buried anthropogenic debris													
MA0787	Area of scattered linear hard reflectors with shadow; possible anthropogenic debris	-	-	-	-	-	MA2514	-	-	-	Medium	50	1.240797	51.818288
MA0789	Area of scattered linear hard reflectors with shadow and scour; potential anthropogenic or wreck debris						MA2516				Medium	50	1.239726	51.817345
MA0796	Rectangular hard reflector with repeating parallel linear features across extent; probable anthropogenic, wreck or fishing debris	-	-	-	-	-	MA2526	MA4450	-	-	Medium	50	1.248728	51.814306





8 APPENDIX B GAZETTEER OF RECORDED SITES, WRECKS AND OBSTRUCTIONS WITHIN THE MARINE ARCHAEOLOGY STUDY AREA

HER ID	NRHE ID	UKHO ID	MA ID	Name	Period constructed	Status	Type	Flag	Date sunk	Description in records	AEZ
MEX10111	-	-	-	Earthwork in vicinity of Holland Haven	Unknown	-	HER monument	-	-	Circular earthwork.	-
MEX10124	-	-	-	Vicinity of Frinton-On-Sea	Mesolithic	-	HER find-spot	-	-	Tranchet axe and one other axe.	-
MEX10282	-	-	-	Sea frontage, between Holland and Frinton	Unknown	-	HER site	-	-	Red Hill	-
MEX1033272	-	-	-	Roman, Coin, Frinton	Roman	-	HER find-spot	-	-	Roman coin found in Frinton	-
MEX1030273	-	-	-	Roman Coin from the Beach at Frinton	Late Iron Age	-	HER find-spot	-	-	Roman silver coin found on the beach at Frinton	-
MEX1034361	-	-	-	Pillbox (destroyed), seashore, Holland Haven	Modern	-	HER monument	-	-	A hexagonal pillbox, probably a type FW3/22, on the seashore under the cliff face.	-
MEX1034362	-	-	-	Pillbox (destroyed), cliff edge, Holland Haven	Modern	-	HER monument	-	-	A hexagonal FW3/22 pillbox, probably with a protective 'skirt', on the cliff edge at Holland Haven.	-
MEX1039272	-	-	-	Martello Tower I, Battery Point, Frinton	Post Medieval	-	HER monument	-	-	Site of Martello tower built in 1810-12 demolished in 1819.	-



HER ID	NRHE ID	UKHO ID	MA ID	Name	Period constructed	Status	Type	Flag	Date sunk	Description in records	AEZ
MEX103 9273	-	-	-	Martello Tower H, Holland Marsh	Post Medieval	-	HER monument	-	-	Site of Martello tower built in 1810-12 demolished in 1819.	-
MEX103 9274	-	-	-	Martello Tower G, Holland Haven - site of	Post Medieval	-	HER monument	-	-	Site of Martello tower built in 1810-12 demolished in 1819.	-
MEX104 0009	-	-	-	'Diver' Site No K14 (destroyed), Frinton Golf Course	Modern	-	HER monument	-	-	WWII Diver site.	-
MEX104 0884	-	-	-	Mammoth tooth from dredging 19 km east of Walton-on-the-Naze	Palaeolithic	-	HER find-spot	-	-	Mammoth tooth from <i>Mammuthus meridionalis</i> (southern mammoth)	-
MEX104 2145	-	-	-	Little Holland Marsh	Medieval to Post Medieval	-	HER area	-	-	A small area of highly improved grassland in Holland Haven, including a mixture of improved grassland and relict salt marsh. Reclamation is likely to be 18 th century or later. Sea defences have beach huts and paths built on them.	-
MEX998 1	-	-	-	Findspot in vicinity of Frinton-on-Sea	Lower Palaeolithic to Late Neolithic	-	HER find-spot	-	-	Implements found in pockets of sand and gravel in the cliffs.	-



HER ID	NRHE ID	UKHO ID	MA ID	Name	Period constructed	Status	Type	Flag	Date sunk	Description in records	AEZ
MEX12258	-	-	-	Findspot in vicinity of Frinton-on-Sea	Unknown	-	HER find-spot	-	-	Denarius of Augustus, found on Frinton Beach; antoninianus of Gordian III found in Frinton.	-
MEX31492	-	-	-	Pillbox at Holland Haven Country Park	Modern	-	HER monument	-	-	A hexagonal, concrete type FW3/22 pillbox.	-
MEX31493	-	-	-	Pillbox (destroyed) east of Holland Haven Country Park	Modern	-	HER monument	-	-	Wills lists a "polygonal, concrete pillbox facing SE at TM 222 175".	-
MEX31495	-	-	-	Pillbox base at Chevaux de Frise Point	Modern	-	HER monument	-	-	There is the base of a pillbox on top of the sea wall.	-
MEX31496	-	-	-	Pillbox on the sea wall E of Chevaux de Frise Point	Modern	-	HER monument	-	-	Standing on the top of the sea wall overlooking the North Sea is a hexagonal concrete type FW3/22 pillbox.	-
MEX31497	-	-	-	Pillbox on the sea wall at Sandy Point	Modern	-	HER monument	-	-	A FW3/22 pillbox standing on the sea wall at Sandy Point.	-
MEX31498	-	-	-	Pillbox (destroyed) on the sea wall at Battery Point	Modern	-	HER monument	-	-	It is reliably reported that a pillbox once stood on the sea wall at Holland Gap.	-
MEX31510	-	-	-	Six-inch gun battery (destroyed) at Frinton	Modern	-	HER monument	-	-	During WWII, a twin 6-inch coastal artillery battery stood on the	-



HER ID	NRHE ID	UKHO ID	MA ID	Name	Period constructed	Status	Type	Flag	Date sunk	Description in records	AEZ
										Greensward opposite the Grand Hotel.	
MEX315 12	-	-	-	Anti-tank obstacles on Frinton Promenade	Modern		HER monument	-	-	There are approximately 92 cubes, each 6' high x 5' x 5', which were originally spaced 2' apart.	
MEX315 13	-	-	-	Pillbox (destroyed), Greensward opposite Cedars Hotel, Frint	Modern		HER monument	-	-	In 1940 a local builder, Symes, was commissioned to build all the pillboxes in Frinton and Walton.	
MEX413 20	-	-	-	Pillbox (destroyed), "Thatched Cottage", Greensward, Frinton	Modern		HER monument	-	-	It is reliably reported that a pillbox stood on the Greensward opposite the end of Second Avenue.	
MEX997 5	-	-	-	Findspot in vicinity of Frinton-on-Sea	Neolithic		HER find-spot	-	-	Axe or pick found on the beach.	
-	15847 43	-	-	St James's Day fight, 1666	-	-	NRHE site	-	-	The St. James's Day Fight or St. James's Day Battle was a two-day battle which took place on 25-26 July 1666 (25 July being St. James's Day). It is known in Dutch as the Tweed-aagse Zeeslag, and recorded as 4 to 5 August	-
-	15075	-	-	UKHO area	-	-	wreck	-	-	Area of numerous magnetic anomalies.	-



HER ID	NRHE ID	UKHO ID	MA ID	Name	Period constructed	Status	Type	Flag	Date sunk	Description in records	AEZ
-	-	15199	-	-	Modern	live	aircraft	-	-	Remains of FW 190 aircraft. Engine has been recovered. Less substantial wreckage may lie in immediate vicinity.	50
-	-	79305	-	-	unknown	live	foul ground	-	-	Probable debris	50
-	-	15076	-	-	unknown	dead	obstruction	-	-	Possible buried cables	50
-	-	59480	-	-	unknown	dead	foul ground	-	-	Cables/chains/moor-ing/nets/tackle/wires	50
-	80233 5	14478	-	-	unknown	dead	foul ground	-	-	Unidentified wreck or obstruction	50
-	-	14972	-	-	unknown	live	foul ground	-	-	Possible fragment of wreckage	50
-	-	15125	-	-	unknown	live	foul ground	-	-	Wreck well broken up, lies within debris	50
-	-	15126	-	-	unknown	live	foul ground	-	-	-	50
-	-	79310	-	-	unknown	live	foul ground	-	-	Not fully investigated	50
-	-	79308	-	-	unknown	live	foul ground	-	-	Possible anchor with chain cable	50
-	-	77249	-	-	unknown	dead	foul ground	-	-	Small contact in scour hole	50
-	-	14515	-	-	unknown	dead	obstruction	-	-	Obstruction with slight magnetometer deflection and scour	50
-	-	79307	-	-	unknown	live	foul ground	-	-	Possible debris	50
-	-	59485	-	-	unknown	dead	foul ground	-	-	Cable like contact in sand wave formation	50



HER ID	NRHE ID	UKHO ID	MA ID	Name	Period constructed	Status	Type	Flag	Date sunk	Description in records	AEZ
-	-	94626	-	-	unknown	unknown	obstruction	-	-	Possible anchor scaring nearby	50
-	-	94627	-	-	unknown	unknown	obstruction	-	-	Obstruction identified sitting within a patch of scour	50
-	-	94628	-	-	unknown	unknown	obstruction	-	-	Obstruction sat amongst a patch of scour	50
-	-	94629	-	-	unknown	unknown	obstruction	-	-	Small object	50
-	-	14533	-	-	unknown	dead	obstruction	-	-	Presumed to be large sand wave	50
-	-	58541	-	-	unknown	dead	foul ground	-	-	Now magnetic anomaly only	50
-	-	58542	-	-	unknown	dead	foul ground	-	-	Square-shaped feature	50
-	-	79311	-	-	unknown	dead	foul ground	-	-	Charted foul ground located and found to be intact. Scour present to the northeast of the object	50
-	-	82869	-	-	unknown	unknown	foul ground	-	-	Foul ground	50
-	-	10915	-	<i>Marie Simone</i>	Modern	dead	wreck	Great Britain	24/10/1968	<i>Marie Simone</i> ; fishing vessel	50
-	-	15709	-	-	unknown	dead	wreck	-	-	Scour of trawl appears to run through position. Bottom flat and even	50
-	-	14540	-	<i>HMS Lord St Vincent</i> (part of)	Modern	live	wreck	Great Britain	7/7/1941	Circular area 30 m in diameter, wreckage of	50



HER ID	NRHE ID	UKHO ID	MA ID	Name	Period constructed	Status	Type	Flag	Date sunk	Description in records	AEZ
										drifter HMS <i>Lord St Vincent</i>	
-	-	14536	-	<i>MV Sirius</i>	Modern	live	wreck	-	-	Probable fragments of wreckage; MV <i>Sirius</i> , when weighing in Kings Anchorage, Thames Estuary, recovered steel plates and frames on anchor in position	50
-	-	14534	-	HMS <i>Lord St Vincent</i> (part of)	Modern	dead	wreck	Great Britain	7/7/1941	Wreckage of drifter HMS <i>Lord St Vincent</i>	50
-	-	14468	-	-	Modern	dead	wreck	-	-	Submarine	50
-	-	14588	-	<i>Empire Bridge</i>	Modern	live	wreck	Great Britain	9/4/1946	Wreck of steam ship <i>Empire Bridge</i> ; shown in conjunction with <i>Fort Massac</i> see also: 14578	50
-	-	14800	-	-	unknown	live	wreck	-	-	In one piece, possibly wooden	50
-	-	15819	-	<i>Willy</i>	Post Medieval	live	wreck	Netherlands	-	Wreck of steam ship <i>Willy</i>	50
-	-	98495	-	-	unknown	Not fully surveyed	wreck	-	-	Potential wreck	50
-	908156	14798	-	<i>Protinus</i> (possibly)	Modern	live	wreck	Netherlands	3/18/1940	Area of small contacts; remains of a Dutch trawler <i>Protinus</i>	50
-	802620	14802	-	<i>Koningen Emma</i> (possibly)	Modern	live	wreck	Netherlands	22/9 1915	Area of wreckage; possibly the steam ship <i>Koningen Emma</i>	50
-	-	14971	-	-	unknown	dead	foul ground	-	-	Area of metallic fragments	50



HER ID	NRHE ID	UKHO ID	MA ID	Name	Period constructed	Status	Type	Flag	Date sunk	Description in records	AEZ
-	-	14518	-	-	unknown	dead	wreck	-	-	Unknown dangerous wreck	50
-	-	14529	-	<i>Palembang</i> (probably)	Modern	live	wreck	Netherlands	18/3/1916	Probable wreck of steam ship <i>Palembang</i> ; intact and on its side	50
-	15243 25	14589	-	<i>Corcrest</i>	Modern	live	wreck	Great Britain	24/6/1949	Wreck of <i>Corcrest</i> ; fully collapsed, covered by <i>Fort Massac</i> see also: (14587); collapsed remains of an English cargo ship which became impaled on the stern section of the <i>Fort Massac</i> in 1949, and was abandoned when she could not be re-floated. She lies midway between the East <i>Fort Massac</i> and West <i>Fort Massac</i>	50
-	90815 7	14595	-	<i>Koningen Emma</i> (part of) (probably)	Modern	live	wreck	Netherlands	22/9/1915	Area of wreckage; partial remains of a Dutch steamer <i>Koningen Emma</i>	50
-	-	14523	-	-	unknown	dead	wreck	-	-	Magnetic anomaly	50
-	-	14472	-	<i>Haytor</i>	Modern	dead	wreck	Great Britain	26/7/1940	Wreck of steam ship <i>Haytor</i>	50
-	-	14464	-	HMS <i>Fleming</i>	Modern	dead	wreck	Great Britain	24/7/1940	Wreck of trawler HMS <i>Fleming</i>	50
-	-	14458	-	<i>Selma</i>	Modern	dead	wreck	Norway	25/10/1915	Wreck of steam ship <i>Selma</i>	50



HER ID	NRHE ID	UKHO ID	MA ID	Name	Period constructed	Status	Type	Flag	Date sunk	Description in records	AEZ
-	-	87044	-	-	unknown	unknown	wreck	-	-	Vague outline of wreck observed	50
-	-	14519	-	-	unknown	dead	wreck	-	-	Strong magnetic anomaly not positively identifiable as the wreck of a vessel with parts similar to a small boiler	50
-	-	14492	-	<i>Ingi</i>	Modern	live	wreck	Panama	14/9/1972	Wreck of <i>Ingi</i> ; intact & upright, stern accommodation, bows southwest	50
-	802327	14475	-	-	unknown	dead	wreck	-	-	Remains of craft of uncertain date, located west of the Galloper Sand. This site was formerly thought to be the possible remains of the <i>Selma</i> , now no longer considered to be the case. TM 61 NE 3 and TR 47 SE 1 are alternative candidates for the remains o	50
-	-	14894	-	<i>Paullette</i>	Modern	dead	wreck	Belgium	19/5/1950	Distributed remains of wreck of fishing vessel <i>Paullette</i>	50
-	-	85403	-	-	unknown	unknown	wreck	-	-	Thought to be a small wooden vessel, now decomposed, and partially buried	50
-	-	14528	-	<i>Second Chance</i> (possibly)	Modern	live	wreck	Great Britain	30/9/1977	Possible wreck of cabin cruiser <i>Second Chance</i> ;	50



HER ID	NRHE ID	UKHO ID	MA ID	Name	Period constructed	Status	Type	Flag	Date sunk	Description in records	AEZ
										two scour holes with debris in each	
-	-	14527	-	<i>Wearside</i>	Modern	live	wreck	Great Britain	25/10/1917	Area of dispersed wreckage of steam ship <i>Wearside</i>	50
-	-	14548	-	HMS <i>Resono</i> (possibly)	Modern	live	wreck	Great Britain	26/12/1915	Possible wreck of trawler HMS <i>Resono</i> ; well degraded, stern section collapsed	50
-	-	14983	-	-	Modern	dead	wreck	Great Britain	26/12/1915	Submarine	50
-	-	14462	-	-	unknown	dead	wreck	-	-	Bottom feature with shadow	50
-	-	14444	-	-	unknown	live	wreck	-	-	Wreck of trawler; intact and upright, part collapsed	50
-	802471	14522	-	-	unknown	dead	wreck	-	-	Small wreck	50
-	1524539	14587	-	<i>Fort Massac</i>	Modern	live	wreck	Great Britain	1/2/1946	Intact, upright, bows e, covers two other wrecks close by; remains of 1946 wreck of English cargo vessel, located 2.3 miles east of Rough's Tower, between the East and West <i>Fort Massac</i> buoys. The <i>Fort Massac</i> , a former 'Victory' ship, collided with another vessel while en	50



HER ID	NRHE ID	UKHO ID	MA ID	Name	Period constructed	Status	Type	Flag	Date sunk	Description in records	AEZ
										route from Middlesbrough to Table Bay	
-	-	14545	-	<i>Bonnington Court</i>	Modern	live	wreck	Great Britain	19/1/1941	Scattered remains of large wreck of motor vessel <i>Bonnington Court</i> with debris protruding from a largely flat seabed	50
-	-	14544	-	HMSM <i>E6</i>	Modern	live	wreck	-	-	Remains of submarine HMSM <i>E6</i> , four clear features standing proud of main structure	50
-	-	14546	-	<i>Michail Ontchoukoff</i>	Modern	dead	wreck	Denmark	17/12/1916	Wreck of steam ship <i>Michail Ontchoukoff</i>	50
-	-	14543	-	<i>Marie Leonhardt</i> (probably)	Modern	live	wreck	Great Britain	14/2/1917	Probable wreck of <i>Marie Leonhardt</i> ; partially covered by sand wave	50
-	-	14537	-	<i>Terukuni Maru</i>	Modern	live	wreck	Japan	21/11/1939	Wreck of <i>Terukuni Maru</i> ; area of debris	50
-	-	14520	-	<i>Drofli</i>	Modern	live	wreck	-	2/8/1956	Wreck of <i>Drofli</i> , with mast showing and marked by conical buoy, in position, 1 mile from Walton on Naze; remains consist of 2 small pieces of wreckage standing between 1 and 2 feet above surrounding seabed.	50



HER ID	NRHE ID	UKHO ID	MA ID	Name	Period constructed	Status	Type	Flag	Date sunk	Description in records	AEZ
-	-	70010	-	<i>HMS Scotch Thistle</i>	Modern	dead	wreck	Great Britain	7/10/1940	Wreck of drifter <i>HMS Scotch Thistle</i>	50
-	-	15864	-	-	unknown	live	wreck	-	-	Well broken up. Sitting upright with a very slight list to port	50
-	-	82140	-	-	unknown	unknown	wreck	-	-	Diffuser	50
-	-	14970	-	<i>Mac 5</i> (possibly)	Modern	live	wreck	Great Britain	26/12/1940	Possible wreck of military vessel <i>Mac 5</i>	50
-	-	14514	-	HMML 127 (possibly)	Modern	live	wreck	Great Britain	22/11/1940	Possible wreck of launch HMML 127	50
-	-	70300	-	-	unknown	dead	wreck	-	-	Unknown wreck	50
-	-	15865	MA0001	-	unknown	live	obstruction (seen in geophysical data)	-	-	Small magnetic anomaly. Debris on the seabed. No orientation or scour	100
-	802453	14513	MA0002	<i>Nico</i>	Modern	live	wreck (seen in geophysical data)	Norway	18/12/1915	Upright and intact; remains of the 1915 wreck of a Norwegian cargo vessel, located 4 miles northeast of the Long Sand Head. The <i>Nico</i> was a steamer, built of steel, which foundered after being mined	100
-	1524480	14461	MA0003	<i>Janny</i>	Modern	live	wreck (seen in geophysical data)	Netherlands	26/1/1967	Upright and intact; substantial remains of Dutch cargo coaster <i>Janny</i> which sprung a	100



HER ID	NRHE ID	UKHO ID	MA ID	Name	Period constructed	Status	Type	Flag	Date sunk	Description in records	AEZ
										leak during a storm, and foundered approximately 3.4 miles east southeast of Long Sand Head Buoy while carrying chemicals from Grimsby to Le Havre	
-	802599	14576	MA0007	-	unknown	live	wreck (seen in geophysical data)	-	-	Small wreck	100
-	802614	14581	MA0008	-	unknown	live	wreck (seen in geophysical data)	-	-	Unidentified wreck	100
-	-	14553	MA0012	-	unknown	live	wreck (seen in geophysical data)	-	-	Three areas of debris lying north to south, possibly a collapsed wreck	100
-	-	14859	MA0013	-	unknown	live	foul ground (seen in geophysical data)	-	-	Possible fragment of wreckage, mainly buried	100
-	-	15035	MA0014	-	unknown	dead	wreck (seen in geophysical data)	-	-	Small and very broken wreck partially buried. a large magnetic anomaly observed	100
-	-	14535	MA0020	<i>Norhauk</i>	Modern	live	wreck (seen in geophysical data)	Norway	21/12/1943	Area of broken wreckage of <i>Norhauk</i>	100



HER ID	NRHE ID	UKHO ID	MA ID	Name	Period constructed	Status	Type	Flag	Date sunk	Description in records	AEZ
-	-	79309	MA0021	-	unknown	live	foul ground (seen in geophysical data)	-	-	Contact and linear item, possibly anchor and chain	100
-	-	14525	MA0022	<i>Morar</i>	Modern	live	wreck (seen in geophysical data)	Great Britain	27/11/1943	Broken wreckage of <i>Morar</i>	100
-	-	14995	MA0029	-	Modern	live	aircraft (seen in geophysical data)	-	-	Small piece of aircraft structure has been recovered by divers. Confirmed as part of the very distinctive 'geodetic' structure used in the WW2 Vickers Wellington and Warwick aircraft. manufacturer's number confirms this as being a Wellington	100
-	-	70092	MA0033	-	unknown	dead	foul ground (seen in geophysical data)	-	-	Small compact object	100
-	-	15074	MA0034	-	unknown	live	wreck (seen in geophysical data)	-	-	Possibly a small wooden vessel	100
-	-	87019	MA0068	-	unknown	unknown	wreck (seen in geophysical data)	-	-	Wreck like structure, appears broken up. debris field towards 083 degrees	100



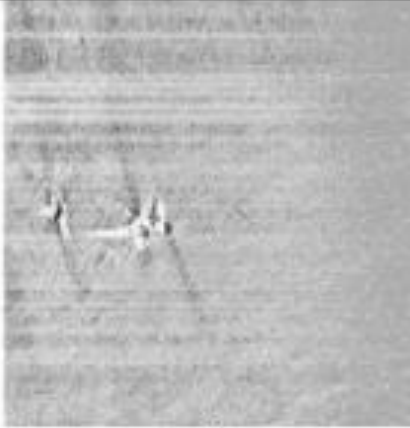

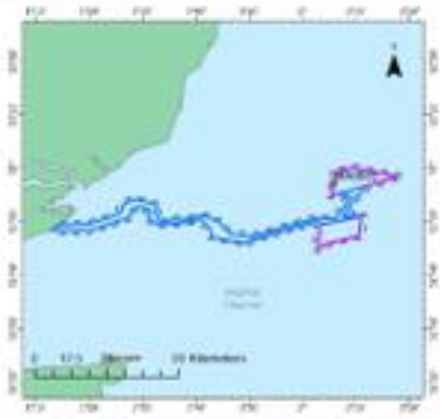
HER ID	NRHE ID	UKHO ID	MA ID	Name	Period constructed	Status	Type	Flag	Date sunk	Description in records	AEZ
-	-	70049	MA0232	HMS <i>Hastfen</i>	Modern	dead	wreck (seen in geophysical data)	Great Britain	24/9/1917	Wreck of trawler HMS <i>Hastfen</i> ; partially buried	100
-	-	14555	MA0578	<i>Vancouver</i>	Modern	live	wreck (seen in geophysical data)	Great Britain	21/9/1941	Two areas of debris lying along 100/280 degree line	100
-	-	87021	MA0703	-	unknown	unknown	wreck (seen in geophysical data)	-	-	No clear wreck but possible outline of a wreck. Debris field towards 129 degrees.	100
-	-	87043	MA0704	-	unknown	unknown	wreck (seen in geophysical data)	-	-	Feature largely indistinguishable but could be a wreck	100
-	-	87002	MA0754	-	unknown	unknown	obstruction (seen in geophysical data)	-	-	Evidence of a significant scour	100
-	-	14541	MA6243	-	Modern	dead	wreck (seen in geophysical data)	-	-	Found by minesweepers. Not considered dangerous	100
-	-	14532	MA6377	-	unknown	dead	foul ground (seen in geophysical data)	-	-	Possible wreck found	100
-	-	14996	MA6650	-	unknown	live	wreck (seen in geophysical data)	-	-	Very deep scour, associated with small wreck	100



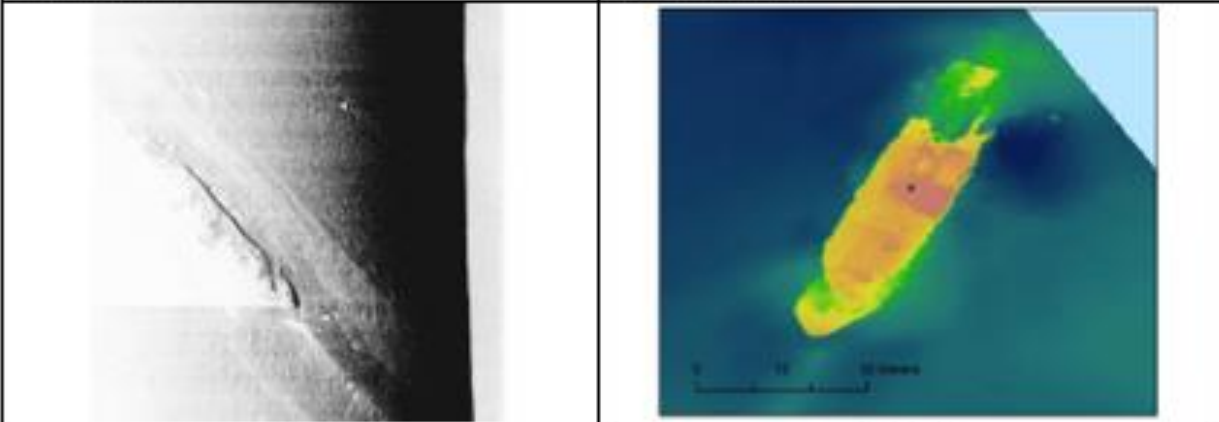
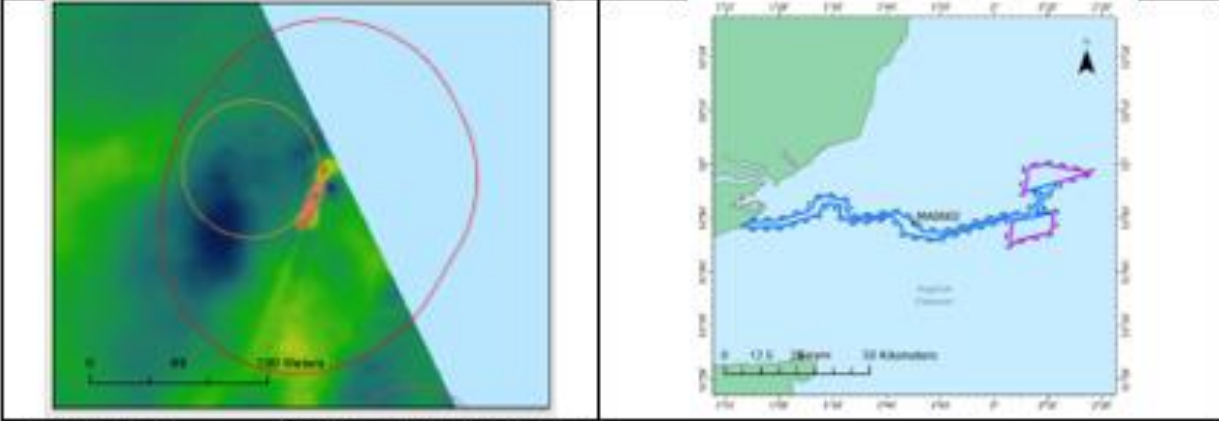
HER ID	NRHE ID	UKHO ID	MA ID	Name	Period constructed	Status	Type	Flag	Date sunk	Description in records	AEZ
-	-	14803	MA6677	-	unknown	dead	foul ground (seen in geophysical data)	-	-	Possible section of dis-used cable	100

9 APPENDIX B GRAPHICS OF RECORDED RECEPTORS


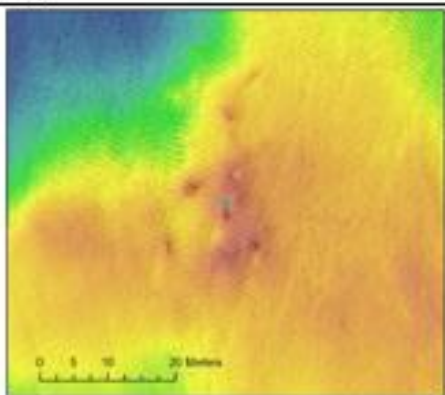
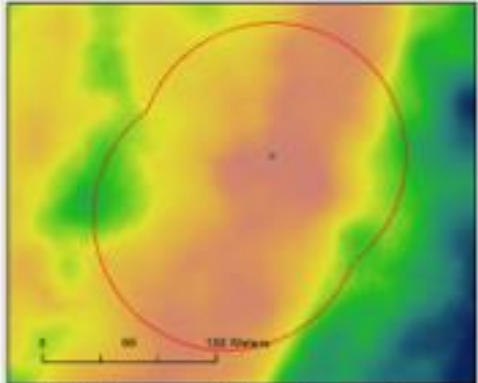
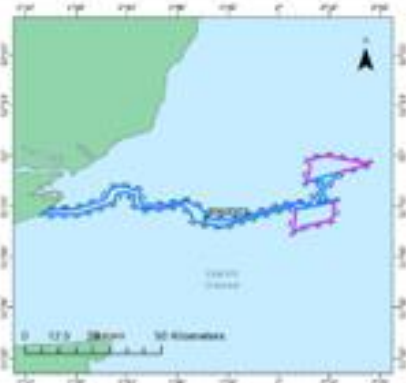

Graphic 11.1. 1 MA0001

MA0001	
Anomaly IDs	UKHO ID: 15865 Classification: Obstruction
	SSS ID: MA2003
	MBES ID: -
	MAG ID: -
Geophysical notes	MA0001: a pair of isolated slightly curved hard reflectors with extended shadow and some scour; probable anthropogenic or wreck debris associated with UKHO15885, an obstruction recorded 65 m north.
SSS MA2003	
	
AEZ	Location
	
Wreck details	Type: Unknown
	Construction: Unknown
	Dimensions (m): Unknown
	Shipyard: Unknown
	Cause of loss: Unknown


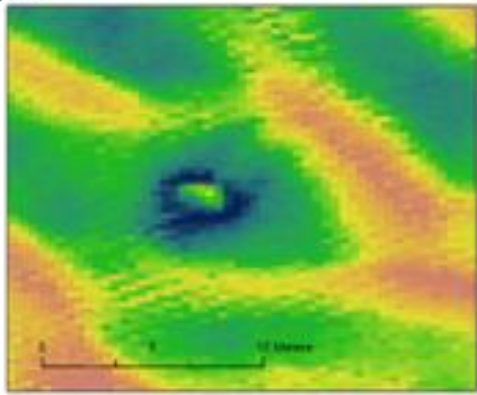
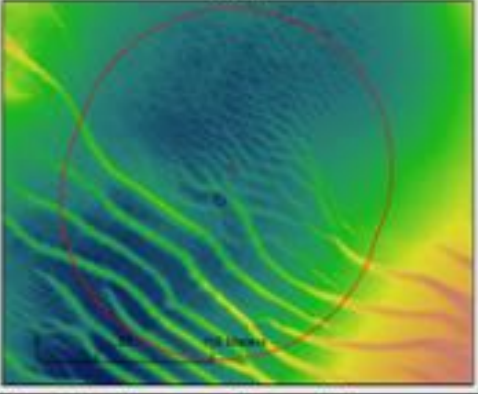


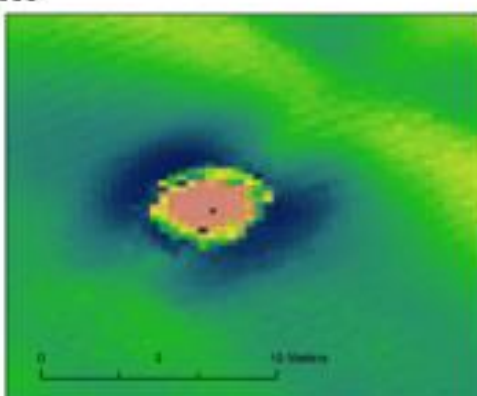
Graphic 11.1. 2 MA0002

MA0002	
Anomaly IDs	UKHO ID: 14513 Classification: Wreck
	SSS ID: MA2119
	MBES ID: MA4034
	MAG ID: MA6002
Geophysical notes	MA0002: an isolated cylindrical hard reflector with extended shadow which correlates with the recorded location for the wreck of SS <i>Nico</i> ; magnetic return of 4844 nT.
SSS MA2119	
MBES MA4034	
	
	
Wreck details	Type: Cargo ship, steam
	Construction: Steel
	Dimensions (m): 58.1 x 9.2 x 4.4 m
	Shipyard: Akers Mekaniske Verksted A/S, Oslo
	Cause of loss: Sunk by a mine from the German submarine <i>UC-3</i> .


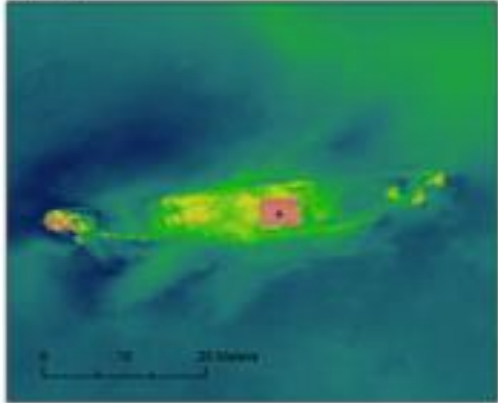
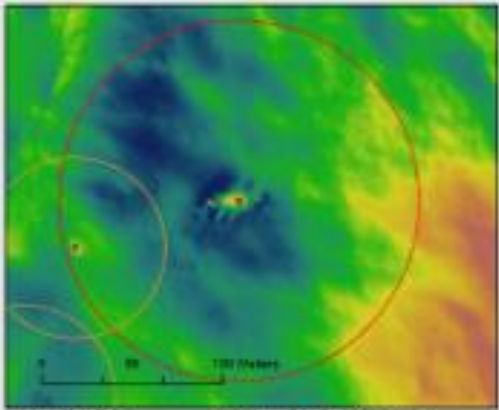

Graphic 11.1. 3 MA0003

MA0003	
Anomaly IDs	UKHO ID: 14461 Classification: Wreck
	SSS ID: MA2123
	MBES ID: MA4036
	MAG ID: MA8005
Geophysical notes	MA0003 : an area of scattered linear hard reflectors with shadow and scour; possibly the wreck of MV <i>Janny</i> , recorded 832 m southwest, potentially wreck debris; magnetic return of 3108 nT.
SSS MA2123	MA4036
	
AEZ	Location
	
Wreck details	Type: Cargo ship, motor
	Construction: Steel
	Dimensions (m): 47 x 6.63 x 2.83
	Shipyard: Apol A., Scheepswerf C.V., Wirdum
	Cause of loss: Flooding.
Associated anomalies	MA0004 : a hard reflector with shadow and scour located 50 m from MA0003 ; potential wreck debris; magnetic return of 241 nT(MA8055).
SSS MA2129	
	


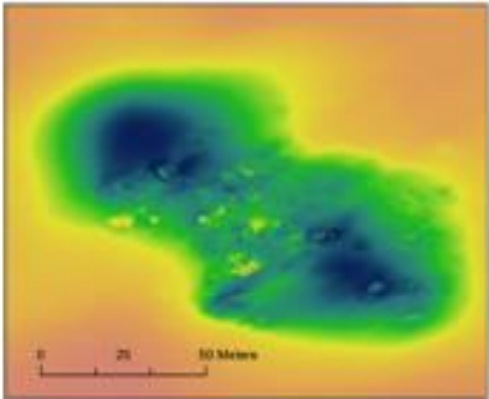
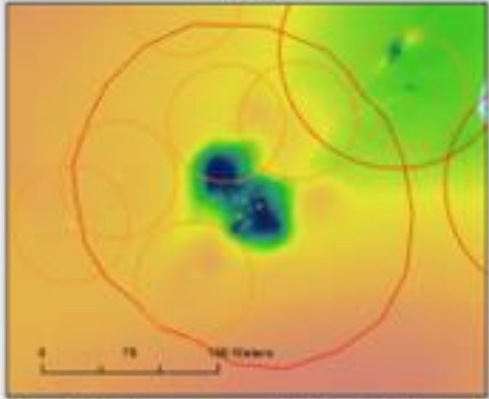

Graphic 11.1. 4 MA0006

MA0006	
Anomaly IDs	UKHO ID: 14576 Classification: Wreck
	SSS ID: MA2197
	MBES ID: MA4084
	MAG ID: MA8154
Geophysical notes	MA0006: a semi-circular hard reflector with shadow; potential wheel; correlates with record for an unidentified wreck; magnetic return of 120 nT.
MA2197	MA4084
	
AEZ	Location
	
Wreck details	Type: Unknown Construction: Unknown Dimensions (m): Unknown Shipyards: Unknown Cause of loss: Unknown
Associated anomalies	MA0007: a circular hard reflector in patch of scour with extended shadow; probable wreck debris associated with UKHO14576, wheel or anthropogenic debris; magnetic return of 120 nT (MA8154).
MA2198	MA4085
	


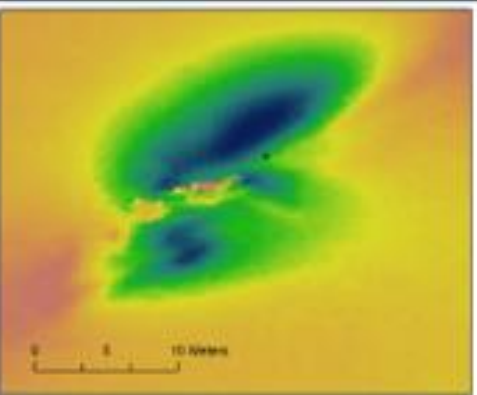
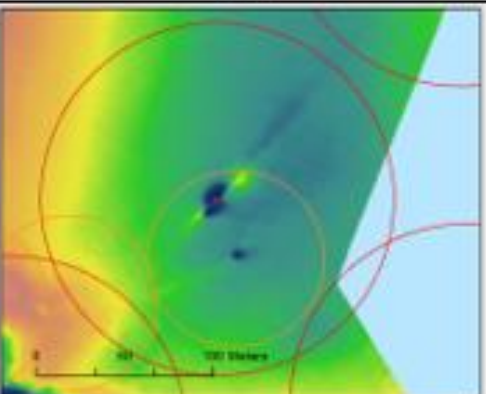

Graphic 11.1. 5 MA0008

MA0008	
Anomaly IDs	UKHO ID: 14581 Classification: Wreck
	SSS ID: MA2199
	MBES ID: MA4086
	MAG ID: MA6003
Geophysical notes	MA0008: an ovate hard reflector with shadow and scour with smaller linear hard reflectors; partially buried wreck with potential wreck debris, hull appears intact; correlates with record for an unidentified wreck; magnetic return of 4705 nT.
MA2199	MA4086
	
AEZ	Location
	
Wreck details	Type: Unknown
	Construction: Unknown
	Dimensions (m): Unknown
	Shipyard: Unknown
	Cause of loss: Unknown


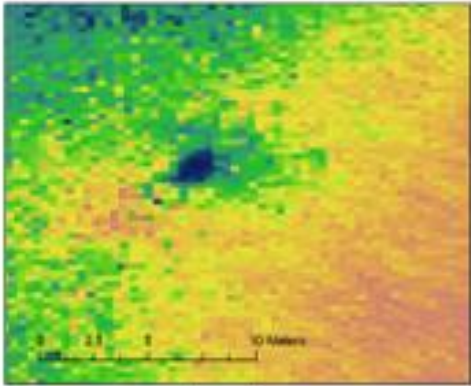
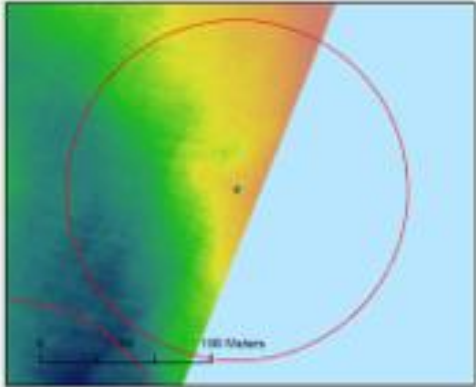
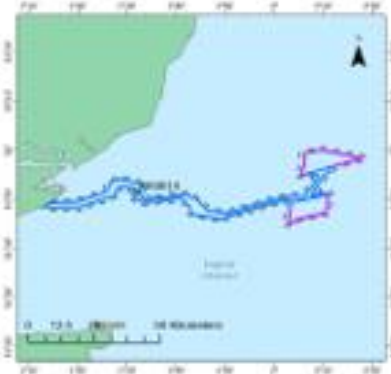
Graphic 11.1. 6 MA0012

MA0012	
Anomaly IDs	UKHO ID: 14553 Classification: Wreck
	SSS ID: MA2260
	MBES ID: MA4305
	MAG ID: MA6000
Geophysical notes	MA0012: a dispersed area of hard reflectors with shadow; correlates with position for an unidentified wreck; magnetic return of 20411 nT.
MA2260	MA4305
	
AEZ	Location
	
Wreck details	Type: Unknown
	Construction: Unknown
	Dimensions (m): Unknown
	Shipyard: Unknown
	Cause of loss: Unknown


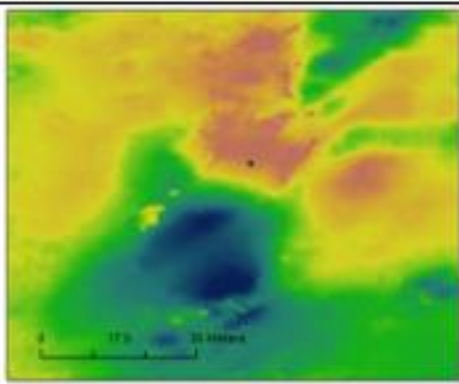
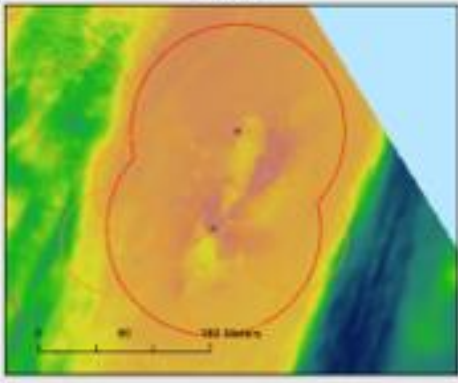


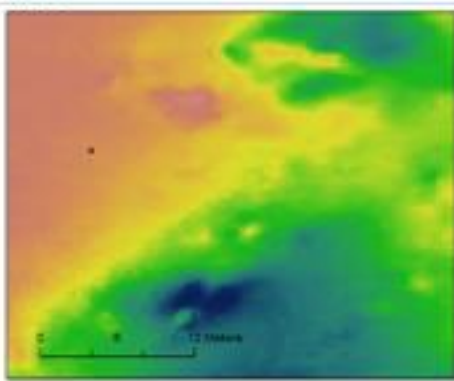
Graphic 11.1. 7 MA0013

MA0013	
Anomaly IDs	UKHO ID: 14859 Classification: Foul ground
	SSS ID: MA2263
	MBES ID: MA4309
	MAG ID: -
Geophysical notes	MA0013: a hard reflector with shadow and scour with points of raised features across its length; potential wreck with rope; correlates with record for foul ground; potentially associated with MA0264 located 27 m south.
MA2263	MA4309
	
AEZ	Location
	


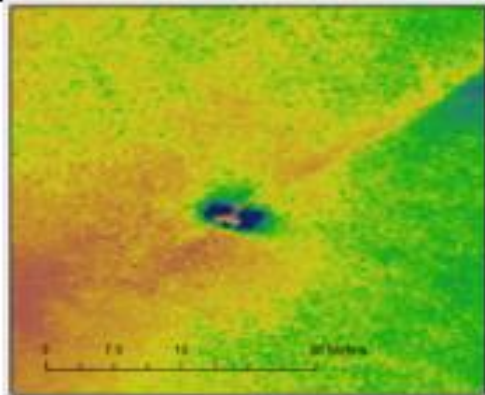
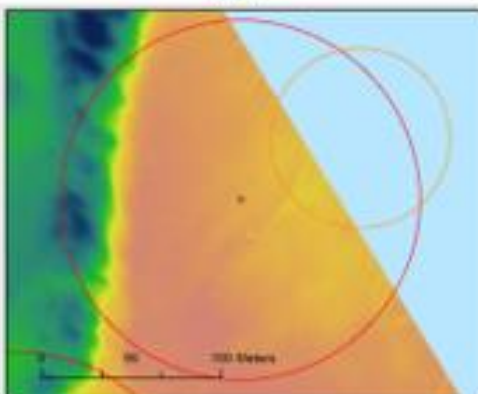

Graphic 11.1. 8 MA0014

MA0014	
Anomaly IDs	UKHO ID: 15035 Classification: Wreck
	SSS ID: MA2270
	MBES ID: MA4315
	MAG ID: MA6788
Geophysical notes	MA0014: an isolated angular hard reflector with shadow and scour; potential wreck or anthropogenic debris; correlates with record for an unidentified wreck; magnetic return of 27.7 nT.
MA2270	MA4315
	
AEZ	Location
	
Wreck details	Type: Unknown
	Construction: Unknown
	Dimensions (m): Unknown
	Shipyard: Unknown
	Cause of loss: Unknown


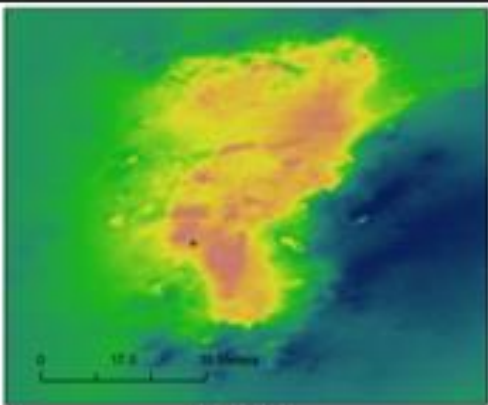
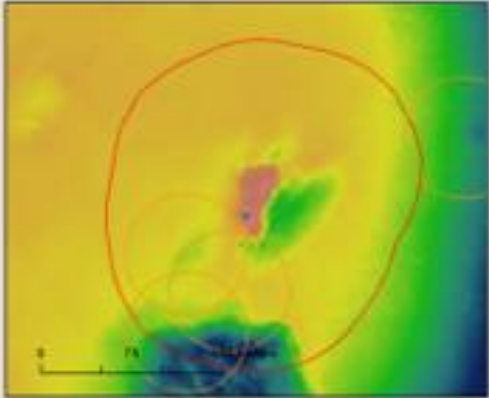
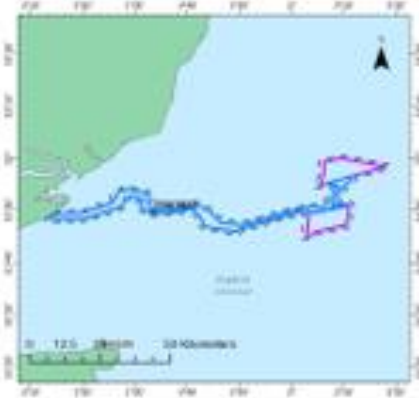
Graphic 11.1. 9 MA0020

MA0020	
Anomaly IDs	UKHO ID: 14535 Classification: Wreck
	SSS ID: MA2314
	MBES ID: MA4349
	MAG ID: MA6001
Geophysical notes	MA0020: an area of linear hard reflectors with scour and spikes of elongated shadows; correlates with record for the wreck of SS <i>Norhauk</i> ; magnetic return of 19031.6 nT.
MA2314	MA4349
	
AEZ	Location
	
Wreck details	Type: Cargo ship, steam
	Construction: Steel
	Dimensions (m): 122.3 x 16.2 x 9.7 m
	Shipyard: G. M. Standifer Construction Corp., Vancouver
	Cause of loss: Mined.
Associated anomalies	MA0283: an area of linear hard reflectors with extended shadows; probable wreck debris associated with MA0020 (SS <i>Norhauk</i> , UKHO14535).
MA2323	MA4356
	


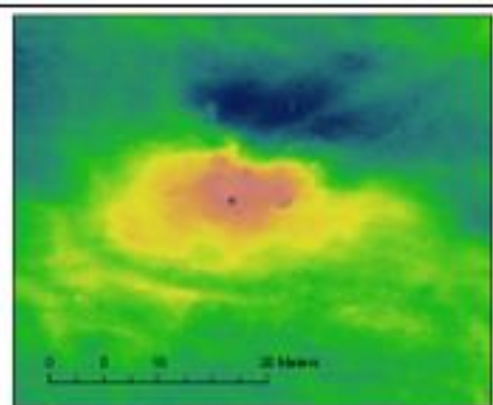
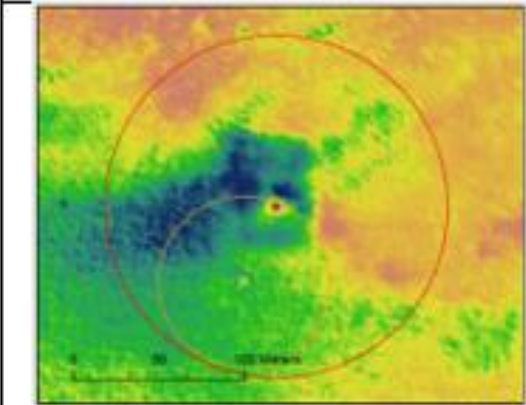
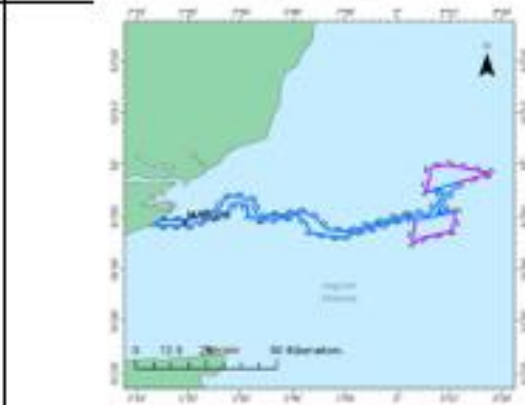
Graphic 11.1. 10 MA0021

MA0021		
Anomaly IDs	UKHO ID: 79309	Classification: Foul ground
	SSS ID: MA2327	
	MBES ID: MA4360	
	MAG ID: MA6587	
Geophysical notes	MA0021 : an angular hard reflector with linear hard reflector, both with shadow and scour; potential anchor associated with MA0285; correlates with record for foul ground; magnetic return of 36.4 nT.	
MA2327	MA4360	
		
AEZ	Location	
		

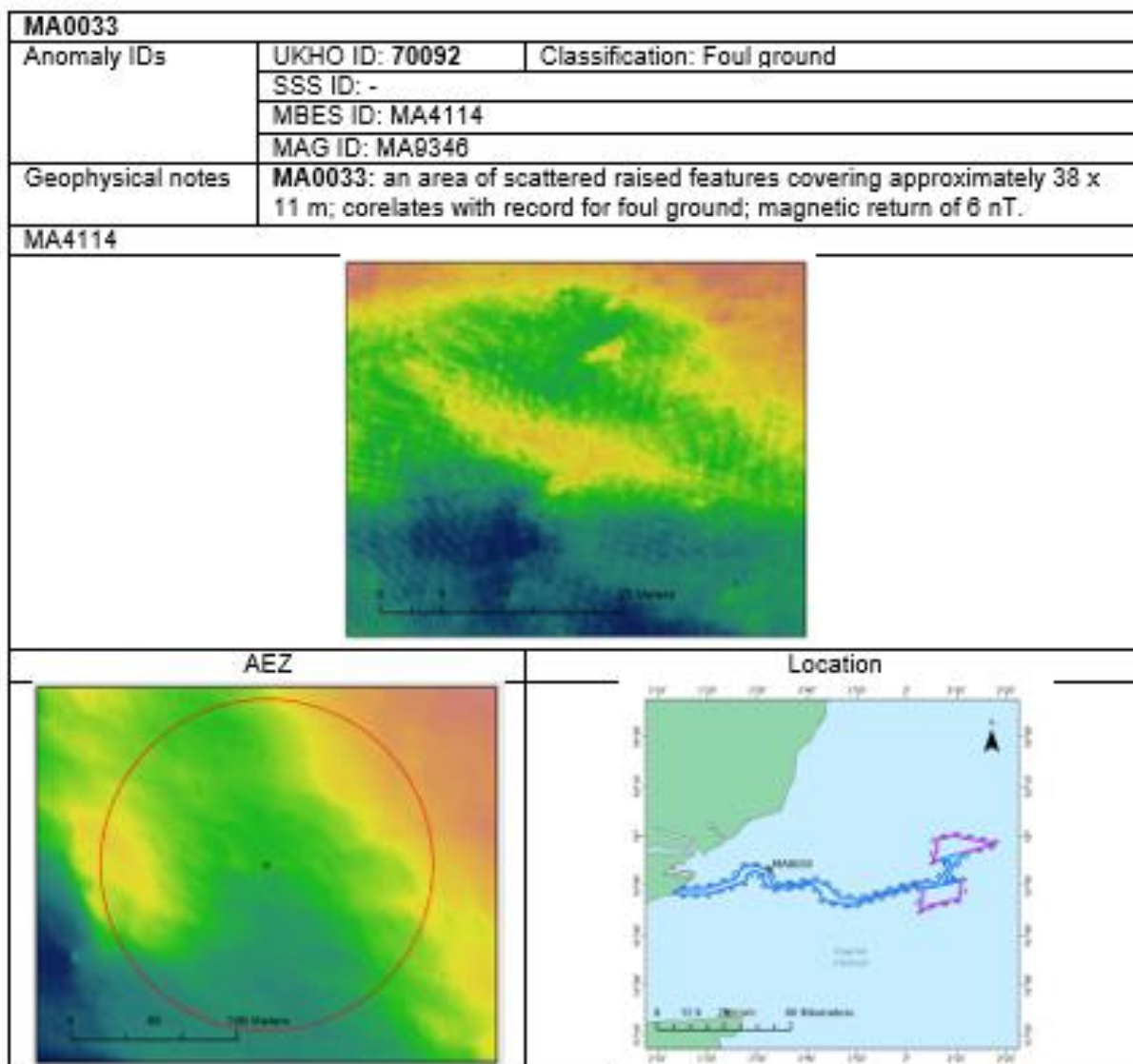
Graphic 11.1. 11 MA0022

MA0022	
Anomaly IDs	UKHO ID: 14525 Classification: Wreck
	SSS ID: MA2335
	MBES ID: MA4365
	MAG ID: MA6004
Geophysical notes	MA0022: an area of scattered linear hard reflectors covering approximately 100 x 50 m; likely the broken up remains of a wreck, and correlating with the record for the wreck of SS <i>Morar</i> , magnetic return of 3936 nT.
MA2335	MA4365
	
AEZ	Location
	
Wreck details	Type: Cargo ship, steam
	Construction: Steel
	Dimensions (m): 73.1 x 11.3 x 5.4 m
	Shipyard: Swan, Hunter & Wigham Richardson Ltd., Wallsend
	Cause of loss: Struck by a mine laid by German E-boats.

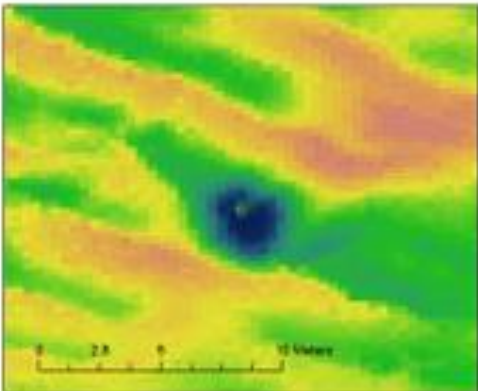
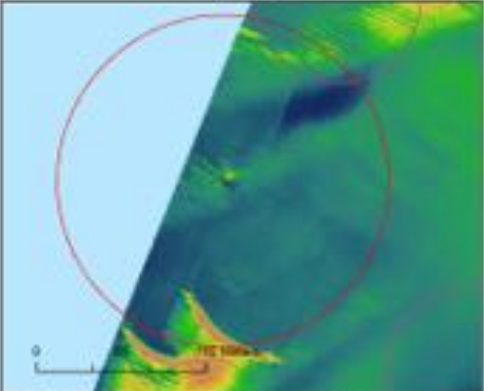

Graphic 11.1. 12 MA0029

MA0029	
Anomaly IDs	UKHO ID: 14995 Classification: Wreck (aircraft)
	SSS ID: MA2397
	MBES ID: MA4228
	MAG ID: MA9137
Geophysical notes	MA0029: a cluster of hard reflectors with shadow; potential anthropogenic debris; correlates with record for an unidentified aircraft; magnetic return of 6.9 nT.
MA2397	MA4228
	
AEZ	Location
	
Wreck details	Type: Aircraft
	Construction: Unknown
	Dimensions (m): Unknown
	Shipyard: Unknown
	Cause of loss: Unknown

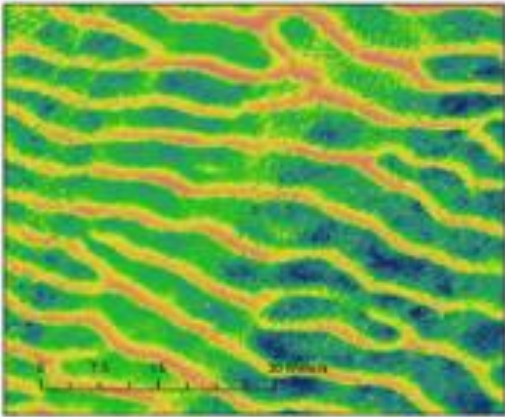
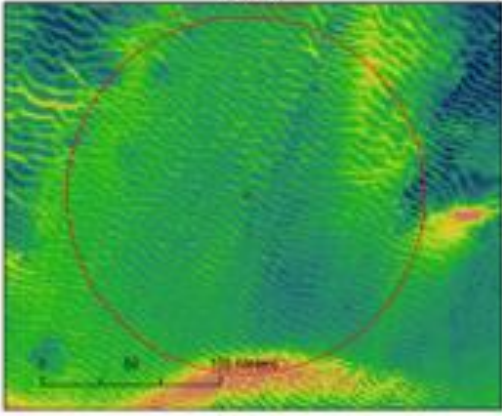

Graphic 11.1. 13 MA0033




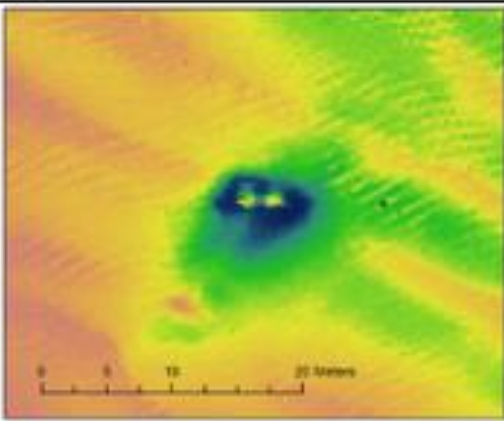
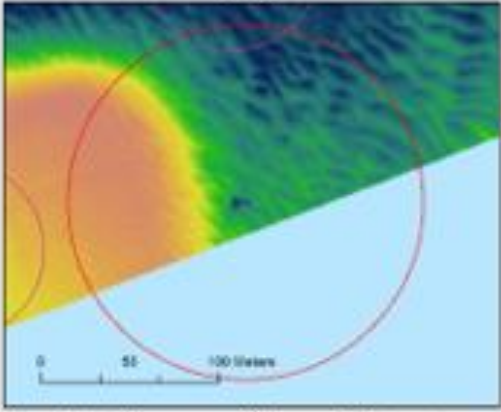
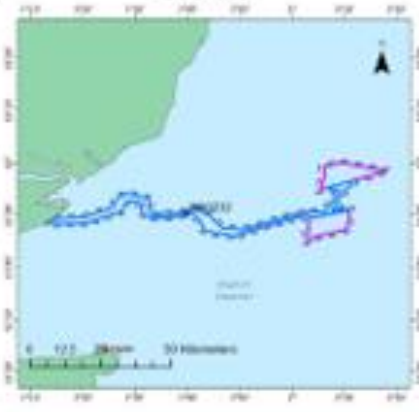
Graphic 11.1. 14 MA0034

MA0034	
Anomaly IDs	UKHO ID: 15074 Classification: Wreck
	SSS ID: -
	MBES ID: MA4146
	MAG ID: MA6134
Geophysical notes	MA0034: a small, raised feature in patch of scour; corelates with record for an unidentified wreck; magnetic return of 131 nT.
MA4146	
	
AEZ	Location
	
Wreck details	Type: Unknown
	Construction: Unknown
	Dimensions (m): Unknown
	Shipyard: Unknown
	Cause: Unknown

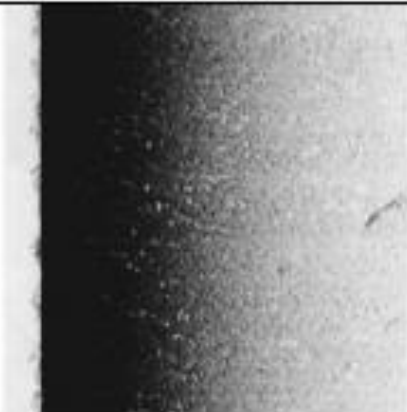
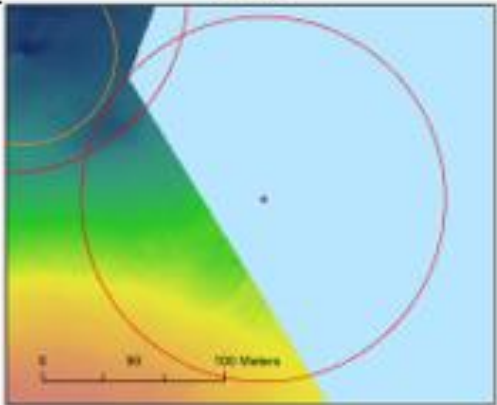
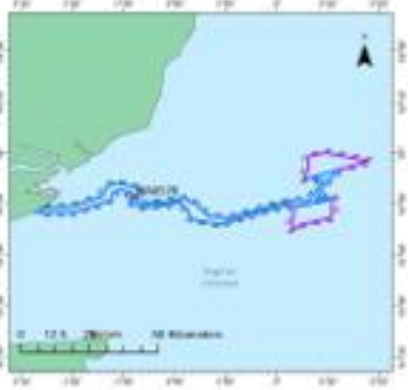
Graphic 11.1. 15 MA0068

MA0068	
Anomaly IDs	Wreck ID: 87019 Classification: Wreck
	SSS ID: -
	MBES ID: MA4437
	MAG ID: MA6030
Geophysical notes	MA0068: a small, raised feature in area of sand waves; correlates with record for unidentified wreck; 355 nT.
MA4437	
	
AEZ	Location
	
Wreck details	Type: Unknown
	Construction: Unknown
	Dimensions (m): Unknown
	Shipyard: Unknown
	Cause of loss: Unknown

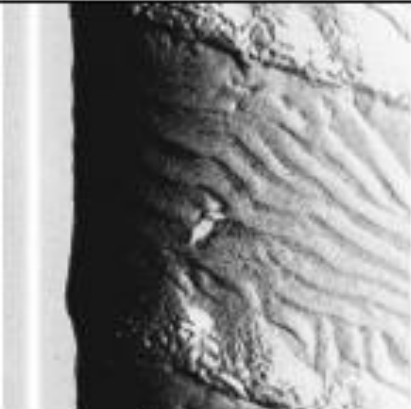
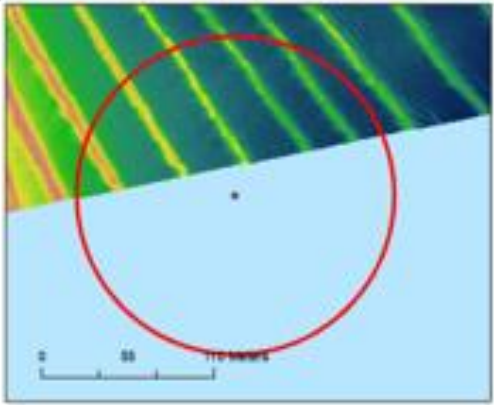
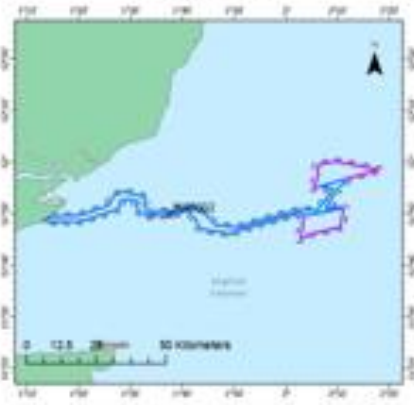
Graphic 11.1. 16 MA0232

MA0232	
Anomaly IDs	UKHO ID: 70049 Classification: Wreck
	SSS ID: MA2378
	MBES ID: MA4398
	MAG ID: -
Geophysical notes	MA0232: an isolated elongated curvilinear hard reflector; probable cable, rope or chain; correlates with record for HMS <i>Hastfen</i> .
MA2378	MA4398
	
AEZ	Location
	
Wreck details	Type: Drifter, steam
	Construction: Wood
	Dimensions (m): Unknown
	Shipyard: Killybegs Co., Donegal
	Cause of loss: Sunk by a mine from the German submarine <i>UC-11</i> .

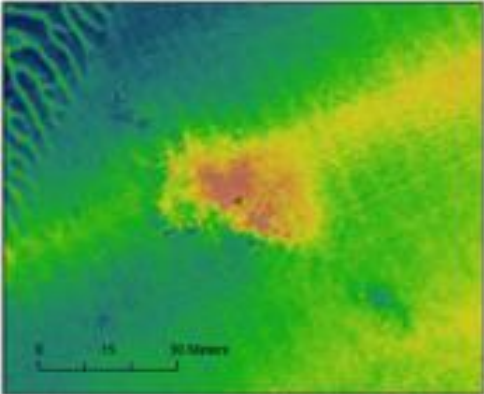
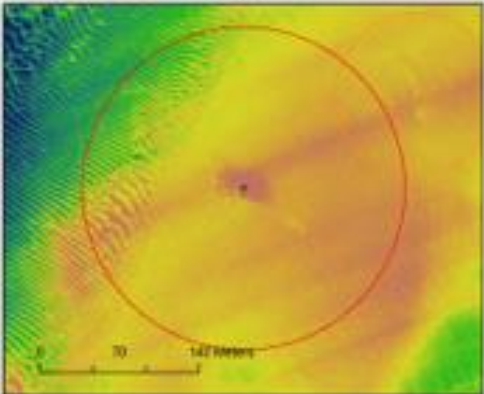

Graphic 11.1. 17 MA0578

MA0578	
Anomaly IDs	UKHO ID:14555 Classification: Wreck
	SSS ID: MA2334
	MBES ID: -
	MAG ID: -
Geophysical notes	MA0578: an isolated curvilinear hard reflector with shadow and scour; potential partially buried anthropogenic or wreck debris; correlates with record for wreck of SS <i>Vancouver</i> (UKHO14555).
MA2334	
	
AEZ	Location
	
Wreck details	Type: Steam ship
	Construction: Steel
	Dimensions (m): 124.97 x 16.46 x 9.14
	Shipyard: Greenock and Grangemouth Dockyard Co. Ltd.
	Cause: Fire

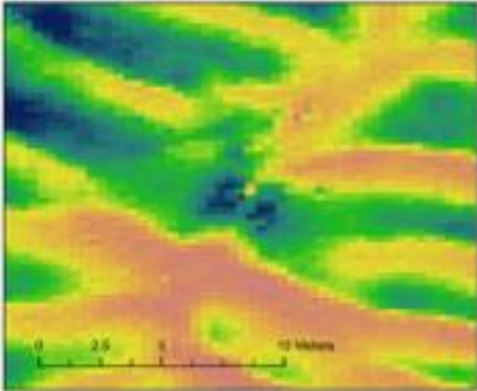
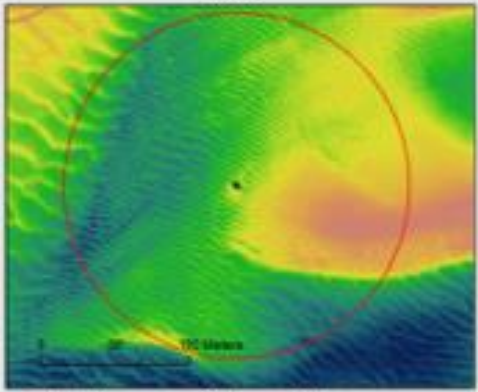
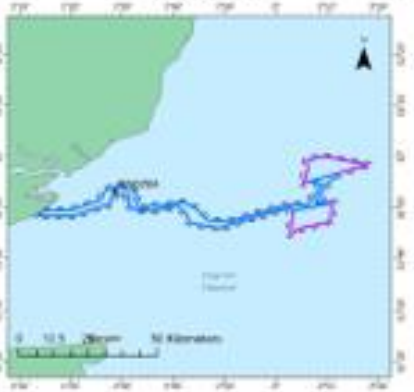
Graphic 11.1. 18 MA0602

MA0602	
14555	UKHO ID: 14983 Classification: Wreck (submarine)
	SSS ID: MA2380
	MBES ID: -
	MAG ID: -
Geophysical notes	MA0602: an isolated hard reflector with shadow and scour; potential anthropogenic or wreck debris; located 273 m east from recorded location of submarine HMSM E6 area not covered by MBES or Mag data.
MA2380	
	
AEZ	Location
	
Wreck details	Type: Submarine
	Construction: Steel
	Dimensions (m): 54.3 x 4.6 x 3.35 m
	Shipyard: Vickers, Sons & Maxim Ltd., Barrow-In-Furness
	Cause: Sunk by a mine from the German submarine UC-5.

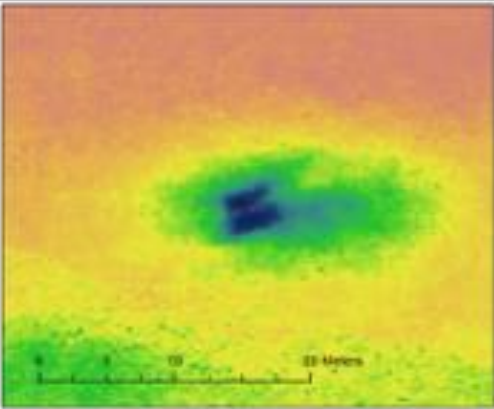
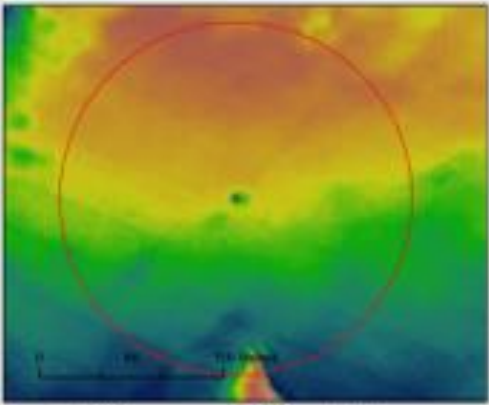

Graphic 11.1. 19 MA0703

MA0703	
Anomaly IDs	UKHO ID: 87021 Classification: Wreck
	SSS ID: -
	MBES ID: MA4144
	MAG ID: -
Geophysical notes	MA0703: a cluster of raised features surrounded by scattered smaller raised features over area measuring approximately 37 x 19 m; correlates with record for distributed remains of an unidentified wreck.
MA4144	
	
AEZ	Location
	
Wreck details	Type: Unknown
	Construction: Unknown
	Dimensions (m): Unknown
	Shipyard: Unknown
	Cause of loss: Unknown

Graphic 11.1. 20 MA0704

MA0704	
Anomaly IDs	UKHO ID: 87043
	Classification: Wreck
	SSS ID: -
	MBES ID: MA4145
Geophysical notes	MA0704: a small, raised feature in patch of scour; correlates with record for an unidentified potential wreck.
MA4145	
	
AEZ	Location
	
Wreck details	Type: Unknown
	Construction: Unknown
	Dimensions (m): Unknown
	Shipyard: Unknown
	Cause of loss: Unknown

Graphic 11.1. 21 MA0754

MA0754	
Anomaly IDs	UKHO ID: 87002 Category: Unknown
	SSS ID: -
	MBES ID: MA4207
	MAG ID: MA10505
Geophysical notes	MA0754: a patch of scour; correlates with record for unknown patch of scour; magnetic return of 12 nT.
MA4207	
	
AEZ	Location
	
Wreck details	Type: Unknown
	Construction: Unknown
	Dimensions (m): Unknown
	Shipyard: Unknown
	Cause of loss: Unknown



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