Bowdun Offshore Wind Farm, Offshore EIA Report

Volume 3, Technical Appendix 19.1: Marine Archaeology Technical Report

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Glossary

Defined Term	Definition
Applicant (the)	Bowdun Offshore Wind Farm Limited (BOWFL).
Array Area	The Array Area is the area in which the Offshore Generation Assets will be located.
Bowdun Offshore Wind Farm (OWF) Limited	A Special-Purpose Vehicle (SPV) (legal entity) for the purpose of developing the Project. BOWFL are the Applicant for the Offshore Application.
Effect	Term used to express the consequence of an impact (i.e. the result of change or changes) on specific environmental resources or receptors. The significance of an effect is determined by correlating the magnitude of the impact with the importance, or sensitivity of the receptor or resource in accordance with defined significance criteria.
Environmental Impact Assessment (EIA)	Process for the assessment of likely significant environmental effects of the Proposed Development on the physical, biological, and human environment during construction, Operation and Maintenance (O&M) and decommissioning.
Environmental Impact Assessment Regulations (EIA Regulations)	Terminology used in the Offshore EIA Report to refer to three sets of regulations: • The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017; • The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017; and • The Marine Works (Environmental Impact Assessment) Regulations 2007.
Exclusive Economic Zone (EEZ)	An area from the outer limit of the territorial sea up to 200 nm from the coastal baseline, over which a sovereign state has rights regarding marine resources.
Export Cable Corridor	The area of seabed seaward of Mean High Water Springs (MHWS) which connects the Array Area with the Landfall within which the Offshore Export Cables will be installed.
Find Spots	A location of an archaeological find, for example; flints or ship timbers.
Impact	A change caused by an action that occurs during a project's lifetime.
Inter-Array Cables (IAC)	Cables which link the Wind Turbines to each other and with the Offshore Substation Platforms (OSPs).
Interconnector Cables	Cables which will connect individual OSPs to each other to provide redundancy against cable failure elsewhere.
Intertidal Area	The area between MHWS and Mean Low Water Springs (MLWS).
Landfall	The area in which the Offshore Export Cables make landfall and is also the transitional area between the Offshore Transmission Assets and the Onshore Transmission Assets. Located in the Intertidal Area at Benholm.
Marine Directorate (MD)	The Marine Directorate of the Scottish Government, formerly known as Marine Scotland. The planning and licensing authority for Scotland's seas and custodian of Scotland's National Marine Plan (NMP). The Marine Directorate - Licensing Operations Team (MD-LOT) are specifically responsible for managing Section 36 Consent and Marine Licence Applications seaward of MHWS.

Defined Term	Definition
Marine Isotope Stage	Alternating warm and cold periods derived from oxygen isotope data taken from deep sea core samples.
Marine Licence	A Marine Licence permits the undertaking of different activities in the marine environment, including construction, the deposition or removal of substances or objects, and dredging. The Marine (Scotland) Act 2010 requires Marine Licences to be obtained for licensable activities taking place within Scottish Territorial Seas (MHWS to 12 nm). The Marine and Coastal Access Act (MCAA) 2009 requires a Marine Licence to be obtained for licensable marine activities within the Scottish offshore region (12 nm – 200 nm).
Mean High Water Springs (MHWS)	The average tidal height throughout the year of two successive high waters during those periods of 24 hours when the range of the tide is at its greatest.
Mean Low Water Springs (MLWS)	The average tidal height throughout the year of two successive low waters during those periods of 24 hours when the range of the tide is at its greatest.
Medieval	AD 1100 - 1560.
Mesolithic	10,000 BC – 4000 BC.
Mitigation	Measures to avoid, prevent, reduce or control effects on the environment.
Neolithic	4,000 BC – 2,500 BC.
Offshore Environmental Impact Assessment (EIA) Report (hereafter, 'Offshore EIA Report')	Document prepared to report the findings of the EIA for the Proposed Development and produced in accordance with the EIA Regulations. The Offshore EIA Report is submitted to support the Offshore Application for the Proposed Development, and to comply with EIA Regulations.
Offshore Export Cables	Subsea cables used to transmit electricity generated offshore by the Wind Turbines from the OSPs to shore. The Transition Joint Bay is the location where the Offshore Export Cable terminates, and the onshore cabling begins.
Offshore Generation Assets	The infrastructure of the Proposed Development required to generate electricity comprising of the Wind Turbines, Wind Turbine foundations and associated infrastructure (e.g. IACs).
Offshore Infrastructure	All of the Offshore Infrastructure associated with the Proposed Development that is located seaward of MHWS, comprising the Offshore Generation Assets and the Offshore Transmission Assets.
Offshore Scoping Report	The report that presents the findings of the EIA scoping process undertaken for the Proposed Development with the purpose of obtaining a Scoping Opinion. The Offshore Scoping Report defines what is intended to be assessed and reported as part of the EIA.
Offshore Substation Platform(s) (OSPs)	OSPs comprise the support structure, topside and electrical components used for collecting and/or converting electricity generated by the Wind Turbines for transmission by the Offshore Export Cables.
Offshore Transmission Assets	The infrastructure of the Proposed Development required to transmit the generated electricity comprising of the OSPs, Offshore Export Cables and associated infrastructure up to MHWS.
Palaeolandscape	Topographic features of a past geological age.

Defined Term	Definition
Plan Option Area (POA)	A location identified in the Sectoral Marine Plan (SMP) as a preferred area for commercial scale offshore wind development.
Project (the)	An overarching term for the Bowdun Offshore Wind Farm (Bowdun OWF) comprising the offshore and onshore infrastructure required to generate and transmit electricity from the Array Area to the onshore Grid Connection Point. The Project includes the Offshore Generation Assets, the Offshore Transmission Assets and the Onshore Transmission Assets.
Proposed Development	Term used to define the Offshore Infrastructure associated with the Project seaward of MHWS for which consent is being sought. Further details of the parameters are included in Volume 1, Chapter 3: Project Description.
Quaternary	The period of geologic time from about 1.8 million years ago to the present, including the part of the Pleistocene (2.58 million to 11,700 BP) and Holocene (11,700 BP to present) Epochs.
Recorded Loss	Dataset entry of a maritime or aviation record that has no specific location attached to them but are given often arbitrary spatial attribution.
Scoping Opinion	A document produced by MD-LOT which is issued in response to submission and review of the Offshore Scoping Report. The Scoping Opinion is supported with feedback and advice from consultees, which details what is expected to be included in the Offshore EIA Report and what can be scoped out of the EIA process.
Scottish Archaeological Research Framework (ScARF)	A comprehensive resource designed to support and enhance archaeological research in Scotland. ScARF provides an overview of the current state of research in Scottish archaeology and outlines key research questions and priorities for future study.
Scottish Marine Area	The area of sea within the seaward limits of the territorial sea of the United Kingdom adjacent to Scotland as defined by the Marine (Scotland) Act 2010.
Scottish Ministers (the)	The decision makers with regard to Marine Licence(s) and Section 36 Consent applications in Scottish Offshore Waters and Scottish Marine Area.
Scottish Offshore Waters	The area of sea beyond 12 nm but within the Scottish Exclusive Economic Zone (EEZ) up to 200 nautical miles from the coast.
Scottish Territorial Waters	The territorial waters of Scotland that extend out from MHWS to 12 nm.
Scour Protection	Protective materials installed to avoid sediment being eroded away from the base of the foundations and/or buried subsea cable due to the flow of water.
Sectoral Marine Plan (SMP)	A plan developed by the Scottish Government which provide the strategically planned spatial footprint for offshore wind development in Scotland.
Significance	Effect factor that is determined by the magnitude of impact along with the sensitivity of the receptor.
Site Boundary	The boundary within which all elements of the Proposed Development will be located. The Site Boundary comprises the Array Area and Export Cable Corridor which ends at MHWS.

Defined Term	Definition
Study Area	For each environmental topic, the baseline environment will be characterised, and the potential environmental impacts will be described within a topic-specific study area. Specific study areas are defined for each topic and are based on the maximum spatial extent across which potential impacts of the Project may be experienced by the relevant receptors (i.e. Zone of Influence).
Wind Turbines	Structures comprising of a tubular tower, rotor blades, and a nacelle which houses the Wind Turbine generator.

Acronyms

Acronym	Definition
3D	Three Dimensional
2D	Two Dimensional
AD	Anno Domini
ADS	Archaeology Data Service
BC	Before Christ
BGS	British Geological Survey
BNG	British National Grid
BP	Before Present
BSB	Below Seabed
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
Esri	Environmental Systems Research Solutions
ETRS	European Terrestrial Reference System
GIA	Glacial Isostatic Adjustment
GIS	Geographic Information System
HEPS	Historic Environment Policy for Scotland
HER	Historic Environment Record
HES	Historic Environment Scotland
HMPA	Historic Marine Protected Area
HVAC	High Voltage Alternating Current
IAC	Inter-Array Cable
KP	Kilometre Point
LAT	Lowest Astronomical Tide
MBES	Multibeam Echosounder
MCA	Marine and Coastguard Agency
MD-LOT	Marine Directorate - Licensing Operations Team
MHWS	Mean High Water Spring
MLWS	Mean Low Water Spring
MPS	Marine Policy Statement
NESRRF	North East Scotland Regional Research Framework
NMP	National Marine Plan
NRHE	National Record of the Historic Environment
OD	Ordnance Datum
OLA	Option Lease Area
OSP	Offshore Substation Platform
OWF	Offshore Wind Farm
POA	Plan Option Area

Acronym	Definition
RoW	Receiver of Wreck
SBP	Sub-bottom Profiler
SCAPE	Scottish Coastal Archaeology and the Problem of Erosion
ScARF	Scottish Archaeology Research Framework
SLIP	Sea Level Index Point
SMP	Sectoral Marine Plan
SSS	Side Scan Sonar
UHRS	Ultra High Resolution Sonar
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USBL	Ultra Short Baseline
UTM	Universal Transverse Mercator
UXO	Unexploded Ordnance
VORF	Vertical Offshore Reference Frames
WGS84	World Geodetic System 1984

Table of Units

Units	Definition
Hz	Hertz
kg	Kilogram
km	Kilometre
km²	Square kilometre
ky	Kiloyear
m	Metre
nm	Nautical mile
nT	Nanotesla

1 Introduction

1.1.1 This Marine Archaeology Technical Report presents the archaeological baseline for the offshore elements of the Bowdun Offshore Wind Farm (OWF) Project (hereafter referred to as the Proposed Development). The Proposed Development covers the Option Lease Area (OLA) that is located in the E3 Plan Option Area (POA), detailed in the Sectoral Marine Plan (SMP) for Offshore Wind Energy (Scottish Government, 2020), and the Offshore Export Cable Corridor. The Array Area is located 38 km from the Aberdeenshire coast at its closest point, covering an area of 187 km^2. The Proposed Development will comprise the Wind Turbines (fixed foundation), Inter-Array Cables (IACs), Offshore Substation Platforms (OSPs), Interconnector Cables, Offshore Export Cable and any necessary Scour Protection/cable protection. The Export Cable Corridor will include a maximum of three High Voltage Alternating Current (HVAC) Offshore Export Cables, each with a length of up to 70 km and will make Landfall at Benholm, Aberdeenshire.

1.1.2 Data has been collected via a thorough desktop study of known resources as well as site-specific geophysical surveys.

1.1.3 The information on marine archaeology presented in this technical report is intended to inform the Offshore Environmental Impact Assessment (EIA) Report for the Proposed Development by providing a detailed understanding of the marine archaeology baseline, against which the potential impacts of the Proposed Development can be assessed.

1.1.4 The aim of this Marine Archaeology Technical Report is to:

- summarise the potential for submerged prehistoric archaeology to be encountered within the Marine Archaeology Study Area (Section 4; Section 6);
- present the results of the archaeological analysis of site-specific geophysical data, identifying deposits of archaeological and palaeoenvironmental interest (Section 6);
- identify any known maritime and aviation sites within the Marine Archaeology Study Area from available desktop sources (Section 7.1);
- assess the potential for the existence of unknown maritime and aviation sites within the Marine Archaeology Study Area (Section 7.3); and
- present the results of the archaeological analysis of site-specific geophysical data, identifying anomalies of archaeological interest and characterising these anomalies, integrating the results with the findings of the desk-based assessment (Section 7.2).

2 Legislation

2.1 Overview

2.1.1 The overarching policy and legislation applicable to the Proposed Development is presented in Volume 1, Chapter 2: Policy and Legislation. This section sets out the legislation, policy, guidance and any development plans relevant to marine archaeology in the context of offshore renewable energy development to provide an appropriate context for the baseline assessment.

2.1.2 The Scottish Marine Area is classed as the area of sea within the seaward limits of the territorial sea of the United Kingdom adjacent to Scotland (i.e. within 12 nm of the coastline). Scottish Offshore Waters include any area of sea beyond 12 nm, but within the Scottish Exclusive Economic Zone (EEZ) up to 200 nm from the coast.

2.1.3 Within the Scottish Marine Area the following legislation applies to marine archaeology:

- The Protection of Wrecks Act 1973;
- The Ancient Monuments and Archaeological Areas Act 1979;
- The Protection of Military Remains Act 1986;
- The Merchant Shipping Act 1995; and
- The Marine (Scotland) Act 2010.

2.1.4 Beyond the Scottish Marine Area, within the Scottish Offshore Waters, archaeology is generally subject to international legislation and policy, with two exceptions:

- The Merchant Shipping Act 1995; and
- The Protection of Military Remains Act 1986.

2.1.5 International policy and legislation to which marine archaeology is subject includes the United Nations Convention on the Law of the Sea 1982 (United Nations, 1982), the European Convention on the Protection of Archaeological Heritage (Council of Europe, 1992 (the Valetta Convention)) and the United Nations Educational, Scientific and Cultural Organisation's (UNESCO) Convention on the Protection of Underwater Cultural Heritage 2001 (UNESCO, 2001). The UK has not ratified the UNESCO 2001 Convention, but has adopted the Rules in its Annex as best practice for underwater archaeology.

2.2 Legislation

2.2.1 Legislation relevant to marine archaeology is listed below in Table 2.1.

Table 2.1: Legislation Relevant to Marine Archaeology

Legislation	Description
The Protection of Wrecks Act 1973	Section 2 provides protection for wrecks that are designated as dangerous due to their contents and is administered by the Maritime and Coastguard Agency (MCA) through the Receiver of Wreck (RoW). In Scotland the Marine (Scotland) Act 2010 has replaced Section 1 of the Protection of Wrecks Act 1973.
The Ancient Monuments and Archaeological Areas Act 1979	Scheduled Monuments and Areas of Archaeological Importance or their equivalent are afforded statutory protection by the Secretary of State, and consent is required for any works impacting them. This Act was primarily terrestrial, but in recent years it has also been used to provide protection for underwater sites.
The Protection of Military Remains Act 1986	Under the Protection of Military Remains Act 1986, all aircraft that have crashed in military service are automatically protected as a 'protected place'. Named vessels can also be designated as a protected place even if the position of the wreck is not known. Maritime vessels lost during military service are not automatically protected, although the Secretary of State has powers to protect the wreck of any vessel or aircraft that was in military service when lost as a 'controlled site'. Outside of UK territorial waters the Act applies to British citizens, subjects and registered companies.
The Merchant Shipping Act 1995	This Act details the procedures for determining the ownership of maritime finds that turn out to be 'wreck'. 'Wreck' is defined as any flotsam, jetsam, derelict and lagan and includes all craft, parts of these, their cargo or equipment. Section 236 of the Merchant Shipping Act 1995 stipulates that all wreck recovered from within the UK's territorial waters (up to 12 nm) and any wreck landed in the UK from outside the UK's territorial waters must be declared to the RoW. If any wreck is recovered, the RoW must be notified, and the wreck material must be kept until the RoW determines ownership or requests that they be given to the RoW. All items which are raised from the seabed, regardless of age or importance, must be reported to the RoW who will act to settle questions of ownership and salvage.
The Marine (Scotland) Act 2010	The marine historic assets of national importance within the Scottish Marine Area may be protected by the Marine (Scotland) Act 2010. Part 5, Section 73 of this Act states that an area may be designated as an Historic Marine Protected Area (HMPA) if Scottish Ministers consider it desirable to preserve a marine historic asset.

2.3 Policy

Marine Policy Statement 2011

2.3.1 The UK Marine Policy Statement (MPS) sets out high level marine objectives for ensuring that marine resources are used in a sustainable way (UK Government, 2011).

2.3.2 Section 2.6.6 of the MPS relates to the historic environment in marine planning and advises that heritage assets should be conserved through marine planning in a manner appropriate and proportionate to their significance. It advises that when considering the significance of a heritage asset and its setting, the marine plan authority should take into account the particular nature of the interest in the assets and the value they hold for current and future generations.

2.3.3 Designated heritage assets in coastal/intertidal areas and territorial/offshore waters may include Scheduled Monuments, Protected Wreck Sites and sites designated under the Protection of Military Remains Act 1986. Non-designated heritage assets of equivalent status should be considered under the same policy principles as designated heritage assets.

2.3.4 Where the loss of the whole or material part of a heritage asset's significance is justified, suitable mitigation measures should be put in place.

Scotland's National Marine Plan 2015

2.3.5 Scotland's National Marine Plan (NMP) was published in 2015 and reviewed in 2018 and 2021 and sets out high level objectives for managing offshore development and advice for the preparation of future Regional Marine Plans.

2.3.6 General Policy 6 within the Scottish NMP relates to the historic environment and states that "*Development and use of the marine environment should protect and, where appropriate, enhance heritage assets in a manner proportionate to their significance*" (Scottish Government, 2015).

2.3.7 It identifies that designated heritage assets should be protected *in situ* within an appropriate setting, and that substantial loss of harm to designated assets should be exceptional and should only be permitted "*if this is necessary to deliver social, economic or environmental benefits that outweigh the harm or loss*" (Scottish Government, 2015).

2.3.8 It outlines that proposals for development that may "*affect the historic environment should provide information on the significance of known heritage assets and the potential for new discoveries to arise. They should demonstrate how any adverse impacts will be avoided, or if not possible, minimised and mitigated. Where it is not possible to minimise or mitigate impacts, the benefits of proceeding with the proposal should be clearly set out*" (Scottish Government, 2015).

2.3.9 Scotland's NMP also states that "*where the case for substantial change to heritage asset is accepted, marine decision-making authorities should require applicants to undertake suitable mitigating actions to record and advance understanding of the significance of the heritage asset before it is lost, in a manner proportionate to that significance*" (Scottish Government, 2015).

2.3.10 Scotland's National Marine Plan 2 is in development and there has been consultation on the Planning Position Statement (Scottish Government, 2024).

Historic Environment Policy for Scotland 2019

2.3.11 The Historic Environment Policy for Scotland (HEPS) was published in 2019 (Historic Environment Scotland (HES), 2019). HEPS states that changes to historic assets should be managed in a way that protects the historic environment. Opportunities for the enhancement should be identified and unavoidable detrimental impacts minimised (Historic Environment Scotland, 2019).

Sectoral Marine Plan for Offshore Wind Energy 2020

2.3.12 The Sectoral Marine Plan for Offshore Wind Energy (SMP) (Scottish Government, 2020) states that impacts to historic environment features and their settings need to be considered by offshore wind projects.

2.3.13 An updated SMP is currently out for consultation and anything of relevance will be considered here (Scottish Government, 2025).

2.4 Guidance

2.4.1 There are a number of guidance documents that are relevant to marine archaeology in the context of offshore renewable development which have been considered in the production of this technical report. These include:

- Military Aircraft Crash Sites: Guidance on their Significance and future management (English Heritage, 2002 (now Historic England));
- Code of Practice for Seabed Development (JNAPC, 2006);
- Historic Environment Guidance for the Offshore Renewable Energy Sector (COWRIE, 2007);
- Conservation Principles Policies and Guidance for the Sustainable Management of the Historic Environment (English Heritage, 2008);
- Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (Gribble and Leather, 2011);
- Ships and Boats: Prehistory to Present: Designation Selection Guide (Historic England, 2012);
- Marine Geophysics Data Acquisition, Processing and Interpretation (Plets *et al.*, 2013);
- Protocol for Archaeological Discoveries: Offshore Renewables Projects (The Crown Estate, 2014);
- Code of Conduct (CIfA, 2014a);
- Standard and Guidance for Historic Environment Desk-Based Assessment (CIfA, 2014b (updated 2020));
- Designation Policy and Selection Guidance (HES, 2020);

- Archaeological Written Schemes of Investigation for OWF Projects (The Crown Estate, 2021);
- Curating the Palaeolithic (Historic England, 2023);
- Managing Change in the Historic Environment: Conserving our Underwater Heritage (HES, 2025); and
- Marine Geophysics Data Acquisition, Processing, and Interpretation Guidance Notes (2nd Edition) (Historic England, 2025).

3 Research Frameworks

3.1.1 This technical report was developed in line with the research objectives identified by research frameworks such as the Scottish Archaeological Research Framework (ScARF) (ScARF, 2012a) and the North-East Scotland Regional Research Framework (NESRRF) (Aberdeenshire Council, 2013). Other regional or period specific frameworks may also be deemed relevant, depending on specific packages of work undertaken (Table 3.1).

Table 3.1: Research Frameworks Relevant to Marine Archaeology

Research Framework	Relevant Objectives and Questions
ScARF	To match multi-disciplinary techniques of interpretation and synthesis with recent technological advances, particularly in the field of non-intrusive survey techniques. The application of such techniques to shipwrecks and extant vessels offers a remarkable opportunity to provide information on the economy of maritime communities.
	To broaden the basis of data retrieval to include every available and relevant source, technique and academic discipline. Due to the pervasive nature of the marine and maritime historic landscape, a holistic approach must be more fully adopted that incorporates evidence from a variety of sources, including, but not limited to: commercial and research archaeology; offshore development; local and national societies; techniques including photography and geophysics; and disciplines including history; ethnology; cultural studies; folklore; and architecture.
NESRRF	To enhance the Historic Environment Record data for North-East Scotland for development control and research purposes.
	To explore the development of North-East Scotland's coastline over time and consider the impact of sea-level change on contemporary populations.

4 Marine Archaeology Study Area

4.1.1 The Marine Archaeology Study Area is shown in Figure 4.1 and is defined as the Site Boundary with an additional 2 km buffer. This encompasses all elements of the Array Area and Export Cable Corridor. This Marine Archaeology Study Area allows for the capture of inaccurately or imprecisely geolocated assets, a larger zone of influence for indirect effects and represents relevant archaeological assets in a broader archaeological context.

4.1.2 The Marine Archaeology Study Area extends seawards from Mean High Water Springs (MHWS) and so includes the Intertidal Area.

4.1.3 The area subject to site-specific geophysical survey is neither coterminous with the Marine Archaeology Study Area nor the Site Boundary and is referred to as the Marine Archaeology Survey Area (Figure 4.1).

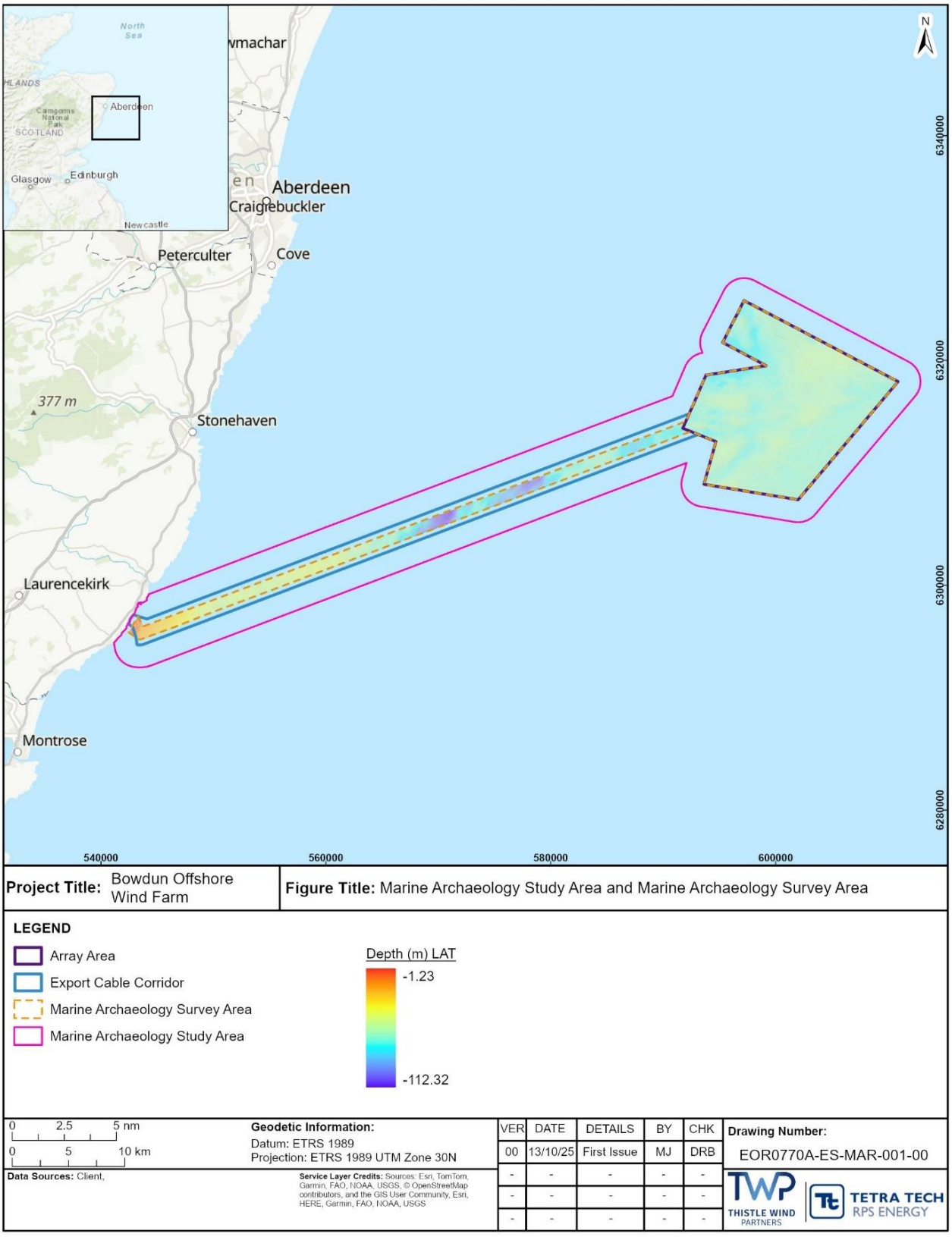

Figure 4.1: Marine Archaeology Study Area and Marine Archaeology Survey Area

5 Methodology

5.1 Themes

5.1.1 Marine archaeology is considered within the following categories:

- **Submerged prehistoric archaeology:** including palaeochannels and other inundated terrestrial landforms that may preserve sequences of sediment of palaeoenvironmental interest. This would also encompass any Palaeolithic or Mesolithic sies and artefacts.
- **Maritime archaeology:** relates generally to watercraft or vessels and any of their associated elements and cargo.
- **Aviation archaeology:** this comprises all military and civilian aircraft crash sites and related wreckage.
- **Intertidal archaeology:** this encompasses all sites and features located in the Intertidal Area, including assets that are terrestrial or maritime in nature.

5.2 Chronology

5.2.1 A list of the main archaeological periods for Scotland referred to in the text, along with their commonly agreed dates are presented in Table 5.1 (ScARF, 2025).

5.2.2 The Quaternary chronology of the UK, used for the assessment of submerged prehistory is set out in Table 5.2 (Marshall *et al.*, 2020; Liesiecki and Raymo, 2005). Marine Isotope Stages are alternating warm and cold periods derived from oxygen isotope data taken from deep sea core samples.

5.2.3 All dates are referred to as Before Christ (BC), Before Present (BP) or Anno Domini (AD) within the text. BP refers to calibrated radiocarbon chronology that can be considered equivalent to calendar years and is used for periods of time older than circa 10,000 years ago.

Table 5.1: Archaeological Periods in Scotland

Period	Sub-Period	Dates
Palaeolithic	Lower	790,000 to 300,000 BP
	Middle	300,000 to 45,000 BP
	Upper	45,000 to 12,000 BP
Mesolithic	Early	10,000 to 7,000 BC
	Late	7,000 to 4,000 BC
Neolithic	Early	4,000 to 3,500 BC
	Middle	3,500 to 3,000 BC
	Late	3,000 to 2,500 BC
Chalcolithic		2500 to 2200 BC
Bronze Age	Early	2,200 to 1,500 BC
	Middle	1,500 to 1,100 BC
	Late	1,100 to 800 BC
Iron Age	Early	800 to 300 BC
	Middle	300 BC to 300 AD
	Late	300 to 500 AD
	Long	800 BC to 800 AD
Early Medieval		400 to 1093 AD
Medieval		1093 to 1603 AD
Post Medieval		1603 to 1799 AD
19th Century		1800 to 1899 AD
Modern		1900 to Present

Table 5.2 Quaternary Chronology

Stage			Age (ky BP)		Climate	Marine Isotope Stage	Epochs and Periods		
Main	Sub.		Start	End					
Beestonian			970	936	Interglacial	25	Pleistocene	Early Pleistocene	Lower Palaeolithic
			936	917		24			
			916	900	Interglacial	23			
			900	866	Stadial	22			
Cromerian Complex			866	814	Sequence poorly understood but evidence for small expansions of the British Ice Sheet marking at least 4 interstadials and 5 warm episodes.	21			
			814	790		20			
			790	761		19		Middle Pleistocene	
			761	712		18			
			712	676		17			
			676	621		16			
			621	536		15			
			536	524		14			
			524	478		13			
Anglian			478	424	Stadial	12			
Hoxnian			424	374	Interglacial	11			
Wolstonia/ Saalian Complex	Unnamed		374	337	Stadial?	10			
	Purfleet		337	300	Interglacial	9			Middle Palaeolithic
	Early		300	243	Stadial?	8			
	Aveley		243	191	Interglacial	7			
	Late		191	123	Stadial	6			
Ipswichian			123	109	Interglacial	5e		Late Pleistocene	
Devensian	Early		109	96	Stadial	5d			
		Chelford	96	87	Interstadial	5c			
			87	82	Stadial	5b			
		Brimpton	82	71	Interstadial	5a			
			71	57	Stadial	4			
	Mid	Upton Warren	57	29	Interstadial	3			Upper Palaeolithic
	Late	Dimlington	29	14.7	Stadial	2			
		Windemere	14.7	12.9	Interstadial				
		Loch Lomond	12.9	11.7	Stadial				
Holocene			11.7	Present	Interglacial	1	Holocene		Mesolithic.

5.3 Coordinate System

5.3.1 Within this technical report, gazetteers are compiled and presented in latitude and longitude referred to World Geodetic System 1984 (WGS84), in the Degrees Minutes and Decimal Minutes format. Coordinates in the Intertidal Area are also presented as Easting and Northings (projected coordinates) referred to OSGB36, British National Grid.

5.3.2 Site-specific survey data were collected with reference to the European Terrestrial Reference System 1989 (ETRS89) datum and Universal Transverse Mercator (UTM) Zone 30 North projection (ETRS89 Z30N) (EPSG 25830). All vertical depths were relative to Lowest Astronomical Tide (LAT) and were reduced to LAT using Vertical Offshore Reference Frames (VORF).

5.3.3 Any transformation of data from OSGB36 to ETRS89 used ETRS_1989_To_OSGB_1936_OSTN15 (EPSG Code:7953). ETRS89 to WGS84 used ETRS_1989_To_WGS_1984 (EPSG Code:1149).

5.4 Desktop Study

Data Sources

5.4.1 Information on marine archaeology within the Marine Archaeology Study Area was collected through a detailed desktop review of existing studies and datasets used to inform the technical report are summarised in Table 5.3.

Table 5.3 Summary of Key Desktop Datasets and Reports for Marine Archaeology

Title	Source	Year	Author
United Kingdom Hydrographic Office (UKHO) Wreck and Obstructions Data	UKHO	2025	UKHO
National Record of the Historic Environment (NRHE) records (Trove)	HES	2025	HES
Aberdeenshire Historic Environment Record (HER) records	Aberdeenshire Council	2025	Aberdeenshire Council
GeoIndex	British Geological Survey (BGS)	2025	BGS
Coastal Zone Assessment Survey: Aberdeenshire and City of Aberdeen, Cullen to Milton Ness	Scottish Coastal Archaeology and the Problem of Erosion (SCAPE)	2023	Boyd and Hambly
Protected Wrecks Map	Marine Directorate	2023	Marine Directorate
BRITICE Glacial Mapping Project version 2.0	University of Sheffield	2017	University of Sheffield
BGS Offshore Regional Report: The Geology of the Central North Sea	BGS	1994	Gatliff *et al.*

Data Structure

5.4.2 In order to compile a marine archaeological baseline for the purposes of this technical report, records with positional information were compiled into gazetteers (Annex B, Annex E, and, Annex F). These comprise records of wrecks, obstructions, sites, Find Spots, seabed features and intertidal sites obtained from the UKHO, NRHE (Trove) and HER located within the Marine Archaeology Study Area.

5.4.3 Unless otherwise stated, where multiple entries across datasets occur that relate to the same archaeological asset, the positional information from the UKHO dataset has been used, as they are most frequently updated with the latest survey positions.

5.4.4 The historic environment records have been discriminated between records where material is known to be on the seabed and recorded losses. Recorded losses are records of vessels that are known to have been lost in the area, but with which no located remains are associated. Recorded losses whose listed positions intersect with the Marine Archaeology Study Area are presented in a gazetteer format (Annex D), but the positional data has been removed as it is either arbitrary or inaccurate.

5.4.5 The desk-based assessment was supplemented by a review of relevant primary and secondary sources to provide further detail on the known assts, and to provide an indication of the nature of the maritime and aviation potential across the Marine Archaeology Study Area.

5.5 Site-Specific Surveys

Overview

5.5.1 A site-specific geophysical survey was carried out by G-Tec between March 2023 and September 2024. These were carried out in two campaigns between July 2023 and October 2023, and between June 2024 and September 2024, and consisted of Sidescan Sonar (SSS), Multibeam Bathymetry (MBES), Magnetometer, Parametric Sub-Bottom Profiler (SBP), and Sparker (Two Dimensional (2D)) Ultra High Resolution Seismic (UHRS) (G-Tec, 2024a; G-Tec, 2024b).

5.5.2 MSDS Marine undertook archaeological analysis of the site-specific geophysical survey data (Figure 4.1) (MSDS Marine, 2025).

5.5.3 A summary of the surveys used to inform the marine archaeology baseline is outlined in Table 5.4 below.

Technical Specifications

5.5.4 Survey operations within the Array Area were undertaken from *Mainport Geo*, a dedicated survey vessel of 50.0 m, and *Karina*, a dedicated survey vessel of 55.0 m. Within the Export Cable Corridor, survey operations were undertaken from *Manor Brunel* a dedicated survey vessel of 19.6 m, and *Ondine Jule* a dedicated survey vessel of 24.9 m. The technical specifications of the survey equipment used can be found in Table 5.4.

5.5.5 The SSS, magnetometer and sparker were towed behind the vessels, the MBES and SBP were mounted to the vessels. Survey operations were undertaken within the Marine Archaeology Survey Area (Figure 4.1). This consisted of 100% coverage of the Array Area, and a 1 km wide corridor within the Export Cable Corridor.

5.5.6 The survey was planned with a lone spacing of 40 m for the main lines, and 1 km for the cross lines within the Export Cable Corridor for SSS, Magnetometer, MBES and SBP. Additional MBES lines were run based on water depth to achieve 100% coverage. Within the Array Area main lines were planned at 50 m, and cross lines at 480 m for SSS, Magnetometer, MBES and SBP, with 2D UHRS being collected on a 500 m x 480 m grid.

5.5.7 The line spacing ensured 100% coverage of MBES data (with a minimum of 10% overlap) and 200% coverage of SSS.

5.5.8 The data were collected to a specification appropriate to achieve the following interpretation requirements:

- SSS: ensonification of anomalies > 0.5 m;
- MBES: ensonification of anomalies > 1.0 m;
- Magnetometer: 5.0 nT threshold for picking archaeological anomalies;
- Parametric SBP: variable penetration, layer resolution to 0.05 m; and
- Sparker (2D UHRS): variable penetration.

Table 5.4: Geophysical and Hydrographic Specifications

Sensor	Manufacturer	Model	Frequency
Mainport Geo (Array Area)			
Sidescan Sonar	Edgetech	4205	230/540/850 kHz
Multibeam	Kongsberg	EM2040	200 to 700 kHz
Magnetometer	Geometrics	G-882	10 Hz update rate
Parametric SBP	Innomar	SES-2000 Medium	2 to 22 kHz
Sparker (2D UHRS)	GSO	GSO-540	1,000 J
Karina (Array Area)			
Sidescan Sonar	Edgetech	4205	230 and 540 kHz
Multibeam	Kongsberg	EM2040	200 to 700 kHz
Magnetometer	Geometrics	G-882	10 Hz update rate
Parametric SBP	Innomar	SES-2000 Quattro	2 to 22 kHz
Sparker (2D UHRS)	GSO	GSO-540	4 kHz
Manor Brunel (Export Cable Corridor)			
Sidescan Sonar	Edgetech	4205	230/850 kHz
Multibeam	Teledyne RESON	T51-R	350 to 430 kHz
Magnetometer	Geometrics	G-882	10 Hz update rate
Parametric SBP	Innomar	SES-2000 Standard	2 to 22 kHz
Ondine Jule (Export Cable Corridor)			
Sidescan Sonar	Edgetech	4205	230/540 kHz
Multibeam	R2Sonic	2024	200 to 400 kHz
Magnetometer	Geometrics	G-882	10 Hz update rate
Parametric SBP	Innomar	SES-2000 Compact	4 to 15 kHz

5.5.9 Towed sensors were positioned using an Ultra Short Baseline (USBL) positioning system to ensure positional accuracy throughout the survey. USBL ensures the actual position of the sensor is recorded, as opposed to when the position is estimated based upon the direction of the vessel and the amount of cable out (layback). Although the accuracy of the USBL system is dependent on the angle, and the distance of the beacon from the transceiver, tolerances of between 0.5 m and 2.0 m can be achieved. Positional accuracy is further increased through the correlation of the SSS dataset with the MBES dataset.

Data Quality and Limitations

Sidescan Sonar

5.5.10 The SSS data covered the extents of the pre-defined geophysical survey boundary, providing coverage of approximately 200% (including nadir). The data were generally of good quality, with minimal interference or data degradation caused by environmental factors, or the simultaneous use of different sensors. In areas, the presence of fish or floating debris (potentially) obscured some of

the seabed, however 200% SSS data, and 100% MBES data largely mitigated this.

5.5.11 Some small horizontal offsets were noted in places between SSS and MBES data, although for the most part these were not significant and were within what would be considered normal tolerances. However, the positions of medium and high potential (and a large number of low potential) anomalies were taken from the MBES data to ensure positional accuracy.

Multibeam Bathymetry

5.5.12 The MBES data covered the extents of the pre-defined geophysical survey boundary, providing coverage of 100%. A review of the un-gridded point cloud data shows that the quality is good with no significant height or positioning errors that effect the overall dataset. The data density is good, and the data is able to be gridded to 0.5 m, increasing the ability to identify smaller features. Features identified within the MBES data generally correlate well with those identified in the SSS data.

5.5.13 MBES data is considered to provide the most accurate positioning due to the direct, and fixed, correlation between the sensor, the Differential Global Positioning System antennas and the Motion Reference Unit (MRU) and is the primary source of anomaly positioning.

Magnetometer

5.5.14 The Magnetometer data covered the extents of the pre-defined geophysical survey boundary and was collected along the pre-defined survey line plan of 40 m in the Export Cable Corridor and 50 m in the Array Area. The data were sampled at 10 Hz, and the data were suitable to identify anomalies with a peak-to-peak amplitude of 5.0 nT. It should be noted that the 40 m and 50 m line spacing achieved is too great for the accurate positioning of magnetic anomalies at distances away from the tracklines but can indicate areas of archaeological potential or can be correlated with visible feature on the seabed that lie on the same plane. Due to the line spacing it is likely that buried ferrous material, particularly smaller objects, between the run lines will not have been identified within the data.

Sub-Bottom Profiler and Ultra High Resolution Seismic

5.5.15 SBP and 2D UHRS data were collected across the Array Area, and SBP data were collected within the Export Cable Corridor. Data quality was assessed by G-Tec within the Array Area and Export Cable Corridor (G-Tec, 2024a; G-Tec, 2024b). MSDS Marine also assessed data quality for palaeolandscape prospection (MSDS Marine, 2025).

5.5.16 The UHRS data within the Array Area was good quality. G-Tec note the reflectors in Unit 30 are occasionally disrupted due to interference from shallower reflectors (Unit 20). Poorer data quality, geological complexity and lack of clarity within the data also owing to interference from shallower reflectors also affected the interpretation of the base of Unit 35A. However, overall data quality was considered good and suitable for archaeological interpretation.

5.5.17 The quality of the SBP data in the Array Area and in the Export Cable Corridor is more variable, and there are some issues with quality evident within some of the lines. Potential issues with data processing were also observed within the SBP data, with apparent inconsistencies in the headers and time stamping.

5.5.18 The primary limitations noted by G-Tec in relation to the SBP data within the Export Cable Corridor are (G-Tec, 2024a; G-Tec, 2024b):

- The absence of survey data from the inshore area between Kilometre Point (KP) 0 and KP 0.25. The survey vessel was not able to access this shallow water, rocky area and as such data is absent.
- Data resolution and quality affected the confident mapping of Unit 10 in places along the Export Cable Corridor. This particularly affected the southern parts of the unit within the Export Cable Corridor, and between KP 38 to 50 where an apparent absence of this unit is likely to reflect limitations in data quality rather than a true absence of the sediments.
- The presence of geological units with similar seismic characteristics making interpretation difficult. This particularly applies to glacial till related deposits, of which there are several in the area.
- The absence of direct geotechnical sampling to verify interpretations (though samples from the wider area mitigated this factor to some extent).

5.5.19 Interpretation of the SBP sequence was therefore more challenging within the Export Cable Corridor due to limited SBP penetration and data quality constraints, which affects the ability to distinguish and define the units that are expected within the area. However, different units are distinguishable in some areas, and the characters of those units are in places discernible. Thus, within the data it has been possible to draw some interpretations of previous environments and archaeological potential.

Summary

5.5.20 The data collected across the extents of the pre-defined survey boundary are of good quality overall, with the MBES provided 100% coverage and the SSS providing 200% coverage. SBP and 2D UHRS data were collected to a pre-determined line plan, largely providing suitable coverage and penetration for the interpretation of the palaeoenvironment, however some limitations are noted. The magnetometer data were collected to a pre-determined line plan suitable for identification of ferrous material with a peak-to-peak amplitude of 5.0 nT, with the minimum detection size increasing with distance from the tracklines.

5.5.21 The data consisted of an appropriate specification, coverage, and quality, to undertake a robust archaeological assessment to inform the EIA process, noting that additional data collection, and interpretation, may be required prior to construction in the post-consent phase.

Archaeological Assessment: Surface Geophysical Anomalies

5.5.22 The archaeological assessment of data was undertaken by a qualified and experienced maritime archaeologist at MSDS Marine with a background in

geophysical and hydrographic data acquisition, processing and interpretation (MSDS Marine, 2025).

5.5.23 Following delivery of the required datasets, an initial review was undertaken to gain an understanding of the geological and topographic make-up of the survey area. Within the extent of the survey area the potential for variations in the seabed are high and can affect the interpretation of anomalies. The assessment considers the full extents of survey data, which was collected within a pre-defined geophysical survey boundary.

Sidescan Sonar

5.5.24 SSS is considered the best tool for the identification of anthropogenic anomalies on the seabed due to the ability to ensonify small features and as such forms the basis of any archaeological assessment of data. SSS data in .xtf format were imported into the Moga Seaview 6.5 software, navigation and positioning were checked and corrected where required, and optimal gains were applied to ensure the consistent presentation of data.

5.5.25 Data were reviewed on a line-by-line basis, and all anomalies of potential anthropogenic origin identified and recorded. Records include at a minimum an image of the anomaly, dimensions, and a description. Whilst typically only images of medium and high potential anomalies are presented with the assessment report, images of all anomalies are recorded as interpretations can change as the data assessment progresses. A rating of archaeological potential was assigned to the anomaly following the criteria outlined in Table 5.5.

5.5.26 Following assessment of the individual lines, a mosaic was created and a Geotiff exported to allow for the checking of positional accuracy against the MBES data and to identify the extents of any anomalies that may have extended past the limits of individual lines.

Table 5.5: Criteria for the Assessment of Archaeological Potential

Potential	Criteria
Low	An anomaly potentially of anthropogenic origin but that is unlikely to be of archaeological significance – examples may include discarded modern debris such as rope, cable, chain, or fishing gear; small, isolated anomalies with no wider context; or small boulder-like features with associated magnetometer readings.
Medium	An anomaly believed to be of anthropogenic origin but that would require further investigation to establish its archaeological significance – examples may include larger unidentifiable debris or clusters of debris, unidentifiable structures, or significant magnetic anomalies.
High	An anomaly almost certainly of anthropogenic origin and with a high potential of being archaeological significance – high potential anomalies tend to be the remains of wrecks, the suspected remains of wrecks, or known structures of archaeological significance.

Magnetometer

5.5.27 Magnetometer data indicates the presence of ferrous, and thus usually anthropogenic, material both on, an under the seabed. Where line spacing allows, typically to a specification for the detection of potential unexploded ordnance (UXO), magnetometer data can provide accurate position of buried ferrous anomalies. The survey line spacing is c. 40 m to 50 m which is too great for the accurate positioning of magnetic anomalies at distances away from the tracklines but can indicate areas of archaeological potential. Where possible, magnetic anomalies were correlated with anomalies visible on the seabed.

5.5.28 Magnetometer data were provided as .csv files and as a gazetteer detailing all anomalies greater than 5.0 nT. An assessment was made by MSDS Marine as to the suitability of the gazetteer for archaeological interpretation. Where required the .csv magnetometer data were imported into Moga Seaview 6.5 software where the data were smoothed, and a 'baseline' identified and removed from the data to highlight ferrous anomalies whilst taking into account geological variations in the data.

5.5.29 Magnetic anomalies identified within the data had the position, amplitude, and dimensions recorded. A rating of archaeological potential was assigned to the anomaly following the criteria outlined in Table 5.5. The data were gridded to visually identify areas where the distribution of anomalies may represent a wider feature such a buried but dispersed wreck, or modern features such as buried cable or chain.

Multibeam Bathymetry

5.5.30 Due to the minimum anomaly detection size of MBES data being larger than that of SSS data, the primary use during archaeological assessment, outside of seabed characterisation, is the corroboration of anomalies identified within other datasets and the visualisation of anomalies that may otherwise be obscured by shadow.

5.5.31 Navigation corrected, but unprocessed, MBES data were provided to MSDS Marine as .xyz files. The data were then imported into QPS Fledermaus where it was gridded and exported as a depth embedded raster, and the raster was then imported into Environmental Systems Research Solutions (Esri) ArcGIS Pro 3.4 and a hill-shaded surface applied, shading was adjusted to ensure the optimal presentation of data. The resulting Three Dimensional (3D) image was viewed on a block-by-block basis, and all anomalies of potential anthropogenic origin identified and recorded.

5.5.32 Records include, at a minimum, an image of the anomaly, dimensions, and a description. A rating of archaeological potential was assigned to the anomaly following the criteria outlined in Table 5.5 where the interpretation of an anomaly was unclear, the data were imported into point cloud visualisation software such as Cloud Compare, in order to view the un-gridded data. The gridded surface image was exported as a Geotiff to allow further assessment alongside other datasets.

Combined Assessment

5.5.33 Following the assessment of all datasets the results were imported into ArcGIS Pro, and reviewed alongside each other, along with Geotiffs of the SSS, MBES and magnetometer data. The concurrent review allows the amalgamation of duplicate anomalies, the assessment of the wider context, and an understanding of the extents of a feature that may be partially buried or span across two or more lines of data. Anomalies were named following the standard MSDS Marine convention [PROJECTYEAR_ID] (e.g. BN25_0001).

5.5.34 Data from the UKHO, including the positions of wrecks and obstructions, and Trove and HER records as well as other relevant data such as third-party assets were assessed to ensure that any additional information is drawn upon, but also that anomalies are not unnecessarily identified as having archaeological potential. The relevant remaining anomalies assessed as having archaeological potential were compiled into a gazetteer (Annex C) and a GIS shapefile.

5.5.35 The interpretation of geophysical and hydrographic data is, by its very nature, subjective. However, with experience and by analysing the form, size and characteristics of an anomaly, a reasonable degree of certainty as to the origin of an anomaly can be achieved.

5.5.36 It should be noted that there may be instances where an anomaly may exist on the seabed but not be visible in the geophysical data. This may be due to being covered by sediment or being obscured from the line of sight of the SSS. The use of SSS and MBES data mitigated this by visualising anomalies from multiple angles, including from above.

Archaeological Assessment: Palaeolandscapes

5.5.37 The interpretation of palaeolandscapes was also based on the archaeological review of geophysical and hydrographic data.

5.5.38 Sub-surface data acquired from seismic and geotechnical surveys were collected reviewed and brought into an assessment which details geological conditions within the Marine Archaeology Study Area. The interpretations of the data have fed into a ground model, and sedimentary units have been identified within the ground model and tentatively correlated with known geological formations in the area based on the available data (Annex A).

5.5.39 From an archaeological perspective the ground model provides insight into the potential geological formations within the Marine Archaeology Study Area and their likely depositional environment. This feeds into the assessment of the palaeolandscapes through time, and corresponding archaeological potential. Information from the ground model and geological maps derived from the interpretation of sub-surface data and the current seabed derived from MBES data were assessed alongside existing studies which contribute to the understanding of the palaeolandscape and prehistoric archaeological potential within the Marine Archaeology Study Area.

5.5.40 An archaeological review of the ground model covering the Marine Archaeology Study Area was conducted by MSDS Marine (MSDS Marine, 2025). This included a review of geophysical survey data reports, select seismic profiles and ground

model outputs. These sources were reviewed in order to establish the suitability of the data from archaeological interpretation and to gain an understanding of the geological make-up of the Proposed Development, formations present and their palaeoenvironmental and archaeological potential. Information about the wider area has also been used to better contextualise the various environments experienced in the area during the Pleistocene and Holocene.

5.5.41 The assessment of submerged prehistoric remains aims to identify periods in which the Marne Archaeology Study Area was dry land, and thus potentially habitable, as well as periods when it was covered by ice or water and thus uninhabitable. It examines the Quaternary sequence within the Marine Archaeology Study Area, as different geological formation reflect varying environmental conditions and associated archaeological potential. The assessment also reconstructs past environmental conditions (e.g. marine, terrestrial, lacustrine, fluvial, marsh and riverine) across the Marine Archaeology Study Area during the Quaternary, which is critical for understanding palaeolandscape, palaeoenvironmental potential, and possible patterns of human activity. Assessing the likelihood of preservation is also key and considers the present geological makeup alongside the impacts of erosion and geological processes linked to successive glaciations and marine transgressions.

6 Submerged Prehistory Baseline

6.1 Overview

6.1.1 This section provides a geological summery and assessment of the palaeoenvironmental and prehistoric archaeological potential of the Marine Archaeology Study Area, taking into account the depositional environment, date, nature and post-depositional processes of the Quaternary sequence (Annex A), which may have influenced this potential. For consistency, Unit names follow those set out within the G-Tec interpretation reports (G-Tec, 2024a; G-Tec, 2024b).

6.2 Geomorphology

6.2.1 Geological processes which form a sequence of seabed deposits provide baseline information to provide an understanding of the potential for submerged prehistoric archaeology to be found within the Marine Archaeology Study Area.

6.2.2 The Marine Archaeology Study Area has experienced a range of environmental conditions throughout the Quaternary Period, resulting in significant erosional and depositional events that have shaped the area's geomorphology. Key features include:

- Moraines: Seabed moraines, evidence of former glaciers within the Marine Archaeology Study Area, are visible within the MBES data and have been mapped and interpreted by Bradwell within the Export Cable Corridor (Bradwell *et al.*, 2008).
- Subglacial Meltwater Channels: Also trending northeast–southwest, these channels have been identified using the BRITICE Map Version 2.0, and by the BGS. While not all have confirmed attribution, many in the vicinity are described by Bradwell (Bradwell *et al.*, 2008).
- Boulder Fields: Scattered boulder fields are present across the Marine Archaeology Study Area, frequently associated with glacial till deposits.
- Mobile Bedforms: Sandwaves, mega ripples and ripples are observed in parts of the Array Area and Export Cable Corridor, indicating active sediment transport.
- Linear Furrows: The Array Area contains extensive elongated, shallow furrows—interpreted as the result of current activity or other natural processes—covering approximately 31% of the Array Area.

6.3 Quaternary Sequence

6.3.1 The quaternary sequence, based on interpretation of seismic data from within the Marine Archaeology Study Area is summarised in Annex A1 for the Array Area and Annex A2 for the Export Cable Corridor. The G-Tec investigations identified a series of different units and sub-units within the Array Area and the Export Cable Corridor, based on interpretation of the SBP data and the UHRS data (the latter only covering the Array Area). Interpretation of the sequence is more

challenging within the Export Cable Corridor due to limited SBP penetration and data quality constraints, which affect the ability to distinguish and define the units that are expected within the area.

6.3.2 Within the Array Area, Quaternary sediments reach a maximum thickness of approximately 75 m, although much of the sequence is thinner, typically less than 45 m. The thickest deposits are found in the central to northern part of the site, reflecting a general trend of increasing Quaternary thickness towards the zone of greatest subsidence seaward of the Array Area, where sandwaves are also present. Within the Export Cable Corridor, the base of the Quaternary sequence varies in depth. BGS records indicate that Quaternary sediments are generally between 20 m to 30 m thick. Due to the limited penetration of the SBP data, the base of the Quaternary is not mapped by G-Tec in this area. Quaternary deposits are absent within approximately the first 1.5 km offshore along the Export Cable Corridor, where bedrock is exposed at the seabed. A wave-cut platform is evident within this area, visible partly within the MBES data and continuing beneath the Quaternary units, as seen within the SBP data.

Quaternary Sequence Interpretation

6.3.3 G-Tec have interpreted the seismic data for the Array Area and the Export Cable Corridor (G-Tec, 2024a; G-Tec, 2024b). Seven main Quaternary units have been identified, with up to nine subunits in total. Lower, pre-Quaternary units which represent the solid geology for the area have also been identified and are listed in Annex A1 and A2 though they are not discussed further here as they hold no archaeological potential.

Unit 10

6.3.4 Unit 10 has been identified across the Array Area and the Export Cable Corridor. The unit has been interpreted as modern seabed sediments. It is composed of unconsolidated, reworked sediments. The unit displays linear furrows in the MBES and SSS data.

Unit 20

6.3.5 Unit 20 can be divided into two distinct sub-units, 20A and 20B. Unit 20 as a whole has been interpreted as the Forth Formation, a late Devensian to Holocene deposit that is divided up into four members:

- Largo Bay Member;
- St Andrews Bay Member;
- Fitzroy Member; and
- Whitehorn Member.

6.3.6 Of these four members, only the Largo Bay and St Andrews Bay members are present in the Marine Archaeology Study Area. The Largo Bay Member is a glaciomarine deposit consisting of clay, silt and rare gravel. It is the oldest of the members, thought to have been deposited during the late-glacial interstadial. Although sea levels were likely regressing on the east coast of Scotland during this period, deposits within the inner estuaries in eastern

Scotland provide evidence of raised marine deposits during the Windemere Interstadial (Holloway *et al.*, 2002; Peacock, 1999) (c. 15,000 to 13,000 BP) demonstrating the likelihood that this member of the Forth Formation was laid down in marine conditions.

6.3.7 During the Loch Lomond Stadial (c. 12,900 BP to 11,700 BP) colder conditions were re-established, and there was a short lived period of ice sheet expansion between c. 13,000 BP to 12,000 BP during which sea levels fell (Smith *et al.*, 2019). Around the east coast, evidence of this now-submerged shoreline, termed the Main Late Glacial Shoreline, has been encountered, including within the Firth of Forth (Stoker *et al.*, 2008). Deposition of the St. Andrews Bay Member of the Forth Formation is thought to have begun during this cold period and continued throughout the Holocene (Stoker *et al.*, 2008). Part of the St Andrews Bay Member (known as Lithozone 1) has been found to represent a fluvio-delta deposit dated to the Loch Lomond Stadial (Younger Dryas) and is thus thought to represent deposition during the lowstand (Stoker *et al.*, 2008). It holds evidence of high arctic microfaunal assemblages laid down in a fluvio-delta deposit, radiocarbon dated, in part, to the Loch Lomond Stadial (Stoker *et al.*, 2008).

6.3.8 The seismic evidence, lower sea levels and channel infill within the St. Andrews Bay Member of the Forth Formation suggests that parts of the Marine Archaeology Study Area may have been exposed during this period and indicates that Unit 20A could hold evidence of this period with lower sea levels. Consideration of sea level is therefore important to understand the potential of the Marine Archaeology Study Area.

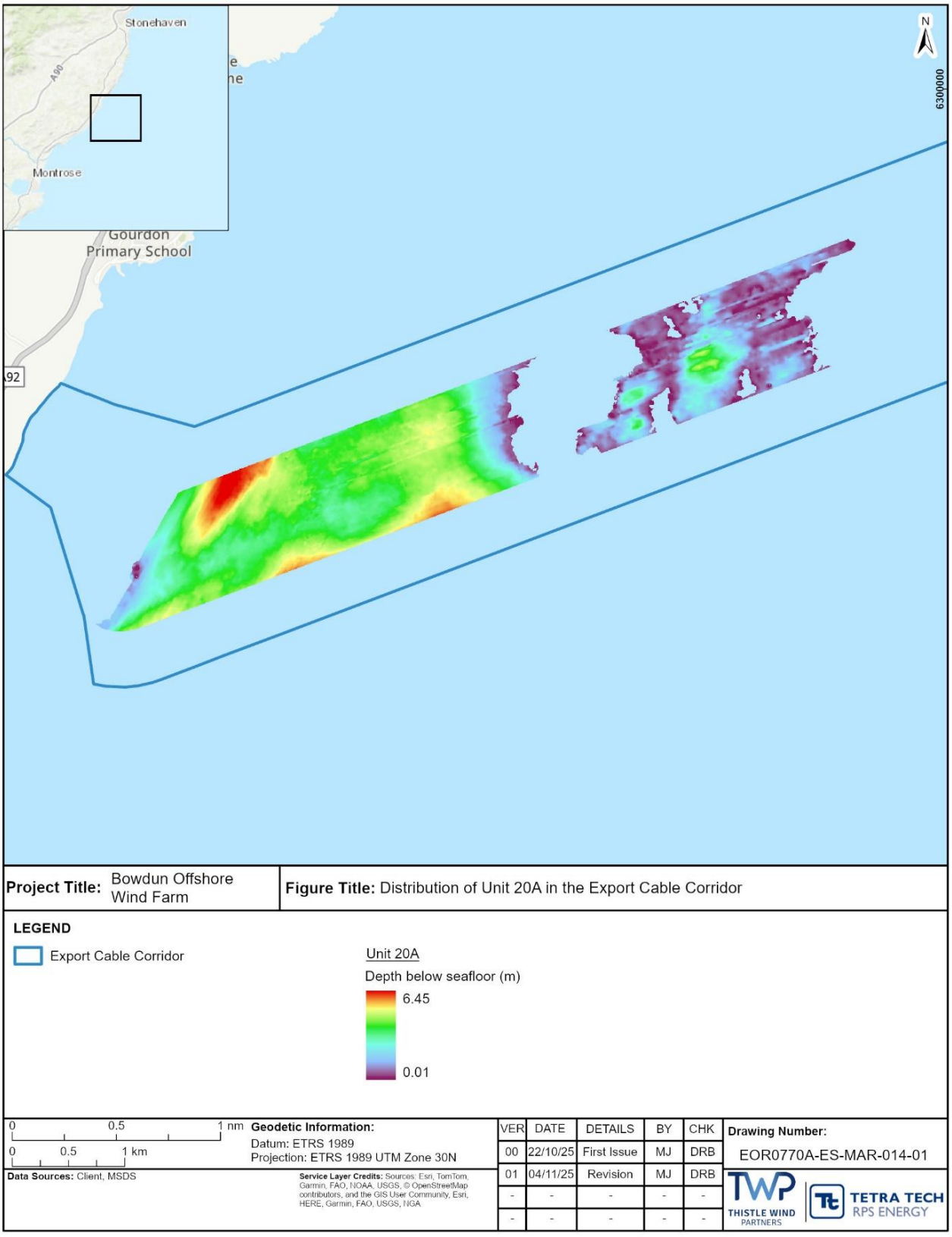

Figure 6.1: Distribution of Unit 20A in the Export Cable Corridor

Unit 30

6.3.9 Unit 30 has been identified as Devensian glacial till, both within the Array Area and the Export Cable Corridor. This is thought to represent the Marr Bank Formation and Wee Bankie Formation. The Wee Bankie Formation is a late Devensian deposit consisting of gravelly and sandy clay that has been interpreted as terminal moraine or subglacial till. The deposit is present within the Export Cable Corridor, but not within the Array Area.

6.3.10 The Marr Bank Formation is present within the Array Area and eastern Export Cable Corridor. It is a late Devensian deposit which consists of silty gravelly sand. It has been previously suggested that it was deposited in a shallow water, high-boreal to arctic environment (Gatliff, 1994). However, increasing evidence has shown that parts of the formation may also represent an outwash plain.

6.3.11 The Marine Archaeology Study Area lies in an area which saw Devensian Ice cover during the last glacial maximum (which was around 24,000 BP to 21,000 BP in the eastern parts of Scotland (Clark *et al*, 2022)). Recent work suggests the Proposed Development may be close to the edge of the receding glaciers by c. 19,000 BP, and the Array Area and Export Cable Corridor both ice free by c. 18,000 BP (based on the optimum potential extents of the ice). Although the Loch Lomond Stadial saw a readvance of ice in mountainous areas of the UK from c. 12,900 BP to11,700 BP this ice is not thought to have overrun eastern Scotland or the Marine Archaeology Study Area (Benn, 2021). Given the glacial history of the area, the Wee Bankie Formation is therefore likely to have been deposited prior to 18,000 BP, when glacial conditions persisted within the Site Boundary, with Unit 30 (representing the Marr Bank Formation) likely laid down at this time as well as an outwash plain or glaciomarine deposit. A series of ice sheet moraine ridges and meltwater channels associated with these units, and mapped within the Export Cable Corridor and Array Area are likely to represent the path of the retreating Devensian glaciers (Bradwell *et al.*, 2008). The geophysical survey data picked up channel structures within Unit 30 (Marr Bank Formation), mapping them as geohazards. These channels are likely to represent the outwash plain character of the formation. The glacial nature of these features indicates a low archaeological potential, though redeposited remains could occur where eroded from elsewhere.

6.4 Sea Levels

Sea Level Data

6.4.1 Data relating to past sea levels can be correlated with geological and glaciogenic data to inform our understanding of palaeolandscape development during the Late Quaternary and Early Holocene. Analysis of reconstructed palaeolandscapes can inform subsequent discussions relating to human occupation and archaeological potential. The Array Area currently lies at between −54 m to −91 m LAT, while the Export Cable Corridor runs from 0 m LAT (inshore) to a maximum of −112.7 m LAT (offshore) (G-Tec, 2024a; G-Tec, 2024b).

6.4.2 A variety of sources of evidence exist on former sea levels. These include Sea Level Index Points (SLIPs), glacial isostatic adjustment (GIA) models, physical evidence observed in geophysical survey data (e.g. deposit and environment types) and key features such as submerged rock cut platforms indicating former stabilised shorelines. Key studies include models (Kuchar, 2012; Bradley *et al.*, 1997), and a SLIP index compiled (Shennan, 2006).

6.4.3 The Marine Archaeology Study Area is thought to have been exposed, but under arctic conditions at around 31,000 BP and submerged after this time, with a high stand at c. 27,000 BP to24,000 BP, remaining submerged until c. 13,000 BP. Parts of the Export Cable Corridor are likely to have been exposed from c. 13,000 BP to approximately 8000/7000 BP (i.e. from the Late Upper Palaeolithic to the Late Mesolithic), during which period Unit 20A was under formation. A wave-cut platform at c. −22 m Ordnance Datum (OD) may have formed during this period. The entire Export Cable Corridor and Array Area were submerged thereafter. This suggests potential for archaeological and palaeoenvironmental remains from this period, in particular focused on Unit 20A, with deposition of this deposit beginning in the Loch Lomond Stadial and potentially continuing after this point until rising sea levels inundated the area. Erosion may have affected the upper parts of this deposit, though some potential for uneroded remains still exists (Stoker *et al.*, 2008). Potential for *in situ* remains in other units is limited, though redeposited remains could occur.

Archaeological Context

6.4.4 While Lower Palaeolithic evidence is well known within England, in a Scottish context the earliest current secure evidence of human presence is from the Late Upper Palaeolithic (Finlayson *et al.*, 2003; Saville and Wickham-Jones, 2012), dating from c. 14,000 BP. Thus, while earlier deposits are present within the Marine Archaeology Study Area (Units 40, 35, 35A, 35B) the archaeological potential of these deposits is considered to be low. This is supported by the kinds of environments they represent (generally marine and glaciomarine, see previous discussion).

6.4.5 The later deposits derive from the Devensian and Holocene (Units 10, 20, 20A, 20B, Unit 30 and the Wee Bankie Formation). Unit 30 (Marr Bank Formation) and the Wee Bankie Formation are both glacial (Devensian) deposits and do not hold archaeological potential. Units 20A and 20B, 20 and 10 were laid down after this

period, and archaeological potential may be focused in Unit 20A (Section 6.3). Sea level data demonstrates that the eastern part of the Export Cable Corridor, where Unit 20A is present, may have been subaerially exposed from the c. 13,000 BP to c. 8,000/7,000 BP (i.e. from the Late Upper Palaeolithic to the Late Mesolithic; see Table 5.1 for date ranges). This is within the potential date range for the deposition of Unit 20A. The below discussion therefore considers archaeological potential for remains from this period to be present within the Marine Archaeology Study Area, specifically within Unit 20A.

6.4.6 While Late Upper Palaeolithic sites are known in Scotland, sites of this period are rare. In the wider landscape sites of this period are best represented along the course of the River Dee, where Late Upper Palaeolithic flints have been found, alongside Mesolithic assemblages. Late Upper Palaeolithic material from some sites is thought to date to between 13,000 BC and 11,000 BC (c. 15,000 BP to 13,000 BP, coinciding with the warmer conditions of the Windemere Interstadial), during which time the Array Area and Export Cable Corridor were likely to have been entirely submerged (Wickham-Jones *et al.*, 2021). However, exposure occurred swiftly after this and the presence of later material in the wider area demonstrates potential for comparable remains within the Marine Archaeology Study Area during the period of exposure (13,000 BP to 8,000/7,000 BP).

6.4.7 There is no evidence for activity during the Loch Lomond Stadial (c. 12,900 BP to 11,700 BP). However, a number of sites (lithic scatters) dating to the final Late Upper Palaeolithic (i.e. following the Loch Lomond Stadial) have been recorded, all close to the River Dee. Mesolithic activity is well-evidenced in Aberdeenshire, in particular along the course of the River Dee. Extensive fieldwork along the course of this river has led to the identification of a large number of Mesolithic sites, many of which are situated on the river's gravel terraces. Environmental evidence from this area suggests that the sites of Mesolithic activity were located on dry gravel terrace islands, situated between peat-filled palaeochannels, indicating human activity amongst the damp valley floor environment, with floodplains also a clear focus for activity, and other areas such as woodland, saltmarsh and coastal dunes also used (Wickham-Jones *et al*, 2021). While the sites on the Dee are best-attested, other rivers in the area are also associated with Mesolithic activity (e.g. the River Don and Ythan estuary, both north of Aberdeen). The latter area in particular demonstrates the importance of river estuaries during this period (Warren, 1999; Wickham-Jones *et al.*, 2021).

Archaeological Potential

6.4.8 Sea levels during the Late Upper Palaeolithic may have been between -35 m and -4 m from 13,000 BP to 12,000 BP (depending on the source used), and between -40 m and -6 m by 11,000 BP (again depending on the source). At the start of the Mesolithic different sources indicate the sea level may have been between –40 m OD and -6 m OD. Thus, while there is disagreement on the actual sea level, all sources suggest potential for submerged Late Upper Palaeolithic and Mesolithic remains to be present within parts of the Site Boundary. Submergence of the Marine Archaeology Study Area was likely

complete by 5,000 BP to 4,000 BP, indicating potential for remains of Neolithic and potentially Early Bronze Age material to survive below modern day sea levels. The intertidal parts of the Marine Archaeology Study Area lay exposed thereafter, indicating that later potential may be focused in these areas and onshore.

6.4.9 The potential is primarily focused on Unit 20A, which is thought to have been under formation during the Holocene period.

6.5 Summary

6.5.1 Interrogation of the SBP, sea level data, MBES contours, and archaeological datasets has demonstrated that Unit 20A may represent a deltaic environment, with evidence of channels, exposed and laid down from the Loch Lomond Stadial potentially continuing into the period when sea levels covered the Marine Archaeology Study Area (i.e. c. 13,000 BP to c. 8000/7000 BP). During this time sea levels may have been as low as -35 m, rising to present day levels (and above, after c. 7,000 BP). This suggests exposure of the Export Cable Corridor out to c. 4 km from the coast. A till outcrop to the north may have been exposed as a dryland/delta edge environment during this period, with the interface potentially preserved within the site.

6.5.2 Archaeological evidence from the wider area demonstrates a focus on riverine, estuarine, coastal and associated environments from the final Late Upper Palaeolithic and Mesolithic. The position of the Marine Archaeology Study Area therefore suggests some archaeological potential, focused in Unit 20A (Figure 6.1). Given the rarity of sites of this period the potential is limited, though palaeoenvironmental evidence is likely to survive within this unit, and all others within the Marine Archaeology Study Area.

6.5.3 There is low potential for *in situ* remains in other units, though redeposited remains could occur.

7 Maritime and Aviation Archaeology Baseline

7.1 Desk-Based Assessment

Designated Wrecks

7.1.1 There are no designated wrecks located within the Marine Archaeology Study Area.

Known Wrecks

7.1.2 There are a total of 29 records identified in the Marine Archaeology Study Area (Annex B). Of these, 13 are named wrecks or Find Spots that can be tied to a known wreck. There are a further 16 unknown wrecks and no other known obstructions.

7.1.3 The oldest known wreck located within the Marine Archaeology Study Area is the *Baku Standard* (UKHO 3059), a tanker built in 1893 and torpedoed by German U-boat *UC-58* in 1918 while carrying oil. The *Baku Standard* was last seen in a 2022 survey and was described as intact and upright with a sonar length of 133 m.

7.1.4 There are two known military wrecks in the Marine Archaeology Study Area, HMS *Repro* (UKHO 3064) and HMT *Lowdock* (UKHO 70430). HMS *Repro* (sometimes listed as HMT *Repro*) was a steam trawler built in 1910 and requisitioned as an armed patrol trawler in 1915, it reportedly struck a German mine in 1917 and sunk 3 miles south-east of Todhead lighthouse. HMT *Lowdock* was a steam trawler built in 1917 and reportedly lost when attacked with bombs and gunfire by German aircraft the finally sunk in a collision in 1940.

7.1.5 Three instances of name boards from ships being found along the shore have occurred within the Marine Archaeology Study Area, these are the listed in Annex B (Trove 285061, Trove 101764 and Trove 285060).

7.1.6 Five wrecks are listed as dead UKHO records, meaning they have not been observed in repeated surveys and are considered by the UKHO to no longer be present at the listed location (UKHO 3057, UKHO 3060, UKHO 3061, UKHO 3064 and UKHO 3172). However, this is not a definitive indication that there is no material present at these locations, as there could be buried remains, or remains smaller than the ensonification limit of the surveys.

Maritime Records Within the Marine Archaeology Survey Area

7.1.7 Three UKHO records (none of which are classed as dead) were identified within the extents of the geophysical survey data (Table 7.1).

7.1.8 All UKHO records identified within the geophysical survey data are discussed in relation to their corresponding potential in Section 7.2.

7.1.9 Fourteen additional Trove and HER records were located in the Marine Archaeology Survey Area, these are all recorded losses (with Trove 201968 being a possible recorded loss) and so their positions are arbitrary (Annex D). They were not visible in the geophysical survey data.

Table 7.1: Maritime Records Within the Marine Archaeology Survey Area

UKHO ID	Trove ID	HER ID	Name	Date sank	Last detected	Position	Visible in Data
3172			Unknown	Unknown	1955	Dead wreck, since removed from UKHO dataset	No
3174	322382		Unknown	Unknown	2009	Known	BN25_0142
58703	323794	NP28SW8001	*Karianda*	2000	2010	Known	BN25_0141
100809			Unknown	Unknown	2022	Known	BN25_0101
	201968	NO97SW0006	Unknown			Possible recorded loss	No
	208079	NP49SW0001	*Galatia*	1917		Recorded loss	No
	313035		*Mary*	1853		Recorded loss	No
	313202		*Athole*	1916		Recorded loss	No
	313217		*William Findley*	1921		Recorded loss	No
	313268		*Mayflower*	1911		Recorded loss	No
	313816		*Dreadnought* (Possibly)	1903		Recorded loss	No
	325825		*Finance*	1854		Recorded loss	No
	327634		Unknown	1925		Recorded loss	No
	328212		*Lady Abercombie*	1836		Recorded loss	No
		NP38NW0001	*Lilie*	Unknown		Recorded loss	No
		NP18SE0001	*Aurora*	1876		Recorded loss	No
		NO86NW0041	*Margaret Reid*	1882		Recorded loss	No
		NO86NW0040	*Dinorah*	1881		Recorded loss	No

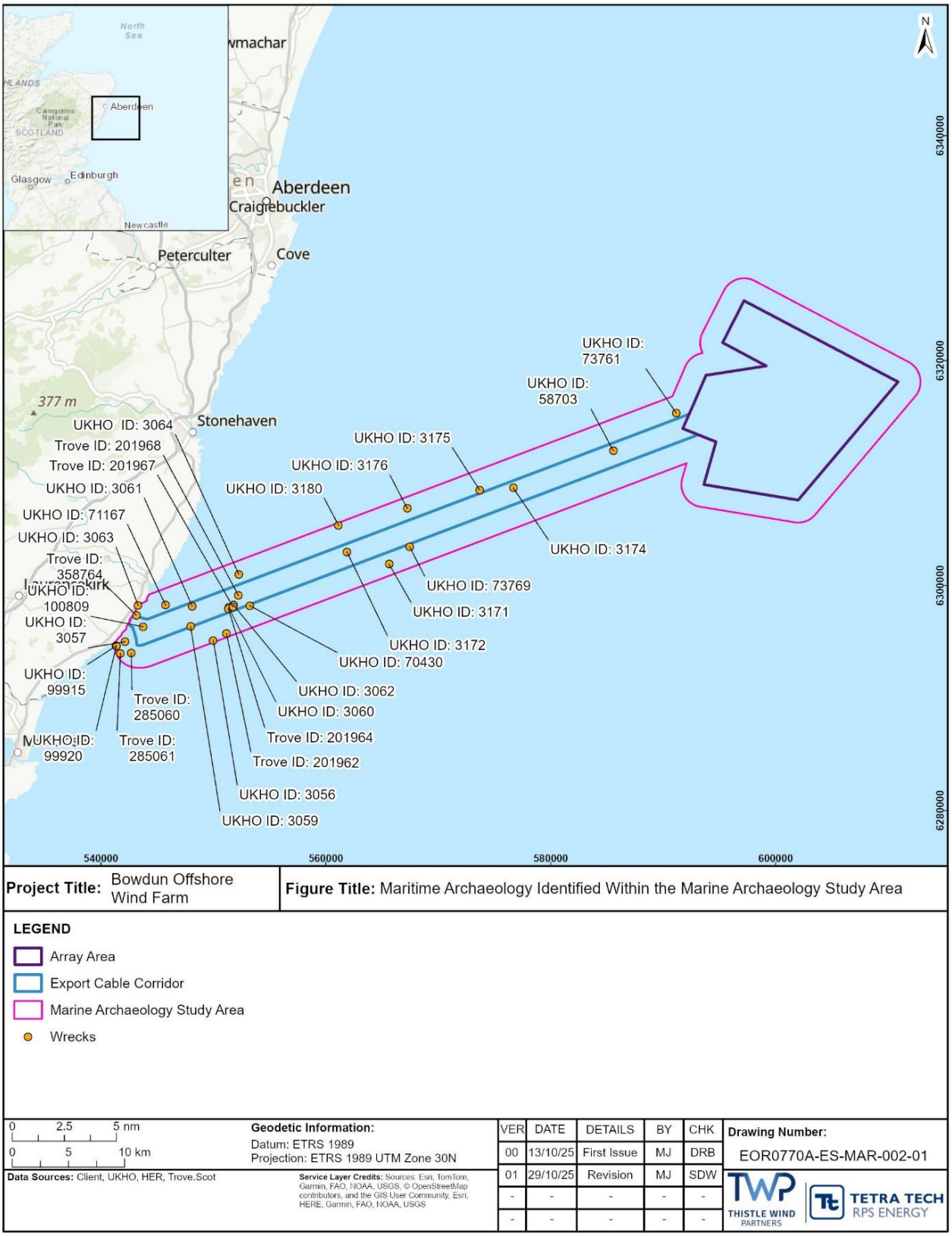

Figure 7.1: Maritime Archaeology Records Identified Within the Marine Archaeology Study Area

7.2 Geophysical Seabed Features Assessment

Overview

7.2.1 A total of 180 surface anomalies of potential archaeological interest have been identified within the geophysical survey data extent (Annex C), of these, 103 are located within the Array Area and 77 are within the Export Cable Corridor (Table 7.2). The anomalies have been categorised by potential following the criteria set out in Table 5.5. Magnetic anomalies with no surface expression are presented separately.

Table 7.2: Distribution of Archaeological Anomalies by Potential

Potential	Array Area	Export Cable Corridor	Total
Low	100	67	167
Medium	3	6	9
High	0	4	4
Total	103	77	180

Low Potential Anomalies

7.2.2 There are 167 low potential anomalies, 100 of which are located within the Array Area and 67 are within the Export Cable Corridor (Annex C). These predominantly represent likely geological features, modern debris such as chain, cable or rope, or small items of debris with no features indicating archaeological potential and are therefore not considered further within this report (Table 7.3). The locations of the low potential anomalies are presented in (Figure 7.2).

Table 7.3: Low Potential Anomaly Categories

Anomaly category	Array Area	Export Cable Corridor	Total
Chain, cable or rope	39	11	50
Likely geological	3	10	13
Potential debris	33	42	75
Linear feature	6	1	7
Fishing gear	18	2	20
Anchor - modern	1	1	2
Total	100	67	167

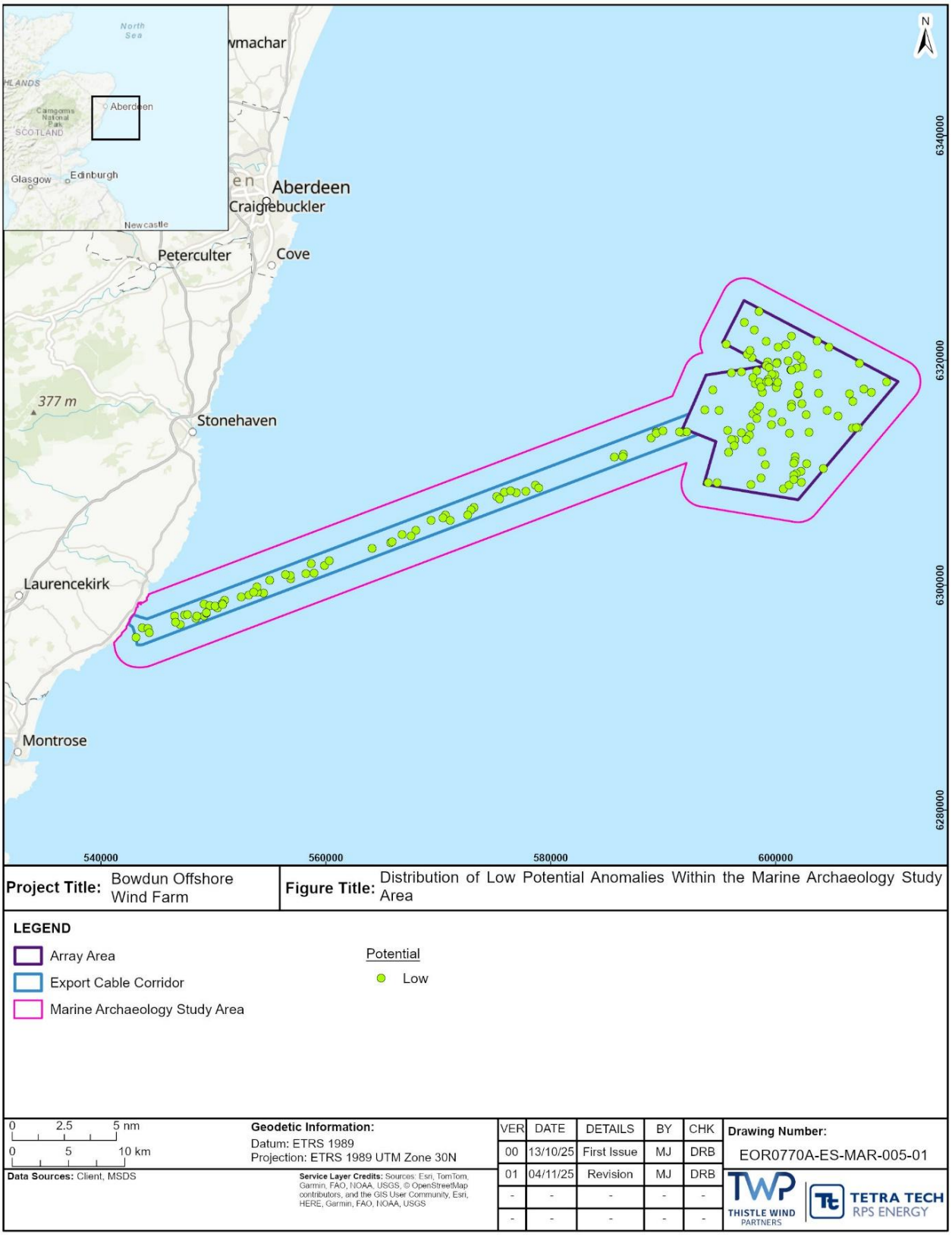

Figure 7.2: Distribution of Low Potential Anomalies Within the Marine Archaeology Study Area

Medium Potential Anomalies

7.2.3 Medium potential anomalies are those that have characteristics that indicate a likelihood of representing anthropogenic material, such as debris or potential debris (Table 7.4). The anomalies interpreted as of medium archaeological potential have characteristics that indicate a likelihood of representing anthropogenic material that has the potential to be of archaeological interest, or where a precautionary approach has been taken for anomalies where the identification isn't clear.

7.2.4 There are nine medium potential anomalies in total with three being located within the Array Area and six within the Export Cable Corridor, the distribution of these is shown in (Figure 7.3).

Table 7.4: Medium Potential Anomaly Categories

Anomaly category	Array Area	Export Cable Corridor	Total
Potential debris	3	4	7
Potential wreck	0	1	1
Wreck debris	0	1	1
Total	3	6	9

Medium Potential BN25_0135

7.2.5 Medium potential BN25_0135 (Figure 7.4) lies within the Export Cable Corridor approximately 12 km north-east of Landfall. The anomaly lies outside of the pre-defined survey extents and is only visible in the SSS data. The anomaly has no corresponding magnetic anomaly as it lies outside of the pre-defined survey extents. The anomaly does not correspond with any UKHO, Trove or HER records.

7.2.6 The anomaly is visible in the SSS data as an incoherent collection of linear and curvilinear features measuring 5.1 m x 3.5 m and with a measurable height of 1.5 m. The form is indicative of anthropogenic material; however, the origin is unclear. Due to the limited datasets available for assessment outside of the pre-defined survey extents a precautionary medium potential rating has been prescribed due to the size and form of the anomaly.

Medium Potential BN25_0140

7.2.7 Medium Potential BN25_0140 (Figure 7.4) lies within the Export Cable Corridor approximately 33 km north-east of Landfall. The anomaly is visible in both the SSS and MBES data and has a corresponding magnetic anomaly of 377.6 nT (1,146.9 kg). The anomaly does not correspond with any known UKHO, Trove or HER records.

7.2.8 The anomaly is visible in the SSS and MBES data as two, possibly three boulder-like features in an area of otherwise featureless seabed. The anomaly measures 3.6 m x 1.5 m and with a measurable height of 1.4 m. Whilst typically the form would indicate a geological origin, the presence of a large associated magnetic anomaly indicates a ferrous component, and thus likely anthropogenic origin.

Due to the overall size of the anomaly and the likely anthropogenic origin a medium potential rating is considered appropriate.

Medium Potential BN25_0145

7.2.9 BN25_0145 (Figure 7.4) lies within the Export Cable Corridor approximately 30 km north-east of Landfall. The anomaly is visible in the SSS data, but not the MBES data and has no corresponding magnetic anomaly although it lies c. 10.6 m from an adjacent trackline. The anomaly does not correspond with any UKHO, Trove or HER records.

7.2.10 The anomaly is visible within the SSS data as a broadly ovular feature outlined by a number of slightly raised features, with a greater density towards the south. The anomaly measures 26.2 m x 5.5 m and with a measurable height of 0.9 m. The form of the anomaly is unusual, although it is broadly of a form that may indicate a wrecked vessel. However, it may also indicate other anthropogenic material such as fishing gear, and as such has been assigned a medium potential rating.

7.2.11 The anomaly may be visible within the MBES data, although it is not clear, potentially due to lying within an area of poor data quality (uncorrected motion).

Medium Potential BN25_0152

7.2.12 Medium potential BN25_0152 (Figure 7.5) lies within the Export Cable Corridor approximately 42 km north-east of Landfall. The anomaly is visible in both the SSS and MBES data and has a corresponding magnetic anomaly of 18.4 nT (142.2 kg). The anomaly does not correspond with any UKHO, Trove, or HER records.

7.2.13 The anomaly is visible in the SSS and MBES data as an irregular mound measuring 8.5 m x 3.4 m with a measurable height of 1.2 m. Two further features, both measuring approximately 1.6 m x 1.6 m lie along the southeastern edge. The form and associated magnetic anomaly of the mound may indicate material of anthropogenic origin, with the size and outlying features potentially indicating material of archaeological interest, as such a medium potential rating has been assigned.

Medium Potential BN25_0153

7.2.14 Medium potential BN25_0153 (Figure 7.5) lies within the Export Cable Corridor approximately 36 km north-east of Landfall. The anomaly is visible in both the SSS and MBES data and has a corresponding magnetic anomaly of 50.9 nT (286.7 kg). The anomaly does not correspond with any UKHO, Trove, or HER records.

7.2.15 The anomaly is visible in the MBES data as an area of potential debris measuring 9.1 m x 3.3 m and with a measurable height of 2.0 m. The anomaly consists of a prominent mound to the west with a diameter of c. 3.5 m and an area of incoherent features to the east. The form of the mound is not dissimilar to a boulder like feature, however the presence of the additional features to the west and the associated magnetic anomaly suggests anthropogenic origin. The form, and size, of the anomaly mean a medium potential rating is appropriate.

Medium Potential BN25_0173

7.2.16 Medium Potential BN25_0173 is potential wreck debris, possibly relating to high potential BN25_0142 and is discussed further with the following high potential analysis in Paragraph 7.2.30.

Medium Potential BN25_0241

7.2.17 Medium Potential BN25_0251 (Figure 7.6) lies within the north-east of the Array Area, approximately 8 km west of the eastern most point. The anomaly is visible in both the SSS and MBES data and has no corresponding magnetic anomaly although it lies c. 16.3 m from an adjacent trackline. The anomaly does not correspond with any UKHO, Trove, or HER records.

7.2.18 The anomaly is visible within the SSS and MBES data as a triangular feature measuring 7.3 m x 4.5 m and with a measurable height of 0.5 m. Slight scour is visible to the south, the east and the west. The form of the anomaly is highly likely to indicate anthropogenic origin, although the origin is unclear.

Medium Potential BN25_0251

7.2.19 Medium potential BN25_0251 (Figure 7.6) lies within the north-east of the Array Area, approximately 8 km north-west of the eastern most point. The anomaly is visible in both the SSS and MBES data and has a corresponding magnetic anomaly of 231.1 nT (311.6 kg). The anomaly does not correspond with any UKHO, Trove, or HER records.

7.2.20 The anomaly is visible in the SSS and MBES data as an irregular mound measuring 9.8 m x 5.6 m with a measurable height of 0.6 m. Mounds can represent buried material of anthropogenic origin, particularly when associated with a magnetic anomaly indicating a ferrous component. The mound is of a size where a medium potential rating is considered appropriate.

Medium Potential BN25_0288

7.2.21 Medium potential BN25_0288 (Figure 7.6) lies within the west of the Array Area, approximately 5 km north-east of the western most point. The anomaly is visible in both the SSS and MBES data and has a corresponding magnetic anomaly of 82.1 nT (915.1 kg). The anomaly does not correspond with any UKHO, Trove, or HER records.

7.2.22 The anomaly is visible in the SSS and MBES as a potential area of debris measuring 25.3 m x 19.7 m and with a measurable height of 0.4 m. The most prominent feature is an irregular cluster of features towards the south of the overall anomaly which are associated with the magnetic anomaly indicating a ferrous, and thus likely anthropogenic, component. To the north-east and north-west smaller, and irregular, features are visible, potentially indicating a wider area of debris. The size of the potential area of debris means a medium potential rating is considered appropriate.

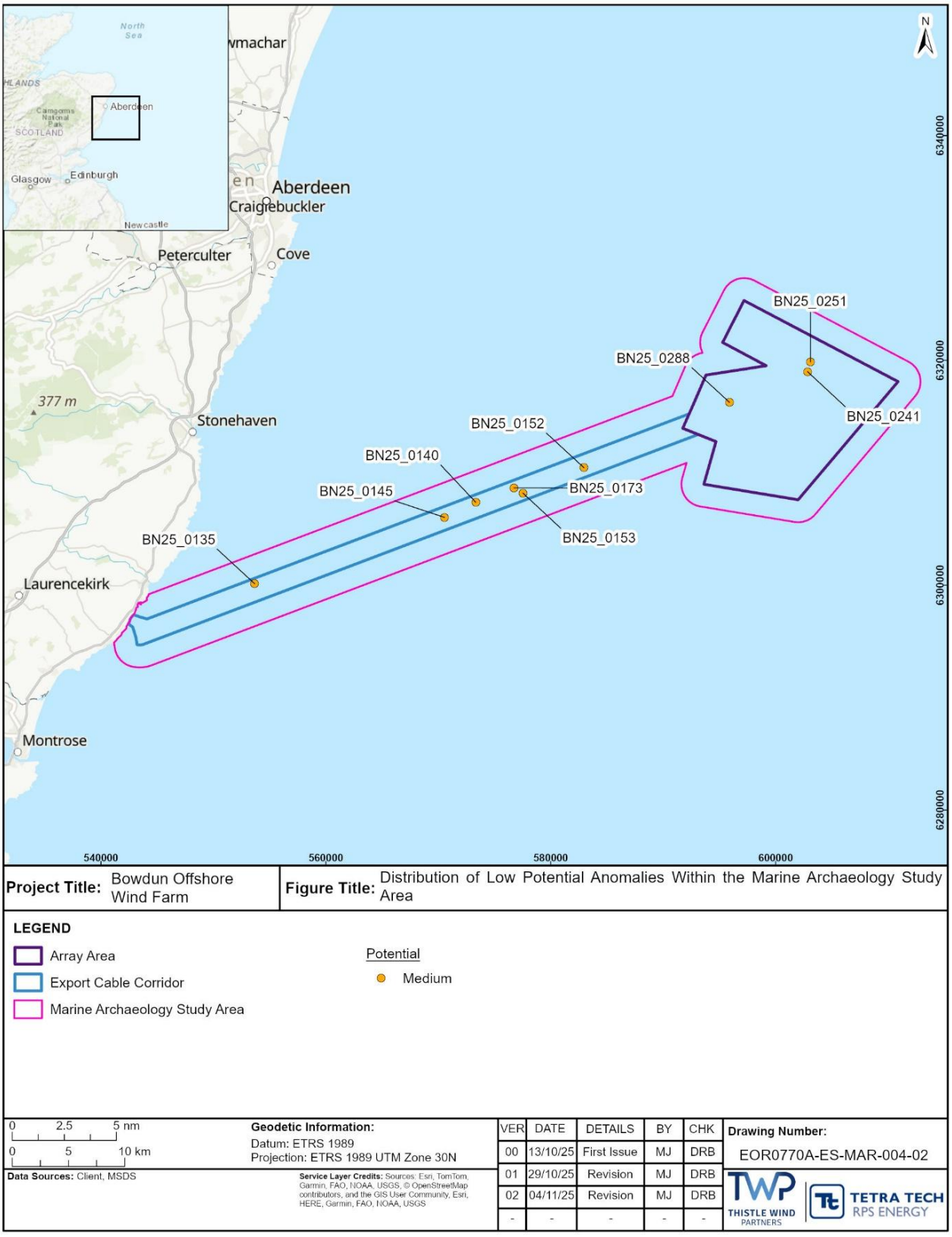

Figure 7.3: Distribution of Medium Potential Anomalies Within the Marine Archaeology Study Area

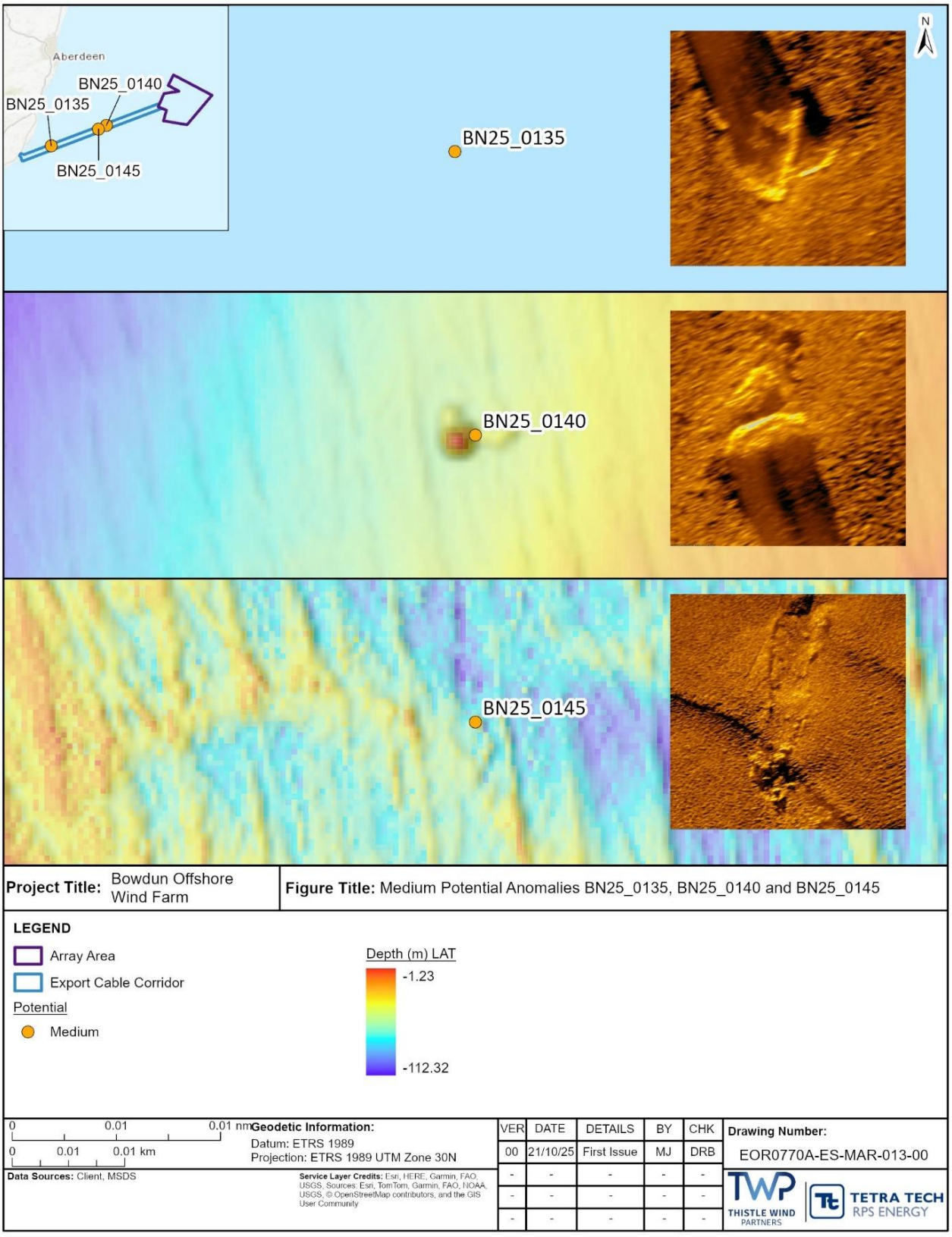

Figure 7.4: Medium Potential Anomalies BN25_0135, BN25_140 and BN25_145

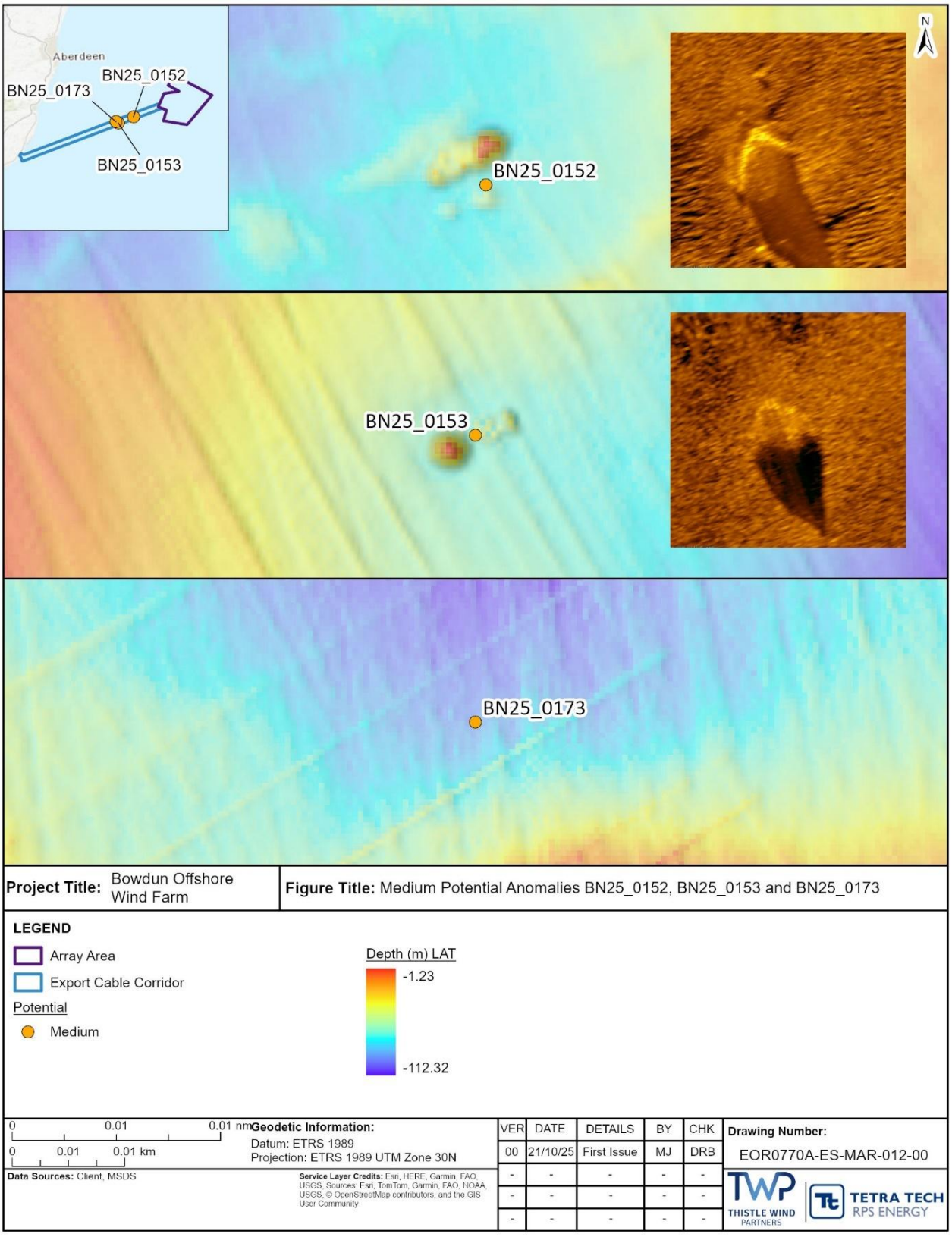

Figure 7.5: Medium Potential Anomalies BN25_0152, BN25_0153 and BN25_0173

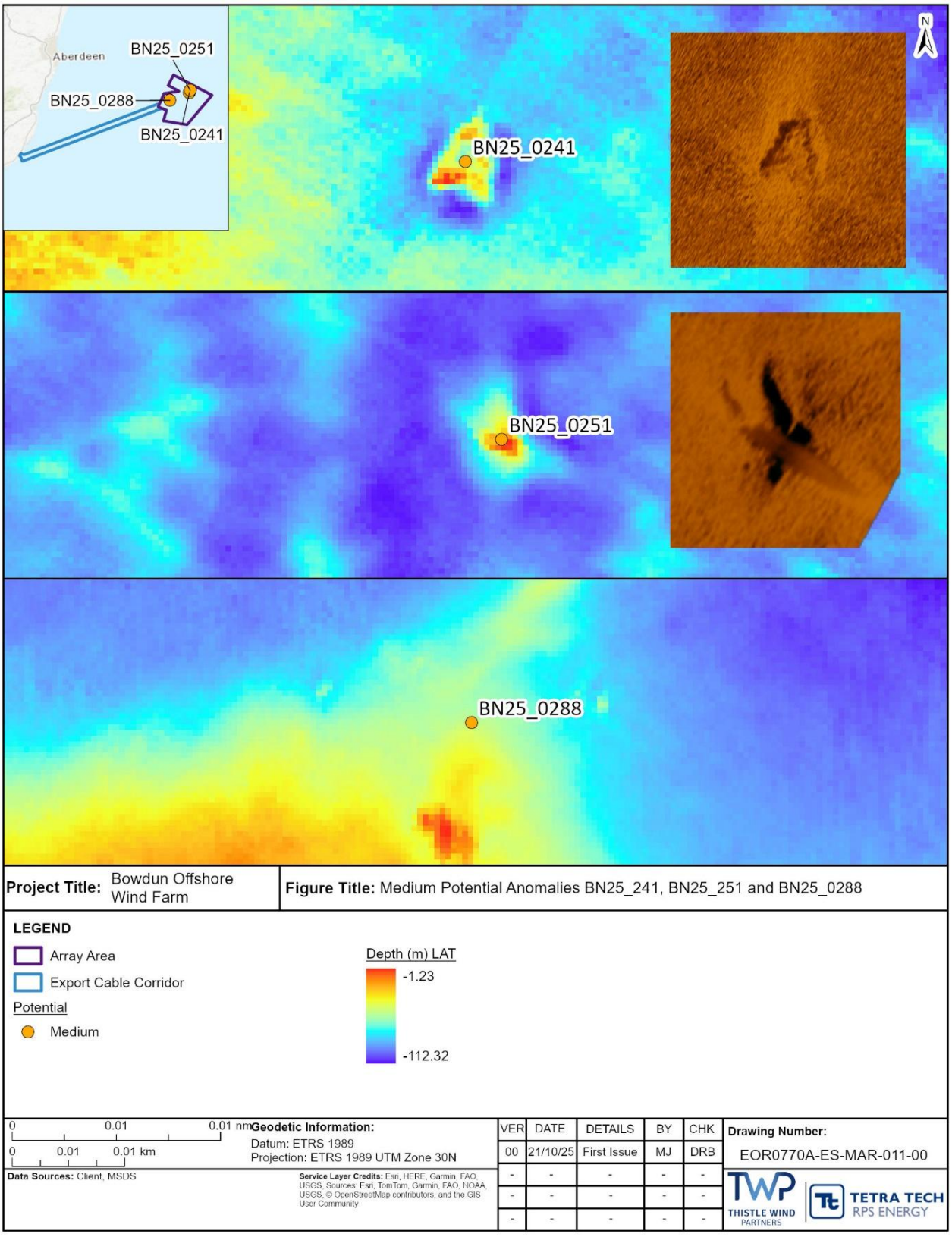

Figure 7.6: Medium Potential Anomalies BN15_241, BN25_251 and BN25_0388

High Potential Anomalies

7.2.23 There are four high potential anomalies in total, with all four being located within the Export Cable Corridor (Figure 7.7). The anomalies interpreted as being of high archaeological potential either have characteristics that indicate a high likelihood of representing anthropogenic material that has a high potential to be of archaeological interest, or a precautionary approach has been taken for anomalies where identification is not clear. Two of the high potential anomalies are wreck sites and two are potential wreck sites.

High Potential BN25_0101

7.2.24 High potential BN25_0101 (Figure 7.8) lies within the Export Cable Corridor approximately 1.2 km south-east of Landfall. The anomaly is visible in both the SSS and MBES data and has a corresponding magnetic anomaly of 1,297.1 nT (15,432.3 kg). the anomaly corresponds with UKHO record 100809, but not Trove or HER records.

7.2.25 The anomaly is a distribution of large features over an area 39.7 m x 36.5 m and with a measurable height of 3.1 m. The overall anomaly is not coherent and appears as a distribution of features that along with a significant magnetic anomaly, indicate the well broken up remains of a wrecked vessel, of ferrous construction. The two largest features measure 14.8 m x 4.4 m and 15.5 m x 5.0 m and the form may indicate sections of hull. There is potential for material to be present outside of the main area of wreckage, particularly to the south, however the form of the outlying features is not dissimilar to the surrounding geology. From the data available it is not possible to provide much more in the way of diagnostics, or identity.

7.2.26 The UKHO record the anomaly as the distributed remains of a wreck first identified in 2022. The wreck is described as degraded with a visible boiler and scattered debris. Although not clearly identifiable within the data, there is potential for the largest feature to the east of the area to represent the boiler.

High Potential BN25_0141

7.2.27 High potential BN25_0141 (Figure 7.9) lies within the Export Cable Corridor approximately 45 km north-east of Landfall. The anomaly is visible in both the SSS and MBES data and has a corresponding magnetic anomaly of 9,824.7 nT (11,973.1 kg). The anomaly corresponds with UKHO record 58703 and Trove record 323794.

7.2.28 The anomaly is the broken up, and largely incoherent, likely remains of a wrecked vessel measuring 22.9 m x 11.6 m and with a measurable height of 3.2 m. Whilst not coherent, the form and dimensions, along with the significant magnetic anomaly, are consistent with a wrecked vessel. The wreck appears to lie on one side and is orientated approximately north-west to south-east, slight scour is visible on all sides.

7.2.29 The UKHO and Trove record the wreck as that of the *Karianda*, a British fishing vessel sunk in 2000. The vessel is reported to have sunk after taking on water following an electrical fault. A survey in 2009 recorded the wreck as intact with the bow to the south-east.

High Potential BN25_0142

7.2.30 High potential BN25_0142 (Figure 7.9) lies within the Export Cable Corridor approximately 36 km north-east of Landfall. The anomaly is visible in both the SSS and MBES data and has a corresponding magnetic anomaly of 7,654.4 nT (58,283.4 kg). The anomaly corresponds with UKHO record 3174 and Trove record 322382.

7.2.31 The anomaly is the coherent remains of a wrecked vessel measuring 61.4 m x 13.7 m and with a measurable height of 5.1 m. The wreck appears upright (bow potentially to the north-east), with deck structure potentially visible, and is orientated northeast to south-west. There is no significant evidence of scour, and the wreck appears largely confined. The form of the wreck, along with the significant magnetic anomaly, indicate ferrous construction. One linear feature (medium potential BN25_0173) lies c. 75 m to the east and is potentially related, the anomaly is associated with a magnetic anomaly of 83.9 nT (275.5 kg) which may indicate chain. A further nine magnetic anomalies, with no surface expression, lie within 75 m of the wreck which have the potential to represent related, but buried, ferrous debris.

7.2.32 The UKHO and Trove record an unknown wreck, originally detected in 1965. The wreck is described as lying upright with the bow to the north-east. No details as to the identity are given.

High Potential BN25_0287

7.2.33 High potential BN25_0287 (Figure 7.8) lies within the Export Cable Corridor approximately 1.8 km south of Landfall. The anomaly is visible in both the SSS and MBES data and has no corresponding magnetic anomaly although it lies c. 19.7 m from an adjacent trackline. The anomaly does not correspond with any UKHO, Trove, or HER records.

7.2.34 The anomaly is a distribution of features over an area 30.6 m x 12.3 m and with a measurable height of 1.4 m. The overall anomaly is not coherent, but appears as a distribution of interconnected features, the form of which may indicate anthropogenic material, and potentially the well broken up remains of a wrecked vessel. The closest magnetic anomaly lies on the closet trackline, some 19.7 m away and whilst due to the distance it cannot be definitively correlated, there is a high potential of it being related. The magnetic anomaly is 9.5 nT which at 19.7 m gives at estimated ferrous mass of 7,263.1 kg which would be consistent with the material visible should it be ferrous. From the data available it is not possible to provide much more in the way of diagnostics, or identity.

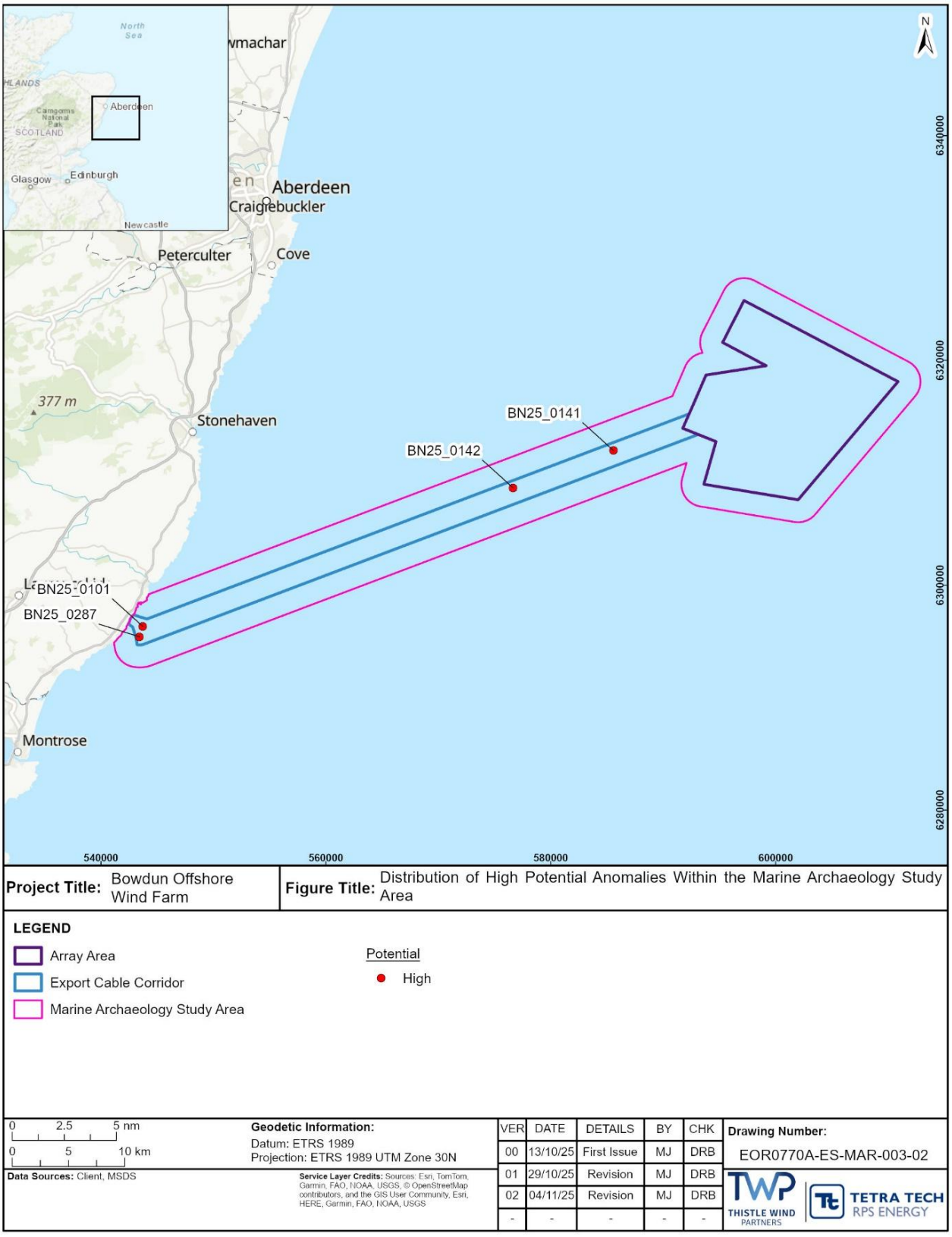

Figure 7.7: Distribution of High Potential Anomalies Within the Marine Archaeology Study Area

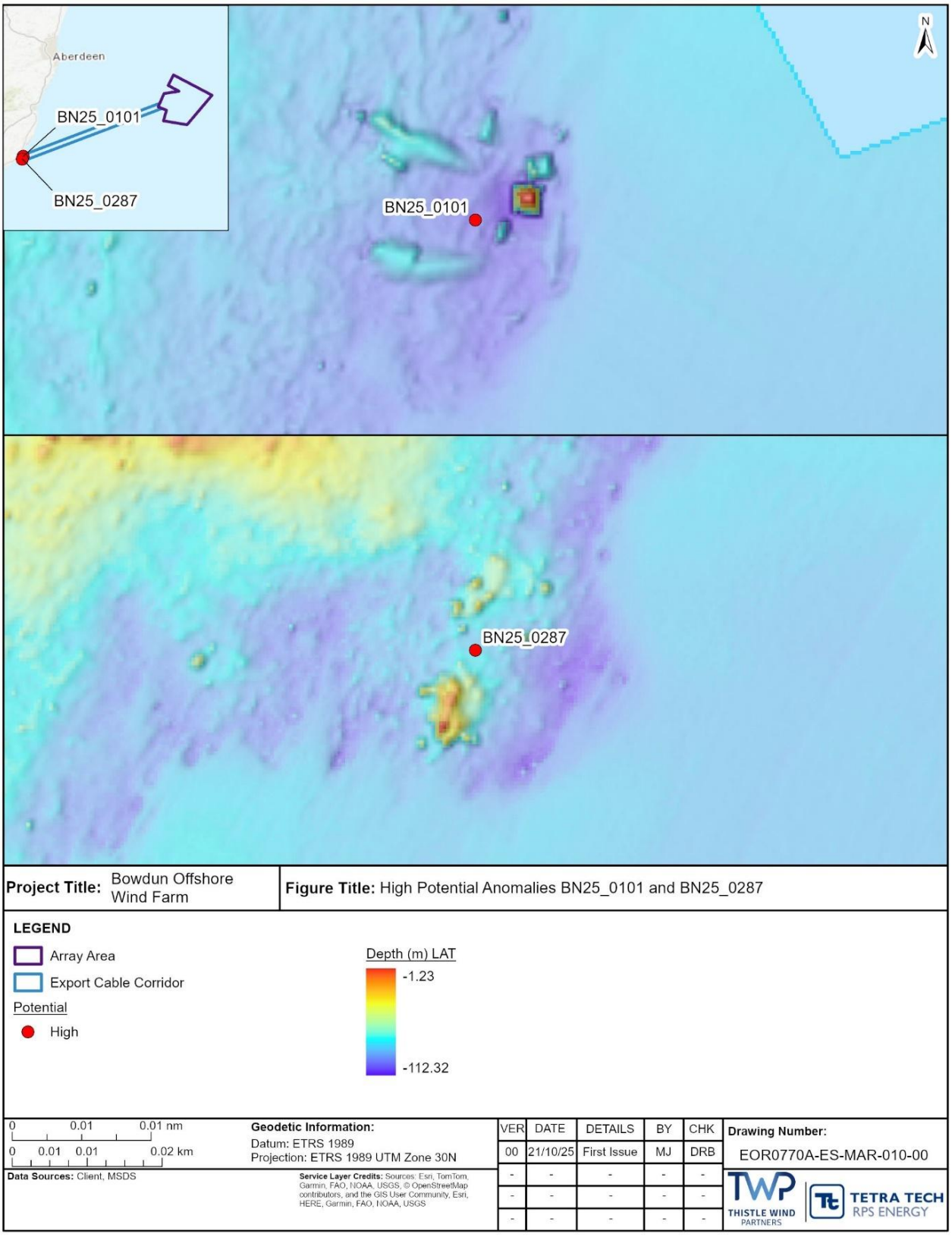

Figure 7.8: High Potential Anomalies BN25_0101 and BN25_0287

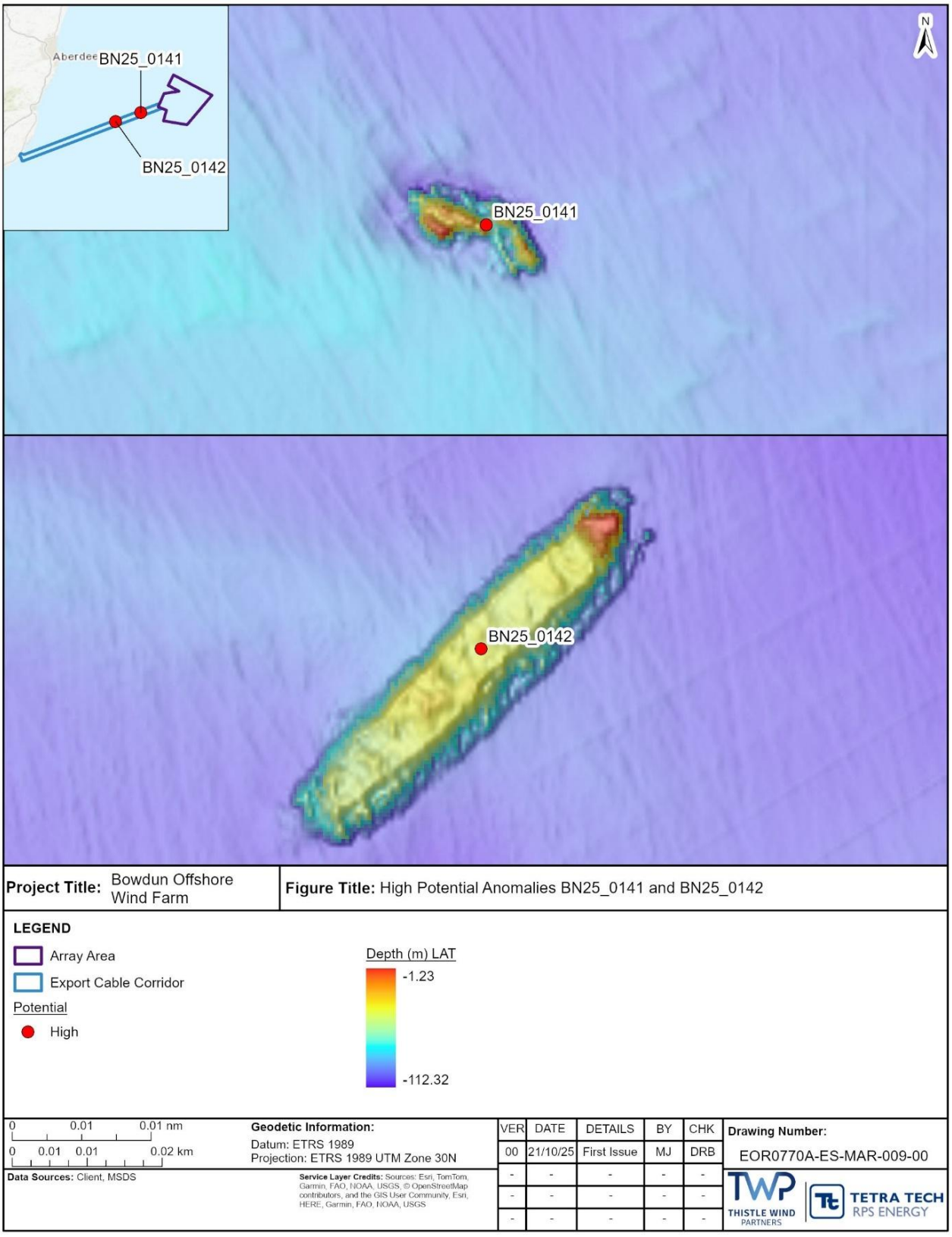

Figure 7.9: High Potential Anomalies BN25_0141 and BN25_0142

Magnetic Anomalies

7.2.35 The are 2,241 magnetic anomalies, ranging between 5.0 nT and 9,824.7 nT, identified within the geophysical survey data extents, of these 2,184 do not correlate with known, or visible features or infrastructure. The distribution of anomalies by amplitude is shown below in Table 7.5 with their spatial distribution presented in (Figure 7.10).

Table 7.5: Magnetic Anomalies by Amplitude

Amplitude (nT)	Array Area	Export Cable Corridor	Total
5 to 50	839	1,155	1,994
50 to 100	22	70	92
100 to 200	3	34	37
200 +	6	7	13
Total	870	1,266	2,136

7.2.36 Anomalies identified from the magnetometer data are ferrous and thus generally anthropogenic in origin although they can be associated with geological features, however, there is no visual interpretation as with other geophysical data.

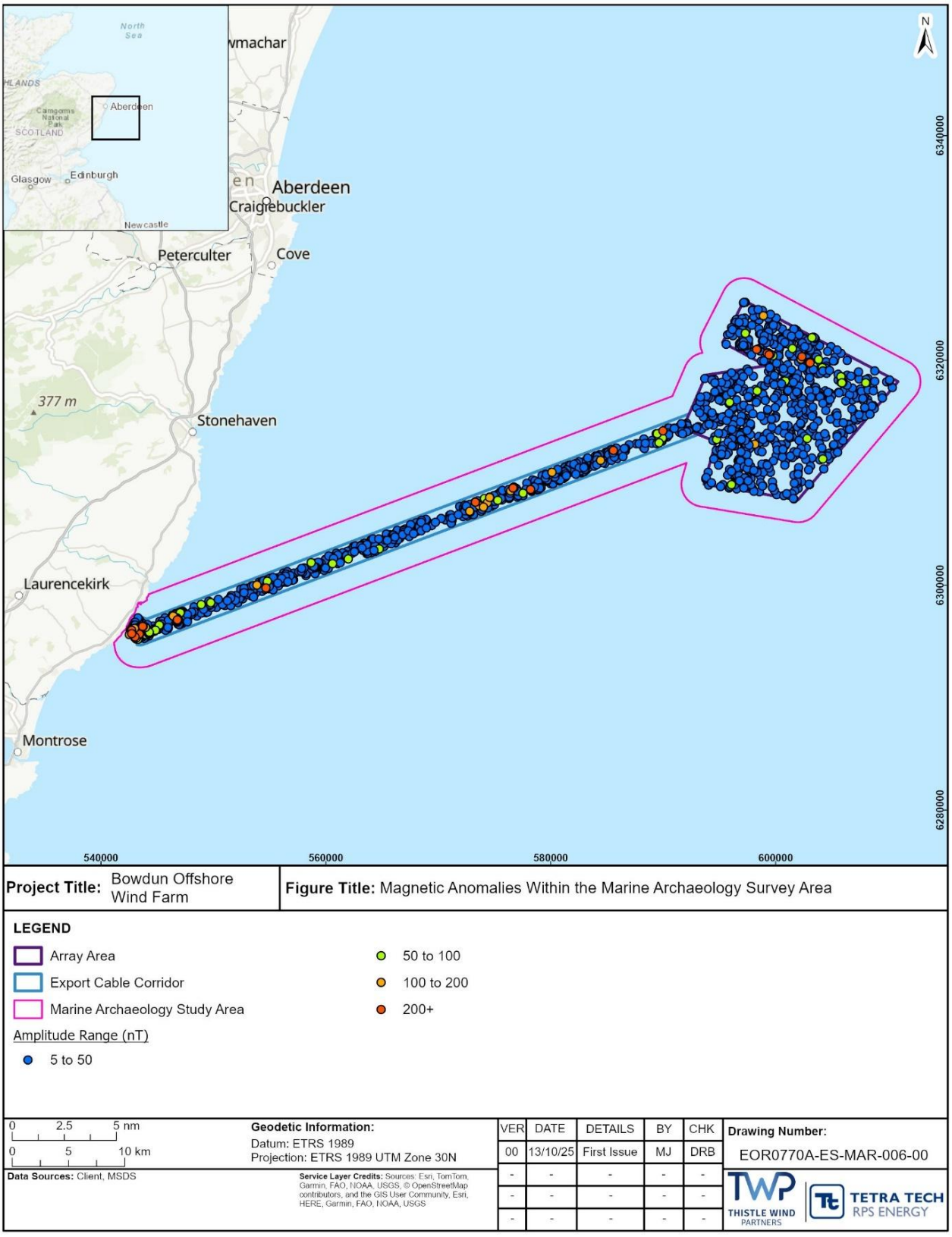

Figure 7.10: Magnetic Anomalies Within the Marine Archaeology Study Area

Calculation of Mass

7.2.37 The presentation, and categorisation of magnetic anomalies by amplitude (nT) provides an effective way to gain a broad understanding of the distribution of ferrous material on, or just below, the seabed. However, to understand the data more comprehensively, the ferrous mass needs to be calculated which is based on the amplitude and the distance from the magnetometer. However, with a line spacing of 40 m to 60 m this is not possible to undertake accurately for anomalies that are not visible on the surface or visible on two lines of data, due to the potential distance of an anomaly from the magnetometer ranging from the altitude to the slant range of 50% of the line spacing.

7.2.38 Therefore, all calculations of mass are made using the assumption that the anomaly lies directly below the magnetometer, with the distance used for the calculation being equal to the recorded altitude of the magnetometer. Furthermore, calculations are made assuming an anomaly ratio of 1:1. The distribution of anomalies by estimated mass is shown below in Table 7.6.

Table 7.6: Magnetic Anomalies by Ferrous Mass (kg)

Estimated Mass (kg)	Array Area	Export Cable Corridor	Total
1 to 100	642	887	1,529
100 to 500	205	303	508
500 to 1,000	18	55	73
1,000 +	5	21	26
Total	870	1,266	2,136

7.2.39 The distribution of the anomalies by estimated mass is broadly similar to the distribution by amplitude. Typically, and dependant on the survey specification and the distance from the target, isolated anomalies under 50 nT or 500 kg are considered to be of limited, or low, potential to be of archaeological significance.

Overview of Magnetic Anomaly Distribution

7.2.40 The distribution of magnetic anomalies is fairly uniform within the extents of the magnetometer data, primarily consisting of anomalies <50 nT and <500 kg. Due to the 40 m to 50 m line spacing used during data collection this is a fairly typical distribution, both geographically and in terms of recorded amplitude and mass.

7.2.41 The size (in nT) of a magnetic anomaly is dependent on both the mass of ferrous material, and the distance from the sensor. Therefore, unless there is a strong correlation between a magnetic anomaly and a seabed feature perpendicular to the track, it is not possible to accurately position or determine the mass of an anomaly. For example, an anomaly of <50 nT relating to a feature directly below the track could, and often does, represent small pieces of debris, steel cable, fishing gear, etc. whilst an anomaly of <50 nT 100 m from the track could indicate a much larger feature. If that feature is not visible in the other

geophysical datasets (potentially due to being buried) then the position is unable to be reconciled. As such, a bias towards anomalies <50 nT is expected as the range to the sensor is greater than 12.5 m for 50% of the seabed at a 50 m line spacing.

7.2.42 The potential ferrous mass of anomalies has been calculated, however with a line spacing of up to 50 m the accuracy of this is extremely limited, primarily due to the unknown distance from the magnetometer to the anomaly.

Discussion of Potential

7.2.43 Magnetic anomalies >100 nT are typically described as large and have the potential to be of archaeological significance. It should be noted that these anomalies, and any interpretations, are based on a magnetic signature rather than a visible image of the anomaly on the seabed. It is often the case that during intrusive investigations these anomalies are identified as modern marine debris, including cable, chain, modern anchors, fishing gear, and parts of modern vessels such as outboard engines, and other detritus either deliberately or accidentally, put overboard. Where anomalies are largely isolated, or relating to a single feature, the most commonly identified material of archaeological interest are isolated anchors, often of indeterminate age. The difficulties in determining the age of concreted anchors, and the lack of a wider context means these are often classed as of low or medium potential to be of archaeological significance. However, whilst the chances of isolated magnetic anomalies being of archaeological interest is potentially low, this does not reduce the potential of anomalies to be of archaeological significance.

7.2.44 As discussed, given the vagaries with positioning, size etc. it would not be proportional to assign potential and therefore mitigation of avoidance, to anomalies where there is no correlating seabed feature – the anomalies to which this section pertains. Therefore, a broad statement of potential is provided below.

7.2.45 2,136 magnetic anomalies of between 5.0 nT and 715.3 nT, and 0.1 kg and 5,444.7 kg, with no definitive correlation with archaeological anomalies, seabed features, or infrastructure, have been identified within the Marine Archaeology Survey Area. Magnetic anomalies are ferrous and thus generally anthropogenic in origin; anthropogenic material has the potential to be of archaeological significance. Therefore, there is broad potential to identify additional material of potential archaeological interest within the extents of the geophysical survey data.

7.2.46 At the line spacing of the survey (between 40 m and 50 m) the potential for anomalies of a significant mass to lie, either undetected or underestimated is high. For example (using Hall's Equation and a minimum reliable detection of 5.0 nT) the minimum mass that can be identified at 5.0 nT at a range of 27.0 m is calculated as 10.0 tonnes (Holt, 2019). Holt also notes that the results of field-testing using divers has demonstrated that Hall's Equation can have errors in the calculation of mass in some instances by a factor of three, potentially due to the magnetism of the anomaly, known as permanent or residual magnetism. Therefore, calculations should be considered as estimations of mass, not

precise measurements of mass. However, they remain a more robust indication of archaeological potential than the presentation of amplitude with no supporting distance from the anomaly data.

7.3 Maritime Archaeology Potential

Overview

7.3.1 The maritime archaeology of the UK is a product of a complex interplay of constantly evolving coastal and marine activities, sea use, and international links from the Late Upper Palaeolithic to the Present Day. This section reviews the potential presence of maritime and aviation archaeology within the Marine Archaeology Study Area.

7.3.2 Presently, the UKHO maintains a register of wreck locations; the Wrecks Database contains circa 70,000 records, of which approximately 20,000 are named vessels (UKHO, 2025). Prior to the advent of the Lloyds of London list of shipping casualties in 1741, there was no official record of ship losses in the UK (Wessex Archaeology, 2007). Records of known wreck sites and losses in UK waters are therefore biased towards the modern period, as a result of increased traffic and increased reporting, as well as the increased prevalence of metal components in ships that allow for greater survival and detection (Burton *et al.*, 2007). Therefore, the precise locations of most wrecks which pre-date the 19th century are not known.

7.3.3 There is potential for undiscovered maritime archaeological material to be present within the Marine Archaeology Study Area from all time periods.

Early Prehistory (Palaeolithic and Mesolithic)

7.3.4 There is no evidence of maritime archaeological remains in the UK that pre-date the start of the Holocene. However, global examples suggest that watercraft were in use by the Middle Palaeolithic period, such as the suggestion that the colonisation of Australia by approximately 40,000 BC involved island hopping (Lourandos, 1997).

7.3.5 During the Late Upper Palaeolithic (approximately 12,000 BC), it is possible that simple watercraft such as logboats or raft were used for coastal journeys and fishing within the British Isles (COWRIE, 2007; Dunkley, 2016), however no evidence of Palaeolithic sea-faring craft is currently known.

7.3.6 The first archaeological evidence for the use of watercraft in the UK dates to the Mesolithic and is from Star Carr in Yorkshire where fragments of a wooden oar have been identified (Wessex Archaeology, 2007; Van de Noort, 2011). A late Mesolithic or early Neolithic burial in a partially burnt dugout canoe was found in St. Albans, Hertfordshire in 1988 (Dunkley, 2016). Finds in Germany and Denmark suggest that logboats were used for coastal journeys.

7.3.7 However, the potential for the survival of any archaeology associated with the marine environment from the Palaeolithic and Mesolithic periods is considered extremely low.

Neolithic, Chalcolithic and Bronze Age

7.3.8 No evidence of Neolithic, Chalcolithic or Bronze Age maritime activity has been recorded within the Marine Archaeology Study Area.

7.3.9 Direct archaeological evidence for the exploitation of the maritime environment and maritime activity in the Neolithic period is rare and limited to logboat finds outside of Scotland (Johnstone, 1980; Wilkinson and Murphy, 1995; Bradley *et al.*, 1997). Shell middens in the UK containing the faunal remains of deep sea fish are also known from this period, suggesting marine exploitation of those resources (Elmers, 1996).

7.3.10 The Bronze Age was a period of technological innovation and of expansion of trade and exchange networks. The discovery of porcellanite stone axes from Ireland on the Western Isles of Scotland and the UK mainland implies transport of these objects by sea (Breen and Forsyte., 2004). This was facilitated by the introduction of new forms of boats for both marine and coastal/riverine transport. The evidence for Bronze Age settlement, funerary and agricultural activity throughout the vast majority of Scotland as well as on the islands implies that widespread movement of people had to have been occurring (ScARF, 2012b).

7.3.11 Evidence for Bronze Age maritime activity has been recorded throughout the UK in the discovery of a number of inland watercraft and sea-faring vessels. The Carpow logboat from the Tay estuary is an inshore example of a common, cross period vessel type (Strachan, 2010). An earlier oak logboat fragment from Scotland survives from Catherinefield, Dumfries and Galloway, which dates to circa 2,000 BC (Mowat, 1996). In addition to boat fragments there are several known examples of potentially prehistoric paddles and oars, although none of the Scottish examples appear to have been directly dated (Strachan, 2010).

7.3.12 Examples of Bronze Age sea-faring craft exist such as five sewn-plank boats discovered at Ferriby in North Yorkshire (Van de Noort, 2004; Chapman, 2021). The Brigg 'raft', also on the Humber (Yorkshire) (McGrail, 1994), Goldcliff, Gwent (Wales) (Parry and McGrail, 1991) and the remains of a boat at Dover, Kent (England) (Clark, 2004) have been discovered elsewhere in the UK. This suggests that boats of this time were being utilised in UK waters and the lack of evidence in Scotland may be down to a lack of archaeological investigation.

7.3.13 However, due to the organic construction materials that would have been used for these craft, the potential for the survival of Bronze Age archaeological material within the Marine Archaeology Study Area is very low.

Iron Age and the Roman Presence

7.3.14 No evidence of Iron Age or Roman maritime activity has been recorded in the Marine Archaeology Study Area.

7.3.15 Broad geographical and chronological narratives have emphasised the importance of the Atlantic Ocean as a routeway and for communication in the pre-Roman Iron Age (Cunliffe, 2001). No remains of Iron Age vessels are yet known from Scotland; however, interaction with the sea can be inferred from

other types of archaeological evidence from the Northern Isles of Orkney and Shetland.

7.3.16 A number of whale bone artefacts have been recovered from Iron Age Scotland (such as Foshigarry, North Uist (Finlay, 1991) and Shetland (Cussans and Bond, 2010)). It is, however, unclear whether these were derived from primary whale hunting from ocean faring vessels, shore drives, or opportunistic recovery from beached animals (MacGregor, 1974; Seller, 1989; Cerón-Carrasco, 1995; Cerón-Carrasco, 1998; Finlay, 1996).

7.3.17 The Roman period is limited in both duration and extent when compared to the rest of the UK. Though Roman remains are known from beyond the Antonine Wall, these are temporary and the level of interaction by sea between the established frontier and the maritime areas of north-eastern Scotland are not well understood.

7.3.18 While Roman presence in Scotland was short lived and patchy, the Roman invasion force of AD 43 was necessarily brought to Britain by ship, and the maintenance of the province of Britannia within the empire through the extraction of agricultural surplus, mineral wealth, and the creation of diplomatic ties was in large part a maritime endeavour.

7.3.19 In the north of Scotland, the Pictish period straddles the traditional periodic divide of Iron Age and Early Medieval periods elsewhere in the UK. Pictish culture is heavily demonstrated in the archaeological record of northern and eastern Scotland between the late third and early ninth centuries AD (Mann, 1974; Hunter, 2007).

7.3.20 Documentary sources attest that there may have been a maritime element to Pictish society. The Annals of Tigernach recorded that in 729 AD, 150 Pictish ships were wrecked upon 'Ros-Cuissine', possibly Troup Head, Aberdeenshire (Anderson, 1922; Cessford, 2005). Examples of sea-faring is present in Pictish art, surviving on carved stones. The most well-known depiction of a boat is on a stone at Cossans, Angus, and shows a double ended, mastless, plan-built vessel with a high prow and stern, a rudder and possibly oars (Ritchie, 1989; Laing and Laing, 1993; Foster, 1996; Carver, 1999). The potential for the survival of Iron Age, Roman or Pictish archaeological material within the Marine Archaeology Study Area is low.

Medieval

7.3.21 No evidence of Early Medieval or Medieval maritime activity has been recorded within the Marine Archaeology Study Area, but regional evidence suggests a lively period of engagement with the sea.

7.3.22 Maritime activity in the North Sea and in the vicinity increased during the Early Medieval period. This was due in part to Viking raiding, the intensification of regional trade and migration, and the growth of several ports on the east coast of the UK (Kelly, 1992; Hutchinson, 1997; Friel, 2003; Middleton, 2005).

7.3.23 Archaeological evidence for vessels from this period is rare. A small number of early Medieval boats are known from the inland waterways of Perth and Kinross, such as the Errol 2 logboat, one of two surviving examples from a concentration

recorded from the Tayt estuary (Strachan, 2010; Mowat, 1996). The boat has yielded radiocarbon dates of AD 548 and AD 599 (Strachan, 2010). Logboats and skin-and-hide vessels were well suited to rivers and estuaries and the evolution of plank-built, sail carrying ships over the Early Medieval period enabled increased seaborne travel (Crumlin-Pedersen, 2010).

7.3.24 The Viking presence and influence along the east coast of Scotland would have demanded the control of rivers and estuaries which secured access to trade routes and passage across the North Sea. Evidence of Viking influence in Scotland is reflected in place names and also the location of Viking hoards along the Forth and Tay estuaries (Dalland and Owen, 1999). The range of geographical contact and the richness of procurable objects is demonstrated by the Galloway Hoard, from south-west Scotland. The hoard included objects reflecting cultural affinities as far afield as Central Asia, implying long-distance maritime communication networks (Goldberg, 2023).

7.3.25 The developing trading networks across Europe achieved a degree of formalisation in the latter centuries of the Medieval period. Lübeck, modern Germany, became the capital of the Hanseatic League, a confederation of port cities ultimately encompassing nearly 200 settlements across seven modern day countries across the Baltic and North Seas, from Sweden and Russia in the north and east, to the Netherlands in the south-west. The Hanseatic League and others like it greatly contributed to the maritime transportation of goods across the North Sea (Hutchinson, 1997; Woodman, 2005).

7.3.26 Maritime technology advanced rapidly during this period to accommodate larger cargoes. Relatively few physical remains have been found from Medieval shipping anywhere in Scotland, but boat fragments from a probably substantial sea-faring ship were produced from excavations in Perth, including frames, lengths of clinker planking, an oarport cover and tholes (pins on which oars pivot while rowing) (Martin and Bogdan, 2012; ScARF, 2012c).

7.3.27 Despite the increase in shipping during this period and the potentially increased visibility of possible wrecks, there is still a low potential for archaeological remains to exist within the Marine Archaeology Study Area.

Post-Medieval to Modern

7.3.28 The growth of commercial maritime trade that began during the later medieval period continued and expanded in the modern period. Alongside overseas ventures which were expanding rapidly, inland and local coasting trade continued to be important in the region. During this period, the number of vessels crossing the North Sea increased significantly, particularly during the Medieval period and the merger of the Royal Scots Navy with the Kingdom of England's Royal Navy after the Acts of Union in 1707 (Murdoch, 2010).

7.3.29 Rapid industrialisation in the 18th and 19th centuries revolutionised shipbuilding, introducing technological innovation that precipitated fundamental changes in maritime technology. By the end of the 19th century the advent of the steam engine, the introduction of iron hulls and the development of the screw propeller had wrought major transformations on ships and shipping (Lambert, 2001). Although steam and steel came to dominate shipping during the 19th

century, there remained a strong local core of maritime activity around much of the coast of the UK which retained the more traditional, often wooden vessel types. For example, at the turn of the 20th century, much of the fishing in the North Sea was still conducted by fleets of sailing smacks and there was a rise in fishing settlements along the east coast during the 18th and 19th centuries. As the modern period progressed into the 20th century, fewer vessels were made of wood. The potential for the discovery of unknown maritime archaeology from the post-medieval period is high.

Modern Military Remains

7.3.30 The maritime archaeological record of the 20th century until the present day is dominated by remains associated with the two World Wars. Warships, submarines and U-boats along with the cargo vessels, personal transport vessels and aircraft, comprise some of the known vessel losses during this period. The majority of known shipwrecks in the North Sea basin within which the Marine Archaeology Study Area is located are the results of military activity. It is thought that initial losses in World War I were due to the blackouts along the coast which led to wrecks along the shoreline and then the subsequent U-boat offensive which sunk a number of Royal Navy submarines (and U-boats) in the Outer Tay and Forth and North Sea basin (Ferguson, 1991). During World War II, approximately 50 merchant vessels were sunk off the north-east coast, along with military vessels (Headland Archaeology, 2011). There are known wrecks dating from this period present in the Marine Archaeology Study Area (Section 7.1). There is also a high potential for the discovery of unknown maritime archaeology from both World Wars.

Recorded Losses

7.3.31 Recorded losses represent maritime and aviation losses that are known to have occurred in the vicinity but for which no wreck remains have been identified. Recorded losses are often grouped with refence to a geographic, hydrographic or other point of reference, making the positional data of these records arbitrary, imprecise or inaccurate and therefore unreliable. However, they do provide information on the historical marine traffic of the general region and therefore archaeological potential.

7.3.32 Eighty-five recorded losses have been identified within the NRHE and HER data for the Marine Archaeology Study Area (Annex D). The majority of these represent the loss of vessels from the 19th century, showing the bias in the dataset towards later periods when reporting became more formalised (Table 7.7). In general, these records highlight the use of the area by cargo vessels in the 19th century, with both national and international trade being represented. For example, the *Cora*, a wooden schooner carrying coal from Sunderland to Stonehaven and the *Nova*, a steel steamship carrying coal from Blyth to Sarpsborg, Norway. The transition from wooden sailing vessels, to steam and on to motor vessels can also be seen in the assemblage. There are also 13 vessels listed as having an unknown date of loss, these likely represent vessels from the 19th century onwards, but they could also represent vessels from

periods not otherwise represented in the dataset, for example, early modern vessels from the 18th century or earlier.

Table 7.7: Number of Recorded Losses by Period

Period	Number of Records
19th Century	52
Modern	20
Unknown	13
Total	85

7.3.33 Further recorded losses are probably extant within the maritime records (e.g. Trove 201961, 201962, 201964, 201967 and 201968), but these have been retained in the maritime gazetteer as a precaution (Annex B).

Navigational Hazards

7.3.34 The majority of all known recorded wreck sites lie relatively close to the coast. The proximity of many historical sailing routes to the coast and the natural hazards of north-eastern Scotland can be expected to have been a determining factor in many maritime casualties in the past (Wessex Archaeology, 2008). Information regarding the whereabouts of wrecks may also be influenced by selective reporting, where knowledge of their whereabouts is advantageous to seafarers, such as around sandbanks and shipping channels (Burton *et al.*, 2007). It may be that there are many undiscovered wreck sites in areas which do not meet these criteria.

Summary of Marine Archaeology Potential

7.3.35 There is potential for currently unknown maritime archaeology, consisting of wrecks, wreck material or associated debris from the prehistoric to modern period, to be present in the Marine Archaeology Study Area. The key periods of potential are summarised in Table 7.8.

Table 7.8: Summary of Key Periods of Maritime Archaeology Potential

Period	Status
Prehistoric (Palaeolithic, Mesolithic, Neolithic, Bronze Age and Iron Age)	Low potential
Romano-British, Early Medieval and Medieval	Low potential
Early Modern	Medium potential
19th century	High potential
Modern (1900 to 1945)	High potential
Modern (1946 to present)	Medium potential

7.4 Aviation Archaeological Potential

7.4.1 Thousands of military and civilian aircraft casualties have occurred in UK waters since the advent of powered flight in the early 20th century. The bulk of these are casualties of World War II and most are concentrated off the south and south-east coasts of England. Although there are no known aviation wreck sites within the Marine Archaeology Study Area, there is clear potential for aircraft casualties the north-western North Sea (Wessex Archaeology, 2008). There were no World War II airfields in the immediate vicinity of the Landfall, but there were in the wider area, including in Montrose and Dyce.

7.4.2 There is one recorded aviation loss located within the Marine Archaeology Study Area (Trove 313229) (Figure 7.11). This is an unknown aircraft wreck, listed as being from World War II. According to the record, the unknown aircraft was reported down in the North Sea near Gourdon on 27 February 1942. The type of aircraft is also unknown (Annex E).

7.4.3 There is one further record of a possible aircraft. 'A/C' is recorded as being trawled up 12 miles off Stonehaven in September 1936 after a long time in the sea (Trove 328314). Trove lists this as a 'craft', but it is possibly an aircraft. It is discussed in this section as a precaution.

7.4.4 While the aviation archaeology record is potentially very large, the ephemeral nature of aircraft wrecks ensures that many sites remain unknown and unrecorded. In addition, despite the potential extensive losses at sea, records are seldom tied to an accurate position. These difficulties complicate any assessment of the likely presence of aircraft wreckage on any particular area of seabed.

7.4.5 There is therefore moderate potential for World War II aircraft to exist in the Marine Archaeology Study Area. Since World War II, despite the volume of both military and civilian air traffic, there have been few aviation losses off the east coast of Scotland. For aircraft remains pre-1939 and post-1945, the potential is considered to be low.

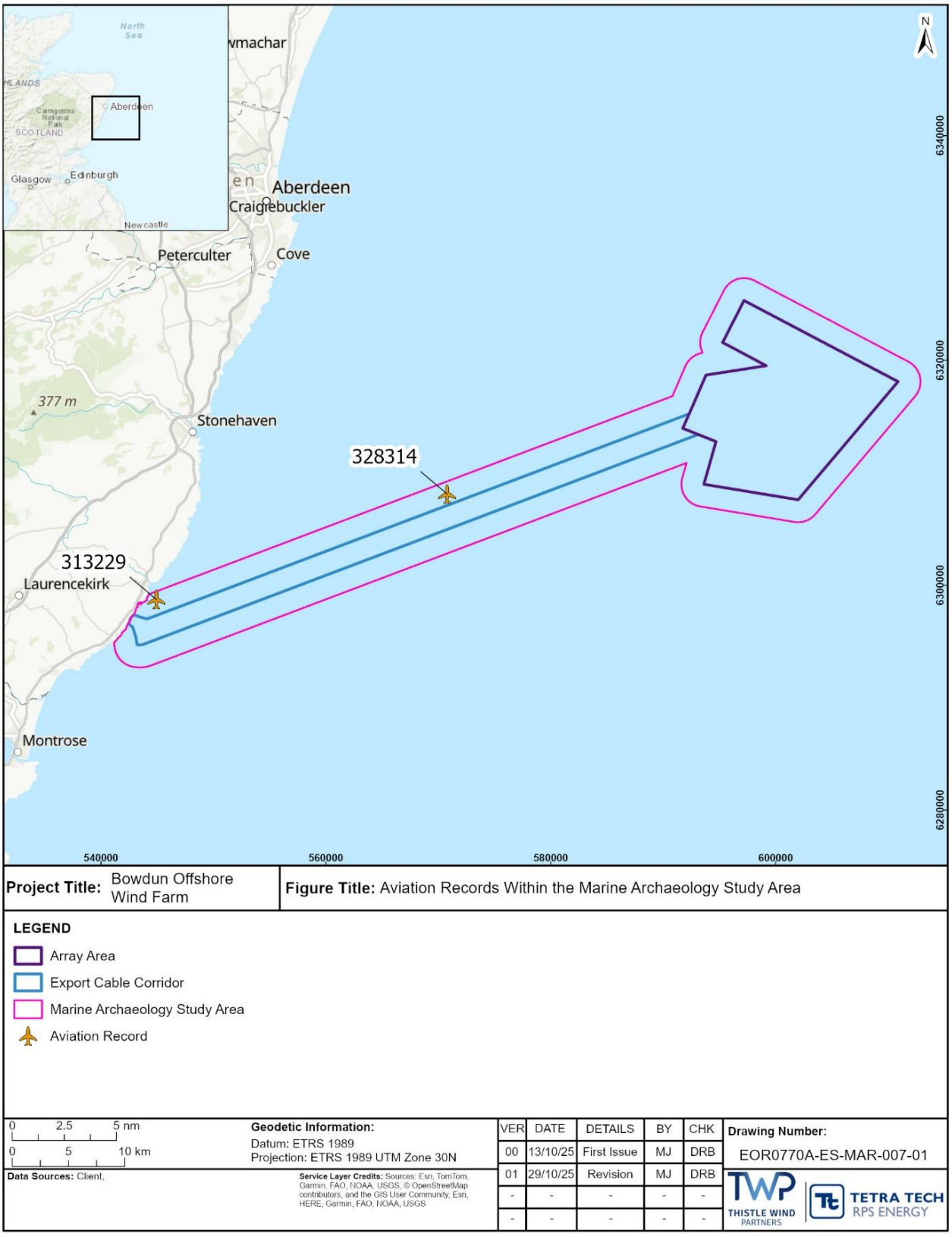

Figure 7.11: Aviation Records Within the Marine Archaeology Study Area

8 Intertidal Archaeology Baseline

8.1.1 The Intertidal Area of within the Marine Archaeology Study Area extends 5.5 km from Johnshaven, north to Gourdon (Figure 8.1). There are two relevant HER records in the Intertidal Area, Gourdon Harbour (NO87SW0033) and Haughs Bay (NO86NW0053) (Figure 8.1).

8.1.2 Gourdon harbour (NO87SW0033) is a small basin formed of two rubble walls dating to the 1880s and a later concrete pier on the south side. Haughs Bay is a natural harbour consisting of a gap in the rock platform with evidence of clearing of boulders to the side.

8.1.3 The Intertidal Area was surveyed as part of a SCAPE Project where a walkover survey was conducted at low tide. The stretch of coastline between Gourdon and Johnshaven is described as being composed mainly of flat-low lying terraces and rock platform (Boyd and Hambly, 2023). No additional archaeological features were identified by the SCAPE survey in the Marine Archaeology Study Area.

8.1.4 The surrounding coast of Aberdeenshire has a high concentration of World War II defensive structures, including lines of anti-tank traps, gun emplacements and pillboxes. Due to the highly mobile beach sands, many of these structures are buried in sand or have been destroyed by coastal erosion (Boyd and Hambly, 2023).

8.1.5 There is potential for further intertidal archaeology of all types to be present within the Marine Archaeology Study Area.

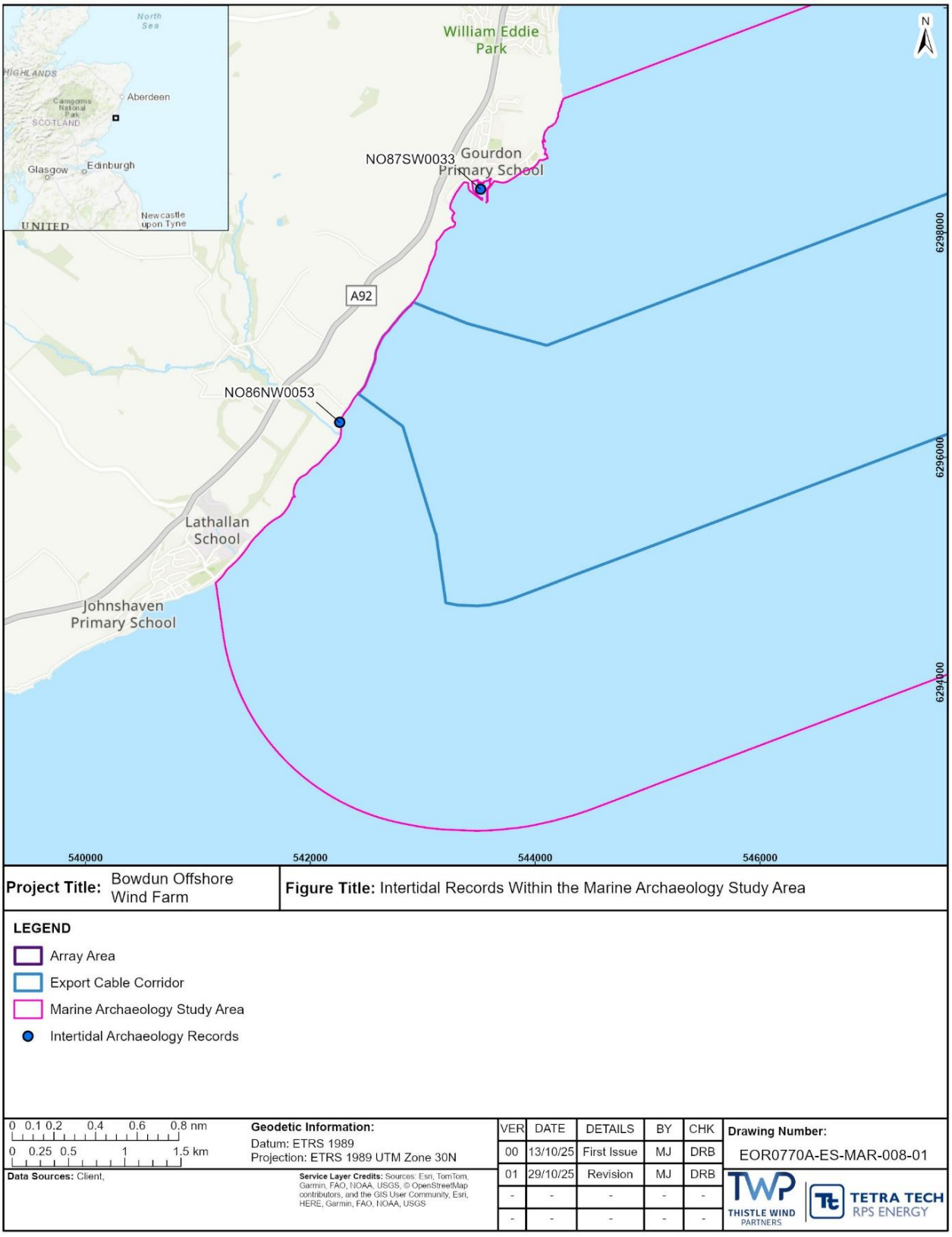

Figure 8.1: Intertidal Records Within the Marine Archaeology Study Area

9 Summary

9.1 Submerged Prehistoric Archaeology

9.1.1 The potential for submerged prehistoric archaeology is considered to be generally low, due primarily to high sea levels and the likelihood of ice coverage for much of prehistory (Section 6).

9.1.2 Interrogation of the SBP, sea level data, MBES contours, and archaeological datasets has demonstrated that Unit 20A may represent a deltaic environment, with evidence of channels, exposed and laid down from the Loch Lomond Stadial potentially continuing into the period when sea levels covered the Marine Archaeology Study Area (i.e. c. 13,000 BP – c. 8000/7000 BP). Archaeological potential is focused in Unit 20A (Figure 6.1). Given the rarity of sites of this period the potential is limited, though palaeoenvironmental evidence is likely to survive within this unit, and all others within the site.

9.2 Maritime and Aviation Archaeology

9.2.1 Within the Marine Archaeology Study Area, a total of 29 maritime records were identified, of those 13 are named wreck sites. There are no designated wrecks present within the Marine Archaeology Study Area. In addition to the known and named wreck sites, 85 recorded losses have been identified in the Marine Archaeology Study Area, although these are arbitrary locations where no remains have been found.

9.2.2 A total of 180 surface anomalies of archaeological interest have been identified within the Marine Archaeology Survey Area (Section 7.2). Of these, four are interpreted as of high potential, all of which are located in the Export Cable Corridor.

9.2.3 There is potential for unknown maritime archaeological assets from all periods to be present in the Marine Archaeology Study Area.

9.2.4 There are two recorded aircraft losses in the Marine Archaeology Study Area, the first of these two is the record of a crash of an unknown aircraft in 1942. The second is a further record of a possible find spot of aircraft material. There is potential for unknown aviation assets from all periods in the Marine Archaeology Study Area.

9.3 Intertidal Archaeology

9.3.1 There are two known archaeological assets present in the Intertidal Area, both of which are harbours. One is an artificial basin and the other is a natural harbour with evidence of artificial enhancement. There is potential for unknown archaeological assets from all periods to be present in the Intertidal Area of the Marine Archaeology Study Area.

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ANNEX A. QUATERNARY SEQUENCES

A1 Quaternary Sequences (Array Area)

Unit	Sub-unit	Seismic Character	Depth	Expected Lithology	Interpretation	Age	Archaeological Potential
Unit 10	-	Chaotic to well-stratified. Basal reflector mostly flat, erosional and continuous.	0 – 11 m Below Seabed (BSB)	Unconsolidated reworked sediments. Seabed sediments.	Superficial sediments.	Holocene (Modern marine)	Low
Unit 20	-	Well-stratified restricted to incised valleys. Incision into Marr Bank Formation. Erosional base.	0 – 34 m BSB	Interbedded sands and clays.	Forth Formation.	Devensian to Holocene	Potential focused in Unit 20A within the Export Cable Corridor
Unit 30	-	Varied internal character. Sub–parallel and continuous reflectors to more chaotic and localised bright amplitudes. Often disturbed by incisions from the overlying unit and possible small internal erosional events. Displays possible clinoforms and glaciotectonic deformation. Basal reflector mostly strong amplitude and planar across the site. Sometimes incised from younger channels.	10 – 43 m BSB	Silty sand, clays, pebbles and boulders.	Marr Bank Formation.	Devensian	Low
Unit 35	A	Often chaotic and varied amplitude response. Often incising lower U35B. Sometimes erosional base but also more planer in places. Difficult to consistently identify.	18 – 53 m BSB	Clays, muds gravels & pebbles	Possible correlation: Coal Pit/Fisher/Ling/ Internal U40	Weichselian to Holsteinian	Low

Unit	Sub-unit	Seismic Character	Depth	Expected Lithology	Interpretation	Age	Archaeological Potential
	B	Often chaotic and varied amplitudes. Erosional base, difficult to consistently identify.	21 – 65 m BSB	Silts and stiff clays	Possible correlation: Ling Fm/ Internal U40	Holsteinian to Saalian	
Unit 40	-	Varied internal character, sometimes displays similarities to the above sub–units. Usually transparent with discontinuous reflectors. Localised bright amplitude reflectors and incisional character. Erosional base with clear truncation. Sometimes difficult to identify due to similar amplitudes and dip of reflectors.	18 – 75 m BSB	Clays, sand & gravels, occasional cobbles & boulders	Aberdeen Ground Formation	Early Pleistocene to Cromerian	Low
Unit 50	-	Parallel continuous reflectors, displaying deformation (Folding + minor Faulting).		Bedrock. Mudstones, claystones, sandstones, siltstones & marls	Bedrock	Pre-Quaternary	Low

A2 Quaternary Sequences (Export Cable Corridor)

Unit	Sub-unit	Seismic Character	Depth	Expected Lithology	Interpretation	Age	Archaeological Potential
Unit 10	-	Continuous, sub-parallel reflectors in nearshore. Chaotic to transparent offshore. Base horizon mostly flat, erosional, continuous.	0 - 9 m BSB	Medium to fine sand, small amounts of gravel.	Seabed sediments.	Holocene (Modern marine)	Low
Unit 20	A	Alternating bright/low amplitudes, sub-parallel and continuous reflectors. Area of transport zones. Base horizon strong continuous and bright amplitude reflector.	0 - 6 m BSB	Soft mud.	Forth Formation (St Andrews Bay Member).	Holocene - Pleistocene	Potential within nearshore area.
	B	Chaotic, bright amplitudes. Erosional base.	0 - 9 m BSB	Sand & Gravel.	Forth Formation (Undivided).		Low
Unit 30	-	Varied internal character. Chaotic, poorly organised reflectors with area of transparency. Base horizon bright, strong amplitude reflector. Mostly continuous. Internal reflectors indicative of channels or localised depressions are mapped within this unit as geohazards.	0 - 18 m BSB	Sand, gravelly till with boulders.	Marr Bank Formation (glacial outwash plain).	Devensian	Low
Unit 35	A	Transparent and lacking internal structure. Base horizon marked by a faint, deep reflector.	0 - 15 m BSB	Clay, fine to coarse sand, pebbles and boulders.	Possible internal or base of Aberdeen Formation.	Holsteinian to Saalian	Low
Additional deposits identified within the data which could not clearly be defined							
		Very little internal structure and base not observed. Expected to be present from Kilometre Post (KP) 1.5 to KP 31 and may outcrop in several area. Where no outcropping, the unit is expected to underly Unit 10 or 20.	0 m - ?	Subglacial till, comprised of course, gravelly sand with large population of cobbles and boulders.	Wee Bankie Formation	Devensian	Very Low

ANNEX B. MARITIME RECORDS

UKHO ID	Trove ID	HER ID	Name	Description	Latitude (WGS84)	Longitude (WGS84)
3056	201961		Unknown	The wrecked remains of an unknown vessel. Last seen in a 2008 survey, described as intact with a recorded sonar length of 34 m.	56° 47.834' N	002° 10.888' W
3057	101764	NO86NW0031	*Hornby*	Remains of the *Hornby*, reportedly sunk in 1919. Not seen in a 2019 survey. Also listed as the *Hawnby* in other records. Dead Wreck.	56° 47.824' N	002° 18.595' W
3059	101879	NO86NE0002	*Baku Standard*	Tanker *Baku Standard*, built in 1893. Torpedoed by *UC-58* in 1918 while carrying oil. Last seen in a 2022 survey, described as upright and intact with a recorded sonar length of 133 m.	56° 48.516' N	002° 12.861' W
3060	101761/101880	NO87SW0140/NO97SW0003	*Taurus*	A Norwegian steamship sunk by air attack while enroute from Port Harcourt to Hull in 1941. Not seen in a 2008 survey. Dead Wreck.	56° 49.407' N	002° 9.513' W
3061	101765	NO87SE0007	Unknown	Possible remains of an unknown wreck, not seen in a 2008 survey. Dead Wreck.	56° 49.491' N	002° 12.696' W
3062	101881	NO97SW0001	*Reindeer*	A Steamship built in 1896 in Sunderland which foundered while on enroute from Dieppe to Middlesbrough in 1916. Not seen in a 2008 survey. Dead Wreck. The position of the record lies 22 m outside the extents of the site specific geophysical data; no evidence of the wreck was identified in the vicinity. Likely a recorded loss.	56° 49.524' N	002° 9.097' W

UKHO ID	Trove ID	HER ID	Name	Description	Latitude (WGS84)	Longitude (WGS84)
3063	101762	NO87SW0141	*Tarvartness*	Trawler sunk in 1940. Probable Recorded loss, not seen in 2019 survey.	56° 49.557' N	002° 17.429' W
3064	322327/324 317/101882	NO97SW0002	*HMS Repro*	Reported location of armed trawler HMS *Repro* built in 1910, sunk after reportedly striking a mine in 1917. Not seen in a 2010 survey. Dead Wreck.	56° 50.991' N	002° 8.597' W
3171	101888/3131 91	NP07SW0002	*Tanevik*	Steamship *Tanevik*, foundered under tow in 1945 while being used as a barrage balloon vessel by the Royal Navy. Last seen in a 2009 survey, described as intact with a recorded sonar length of 29 m.	56° 51.377' N	001° 55.437' W
3172			Unknown	Possible remains of an unknown wreck, not seen in a 2010 survey. Dead Wreck. This record has been removed from the latest UKHO dataset.	56° 51.991' N	001° 59.098' W
3174	322382		Unknown	The wrecked remains of an unknown vessel. Last seen in a 2009 survey, described as intact and upright with a recorded sonar length of 59 m.	56° 54.926' N	001° 44.447' W
3175	322383		Unknown	The wrecked remains of an unknown vessel. Last seen in a 2009 survey, described as intact but collapsing with a recorded sonar length of 47 m.	56° 54.854' N	001° 47.396' W
3176	101889	NP07NE0001	*Sandvik (possibly)*	Steamship *Sandvik*, formerly *Temple*, built in 1901. Torpedoed by *UC-77* in 1917 while on passage from London to Christiana (Oslo). Last seen in a 2010 survey, described intact and upright with a recorded sonar length of 55 m.	56° 54.033' N	001° 53.764' W

UKHO ID	Trove ID	HER ID	Name	Description	Latitude (WGS84)	Longitude (WGS84)
3180	322387		*Solpakur*	Islandic trawler *Solpakur* which sunk while on passage to Grimbsy for scrapping. Last seen in a 2009 survey, described as intact and upright but missing her mast with a recorded sonar length of 37 m.	56° 53.279' N	001° 59.809' W
58703	323794	NP28SW8001	*Karianda*	Fishing vessel sunk in 2000 after an electrical fault. Last seen in 2010 survey, recorded sonar length of 18 m.	56° 56.622' N	001° 35.617' W
70430		NO97SW0007	*HMT Lowdock*	Steam trawler HMT *Lowdock*, sunk by bombing and gunfire in 1940. Seen in a 2024 survey, described as upright and intact with a recorded length of 41 m.	56° 49.479' N	002° 7.66' W
71167			Unknown	Remains of an unknown vessel, described as intact with a recorded sonar length of 10 m.	56° 49.559' N	002° 15.033' W
73761	324452		Unknown	The wrecked remains of an unknown vessel. Last seen in a 2009 survey, described as intact and upright with a recorded sonar length of 34 m.	56° 58.36' N	001° 30.024' W
73769	324455		Unknown	The wrecked remains of an unknown vessel. Last seen in a 2009 survey, described as highly degraded with a recorded sonar length of 19 m.	56° 52.199' N	001° 53.614' W
99915			Unknown	Remains of an unknown vessel, seen in a 2022 survey. Described as in two parts.	56° 47.616' N	002° 19.402' W

UKHO ID	Trove ID	HER ID	Name	Description	Latitude (WGS84)	Longitude (WGS84)
99920			Unknown	Remains of an unknown vessel, seen in a 2022 survey. Described as being in two parts with three boilers visible.	56° 47.633' N	002° 19.363' W
100809			Unknown	Distributed remains of an unknown, wreck seen in a 2022 survey.	56° 48.53' N	002° 17.024' W
	285061	NO86NW0029	*Freischutz*	Find spot of a name board inscribed *Freischutz* found in 1860.	56° 47.27' N	002° 19.012' W
	285060	NO86NW0028	*Susan and Henry*	Find spot of a name board inscribed with *Susan and Henry*, found in 1860.	56° 47.273' N	002° 18.07' W
	201962	NO96NW0002	Unknown	Unknown craft. Possible recorded loss.	56° 48.151' N	002° 9.726' W
	201964	NO97SW0004	Unknown	Unknown craft. Possible recorded loss.	56° 49.337' N	002° 9.534' W
	201967	NO97SW0005	Unknown	Unknown craft. Possible recorded loss.	56° 49.445' N	002° 9.142' W
	201968	NO97SW0006/NO86NE0006	Unknown	Unknown craft. Possible recorded loss. Not visible in site-specific geophysical survey.	56° 49.985' N	002° 8.652' W
	358764	NO86NW0013	Unknown	Shipwreck timbers found at this location in 2006. Long arcing length of wood over 2 m long with wooden dowels found. A second timber length found from the same location contained copper bolts.	56° 49.078' N	002° 17.6' W

ANNEX C. GEOPHYSICAL ANOMALIES

Name	Potential	Description	Magnetic Amplitude (nT)	Length (m)	Width (m)	Height (m)	UKHO ID	Latitude	Longitude
BN25_0100	Low	Likely geological	<Null>	24.3	7.9	0.5	<Null>	56° 48.01' N	002° 17.651' W
BN25_0101	High	Potential wreck	1297.1	39.7	36.5	3.1	100809	56° 48.528' N	002° 17.032' W
BN25_0102	Low	Chain cable or rope	<Null>	10.0	0.3	0.1	<Null>	56° 48.462' N	002° 17.103' W
BN25_0103	Low	Potential debris	<Null>	4.0	1.2	1.9	<Null>	56° 48.435' N	002° 16.606' W
BN25_0104	Low	Potential debris	<Null>	5.3	0.5	0.1	<Null>	56° 48.225' N	002° 16.465' W
BN25_0105	Low	Potential debris	<Null>	2.2	1.2	0.1	<Null>	56° 48.882' N	002° 12.396' W
BN25_0106	Low	Likely geological	<Null>	8.0	4.4	0.9	<Null>	56° 50.057' N	002° 6.446' W
BN25_0107	Low	Potential debris	<Null>	2.7	2.1	0.0	<Null>	56° 48.597' N	002° 13.747' W
BN25_0108	Low	Potential debris	<Null>	4.2	2.1	0.4	<Null>	56° 50.987' N	002° 2.016' W
BN25_0109	Low	Chain cable or rope	<Null>	21.9	0.2	0.0	<Null>	56° 49.003' N	002° 11.690' W
BN25_0110	Low	Potential debris	7.8	2.0	0.8	0.5	<Null>	56° 51.342' N	002° 1.070' W
BN25_0111	Low	Fishing gear	5.8	104.4	0.2	0.0	<Null>	56° 49.880' N	002° 8.419' W
BN25_0112	Low	Potential debris	6.2	1.0	1.5	0.1	<Null>	56° 49.001' N	002° 12.314' W

Name	Potential	Description	Magnetic Amplitude (nT)	Length (m)	Width (m)	Height (m)	UKHO ID	Latitude	Longitude
BN25_0113	Low	Potential debris	<Null>	2.8	2.2	0.6	<Null>	56° 49.365' N	002° 10.493' W
BN25_0114	Low	Potential debris	5.3	1.7	0.9	0.7	<Null>	56° 50.973' N	002° 2.704' W
BN25_0115	Low	Potential debris	<Null>	2.0	0.9	0.2	<Null>	56° 50.729' N	002° 4.077' W
BN25_0116	Low	Likely geological	<Null>	3.7	0.8	0.6	<Null>	56° 50.109' N	002° 7.000' W
BN25_0117	Low	Potential debris	9.3	1.8	1.1	0.7	<Null>	56° 49.974' N	002° 7.723' W
BN25_0118	Low	Likely geological	<Null>	4.6	2.0	1.4	<Null>	56° 49.044' N	002° 13.370' W
BN25_0119	Low	Likely geological	<Null>	5.6	1.3	0.3	<Null>	56° 49.574' N	002° 11.677' W
BN25_0120	Low	Potential debris	<Null>	14.0	7.2	0.3	<Null>	56° 49.726' N	002° 9.847' W
BN25_0121	Low	Potential debris	15.1	1.6	1.2	0.3	<Null>	56° 50.871' N	002° 4.086' W
BN25_0122	Low	Potential debris	5.8	3.0	1.1	0.5	<Null>	56° 50.661' N	002° 5.891' W
BN25_0123	Low	Linear feature	<Null>	4.5	0.5	0.4	<Null>	56° 50.923' N	002° 4.520' W
BN25_0124	Low	Potential debris	5.5	2.9	0.8	0.5	<Null>	56° 51.432' N	002° 2.259' W
BN25_0125	Low	Potential debris	6.1	2.7	0.7	0.2	<Null>	56° 49.490' N	002° 11.181' W
BN25_0126	Low	Potential debris	<Null>	2.4	0.5	0.6	<Null>	56° 49.459' N	002° 10.712' W

Name	Potential	Description	Magnetic Amplitude (nT)	Length (m)	Width (m)	Height (m)	UKHO ID	Latitude	Longitude
BN25_0127	Low	Potential debris	20.1	2.7	0.8	1.0	<Null>	56° 49.074' N	002° 13.118' W
BN25_0128	Low	Potential debris	<Null>	2.9	1.4	0.4	<Null>	56° 50.347' N	002° 7.032' W
BN25_0129	Low	Potential debris	<Null>	4.7	1.3	0.2	<Null>	56° 51.570' N	002° 0.658' W
BN25_0130	Low	Likely geological	<Null>	5.0	1.7	0.4	<Null>	56° 50.111' N	002° 7.339' W
BN25_0131	Low	Chain cable or rope	<Null>	5.3	0.6	0.1	<Null>	56° 49.142' N	002° 11.476' W
BN25_0132	Low	Fishing gear	<Null>	8.0	1.5	0.2	<Null>	56° 49.567' N	002° 10.082' W
BN25_0133	Low	Potential debris	<Null>	6.6	1.0	0.1	<Null>	56° 49.538' N	002° 10.055' W
BN25_0134	Low	Chain cable or rope	<Null>	8.5	2.9	0.3	<Null>	56° 49.000' N	002° 14.241' W
BN25_0135	Medium	Potential debris	<Null>	3.5	5.1	1.5	<Null>	56° 50.512' N	002° 7.213' W
BN25_0136	Low	Potential debris	<Null>	4.5	2.7	0.4	<Null>	56° 48.708' N	002° 14.188' W
BN25_0137	Low	Potential debris	<Null>	5.6	0.4	0.0	<Null>	56° 49.144' N	002° 11.479' W
BN25_0138	Low	Potential debris	<Null>	4.3	2.5	0.7	<Null>	56° 57.456' N	001° 31.803' W
BN25_0139	Low	Potential debris	<Null>	8.5	6.7	0.3	<Null>	56° 53.670' N	001° 50.447' W
BN25_0140	Medium	Potential debris	377.6	3.6	2.5	1.4	<Null>	56° 54.262' N	001° 47.765' W

Name	Potential	Description	Magnetic Amplitude (nT)	Length (m)	Width (m)	Height (m)	UKHO ID	Latitude	Longitude
BN25_0141	High	Wreck	9824.7	22.9	11.6	3.2	58703	56° 56.622' N	001° 35.619' W
BN25_0142	High	Wreck	7654.4	61.4	13.7	5.1	3174	56° 54.919' N	001° 44.465' W
BN25_0143	Low	Likely geological	<Null>	1.8	1.4	0.1	<Null>	56° 53.529' N	001° 50.656' W
BN25_0144	Low	Potential debris	8	4.2	2.9	2.0	<Null>	56° 54.004' N	001° 47.917' W
BN25_0145	Medium	Potential wreck	<Null>	26.2	5.5	0.9	<Null>	56° 53.561' N	001° 50.528' W
BN25_0146	Low	Potential debris	<Null>	5.8	0.6	0.6	<Null>	56° 54.671' N	001° 44.204' W
BN25_0147	Low	Chain cable or rope	<Null>	7.3	3.6	0.0	<Null>	56° 57.163' N	001° 32.293' W
BN25_0148	Low	Potential debris	<Null>	2.6	2.6	0.1	<Null>	56° 55.033' N	001° 42.505' W
BN25_0149	Low	Potential debris	10.2	2.0	0.7	0.5	<Null>	56° 52.383' N	001° 55.254' W
BN25_0150	Low	Potential debris	<Null>	1.8	1.3	0.3	<Null>	56° 53.403' N	001° 50.016' W
BN25_0151	Low	Potential debris	7.2	3.0	1.0	0.6	<Null>	56° 57.410' N	001° 29.571' W
BN25_0152	Medium	Potential debris	18.4	8.5	6.6	1.2	<Null>	56° 55.819' N	001° 38.223' W
BN25_0153	Medium	Potential debris	50.9	9.1	3.3	2.0	<Null>	56° 54.649' N	001° 43.594' W
BN25_0154	Low	Potential debris	<Null>	3.3	2.4	0.5	<Null>	56° 53.900' N	001° 48.154' W

Name	Potential	Description	Magnetic Amplitude (nT)	Length (m)	Width (m)	Height (m)	UKHO ID	Latitude	Longitude
BN25_0155	Low	Chain cable or rope	35.4	18.2	4.9	0.2	<Null>	56° 57.435' N	001° 29.145' W
BN25_0156	Low	Chain cable or rope	<Null>	30.6	0.7	0.2	<Null>	56° 54.749' N	001° 43.344' W
BN25_0157	Low	Chain cable or rope	12.1	8.8	7.2	0.1	<Null>	56° 57.431' N	001° 29.753' W
BN25_0158	Low	Potential debris	<Null>	3.4	0.4	0.1	<Null>	56° 54.715' N	001° 45.223' W
BN25_0159	Low	Potential debris	140.8	2.5	0.6	0.1	<Null>	56° 54.776' N	001° 44.671' W
BN25_0160	Low	Potential debris	<Null>	5.3	0.7	0.2	<Null>	56° 54.506' N	001° 45.911' W
BN25_0161	Low	Potential debris	16.4	2.1	0.9	0.2	<Null>	56° 52.763' N	001° 54.235' W
BN25_0162	Low	Potential debris	<Null>	3.9	1.1	0.6	<Null>	56° 52.961' N	001° 53.053' W
BN25_0163	Low	Potential debris	32.5	1.1	1.2	0.2	<Null>	56° 56.303' N	001° 35.512' W
BN25_0164	Low	Potential debris	<Null>	3.6	0.8	0.2	<Null>	56° 56.430' N	001° 34.737' W
BN25_0165	Low	Potential debris	<Null>	6.5	2.7	0.3	<Null>	56° 54.893' N	001° 42.210' W
BN25_0166	Low	Potential debris	<Null>	6.1	0.6	0.4	<Null>	56° 53.655' N	001° 48.473' W
BN25_0167	Low	Likely geological	<Null>	3.0	1.5	1.1	<Null>	56° 52.684' N	001° 53.482' W
BN25_0168	Low	Potential debris	14.6	0.7	1.1	0.4	<Null>	56° 56.302' N	001° 34.794' W

Name	Potential	Description	Magnetic Amplitude (nT)	Length (m)	Width (m)	Height (m)	UKHO ID	Latitude	Longitude
BN25_0169	Low	Likely geological	<Null>	6.5	4.0	0.6	<Null>	56° 52.439' N	001° 55.120' W
BN25_0170	Low	Chain cable or rope	<Null>	11.4	0.4	0.0	<Null>	56° 52.136' N	001° 56.902' W
BN25_0171	Low	Likely geological	<Null>	6.4	2.5	0.7	<Null>	56° 54.400' N	001° 45.666' W
BN25_0172	Low	Chain cable or rope	<Null>	37.1	0.1	0.0	<Null>	56° 57.399' N	001° 31.798' W
BN25_0173	Medium	Wreck debris	83.9	33.7	0.5	0.2	<Null>	56° 54.916' N	001° 44.393' W
BN25_0174	Low	Anchor (modern)	<Null>	30.9	1.0	0.3	<Null>	56° 53.421' N	001° 51.673' W
BN25_0175	Low	Chain cable or rope	211.2	11.2	6.9	0.1	<Null>	56° 57.509' N	001° 31.214' W
BN25_0177	Low	Potential debris	11.1	2.0	1.6	0.7	<Null>	57° 2.610' N	001° 23.876' W
BN25_0179	Low	Potential debris	25	1.8	1.8	0.1	<Null>	57° 0.221' N	001° 25.099' W
BN25_0183	Low	Chain cable or rope	<Null>	34.7	1.4	0.1	<Null>	57° 2.231' N	001° 22.987' W
BN25_0184	Low	Potential debris	<Null>	6.9	1.4	0.1	<Null>	57° 3.125' N	001° 22.561' W
BN25_0185	Low	Chain cable or rope	13.9	12.0	0.3	0.0	<Null>	57° 1.585' N	001° 25.501' W
BN25_0186	Low	Potential debris	<Null>	3.7	1.1	0.1	<Null>	56° 58.461' N	001° 27.495' W
BN25_0187	Low	Potential debris	<Null>	7.2	4.0	0.7	<Null>	56° 59.402' N	001° 26.752' W

Name	Potential	Description	Magnetic Amplitude (nT)	Length (m)	Width (m)	Height (m)	UKHO ID	Latitude	Longitude
BN25_0192	Low	Chain cable or rope	<Null>	30.7	25.2	0.1	<Null>	57° 0.913' N	001° 23.264' W
BN25_0193	Low	Chain cable or rope	<Null>	49.1	0.1	0.1	<Null>	57° 1.079' N	001° 23.663' W
BN25_0194	Low	Potential debris	<Null>	9.1	4.1	0.2	<Null>	57° 0.688' N	001° 21.888' W
BN25_0195	Low	Linear feature	<Null>	61.3	0.8	0.1	<Null>	57° 0.279' N	001° 22.866' W
BN25_0196	Low	Potential debris	<Null>	5.7	4.1	0.1	<Null>	56° 59.665' N	001° 23.047' W
BN25_0197	Low	Chain cable or rope	<Null>	40.3	8.8	0.1	<Null>	57° 1.389' N	001° 20.939' W
BN25_0198	Low	Potential debris	<Null>	4.2	2.3	0.8	<Null>	56° 59.753' N	001° 22.675' W
BN25_0199	Low	Chain cable or rope	<Null>	24.8	13.9	0.2	<Null>	57° 0.516' N	001° 22.024' W
BN25_0200	Low	Chain cable or rope	<Null>	14.8	10.8	0.1	<Null>	57° 1.266' N	001° 23.407' W
BN25_0201	Low	Chain cable or rope	<Null>	10.8	3.4	0.1	<Null>	56° 59.953' N	001° 23.222' W
BN25_0202	Low	Chain cable or rope	<Null>	28.3	5.5	0.1	<Null>	57° 1.670' N	001° 21.964' W
BN25_0203	Low	Anchor (modern)	<Null>	127.0	0.4	1.6	<Null>	56° 57.455' N	001° 25.542' W
BN25_0204	Low	Fishing gear	<Null>	31.1	4.4	0.6	<Null>	56° 58.429' N	001° 26.236' W
BN25_0205	Low	Chain cable or rope	<Null>	35.2	5.8	0.0	<Null>	57° 0.239' N	001° 24.227' W

Name	Potential	Description	Magnetic Amplitude (nT)	Length (m)	Width (m)	Height (m)	UKHO ID	Latitude	Longitude
BN25_0206	Low	Fishing gear	<Null>	180.5	0.5	0.2	<Null>	56° 56.984' N	001° 24.919' W
BN25_0207	Low	Potential debris	<Null>	6.7	0.7	0.4	<Null>	56° 54.968' N	001° 26.579' W
BN25_0208	Low	Likely geological	<Null>	8.2	2.7	0.2	<Null>	57° 0.063' N	001° 21.308' W
BN25_0209	Low	Chain cable or rope	21	37.1	10.9	0.2	<Null>	56° 58.222' N	001° 23.287' W
BN25_0210	Low	Chain cable or rope	<Null>	8.3	5.4	0.1	<Null>	56° 58.406' N	001° 22.901' W
BN25_0211	Low	Linear feature	<Null>	5.5	0.4	0.0	<Null>	56° 57.205' N	001° 23.625' W
BN25_0212	Low	Linear feature	<Null>	15.8	0.2	0.0	<Null>	56° 59.541' N	001° 21.180' W
BN25_0213	Low	Linear feature	<Null>	38.7	0.2	0.0	<Null>	56° 59.453' N	001° 21.193' W
BN25_0214	Low	Potential debris	<Null>	3.2	1.8	0.5	<Null>	56° 57.597' N	001° 23.553' W
BN25_0215	Low	Chain cable or rope	<Null>	9.8	6.8	0.1	<Null>	56° 58.575' N	001° 22.687' W
BN25_0216	Low	Potential debris	6.3	6.5	4.5	0.2	<Null>	56° 56.998' N	001° 23.949' W
BN25_0217	Low	Chain cable or rope	<Null>	28.6	9.8	0.0	<Null>	57° 1.488' N	001° 20.290' W
BN25_0218	Low	Potential debris	15.1	4.2	0.6	0.1	<Null>	57° 0.418' N	001° 21.763' W
BN25_0219	Low	Fishing gear	<Null>	73.6	0.1	0.2	<Null>	56° 57.022' N	001° 25.230' W

Name	Potential	Description	Magnetic Amplitude (nT)	Length (m)	Width (m)	Height (m)	UKHO ID	Latitude	Longitude
BN25_0220	Low	Fishing gear	<Null>	185.2	0.4	0.3	<Null>	56° 56.723' N	001° 25.004' W
BN25_0221	Low	Fishing gear	<Null>	169.9	0.2	0.4	<Null>	56° 57.318' N	001° 24.323' W
BN25_0222	Low	Potential debris	42.7	3.0	1.2	0.2	<Null>	57° 1.907' N	001° 19.759' W
BN25_0223	Low	Potential debris	<Null>	3.9	1.5	0.2	<Null>	57° 0.661' N	001° 21.060' W
BN25_0224	Low	Potential debris	5.8	1.3	0.2	0.2	<Null>	57° 0.619' N	001° 21.104' W
BN25_0225	Low	Chain cable or rope	8.4	13.5	6.2	0.0	<Null>	57° 0.096' N	001° 21.525' W
BN25_0226	Low	Chain cable or rope	13.3	66.5	0.9	0.1	<Null>	56° 59.840' N	001° 21.909' W
BN25_0227	Low	Potential debris	<Null>	6.9	3.0	0.1	<Null>	56° 59.731' N	001° 22.038' W
BN25_0228	Low	Chain cable or rope	<Null>	47.6	0.8	0.1	<Null>	56° 59.241' N	001° 22.429' W
BN25_0229	Low	Potential debris	<Null>	8.2	3.9	0.2	<Null>	56° 54.967' N	001° 27.377' W
BN25_0230	Low	Fishing gear	<Null>	85.3	9.1	0.4	<Null>	56° 56.402' N	001° 25.510' W
BN25_0231	Low	Potential debris	<Null>	11.5	0.6	0.1	<Null>	56° 59.489' N	001° 22.518' W
BN25_0232	Low	Linear feature	<Null>	10.4	0.3	0.1	<Null>	57° 0.729' N	001° 20.107' W
BN25_0233	Low	Chain cable or rope	<Null>	6.9	0.4	0.0	<Null>	56° 59.701' N	001° 21.071' W

Name	Potential	Description	Magnetic Amplitude (nT)	Length (m)	Width (m)	Height (m)	UKHO ID	Latitude	Longitude
BN25_0234	Low	Potential debris	<Null>	7.2	2.3	0.3	<Null>	56° 57.995' N	001° 22.953' W
BN25_0235	Low	Chain cable or rope	<Null>	106.6	10.4	0.1	<Null>	56° 59.733' N	001° 21.870' W
BN25_0236	Low	Likely geological	<Null>	3.8	2.2	1.0	<Null>	56° 57.803' N	001° 20.773' W
BN25_0237	Low	Fishing gear	6.8	50.6	15.4	0.3	<Null>	56° 59.141' N	001° 19.302' W
BN25_0238	Low	Fishing gear	37	19.3	20.9	0.5	<Null>	56° 59.152' N	001° 19.320' W
BN25_0239	Low	Potential debris	11.1	4.2	1.2	0.5	<Null>	56° 58.628' N	001° 19.899' W
BN25_0240	Low	Fishing gear	<Null>	406.4	0.2	0.1	<Null>	56° 59.512' N	001° 19.175' W
BN25_0241	Medium	Potential debris	<Null>	7.3	4.5	0.5	<Null>	57° 0.180' N	001° 18.411' W
BN25_0242	Low	Potential debris	161.5	3.8	2.7	0.6	<Null>	57° 0.782' N	001° 18.953' W
BN25_0243	Low	Fishing gear	<Null>	138.1	0.5	0.1	<Null>	57° 0.419' N	001° 18.793' W
BN25_0244	Low	Potential debris	<Null>	8.2	3.1	0.1	<Null>	57° 1.631' N	001° 17.483' W
BN25_0245	Low	Fishing gear	5.1	60.0	13.7	0.3	<Null>	57° 0.275' N	001° 19.857' W
BN25_0246	Low	Chain cable or rope	<Null>	98.0	0.2	0.1	<Null>	57° 0.952' N	001° 19.284' W
BN25_0247	Low	Potential debris	<Null>	5.1	1.3	1.1	<Null>	57° 0.376' N	001° 19.367' W

Name	Potential	Description	Magnetic Amplitude (nT)	Length (m)	Width (m)	Height (m)	UKHO ID	Latitude	Longitude
BN25_0248	Low	Chain cable or rope	<Null>	31.2	0.6	0.0	<Null>	56° 58.238' N	001° 21.585' W
BN25_0249	Low	Chain cable or rope	<Null>	19.9	0.2	0.0	<Null>	56° 57.687' N	001° 21.672' W
BN25_0250	Low	Potential debris	14.9	4.4	2.4	0.8	<Null>	56° 56.386' N	001° 22.566' W
BN25_0251	Medium	Potential debris	231.1	9.8	5.6	0.6	<Null>	57° 0.649' N	001° 18.134' W
BN25_0252	Low	Fishing gear	16.7	9.4	3.6	0.3	<Null>	57° 0.286' N	001° 19.829' W
BN25_0253	Low	Potential debris	7	3.6	1.6	0.9	<Null>	56° 58.126' N	001° 18.620' W
BN25_0254	Low	Fishing gear	<Null>	95.8	48.2	0.3	<Null>	56° 59.129' N	001° 17.485' W
BN25_0255	Low	Chain cable or rope	<Null>	55.9	0.4	0.0	<Null>	56° 55.765' N	001° 22.323' W
BN25_0256	Low	Chain cable or rope	<Null>	11.1	10.8	0.1	<Null>	56° 57.244' N	001° 20.114' W
BN25_0257	Low	Likely geological	<Null>	1.6	5.6	0.5	<Null>	57° 1.339' N	001° 16.479' W
BN25_0258	Low	Chain cable or rope	<Null>	20.3	0.3	0.1	<Null>	56° 58.494' N	001° 19.914' W
BN25_0259	Low	Fishing gear	5.9	20.6	10.6	0.3	<Null>	56° 58.642' N	001° 18.990' W
BN25_0260	Low	Linear feature	<Null>	15.5	0.3	0.1	<Null>	56° 55.127' N	001° 22.735' W
BN25_0261	Low	Potential debris	7	5.2	1.0	0.4	<Null>	56° 54.825' N	001° 23.595' W

Name	Potential	Description	Magnetic Amplitude (nT)	Length (m)	Width (m)	Height (m)	UKHO ID	Latitude	Longitude
BN25_0262	Low	Potential debris	<Null>	9.8	1.1	0.5	<Null>	57° 0.069' N	001° 17.511' W
BN25_0263	Low	Potential debris	<Null>	6.9	3.0	0.4	<Null>	56° 56.121' N	001° 19.657' W
BN25_0264	Low	Chain cable or rope	<Null>	35.2	0.1	0.0	<Null>	56° 55.410' N	001° 19.201' W
BN25_0265	Low	Fishing gear	<Null>	93.6	0.9	0.3	<Null>	56° 58.301' N	001° 16.783' W
BN25_0266	Low	Chain cable or rope	<Null>	8.8	4.4	0.1	<Null>	56° 54.593' N	001° 20.775' W
BN25_0267	Low	Fishing gear	<Null>	51.8	15.0	0.2	<Null>	57° 0.525' N	001° 13.847' W
BN25_0268	Low	Chain cable or rope	<Null>	14.4	0.3	0.4	<Null>	56° 54.771' N	001° 20.258' W
BN25_0269	Low	Chain cable or rope	<Null>	12.9	2.5	0.1	<Null>	56° 55.303' N	001° 19.613' W
BN25_0270	Low	Chain cable or rope	5.6	5.3	2.8	0.0	<Null>	56° 57.261' N	001° 18.401' W
BN25_0271	Low	Chain cable or rope	<Null>	29.0	0.4	0.1	<Null>	56° 55.774' N	001° 18.676' W
BN25_0272	Low	Chain cable or rope	<Null>	93.4	0.1	0.0	<Null>	56° 55.912' N	001° 19.725' W
BN25_0273	Low	Chain cable or rope	11.7	24.2	0.2	0.0	<Null>	56° 55.246' N	001° 19.825' W
BN25_0274	Low	Chain cable or rope	<Null>	67.6	0.3	0.1	<Null>	56° 55.818' N	001° 19.820' W
BN25_0275	Low	Chain cable or rope	<Null>	7.7	6.1	0.0	<Null>	56° 55.025' N	001° 19.865' W

Name	Potential	Description	Magnetic Amplitude (nT)	Length (m)	Width (m)	Height (m)	UKHO ID	Latitude	Longitude
BN25_0276	Low	Chain cable or rope	<Null>	23.4	0.2	0.1	<Null>	56° 57.430' N	001° 14.080' W
BN25_0277	Low	Potential debris	6.3	2.7	0.7	0.3	<Null>	56° 59.596' N	001° 11.488' W
BN25_0278	Low	Potential debris	13	2.7	0.7	0.1	<Null>	56° 57.433' N	001° 14.615' W
BN25_0279	Low	Potential debris	<Null>	3.0	1.6	0.9	<Null>	56° 59.100' N	001° 12.847' W
BN25_0280	Low	Chain cable or rope	<Null>	56.2	31.5	0.1	<Null>	56° 57.444' N	001° 14.283' W
BN25_0281	Low	Fishing gear	<Null>	86.9	0.2	0.0	<Null>	56° 59.281' N	001° 13.500' W
BN25_0282	Low	Potential debris	5.1	4.8	2.1	0.1	<Null>	56° 55.513' N	001° 17.220' W
BN25_0283	Low	Fishing gear	<Null>	34.5	0.3	0.4	<Null>	56° 59.076' N	001° 14.756' W
BN25_0284	Low	Potential debris	<Null>	3.8	0.8	0.3	<Null>	56° 54.897' N	001° 19.187' W
BN25_0285	Low	Chain cable or rope	<Null>	9.6	0.3	0.4	<Null>	56° 58.710' N	001° 14.480' W
BN25_0286	Low	Chain cable or rope	<Null>	108.8	0.3	0.0	<Null>	56° 58.004' N	001° 15.814' W
BN25_0287	High	Potential wreck	<Null>	30.6	12.3	1.4	<Null>	56° 48.033' N	002° 17.342' W
BN25_0288	Medium	Potential debris	82.1	25.3	19.7	0.4	<Null>	56° 58.803' N	001° 25.335' W

ANNEX D. RECORDED LOSSES

Trove ID	HER ID	Name	Description	Year of Loss
121225	NO86NW0032	*Balmoral*	Cargo vessel	1891
197226	NO86NW0023	*Mould*	Schooner	1854
199386	NO87SW0147	*Sarah Anderson*	Lugger	1890
196877	NO86NW0026	*Lord Of The Isles*	Vessel	1838
198281	NO86NW0034	*Speculation*	Brig	1876
198441	NO86NW0035	*Gem*	Schooner	1878
200326	NO86NW0036	*Lord Clyde*	Schooner	1902
200347	NO87SW0154	*Brothers*	Lugger	1902
200348	NP07NW0002	*Gudrun*	Smack	1902
199697	NO87SW0151	*Alice And Isabella*	Lugger	1897
200128	NO87SW0153	*Southesk*	Lugger	1900
201120	NP07SW0001	*Queen Alexandra*	Steam Trawler	1915
199421	NO86NW0024	*Die Gute Erwartung*	Smack	1891
200460	NO87SW0155	*Brimming River*	Lugger	1904
199441	NO87SW0148	*Rose Bank*	Lugger	1892
207490/313193	NP18SW0001	*Ethelbert*	Steam Trawler	1911
208078	NP07SE0001	*Nova*	Steamship	1917
208079	NP49SW0001	*Galatia*	Steam Trawler	1917
250280	NO86NW0037	*Freia*	Brigantine	1889
257939	NO87SW0160	*Fisher Lassie*	Lugger	1875
255923	NO86NW0030	*Cora*	Schooner	1868
256575	NO87SW0158	*Ann Wylie*	Lugger	1875
261070	NO87SW0162	*Earl Of Clarendon*	Schooner	1884

Trove ID	HER ID	Name	Description	Year of Loss
265520	NO86NW0039	*Mercur*	Schooner	1875
260898	NO86NW0038	*Maren*	Schooner	1882
271999	NO86NW0027	*Leslie*	Brig	1844
273287	NP07NW0001	*Thomas And James*	Unknown	1844
285490	NO87SW0169	*Pallas*	Schooner	1868
285060		*Susan And Henry*	Craft	19th century
285061		*Freischutz*	Craft	19th century
290938		*Albion*	Schooner	19th century
313217		*William Findley*	Steamship	19th century
313255		*Marjorie Brown*	Lugger	20th century
313264		*Chestnut*	Drifter	20th century
313202		*Athole*	Steam Trawler	20th century
313228		*Greenwich*	Craft	19th century
313232		*Arrow*	Smack	19th century
313272		*Euphemia*	Brig	19th century
313276		*Hood*	Steam Trawler	20th century
313816		*Dreadnought (Possibly)*	Craft	Unknown
313268		*Mayflower*	Lugger	20th century
313035		*Mary*	Craft	19th century
313239		*Dutiful*	Motor Fishing Vessel	20th century
313240		*Robin*	Steam Trawler	20th century
313241		*Williamina*	Smack	20th century
313242		*Guiding Star*	Smack	20th century
313243		*Experiment*	Craft	19th century

Trove ID	HER ID	Name	Description	Year of Loss
313244/325694		*Two Brothers*	Craft	19th century
328129		*James (Me 186)*	Lugger	20th century
325825		*Finance*	Brig	Unknown
328212	NO86NW8040	*Lady Abercombie*	Sloop	Unknown
324676		*Unknown*	Craft	Unknown
325657		*Northern Star (North Star ?)*	Steamship	Unknown
327634		*Unknown 1925*	Craft	Unknown
325694		*Two Brothers*	Craft	Unknown
328949		Unknown 1786	Craft	Unknown
327729		Unknown 1815	Fishing Vessel	Unknown
329567		Unknown 1768	Craft	Unknown
329044		William	Craft	Unknown
327865		Unknown 1820	Craft	Unknown
208561	NP38NW0001	Lilie	Unknown	Unknown
	NO86NW0033	Soar	Steam Trawler	1940
	NO87SW0159	Mereur	Schooner	1875
	NP18SE0001	Aurora	Lugger	1876
	NO87SE0004	Barth	Unknown	1876
	NO87SW0150	Jane Marie	Schooner	1895
	NO87SW0165	Margaret And Ann	Cutter	1847
	NO87SW0157	Augvald	Schooner	1898
	NO87SW0145	Pride Of Scotland	Lugger	1890
	NP28NE0001	Tullochgorm	Lugger	1875
	NO87SW0168	Commerce	Brig	1858

Trove ID	HER ID	Name	Description	Year of Loss
	NO87SW0146	Adelaide	Brigantine	1881
	NO86NW0040	Dinorah	Unknown	1881
	NO87SW0163	Little Alice	Steamship	1874
	NO87SE0005	Elise	Unknown	1876
	NO87SW0143	Lady Abercromby	Sloop	1836
	NO87SW0166	Maine	Unknown	1852
	NO87SW0152	Agnes And Mary Anne	Lugger	1897
	NO87SW0167	Janets And Isabella	Unknown	1852
	NO87SE0003	Solus	Unknown	1877
	NO87SW0161	Louisa Caroline	Schooner	1880
	NO87SW0164	Penelope	Brig	1876
	NO86NW0041	Margaret Reid	Schooner	1882
	NO87SE0006	Renen	Unknown	1876
	NO87SW0144	Argus	Schooner	1876

ANNEX E. AVIATION RECORDS

Trove ID	Type	Description	Latitude (WGS84)	Longitude (WGS84)
313229	Unknown	An unknown aircraft was reported lost in the North Sea near Gourdon on 27th February 1942.	56° 49.811' N	002° 15.829' W
328314	Unknown	'A/C' listed as being trawled up 12 miles off Stonehaven in September 1936 after a long time in the sea. Trove lists this as a 'craft', but it is presumably an aircraft.	56° 54.673' N	001° 50.245' W

ANNEX F. INTERTIDAL RECORDS

HER ID	Type	Description	Latitude (WGS84)	Longitude (WGS84)	Easting (BNG)	Northing (BNG)
NO87SW0033	Harbour	Gourdon Harbour is a late 19th century harbour that began gaining importance in the late 18th century. It is listed as a standing structure and consists of a single-basin harbour formed from two rubble piers and later enhanced by a concrete pier on the south side.	56° 49.637' N	002° 17.22' W	382583.46	770682.73
NO86NW0053	Harbour	Haughs Bay is a natural harbour, with some evidence of clearing of boulders to the side, recorded during site visit in 2023 as part of the SCAPE Coastal Zone Assessment Survey. This is one of the very few boat access places through the rock platform.	56° 48.525' N	002° 18.47' W	381302.50	768624.48