Erebus Floating Offshore Wind Farm

Marine Archaeology Technical Report

Project Name	Erebus Floating Offshore Windfarm	
Client	MarineSpace	
Client Project Number		
MSDS Marine Project Number	MSDS20149	
Author and contact details	Phoebe Ronn Phoebe@MSDSMarine.co.uk	Mark James Mark@MSDSMarine.co.uk
Origination date	21/05/2021	
Reviser (s)	Sally Evans, Mark James	
Date of last revision	02/11/2021	
Quality Assurance Approval	Mark James	
Version number:	2	
Summary of changes	Addressing client comments Alterations to AEZs following consultation with RCAHMW and Cadw	

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1.0 Introduction

1.0.1 MSDS Marine were contracted by MarineSpace to produce a Marine and Intertidal Archaeological Technical Report of the site of the Erebus Floating Offshore Wind Farm (FLOW). This Technical Report supports the Marine and Intertidal Archaeology Environmental Statement (ES) for the site.

1.1 Aims and Objectives

1.1.1 The aim of this Technical Report is to provide an assessment of the known and potential historic assets that exist within the study area, and to identify the risks to these resources from the effects of development. To achieve this aim, the following objectives are proposed:

- To detail the policy context for the assessment by summarising relevant legislation, policy and guidance relating to the archaeological interests that may be affected by development and works within the study area;
- To establish the known and potential archaeological baseline for the marine and intertidal areas including to:
- To identify designated and non-designated heritage assets within the site and study area;
- To provide an assessment these known, and potential remains based on existing data records and secondary sources;
- To review and assess available geophysical survey data to identify and provide an assessment of features of archaeological interest;
- To assess the potential for currently unrecorded historic assets within the site and study area;
- To summarise the known and potential archaeological interests that may be impacted by the development and works;
- To assess the significance of the known and potential archaeological resources;
- To identify potential impacts and provide an assessment of risk to marine archaeological resources from the proposed development and works; and
- To provide recommendations for mitigation measures to ensure appropriate protection and reporting of archaeological sites and material over the life span of any development.

1.1.2 The components of the baseline environment described in this chapter are the prehistoric, maritime, aviation sites of archaeological potential. The baseline is defined as the present nature of the archaeological environment at the site.

2.0 Policy, Legislation and Guidance

2.0.1 Legislation, policy, and guidance relating to the marine historic environment within Welsh territorial waters have been collated and assessed. The most notable and relevant examples to the project are summarised below. All work set out within this document follows the legislation, policy and guidance detailed within this section.

2.1 Legislation and policy

- International The World Heritage Convention (1972);
- United Nations Convention on the Law of the Sea (1982);
- International Council of Monuments and Sites Charter on the Protection and Management of Underwater Cultural Heritage (1996) (the Sofia Charter);
- UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001);
- European Convention on the Protection of the Archaeological Heritage (Revised) 1992 (the Valletta Convention) – this was ratified by the UK Government in 2000 and came into force in 2001.
- European Landscape Convention 2000 – adopted in the UK 1st March 2007.

United Kingdom

2.1.1 In addition to this, there are a number of Acts and policy documents that relate specifically to maritime cultural heritage within the UK that lies within the 12 nautical mile territorial limit. These are as follows:

- Protection of Wrecks Act (1973):

  Section One – this section of the PWA 1973 enables the Secretary of State to protect wreck sites from unauthorised interference if they are of archaeological or artistic importance. Under the Act it is an offence to carry out certain activities in a defined area surrounding the site unless a licence for those activities has been obtained from the Government.

  Section Two – this section of the PWA 1973 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). While Section Two of the Act is not used to designate sites because of their archaeological interest, it is possible that a dangerous wreck designated under this section might also be of archaeological interest.

- Ancient Monuments and Archaeological Areas Act (1979):

  This Act has previously primarily been employed to protect sites on land, but in recent years it has also been used to in the designation of underwater sites. Scheduled Monuments and Areas of Archaeological Importance are afforded statutory protection by the Secretary of State, and consent is required for any intrusive works.

- Protection of Military Remains Act (1986):

  Under the PMRA 1986, all aircraft that have crashed in military service are protected, and the Ministry of Defence (MoD) has powers to protect vessels that were in military service when they were lost. The MoD can designate named losses as Protected Places even if the position of the wreck is not known. In addition, the MoD can designate Controlled Sites around wrecks whose position is known. In the case of Protected Places, the vessel must

have been lost after 4th August 1914, whereas in the case of a wreck protected as a 'controlled site' no more than 200 years must have elapsed since loss.

For Controlled Sites or Protected Places, it is not necessary to demonstrate the presence of human remains. Diving is not prohibited at a Protected Place, but it is an offence to tamper with, damage, move or remove sensitive remains. However, diving, salvage and excavation are all prohibited on Controlled Sites, though licences for restricted activities can be sought from the MoD.

- Merchant Shipping Act (1995):

Within the context of the Merchant Shipping Act 1995, 'wreck' refers to flotsam, jetsam, derelict, and lagan found in or on the shores of the sea or any tidal water. It includes a ship, aircraft or hovercraft, parts of these, their cargo or equipment. It may be of antique of archaeological value such as gold coins, or a yacht or dinghy abandoned at sea or items such as drums of chemicals or crates of foodstuffs (Definition from the Marine and Coast Guard Agency web site).

The ownership of underwater finds recovered from the sea is decided in line with a set of procedures detailed in the Merchant Shipping Act 1995. If finds are brought ashore the salvor is required to give notice to the Receiver of Wreck (RoW) that he/she is in possession of the material. This applies whether material has been recovered from within or outside UK Territorial Waters.

- Marine and Coastal Access Act (2009):

This act introduced new planning and management systems for overseeing the marine environment. It introduced a requirement to obtain marine licences, administered in Wales by Natural Resources Wales for works at sea (including the deposition or removal of any substance or object below Mean High Water). The act also instated a marine planning system to promote the efficient, sustainable use and protection of the marine environment, this is guided by the Marine Policy Statement and local marine plans. The Act also amended certain provisions of the Planning Act 2008.

This act also introduced the designation of Marine Conservation Zones (MCZs) which are a type of Marine Protected Area (MPA). This designation seeks to protect important marine wildlife, habitats, geology, and geomorphology.

- UK Marine Policy Statement (2011):

The UK Marine Policy Statement (MPS) (HM Government, 2011) and UK High Level Marine Objectives (HLMO) set out the importance of cultural heritage as a component of delivering sustainable development in the UK through the use of a system of Marine Planning. The documents clearly identify cultural heritage as an important component of decision making and state that non-designated heritage sites should be considered subject to the same policy principles as applied to designated heritage assets (HM Government, 2011, Section 2.6.6.3). According to the MPS, the interest and significance of all heritage assets that may be affected by a proposed development should be identified and properly assessed to minimise conflict.

Wales

2.1.2 There are four regional archaeological trusts in Wales that have advisory roles to Cadw; the Project is covered by Dyfed Archaeological Trust. There are a number of Acts and Policies of relevance to this project, for marine archaeology:

- Historic Environment (Wales) Act (2016):

  This forms part of a suite of legislation, policy, advice, and guidance that makes improvements to the existing systems for the protection and sustainable management of the Welsh historic environment. The Historic Environment (Wales) Act became law on 21 March 2016. In conjunction with this Cadw have started to prepare several policy, advice and guidance documents relating to managing the historic environment which will be subject to amendment as the provisions of the Act alter and will be subject to full public consultation before adoption. This includes Technical Advice Note 24: Historic Environment which will provide guidance on local development plans, designated assets and archaeological remains.

- The Planning (Listed Buildings and Conservation Areas) (Wales) Regulations (2012):

  This Act was passed in July 2015 and makes provision for the preparation and revision of a new National Development Framework for Wales and the production of Strategic Development Plans. Although planning law only applies within the territory of local authorities, which generally extends only to Mean Low Water (MLW), Cadw is fully aware of the significance of seabed prehistory and submerged landscapes, and the importance of a seamless approach to protection.

- Planning Policy Wales (2017):

  Planning Policy Wales (PPW), edition 10, was published by the Welsh Government in December 2018. This document includes the principal national guidance on the importance, management and safeguarding of the historic environment within the planning process in Wales and provides advice on all aspects of planning policy in Wales. PPW is supplemented by a series of Technical Advice Notes (TANs) and Circulars issued by the Welsh Office and the National Assembly of Wales. PPW, the TANs, Circulars and policy clarification letters comprise national planning policy in Wales.

- Welsh National Marine Plan (2019):

  This policy covers cultural heritage, historic landscapes, and amenity issues. It also stresses the need for sustainable development and holistic management.

2.1.3 The relevant marine plan objectives from the Welsh National Marine Plan (2019) include:

- Objective 7: support enjoyment and stewardship of our coasts and seas and their resources by encouraging equitable and safe access to a resilient marine environment, whilst protecting and promoting valuable landscapes, seascapes, and historic assets. (supported by SOC_05, and in part by SOC_06 and SOC_07)

2.1.4 Policy SOC_05 identifies that proposals that may affect historic assets should demonstrate that they will in order of preference: a) avoid, b) minimise, c) mitigate, d) if it is not possible to mitigate, to state the case, such as reasoning the greater public benefit, for proceeding, and that opportunities to enhance historic assets are encouraged (Welsh Government 2019).

2.1.5 Policy SOC_06 identifies that proposals that may affect designated landscapes should demonstrate that they will in order of preference: a) avoid, b) minimise, c) mitigate, d) if it is not possible to mitigate, to state the case, such as reasoning the greater public benefit, for

proceeding, and that opportunities to enhance designated landscapes are encouraged (Welsh Government 2019).

2.1.6 Policy SOC_07 identifies that proposals that may affect seascapes should demonstrate that they will in order of preference: a) avoid, b) minimise, c) mitigate, d) if it is not possible to mitigate, to state the case, such as reasoning the greater public benefit, for proceeding, and that opportunities to enhance seascapes are encouraged (Welsh Government 2019).

2.2 Guidance

2.2.1 Relevant guidance for working with offshore archaeology and cultural heritage include the following:

- Welsh Government Technical Advice Note 24: The Historic Environment (Welsh Government, 2017a);
- Managing the Marine Historic Environment of Wales (Cadw, 2020);
- Conservation Principles for the Sustainable Management of the Historic Environment in Wales (Cadw, 2011);
- Heritage Impact Assessment in Wales, Cadw, Welsh Assembly Government (Cadw, 2017);
- Code of Practice for Seabed Development (Joint Nautical Archaeology Policy Committee, 2006);
- Military Aircraft Crash Sites (English Heritage, 2002);
- Aircraft Crash Sites at Sea (Wessex Archaeology, 2008);
- Identifying and Protecting Palaeolithic Remains (English Heritage, 1998);
- Marine Geophysics Data Acquisition, Processing and Interpretation, Guidance Notes, (English Heritage, 2013);
- Standard and guidance for historic environment desk-based assessment (CIfA, 2017)
- Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (COWRIE, 2011)
- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (COWRIE, 2008)
- Historic Environment Guidance for the Offshore Renewable Energy Sector (Wessex Archaeology, 2007)
- Historic Environment Guidance for Wave and Tidal Energy (Firth, 2013);
- Archaeological Written Schemes of Investigation for Offshore Renewables Projects (The Crown Estate 2021); and
- Protocol for Archaeological Discoveries (PAD), (The Crown Estate 2014)

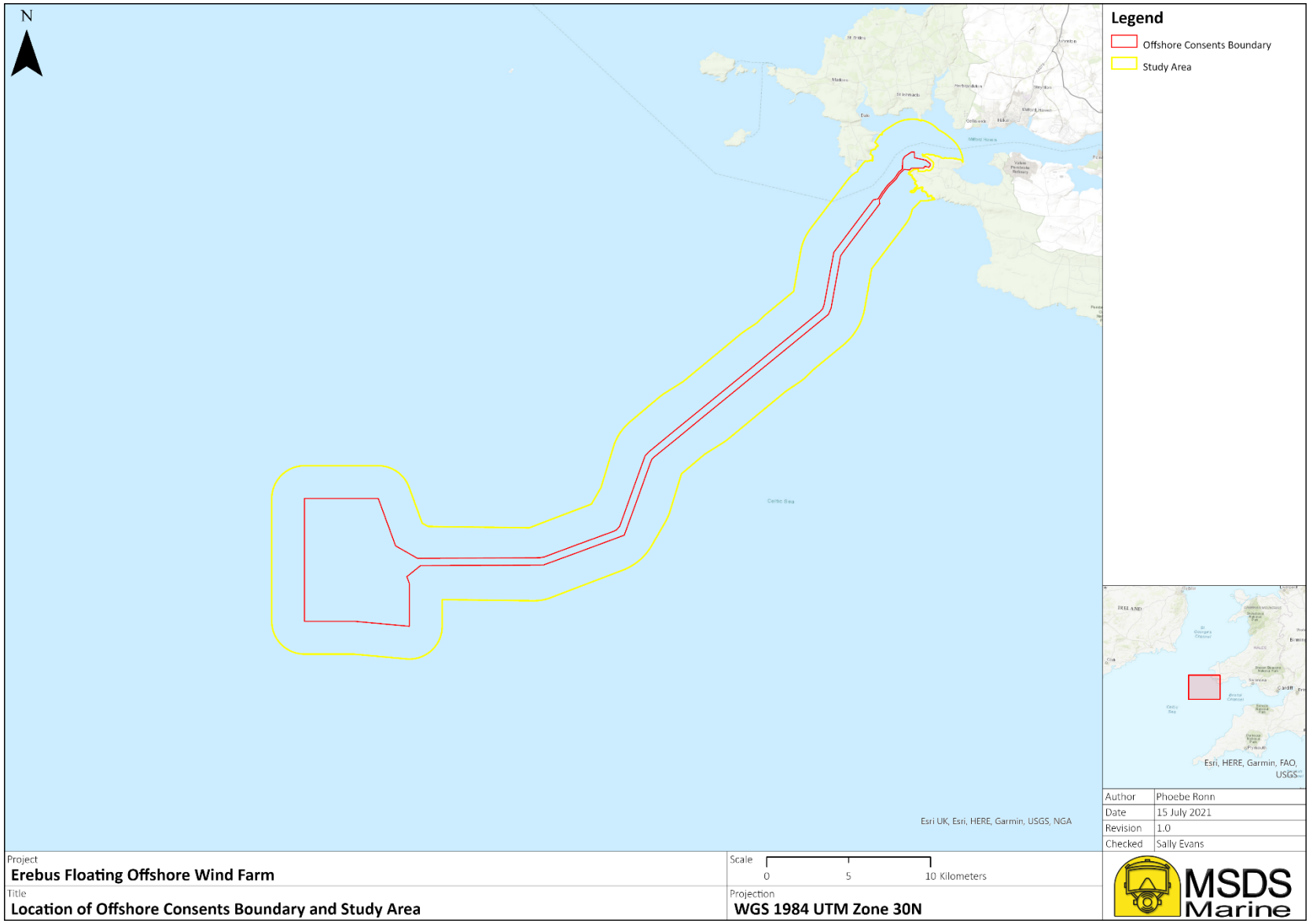


Figure 1: Location of Offshore Consent Boundary and Study Area.

3.0 Methodology

3.1.1 This section provides an overview of methods used to inform the baseline assessment. The site and study area are described first, followed by data sources, and detailed methods for the review of these data sources then follows.

3.1.2 The baseline assessment is primarily focused on known and potential remains relating to:

- Submerged prehistoric remains and palaeolandscapes;
- Maritime and aviation archaeology;
- Maritime infrastructure, intertidal remains and adjacent archaeology; and
- Registered landscapes (specifically, the Milford Haven Waterway).

3.1.3 The data sources, methods, and structure of the baseline section (Section 4.0 to **Error! Reference source not found.**) reflect this.

3.2 Consent BoundaryStudy Area

3.2.1 The Proposed Development consists the Array Area and Export Cable Route or Offshore Cable Corridor (referred to as the ECC). These areas form the Offshore Consent Boundary (Figure 1). They cover the offshore component for installation of the Proposed Development including where the ECC makes landfall, in West Angle Bay.

3.2.2 For this assessment, a Marine Archaeological Study Area (Study Area) has been created. The Study Area comprises a buffer zone of 2 km around the Offshore Consent Boundary up to Mean High Water Spring (MHWS). Additionally, a buffer of 200 m has been applied at the landfall site above MHWS. These buffers are included within the Study Area. The buffer extends above MHWS as there is potential for remains eroded from the surrounding area to be present within the intertidal zone and thus within the Offshore Consent Boundary. The buffers were selected in order to better characterise the potential for archaeological remains.

3.3 Data sources

3.3.1 In order to assess the known and potential archaeological resource a wide variety of information sources and reference materials have been consulted to inform the assessment. Information has been collated from regional and site-specific archaeological assessments and surveys. Evidence from these data sources have been reviewed to produce an understanding of known and potential heritage assets with the overall aim of determining the nature, extent and significance of the historic environment within a specified area' (i.e., within the Offshore Consent Boundary and Study Area) (CIfA 2014: 4).

Site Surveys, existing datasets, and secondary sources

3.3.2 Site specific surveys have provided key sources of data. Geophysical data collected over the Proposed Development and the ground model produced for the Proposed Development has undergone archaeological review.

3.3.3 An intertidal walkover survey was also undertaken as part of the baseline assessment, with an initial review of the results of drone survey of the intertidal area. Detailed methods for these reviews are set out below.

3.3.4 An initial geotechnical campaign was also undertaken in 2021; at the current time no results are available to incorporate into the assessment. However, geoarchaeological work associated with this campaign is ongoing. Full details of the methods for this geoarchaeological involvement are set out within Volume 3, Technical Appendix 14.2 Marine Archaeology Written Scheme of Investigation.

3.3.5 Known heritage assets have been collated to create a gazetteer (Appendix 1: Gazetteer). Entries are provided with a number with the prefix 'MSDS_Erebus_'. These inform the assessment, and where relevant are referred to within the text.

3.3.6 A list of the main sources of information and data used in this report can be found in Table 1.

Type	Source
Geophysical and Geotechnical reports	Site geophysical survey (GEOxyz, 2021)
	Site geophysical survey (Rovco, 2021a)
	Erebus Stage 1 Floating Windfarm Geological Desk Top Study (Intertek 2019)
	Blue Gem Wind Project Geophysical & Environmental Final Survey Report (OWC 2021b) ROV Survey undertaken in September 2021 for the sole purposes of investigating two archaeological sites identified by the archaeological assessment of geophysical survey data
Research Papers and Publications	United Kingdom Offshore Regional Report: The geology of Cardigan Bay and the Bristol Channel (Tappin et al. 1994)
	An overview of the lithostratigraphical framework for the Quaternary deposits on the United Kingdom continental shelf (Stoker et al. 2011)
	North Celtic Sea including parts of 1:250 000 series sheets Nymphe Bank 51 N - 08 W; Lundy 51 N - 06 W;Labadie Bank 50 N - 10 W; Haig Fras, 50 N - 08W; and Land's End 50 N - 06 W. Quaternary Geology. (Ordnance Survey for the Institute of Geological Sciences 1991)
	West Coast Palaeolandscape Survey (Fitch et al. 2011)
	British Geological Society GeoIndex Offshore
	BRITICE Glacial Mapping Project (University of Sheffield)
	A range of publications by the following authors who have undertaken research into the palaeogeography in the outer Bristol Channel area: Christopher Rolfe, David Bowen, Christopher Clark, Anna Hughes, Philip Gibbard, Philip Hughes, John Hiemstra, and Rachel Smedley
Data Sources	List of designated heritage assets held by Cadw Including: • World Heritage Sites; • Protected Wrecks; • Scheduled Monuments; • Listed buildings; • Registered Parks and Gardens; and • Registered Landscapes.
	List of wrecks designated under the Protection of Military Remains Act, 1986
	United Kingdom Hydrographic Office (UKHO) records of wrecks, obstructions, and fouls

	National Monuments Record of Wales (NMRW) data from the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW)
	Records from the Receiver of Wrecks (RoW)
	Historic Environment Record (HER) data from Dyfed Archaeological Trust
	Secondary sources consulted include relevant literature from journals, publications, and unpublished archaeological reports.
ASLF Projects	Enhancing our Understanding: Mapping Navigational Hazards as areas of Maritime Archaeological Potential (Merrit et al. 2007)
	Mapping Navigational Hazards as Areas of Maritime Archaeological Potential: The effects of sediment type on the preservation of marine archaeological materials (Gregory 2006)
	Refining Areas of Maritime Archaeological Potential for Shipwrecks - AMAP 1 (Merrit 2008)
	Areas of Maritime Archaeological Potential 2 - Characterising the Potential for Wrecks (AMAP2) (SeaZone 2011)

Table 1 Information and Data Sources

3.3.7 Specific methodologies for incorporation of the geophysical survey data and intertidal survey data into the baseline assessment are set out below. However, before the detailed methods are set out an overview of dating terminology is given.

3.4 Chronology

Archaeological Chronology

3.4.1 Three chronology systems are used when discussing archaeological remains or periods. These are as follows:

- Absolute dates: These are fixed dates that correspond with calendar years and are suffixed with BC (Before Christ) or AD (Anno Domini). For example, a date of 643 BC occurred 2664 years ago, and a date of 1066 AD occurred 955 years ago (correct as of 2021).
- Calibrated radiocarbon dates: these can either be presented as calendar dates, or as the number of years before 1st January 1950 (before practical radiocarbon dating technology was available, and before large scale nuclear testing altered the global ratio of ^{14}C to ^{12}C making dating subsequent to this date unreliable). For example, a date of 11,700 BP occurred 11,770 years ago (correct as of 2021) and could also be presented as 9,749 BC, noting that there is no 'year zero' so 1 Is subtracted from each date.
- Uncalibrated radiocarbon dates: these are dates that are based on the radiocarbon dating that do not take fluctuations in 14C levels into account. These dates can be calibrated using a calibration curve to convert them into calendar dates.

3.4.2 Dating in this report uses BP or BC dates. For events or sites that predate the Mesolithic (10,000 BP/8,000 BC) dates are usually given in BP. From the Mesolithic onwards dates are generally given in BC. In some cases, dates after the Mesolithic are provided in BP where environmental features and events are discussed e.g., the development of the current coastlines of the UK in approximately 6,000 BP.

3.4.3 The main archaeological periods discussed in this report are listed in Table 2 and are derived from controlled vocabulary managed by the Royal Commission on the Ancient and Historical Monuments of Wales.

Broad Period	Dates
Palaeolithic	790,000 – 8,500 BC
Mesolithic	8,500 – 4,000 BC
Neolithic	4,000 – 2,200 BC
Bronze Age	2,200 – 700 BC
Iron Age	700 BC – 43 AD
Roman	43 – 410 AD
Early Medieval	410 – 1086 AD
Medieval	1086 – 1536 AD
Post Medieval	1536 – 1900 AD
Modern	1900 AD– Present

Table 2: Archaeological periods and dates in Wales

Quaternary Chronology

3.4.4 The Quaternary chronology of the UK is outlined in Table 3. Marine Isotope Stages (MIS) are alternating warm and cold periods derived from oxygen isotope data taken from deep sea core samples.

Stage			Years BP	MIS		Broad period	Archaeological period
Cromerian*			970-478,000	19+		Pleistocene	Lower Palaeolithic
				18			
				17			
				16			
				15			
				14			
				13			
Anglian/Elsterian			478-424,000	12			
Hoxnian/Holsteinian			424-380,000	11			
Wolstonian/Saalian			380,000-	10			Middle Palaeolithic
	Purfleet		337-290,000	9			
				8			
	Aveley		243-150,000	7			
			-132,000	6			
Ipswichian/Eemian			135-115,000	5	e		
Devensian/Weichselian	Early		115,000-		d		
		Chelford	108-92,000		c		
					b		
		Brimpton	86-72,000		a		
			-55,000	4			
	Middle		55-26,000	3			Upper Palaeolithic
	Late	Dimlington (LGM)	26-14,700	2			
		Windermere/Oldest Dryas	14,700-12,900	1			
		Loch Lomond/ Younger Dryas	12,900-11,700				
Holocene			11,700- present			Holocene	Mesolithic

*The Cromerian Complex was broadly interglacial, but did included moderate glacial stages

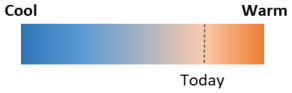


Table 3: Quaternary chronology (based in part on Wenban-Smith et al. 2010b)

3.5 Method Statements

3.5.1 The following sections set out methods for the intertidal survey, archaeological review of geophysical data and palaeolandscape assessment, in addition to general methods for determining archaeological potential.

Intertidal survey

3.5.2 The intertidal walkover survey was undertaken in line with the following documents:

- Standard and guidance for historic environment desk-based assessment (CIfA 2014)
- Risk Assessment Method Statement agreed with MarineSpace and Blue Gem Wind

3.5.3 The CIfA guidance states that '*the archaeologist undertaking the desk-based assessment should visit the study area in order to assess its character, identify visible historic features and assess possible factors that may affect the survival or condition of known or potential assets*' (CIfA 2014: 8) in order to contribute to the overall aims of the desk based assessment, which are to determine '*the nature, extent and significance of the historic environment within a specified area*' (CIfA 2014: 4). The intertidal walkover survey was undertaken to achieve these aims.

3.5.4 The walkover survey was conducted over the landfall area of the Offshore Consent Boundary up to the MWHS, although additional sites above the MHWS were reviewed where there was a possibility for remains of these sites to erode into the intertidal Offshore Consents Boundaries. The intertidal walkover survey was undertaken during a period of spring low tides, to ensure the survey covered as much of the lower shore areas as possible, on 27th May 2021. Two CIfA-accredited archaeologists reviewed all areas of known archaeological interest and reviewed the Study Area for any new sites of potential interest.

3.5.5 The walkover survey reviewed sites identified in a desk-based assessment conducted prior to the survey. This assessment was based on a variety of sources including archaeological datasets, historic maps, historic and modern aerial photos, and drone footage (Rovco, 2021b). Known sites identified through these sources were visited during the survey and records were made. Additionally, any evidence for previously unknown archaeological remains was also noted. The recording of any historic assets was undertaken using a handheld Global Positioning System (GPS), digital camera, and field notes. The distribution of any features of historic interest was recorded using photographs and GPS fixes. The outline of features were mapped by taking GPS positions around the perimeter of a feature, in order to map its extents. Where the full extents of a feature were not visible due to sand or vegetation cover this was recorded.

3.5.6 Field notes were also compiled and non-intrusive investigations including visual examination sought to identify the nature and extent of any remains encountered.

3.5.7 Limitations to the survey were also noted, such as where sand or vegetation (including marine species such as kelp) obscured archaeological remains from view. Kelp cover was extensive on the lower parts of the intertidal zone where bedrock outcrops on either side of West Angle Bay.

3.5.8 Consent BoundaryAll details from known heritage assets and any new items recorded from the walkover survey were fed into the gazetteer (Appendix 1: Gazetteer). Consent BoundaryConsent Boundary

Archaeological review of geophysical data

Data collection

3.5.9 All geophysical data acquired for the Proposed Development (Table 1) were reviewed and confirmed to have been collected to a specification that fulfils the requirements of Section 5 of Archaeological Written Schemes of Investigation (The Crown Estate 2021).

3.5.10 The survey was divided into three areas;

- Nearshore (Blocks A1-A5, WA1 – KP0-~KP5)
- (Offshore) Export Cable Corridor (ECC) (Blocks A4-A19 - ~KP5 to array area)
- Array Area

3.5.11 The nearshore survey was undertaken by Rovco (Rovco 2021a) using the survey vessel *Iceni Spirit* between 1st September 2020 and 22nd October 2020. The ECC survey, also undertaken by Rovco, was completed using the survey vessel *Seazip Fix* between 18th September 2020 and 11th November 2020 (the campaign also included partial coverage of the Array Area). The full Array Area survey was undertaken by GEOxyz (GEOxyz 2021) using the survey vessel *GeoOcean IV* between 7th March 2021 and 18th April 2021 (Table 4).

3.5.12 The data collected varied in specification across the three areas, however the data from each area is considered comparable and appropriate to characterise the marine archaeological potential of the proposed consent area. Mobilised sensors are detailed in Table 4 and the coverage presented in Figure 2.

3.5.13 Line spacing varied across the survey areas but achieved a minimum of 100% coverage of both multibeam bathymetry and sidescan sonar data. Magnetometer data was collected on all main survey lines within the array, averaging at c.75 m line spacing. Within the ECC and nearshore areas the magnetometer coverage was less consistent and ranged approximately between 30 m and 100 m, magnetometer data was not collected over the full survey area. Figure 3 shows an example of the magnetometer coverage within the nearshore area.

Vessel	Dates surveyed	Sidescan Sonar	Multibeam	Magnetometer	Sub-bottom	Ref.
Iceni Spirit	01/09/2020-22/10/2020	Edgetech 4200 (300/600 kHz)	R2Sonic (400 kHz)	Geometrics G-882	Innomar SES-2000 Medium; GSO 360 Sparker[1]	Rovco 2021a
Seazip Fix	18/09/2020-11/11/2020	Edgetech 4200 (300/600 kHz)	R2Sonic (400 kHz)	Geometrics G-882	Innomar SES-2000 Medium; GSO 360 Sparker[1]	Rovco 2021a

[1] SBP collected as Innomar SES-2000 Medium (high frequency, 100 kHz; 8 kHz) and GSO 360 Sparker (low frequency (1.8 kHz).

Vessel	Dates surveyed	Sidescan Sonar	Multibeam	Magnetometer	Sub-bottom	Ref.
GeoOcean IV	07/03/2021-18/04/2021	Edgetech 4205 (300/600 kHz)	Kongsberg 2040 Dual head (400 kHz)	Geometrics G-882	Innomar SES-2000 Medium; GSO 360 Sparker[1]	GEOxyz 2021

Table 4: Survey vessels and survey sensors

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

- Multibeam echosounder (MBES): ensonification of anomalies >0.5 m;
- Sidescan sonar (SSS): ensonification of anomalies >0.5 m;
- Magnetometer: identification of anomalies >5 nT; and
- Sub-bottom profiler (SBP): penetration deeper than 5 m (high frequency) and 20 m (low frequency).

3.5.15 All data were collected and referenced relative to the WGS84 datum and UTM30N projection.

3.5.16 The towed sensors, SSS, SBP and magnetometer, used an Ultra Short Baseline (USBL) positioning system to ensure positional accuracy of the sensors 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).

3.5.17 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 SSS and magnetometer datasets with the MBES dataset, where possible.

Data processing

3.5.18 Data collected by GEOxyz were processed by GEOxyz, data collected by Rovco were processed by Rovco and CM Geomatics (CMG). Whilst the specifics and the software may vary between contractors and areas, the general methodologies remain the same ensuring consistent deliverables.

3.5.19 MSDS Marine undertook the marine archaeological assessment of the geophysical data provided by GEOxyz, Rovco and CMG. The following deliverables in Table 5 were provided to MSDS Marine for further archaeological assessment.

Sensor	Deliverables
Sidescan sonar	Navigation processed SSS data (.xtf) SSS contact list (.csv) Seabed characterisation polygons (.shp)
Multibeam echosounder	Bathymetry DTM all points (.ascii (XYZ)) Bathymetry DTM gridded 0.5m (.ascii (XYZ)) Bathymetry LAT datum Contours (.shp and .dwg)
Magnetometer	Raw magnetometer data (.csv)

	Processed magnetometer data (.csv/ .txt) Total-field grid (Geotiff) Analytical signal grid (Geotiff) Magnetometer altitude grid (Geotiff) Magnetometer anomaly list (.xls) OASIS Montaj Project
Sub bottom profiler	Raw SBP data (.sgy) Processed SBP data (.sgy) IHS Kingdom project Geological maps (.shp/ .dwg) Interpreted horizons depth converted (.grd/ .shp)

Table 5: Survey deliverables to MSDS Marine

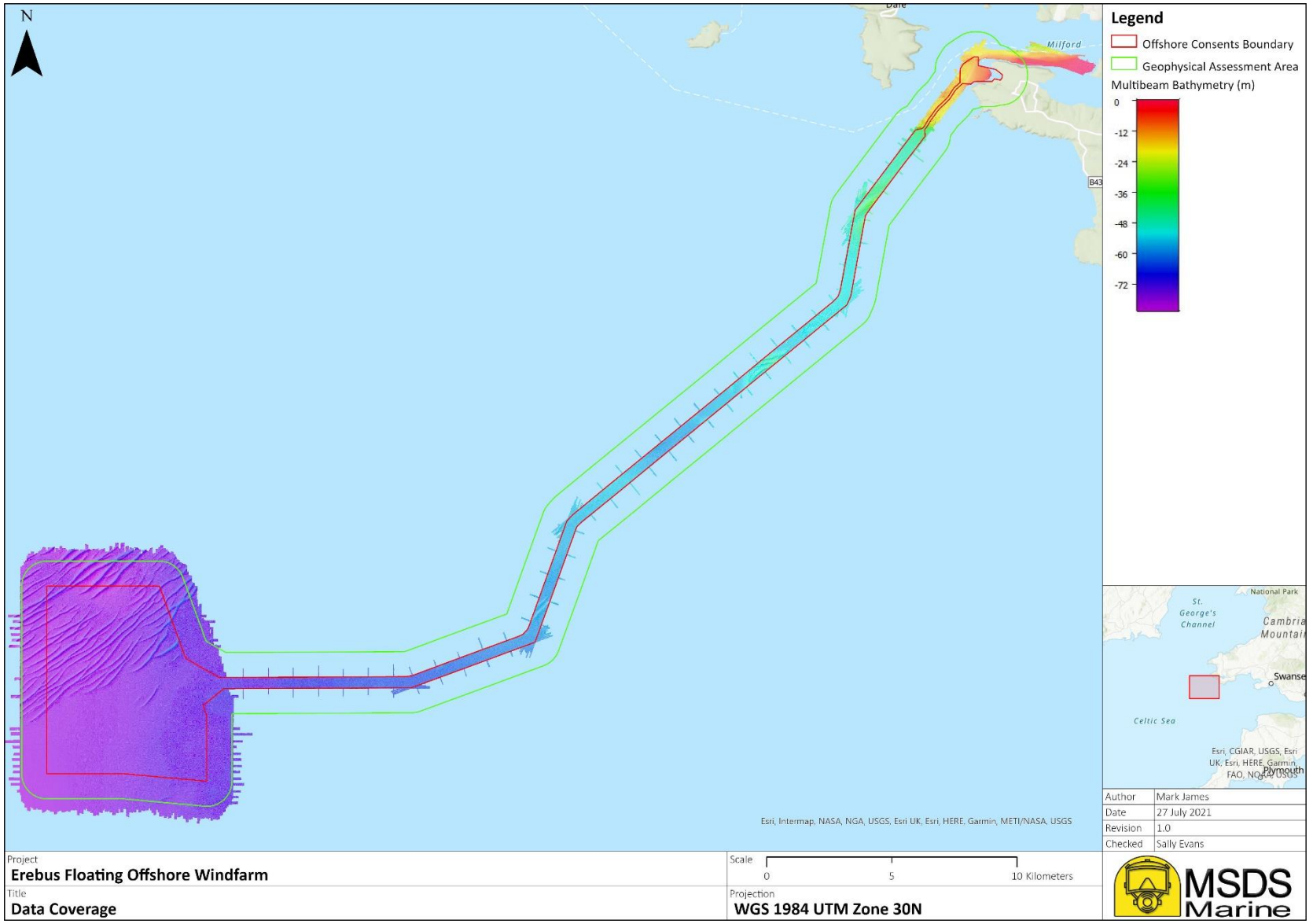


Figure 2: Data coverage

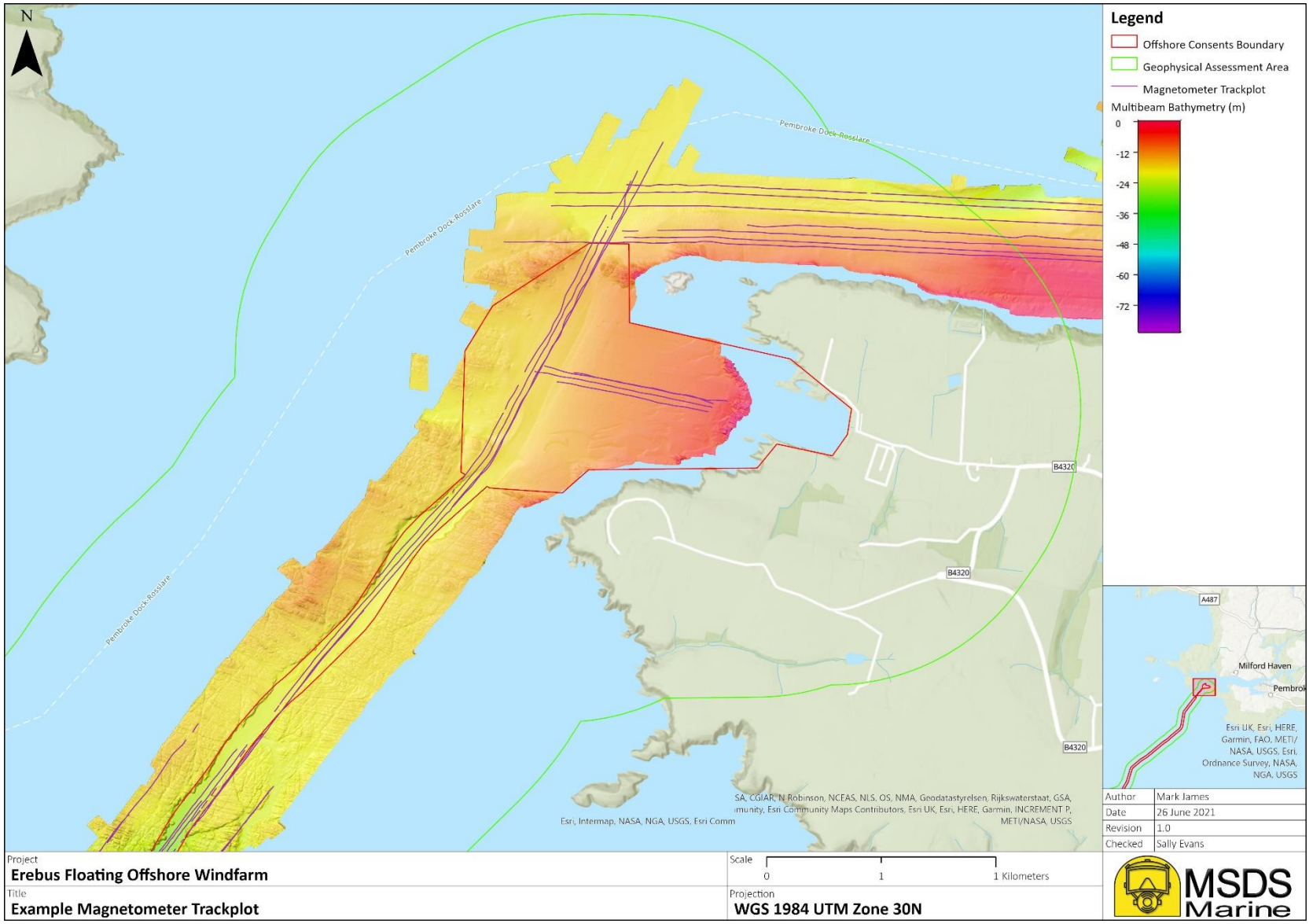


Figure 3: Example magnetometer trackplot

Archaeological assessment

3.5.20 An assessment of data was undertaken by a qualified and experienced marine archaeologist with a background in geophysical and hydrographic data acquisition, processing, and interpretation.

3.5.21 The assessment considers all data within the Study Area, with some extending past the Offshore Consent Boundary. This provided a thorough understanding of the historic environment of the surrounding area, and therefore useful in understanding the potential Consent Boundary.

3.5.22 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 these extents, the potential for variations in the seabed are high and can affect the interpretation of anomalies.

3.5.23 The datasets were reviewed on a line-by-line basis and all anomalies of potential anthropogenic origin identified and recorded. Records include at a minimum (where appropriate) an image of the anomaly, dimensions, and a description. An archaeological potential was assigned to the anomaly following the criteria outlined in Table 6 below.

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 of archaeological significance – high potential anomalies tend to be the remains of wrecks, the suspected remains of wrecks, or known structures of archaeological significance.

Table 6: Criteria for the Assessment of Potential.

3.5.24 Following the assessment of all datasets the results were imported into ESRI ArcGIS Pro 2.7, a Geographical Information System (GIS), 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.

3.5.25 Data from the United Kingdom Hydrographic Office (UKHO), including the positions of wrecks and obstructions, as well as all other relevant data such as recorded heritage assets, third party assets and nautical chart were assessed to ensure that any additional information is drawn upon, but also that anomalies are not unnecessarily identified as having archaeological potential when the origination can be identified. The resultant remaining anomalies assessed as having archaeological potential were compiled into a gazetteer (Appendix 4: Gazetteer of Archaeological Anomalies) and a shapefile.

3.5.26 The interpretation of geophysical and hydrographic data can, by its very nature, be 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.

3.5.27 Measurements can be taken in most data processing software, and whilst largely accurate, discrepancies can be noted due to a number of factors. Where there is uncertainty as to the potential of an anomaly, or its origin, a precautionary approach is always taken to ensure the most appropriate and robust mitigation for the historic environment.

3.5.28 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 sonar. The use of both SSS and MBES data mitigates this to some degree by visualising anomalies from multiples angles, including from above.

Remotely Operated Vehicle Survey

3.5.29 Following the identification of two high potential anomalies (ERS21_0123 and ERS21_0137) within the Row Rocks area of the ECC a Remotely Operated Vehicle (ROV) survey was undertaken to better understand the character of the anomalies, and to establish with greater certainty whether the anomalies represented the remains of wrecked vessels.

3.5.30 The ROV survey was undertaken by MSDS Marine and Ultrabeam Hydrographic on the 9th September 2021 onboard the dedicated survey vessel *Coastal Observer*. The survey utilised a BlueRobotics BlueROV2 inspection class ROV. The ROV was mobilised with a forward facing High Definition (HD) camera with a live feed to the surface and a Sonardyne Micro Ranger 2 acoustic tracking system to monitor the position in real time in relation to the geophysical data. Due to strong tides within the Row Rocks area the survey was undertaken during the slack water period.

3.5.31 The survey was conducted by an ROV pilot from Ultrabeam Hydrographic and guided by a marine archaeologist from MSDS Marine. Features of interest were located, with video and positions recorded. Following the survey, the video were reviewed and further assessment of the identified material made.

Palaeolandscape Assessment

3.5.32 Whilst the interpretation of the palaeolandscape is based upon the archaeological review of geophysical and hydrographic data, the method of assessment, the assessment criteria and the best practise mitigation strategies differ from those presented in the preceding sections and thus it is detailed separately for clarity.

3.5.33 Sub-surface data acquired from SBP, and seismic surveys is key to understanding the palaeolandscape potential of the study area. Sedimentary horizon grids 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 area.

3.5.34 An archaeological review of the geophysical survey assessments and preliminary ground model covering the Offshore Consent Boundary and Study Area was conducted by MSDS Marine with support from the Coastal and Offshore Archaeological Research Services (COARS). This included a review of geophysical survey data reports, select seismic profiles and ground model outputs including mapped horizons and grids. These sources were reviewed in order to establish an

understanding of the geological make-up of the site, 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. Further detailed reviews of seismic data will be conducted alongside the geoarchaeological review of geotechnical cores.

3.5.35 A number of data sources were used for the assessment (Table 1).

3.5.36 Consent BoundaryConsent BoundaryConsent BoundaryThe following sections set out the baseline assessment. Potential for remains of submerged prehistoric landscapes are set out first, followed by maritime and aviation remains, and intertidal features.

3.6 Mitigation

3.6.1 A range of standard mitigation measures have already been applied to the Project as part of the over-arching site selection and iterative design process. Following current policy set out within the Welsh National Marine Plan (in particular SOC_05) mitigation aims first to avoid adverse impacts on historic assets and their settings, then to minimise impacts where they cannot be avoided, and to mitigate impacts where they cannot be minimised.

3.6.2 Standard mitigation measures which the Project has already implemented, or is committed to in the future, in order to avoid potential impacts to offshore archaeology are listed in Table 7 below:

Strategy	Criteria
Archaeological Exclusion Zones (AEZs)	For potentially archaeologically significant contacts that are clearly identifiable in the survey data and where the extents are largely known, Archaeological Exclusion Zones (AEZs) will be recommend. AEZs will remain for the life of the project or until ground truthing or higher resolution data determines a reduction in potential, significance, or extents.
Temporary Archaeological Exclusion Zones (TAEZs)	Where a contact is not visible in the survey data but likely to exist on the seabed at a known position, or where the extents of a contact are not fully identifiable, or the contact has been identified as of high potential but the significance has not been determined, Temporary Archaeological Exclusion Zones (TAEZs) will be recommended. TAEZs have been identified as highly likely to be altered following higher resolution or full coverage data assessment, or further investigation has been undertaken to establish significance, however they will remain in place until alterations have been formally agreed.
Areas of Archaeological Potential (AAP)	Areas of Archaeological Potential (AAP) are primarily reserved for magnetic anomalies where, due to line spacing or data coverage, positions are not accurately known or there is potential for the presence of additional material not covered by the survey extents. Any additional material is likely to be identified following higher resolution or full coverage data assessment but as the nature and position is not precisely known, no formal exclusion zone is recommended but instead an awareness of the potential within an area, and an

	expectation of further investigation, is considered appropriate at this phase.

Table 7 Standard Mitigation

3.6.3 This mitigation will result in the avoidance of historic assets, and potential historic assets, following the preferred option in policy.

3.6.4 Additional mitigation is also proposed for this Project where warranted. This mitigation has been applied where potential significant effects have been identified. The mitigation includes:

- Implementation of a protocol for reporting finds of archaeological interest (e.g. The Crown Estate 2014);
- Recommendations for a watching brief; and
- Geoarchaeological assessment and analysis.

3.6.5 Methods for all mitigation are set out within Volume 3, Technical Appendix 14.2 Marine Archaeology Written Scheme of Investigation.

4.0 Baseline Assessment: Submerged Prehistoric Landscapes

4.1 Introduction

4.1.1 The UK has been affected by several glacial events over the last 1 million years; including the Anglian (480-430,000 BP), the Wolstonian (350-132,000 BP), and the Devensian (122-10,000 BP), and intervening marine transgressions all of which have influenced archaeological potential. The region under study saw extensive glaciation over the Late Quaternary period, with multiple phases of advance and retreat of the Irish Sea Glacier, which generally flowed through the St Georges Channel in the Irish Sea, to the west of the Study Area. These large-scale events have influenced the geomorphology, geology, and archaeological potential of the area however, debate regarding the extents of the glaciation is also ongoing (Gibbard and Clark 2011, Hughes et al. 2011, Gibbard et al. 2017, Roberts et al. 2020), influencing understanding of archaeological potential.

4.1.2 There are no known prehistoric remains within the Offshore Consent Boundary, however, the coastal margins of south-west Wales are rich in prehistoric archaeological remains, evidenced by the numerous records in the RCAHMW's Coflein (the online catalogue of archaeology, buildings, industrial and maritime heritage in Wales) and there is therefore potential for comparable evidence in the offshore region. Following the methodology set out in Section 3.5, the following sections establish the sub surface deposits identified within the site and their archaeological and palaeoenvironmental potential.

4.1.3 With regards to understanding the palaeolandscapes within the area, geological deposits across the wider area have been recorded by the BGS (Tappin et al. 1994; Stoker et al. 2011) and the wider landscape, east of the Project, reviewed within the West Coast Palaeolandscape Study (WCPS) (Fitch et al. 2011)[2]. Site-specific surveys have identified different geological deposits within the site from a range of depositional environments demonstrating that Quaternary deposits are present within the site. However, these surveys did not directly date the deposits nor were they able to relate them back to the known geology defined by the BGS (OWC 2021a, GEOxyz Ltd 2021). Thus, the exact nature of the geological makeup of the site is uncertain. Further studies are currently ongoing to enable greater understanding (geotechnical campaign in 2021) and will lead to an update in the ground model of the area, where available these will be used to assist in the context as the Project progresses. This report will therefore include a description of the geological nature of the wider landscape which includes the northern portion of the Celtic Sea, the southern portion of the Irish Sea, the Inner and Outer Bristol Channel areas, and the surrounding land masses in order to make inferences about the geological nature of the site.

4.2 Overview of geomorphology and major features

4.2.1 A series of troughs, platforms and channel features characterise the geomorphology and geology of the region (Figure 4). The Celtic Trough extends between the Celtic and Irish Seas;

[2] This study built on the results of the North Sea Palaeolandscape Project (NSPP) and investigated use of 2D and 3D seismic and related data to improve understandings of submerged prehistoric landscapes including within the Irish Sea and Bristol Channel. The project focused on Late Upper Palaeolithic and Mesolithic palaeolandscapes.

within this there is the Celtic Deep Trough, to the south of St David's Head, and St George's Channel Trough, to the north. Quaternary deposits are particularly thick in these areas; up to 375 m in some areas (Tappin et al. 1994). Around these trough features are highs or platforms, these include on the eastern side of the Celtic Sea; the Lundy Platform and the Welsh Platform, on the western side of the Celtic Sea; the Irish Platform and Nymphe Bank Platform , and the Haig Fras Platform to the south. The Consent BoundaryProposed Development sits on the Lundy Platform, which extends across the Outer Bristol Channel area. The eastern edge of the Celtic Deep Trough has been mapped within 500 m of the western edge of the Array Area.

4.2.2 Four phases of incisions have been identified in the wider area, on both platforms and within the trough features (Tappin et al. 1994). These are discussed further below (Section 4.3). The largest of these incisions (larger than c.100 m depth) are detailed in Figure 5. A number of possible causes have been suggested for the origin of these incisions, these are; tidewater action or erosion at ice fronts, subglacial tunnel valley formation, and low stand river action modified by glacial and deglacial processes (Tappin et al. 1994; Westley and Edwards 2017). While current interpretations indicate a late Pleistocene origin for these features, dating has not been undertaken to confirm this.

4.2.3 The Consent BoundaryProposed Development is characterised by a number of localised geomorphic features. Landfall of the ECC is at West Angle Bay is a sheltered bay with outcropping bedrock. Moving offshore there is a rock platform and channel (forming a sediment-filled trough in the rock platform) are present in the first few kilometres along the ECC, adjacent to the coast, after which the seabed deepens (after KP 4.5). The remainder of the ECC is characterised by a generally sandy seabed with a number of sandbanks and sandwaves. Sandwaves are also seen in the Array Area (OWC 2021a: 24).

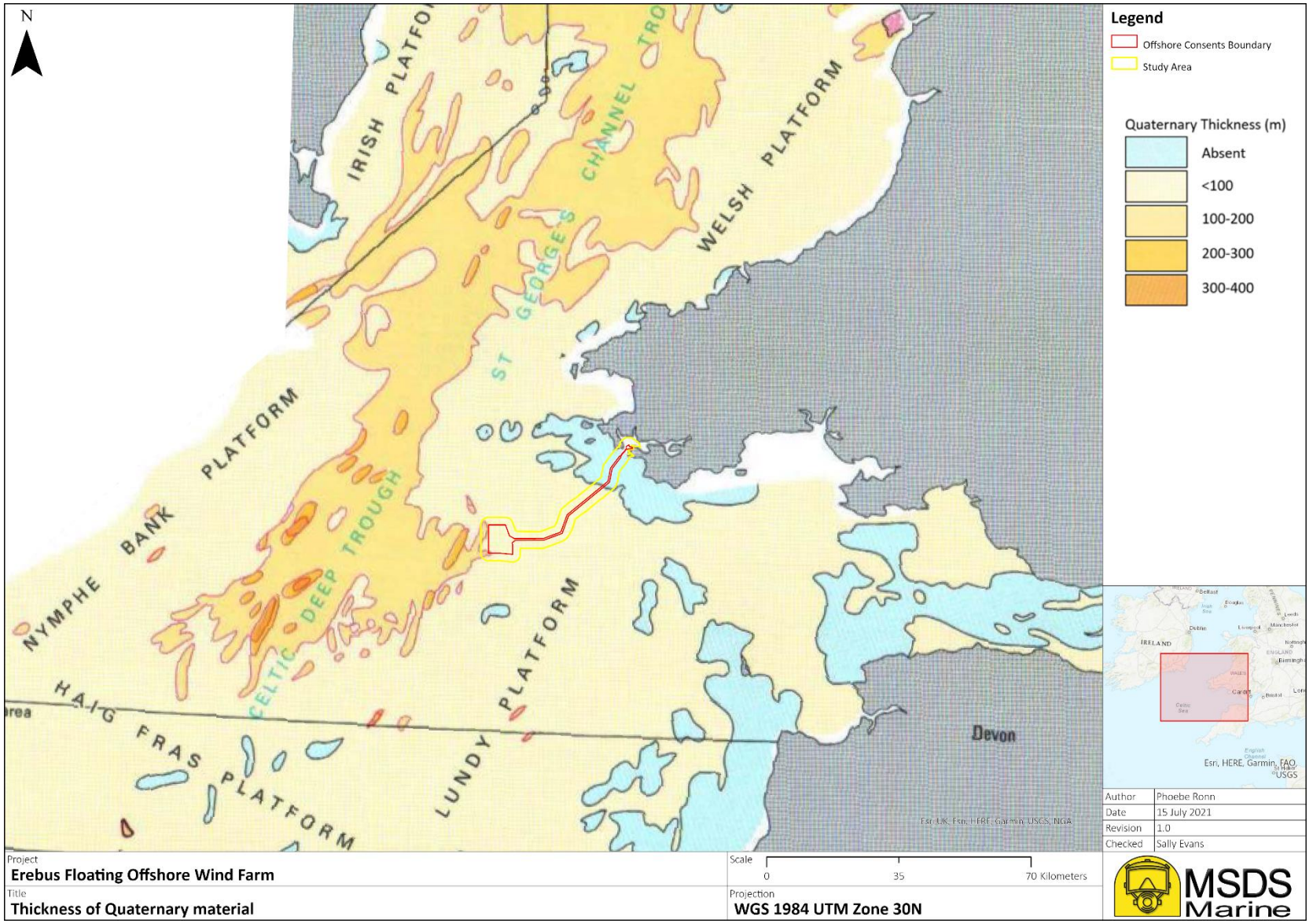


Figure 4: Low Resolution Thickness of Quaternary Material and Location of Major Features (from Tappin et al. 1994)

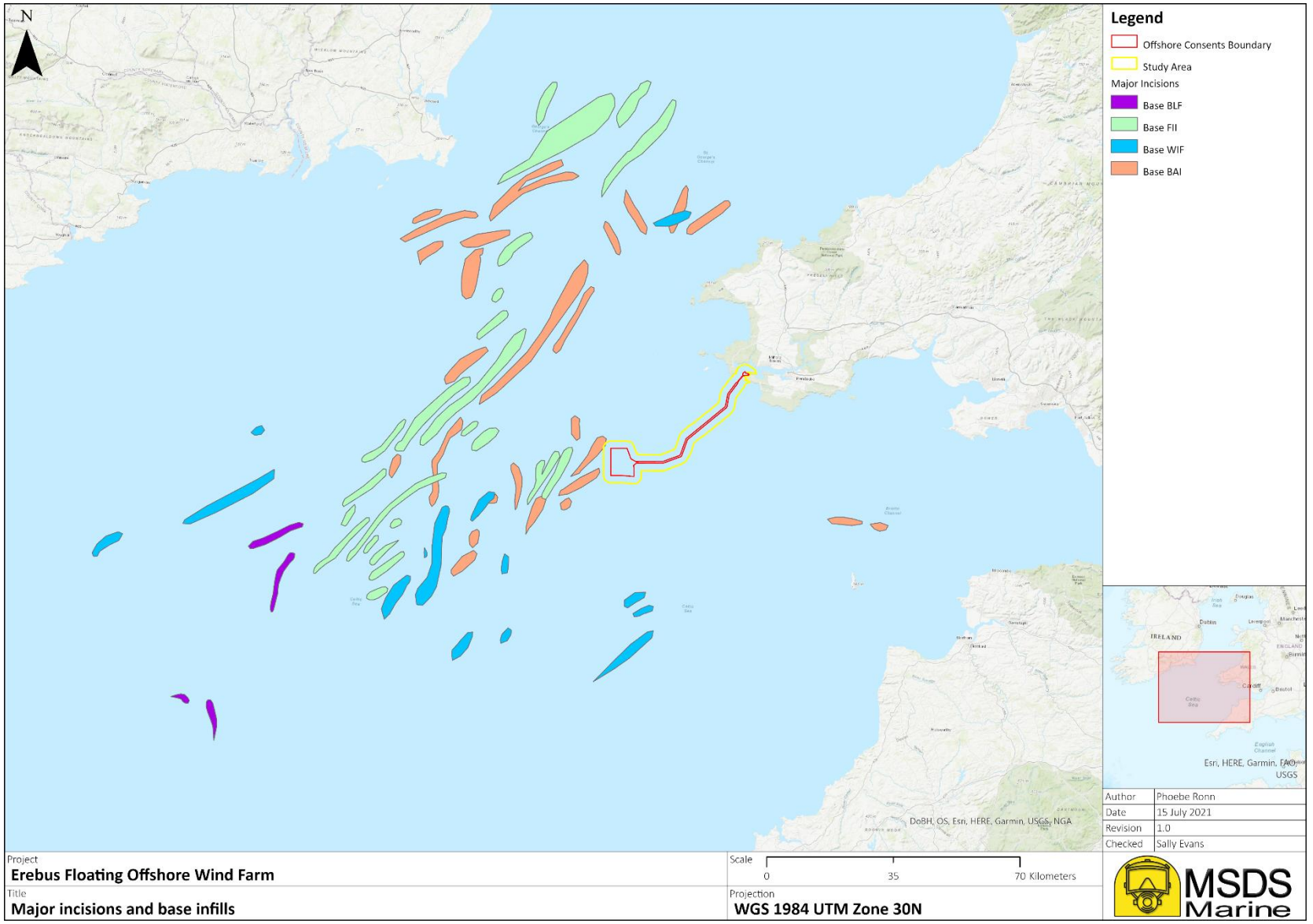


Figure 5 Major incisions in the area and the deposits in their bases

4.3 Overview of geology

4.3.1 Information on the solid geology within the Proposed Development was derived from the British Geological Survey's Offshore GeoIndex. In the Array Area the bedrock is indicated to consists of late Cretaceous chalk. The bedrock along the ECC consists of four geological types; late Cretaceous chalk, early Jurassic mudstone and limestone, Triassic mudstone and halite-stone, and Devonian and Carboniferous mudstone, sandstone, and limestone (Tappin et al. 1994; Stoker et al. 2011; OWC 2021a, b).

4.3.2 Quaternary deposits have also been identified within the Proposed Development (Tappin et al. 1994; Stoker et al. 2011) and site-specific surveys have defined a series of stratigraphic units which constitute the quaternary geology of the site (OWC 2021a, b).

4.3.3 Broadly the Proposed Development Consent Boundaryis characterised by Pleistocene glacial till deposits, with a series of channel features identified along the ECC and Array Area (OWC 2021a,b) with associated fills, tills, and interglacial members (OWC 2021a:11). As will be seen, dating for these deposits is uncertain and they may relate to a number of glacial and interglacial periods. Holocene sands cover the majority of the ECC to shore and becoming gravelly close to shore (OWC 2021a: 5).

4.3.4 The thickness of the deposits in the outer Bristol Channel region exceeds 200 m in places (Tappin et al. 1994). However, the average Quaternary thickness across the area of the Proposed DevelopmentConsent Boundary is considerably less (BGS 2014). On the platforms Quaternary deposits are <50 m in thickness, and are even absent in places (Tappin et al. 1994).Where Quaternary deposits infill the incisions on these platforms they can be up to 250 m deep, especially some of the larger incisions. Across the majority of the ECC, the thickness ranges from <0.5 m-20 m with local areas exceeding 50 m; the inshore parts of the ECC have particularly thin Quaternary geology. Within the Array Area, BGS (2014) indicate the thickness of Quaternary sediments are typically over 30 m, extending over 50 m in places). Figure 6 shows the mapped Quaternary deposits in the area to a resolution of 1:125,000 (Wingfield and Tappin 1991). IT should be noted that Figure 6 does not capture all incisions into the bedrock as the BGS only mapped the incisions over 100 m in width, thus there may be further incision features in the area.

4.3.5 Quaternary deposits are discussed in detail below. Site-specific data are reviewed first. Information from wider geological studies has then been reviewed in order to contextualise the site-specific data and to determine where correlation between known formations is possible. These sections feed into the overall assessment of potential for submerged prehistory.

4.4 Units identified in site-specific surveys

4.4.1 A series of units have been defined within the seismic data covering the Array Area and ECC. The ground model is currently awaiting update with the units identified in the Array Area, and so the units in ECC have not yet been correlated; therefore each is dealt with separately below. Ongoing and future work will enable a confident correlation between the deposits identified in these areas. Figures showing the grids and isopach's can be found in Appendix 2: Grids and Isopaches.

Export Cable Corridor

4.4.2 Units identified within the ECC are detailed in Table 8 which sets out units, interpretations, and horizons (correlating to boundaries between deposits). The table also includes the relevant figure numbers which shows the extents of each unit within the ECC.

Unit	Horizon	Interpretation	Figure
Unit A	H050	Recent sediments exhibiting a range of textures including: Layered (nearshore) Grainy (often sandwaves) Smooth (along route variability) Dipping (along route variability)	Figure 31
Unit B2	H055	Late-stage channel fill or till, generally with grainy texture, sometimes heterogenous with internal reflectors	Figure 32
Unit B1	H060	Late-stage channel fill, generally with smooth/homogenous texture along cable route, sometime heterogenous with internal reflectors, stacked layered channel fill in Array Area	Figure 33
Unit C	H100	Glacial channel fill exhibiting a range of textures including: High amplitude layered (nearshore) Partially grainy (very common) Stacked layers (observed in some fill packages beneath Unit B2) Hyperbolae (typically marks base of channels)	Figure 34
Unit D	Base not observed	Rock that exhibits either structureless, grain/dipping, or dipping textures	N/A

Table 8 Geological units identified in the ground model.

4.4.3 The location and interpretation of the units, based on the ground model (OCW 2021a), is discussed below, along with descriptions of features within the units:

- Unit A: This unit is present across the majority of the ECC and represents recent (likely Holocene) seabed sediments which consist mainly of sand with a variety of textures (listed in above table). Unit A likely relates to the recent Holocene marine transgression and formed in a wholly marine environment;
- Unit B2: This unit is located in the mostly westerly part of the ECC and includes both narrow and wide incised channels. The orientation of the channel features is not discernible. A thinner blanket of this unit is present to the northeast of the widest channel. The unit has been interpreted as Pleistocene glacial sediments. These sediments are layered in places and may correspond with till facies of clay, sand, gravel, shells, cobbles, and boulders (OWC 2021a: 43). Units B2 has not been dated but is believed to be glacially derived, and thus could relate to a number of Pleistocene glacial episodes (discussed further below).
- Unit B1: This unit is located in the central part of the ECC and includes a large channel feature that intersects the cable route. The orientation of this feature is not discernible. A thinner blanket of this unit is present to the south of the channel feature. The unit has been interpreted as the fill of late Pleistocene channels possibly active during an episode of sea level rise, containing fine grained, well sorted sediments. Unit B1 consists of fine-grained sediments which suggests a fluvial depositional environment (OWC 2021a). The precise environment type is not discernible however the lithology and formation of the

unit suggests that it was laid in channels active during sea level rise (OWC 2021a). The environment of the site would likely have been similar to this at the interfaces between glacial and interglacial episodes. Sea level index points from Freshwater West (c.5km from the site) and Port Talbot (c.90km) indicates that the sea level was at -5.09m OD at 6800 BP and at -25.66m OD at 10,075 BP respectively. Comparison with modern bathymetry data suggests that the -5.09m OD shoreline is very close to the current shoreline and that the -25.66m OD shoreline is fairly close to the current shoreline. The channels containing B1 identified in the ground model are 20km offshore and are at c.-60m OD. This indicates that the channels were submerged by 10,075 BP and that the sea level rose in the area over the following 3,000 years. Thus the formation of these channels could feasibly date to the very early Holocene, or more likely, the interfaces between earlier glacial and interglacial episodes.

- Unit C: This unit is located across the offshore half of the ECC. It includes a number of large and deeply incised channels. This unit has been interpreted as the fill of early-stage glacial channels. The unit is described as largely mixed and undifferentiated. Unit C is a glacial channel deposit underlying both Units B1 and B2. This may relate to early Devensian or pre-Devensian glacial action. Due to its erratic base and undifferentiated fill, it is unclear what type of environment this unit formed in or what period it relates to.
- Unit D: This unit represents the bedrock. It includes dipped beds which indicates mudstones and shales. Acoustic texture at the upper interface suggests some weathering has occurred however this texture may be the result of data processing.

4.4.4 These units could feasibly relate to a number of known deposits from different periods. Without dating it is not possible to reliably correlate the identified units with known deposits.

Array Area

4.4.5 A number of horizons have been identified within the Array Area (GeoXYZ Ltd 2021). Each horizon has been numbered below:

- Horizon 1 (H1): This horizon marks the base of what are likely Holocene recent seabed sediments which are predominantly sandy in composition. Sandwaves are present in places. Described as 'base of recent sediments' in GEOxyz Ltd (2021: 50). Shown in Figure 26.
- Horizon 2 (H2): Described as 'base of recent channel system' in GEOxyz Ltd (2021: 52). This horizon marks the base of a channel system that underlies the recent sediments. It contains laminated sediments thought to be interbedded sand and mud and takes the form of a large channel system that is present between 1 m and 25 m below the seabed. It is thickest in the north-western part of the Array. The channel is c.1.8 km at its widest point. This channel appears to be a recutting of the largest channel in the older channel system (see H3). Shown in Figure 27.
- Horizon 3 (H3): Described as 'base of older channel system' in GEOxyz Ltd (2021: 54). This horizon marks the base of a channel system which is stratigraphically earlier than Horizon 2. The older channel system (H3) is composed of a large channel in the north of the Array (2.5 km at its widest point), a smaller channel in the south (950 m at its widest point), and a number of smaller channels in the central part. The older channel system cuts through a sheet deposit comprised of mixed sediment that may be a glacial till which sits above H4. Shown in Figure 28.
- Horizon 4 (H4). Described as 'top of channel fill' in OWC GEOxyz Ltd (2021: 55). This horizon marks the top of a series of poorly defined channel features and also maps the base of a possible glacial till into which the older channel system is cut. This channel fill

below is formed of potential pre-glacial channels that are poorly defined. They are also possible glacial till deposits on top of this horizon in areas of the site (GEOxyz Ltd 2021: 54). Shown in Figure 29.

- Horizon 5 (H5): Described as 'top of rock' in GEOxyz Ltd (2021: 57). This marks the top of rock and represents the boundary with the channel fill and the bedrock. Shown in Figure 30.

Summary

4.4.6 The deposits identified within the ECC have been tentatively dated; Unit A is possibly Holocene, Units B1 and B2 were defined as 'late-stage' glacial channels with B2 being likely Pleistocene, Unit C was defined as filling 'early stage' glacial channels (OWC 2021a). The review of the Array Area did not indicate any dating for the deposits identified, however, it did identify multiphase channel systems, the larger channel features within the Array Area are detailed in Figure 6.

4.4.7 It is likely that Unit A and Horizon 1, both of which are related to the current seabed, are equivalent. It is also likely that Unit D and Horizon 5, which relate to the bedrock, are equivalent. The remainder of the deposits identified in the ECC cannot be reliably correlated with the horizons identified in the Array.

4.4.8 The units and horizons within the ECC and Array Area could feasibly relate to a number of known deposits from different periods. Without absolute dating and further examination of the composition of the geology, it is not possible to reliably correlate the identified units and features with known deposits. However, known deposits within the area are summarised in the sections below to provide an indication of the potential origins of the different units identified within the site.

4.5 Quaternary deposits identified by previous works

4.5.1 The surveys undertaken within the Proposed Development have demonstrated the presence of a sequence of deposits, incisions, fills and glacial tills. While the extents of different glaciations, and particular the Devensian, is in debate (see Gibbard and Clark 2011, Hughes et al. 2011, Gibbard et al. 2017, Roberts et al. 2020) the presence of glacial deposits and tills within the Proposed Development Consent Boundarydemonstrates that the site was, at times, dominated by glacial conditions.

4.5.2 However, dating has not been undertaken on the deposits and the units identified have not yet been correlated with known formations, though geotechnical work is ongoing and is likely to provide further insights. Ahead of this correlation the known Quaternary deposits in the wider area have been summarised in Table 9. The formations are detailed individually in Appendix 3: Further information on geological deposits.

4.5.3 The following section discusses the potential for submerged prehistoric remains based on the information set out here and above. These are contextualised below in Section 4.6 which sets out a discussion of the palaeolandscape during different periods, referring to the below deposits, and feeding into Section 4.7 which sets out prehistoric archaeological potential.

Deposit	Member	Lithological Description	Depositional Environment	Dating	Thickness (m)
Surface Sands Formation	SL1 Member	Mobile seabed sediments	Marine/intertidal	Holocene	Up to 40
	SL2 Member	Sand with flora, fauna, and estuarine silts	Temperate climatic conditions with shallower water depths than the present, some beach deposits	Holocene/ Late Devensian	
	Seabed Depression Member	Sandy silt with shell debris and microbiota	Temperate-marine		Up to 60
Western Irish Sea Formation	Codling Bank Facies	Cobble to boulder sized ballast	Subaqueous ice-rafting/sandur/flooding	Late Devensian	15
	Sarnau Facies	Clast supported clayey diamictons	Morainic, evidence of a possible late-glacial sandur		Unknown
	Mud Facies	Greenish grey, shelly, sulphide or glauconite-rich silts with cold-water marine microbiota	Distal glaciomarine deposit transitioning to a temperate marine environment		Unknown
	Prograded Sand Facies	Sand	Pro-deltaic, glaciomarine		Unknown
	Chaotic Facies	Sands, gravels and cobbles with rafts of till and disturbed clay	Ice-proximal, arctic-like conditions; likely glaciomarine/ glaciolacustrine	Devensian	variable
Cardigan Bay Formation	Upper Till Member	Stiff to hard diamicton of clay with varying amounts of sand, gravel, shell, cobbles and boulders	Subglacial	Late Devensian	30
	Bedded and Infill Member	Upper part: fine-grained silty sands and sandy clays Lower part: Sand with subordinate muds	Arctic-like or boreal conditions	Ipswichian to early Devensian	60
	Lower Till Member	Stiff clay with abundant pebbles or sand with lithic granules, pebbles and shell clasts	Subglacial	Wolstonian	Up to 90
St George's Channel Formation	N/A	Muds with minor shell debris and sporadic pebbles	Arctic: Boreal and cold-water conditions	Wolstonian	Up to 125
Caernarfon Bay Formation	Upper Unstratified Member	Till or sandy/muddy diamicton with dropstones and cold-water flora	Subglacial/ice-proximal glaciomarine	Early Wolstonian	Up to 90
	Incision Infill Member	Stiff clay with stones, muds with clasts from pebble to boulder size, sands, muds, and clays	Infills eroded depressions in underlying sediment cut	Late Anglian-Hoxnian	200+
	Bedded Member	Sand with occasional clay beds, scattered pebbles with shell debris	Unknown	Late Anglian	20-70
	Lower Unstratified Member	Till comprising hard diamicton, gravelly, muddy sand with broken shells and abundant chalk and lignite fragments	Subglacial or ice proximal	Early Anglian	70
Bardsey Loom Formation	N/A	Clay, sand, pebbly sand, and gravel with layers of peat, and microbiota	Cold environment	Pre-Anglian (Cromerian)	Up to 50

Table 9: Sequence of Quaternary deposits in the Outer Bristol Channel area (derived from Tappin et al. 1994).

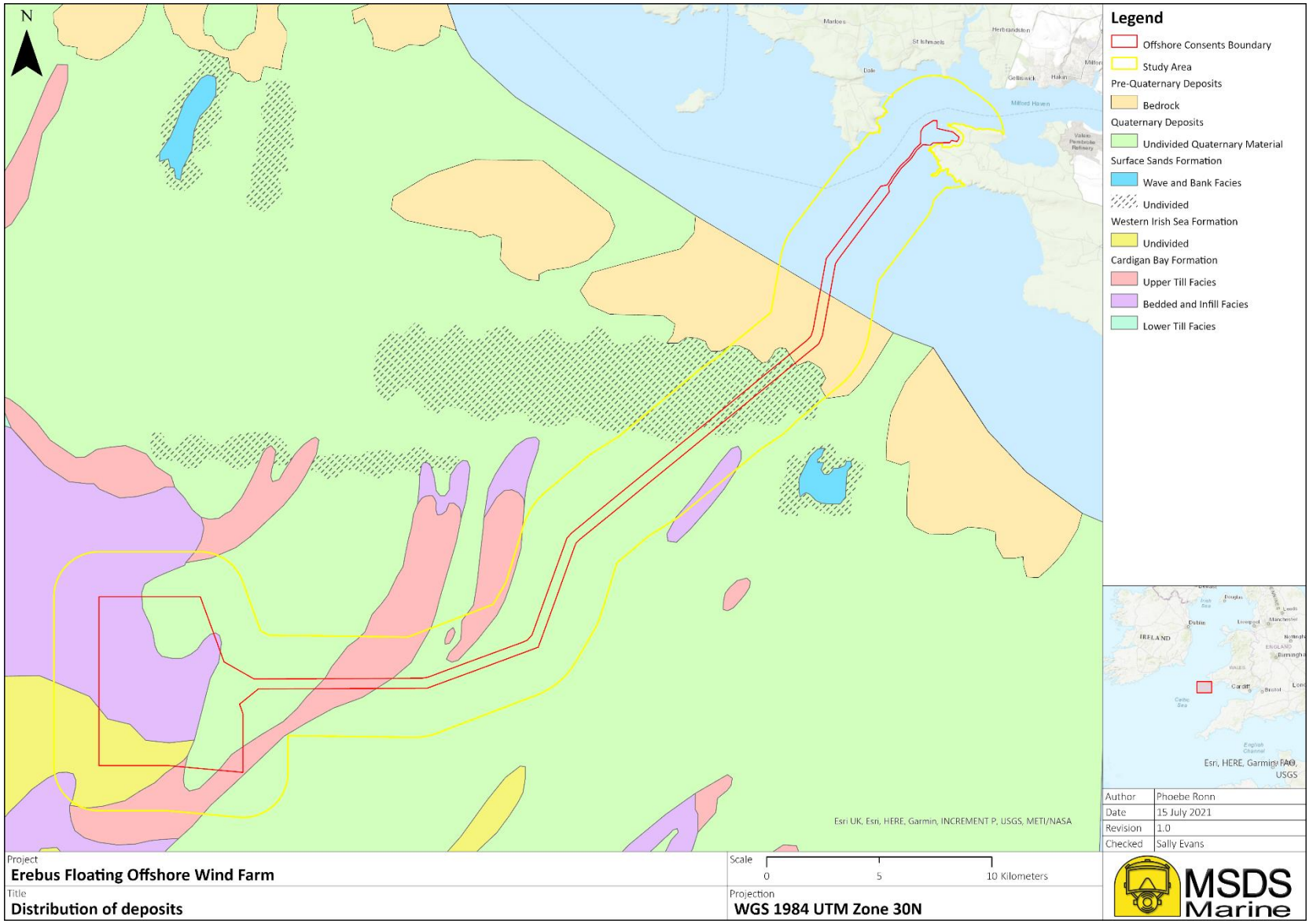


Figure 6 Distribution of Quaternary Deposits (derived from Wingfield and Tappin 1991)

4.6 Palaeolandscape Evolution and Context

4.6.1 The Quaternary evolution of the wider landscape (which includes the northern portion of the Celtic Sea, the southern portion of the Irish Sea, the Inner and Outer Bristol Channel areas, and the surrounding land (see Figure 4) is punctuated by glacial or marine coverage. Evidence of glacial coverage during the Anglian, Wolstonian and Devensian glaciations have been identified in this wider landscape, suggesting that for a significant portion of the Quaternary period the area was covered with ice, though the exact extent of the ice sheets in different periods remains under debate (Gibbard et al. 2017). The ice sheet that repeatedly advanced and retreated is named the British-Irish Ice Sheet (BIIS). This is discussed further below.

4.6.2 There is also evidence of marine coverage and relative sea level of the area during the Quaternary. This evidence is outlined in

Location	Distance from site	Evidence	Date	Reference
West Angle	<1 km	Raised Beach	Early to Middle Hoxnian	Stevenson and Moore 1982
Waterford	c.200 km	Raised beach	Hoxnian	Bowen 1973
Minchin Hole	c.70 km	Raised beach	Aveley	Bowen et al. 1985
Pennard	c.70 km	Raised beach	Ipswichian	Bowen et al. 1985
Port Talbot	c.90 km	Sea level index point at -25.66 m OD	10,075 BP	Massey 2004
Port Talbot	c.90 km	Sea level index point at -25.6 m OD	10,049 BP	Massey 2004
Margam	c.100 km	Sea level index point at -10.6 m OD	7,067 BP	Massey 2004
Freshwater West	c.5 km	Sea level index point at -5.09 m OD	6,800 BP	Massey 2004
Margam	c.100 km	Sea level index point at -10.1 m OD	6,405 BP	Massey 2004
Margam	c.100 km	Sea level index point at -9.2 m OD	3,658 BP	Massey 2004

4.6.3 Table 10.

Location	Distance from site	Evidence	Date	Reference
West Angle	<1 km	Raised Beach	Early to Middle Hoxnian	Stevenson and Moore 1982
Waterford	c.200 km	Raised beach	Hoxnian	Bowen 1973
Minchin Hole	c.70 km	Raised beach	Aveley	Bowen et al. 1985
Pennard	c.70 km	Raised beach	Ipswichian	Bowen et al. 1985
Port Talbot	c.90 km	Sea level index point at -25.66 m OD	10,075 BP	Massey 2004
Port Talbot	c.90 km	Sea level index point at -25.6 m OD	10,049 BP	Massey 2004

Margam	c.100 km	Sea level index point at -10.6 m OD	7,067 BP	Massey 2004
Freshwater West	c.5 km	Sea level index point at -5.09 m OD	6,800 BP	Massey 2004
Margam	c.100 km	Sea level index point at -10.1 m OD	6,405 BP	Massey 2004
Margam	c.100 km	Sea level index point at -9.2 m OD	3,658 BP	Massey 2004

Table 10 Evidence of Quaternary marine coverage

4.6.4 This evidence indicates marine highstand during the Hoxnian interglacial, Aveley interstadial, Ispwichian interglacial. It also shows a lower sea level in the early Holocene and demonstrates sea level rise throughout the middle to late Holocene.

4.6.5 Based on geological evidence, it appears that the Outer Bristol Channel area was also affected by glaciation during or before the Cromerian period, evidenced by incisions possibly caused by glacial erosion into the bedrock infilled with the Cromerian Bardsey Loom Formation (Tappin et al. 1994). The incisions would have formed deep valleys in the landscape, with a number of mapped incisions reaching >100 m. Environmental conditions of the Cromerian are poorly understood, however, geological evidence from the Bardsey Loom Formation indicate that wider landscape was fluviatile or shallow marine prior to the Anglian glaciation (Tappin et al. 1994).

4.6.6 The glaciation during the Anglian stage (480-430,000 BP, MIS 12) extended across the wider landscape. Geological evidence for the margin of this glaciation has been identified on the Gower Peninsula. However, the offshore component of the glacier is believed to have extended further south, towards the northern coast of southwestern England (Gibbard and Clark 2011). It appears that the Inner Bristol Channel area was not subglacial during the Anglian, but the Outer Bristol Channel region and much of the Celtic Sea were covered by ice (see Figure 7) (Gibbard and Clark 2011, Gibbard et al. 2017). Indeed, possible Anglian-aged deposits infilling incisions from the Celtic Sea area and Lundy Platform suggests that Anglian age materials were deposited contemporaneously with the creation of glacially incised valleys in the area, indicating that the Irish Sea glaciation did indeed cover the wider landscape during the Anglian phase (Tappin et al. 1994, Gibbard and Clark 2011, Rolfe et al. 2012).

4.6.7 During the Hoxnian interglacial (430-350,000 BP, MIS 11) the sea level was likely higher than today, evidenced by raised beaches on the Pembrokeshire coast, leaving the wider landscape including the site broadly submerged (Bowen et al. 1985, Stevenson and Moore 1982). This is also evidenced by the potentially Hoxnian-age upper parts of the Incision Infill Member which are possibly marine in origin, indicating submerged conditions. However, during the transitional phases at the beginning and end of the interglacial, while the sea was undergoing transgression and regression respectively, parts of the wider area may have been subaerially exposed. Evidence of a Hoxnian temperate forest environment is present on West Angle, the location of the project landfall; pollen analysis of clays and muds overlying a raised beach deposit produced evidence of temperate forest taxa suggesting the area was terrestrial and wooded (Stevenson and Moore 1982). This evidence likely dates to the late Hoxnian, during the marine regression associated with the onset of the Wolstonian, and the raised beach it lies upon likely dates to the early to middle Hoxnian during a period of marine transgression.

4.6.8 Subsequent to the Hoxnian, ice sheets once again advanced during the Wolstonian glacial stage (350-132,000 BP, MIS 10-6). The Wolstonian was punctuated by brief interstadials; the Purfleet (337-290,000 BP, MIS 9) (Bridgland et al. 2013) and Aveley (243- 150,000 BP, MIS 7) (Langford et al. 2014; McNabb 2007). During the glacial episodes of the Wolstonian, the wider area was likely subglacial. Irish Sea Till deposits relating to the Wolstonian identified on the Gower Peninsula and on the Isles of Scilly (Bowen 1973, John 2016) indicate that the glaciation extended across much of the wider area (see Figure 7). However, geological evidence from the Cardigan Bay Formation indicates a glaciomarine environment during the Wolstonian, suggesting that parts of the landscape were characterised by ice-proximal marine conditions. There is evidence of the Aveley interglacial in a raised beach deposit on the Gower Peninsula which suggests a period of marine highstand during MIS 7 (Bowen et al. 1985). The Wolstonian was likely a complex period of both glacial and marine advance and retreat, the evolution of the wider landscape during this period is poorly understood.

4.6.9 The Ipswichian interglacial (132-122,000 BP, MIS 5) raised beach deposits on the Gower Peninsula and Poppit Sands, Pembrokeshire (NPRN: 418348) indicate that the sea level was higher during the last interglacial period than it is today thus the wider landscape was likely characterised by a marine environment until the onset of the Devensian glaciation (Hiemstra et al. 2008). During the transition from the interglacial period to the onset of the Dimlington Stadial glaciation, during the early Devensian period, it is likely that the area experienced marine regression as the seawater was becoming trapped in ice, leaving parts of the wider landscape subaerially exposed.

4.6.10 In much of the rest of the UK, the most extensive phase of the Devensian stage (122-10,000 BP, MIS 5-1) occurred during the Dimlington Stadial (26-13,000 BP, MIS 3-2). However, there is evidence that the most extensive phase of the Devensian Irish Sea glaciation actually occurred during the early to middle Devensian stage (122-25,000 BP, MIS 4-3), in that its coverage was greater than the later glacial readvance (26-13,000 BP, MIS 3-2) (Bowen et al. 2002, Rolfe et al. 2012). It has been suggested that ice sheets of the early to middle Devensian Irish Sea glaciation extended well over the Celtic Sea and Lundy Platform, and penetrated the Outer Bristol Channel area, but did not extend on to the currently terrestrial portion of Wales (Rolfe et al. 2012, Gibbard et al. 2017). Evidence of glacial erosion on Lundy Island in the Outer Bristol Channel area indicates that the greatest erosive episode may have occurred during the early to middle Devensian; the ice sheet advanced during MIS 4 (74-59,000 BP), and subsequently began its retreat during MIS 3 (59-29,000 BP) with full subaerial exposure of the island by around 35-40,000 BP (Rolfe et al. 2012). This glacial retreat corresponds with a period of climatic amelioration prior to the onset of the Dimlington Stadial ice sheet. Indeed, evidence of human activity dating to around 33,000 BP (middle Devensian) on the Gower Peninsula indicates that this area was not only subaerially exposed but had sufficient environmental conditions to sustain human life despite close proximity to retreating glacial ice (Dinnis 2012).

4.6.11 The readvancement of these ice lobes during the Dimlington Stadial culminated in the LGM (26-21,000 BP) which likely resulted in much of the Celtic Sea and part of the Lundy Platform being covered in ice (Hughes et al. 2011, Gibbard et al. 2017). There is evidence to suggest that the ice extended as far south as the Isles of Scilly (Smedley et al. 2017). The Inner and Outer Bristol Channel areas were probably not subglacial during this period; periglacial outwash fan deposits identified on Rotherslade Beach on the Gower Peninsula indicate that the glaciation did not

extend far enough south or east to cover the Peninsula which is situated on the northern edge of the Bristol Channel, thus suggesting that the glaciation did not cover the Bristol Channel at all (Hiemstra et al. 2008). The understanding of the glacial limits on the onshore portion of the wider landscape is quite well refined, with debates over ice margin positions differing by <5 km. However, the margins on the offshore portion of the wider landscape are less well defined, with proposed extents of the glaciation across the Lundy Platform differing by up to 70km (See Figure 8) (Gibbard and Clark 2011, Hughes et al. 2011, Gibbard et al. 2017, Roberts et al. 2020)

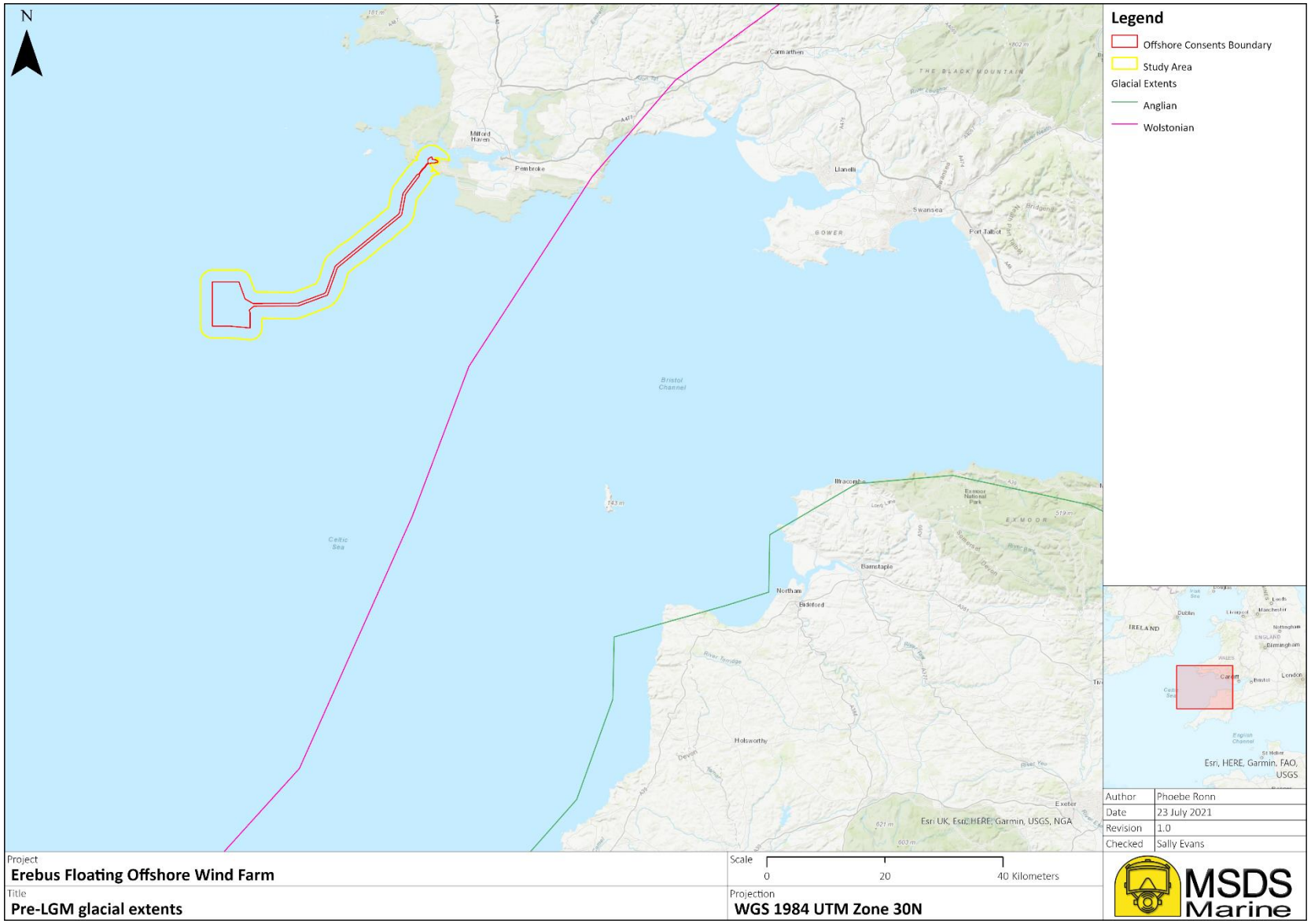


Figure 7 Pre-LGM Glacial Extents (derived from Clark and Gibbard 2004)

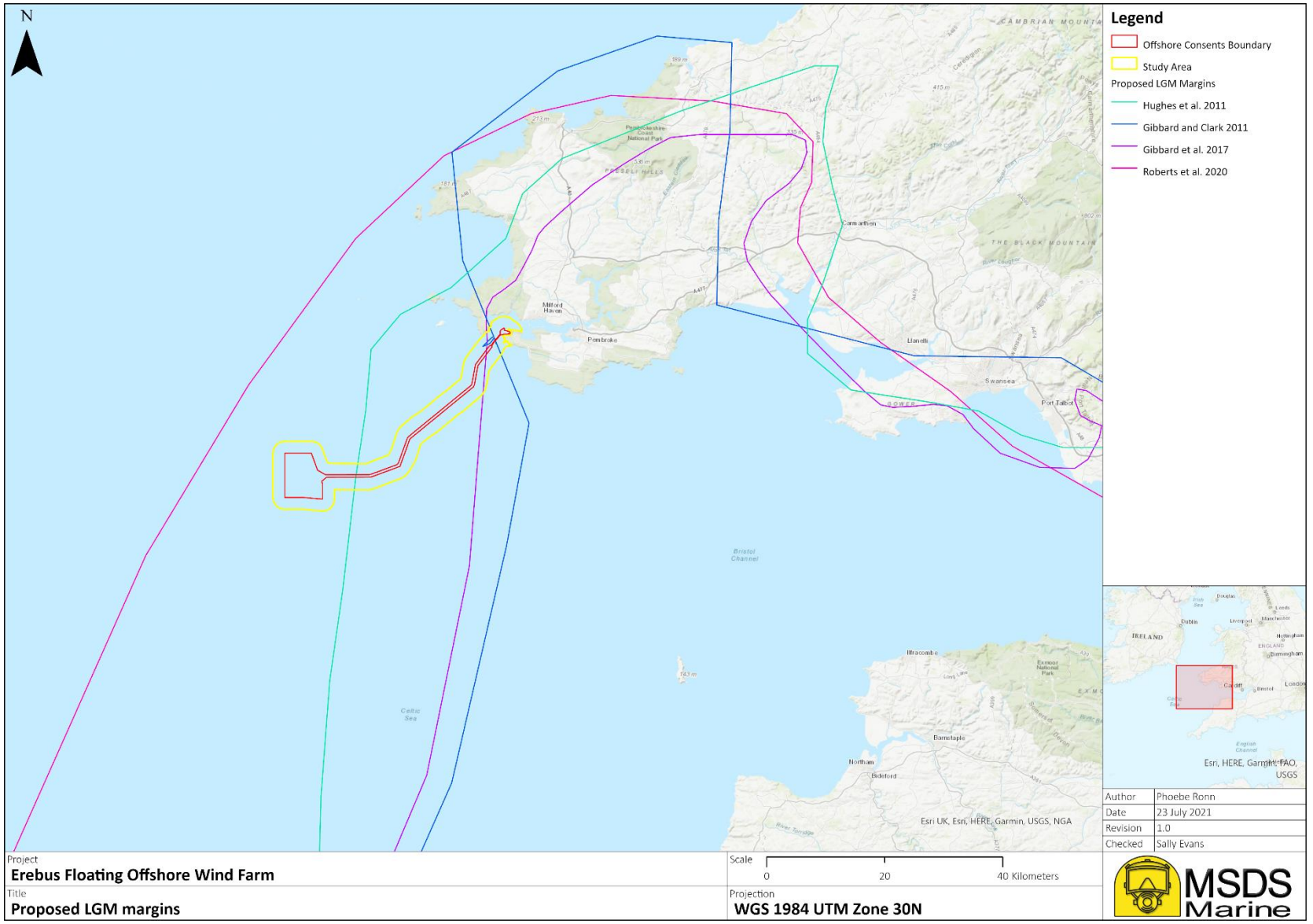


Figure 8 Proposed LGM Margins (derived from Hughes et al. 2011, Gibbard and Clark 2011, Gibbard et al. 2017, and Roberts et al. 2020).

4.6.12 The Devensian extents detailed in Figure 8 are based on the following sources:

- Hughes et al. 2011: sedimentological geochemistry, Celtic Sea cores, stable isotope analysis, modelling;
- Gibbard and Clark 2011: modelling;
- Gibbard et al. 2017: modelling; and
- Roberts et al. 2020: ^{36}Cl dating, geological stratigraphy, landscape morphology.

4.6.13 As discussed above, the exact extent of the LGM is currently unknown; evidence from the WCPS suggests that the survey area (just 50km east of the Array Area, and 20km east of the central part of the ECC) was not covered by LGM ice, and instead was a periglacial tundra covered in herbs and grasses (Fitch et al. 2011). Towards the end of the LGM, the diversity of vegetation likely increased; shrubs and tree species such as willow were becoming established, and even small areas of sparse woodland were developing. Up to 20km of the inshore section of the ECC is similar to that seen in the WCPS survey area, suggesting that topographically at least part of the ECC may have been exposed as the WCPS Study Area was found to be exposed (Fitch et al. 2011).

4.6.14 The ice is believed to have begun retreating by around 16,000 BP, and the subsequent sea level rise was induced by the onset of the temperate Windermere interstadial, which melted the LGM ice (Fitch et al. 2011). During this brief interstadial, the ice would have retreated, possibly resulting in marine incursion in the wider area (Figure 9 parts 4-5).

4.6.15 The WCPS identified late Pleistocene channel features in the Bristol Channel region (Fitch et al. 2011). The channels were likely formed as a result of the melt of the LGM and contain riverine infill, and likely extended beyond the WCPS study area and potentially into the Study Area. The channels would have formed a network of high energy rivers. This high energy resulted in sharp incisions in the valley floor, suggesting that any relict rivers present in the site might be identifiable geologically. Glacial lakes were also identified in the low-lying areas of the Bristol Channel, it is possible that similar lake features were present further to the west, within the Study Area. The Proposed Development may also have been similarly or more low-lying during the late Pleistocene, and so there is potential that lake features to have been present.

4.6.16 The final episode of the Devensian stage, the Loch Lomond Stadial brought about a fall in sea levels; this glaciation was limited to northwest Scotland and Northern Ireland, and thus the wider landscape was not subglacial, but would have been affected by permafrost (Fitch et al. 2011). Parts of the region are likely to have been a terrestrial and periglacial tundra during this Stadial (see Figure 9 part 6). Subsequent to the Loch Lomond Stadial, was climatic amelioration that marks the start of the Holocene. Prior to complete marine transgression caused by glacial melt, parts of the Bristol Channel area are likely to have been subaerially exposed with channel systems and lake features in low-lying areas (Fitch et a. 2011).

4.6.17 Figure 9 is based on a study by Tappin et al. (1994) which provided a broad overview of landscape changes in the Celtic Sea during the late Pleistocene and early Holocene. Part 6 of the figure indicates that the site was terrestrial at 10,500 BP (around the onset of the Holocene). However, a later study of sea level index points (Massey 2004) demonstrated that the sea level at Port Talbot (c.90km from the Study Area) was at -25.66m OD by 10,075 BP. The Array, and approximately two thirds of the ECC are at depths greater than -40m OD, suggesting

that much of the area within the Offshore Consent Boundary was submerged by 10,075 BP (i.e. the Early Mesolithic period), and thus channel features within the Array Area and offshore portion of the ECC must pre-date this period.

4.6.18 Evidence from the BGS and the WCPS suggest that the current coastline of the Outer Bristol Channel region was established in around 5,000 BP (Tappin et al. 1994; Fitch et al. 2011). The landscape change indicated by the difference in terrestrial coverage in Figure 9 (parts 6-7) shows the potential speed of the marine transgression. A sea level index point from Freshwater West (c.5km from the site) indicates that the sea level was at -5.09m at 6800 BP (Massey 2004). Modern bathymetry shows that this depth is very close to the current shoreline, demonstrating that coastlines similar to todays were established in the area by around 6800 BP (during the Late Mesolithic), thus the site was likely almost entirely submerged by this date.

4.6.19 Prior to inundation, the terrestrial environment would have been temperate, with mixed deciduous forest with many edible plants, and low energy river networks providing further food sources and open areas, all of which represent an ideal human habitat (Fitch et al. 2011). Evidence of Mesolithic forests are frequently revealed by low tides and storm surge erosion near to the ECC landfall, such as sites at Frainslake, Freshwater West, and Lydstep (NPRN: 524739, 524740, 524754). In September 2020, the low tide following Storm Francis revealed a petrified forest at Llanrhystud (90km north of the ECC landfall) dated to between 4500-6000 BP (Grug 2020).

4.6.20 No evidence of peat has been identified within the Study Area so far, including in the intertidal area. However, the geophysical survey of the ECC (OWC 2021b) identified evidence of acoustic blanking from the area to the north outside of the Offshore Consent Boundary, but within the Study Area, that was interpreted as gas accumulation, which can indicate the presence of peat deposits or organic material.Consent Boundary

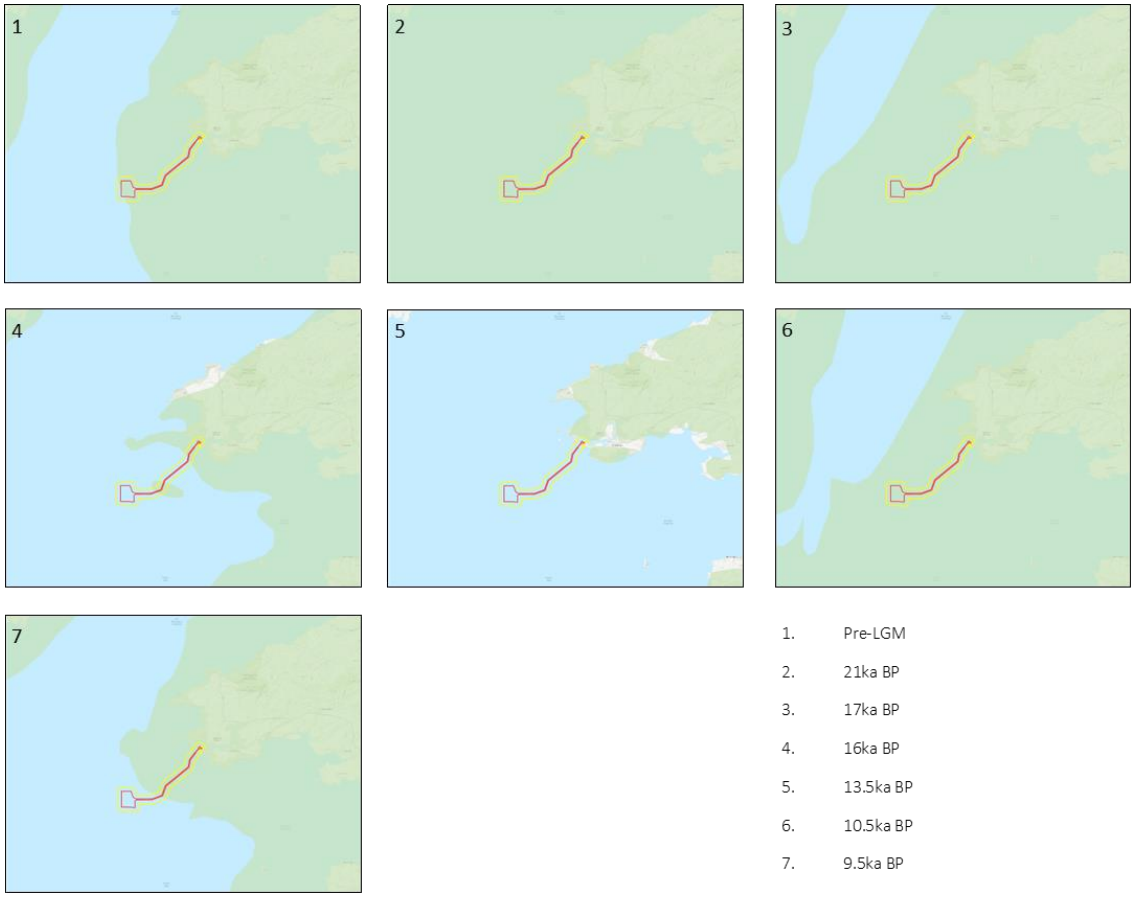


Figure 9 Landscape Evolution from pre-LGM period to beginning of the Holocene (Derived from Tappin et al. 1994)

4.7 Prehistoric Archaeological Potential

4.7.1 The potential for prehistoric archaeological remains to be present in an area is linked to the suitability for human habitation of the various environmental and climatic conditions that have affected that area. An area suitable for human habitation would be one that is terrestrial and aerially exposed i.e., not covered in ice or water. A particularly suitable environment is one that includes water sources e.g., river valleys and terraces, estuaries, lakes, and glacial meltwater channels. These environments would have provided rich food sources to human species. Other environments include caves and cliff faces; as these would have offered shelter from the elements. Previous environmental conditions can be inferred from the characteristics of the relevant geological deposits present within an area.

4.7.2 Palaeoenvironmental remains may be present in an area regardless of the suitability for human occupation. These remains can be used to reconstruct prehistoric environments and determine what the climatic conditions were when the remains were deposited. The sedimentary properties of a geological deposit will also affect the preservation of remains; for example, fine grained and organic deposits are excellent preservation environments for remains.

4.7.3 As set out in Section 4.4, there are a series of units within the site. While it has not been possible to determine the age of these deposits, their characteristics provide some indication of archaeological potential. A number of these have properties indicative of glacial deposition, identified in Unit B2, C and above H4 (OWC 2021a,b). These deposits are likely to have low archaeological potential, though dating of these deposits could constrain dates for glacial advances and retreats which would aid understanding of when the area was inhabitable by human populations. However, channel fill deposits with a fine-grained or interbedded nature (as seen in Unit B1 and the unit above H2) have heightened archaeological and palaeoenvironmental potential. There may also be archaeological potential associated with other channel deposits (e.g., above H3 and below H4), however, the nature of the fills associated with these channels is less clear and potential therefore uncertain.

4.7.4 Archaeological potential is discussed further below.

Lower and Middle Palaeolithic (c. 970,000 – 45,000 BC)

4.7.5 The earliest evidence of human occupation in the British Isles dates to between 1 and 0.78 Ma (Ashton et al. 2014) during the Cromerian Complex; worked flints and hominin footprints attributed to *Homo Antecessor* were found at Happisburgh (Norfolk) during excavations as part of the Ancient Human Occupation of Britain (AHOB) project. These remains indicate the presence of human species in the UK. There is further evidence of human occupation during the Cromerian in Sussex; at Boxgrove (Stringer et al. 1998). Human bone attributed to *Homo Heidelbergenis* was discovered at this site, dating to around 500,000 BP. The earliest hominid remains identified in Wales is a fragment of *Homo Neanderthalenis* dated to 230,000 BP.

4.7.6 Due to the length of the Cromerian and the varying climatic conditions, the environment of the Study Area likely fluctuated. The only deposit identified within the outer Bristol Channel region dating to the Cromerian is the fluviatile/shallow marine Bardsey Loom Formation. As previously discussed, this formation may be present within the Study Area at the base of incisions into the bedrock. Peat was identified in the Cromerian Bardsey Loom Formation in a borehole taken 47 km to the west of the Array Area (Tappin et al. 1994).

4.7.7 Presence of a possible fluvial/shallow marine deposit 90km offshore indicates that the sea level was considerably lower than the present day at points (Tappin et al. 1994). Thus, it is possible that human species were present in the area during the Cromerian. Due to the low-lying nature of the Celtic Sea floor, it is likely that during episodes of aerial exposure, the outer Bristol Channel region included a network of river systems draining from both east from Ireland and west from mainland UK (Fitch et al. 2011). Further to this, the position of the site on the Lundy Platform would have provided a strategic habitat overlooking the Celtic Deep Trough for tracking game (Fitch et al. 2011). This would make it an ideal environment for human occupation. There is also high potential for palaeoenvironmental remains to be present within the Bardsey Loom Formation; layers peat identified in a borehole just 47 km west of the Study Area indicate that the Bardsey Loom Formation contains preserved organic material ideal for palaeoenvironmental sampling.

4.7.8 However, no archaeological remains dating to this period have as yet been identified in Welsh contexts, and it is currently uncertain whether the Bardsey Loom Formation is represented within the Study AreaConsent Boundary.

4.7.9 The Cromerian Complex was followed by the Anglian glacial stage. There is currently no evidence of human occupation of the UK dating to the Anglian.

4.7.10 Geological evidence indicates that the region was likely subglacial or ice-proximal (glacio)marine during the Anglian (Tappin et al. 1994). These adverse conditions suggest that humans were unlikely to be present in the area during the Anglian, and thus the potential for prehistoric archaeological remains to be present is very low. However, there is potential for paleoenvironmental evidence to be present within the Study AreaConsent Boundary if contemporary deposits are present, these would be in the form of shell debris identified in the Bedded Member of the Caernarfon Bay Formation (Tappin et al. 1994). This deposit may represent the transition between the Anglian and Hoxnian, as the ice was retreating, and the environment was becoming temperate.

4.7.11 The Hoxnian interglacial stage (430-350,000 BP, MIS 11) followed the Anglian glaciation. As the ice retreated, the UK became temperate and covered by closed deciduous woodland. Both *Homo Heidelbergenis* and *Homo Neanderthalensis* were present in the UK during this period. At Beeches Pit, Suffolk, evidence of human occupation has been identified in the form of worked flint and burned remains; these have been attributed to *Homo Heidelbergenis* (Preece et al. 2006). In Swanscombe, Kent, a skull has been dated to around 400,000 BP making it the earliest evidence of occupation by Homo Neanderthalensis (University of Southampton 2010).

4.7.12 Evidence of increased sea levels during the Hoxnian suggest that the Study AreaConsent Boundary was likely submerged (Bowen 1973). Therefore, there is low potential for prehistoric archaeological remains to be present dating to the middle Hoxnian. However, prior to the marine transgression at the end of the Anglian, it is possible that the Study Area was terrestrial, and aerially exposed. Indeed, there is evidence of a temperate forest environment at West Angle, the location of the project landfall (Stevenson and Moore 1982). However, the subsequent marine transgression is likely to have negatively affected the preservation of any remains, although uneroded surfaces may have potential for remains. It is also possible that towards the end of the Hoxnian, during marine regression associated with the onset of the Wolstonian, the Study Area was terrestrial and aerially exposed and thus potentially suitable

for human habitation. However, the subsequent glaciation is likely to have reworked any remains Hoxnian remains and as no remains are known from this period in Welsh contexts this potential is very limited.

4.7.13 There is also potential for palaeoenvironmental evidence to be present within the Study Area dating to the Hoxnian within infill of possible kettle holes within the Incision Infill Member of the Caernarfon Bay Formation, if the previously discussed incisions are present (Tappin et al. 1994).

4.7.14 A subsequent glaciation, the Wolstonian, affected the UK after the Hoxnian, as discussed previously, two interglacial stages occurred during the Wolstonian. Evidence of human occupation dating to the Purfleet interglacial has been identified at various sites in Essex in the form of worked flint. Evidence dating to the Aveley interglacial was identified at Aveley, Essex again in the form of worked flints, but also at Pontnewydd, Wales where a jaw fragment attributed to *Homo Neanderthalensis* and dated to 230,000 BP was discovered indicating hominid activity in Wales by this point (Green et al. 1981).

4.7.15 The Wolstonian glaciation is believed to have extended c.100km south of the Study Area which suggests that the site was largely subglacial during this period (Clark and Gibbard 2004). Geological evidence suggests that towards the early Wolstonian, the site was a peri-glacial marine environment in the process of becoming fully glacial.

4.7.16 Humans were unlikely to be present at the site during periods of subglacial conditions, although, evidence of human presence in the UK during the Purfleet and Aveley interstadials suggests that the glacial conditions eased enough in places to provide a suitable habitat for humans. However, no formations have been identified in the region that have been dated to either interstadial period suggesting potential for such remains to be present within the Study Area Consent Boundaryis very limited.

4.7.17 An interstadial period known as the Ipswichian followed the melt of the Wolstonian ice. The environment of the UK was typically mixed deciduous forest during this stage. Despite suitable conditions for human occupation of the UK, no evidence indicating the presence of humans during this period has yet been identified.

4.7.18 Evidence indicates that the sea level was higher than the present day, so it is probable that the Study Area Consent Boundarywas submerged during the Ipswichian indicating low archaeological potential. However, it may be that the area was terrestrially exposed during the transitional period between the retreat of the Wolstonian ice and prior to the Ipswichian marine transgression. The area may also have been inhabitable by humans at the end of the Ipswichian during marine regression related to the onset of the Devensian glaciation; the Bedded and Infill Member of the Cardigan Bay Formation contains evidence of a boreal to arctic environment dating to the late Ipswichian possibly representing the later transition.

4.7.19 There is potential for both prehistoric archaeological and palaeoenvironmental remains to be present within the site dating to the Ipswichian. Any prehistoric archaeological remains would likely be restricted to the beginning or end of the Ipswichian due to marine inundation of the area thus inhibiting human occupation, but palaeoenvironmental remains could date from any time during the Ipswichian. Palaeoenvironmental remains dating to this period could shed light

on the environmental conditions during the transitions from glacial to interglacial at the beginning of the Ipswichian, and the transition back to glacial at the end of the Ipswichian.

4.7.20 The Ipswichian interglacial was followed by the Devensian glaciation. A cold climate and lack of evidence from the early part of the period suggests that the UK remained uninhabited until at least c.44,000 BP.

Upper Palaeolithic (c. 45,000 – 8, 500 BC)

4.7.21 The Devensian glaciation that directly followed the Ipswichian interglacial was the last glaciation that affected the UK. As discussed above (see Section 4.6) the extent of the glaciation is under debate, influencing the discussions of archaeological potential below.

4.7.22 Flint artefacts and skeletal remains indicating human presence in the UK during parts of the Devensian/Devensian have been identified in Dartford (Kent), Gower (Wales), and Creswell (Derbyshire) (Wenban-Smith et al. 2010a; Dinnis 2012; Pike et al. 2005). The earliest evidence for human species in the UK during the Devensian/Devensian is a human maxilla (jawbone) found in Devon, dating to between 44,000 and 41,000 BP (Higham et al. 2011).

4.7.23 The conditions within the Study Area Consent Boundaryare likely to have fluctuated during the Devensian as the ice advanced and retreated. During the early to middle Devensian, it is likely that the nearshore part of the site may have been terrestrial and possibly aerially exposed; but by at least the middle Devensian the majority of the Study Area was likely to have been subglacial (Gibbard et al. 2017). This suggests that there is potential for humans to have been present in the area during the middle Devensian, either before or after the early to middle Devensian glacial episode, indeed human remains were identified in a cave in Gower (54 km to the east of the site) dating to the middle Devensian, after the glacial episode (Dinnis 2012). Late Upper Palaeolithic material has survived in cave deposits on the Pembrokeshire coast at sites including Priory Farm Cave (NPRN: 92727) (10km from the Study Area), Hoyles Mouth cave (NPRN: 304237) (30km from the Study Area), Longberry Bank cave (NPRN: 305459) (30km from the Study Area).

4.7.24 There is potential for both palaeoarchaeological and palaeoenvironmental remains to be present within the Study Area dating to the early to middle Devensian, however, no offshore geological deposits corresponding to this period have been identified in the outer Bristol Channel region (Tappin et al. 1994). Research undertaken by Goodwyn et al. (2010) suggests that primary context sites dating to prior to the LGM would likely not be present in areas that had been subglacial due to the destructive nature of glacial processes, so early/middle Devensian deposits present in the outer Bristol Channel region may not have survived in situ the glacial and marine processes associated with the LGM, though redeposited remains could occur. In the parts of the Study Area that were likely subglacial during the LGM the potential for both in situ archaeological and palaeoenvironmental remains is low. However, it is possible that a significant part of the Study Area was not directly affected by ice during the LGM, and so deposits containing palaeoarchaeological and palaeoenvironmental remains may be present.

4.7.25 While there remains debate on the extent of the LGM it is likely that the Study Area was either sub-glacial, or characterised by ice-proximal conditions, suggesting archaeological potential would be limited.

4.7.26 During the Windermere Interstadial it is likely that the area experienced marine transgression associated with the retreat of the LGM ice (Figure 9 parts 4-5). Prior to inundation, however, the site would have been terrestrial and temperate, with increasingly diverse vegetation and glacial melt-derived fluvial networks; a highly suitable environment for human habitation (Fitch et al. 2011) and channel systems identified within the array area and ECC could have been active during this period. Humans are known to have been present in the UK during the Windermere Interstadial; evidenced by faunal and lithic remains found at Creswell, Derbyshire (Pike et al. 2005).

4.7.27 Subsequent to this, the rapid cooling of the UK during the Loch Lomond Stadial would have caused the vegetation diversity to decrease, and the readvancing glaciation may have diminished the river networks in the area, thus decreasing the suitability for human occupation. There is currently no evidence of human presence in the UK during the Loch Lomond Stadial.

4.7.28 There is potential for Late Upper Palaeolithic remains to be present within the Study Area Consent Boundarydating to episodes of terrestrial exposure during the post-LGM late Devensian. There is also potential for palaeoenvironmental remains to be present, such remains could date from any time during the post-LGM late Devensian and could represent a range of environments. Remains may be present in the Western Irish Sea Formation; the only known formation dating to this period, though as discussed above it is currently uncertain whether this deposit extends to within the Study AreaConsent Boundary. Channel systems identified within the array area and ECC could have been active during this period and these areas hold archaeological potential.

Mesolithic (c. 8,500 – 4,000 BC)

4.7.29 The melt of the Devensian ice marks the end of the Pleistocene, and the start of the Holocene. It was during the Holocene, at around 5000 BP, that the current coastlines of the UK were established as a result of rising sea levels (Tappin et al. 1994; Fitch et al. 2011). Humans were well established in the UK during the Holocene; the relevant archaeological period is called the Mesolithic.

4.7.30 As discussed previously by 10,075 BP, during the Early Mesolithic period, the Array Area and approximately two thirds of the ECC were likely submerged. Thus, the potential for in situ archaeological remains within these areas is restricted to the Early Mesolithic and earlier periods. Marine transgression continued and a sea level index point from Freshwater West (c.5km from the site) indicates that the sea level was at -5.09m at 6800 BP, placing the Late Mesolithic coastline very close to that of the present day. By 5000 BP the coastline is thought to have reached its present position (Bell 2007; Tappin et al. 1994; Fitch et al. 2011).

4.7.31 Mesolithic flint working sites identified on the beach at Freshwater East (17 km from landfall site) and on Nab Head (10km from landfall site) indicate that humans were living close to the coasts during the Mesolithic (NPRN: 308819, 424206, and 524741). Possibly Mesolithic flint flakes were identified adjacent to the beach at West Angle Bay (MSDS_Erebus_068). The coastal caves in the wider area (such as those on the Gower peninsula) that were used by Neanderthals in the middle Devensian may still have been in use during the Holocene, although at this point they would have been considerably closer to the sea (Bell 2007).

4.7.32 Channel systems within the Study Area may date to this period, or earlier periods, and could have provided favourable locations for human activity. Channel fill deposits with a fine-grained

or interbedded nature (in particular Unit B1 and the unit above H2) could potentially date from this or earlier periods (and those within the array area and offshore portions of the ECC were likely submerged by 10,075 BP indicating an earlier origin) and provide areas where archaeological and palaeoenvironmental remains may be well preserved. Additionally, although peat deposits have not been recorded within the Offshore Consents Boundary peats have been identified on the coast at Frainslake Sands (NPRN: 403822), just 1 km south of the ECC landfall site, and Manorbier (NPRN: 524757). Acoustic blanking in geophysical data has been identified to the north of the Study Area, potentially suggesting the presence of peat. Further to this, as discussed previously, numerous submerged prehistoric forests have been identified on the Pembrokeshire coasts, often revealed by storm surges and other extreme weather episodes. Footprints in coastal peat deposits have been identified near to the Study Area; human, auroch, and deer footprints were discovered in peat at Freshwater West in June 2021 by Dr Rhiannon Philp (pers. comm., Dyfed Archaeological Trust 2021). Other peat deposits at Freshwater West have previously been dated to 5250-4550BC. While no peats have been identified within the Offshore Consent Boundary there is potential for remains of this nature to be present.

4.7.33 Kettle hole features in the identified within the Devensian Western Irish Sea Formation may have formed lakes or shallow marshes. These features were often a focus for prehistoric activity; evidenced by the rich Mesolithic assemblages found at kettle hole sites in Killerby, North Yorkshire and Slotseng, Denmark (Hunter and Waddington 2018; Noe-Nygaard et al. 2007). Relic kettle holes sites may be present within the Study Area in any incisions infilled with Western Irish Sea Formation, though no such features have been identified in the data at present.

4.7.34 There is potential for Mesolithic remains to be present within the Study Area, particularly the ECC, the nearshore parts of which would have remained terrestrial well into the Holocene. Although marine transgression is likely to have disturbed and reworked Mesolithic remains, it is possible for such remains to be preserved in-situ particularly within in sheltered environments. A Mesolithic site dated to 8,000 BP near Bouldnor Cliff on the Isle of Wight proves that material from open-air Mesolithic sites can be preserved in-situ in a marine context (Smith et al. 2015).

4.7.35 There is also high potential for palaeoenvironmental remains to be present; floral and faunal fossils identified in the Surface Sands Formation and its members indicates that palaeoenvironmental information would be extractable from Holocene deposits (Tappin et al. 1994).

4.8 Prehistoric Summary

4.8.1 There is varying potential for prehistoric remains to be present within the Study Area dating to a number of prehistoric periods. The potential for each key period and their relevant geological deposits identified in the BGS report are detailed in Table 11.

4.8.2 Further information from ongoing geotechnical work and the development of the ground model will provide more information on which deposits are present within the Study AreaConsent Boundary, with implications for prehistoric archaeological potential.

Dating	Deposit	Member	Prehistoric Archaeological potential	Paleoenvironmental potential
Holocene	Surface Sands Formation	SL1 Member	No- marine conditions	Yes
Holocene/ Late Devensian		SL2 Member	Yes	Yes
		Seabed Depression Member	Yes	Yes
Late Devensian	Western Irish Sea Formation	Codling Bank Facies	Not present within site	Not present within site
		Sarnau Facies	Not present within site	Not present within site
		Mud Facies	No- marine conditions	Yes
		Prograded Sand Facies	No- marine conditions	Yes
		Chaotic Facies	No- marine conditions	No- glacial conditions
Devensian		Chaotic Facies	No- marine conditions	No- glacial conditions
Late Devensian	Cardigan Bay Formation	Upper Till Member	No- glacial conditions	Yes
Ipswichian to early Devensian		Bedded and Infill Member	Yes	Yes
Wolstonian		Lower Till Member	No- glacial conditions	No- glacial conditions
	St George's Channel Formation	N/A	No- marine conditions	Yes
Early Wolstonian	Caernarfon Bay Formation	Upper Unstratified Member	No- marine conditions	Yes
Late Anglian		Incision Infill Member	Yes	Yes
		Bedded Member	No- glacial conditions	Yes
Early Anglian		Lower Unstratified Member	No- glacial conditions	No- glacial conditions
Pre-Anglian (Cromerian)	Bardsey Loom Formation	N/A	Yes	Yes

Table 11: Potential for each key period and related geological deposits

5.0 Maritime Archaeology

5.1 Designated Assets and Historic Landscapes

Registered Historic Landscapes

5.1.1 The Offshore Consent Boundary and Study Area runs through the Milford Haven Waterway, a Registered Landscape of Outstanding Historic Interest in Wales (MSDS_Erebus_003). This seascape has a rich maritime history extending back over 2000 years. Evidence of activity relating to conquest, defence, settlement, commerce, and fishing is present in this area. The summary description of the Landscape included within the register indicates that the Milford Haven Waterway is '*The classic ria, drowned valley and estuary in Wales, with an unsurpassed concentration of remains reflecting maritime conquest, settlement, commerce, fishing, defence and industry spanning the prehistoric to modern periods. The area includes: Iron Age promontory forts; Early Christian and Viking placenames; Norman coastal castle-boroughs; medieval castles and later gentry residences; Milford and Pembroke Dock planned settlements; recent and modern quays, jetties and landing places, coal mines, limestone quarries, military and naval fortifications, oil terminals, jetties, refineries and power station'.*

5.1.2 There are numerous Historic Landscape Character Areas (HLCAs) within the Milford Haven Waterway. Those which are intersected by the boundaries of the Study Area are discussed below.

Historic Landscape Character Areas

5.1.3 There are six Historic Landscape Character Areas (HLCAs) within the Study Area (MSDS_Erebus_373 to 378). The HLCAs include archaeological sites and horizons ranging from prehistory to the modern period, demonstrating the rich time depth of the wider area. The types of archaeological site include (but are not limited to) prehistoric flint-working sites, Iron Age forts, early medieval to modern settlements and industrial sites, and medieval to modern defensive structures relating to the defence of Milford Haven various conflicts.

5.1.4 The Offshore Consent Boundary intersects one of these character areas: The West Angle to Freshwater West Coastal Strip. The area forms a narrow strip of land which bounds the peninsula on which Angle sits, running from Thorn Island just to the north of West angle Bay, to Freshwater West. The description and essential historic landscape components for this area are described by Dyfed Archaeological Trust as follows:

5.1.5 'This historic landscape character area consists of approximately a 7 km strip of high, hard-rock sea cliff topped by a narrow band of moor, scrub and rough ground. The Pembrokeshire Coast Path runs along the entire length of this area. Although it comprises a very narrow strip of land, sometimes just a few metres wide, this area is very different from the highly cultivated land that bounds it, and for long sections there is no connection between the cultivated fields and the coastal strip. Essentially the historic landscape of the coastal strip is characterised by its many and varied archaeological sites. The most obvious of these are military sites dating from the 16th century through to the 20th century, including the earliest surviving military installation on the waterway, East Blockhouse, constructed in the 16th century, and now reduced to a tottering stone ruin on the cliff top. Also included is the grade II* listed 19th century fort on Thorn Island, built in 1859 and now converted to a hotel (itself grade II* listed), the coast gun battery at East Blockhouse constructed in 1901-04, and several dispersed

installations such as searchlight batteries and gun emplacements. Buildings at East Blockhouse are still used by the military. Other archaeological sites include iron age forts, a possible dark age site at Sheep Island and numerous flintworking floors. This distinct area is clearly separated from the enclosed farmland that bounds it inland.'

Consent BoundaryDesignated Wrecks

5.1.6 There are no designated wrecks within the Offshore Consent Boundary or Study Area.

Scheduled Monuments

5.1.7 There are two scheduled monuments within the Study Area, these are detailed in Table 12. These assets above the Mean High-Water Spring (MHWS) and as such are not within the Offshore Consent Boundary. These assets are considered in the Intertidal Section (Section 7.0), with full details provided within the onshore archaeology Environmental Statement (ES) chapter and technical report.

MSDS ID	Name	Description	Cadw ID
MSDS_Erebus_001	West Angle Bay Settlement	Remains of a well-preserved cemetery, which dates to the early Medieval period (sixth to tenth centuries AD). It consists of two parts, both located in improved pasture on the cliff top overlooking West Angle Bay to the North.	PE554
MSDS_Erebus_002	Stack Rock Fort	Trefoil plan Battery built in 1852 to defend the middle part of Milford Haven.	PE334

Table 12: Scheduled Monuments within the Study Area.

5.1.8 No other designated heritage assets are present within the Offshore Consent Boundary or Study Area

5.2 Known Maritime Sites and Geophysical Anomalies

5.2.1 The recorded heritage assets within the Offshore Consent Boundary and Study Area are displayed in Figure 10, Figure 11, and Figure 12.

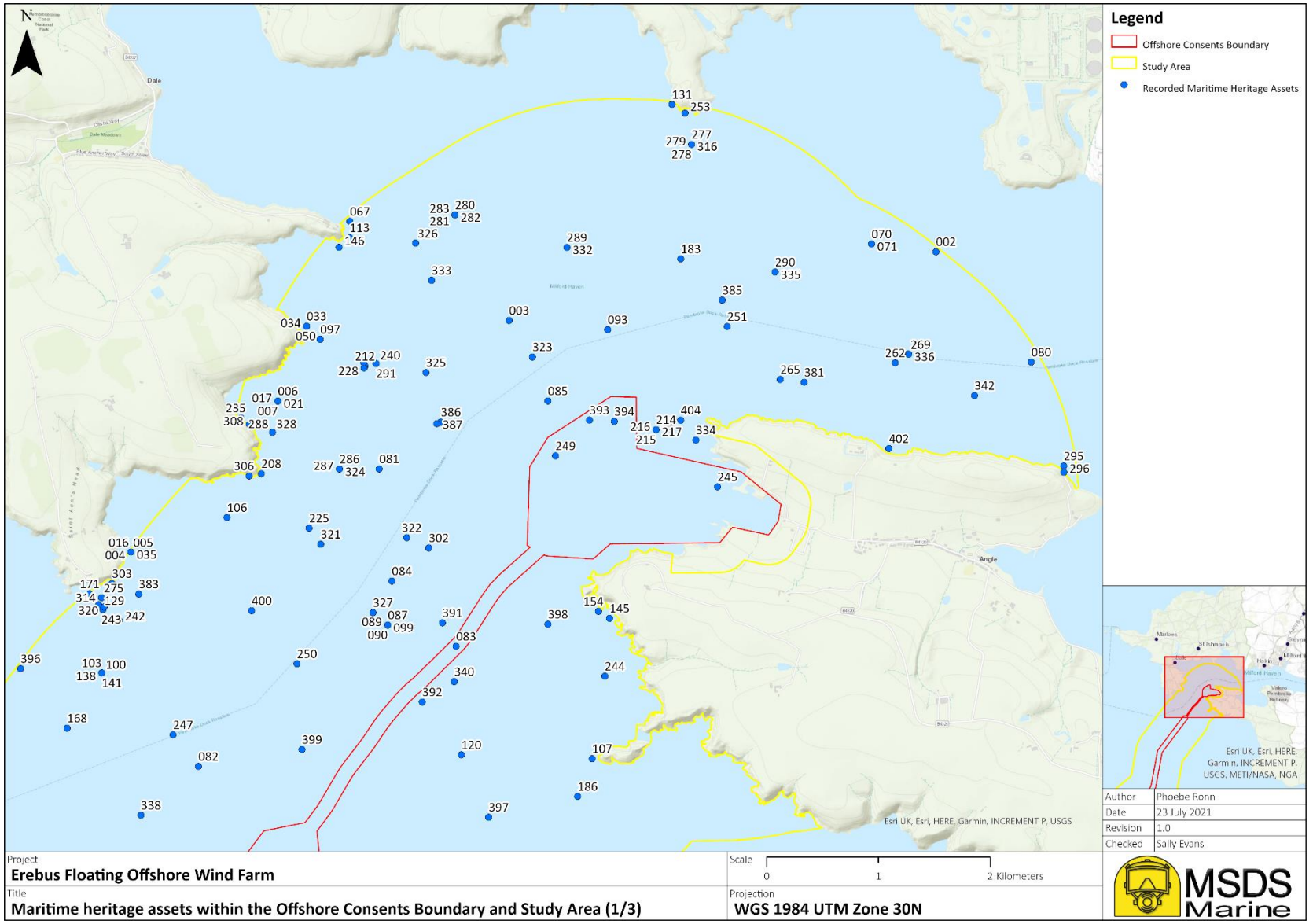


Figure 10: Recorded maritime heritage assets within the Offshore Consent Boundary and Study Area (1/3)

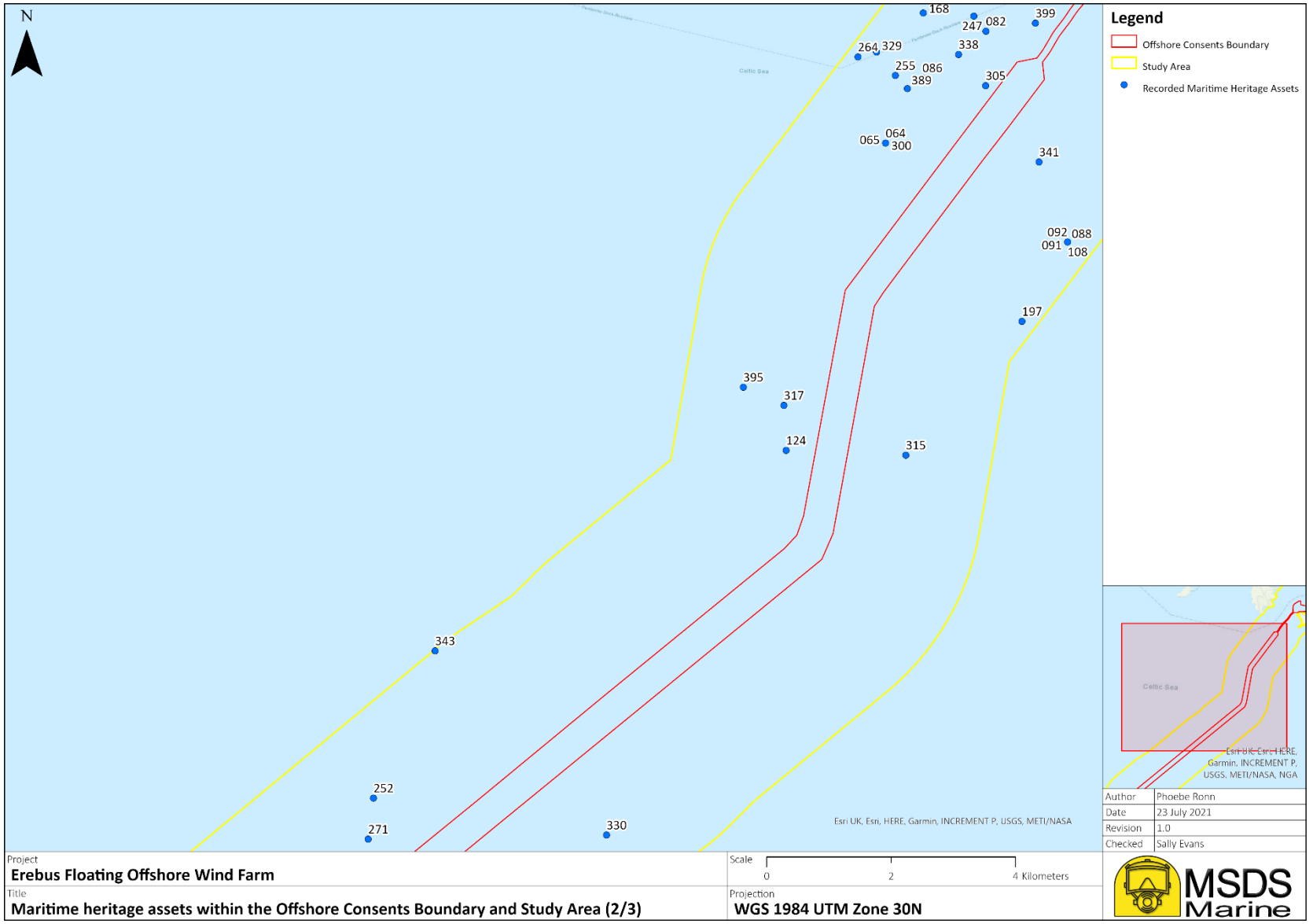


Figure 11: Recorded maritime heritage assets within the Offshore Consent Boundary and Study Area (2/3)

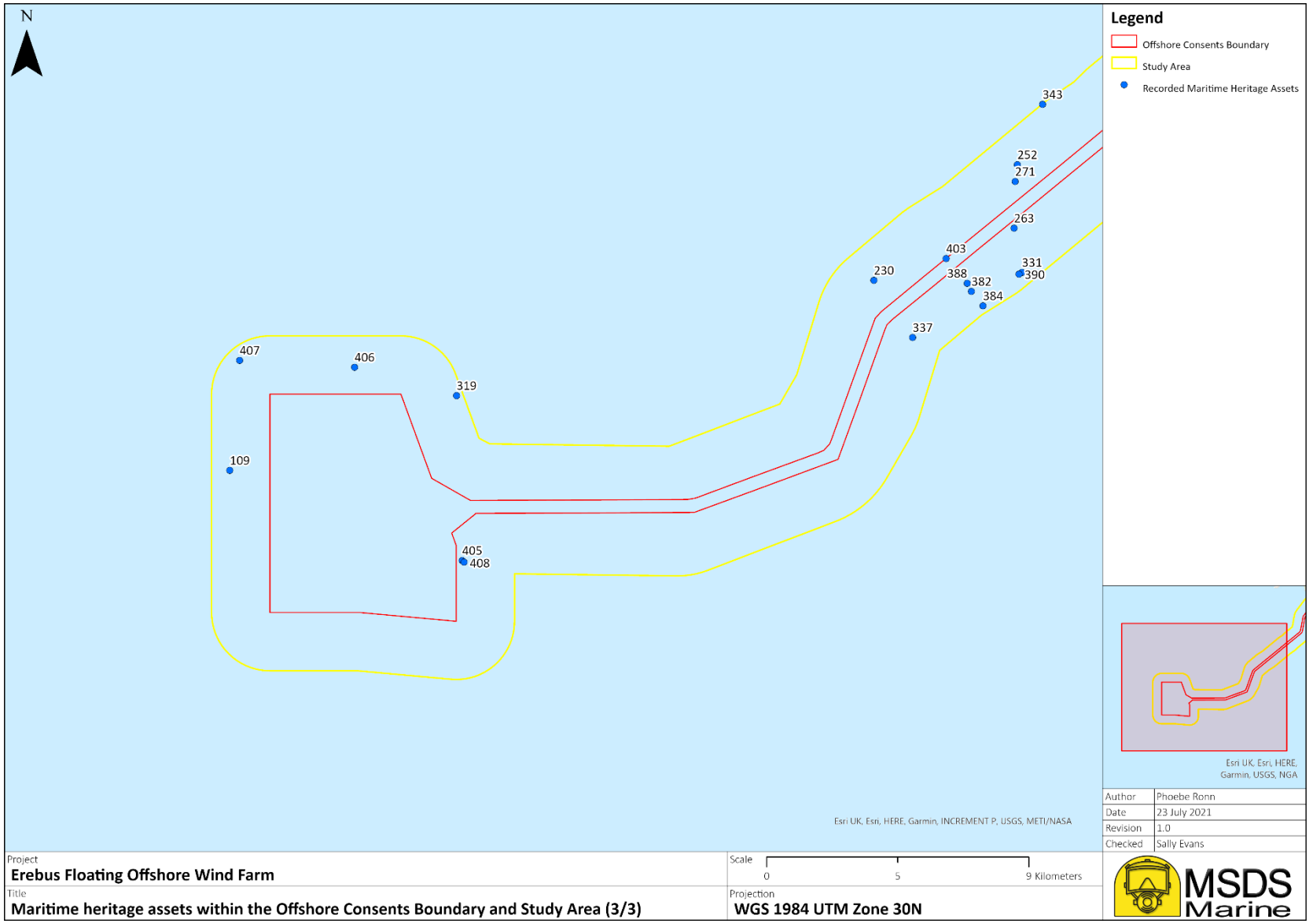


Figure 12: Recorded maritime heritage assets within the Offshore Consent Boundary and Study Area (3/3)

Wrecks

5.2.2 The majority of wreck records came from the UKHO dataset. The UKHO describes the status of wrecks as either live, dead, lifted, or abey which are defined thusly:

- Live: A wreck has been previously recorded at that location, and has been identified upon recent surveys of that position.
- Dead: A wreck has been previously recorded at that location and has not been identified upon recent surveys of that position.
- Lifted: All or part of the wreck has been removed from the seabed
- Abey: The existence of the wreck is in doubt (this status is rarely used)

5.2.3 There are 33 known wrecks within the Study Area. Of these, one is within the Offshore Consent Boundary: HMS *Leda*.

5.2.4 HMS *Leda* was built in 1800 and was a 5th rate Ship of the Line. *Leda* was crewed by 284 people and carried 38 cannon. The vessel sailed from Cork and was lost in 1808 after becoming damaged in a gale and running onto rocks outside of West Angle Bay. The wreck was abandoned and was heavily salvaged at low tide (RCAHMW 2008). *Leda* eventually broke up completely. Cannonballs and nails have been recovered from the rocks. The location was covered by the intertidal survey, however, there was significant kelp cover in gullies there, and no remains could be seen. While remains may be present it is likely that the majority of the wreck was removed through contemporary salvage and any remaining evidence is likely to be scattered and situated within rocky gullies on the margins of West Angle Bay.

5.2.5 A further 32 wrecks with known positions are recorded within the Study Area, although seven of these positions are considered to be dead by the UKHO. Descriptions of these wrecks are detailed in Appendix 1: Gazetteer.

5.3 Geophysical Assessment

5.3.1 A total of 197 anomalies of potential anthropogenic origin were identified using the multibeam bathymetry and sidescan sonar data, with any corresponding magnetic anomalies, within the Study Area where there was geophysical data coverage; 116 of which fall within the Offshore Consent Boundary. These are categorised by potential in Table 13 and Figure 13.

Potential	Offshore Consent Boundary	1 km buffer (wider Study Area)	Total
High	3	2	5
Medium	11	11	22
Low	102	68	170
Total	**116**	**81**	**197**

Table 13: Distribution of anomalies by potential within the Study Area

5.3.2 In addition, 1,355 magnetic anomalies, without strongly correlating anomalies of archaeological interest visible in the surficial datasets were identified within the survey data; of which, 505 fall within the Offshore Consent Boundary. Whilst the vast majority of these are unlikely to be of archaeological interest, the presence of a magnetic anomaly generally indicates ferrous material and thus the anomalies have been included for completeness and context.

5.3.3 The distribution of anomalies is shown in Figure 13, as can be noted the distribution is fairly uniform across the surveyed areas. The ratios of high, medium, and low potential anomalies are consistent with a typical archaeological assessment of data. This shows a consistent approach to the assessment.

5.3.4 The high, medium, and low potential anomalies are discussed below according to their assessed potential.

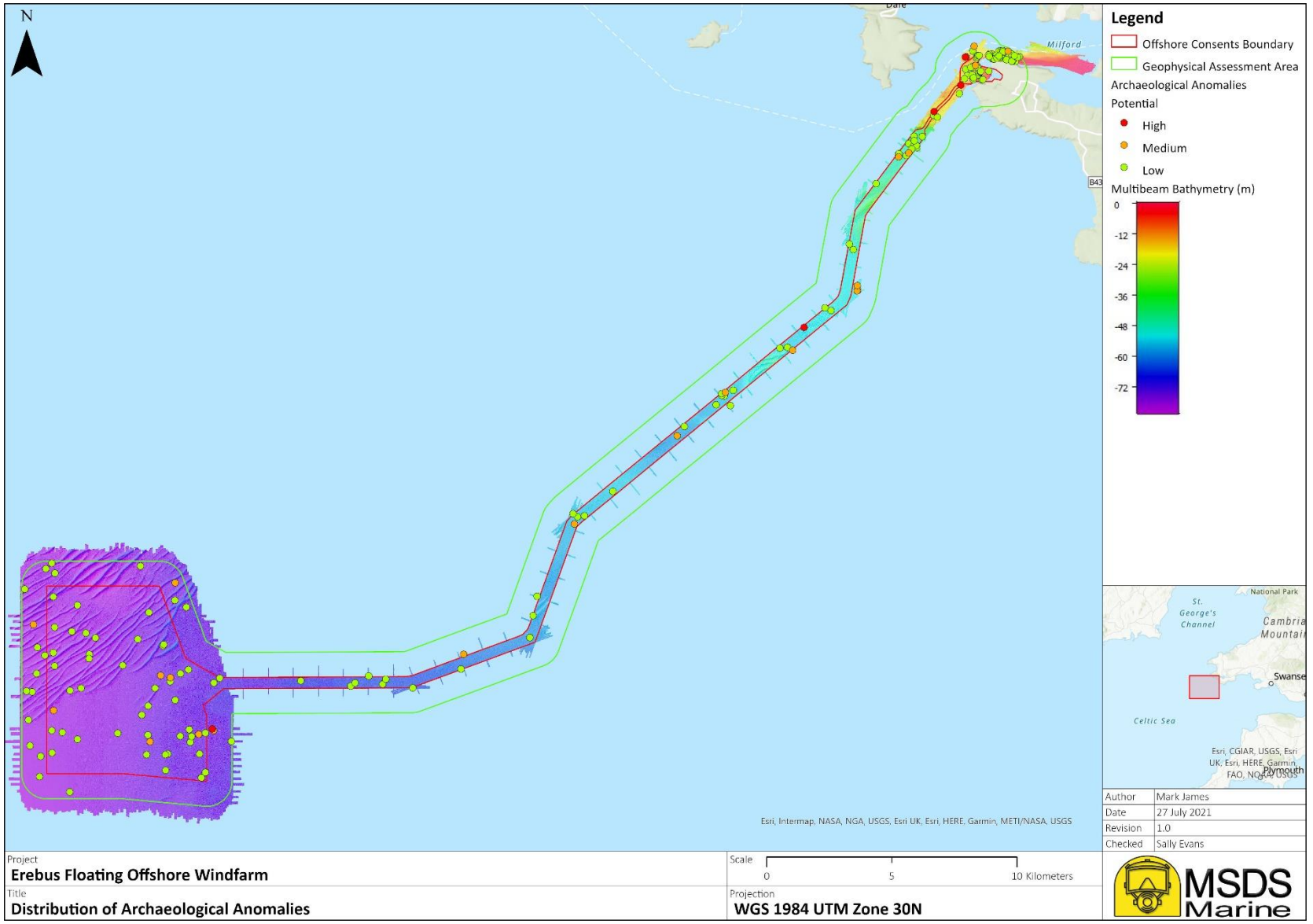


Figure 13: Distribution of archaeological anomalies

High potential anomalies

5.3.5 Five anomalies were identified as of high archaeological potential within the assessment extents, three of which fall within the Offshore Consent Boundary. The anomalies are categorised in Table 14, the distribution is shown in Figure 14.

Anomaly category	Offshore Consent Boundary	1km buffer	Total
Wreck	3	2	5
Total	**3**	**2**	**5**

Table 14: High potential anomaly categories within the Geophysical study area

5.3.6 The anomalies identified as of high archaeological potential relate to wrecked vessels, or likely wrecked vessels. Of the five anomalies identified, one is associated with a UKHO record (12147), but is not named.

5.3.7 Each high potential anomaly is discussed, along with an image, below. Further information regarding mitigation can be found in Section 8.0, and a gazetteer of high potential anomalies, including positions and dimensions can be found in Appendix 4: Gazetteer of Archaeological Anomalies.

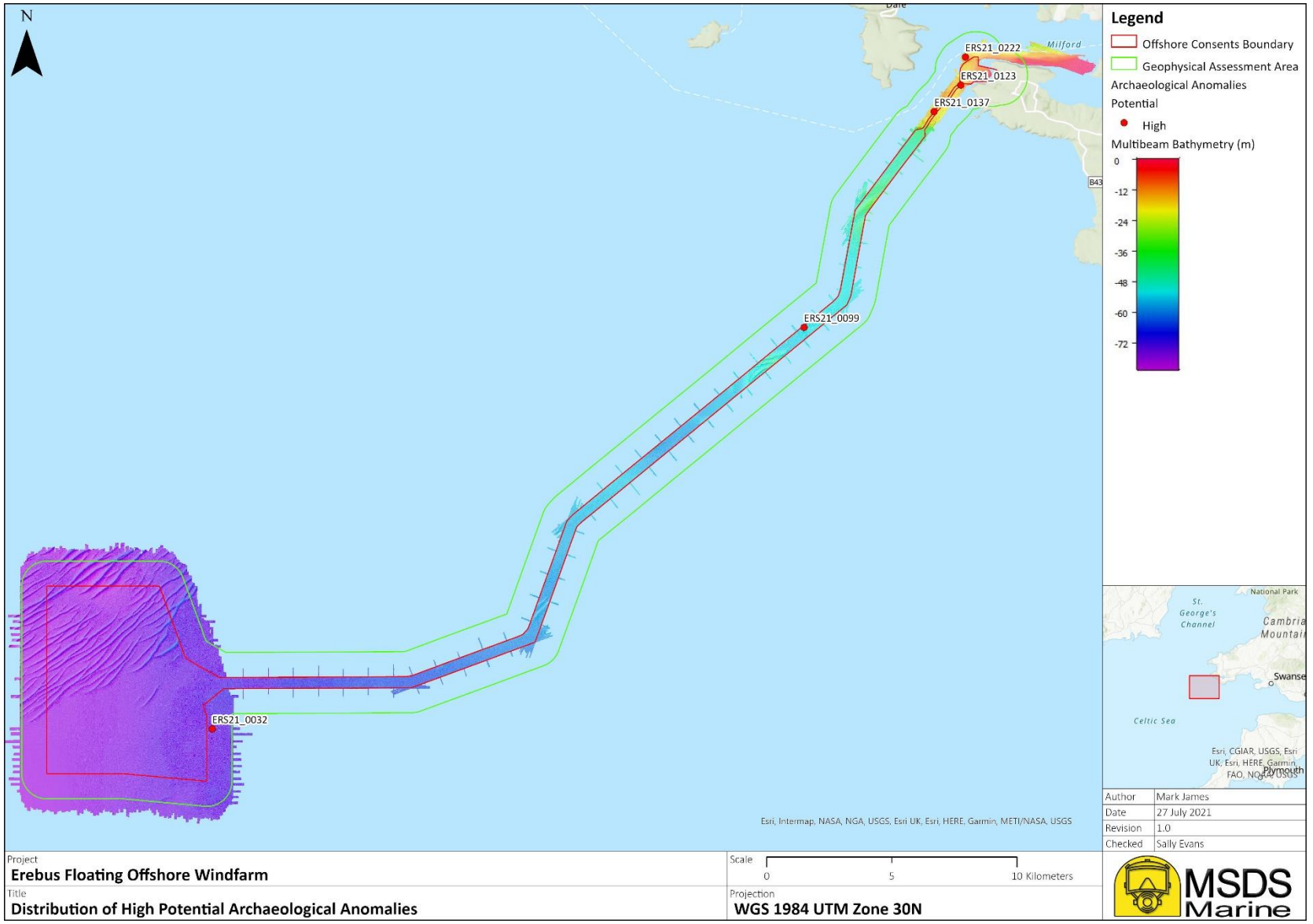


Figure 14: Distribution of high potential archaeological anomalies

High potential anomalies within the Offshore Consent Boundary

ERS21_0099

5.3.8 ERS21_0099 (Figure 15) lies within, and c.63.0 m from the northern edge of the Offshore Consent Boundary along the ECC, approximately 12.8 km from the proposed landfall. The anomaly covers an area 40.7 x 18.9 m and has been interpreted as the potential remains of a wrecked vessel. The anomaly is visible in the SSS and MBES data but is not covered by a magnetometer line.

5.3.9 The anomaly is characterised by an irregular mound, measuring 22.6 x 7.6 m, amongst the surrounding sand waves. 22.3 m to the south-east of the mound is a linear feature measuring 9.1 x 1.6 m, alongside is a small mound which appears irregular in form but is potentially an accumulation of seabed. To the north of the linear feature is a small boulder like feature. Another linear feature, 19.2 m in length, extends from the north-west side of the mound, the feature bisects, and is prominent through, the sand waves.

5.3.10 A further, potentially related, feature lies c.55.0 m to the south-west. The feature is boulder like in appearance, within an area of scour, and measures 3.7 x 3.3 m. A linear feature, 6.4 m in length, protrudes from the feature to the north-west, however, it is not clear if this is related to the feature or a section of sand wave.

5.3.11 The anomaly is not associated with any recorded heritage assets or UKHO records.

5.3.12 Whilst overall the remains are incoherent, and are not immediately recognisable as a wreck, the form, size, and distribution indicate an area of anthropogenic debris the origin of which could be from a wrecked vessel. Therefore, the archaeological potential has been assessed as high.

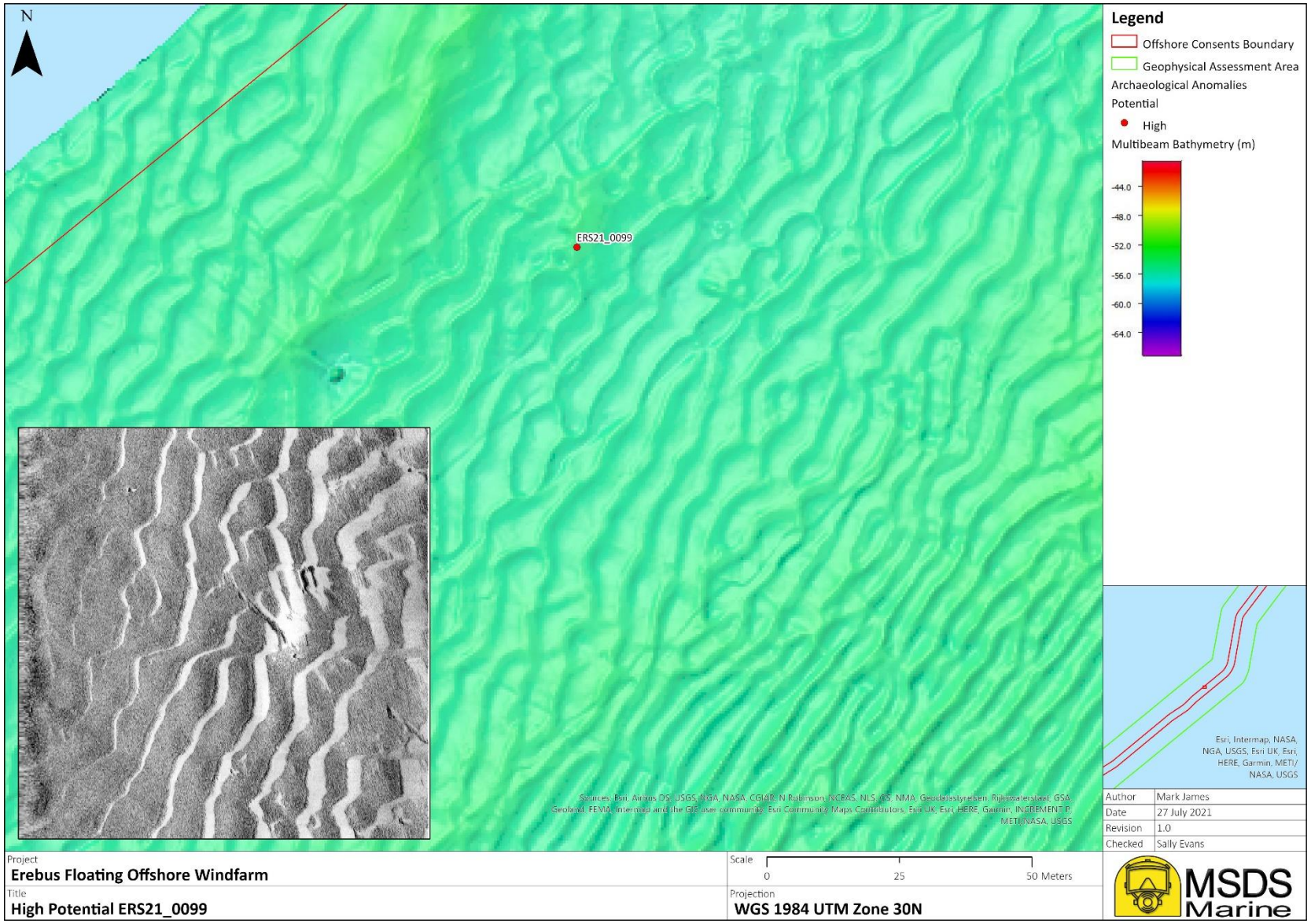


Figure 15: High potential ERS21_0099

ERS21_0123

5.3.13 The centre point for ERS_0123 (Figure 16) lies just on the Offshore Consent Boundary along the ECC, c.100 m south-west of the narrowing of the Row's Rock area of the ECC. The anomaly covers an area 16.7 x 7.8 m, has a measurable height of 1.0 m, and is bisected by the Offshore Consent Boundary. The anomaly is visible in the SSS and MBES data but is not covered by a magnetometer line.

5.3.14 Within the MBES data the anomaly is visible as prominent mound 4.9 x 2.8 m with smaller mounds to the south-east and slight depressions to the north-west. Within the SSS data the anomaly appears as a large number of parallel, linear striations running north, south, across the extents of the anomaly. With a further linear feature to the north and a small area of potential debris to the east. The anomaly is not associated with any recorded heritage assets or UKHO records.

5.3.15 The anomaly was investigated by ROV and established to be the remains of a wrecked vessel (Figure 16). Whilst visibility was poor during the survey a number of diagnostic elements were identified which allowed the following assessment of the vessel to be made. The vessel is of metal construction, likely steel, with at least one boiler visible. The visible, and prominent, remains appear to largely lie within the confines of the material visible on the seabed. The condition of the wreck is poor, although it is clearly identifiable as a wreck. The visible remains are largely contained with little evidence observed of outlying material, however the buried extents are unknown and would require further investigation.

5.3.16 The identity of the wreck is unknown. Further investigation, and research, would be required to establish the identity and significance of the wreck. With the information currently known a high potential rating is appropriate.

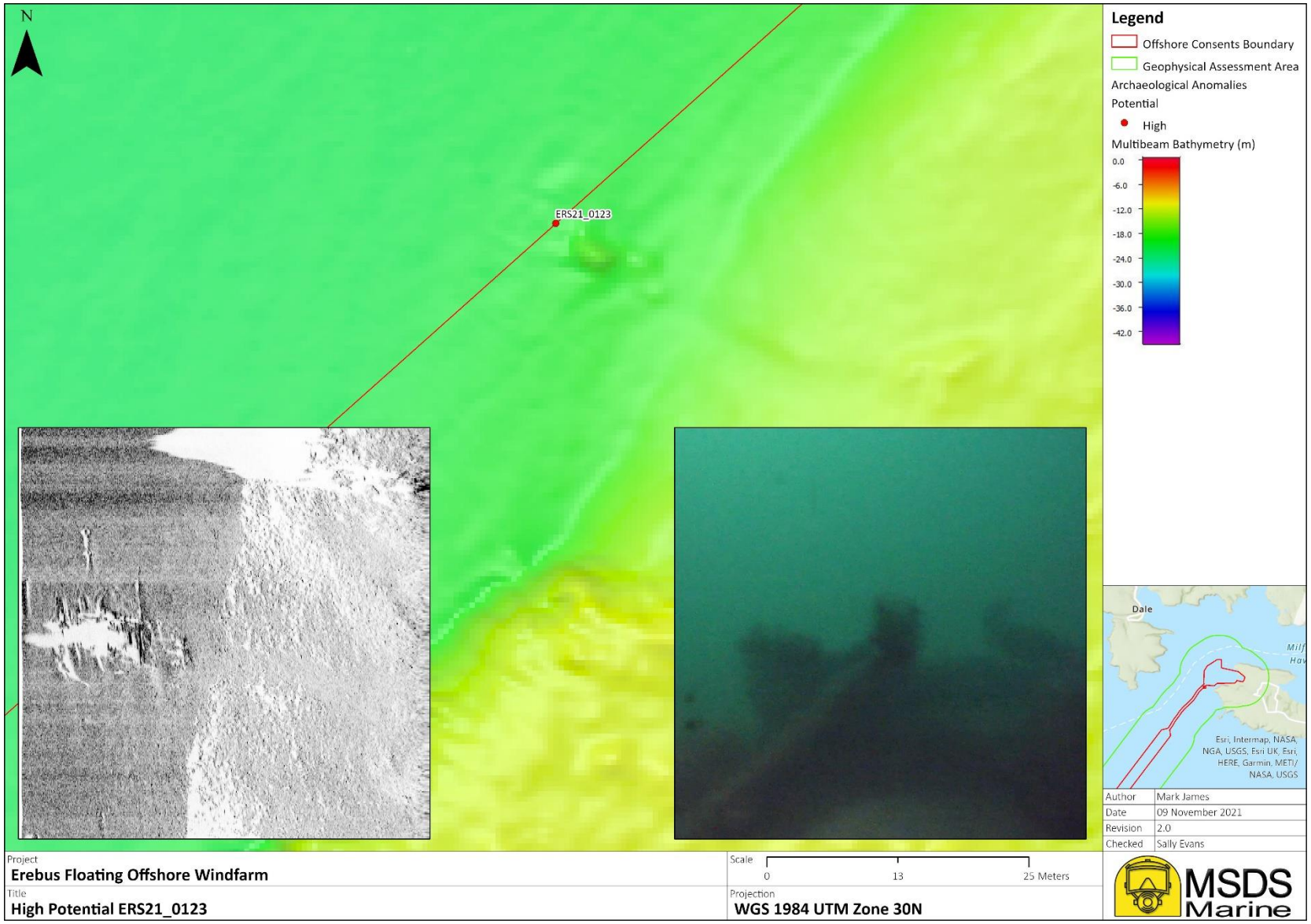


Figure 16: High potential ERS21_0123

ERS21_0137

5.3.17 ERS21_0137 (Figure 17) lies within, and c.6.0 m from, the north-western edge of the Offshore Consent Boundary along the ECC, approximately 3.0 km from the proposed landfall, and has been interpreted as a wreck. The anomaly covers an area 25.6 x 9.9 m and with a measurable height of 0.4 m. The anomaly is visible in the SSS and MBES data but is not covered by a magnetometer line.

5.3.18 The anomaly is characterised predominantly by a number of scattered linear features up to 7.0 m in length interspersed with incoherent clusters of likely debris to the south-east. To the north-east is an irregular mound measuring 4.9 x 3.3 m with smaller debris like features extending up to 6.0 m further north-east. The anomaly is not associated with any recorded heritage assets or UKHO records.

5.3.19 The anomaly was investigated by ROV and established to be the remains of a wrecked vessel. Whilst visibility was poor during the survey material was identified on the seabed. Whilst material was identified, it was sparser than was identified within the geophysical data. The seabed was identified as mobile sands during the survey, with evidence of small sand waves, this suggests the material identified within the geophysical data was partially covered at the time of the inspection.

5.3.20 Whilst the material identified is clearly from a wrecked vessel, no coherent structure was identified, and the material is scattered without any overall form. The most prominent feature was a large mechanical object, likely a windlass (Figure 17), with evidence of hydraulic controls. To the west of the windlass is a length of chain with what appears to be a shackle on the end. To the east is a pile of chain, possibly from a chain locker. Within the vicinity is a number of other features, largely unidentifiable, although potential timber structure is noted.

5.3.21 The identity of the wreck is unknown, although the presence of a potential hydraulic windlass likely indicates no great age. Further investigation, and research, would be required to establish the identity and, or, significance of the wreck. With the information currently known a high potential rating is appropriate.

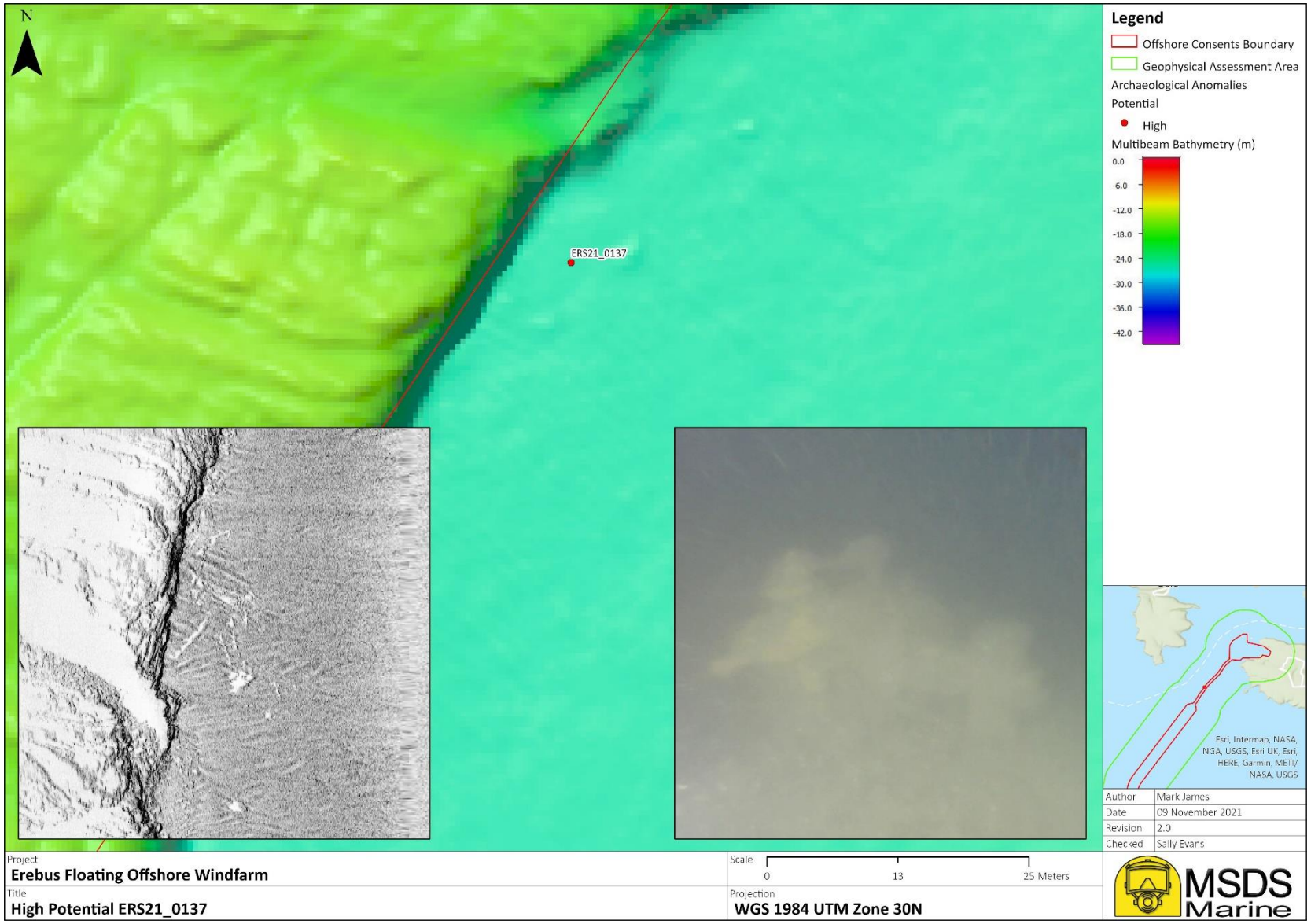


Figure 17: High potential ERS21_0137

High potential anomalies within the 1 km buffer

ERS21_0032

5.3.22 ERS21_0032 (Figure 18Figure 18: High potential ERS21_0032) lies c.200 m outside the south-eastern edge of the Array Area and Offshore Consent Boundary, and is a wrecked vessel 32.8 m in length with a beam of 7.6 m and a measurable height of 2.9 m. The anomaly is visible in the SSS and MBES data but is not covered by a magnetometer line.

5.3.23 The wreck is coherent in form, and identifiable as such. The wreck lies approximately north-west, south-east with the bow likely to the north-west. Whilst not possible to fully assess the condition on the seabed, superstructure is visible as upstanding features between midships and the stern. The deck level is consistent from bow to stern with the only evidence of slight collapse amidships. The bow and stern appear more prominent due to scour present at both ends, which whilst visible is relatively localised.

5.3.24 There is evidence of a small debris field around the immediate vicinity of the wreck with scattered debris primarily off the stern to the south. Extending from the portside for c.11.0 m to the south is a larger area of potential debris, visible in the MBES data as a slightly raised ridge. Anomaly ERS21_0071 lies c.90 m to the south-east and has been identified as debris potentially relating to the wreck. The debris extends 17.7 x 8.5 m with a measurable height of 0.4 but is incoherent in form.

5.3.25 The wreck is recorded by the UKHO as record 11902 (MSDS_Erebus_405), an unidentified wreck. It was originally detected in 1945 and as a wreck in two pieces. Whilst the wreck appears largely intact there is potential for the identification of two pieces to have related to the wreck and the debris to the south-east. The identity is unknown, however the wreck pre-dates 1945, the current form and condition likely indicates a vessel of steel construction.

Figure 18: High potential ERS21_0032

ERS21_0222

5.3.26 ERS21_0222 (Figure 19) lies c.200 m north of the landward section of the ECC and Offshore Consent Boundary, and 1.7 km north-west of the proposed landfall. It is a prominent rectangular feature measuring 14.5 x 6.3 m with a measurable height of 0.7 m. The anomaly is associated with a magnetic anomaly of 291.0 nT. Other than being of likely anthropogenic origin, the identity of the feature is unclear. The MBES data shows the outline of rectangular shape with rounded corners and a mound to the north-west end. The SSS data shows a more regular rectangle with a depression within the feature to the north-west. A feature, potentially debris, is visible alongside the south-east edge.

5.3.27 Whilst the form of the anomaly does not necessarily indicate a complete wrecked vessel, the form and the size may potentially indicate a section of one, or a vessel such as a landing craft. The assessment by Rovco (2021a) tentatively identified the anomaly as a container, however, a standard 40-foot container measures 12.0 x 2.33 x 2.35 m. The measured length of 14.5 m may correlate but the width of 6.3 m may indicate that the anomaly is not a container.

5.3.28 The anomaly is not associated with any recorded heritage assets or UKHO records.

5.3.29 The form, size, and anthropogenic origin may indicate a wrecked vessel, or part of, and therefore a high potential rating is appropriate.

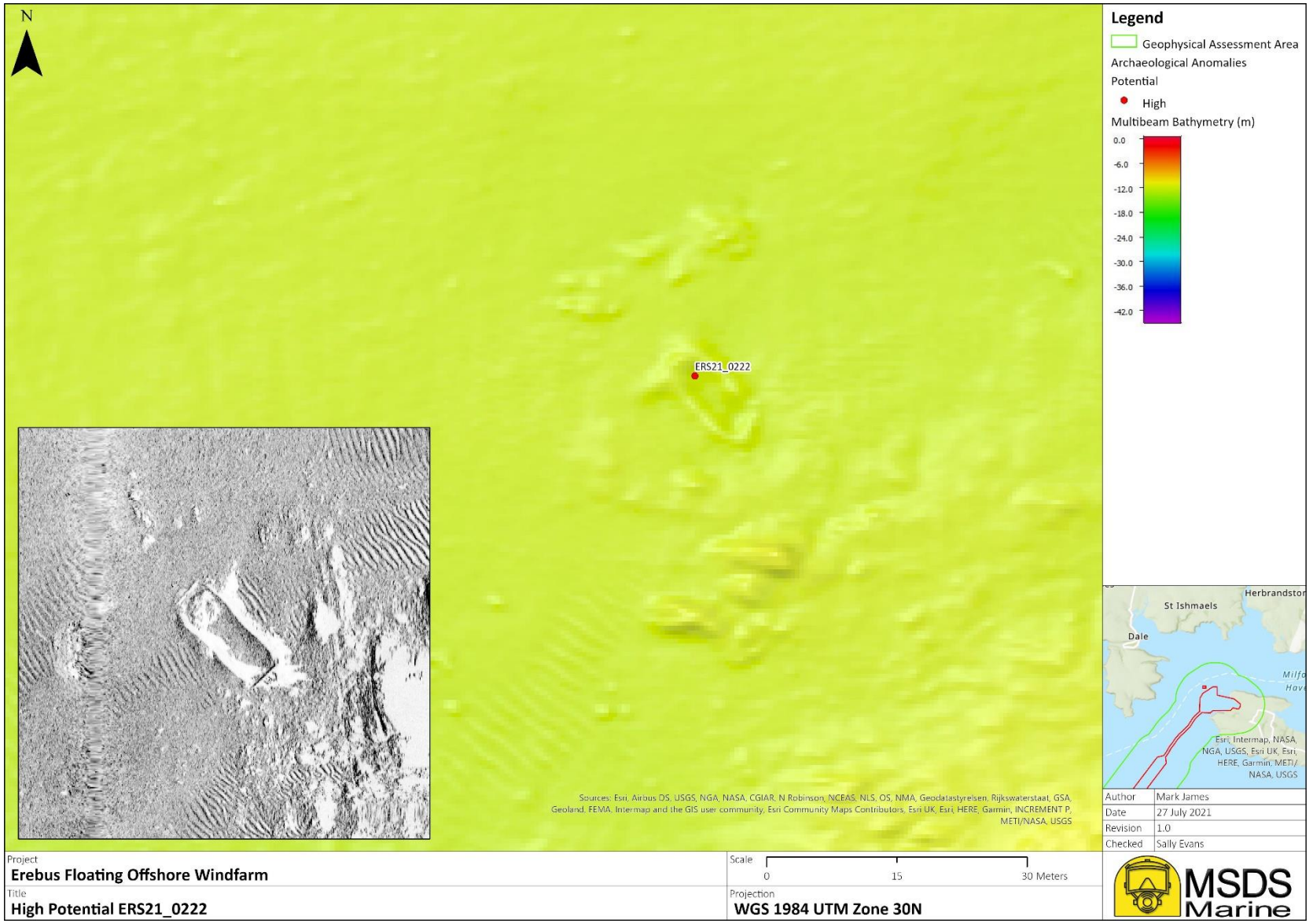


Figure 19: High potential ERS21_0222

Medium Potential Anomalies

5.3.30 22 anomalies were identified as of medium archaeological potential within the assessment extents, 11 of which fall within the Offshore Consent Boundary. The anomalies can be broken down into broad categories as follows in Table 15, the distribution is shown in Figure 20.

Anomaly category	Offshore Consent Boundary	1km buffer	Total
Anchor	1	1	2
Mound	1	1	2
Potential debris	3	3	6
Unidentified debris	6	2	8
Likely geological	0	2	2
Wreck debris	0	2	2
Total	**11**	**11**	**22**

Table 15: Medium potential anomaly categories within the Geophysical Study Area

5.3.31 The anomalies identified as of medium archaeological potential range from debris with potential association to a wrecked vessel to mounds that may represent partially buried material. The precautionary approach used during the archaeological assessment means that possible geological features, where there is the potential they may represent anthropogenic debris, have been assessed as of medium archaeological potential.

5.3.32 Each medium potential anomaly is discussed, along with an image, below. Further information regarding mitigation

5.3.33 n can be found in Section 8.0, and a gazetteer of medium potential anomalies, including positions and dimensions can be found in Appendix 4: Gazetteer of Archaeological Anomalies.

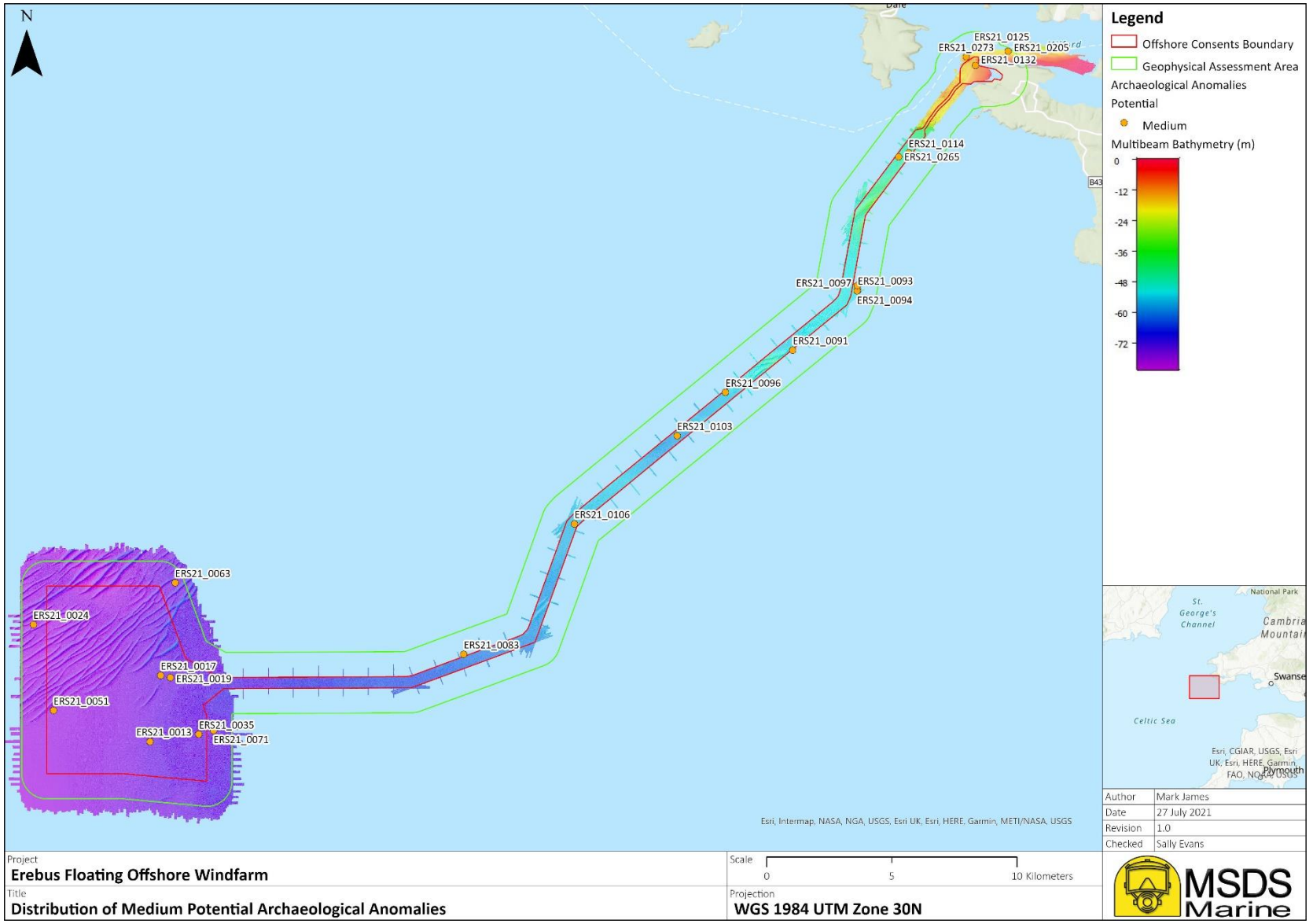


Figure 20: Distribution of medium potential archaeological anomalies

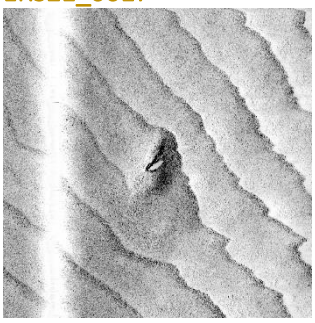
Medium potential anomalies within the Offshore Consent Boundary

ERS21_0013

ERS21_0013 lies to the south-east of the Array Area, c.1.4 km from the southern edge of the Offshore Consent Boundary. The anomaly measures 7.2 x 2.1 m with a measurable height of 2.4 m. The anomaly is characterised by two large irregular features, with smaller curvilinear features to one side, the anomaly sits within an area of scour. The long shadow potentially indicates potential snagged rope, or fishing gear, may be attached to the anomaly. The location is not on a magnetometer line.

Whilst identification of the anomaly is not possible, the size and form mean a medium potential rating is appropriate.

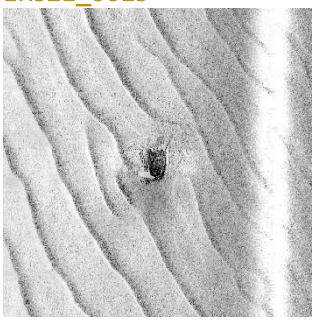
ERS21_0017



ERS21_0017 lies towards the east of the Array Area approximately mid-way between the north and south Offshore Consent Boundary. The anomaly measures 7.8 x 2.6 m with a measurable height of 0.5 m and is a large, almost boulder-like feature within an area of scour. Alongside the main feature are faint curvilinear and angular features which may indicate anthropogenic origin. The location is not on a magnetometer line.

Whilst the feature is similar in form to a large boulder, the presence of potential anthropogenic material and the size means a medium potential rating is appropriate.

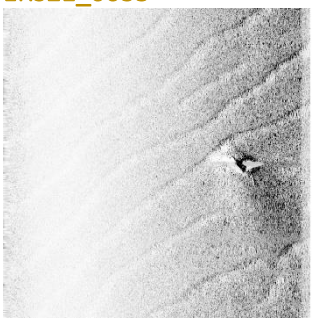
ERS21_0019



ERS21_0019 lies towards the east of the Array Area approximately mid-way between the north and south Offshore Consent Boundary. The anomaly measures 7.4 x 4.9 m with a measurable height of 0.6 m. The anomaly is a boulder like contact, within an area of scour with a long linear feature to one side. The location is not on a magnetometer line.

The anomaly is in an area of stretched data and is likely geological in origin, the medium potential rating is precautionary.

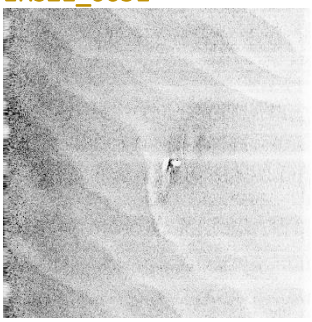
ERS21_0035



ERS21_0035 lies in the south-east of the Array Area c.330 m from the eastern edge of the Offshore Consent Boundary. The anomaly is a prominent feature 8.4 m x 1.9 m with a measurable height of 0.7 m. A linear feature extends to the south, and potentially the north, the form of which may indicate anthropogenic origin. Two potentially related smaller features lie to the south. The location is not on a magnetometer line.

The form and size of the anomaly suggest a medium potential rating is appropriate.

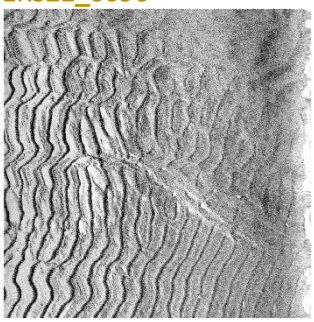
ERS21_0051



ERS21_0048 lies in the south-west of the Array Area c.270 m from the western edge of the Offshore Consent Boundary. The anomaly is a boulder-like feature associated with a prominent linear feature measuring 9.1 x 3.3 m with a measurable height of 0.5 m. The location is not on a magnetometer line.

The presence of a linear feature indicates potential anthropogenic origin, and the size suggests a medium potential rating is appropriate.

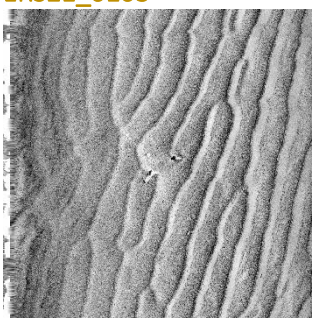
ERS21_0096



ERS21_0096 lies within the ECC approximately 16.7 km south-west of the proposed landfall. The anomaly is characterised by an area of disturbed seabed with potential linear features measuring 11.2 x 5.6 m. A trail of individual features extends 32.7 m from the feature. The maximum measurable height is 0.2 m.

It is unclear as whether the anomaly is of geological or anthropogenic origin, thus a medium potential rating is appropriate.

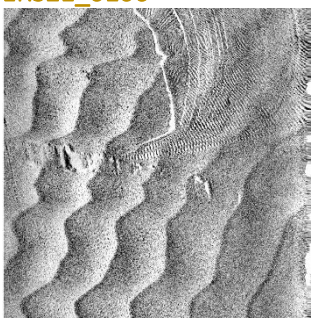
ERS21_0103



ERS21_0103 lies within the ECC approximately 19.3 km south-west of the proposed landfall. The anomaly is a low-lying mound, amongst sand waves, measuring 17.2 x 14.4 m. Within the mound a number of small, but prominent, features are visible suggesting partially material. The anomaly is associated with a magnetic anomaly of 80.7 nT suggesting the presence of ferrous, and thus anthropogenic, material.

The potential anthropogenic nature of the partially buried material, and the size of the feature, may indicate a feature of archaeological significance which corresponds with a medium potential rating.

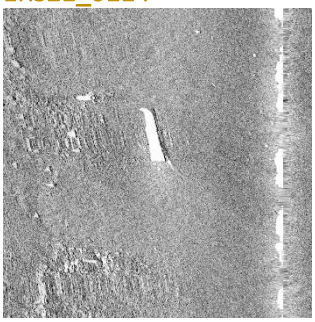
ERS21_0106



ERS21_0106 lies within the ECC approximately 31.6 km south-west of the proposed landfall. The anomaly consists of a number of parallel linear features over an area 49.7 x 5.9 m but is not recognisable as a geological feature such as outcropping bedrock. The anomaly lies on the edge of a large area of seabed disturbance, likely caused by anchoring, and may be related but this is unclear. The anomaly is located on two magnetometer lines but has no associated anomaly.

The unknown origin of the anomaly, and the size, suggests a medium potential rating is appropriate.

ERS21_0114

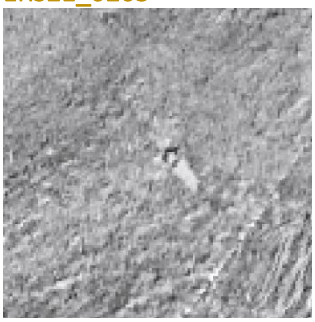


ERS21_0114 lies within the ECC approximately 4.8 km south-west of the proposed landfall and is a significant sized piece of linear debris measuring 10.3 x 1.6 m, the origin of which is unknown. The anomaly is prominent and unique in the surrounding area, but the location is not on a magnetometer line. The origin, or identity is unclear, although it should be noted that it lies within a disused spoil ground.
The size of the anomaly and interpretation as of anthropogenic origin means a medium potential rating is appropriate.

ERS21_0132

ERS21_0132 lies within the ECC approximately 1.1 km west-north-west of the proposed landfall and is an anchor measuring 2.8 x 2.2 m. It is not possible to determine the age of an anchor through geophysical data. However, the form could indicate one of potential archaeological interest. Although as isolated features anchors are limited in their significance, should it be of some age then it may be of interest or part of a larger feature such as a wrecked vessel.
Due to the unknow origin, a medium potential rating has been assigned.

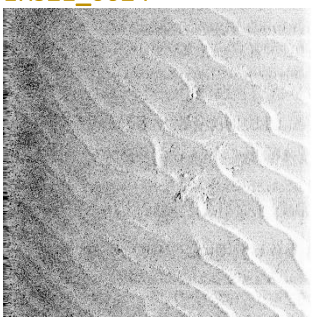
ERS21_0265



ERS21_0265 lies within the ECC approximately 5.3 km south-west of the proposed landfall. The anomaly is a boulder-like feature measuring 1.7 x 1.0 m with a measurable height of 0.3 m. The anomaly has been identified as of archaeological potential due to the corelation with a significant magnetic anomaly of 925.2 nT, indicating ferrous material and therefore anthropogenic origin.
The unknown origin of the anomaly means a medium potential rating is appropriate.

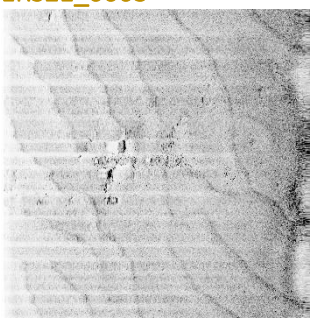
Medium potential anomalies within the 1 km buffer

ERS21_0024



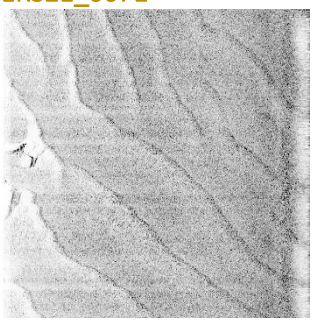
ERS21_0024 lies c.535 m to the west of the Array Area outside the Offshore Consent Boundary and is an area of scattered potential debris measuring 27.8 x 18.6 m with a measurable height of 0.1 m. The form may suggest a degree of burial. The anomaly is associated with a magnetic anomaly of 70.7 nT indicating ferrous, and thus anthropogenic, material.
Whilst the anomaly appears anthropogenic in form, it is not possible to identify the origin which means a medium potential rating is appropriate.

ERS21_0063



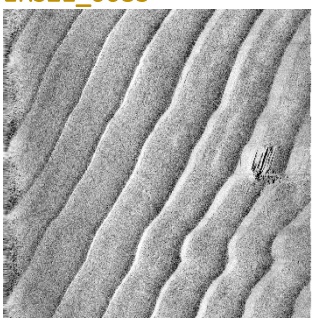
ERS21_0063 lies c.650 m east of the north-east corner of the Array Area outside the Offshore Consent Boundary and is an area of potential debris or outcropping bedrock measuring 27.9 x 16.8 m. Although potentially geological in origin, the anomaly has been identified as of archaeological potential due to the form, size, and uniqueness in the surrounding environment. The location is not on a magnetometer line.
Due to the unknown origin of the anomaly a medium potential rating has been assigned.

ERS21_0071



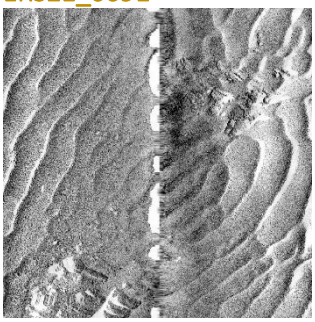
ERS21_0071 lies c.260 m east of the Array Area outside the Offshore Consent Boundary and has been identified as an area of debris relating to high potential ERS21_0032, an unidentified wreck. The debris extends 17.7 x 8.5 m with a measurable height of 0.4 m but is incoherent in form. The anomaly correlates with NPRN record 516032 (MSDS_Erebus_408). The location is not on a magnetometer line. The anomaly is discussed further in relation to ERS21_0032.
The identification as wreck debris means a medium potential rating is appropriate.

ERS21_0083



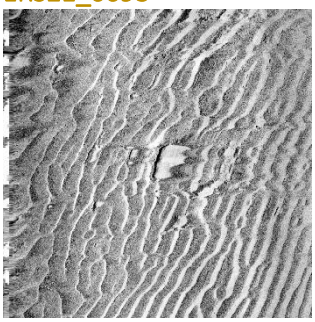
ERS21_0083 lies c.75 m north of the ECC and c.11 km east of the Array Area, outside the Offshore Consent Boundary. The anomaly measures 8.7 x 6.2 m and with a measurable height of 0.3 m. The anomaly is characterised by a number of striations in an oval with a further textured component to the east, it is unusual in form in the surrounding area and could represent a geological feature. However, it is outside the MBES and magnetometer coverage, so a precautionary approach has been taken and a medium potential rating has been assigned.

ERS21_0091



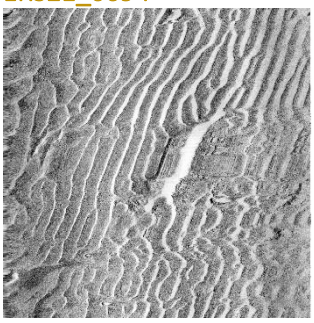
The centre point of ERS21_0091 lies c.27.5 m south of the ECC outside of the Offshore Consent Boundary and c.13.8 km south-west of the proposed landfall. Potentially a geological feature measuring 88.7 x 23.7 m and with a measurable height of 1.7 m a precautionary approach has been taken with the assessment as of medium potential. Whilst similar in form to a geological feature, potential linear features are visible within the data and the anomaly is prominent within the surrounding area. The anomaly is outside both MBES and magnetometer coverage.

ERS21_0093



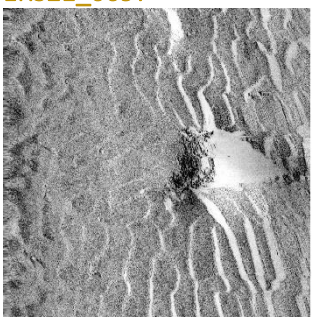
ERS21_0093 lies c.235 m to the east of the ECC outside of the Offshore Consent Boundary and c.10.3 km to the south-west of the proposed landfall. The anomaly is a prominent linear feature 8.2 x 1.3 m with a variable height to a maximum of 0.9 m. The form of the anomaly indicates anthropogenic material although the origin is unknown. Other features in the immediate area appear geological, and similar in form but slightly smaller. The location is not on a magnetometer line.
The linear form, and the size of the anomaly, indicate anthropogenic origin and therefore a medium potential rating has been assigned.

ERS21_0094



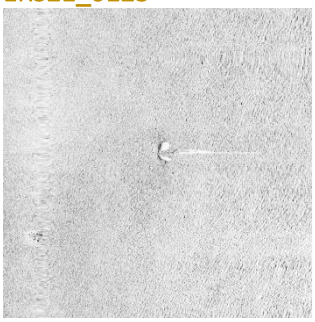
ERS21_0094 lies c.210 m to the east of the ECC outside of the Offshore Consent Boundary, c.10.4 km to the south-west of the proposed landfall and c.45 m to the south-east of ERS21_0093. The anomaly measures 16.7 x 3.0 m with a measurable height of 0.7 m and is a large ridge with a prominent and defined edge the form of which may indicate partially buried anthrophonic debris. The location is not on a magnetometer line.
The size and form of the anomaly, and the proximity to a similar feature (ERS21_0093) means a medium potential rating is appropriate.

ERS21_0097



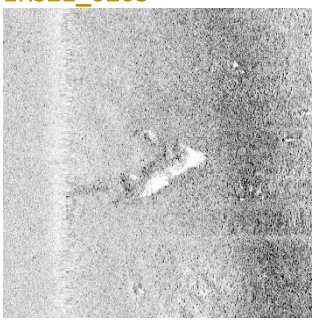
ERS21_0097 lies c.179 m to the east of the ECC outside of the Offshore Consent Boundary and c.10.2 km to the south-west of the proposed landfall and is a prominent mound 22.8 x 10.9 m with a measurable height of 2.2 m. The mound is unusual in the surrounding area has an irregular surface, potentially indicative of partially buried material. The location is not on a magnetometer line.
Mounds can represent buried material of archaeological interest, such as buried wrecks or ballast mounds. The size and form of ERS21_0097 means a medium potential rating is appropriate.

ERS21_0125



ERS21_0125 lies c.425 m north of the landward section of the ECC, outside of the Offshore Consent Boundary, and is an anchor measuring 3.5 x 3.3 m. It is not possible to determine the age of an anchor through geophysical data. However, the form could indicate one of potential archaeological interest. Although as isolated features anchors are limited in their significance, should it be of some age then it may be of interest or part of a larger feature such as a wrecked vessel.
Due to the unknow origin, a medium potential rating has been assigned.

ERS21_0205



ERS21_0205 lies c.1.0 km north of the proposed landfall, outside of the Offshore Consent Boundary, and is a prominent mound, or ridge, measuring 12.9 x 3.4 m and with a measurable height of 0.6 m. The anomaly is similar to other geological features in the vicinity and potentially represents a geological feature. However, the form, size, and prominence mean that there is some potential to be of archaeological interest.
Whilst likely geological, a precautionary approach has been taken and the anomaly assigned a medium potential rating.

ERS21_0273

ERS21_0273 lies c.190 m north of the landward section of the ECC, outside of the Offshore Consent Boundary, and 1.6 km north-west of the proposed landfall. The anomaly is a boulder like feature measuring 5.3 x 1.4 m with a large associated magnetic anomaly of 204.7 nT. The anomaly lies 42.0 m east-north-east of high potential ERS21_0222, a potential wreck.
Whilst geological in form, the large magnetic anomaly indicates ferrous material, the proximity to the potential wreck means an interpretation as potential wreck debris is likely and therefore a medium potential rating has been assigned.

Low Potential Anomalies

5.3.34 170 anomalies were identified as of low archaeological potential within the assessment extents, of which 100 fall within the Offshore Consent Boundary. The anomalies can be broken down into broad categories as follows in Table 16

Anomaly category	Offshore Consent Boundary	1km buffer	Total
Anchor	3	0	3
Cable, chain, or rope	15	23	38
Potential marine mammals	1	0	1
Likely geological	23	18	31
Linear feature	10	7	17
Mound	1	0	1
Potential debris	37	15	52
Seabed disturbance	2	1	3
Unidentified debris	9	5	14
Towed equipment	1	0	1
Fishing gear	0	9	9
Total	**102**	**68**	**170**

Table 16: Low potential anomaly categories within the Geophysical Study Area

5.3.35 The anomalies identified as of low archaeological potential are a mixture of small features, often boulder like, or isolated linear features and modern debris such as rope, chain, fishing gear or seabed anomalies with associated magnetic anomalies. Each anomaly was reviewed and established to be of low archaeological potential. A further review was undertaken following assessment of the whole area.

5.3.36 Low potential anomalies have been assessed against all available evidence and are deemed to be unlikely to be of archaeological significance and as such will not be discussed further within the results section of this report. The distribution of low potential anomalies is shown in Figure 21.

5.3.37 Further information regarding mitigation can be found in Section 8.0, and a gazetteer of low potential anomalies, including positions and dimensions can be found in Appendix 4: Gazetteer of Archaeological Anomalies.

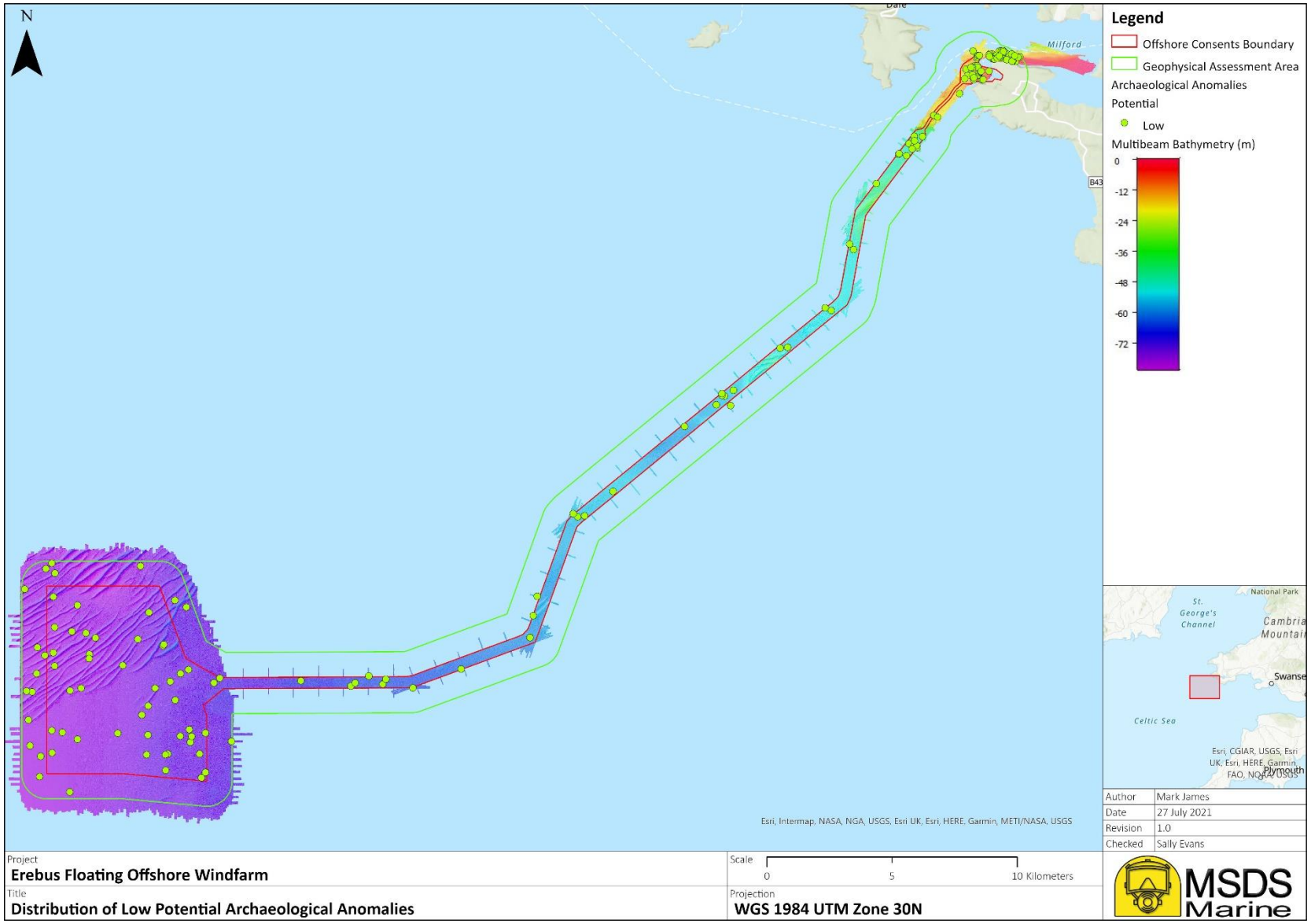


Figure 21: Distribution of low potential archaeological anomalies

Magnetic anomalies

5.3.38 1,355 magnetic anomalies with no correlating known features nor associated with anomalies of archaeological potential, were identified within the assessment extents; of which 505 lie within the site boundary. The distribution of intensities is shown below in Table 17 and the distribution of anomalies presented in Figure 22.

Intensity (nT)	Offshore Consent Boundary	1km buffer	Total
5 to 50	421	733	1154
50 to 100	34	58	92
100 to 200	29	43	72
200 +	21	16	37
Total	**505**	**850**	**1355**

Table 17: Magnetic Anomalies within the Offshore Consent Boundary

5.3.39 Anomalies identified from the magnetometer data are ferrous and thus generally anthropogenic in origin, although they can be associated with geological features in certain circumstances (not believed to be the case within the Study Area). However, unlike other geophysical data, there is no visual interpretation .

5.3.40 The data collection methodology across the Erebus assessment area was intended to provide an overall understanding of the offshore consents area. As such line spacing varied from c.75 m in the array area, to up to 100 m in the ECC and nearshore areas, and with limited coverage within these areas. The position for a magnetic anomaly can only be determined from directly below the sensor, or where lines are run close enough together to be able to confidently position an anomaly seen on two, or more, lines.

5.3.41 The positions of magnetic anomalies were viewed alongside the available datasets and where there was a strong correlation with the surficial representation of a seabed anomaly, they were assessed for archaeological potential. All remaining anomalies have been included within this section.

Large magnetic anomalies

5.3.42 109 magnetic anomalies considered large (>100 nT) have been identified within the assessment extents, 50 of which lie within the Offshore Consent Boundary. These anomalies have the potential to represent material of anthropogenic origin that may be of potential archaeological significance.

5.3.43 Further information regarding mitigation can be found in Section 8.0. The values and position are outlined in Appendix 5: Gazetteer of Magnetic Anomalies and presented in Figure 23.

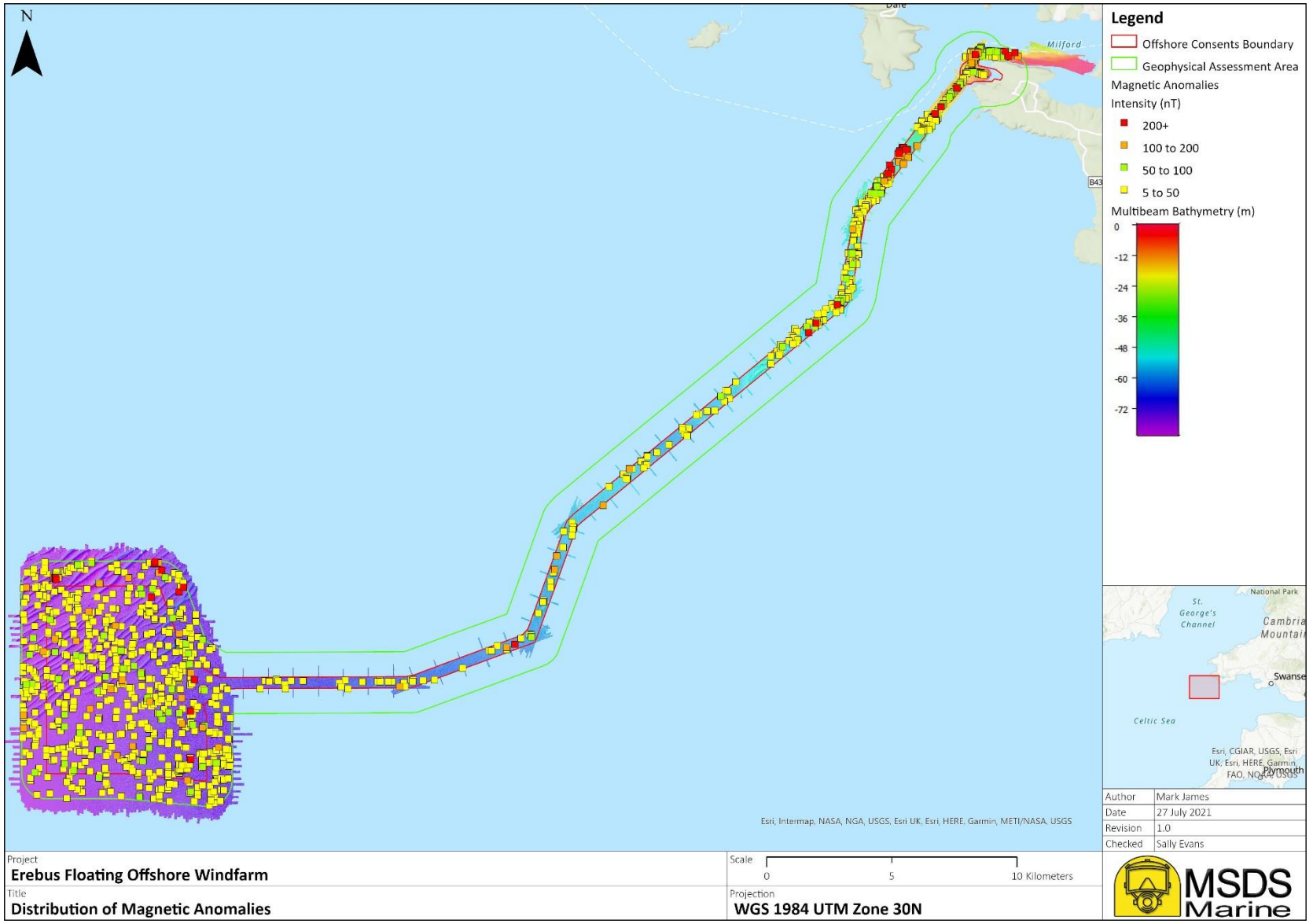


Figure 22: Distribution of magnetic anomalies

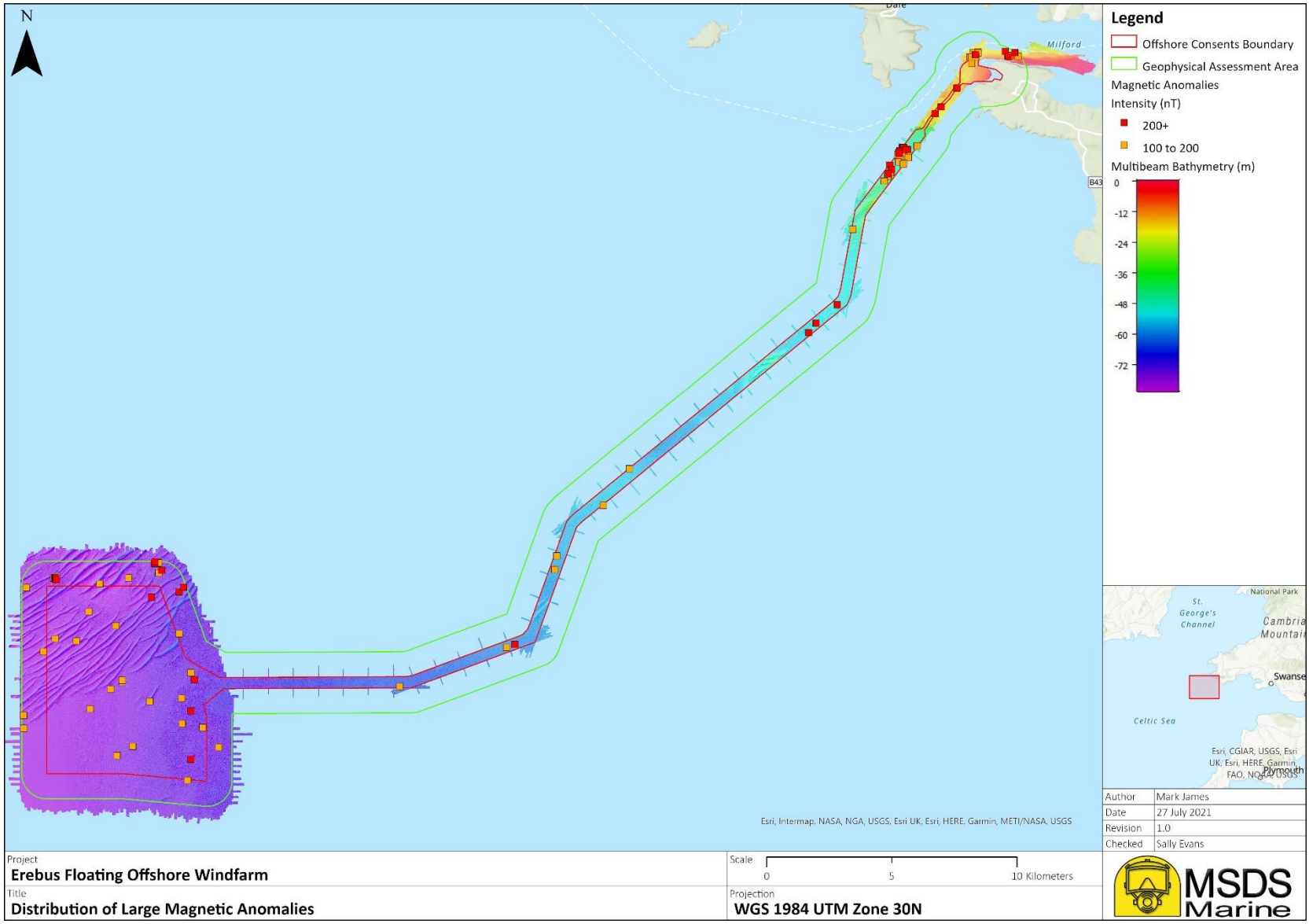


Figure 23: Distribution of large magnetic anomalies

5.4 Assessing Maritime Archaeological Potential

5.4.1 As well as the known maritime archaeological resources, there may also be potential for further maritime archaeological remains that have not been identified to be present on the seabed within the Study Area. As previously mentioned, the potential for remains to be present can be affected by the preservation environment.

- The potential for preservation of remains is discussed in relation to the results of the Navigational Hazards, AMAP1 and AMAP2 projects as detailed in Section 3.0. The seabed within the Array Area and the majority of the ECC is rated highly as a preservation environment (4 out of 19). The inshore part of the ECC was rated as a moderate preservation environment (9-11 out of 19), and areas with the central part of the ECC were rated fairly highly (5-8 out of 19). A small section of the inshore part of the ECC was rated poorly (16-19 out of 19). The distribution of preservation levels within Offshore Consent Boundary and Study Area is detailed in Figure 24. These can also be correlated with the seabed sediments and features identified in the interpretation reports (Rovco, 2021a; GEOxyz Ltd, 2021).

5.4.2 The UKHO records indicate that there are vessels lost within the area which are over 100 years old, therefore indicating that there is potential for pre-modern wreck material to be present on the seabed. Additionally, geophysical survey data indicates the presence of undated wrecks and possible anthropogenic debris, further demonstrating the potential of the area.

5.4.3 The following sections will assess the potential for maritime archaeological remains from different periods in time to be present within the Study Area, based on human maritime activity in the UK, Celtic Sea, Milford Haven, Outer Bristol Channel area, and Pembrokeshire. The full details of remains within the intertidal zone and intertidal Study Area are discussed in Section 7.0.

5.4.4 The Study Area crosses the entrance to Milford Haven. Thus, discussions of maritime activity related to Milford Haven is directly relevant to the Study Area.

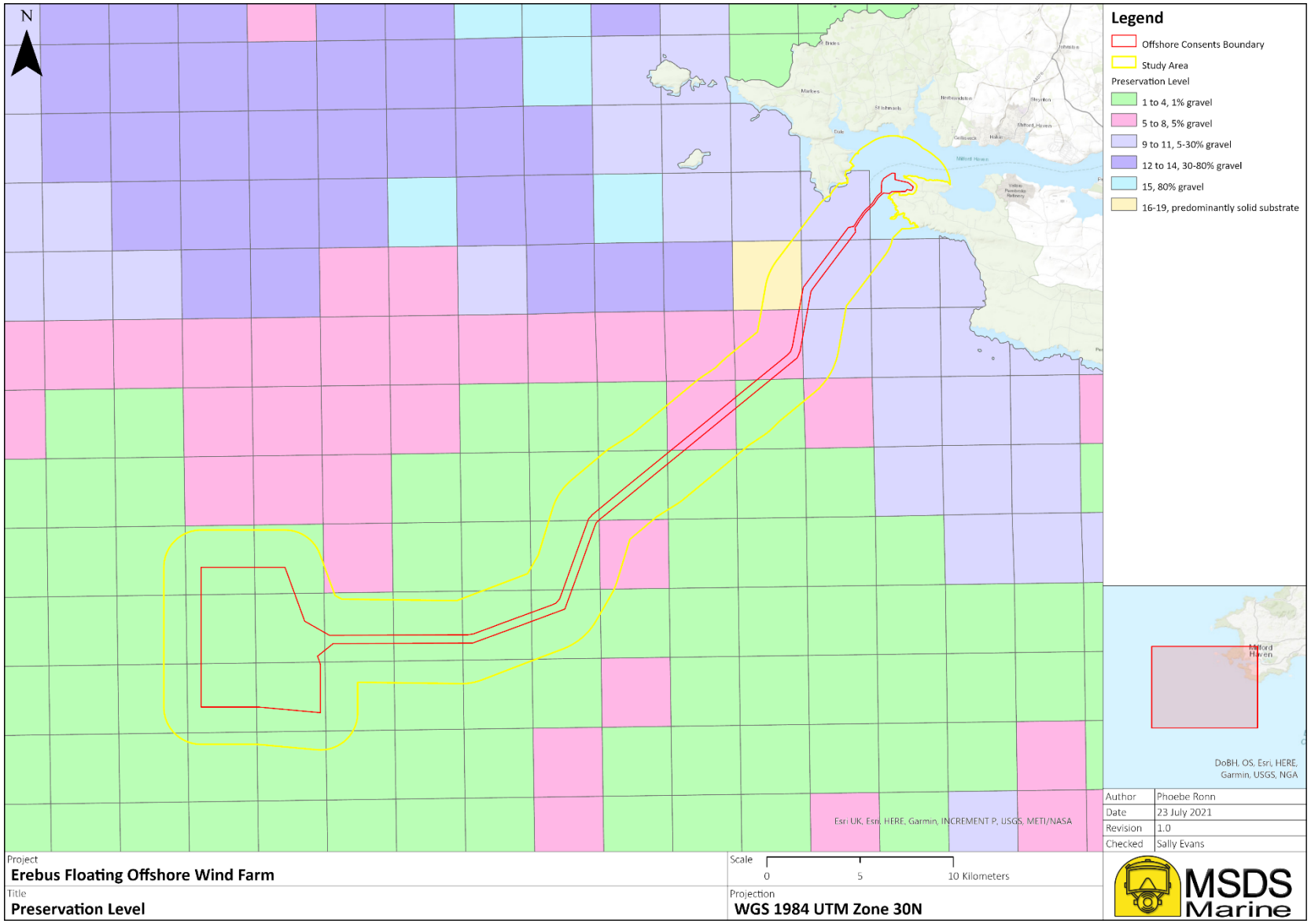


Figure 24: Preservation Level

Early Prehistory (Palaeolithic to Mesolithic)

5.4.5 The early Prehistoric period is not known for maritime activity. There is sparse evidence for seafaring and boat use beyond island hopping, such as evidence of Mesolithic human occupation on the island of Oronsay, Scotland (Jardine 1977). There is indirect evidence for seafaring indicated by the migration of humans to Australia around 40,000-60,000 BP (Balme 2013), and the colonisation of the island of Flores by *Homo erectus* 800,000-900,000 years ago (Rose 1998) which indicates that the technology for seafaring has been available for much of human history. Currently, the earliest known vessel in the world was found in the Netherlands; it is a dugout canoe made from Scots Pine dated to the Early Mesolithic between 8,040-7,510 BC (Verhart 2008), experimental archaeological testing indicates that it could potentially have been seaworthy (Lok 2019).

5.4.6 No maritime archaeological remains are known within the Study Area, and the area was periodically submerged during this period. There is evidence of terrestrial activity dating to the early prehistoric period present within the Study Area; flint flakes, blades, scrapers and debitage have been found on the coasts, including a flint scatter near the intertidal zone (MSDS_Erebus_068). This evidence supports the conclusions of the palaeoarchaeological baseline assessment which identified potential for early prehistoric human activity within the Study Area as a result of the frequent aerial exposure of parts of the currently submerged landscapes.

5.4.7 While there is potential that early humans used seafaring technology for coastal travel, evidence of this is incredibly rare, and may not have survived despite the good preservation environment of parts of the Study Area.

Neolithic and Bronze Age (4,000-700 BC)

5.4.8 By the Neolithic, the Study Area would have been entirely submerged. Dugout canoes dating to the Neolithic (Dunkley 2012) indicate that the technology to produce sea-going vessels was available during this time, although it is uncertain whether these vessels were used for seafaring or for inland water travel, and no evidence of Neolithic seafaring has yet been found in the UK.

5.4.9 Several boats dated to the Bronze Age have been identified in the UK including, three sewn plank-built boats found in Ferriby (Wright et al. 2001) dated to 2,030-1,680 BC, a boat plank found in Kilnsea dated to 1,750-1,620 BC (Van de Noort and Bayliss 1999), and a sewn plank-built boat found in Dover (Clark 2013) dated to 1575–1520 BC. These boats have been interpreted as vessels that would have been used on inland waters and possibly the coast and the open sea, demonstrating that the technology for seafaring was available to humans in the Bronze Age.

5.4.10 However, such remains are rare and the potential for remains of such activity to be present within the Study Area is low due to the general rarity of such remains, despite the good preservation environment in parts of the Study Area.

Iron Age and Roman (700 BC-410 AD)

5.4.11 During the Iron Age, human settlements in the UK became larger and the need for trade increased. It is likely that this trade took place in established places like ports and large settlement centres. The Study Area includes the remains of two Iron Age promontory forts (MSDS_Erebus_073 and MSDS_Erebus_074). It is possible that these people engaged in

seafaring, although there is no physical evidence of vessels in the Study Area to support this and such remains are rare in a UK context.

5.4.12 The Romans reached Wales in 48 AD, during this period maritime trade increased, and shipping routes became established, including routes via Wales to Hibernia (modern day Ireland) (Lewis 2019). Large quantities of imported Roman goods and materials found in Wales suggests a strong trading connection with the empire (Lewis 2019). Although no evidence of Roman activity has been identified within the Milford Haven area, Roman activity has been identified at nearby Amroth, Pembrokeshire.

5.4.13 Ships during this time would have been wooden, and as such would only be preserved in very favourable environments. However, cargoes of durable materials like amphora, brick and tile can survive on the seabed and can represent Roman wrecks.

5.4.14 The potential for Iron Age maritime archaeological remains to have survived is low, however, terrestrial archaeology may be present eroding from the cliff faces. The potential for Roman remains is slightly higher, due to the increase in maritime activity generally, and evidence of terrestrial activity in Wales. However, such remains are rare in a UK context and as such the potential for remains of Roman maritime activity to occur within the Study Area is still very limited.

Early Medieval and Medieval periods (410–1536 AD)

5.4.15 Despite the cultural and economic decline instigated by the fall of the Roman Empire, the development of maritime activity in the UK did not slow down. Alongside local and regional developments, invaders and then settlers, from Scandinavia brought new boat building technologies and opportunities for trade. A number of coastal placenames around the entrance to Milford Haven have Scandinavian roots which indicates Viking activity in the area, examples of these include Skomer, Skokholm, Thorn, Stack Rock, Milford, and Angle. Viking raids and other activity between the 9th and 11th centuries is well recorded in the north of Wales, and these placenames indicate that similar activities may have been happening in the south too (Redknap 2019a). Literary sources suggest that the early medieval period saw significant international movement, and evidence of imported goods found in foreshore contexts on the outskirts of Milford Haven indicate foreign trade (Redknap 2019c).

5.4.16 Early medieval terrestrial remains within the Study Area directly adjacent to the landfall at West Angle Bay (MSDS_Erebus_001 and MSDS_Erebus_075 to MSDS_Erebus_077) and indicate a settlement. These remains are Scheduled and discussed within Chapter 24: Onshore Archaeology and Cultural Heritage.. It is unknown whether the occupants engaged in seafaring but being a coastal settlement, it is likely that they exploited the coastal resources available. Based on evidence from elsewhere in Pembrokeshire and the Bristol Channel, coastal and cross-channel trade remained prevalent after the fall of the Roman empire, as such it is very possible that the people living at West Angle Bay participated in this (Wooding 2019).

5.4.17 During the medieval period, increased levels of trade and conflict resulted in an expansion of maritime activity. The Milford Haven area was a centre of trade during the medieval period; French and Iberian wine was a frequently traded commodity in Pembroke, Milford Haven, and Tenby, and vessels from a number of places including Milford carried out the main trade with Ireland (Redknap 2019b). An increase in medieval foreign trade indicates shipping activity; this implies an increase in the potential for shipwrecks from this period within the Study Area.

5.4.18 The area also sheltered large naval forces during the medieval period; in 1405 a French Fleet was housed in Milford Haven, present in support of Owain Glyndŵr and in 1485 the Haven hosted a fleet held by Henry Tudor (Redknap 2019b). While no naval conflict took place in the Haven during this period, naval activity was frequent. Defensive structures were constructed to defend the Haven, such as the blockhouses on either side of Milford Haven (one on the western side of the Angle peninsula, and the other on the eastern side of St Annes Head) built at the behest of Henry VIII (Davies 2019).

5.4.19 There is potential for maritime archaeological remains to be present within the Study Area dating to the early medieval and medieval periods, however, due to the generally low rates of preservation of these vessels due to time and construction materials, it is unlikely that vessels would have survived. It is possible for wrecks of this period to be represented on the seabed by durable cargoes e.g., bricks, metal etc, though the potential for such remains is still very limited due to the overall rarity of remains from these periods.

Post Medieval (1536-1900)

5.4.20 The recording of maritime history became common practice by the post medieval period, and as such, our knowledge of maritime activity is much stronger than in earlier periods. The number of trade routes and links continued to increase. The advent of the steam engine, and the use of iron and steel in shipbuilding meant that ships were able to transport more cargo, travel faster and further, and do so more safely than wooden built ships.

5.4.21 A wide range of vessel types have been recorded as lost or have been identified within the Study Area. There have been 126 Documented Losses of vessels in the area (MSDS_Erebus_086 to MSDS_Erebus_211). These represent a variety of vessel types including steamships, smacks, brigantines, schooners, steam packets, sloops, ketches, paddle steamers, square rigged vessels, and paddle tugs.

5.4.22 Naval and defensive activities were key during the post medieval period. The medieval blockhouse on St Annes Head was built upon in the 19th century in response to the rising threat posed by Napoleon III of France. Further forts were built to complement this, including forts at Thorn Island, Dale, and Stack Rock (Hughes 2019; Davies 2019). Milford Haven defences were significantly improved during the latter half of the 19th century; with minefields, gun batteries, forts (Hughes 2019).

5.4.23 During the post medieval period, the wider Milford Haven area had a number of thriving maritime industries; port books from between 1565 and 1713 from Milford Haven, the head port for the southwest of Wales, notes that all ports in the Haven were in use for shipping (Nash 2019). Fishing became one of the largest industries from the late 18th century with Milford Haven being one of the chief ports in England and Wales by the 19th century (Vousden and Groom 2019). Pembrokeshire also had a strong lime trade during the 18th and 19th centuries and lime was transported to kilns all around the Haven. The main use of lime was as an agricultural improvement, although lime was transported for masonry and road making purposes. This industry dwindled by the early 20th century as alternative fertilisers became available (Groom 2019a). The remains of coastal lime kilns are still evident around Wales, an example is present within the Study Area (MSDS_Erebus_233), along with evidence of quarrying (MSDS_Erebus_226 and MSDS_Erebus_227). Also operating out of Milford Haven from as early as the 1790s were packet steamers that later became established as a ferry

service to Ireland (Jenkins 2019a). South Wales was also a key importer of coal during the post medieval period, as coal from local seams proved to be incredibly efficient for powering steam ships. A total of 592 losses of coal-carrying ships recorded in Welsh waters (Scott et al. 2019). As noted in Section 7.0an information board at the landfall site stated that coal was transported into West Angle Bay to fuel the brick works (MSDS_Erebus_231) there.

5.4.24 Over 100 wrecks dated to the post medieval period are believed to have been lost within the Study Area, and four post medieval wrecks have been identified on the seabed (MSDS_Erebus_244 to MSDS_Erebus_247). The presence of these wrecks, and the increase in shipping traffic and naval activity during this period, and the introduction of metal as a building material indicates that the potential for post medieval archaeological remains to exist in the area is relatively high.

Modern (1900-present)

5.4.25 The last century has seen a further boost in maritime activity. The transport of people for recreational purposes, the economic reliance on sea-trade, and the two World Wars increased the maritime traffic in the area.

5.4.26 Vessel design changed significantly during the modern period; the introduction of motor engines in the 1920s offered economic benefits to the shipping and trade industries as fewer crew were required to man the vessel, and more space for cargo became available as boilers and coal bunkers were no longer needed (Jenkins 2019b). However, sail-powered trading vessels remained popular until the 1960s despite these advancements in motorised vessel technology because they were cheap and easy to operate (Green 2019).

5.4.27 The coal trade continued to flourish into the modern period, reaching its peak in 1913 when 26 million tonnes were shipped from southern Welsh ports. Limestone and animal feed were also intensely traded (Jenkins 2019b).

5.4.28 A review of the records identified a large number of documented losses and known losses of trading and transport vessels lost within the Study Area during the modern period. These include a variety of vessel types; schooners, steamships, motor vessels, fishing vessels, sailing vessels, landing craft, and barges have all been recorded as lost or have been identified within the Study Area. The baseline assessment also identified terrestrial features that indicate maritime activity in the area; a landing stage (MSDS_Erebus_311) within a natural harbour with a man-made entrance (MSDS_Erebus_344), and boat mooring points (MSDS_Erebus_232) indicates that the landfall site was frequented by boats- further discussion of these features can be found in Section 7.0.

5.4.29 During both World Wars, dozens of vessels operating in the Milford Haven area were requisitioned for naval use, many as minesweepers and anti-submarine craft (Groom 2019b). An anti-submarine boom and net was also constructed between Thorn Island and Dale (Hughes 2019). Features including minefields, infantry posts, gun ranges, and batteries identified within the terrestrial part of the Study Area demonstrate the scale of the military activity in the area during wartime.

5.4.30 Casualties from both World Wars are common Celtic Sea. The baseline assessment identified over 30 vessels lost during war time within the Study Area.

5.4.31 Although lost vessels are better documented in the modern period compared with earlier eras, the location of losses is sometimes poorly documented/constrained, particularly during wartime when rates of loss were high. There is potential for further wreck remains dating to this period to be present within the Study Area.

Undated Remains

5.4.32 A number of features and finds recorded within the Study Area are undated. These include findspots of possible wreck material, coastal structures, seabed features, and wrecks. The majority of these records are recorded to be within the Study Area, but not within the Offshore Consent Boundary. Five records that represent physical remains are within the Offshore Consent Boundary (MSDS_Erebus_344, MSDS_Erebus_345, MSDS_Erebus_346, MSDS_Erebus_401, and MSDS_Erebus_403). Further to this, interpretation of geophysical data collected between August 2020 and April 2021 has identified undated material and other debris which may be indicative of anthropogenic material. Although these remains are undated, they demonstrate the maritime archaeological potential of the area.

5.4.33 Data from the Receiver of Wreck was reviewed as part of this assessment. It includes finds from a larger area that includes the Study Area. These records include ship components, personal effects, and parts of cargo. Although these records do not include positions or dating, they support statements made about the general potential for maritime remains to be present in the area.

5.5 Maritime Summary

5.5.1 A total of 7 maritime archaeological records are present within the Offshore Consent Boundary, these consist of RCAHMW and UKHO records. The remaining 368 records are located within the Study Area.

5.5.2 Potential for maritime remains dating to the prehistoric and Roman periods is low due to the rarity of such remains internationally and the relatively poor rates of preservation of construction materials of these types of remains. The potential increases for early medieval to medieval archaeology considering the increase in maritime activity. There is higher potential for remains of post medieval and modern vessels to be present due to the further increases in trading, transport, and naval activities.

6.0 Aviation Archaeology

6.1 Known Aviation Archaeological Resource

6.1.1 Aviation technology has been available since the early 20th century, however, air travel became more prevalent after World War I. During the inter-war years commercial air travel boomed, however, during World War II the skies were dominated by military aircraft. After the war, commercial aviation steadily increased and improved; in 1950, UK airports ran 195,000 flights and in 2018 they ran 2,215,000 (Gov.uk 2018). The remains of thousands of aircraft casualties- both civil and military- are present in UK waters (Wessex Archaeology 2008).

6.1.2 There are three reports of lost aircraft or found components within the Study Area, these are detailed in Table 18. No accurate positions were provided for MSDS_Erebus_241 and MSDS_Erebus_272. No seabed remains are visible at the position given for MSDS_Erebus_265. However, these records support statements on the general potential for aviation archaeological remains as discussed below.

MSDS ID	Type	Description
MSDS_Erebus_241	Documented Loss	Documented loss of Hawker Hurricane I V7022, ditched into the sea a mile off St Anne's Head in 1941
MSDS_Erebus_265	Documented Loss	Documented loss of Short Sunderland Gr V Nj267 which sank in 1954. Majority was recovered.
MSDS_Erebus_272	Findspot	1 x Bristol Pegasus XXII Radial Engine and three-bladed propeller from a Mark I Sunderland Flying Boat.

Table 18: Records of aircraft losses and remains within the Study Area.

6.2 Aviation Archaeological Potential

6.2.1 Southwest Wales has a rich history of aviation; during the 20th century a total of twelve Royal Air Force (RAF) or Royal Navy Air Service (RNAS) bases were constructed in west Wales (John 2003).

6.2.2 RAF Milford Haven, RAF Fishguard and RAF Pembroke (later RAF Carew Cheriton) (NPRN: 309962) were constructed and used during World War I, a variety of aircraft were flown from these bases including SS-class, SSZ-class, and C-class airships and Sopwith Baby and Short 184 biplanes. The main role of these aircraft was to patrol the Irish Sea and St George's Channel for submarine and protect merchant shipping in this area (John 2003).

6.2.3 A further 10 bases were constructed during the run-up to World War II, including an RAF Angle (later RNAS Angle) (NPRN: 308209) in 1941 which was situated 500 m from the edge of the Study Area. Several RAF squadrons operated out of this airfield, flying a variety of aircraft and flying boats including the Hawker Hurricane, the Supermarine Spitfire, and the Western Whirlwind.

6.2.4 Close by, RNAS Dale (NPRN: 300021), RAF Talbenny (NPRN: 308387), and RAF Pembroke Dock (NPRN: 308217) were built between 1931 and 1942 with further aircraft types including the Southampton II, Catalina, Lerwick, Fokker T VIIIw/G, Ansons, Scapa, London, Singapore, Stranraer, and the Sunderland flying boat (John 2003).

6.2.5 During the post-war period, the majority of the military airfields were decommissioned. However, civilian airfields were built upon a number of these sites, including at Haverfordwest (17 km from the Study Area) where a civilian airfield was opened in 1950. RAF Angle was operated into the 1950s as a Relief Landing Ground for Fleet Air Arm aircraft based at RNAS Brawdy (NPRN: 96001) (Airfields of Britain Conservation Trust n.d.).

6.2.6 The number of airfields and variety of aircraft operating in the wider area during both World War I and II, and the post-war period, demonstrate the potential for aircraft remains to be present within the Offshore Consent Boundary and wider Study Area. Aircraft casualties rarely result in articulated aircraft remains on the seabed. Due to the traumatic nature of an aircraft crashing into the sea, the remains of an aircraft are usually scattered on the seabed (Wessex Archaeology 2008). Aircraft, particularly military aircraft, are typically small and built of light materials; crashed remains may travel on the sea surface before sinking and settling on the seabed. Therefore, it is rare for remains to be identified articulated and in situ.

6.2.7 It has been determined that the best preservation environment for aviation archaeological remains is a sandy intertidal environment as remains are likely to be buried and therefore well preserved (Wessex Archaeology 2008). The Study Area is mostly an open deep-sea environment with a predominantly sandy seabed, the rate of preservation of aviation archaeological material is likely to be high. Inshore areas of the Study Area have lower preservation rates due to seabed material.

6.3 Aviation Summary

6.0.2 There are two recorded losses of aircraft within the Study Area and one recorded find of aircraft material. There are no records of aviation archaeological remains within the Offshore Consent Boundary, and no aircraft or possible aircraft remains were identified in the geophysical data. In combination with the good preservation rates of much of the seabed environment and the high numbers of aircraft passing over the area (particularly during wartime) there is potential for the remains of the aircraft recorded as lost in the area and further aircraft to be present within the Study Area.

7.0 Maritime Infrastructure, Intertidal and Adjacent Archaeology

7.1 Known Archaeological Resource

7.1.1 Other relevant records that inform understanding of the maritime infrastructure, intertidal, and adjacent archaeology which fall within the offshore Consent Boundary and terrestrial part of the study area are discussed in this section. Of these, 19 were within the Offshore Consent Boundary, summarised in Table 19 (full details in Appendix 1: Gazetteer). All relevant features are displayed in Figure 25. Photographs taken of features reviewed during the intertidal walkover survey are include in Appendix 6: Intertidal Walkover Survey Photos, and photo locations and directions are outlined in Figure 49.

MSDS ID	Name	Origin Dataset(s)	Image Reference
MSDS_Erebus_073	Promontory Fort	RCAHMW	Figure 35
MSDS_Erebus_075	Cist Cemetery	HER	Figure 36
MSDS_Erebus_079	Seabed Remains	RCAHMW, UKHO	No figure
MSDS_Erebus_226	Quarry	RCAHMW, HER	Figure 37
MSDS_Erebus_227	Quarry	RCAHMW, HER	Figure 38
MSDS_Erebus_232	Boat Mooring Points	HER	Figure 39
MSDS_Erebus_236	OS Trig Point	HER	No figure
MSDS_Erebus_237	Sea Wall	HER	Figure 40
MSDS_Erebus_239	Structure	Aerial Photo, Historic Maps	Figure 41
MSDS_Erebus_245	HMS Leda (probably)	RCAHMW, UKHO	No figure
MSDS_Erebus_304	Slipway	Aerial Photo	Figure 41
MSDS_Erebus_307	Concrete Post	Walkover Survey	Figure 42
MSDS_Erebus_309	Possible Crane Base	Walkover Survey	Figure 43
MSDS_Erebus_311	Slipway	HER	Figure 44
MSDS_Erebus_313	Structure	Aerial Photo, Historic Maps	Figure 41
MSDS_Erebus_344	Channel	Historic Maps, Drone Footage	Figure 45
MSDS_Erebus_345	Ditch	HER	No figure
MSDS_Erebus_346	Charcoal Horizon	Walkover Survey	Figure 46, Figure 47
MSDS_Erebus_401	Pathway	Walkover Survey	Figure 48

Table 19: Features within Offshore Consent Boundary

7.1.2 HMS *Leda* (MSDS_Erebus_245) has been discussed in the maritime section; although it is located within the intertidal zone, it is a wreck site and thus is related to the maritime archaeological section of this report.

Prehistoric

7.1.3 The earliest dated remains found within the Study Area are an unknown number of Mesolithic or Neolithic flint flakes (MSDS_Erebus_068) found eroding from a clay pit adjacent to the beach. No remains were identified in the walkover survey.

7.1.4 Two Iron Age Promontory forts (MSDS_Erebus_073 and MSDS_Erebus_074) (see Figure 35) were also identified within the Study Area on the north and south sides of the bay. The remains consist of earthworks which are undergoing active erosion directly above the intertidal zone.

No remains were identified in the walkover survey; however evidence of the active erosion was noted.

Early Medieval and Medieval

7.1.5 Evidence of an early medieval settlement (MSDS_Erebus_001) with associated chapel site and cemetery (MSDS_Erebus_075, MSDS_Erebus_076, MSDS_Erebus_077) is present within the Study Area (seen in Figure 25). This settlement is a Scheduled monument (Cadw ID: PE554). It consists of a well preserved early medieval cemetery with two distinct locations. The northern edge of the larger area is adjacent to the survey area and consists of an oval earthwork boundary within a larger rectangular ditched enclosure. The northern edge of this enclosure has been truncated by the coastline; a small number of graces were identified eroding from the cliff-face (see Figure 36). The smaller area is to the west of this and consists of narrow spit of land protruding into the sea; burials are also eroding from the cliff-face here (pers. comm. Dyfed Archaeological Trust 2021).

7.1.6 As mentioned, an early medieval chapel site is recorded present within this designated area; identified within an oval enclosure believed to be an associated churchyard. Remains related to this settlement and churchyard were not evident in the drone footage or intertidal walkover survey. The field in this location on the 1842 Tithe maps is called “Old Church” which likely refers to the chapel. A possible corn drying kiln (MSDS_Erebus_078) was found in 2010 in the near vicinity of the designated site, possibly related to the early medieval settlement.

7.1.7 A concentration of 15th century pottery and timber (MSDS_Erebus_079) was recorded within the wider Study Area. It was interpreted as a midden in the NMRW data, this interpretation was likely based on the description of the finds as a ‘rubbish tip’ in the UKHO record. This position of this record is believed to be erroneous as the record is described as being close to St Justinian’s Lifeboat station, which is 25 km to the northeast of the Study Area, suggesting that it is not within the survey area or wider Study Area.

7.1.8 All of the above features demonstrate the potential for eroded remains to be present within the intertidal zone, spanning the Mesolithic period onward. No finds or features dated to the medieval period are currently recorded within the intertidal Study Area.

Post Medieval and Modern

7.1.9 The post medieval and modern features present within the Study Area are mainly indicative of terrestrial activities including farming, quarrying, and brick making, as well as some maritime activity. These are discussed further below.

7.1.10 Two inlets in the bedrock that form natural harbours are present within the bay and within the Offshore Consent Boundary. These are evident on OS maps from as early as 1864. An artificially cut channel (MSDS_Erebus_344; Figure 25; Figure 45) leading from the bay to the larger harbour is apparent in historic maps as early as 1864. This may have existed prior to this date, but due to the relatively small scales of earlier maps, this detail was not previously visible cartographically. This channel can be seen in the drone footage and was recorded in the intertidal walkover survey. Another smaller and less defined possibly natural harbour is present directly to the east of this larger one, identified in the drone footage and walkover survey. However, there is potentially obstructive outcropping bedrock and no evidence of moorings within the area, suggesting that it may not have been used as a harbour and is just a natural formation. A map from 1595, believed to be marking anchorages in Milford Haven, depicts a

small oar powered vessel in West Angle Bay (British Library n.d.). This may be referring to the bay itself as an anchorage, or could be referring to either harbour as a landing place.

7.1.11 A small concrete slipway (MSDS_Erebus_311; Figure 25; Figure 44) is present in the larger harbour with a number of mooring hooks embedded into it and the surrounding bedrock. Further to this, a concrete path (MSDS_Erebus_402; Figure 48) leads across the exposed bedrock on the seaward side of the harbour to the edge of the rock cut channel from eastern landward edge of harbour. Here there is an 'H' shaped concrete feature (MSDS_Erebus_309; Figure 25; Figure 43) with rusting ferrous fixings embedded into it. This feature may represent a base for a crane for loading and unloading of cargo from vessels. A number of ferrous stakes and bolts are embedded in the eastern face of the channel suggesting other features or structures were once present there, possibly fenders to protect boats from the bedrock and harbour entrance walls. There was also a concrete post (MSDS_Erebus_307; Figure 25; Figure 42) embedded in the eastern section of this harbour that may be related to the pathway. The concrete path and 'H' shaped feature were identified in the drone footage and their presence confirmed in the intertidal walkover survey (MSDS_Erebus_309; Figure 25; Figure 43). Neither were recorded in previous datasets; however, the 'H' shaped feature was marked on a 1908 OS map as a rectangular structure.

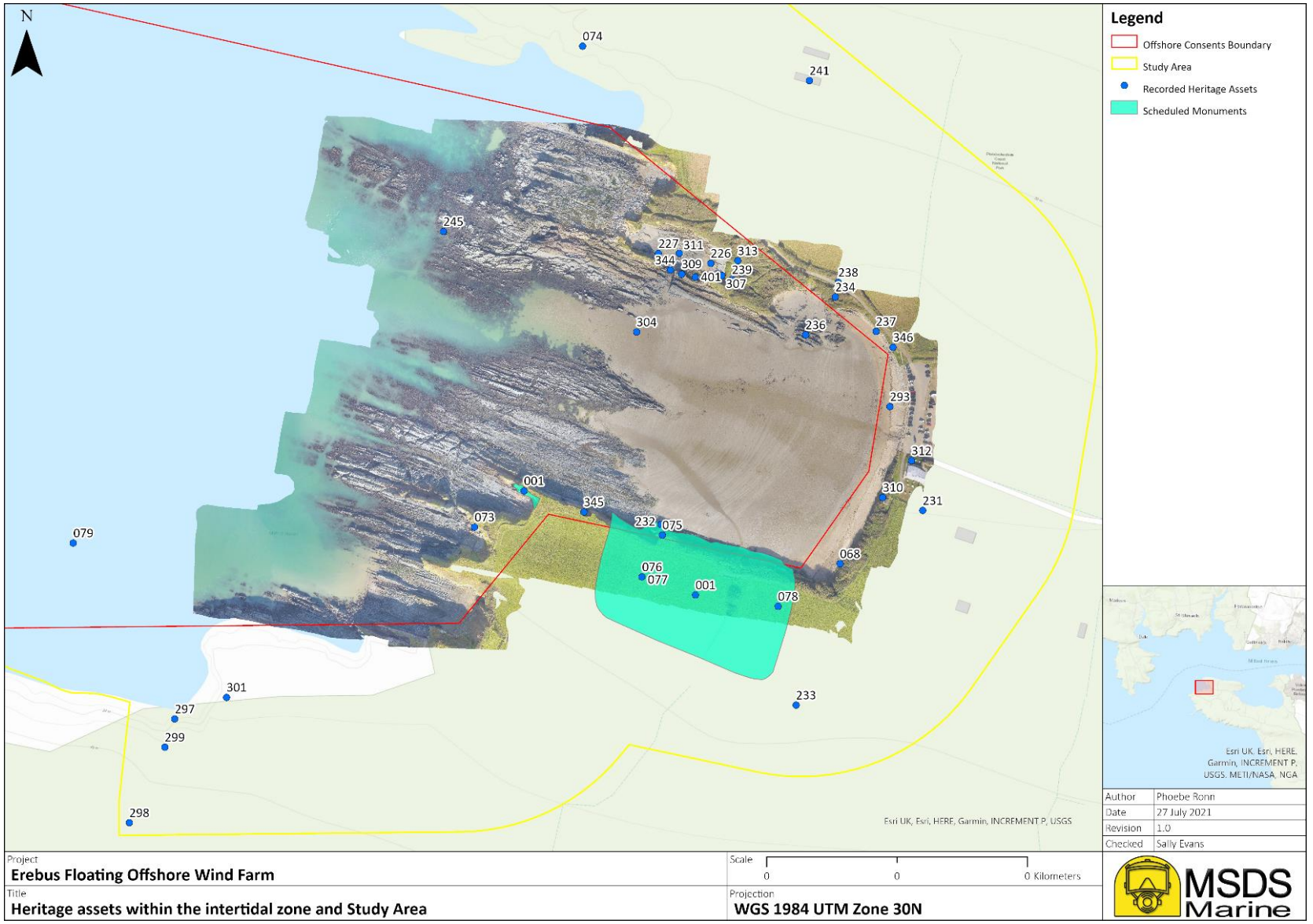


Figure 25: Recorded heritage assets within the intertidal and Study Area

7.1.12 Evidence of maritime activity can be found on the south side of the bay; rock cut hollows with mortar and iron fittings, and mooring hooks in the cliffs and bedrock were recorded in previous datasets as boat mooring points (MSDS_Erebus_232; Figure 25; Figure 39). They are present at three different levels, potentially so that this mooring position could be used at different states of the tide. These were identified in the intertidal walkover survey.

7.1.13 Evidence of terrestrial activities in the area includes a lime kiln and brick works. The lime kiln (MSDS_Erebus_234; Figure 25) appears for the first time in the 1864 OS map, however the 1842 Tithe maps label a field to the east as "Field above the Kiln" which indicates that the kiln was present as early as 1842. On the 1864 OS map it is marked east of the smaller harbour along with a small cottage (MSDS_Erebus_238; Figure 25) is marked just to the north. The structure is present on a 1972 OS map, the latest OS map reviewed. No trace of the small building/cottage is evident in the drone footage and no remains were identified during the intertidal walkover survey. However, the lime kiln, however, is marked as disused in the 1972 OS map and kiln was confirmed and recorded in the intertidal walkover survey; it is mostly covered by vegetation but appears to be in good condition.

7.1.14 The area between the two harbours along the northern side of the bay is labelled on the 1864 OS map as "*Old Quarries*". This label is likely referring two quarries recorded in the HER data within the larger harbour one on either side to the west and east (MSDS_Erebus_226 and MSDS_Erebus_227, respectively; Figure 25; Figure 37; Figure 38). Data from RCAHMW also indicates the presence of another quarry: "*second quarry to the east is associated with a lime kiln*". Labelling the quarries as 'old' may suggest that these were no longer in use as quarries by 1864. No quarrying activity is marked on previous maps, although no earlier maps are available at a large enough scale that might reasonably include such detail. No evidence of quarrying was identified in the intertidal walkover survey. A small square structure (MSDS_Erebus_239; Figure 25; Figure 41) was marked on the land between the two harbour areas for the first time on the 1864 OS map. A second rectangular structure was also marked on the land between these harbours on a 1937 OS map (MSDS_Erebus_313; Figure 41), however neither are confirmed to be associated with quarrying activity. A number of footpaths are present between the harbours.

7.1.15 A brick works is also recorded within the wider Study Area. On an OS map from 1898, buildings (MSDS_Erebus_231; Figure 25) appear at the eastern edge or back of the beach. These are labelled as "*Brick Works*" in the 1908 OS map. By 1937 the Brick works are marked as "*disused*". These buildings do not appear on the 1842 Tithe map, however, a field immediately to the east of this location is named "*Brick Field*", it may be that activity related to brick making was taking place in the area prior to the brick works construction (recorded in 1908). The majority of the buildings associated with the brickworks are no longer present, however one two-storey stone-built tower was identified in the intertidal walkover survey, the only surviving remains of the brickworks. An information board at the beach stated that coal was imported from other parts of Wales to supply the brick works and kiln, although no reference was provided for this information.

7.1.16 A post medieval farmhouse is present c.170 m north of the bay (MSDS_Erebus_241; Figure 25). The post medieval Tithe maps suggest that the surrounding fields were used for animal pasture, crops, plantations, and meadows and were associated with the farmhouse.

7.1.17 One road is currently present leading to the bay from Angle to the east, this road first appears on the "*Plan of Milford Haven"* by Lieutenant Colonel David Watson in 1756. This road then appears consistently in every map reviewed since 1756 and appears to be the main access to the bay. A second road appears on the earliest OS map, drawn by Thomas Budgen, in 1809. This road leads to the bay from North Studdock farm to the south. It is not present on all maps, and in the OS maps from 1898 to 1964 the southern part of it appears to have been downgraded to a footpath. By the 1972 OS map, this road has disappeared, and it is not present in current maps, visual inspection suggests that it is now a footpath. While the roads themselves do not particularly increase the potential for artefacts or remains to be present there, the access that they provided to the bay would have been crucial for supporting the evident industries, thus supporting previous statements about the frequency of activity here. This contributes to the statements made regarding the potential for intertidal remains.

7.1.18 The Angle peninsula was a base for military activity in both World Wars, evidence of this was able to be identified within the records for the intertidal Study Area. A minefield (MSDS_Erebus_301), defence line (MSDS_Erebus_297), and infantry post (MSDS_Erebus_299) were recorded to be in the southwestern part of the intertidal Study Area (Figure 25). These features were part of a wider landscape of military features noted on a 1916 War Office map of Field Defences and recorded by the Defence of Britain Project, constructed in order to defend Milford Haven in the event of invasion during the First and Second World Wars (Pyper and Page 2015; Council for British Archaeology 2002). These features are located at the edge of the Study Area, they were not covered by the drone footage nor investigated further during the intertidal survey. A long sub-linear feature was identified in an aerial photograph from 1946 (MSDS_Erebus_304; Figure 25; Figure 41). The feature appears to extend at a slight angle from the exposed bedrock at the north of the beach and into the sea. Its function is unknown; however, it was not present in aerial photographs from 1940 but was present in photographs from 1946, and it was absent in photographs from 1950. Thus, it was constructed and removed between 1940 and 1950 suggesting it may have been a war time structure. It may represent a jetty, blockade, or other wartime feature. No remains of MSDS_Erebus_304 was seen in the intertidal walkover.

7.1.19 A series of walls (MSDS_Erebus_237; Figure 25; Figure 40) were identified on the north-eastern edge of the beach in the drone footage within the Offshore Consent Boundary. The intertidal walkover survey confirmed that these are likely seawalls to prevent erosion, however, parts of the walls have collapsed recently possibly due to wave action and/or erosion.

7.1.20 On a 1972 OS map, a pumping station (MSDS_Erebus_310; Figure 25) is marked on the south side of the road at the back of the beach (or east of the bay) along with a caravan park, and associated structure that are set back from the beach. A car park is marked to the north of the road. A structure (MSDS_Erebus_312; Figure 25) is also present on the 1972 map marked adjacent to the road, possibly associated with the pumping station or car park. The car park is currently situated on the north side of the road, where the caravan park was previously marked, and the pumping station is no longer present.. The area is now used recreationally as a beach with a small café and public toilets. To the south of the road, set back from the beach behind the café is a caravan park.

7.1.21 A charcoal horizon (MSDS_Erebus_346; Figure 25; Figure 46; Figure 47) was identified eroding from the bank to the east of the beach in the walkover survey, and on the eastern side of the larger harbour. This was not dated, however post medieval/modern glass was found within this context indicating that the charcoal was deposited in the relatively recently, potentially related to fire at the lime kiln or brick works which were situated close by.

7.2 Intertidal Archaeological Potential and Summary

7.2.1 There are in total 19 known intertidal archaeological remains within the Offshore Consent Boundary.

7.2.2 The potential for further intertidal remains to be present within the Study Area is fairly high, as the surrounding cliffs are undergoing active erosion and remains from the early medieval settlement and cemetery, and Iron Age promontory forts may fall into the intertidal zone. There is also potential for isolated finds to be present within the beach deposits dating to the prehistoric period onwards.

7.2.3 The date range of the intertidal remains within the Study Area at the landfall site indicates the time depth of the activity in the area. Wales has a long history of coastal industry and activity and the remains at West Angle Bay provide good evidence of this.

8.0 Mitigation

8.0.1 A range of standard mitigation measures have already been applied to the Project as part of the over-arching site selection and iterative design process (see Chapter 3: Site Selection and Alternatives). Following current policy set out within the Welsh National Marine Plan (in particular SOC_05) mitigation aims first to avoid adverse impacts on historic assets and their settings, then to minimise impacts where they cannot be avoided, and to mitigate impacts where they cannot be minimised. This section provides an overview of mitigation. Strategies are discussed in more detail within Chapter 14: Marine Archaeology and Cultural Heritage and Volume 3, Technical Appendix 14.2 Marine Archaeology Written Scheme of Investigation, and are summarised below. The key mitigation measures (both standard and additional) include:

- AEZs, TAEZs and AAPs;
- A watching brief within the intertidal zone;
- A protocol for reporting finds of archaeological interest; and
- Geoarchaeological work associated with geotechnical cores.

8.0.2 Additionally, archaeological involvement in further work is a key component in the ongoing process of assessing known and potential archaeological remains within the development area, to ensure robust and proportionate mitigation for heritage assets which may be impacted by the development. Thus, input info further work is required to ensure robust mitigation for the Proposed Development. This includes:

- Geophysical survey will require an archaeological assessment of the survey dataset;
- Diver/ROV obstruction surveys will require an archaeological assessment of the survey dataset (video and positional data); and
- Geotechnical investigations will require geoarchaeological assessment and, where necessary, analysis following a staged approach.

8.0.3 Mitigation strategies for the different aspects of marine archaeology are set out within Chapter 14: Marine Archaeology and Cultural Heritage and Volume 3, Technical Appendix 14.2 Marine Archaeology Written Scheme of Investigation.

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10.0 Appendix 1: Gazetteer

MSDS ID	Type	Name	Description	Period	X	Y	UKHO ID	NPRN	PRN	Cadw ID	ROW ID	PAS ID	NMRW ID	Location
MSDS_Erebus_001	Settlement	West Angle Bay Settlement	Remains of a well-preserved cemetery, which dates to the early Medieval period (sixth to tenth centuries AD). It consists of two parts, both located in improved pasture on the cliff top overlooking West Angle Bay to the North.	Early Medieval	354202.9	5728094	null	null	null	PE554	null	null	null	Consent Boundary
MSDS_Erebus_002	Structure	Stack Rock Fort	Trefoil plan Battery built in 1852 to defend the middle part of Milford Haven.	Post Medieval	355427.2	5730021	null	268158	4198, 24447, 60462, 11462	PE334	null	null	null	Study Area
MSDS_Erebus_003	Seascape	Milford Haven Waterway	This seascape has a rich maritime history extending back over 2000 years. Evidence of activity relating to conquest, defence, settlement, commerce, and fishing is present in this area.	Unknown	352562.2	5729559	null	407932	null	HLW (D) 3	null	null	null	Study Area
MSDS_Erebus_004	Findspot	Mill Bay Bottom	A flake of 'yellow flint' that exhibits working on one edge.	Prehistoric	350024.1	5728005	null	null	12798	null	null	null	null	Study Area
MSDS_Erebus_005	Findspot	Prehistoric flint blade	blade	Prehistoric	350024.1	5728005	null	null	null	null	null	null	219664	Study Area
MSDS_Erebus_006	Findspot	Prehistoric flint blade	blade	Prehistoric	351010	5729018	null	null	null	null	null	null	219915	Study Area
MSDS_Erebus_007	Findspot	Prehistoric flint blade	blade	Prehistoric	351010	5729018	null	null	null	null	null	null	219904	Study Area
MSDS_Erebus_008	Findspot	Prehistoric flint blade	blade	Prehistoric	351010	5729018	null	null	null	null	null	null	219898	Study Area
MSDS_Erebus_009	Findspot	Prehistoric flint blade	blade	Prehistoric	351010	5729018	null	null	null	null	null	null	219905	Study Area
MSDS_Erebus_010	Findspot	Prehistoric flint blade	blade	Prehistoric	351010	5729018	null	null	null	null	null	null	219887	Study Area
MSDS_Erebus_011	Findspot	Prehistoric flint blade	blade	Prehistoric	351010	5729018	null	null	null	null	null	null	219778	Study Area
MSDS_Erebus_012	Findspot	Prehistoric flint blade	blade	Prehistoric	351010	5729018	null	null	null	null	null	null	219777	Study Area
MSDS_Erebus_013	Findspot	Prehistoric flint blade	blade	Prehistoric	351010	5729018	null	null	null	null	null	null	219828	Study Area
MSDS_Erebus_014	Findspot	Prehistoric flint blade	blade	Prehistoric	351010	5729018	null	null	null	null	null	null	219776	Study Area
MSDS_Erebus_015	Findspot	Prehistoric flint blade core	blade core	Prehistoric	351010	5729018	null	null	null	null	null	null	219910	Study Area
MSDS_Erebus_016	Findspot	Prehistoric flint core	core	Prehistoric	350024.1	5728005	null	null	null	null	null	null	219662	Study Area
MSDS_Erebus_017	Findspot	Prehistoric flint core	core	Prehistoric	351010	5729018	null	null	null	null	null	null	219911	Study Area
MSDS_Erebus_018	Findspot	Prehistoric flint core	core	Prehistoric	351010	5729018	null	null	null	null	null	null	219881	Study Area

MSDS ID	Type	Name	Description	Period	X	Y	UKHO ID	NPRN	PRN	Cadw ID	ROW ID	PAS ID	NMRW ID	Location
MSDS_Erebus_019	Findspot	Prehistoric flint core	core	Prehistoric	351010	5729018	null	null	null	null	null	null	219880	Study Area
MSDS_Erebus_020	Findspot	Prehistoric flint core	core	Prehistoric	351010	5729018	null	null	null	null	null	null	219879	Study Area
MSDS_Erebus_021	Findspot	Prehistoric flint core rejuvenation flake	core rejuvenation flake	Prehistoric	351010	5729018	null	null	null	null	null	null	219901	Study Area
MSDS_Erebus_022	Findspot	Prehistoric flint debitage	knapping debitage	Prehistoric	351010	5729018	null	null	null	null	null	null	219783	Study Area
MSDS_Erebus_023	Findspot	Prehistoric flint debitage	knapping debitage	Prehistoric	351010	5729018	null	null	null	null	null	null	219782	Study Area
MSDS_Erebus_024	Findspot	Prehistoric flint debitage	knapping debitage	Prehistoric	351010	5729018	null	null	null	null	null	null	219916	Study Area
MSDS_Erebus_025	Findspot	Prehistoric flint debitage	knapping debitage	Prehistoric	351010	5729018	null	null	null	null	null	null	219914	Study Area
MSDS_Erebus_026	Findspot	Prehistoric flint debitage	knapping debitage	Prehistoric	351010	5729018	null	null	null	null	null	null	219909	Study Area
MSDS_Erebus_027	Findspot	Prehistoric flint debitage	knapping debitage	Prehistoric	351010	5729018	null	null	null	null	null	null	219908	Study Area
MSDS_Erebus_028	Findspot	Prehistoric flint debitage	knapping debitage	Prehistoric	351010	5729018	null	null	null	null	null	null	219906	Study Area
MSDS_Erebus_029	Findspot	Prehistoric flint debitage	knapping debitage	Prehistoric	351010	5729018	null	null	null	null	null	null	219900	Study Area
MSDS_Erebus_030	Findspot	Prehistoric flint debitage	knapping debitage	Prehistoric	351010	5729018	null	null	null	null	null	null	219835	Study Area
MSDS_Erebus_031	Findspot	Prehistoric flint debitage	knapping debitage	Prehistoric	351010	5729018	null	null	null	null	null	null	219833	Study Area
MSDS_Erebus_032	Findspot	Prehistoric flint debitage	knapping debitage	Prehistoric	351010	5729018	null	null	null	null	null	null	219890	Study Area
MSDS_Erebus_033	Findspot	Prehistoric flint debitage	knapping debitage	Prehistoric	351203	5729521	null	null	null	null	null	null	219969	Study Area
MSDS_Erebus_034	Findspot	Prehistoric flint debitage	knapping debitage	Prehistoric	351203	5729521	null	null	null	null	null	null	219970	Study Area
MSDS_Erebus_035	Findspot	Prehistoric flint flake	flake	Prehistoric	350024.1	5728005	null	null	null	null	null	null	219661	Study Area
MSDS_Erebus_036	Findspot	Prehistoric flint flake	flake	Prehistoric	350024.1	5728005	null	null	null	null	null	null	219663	Study Area
MSDS_Erebus_037	Findspot	Prehistoric flint flake	flake	Prehistoric	351010	5729018	null	null	null	null	null	null	219826	Study Area
MSDS_Erebus_038	Findspot	Prehistoric flint flake	flake	Prehistoric	351010	5729018	null	null	null	null	null	null	219824	Study Area
MSDS_Erebus_039	Findspot	Prehistoric flint flake	flake	Prehistoric	351010	5729018	null	null	null	null	null	null	219912	Study Area
MSDS_Erebus_040	Findspot	Prehistoric flint flake	flake	Prehistoric	351010	5729018	null	null	null	null	null	null	219907	Study Area
MSDS_Erebus_041	Findspot	Prehistoric flint flake	flake	Prehistoric	351010	5729018	null	null	null	null	null	null	219822	Study Area
MSDS_Erebus_042	Findspot	Prehistoric flint flake	flake	Prehistoric	351010	5729018	null	null	null	null	null	null	219902	Study Area

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MSDS_Erebus_043	Findspot	Prehistoric flint flake	flake	Prehistoric	351010	5729018	null	null	null	null	null	null	219913	Study Area
MSDS_Erebus_044	Findspot	Prehistoric flint flake	flake	Prehistoric	351010	5729018	null	null	null	null	null	null	219897	Study Area
MSDS_Erebus_045	Findspot	Prehistoric flint flake	flake	Prehistoric	351010	5729018	null	null	null	null	null	null	219884	Study Area
MSDS_Erebus_046	Findspot	Prehistoric flint flake	flake	Prehistoric	351010	5729018	null	null	null	null	null	null	219883	Study Area
MSDS_Erebus_047	Findspot	Prehistoric flint flake	flake	Prehistoric	351010	5729018	null	null	null	null	null	null	219882	Study Area
MSDS_Erebus_048	Findspot	Prehistoric flint flake	flake	Prehistoric	351010	5729018	null	null	null	null	null	null	219853	Study Area
MSDS_Erebus_049	Findspot	Prehistoric flint flake	flake	Prehistoric	351010	5729018	null	null	null	null	null	null	219852	Study Area
MSDS_Erebus_050	Findspot	Prehistoric flint flake	flake	Prehistoric	351203	5729521	null	null	null	null	null	null	219967	Study Area
MSDS_Erebus_051	Findspot	Prehistoric flint flake	flake	Prehistoric	351203	5729521	null	null	null	null	null	null	219965	Study Area
MSDS_Erebus_052	Findspot	Prehistoric flint knife	knife	Prehistoric	351010	5729018	null	null	null	null	null	null	219877	Study Area
MSDS_Erebus_053	Findspot	Prehistoric flint scraper	end scraper	Prehistoric	351010	5729018	null	null	null	null	null	null	219820	Study Area
MSDS_Erebus_054	Findspot	Prehistoric flint serrated flake	denticulate blade	Prehistoric	351010	5729018	null	null	null	null	null	null	219878	Study Area
MSDS_Erebus_055	Findspot	Prehistoric flint spall	chip	Prehistoric	350024.1	5728005	null	null	null	null	null	null	219665	Study Area
MSDS_Erebus_056	Findspot	Prehistoric flint spall	chip	Prehistoric	351010	5729018	null	null	null	null	null	null	219780	Study Area
MSDS_Erebus_057	Findspot	Prehistoric flint spall	chip	Prehistoric	351010	5729018	null	null	null	null	null	null	219779	Study Area
MSDS_Erebus_058	Findspot	Prehistoric flint spall	chip	Prehistoric	351010	5729018	null	null	null	null	null	null	219899	Study Area
MSDS_Erebus_059	Findspot	Prehistoric flint spall	chip	Prehistoric	351010	5729018	null	null	null	null	null	null	219831	Study Area
MSDS_Erebus_060	Findspot	Prehistoric flint spall	chip	Prehistoric	351010	5729018	null	null	null	null	null	null	219888	Study Area
MSDS_Erebus_061	Findspot	Prehistoric flint spall	chip	Prehistoric	351010	5729018	null	null	null	null	null	null	219855	Study Area
MSDS_Erebus_062	Findspot	Prehistoric flint spall	chip	Prehistoric	351010	5729018	null	null	null	null	null	null	219854	Study Area
MSDS_Erebus_063	Findspot	Prehistoric flint utilized flake	utilized flake	Prehistoric	350024.1	5728005	null	null	null	null	null	null	247472	Study Area
MSDS_Erebus_064	Findspot	Prehistoric stone bevelled Pebble	bevelled pebble	Prehistoric	349065.6	5724993	null	null	null	null	null	null	248435	Study Area
MSDS_Erebus_065	Findspot	Prehistoric stone bevelled Pebble	bevelled pebble	Prehistoric	349065.6	5724993	null	null	null	null	null	null	248434	Study Area
MSDS_Erebus_066	Findspot	Prehistoric stone flake	flake	Prehistoric	351010	5729018	null	null	null	null	null	null	219903	Study Area

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MSDS_Erebus_067	Findspot	Dale Point	Hundreds of flint flakes and waste material recovered from around the Dale Field Centre. There are no accurate details of the findspot(s) of this material.	Mesolithic	351493.3	5730225	null	null	12224	null	null	null	null	Study Area
MSDS_Erebus_068	Findspot	Flint Flakes	A few flint flakes were found in a clay pit near to the shore at West Angle.)	Mesolithic, Neolithic	354341.4	5728124	null	null	3087	null	null	null	null	Study Area
MSDS_Erebus_069	Findspot	Late Mesolithic flint truncated blade	truncated blade	Mesolithic	351010	5729018	null	null	null	null	null	null	219821	Study Area
MSDS_Erebus_070	Findspot	Mesolithic flint blade core	blade core	Mesolithic	354994.6	5730073	null	null	null	null	null	null	247410	Study Area
MSDS_Erebus_071	Findspot	Mesolithic flint blade core	blade core	Mesolithic	354994.6	5730073	null	null	null	null	null	null	247409	Study Area
MSDS_Erebus_072	Findspot	Mesolithic flint scraper	end scraper	Mesolithic	351010	5729018	null	null	null	null	null	null	219819	Study Area
MSDS_Erebus_073	Promontory Fort	Promontory Fort	Eroded promontory fort at the end of West Angle Bay.	Iron Age	353991	5728159	null	422297, 422298, 422299	99104	null	null	null	null	Consent Boundary
MSDS_Erebus_074	Promontory Fort	Promontory Fort	What seem to be earthworks of a defensive site of probable prehistoric date lie on the north side of West Angle Bay.	Iron Age	354094.7	5728621	null	null	35019	null	null	null	null	Study Area
MSDS_Erebus_075	Cemetery	Cist Cemetery	A cist cemetery on the site of the churchyard associated with the documented medieval St. Anthony's Chapel. Cist graves have been observed eroding from the cliff face, and aerial photographs show a low but distinct oval shaped earthwork bank in improved pasture. Substantial rectangular enclosure surrounding an oval cemetery compound.	Early Medieval	354171.1	5728152	null	null	35095	null	null	null	null	Consent Boundary
MSDS_Erebus_076	Chapel	St Anthony's Chapel	Site of medieval St Anthony's Chapel, associated with churchyard and cist cemetery	Early Medieval	354151.7	5728112	null	409858	3092	null	null	null	null	Study Area
MSDS_Erebus_077	Churchyard	St Anthony's Chapel Churchyard	Early medieval Churchyard associated with St Anthony's Chapel	Early Medieval	354151.7	5728112	null	409858	7595	null	null	null	null	Study Area
MSDS_Erebus_078	Structure	Kiln	Possible corn-drying kiln found during excavation in 2010 within possible annexe. Early Medieval in date but form uncertain.	Early Medieval	354282	5728083	null	null	125624	null	null	null	null	Study Area
MSDS_Erebus_079	Seabed Feature	Seabed Remains	Timbers and 15th century pottery. Considered dead by UKHO. Position believed to be erroneous, contact believed to be 25 km to northeast.	Medieval	353606.3	5728144	12176	240885	null	null	null	null	null	Consent Boundary
MSDS_Erebus_080	Anchorage	Anchorage, Nangle	Anchorage in Angle Bay, recorded in 1748	Post Medieval	356066.2	5729281	null	525635	null	null	null	null	null	Study Area

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MSDS_Erebus_081	Buoy	Buoy	A wreck buoy marked on an historic chart	Post Medieval	351690.1	5728563	null	518605	null	null	null	null	null	Study Area
MSDS_Erebus_082	Buoy	Middle Channel Rock Buoy	Buoy recorded in 1884 warning of the southwestern end of the Rows Rocks.	Post Medieval	350476.7	5726566	null	518594	null	null	null	null	null	Study Area
MSDS_Erebus_083	Buoy	Red And White Buoy, Chapel Rocks	Buoy recorded in 1884 marking the Chapel Rocks	Post Medieval	352206.3	5727372	null	518598	null	null	null	null	null	Consent Boundary
MSDS_Erebus_084	Buoy	Red Buoy, Chapel Rocks	Buoy recorded in 1884 marking the Chapel Rocks	Post Medieval	351775.4	5727810	null	518597	null	null	null	null	null	Study Area
MSDS_Erebus_085	Buoy	Red Buoy, Harbour Rock	Buoy recorded in 1884 marking the western edge of Harbour Rocks	Post Medieval	352822.5	5729019	null	515101	null	null	null	null	null	Study Area
MSDS_Erebus_086	Documented Loss	Afton	Recorded loss of Afton, an iron-hulled steamship built in 1877 sunk in 1896	Post Medieval	349581.9	5725909	null	273110	null	null	null	null	null	Study Area
MSDS_Erebus_087	Documented Loss	Ann	Recorded loss of Ann, a sailing vessel sunk in 1801	Post Medieval	351747.4	5727515	null	272587	null	null	null	null	null	Study Area
MSDS_Erebus_088	Documented Loss	Ann Jones	Recorded loss of Ann Jones, a smack built in 1853 sunk in 1856	Post Medieval	351625.1	5723601	null	544371	null	null	null	null	null	Study Area
MSDS_Erebus_089	Documented Loss	Anna Maria	Recorded loss of Anna Maria, a sailing vessel sunk in 1795	Post Medieval	351747.4	5727515	null	272576	null	null	null	null	null	Study Area
MSDS_Erebus_090	Documented Loss	Anne	Recorded loss of Anne, a sailing vessel sunk in 1758	Post Medieval	351747.4	5727515	null	272553	null	null	null	null	null	Study Area
MSDS_Erebus_091	Documented Loss	Ant	Recorded loss of Ant, a sailing vessel sunk in 1821	Post Medieval	351625.1	5723601	null	273376	null	null	null	null	null	Study Area
MSDS_Erebus_092	Documented Loss	Ardent	Recorded loss of Ardent, a brigantine built in 1826 sunk in 1858	Post Medieval	351625.1	5723601	null	524912	null	null	null	null	null	Study Area
MSDS_Erebus_093	Documented Loss	Aurora	Recorded loss of Aurora, schooner built in 1866 sunk in 1869	Post Medieval	353223.9	5729498	null	240958	null	null	null	null	null	Study Area
MSDS_Erebus_094	Documented Loss	Barley Corn	Recorded loss of Barley Corn, a sailing vessel lost in 1833	Post Medieval	351625.1	5723601	null	272822	null	null	null	null	null	Study Area
MSDS_Erebus_095	Documented Loss	Breeze	Recorded loss of Breeze, a schooner built in 1858 and lost in 1875	Post Medieval	351625.1	5723601	null	272661	null	null	null	null	null	Study Area
MSDS_Erebus_096	Documented Loss	Britannia	Recorded loss of Britannia, sailing vessel lost in 1822	Post Medieval	351747.4	5727515	null	272708	null	null	null	null	null	Study Area
MSDS_Erebus_097	Documented Loss	Caroline	Recorded loss of Caroline, a schooner built in 1863 and lost in 1896	Post Medieval	351294.2	5729433	null	273103	null	null	null	null	null	Study Area
MSDS_Erebus_098	Documented Loss	Catharine	Recorded loss of Catharine, a sailing vessel sunk in 1777	Post Medieval	351625.1	5723601	null	272420	null	null	null	null	null	Study Area
MSDS_Erebus_099	Documented Loss	Catherine	Recorded loss of Catherine, a sailing vessel sunk in 1803	Post Medieval	351747.4	5727515	null	273279	null	null	null	null	null	Study Area
MSDS_Erebus_100	Documented Loss	Catherine Williams	Recorded loss of Catherine Williams, a schooner built in 1856 sunk in 1885	Post Medieval	349828.3	5727194	null	525219	null	null	null	null	null	Study Area
MSDS_Erebus_101	Documented Loss	Ceres	Recorded loss of Ceres, a sailing vessel sunk in 1808	Post Medieval	351625.1	5723601	null	273521	null	null	null	null	null	Study Area
MSDS_Erebus_102	Documented Loss	Charles	Recorded loss of Charles, a sailing vessel sunk in 1791	Post Medieval	351625.1	5723601	null	273373	null	null	null	null	null	Study Area
MSDS_Erebus_103	Documented Loss	Charles Henry	Recorded loss of Charles Henry, a brig sunk in 1820	Post Medieval	349828.3	5727194	null	272690	null	null	null	null	null	Study Area
MSDS_Erebus_104	Documented Loss	Chesterfield Packet	Recorded loss of Chesterfield Packet, a sailing vessel sunk in 1795	Post Medieval	351747.4	5727515	null	272812	null	null	null	null	null	Study Area

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MSDS_Erebus_105	Documented Loss	Coronet	Recorded loss of Coronet, a brig sunk in 1862	Post Medieval	351747.4	5727515	null	272923	null	null	null	null	null	Study Area
MSDS_Erebus_106	Documented Loss	Courrier	Recorded loss of Courrier, a brigantine sunk in 1868	Post Medieval	350668.8	5728237	null	272929	null	null	null	null	null	Study Area
MSDS_Erebus_107	Documented Loss	Crystal	Recorded loss of Crystal, a brig lost in 1842	Post Medieval	353119.4	5726618	null	273411	null	null	null	null	null	Study Area
MSDS_Erebus_108	Documented Loss	Cyfarthfia	Recorded loss of Cyfarthfia, a smack built in 1846 sunk in 1856	Post Medieval	351625.1	5723601	null	524861	null	null	null	null	null	Study Area
MSDS_Erebus_109	Documented Loss	Eaglet	Recorded loss of Eaglet, a schooner built in 1863 sunk in 1895	Post Medieval	314823.4	5705281	null	null	null	null	null	null	null	Study Area
MSDS_Erebus_110	Documented Loss	Earl Of Shannon	Recorded loss of Earl of Shannon sunk in 1771	Post Medieval	351747.4	5727515	null	272797	null	null	null	null	null	Study Area
MSDS_Erebus_111	Documented Loss	Eleanor	Recorded loss of Eleanor, a sloop built in 1805 sunk in 1883	Post Medieval	351625.1	5723601	null	507132	null	null	null	null	null	Study Area
MSDS_Erebus_112	Documented Loss	Eliza	Recorded loss of Eliza, a sailing vessel sunk in 1838	Post Medieval	351747.4	5727515	null	272847	null	null	null	null	null	Study Area
MSDS_Erebus_113	Documented Loss	Eliza	Recorded loss of Eliza, a ketch built in 1868 sunk in 1892	Post Medieval	351491.8	5730116	null	273045	null	null	null	null	null	Study Area
MSDS_Erebus_114	Documented Loss	Elizabeth	Recorded loss of Elizabeth, a sailing vessel sunk in 1794	Post Medieval	351747.4	5727515	null	272810	null	null	null	null	null	Study Area
MSDS_Erebus_115	Documented Loss	Elizabeth And Kitty	Recorded loss of Elizabeth and Kitty, a sailing vessel sunk in 1791	Post Medieval	351625.1	5723601	null	273371	null	null	null	null	null	Study Area
MSDS_Erebus_116	Documented Loss	Ellen Hughes	Recorded loss of Ellen Hughes, a schooner built in 1852 sunk in 1868	Post Medieval	351625.1	5723601	null	524864	null	null	null	null	null	Study Area
MSDS_Erebus_117	Documented Loss	Elvina	Recorded loss of Elvina, a ketch built in 1872 sunk in 1886	Post Medieval	351625.1	5723601	null	272759	null	null	null	null	null	Study Area
MSDS_Erebus_118	Documented Loss	Emblem	Recorded loss of Emblem, a schooner built in 1845 sunk in 1846	Post Medieval	351625.1	5723601	null	516187	null	null	null	null	null	Study Area
MSDS_Erebus_119	Documented Loss	Emerald Isle	Recorded loss of Emerald Isle, a sailing vessel sunk in 1836	Post Medieval	351747.4	5727515	null	272831	null	null	null	null	null	Study Area
MSDS_Erebus_120	Documented Loss	Emily	Recorded loss of Emily, a sailing vessel sunk in 1857	Post Medieval	352241.2	5726644	null	273321	null	null	null	null	null	Study Area
MSDS_Erebus_121	Documented Loss	Energy	Recorded loss of Energy, a brig built in 1845 sunk in 1861	Post Medieval	351625.1	5723601	null	506301	null	null	null	null	null	Study Area
MSDS_Erebus_122	Documented Loss	Enterprize	Recorded loss of Enterprize, a schooner built in 1848 sunk in 1866	Post Medieval	351625.1	5723601	null	272636	null	null	null	null	null	Study Area
MSDS_Erebus_123	Documented Loss	Erin	Recorded loss of Erin, a wooden paddle steamer sunk in 1833	Post Medieval	351747.4	5727515	null	273290	null	null	null	null	null	Study Area
MSDS_Erebus_124	Documented Loss	Excelsior	Recorded loss of Excelsior, a schooler built in 1880 sunk in 1883	Post Medieval	347666.2	5720669	null	272751	null	null	null	null	null	Study Area
MSDS_Erebus_125	Documented Loss	Fanny	Recorded loss of Fanny, a sailing vessel sunk in 1808	Post Medieval	351747.4	5727515	null	273538	null	null	null	null	null	Study Area
MSDS_Erebus_126	Documented Loss	Fanny Anne	Recorded loss of Fanny Anne, a sloop built in 1801 sunk in 1841	Post Medieval	351625.1	5723601	null	544240	null	null	null	null	null	Study Area
MSDS_Erebus_127	Documented Loss	Farmer	Recorded loss of Farmer, a sloop sunk in 1806	Post Medieval	351625.1	5723601	null	273528	null	null	null	null	null	Study Area
MSDS_Erebus_128	Documented Loss	Favourite	Recorded loss of Favourite, a schooner built in 1824 sunk in 1868	Post Medieval	351625.1	5723601	null	507182	null	null	null	null	null	Study Area

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MSDS_Erebus_129	Documented Loss	Fidelity	Recorded loss of Fidelity, a sloop built in 1807 sunk in 1846	Post Medieval	349807	5727650	null	544245	null	null	null	null	null	Study Area
MSDS_Erebus_130	Documented Loss	Flora	Recorded loss of Flora, a sloop built in 1795 sunk in 1829	Post Medieval	351625.1	5723601	null	544242	null	null	null	null	null	Study Area
MSDS_Erebus_131	Documented Loss	Flora	Recorded loss of Flora, a brig sunk in 1819	Post Medieval	353655.1	5731010	null	272684	null	null	null	null	null	Study Area
MSDS_Erebus_132	Documented Loss	Friendship	Recorded loss of Friendship, a sailing vessel sunk in 1809	Post Medieval	351625.1	5723601	null	273523	null	null	null	null	null	Study Area
MSDS_Erebus_133	Documented Loss	George And Francis	Recorded loss of George Francis, a schooner built in 1846 sunk in 1852	Post Medieval	353945.6	5728631	null	272893	null	null	null	null	null	Study Area
MSDS_Erebus_134	Documented Loss	Gleaner	Recorded loss of Gleaner, a schooner built in 1845 sunk in 1857	Post Medieval	351625.1	5723601	null	524892	null	null	null	null	null	Study Area
MSDS_Erebus_135	Documented Loss	Glory	Recorded loss of Glory, a sailing vessel sunk in 1771	Post Medieval	351747.4	5727515	null	272798	null	null	null	null	null	Study Area
MSDS_Erebus_136	Documented Loss	Good Hope	Recorded loss of Good Hope, a smack sunk in 1858	Post Medieval	349828.3	5727194	null	272911	null	null	null	null	null	Study Area
MSDS_Erebus_137	Documented Loss	Happy Return	Recorded loss of Happy Return, a sailing vessel sunk in 1755	Post Medieval	351747.4	5727515	null	272507	null	null	null	null	null	Study Area
MSDS_Erebus_138	Documented Loss	Harriet	Recorded loss of Harriet, a sailing vessel sunk in 1813	Post Medieval	349828.3	5727194	null	272956	null	null	null	null	null	Study Area
MSDS_Erebus_139	Documented Loss	Haverfordwest	Recorded loss of Haverfordwest, a sailing vessel sunk in 1807	Post Medieval	351747.4	5727515	null	273530	null	null	null	null	null	Study Area
MSDS_Erebus_140	Documented Loss	Herald	Recorded loss of Herald, a sailing vessel sunk in 1810	Post Medieval	351747.4	5727515	null	273522	null	null	null	null	null	Study Area
MSDS_Erebus_141	Documented Loss	Hero	Recorded loss of Hero, a sailing vessel sunk in 1821	Post Medieval	349828.3	5727194	null	273375	null	null	null	null	null	Study Area
MSDS_Erebus_142	Documented Loss	Holberg	Recorded loss of Holberg, a sailing vessel sunk in 1792	Post Medieval	351625.1	5723601	null	273547	null	null	null	null	null	Study Area
MSDS_Erebus_143	Documented Loss	Ilfracombe	Recorded loss of Ilfracombe, a sailing vessel sunk in 1802	Post Medieval	351625.1	5723601	null	272962	null	null	null	null	null	Study Area
MSDS_Erebus_144	Documented Loss	John And Henry	Recorded loss of John and Henry, a sailing vessel sunk in 1796	Post Medieval	351747.4	5727515	null	272579	null	null	null	null	null	Study Area
MSDS_Erebus_145	Documented Loss	Kelpie	Recorded loss of Kelpie, a brig sunk in 1870	Post Medieval	353236.4	5727560	null	272933	null	null	null	null	null	Study Area
MSDS_Erebus_146	Documented Loss	La Muette	Recorded loss of La Muette, a sailing vessel sunk in 1757	Post Medieval	351420.7	5730051	null	272552	null	null	null	null	null	Study Area
MSDS_Erebus_147	Documented Loss	Laura And Ellen	Recorded loss of Laura Ellen, a schooner built in 1838 sunk in 1867	Post Medieval	351747.4	5727515	null	272641	null	null	null	null	null	Study Area
MSDS_Erebus_148	Documented Loss	Leeba	Recorded loss of Leeba, a sloop built in 1841 sunk in 1866	Post Medieval	351625.1	5723601	null	272633	null	null	null	null	null	Study Area
MSDS_Erebus_149	Documented Loss	Liberator	Recorded loss of Liberator, a schooner sunk in 1853	Post Medieval	351747.4	5727515	null	272737	null	null	null	null	null	Study Area
MSDS_Erebus_150	Documented Loss	Liberty	Recorded loss of Liberty, a sailing vessel sunk in 1817	Post Medieval	349828.3	5727194	null	272815	null	null	null	null	null	Study Area
MSDS_Erebus_151	Documented Loss	Liver	Recorded loss of Liver, a sailing vessel sunk in 1828	Post Medieval	351747.4	5727515	null	272572	null	null	null	null	null	Study Area
MSDS_Erebus_152	Documented Loss	Mair	Recorded loss of Mair, a schooner built in 1851 sunk in 1869	Post Medieval	351625.1	5723601	null	544466	null	null	null	null	null	Study Area

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MSDS_Erebus_153	Documented Loss	Mark	Recorded loss of Mark, a sailing vessel sunk in 1806	Post Medieval	351747.4	5727515	null	273527	null	null	null	null	null	Study Area
MSDS_Erebus_154	Documented Loss	Marvel	Recorded loss of Marvel, a schooner sunk in 1869	Post Medieval	353161.8	5727607	null	272930	null	null	null	null	null	Study Area
MSDS_Erebus_155	Documented Loss	Mary	Recorded loss of Mary, a sailing vessel sunk in 1816	Post Medieval	351625.1	5723601	null	273282	null	null	null	null	null	Study Area
MSDS_Erebus_156	Documented Loss	Mary	Recorded loss of Mary, square rigged ship built in 1812 sunk in 1854	Post Medieval	351625.1	5723601	null	544267	null	null	null	null	null	Study Area
MSDS_Erebus_157	Documented Loss	Mary	Recorded loss of Mary, a sailing vessel sunk in 1764	Post Medieval	351747.4	5727515	null	272561	null	null	null	null	null	Study Area
MSDS_Erebus_158	Documented Loss	Mary	Recorded loss of Mary, a sailing vessel sunk in 1797	Post Medieval	351747.4	5727515	null	272581	null	null	null	null	null	Study Area
MSDS_Erebus_159	Documented Loss	Medina	Recorded loss of Medina, a sailing vessel sunk in 1819	Post Medieval	351747.4	5727515	null	273311	null	null	null	null	null	Study Area
MSDS_Erebus_160	Documented Loss	Mercury	Recorded loss of Mercury, a sailing vessel sunk in 1819	Post Medieval	351747.4	5727515	null	273394	null	null	null	null	null	Study Area
MSDS_Erebus_161	Documented Loss	Milford	Recorded loss of Milford, a sailing vessel sunk in 1801	Post Medieval	351747.4	5727515	null	272586	null	null	null	null	null	Study Area
MSDS_Erebus_162	Documented Loss	Nancy	Recorded loss of Nancy, a sloop sunk in 1812	Post Medieval	349828.3	5727194	null	273495	null	null	null	null	null	Study Area
MSDS_Erebus_163	Documented Loss	Nancy	Recorded loss of Nancy, a sailing vessel sunk in 1819	Post Medieval	351747.4	5727515	null	273395	null	null	null	null	null	Study Area
MSDS_Erebus_164	Documented Loss	Neptune	Recorded loss of Neptune, a sailing vessel sunk in 1771	Post Medieval	351747.4	5727515	null	272796	null	null	null	null	null	Study Area
MSDS_Erebus_165	Documented Loss	New Hope	Recorded loss of New Hope, a sloop built in 1828 sunk in in 1861	Post Medieval	351625.1	5723601	null	518322	null	null	null	null	null	Study Area
MSDS_Erebus_166	Documented Loss	Ospray	Recorded loss of Ospray, a smack built in 1835 sunk in 1871	Post Medieval	351625.1	5723601	null	507154	null	null	null	null	null	Study Area
MSDS_Erebus_167	Documented Loss	Osprey	Recorded loss of Osprey, a sloop built in 1831 sunk in 1871	Post Medieval	351625.1	5723601	null	525150	null	null	null	null	null	Study Area
MSDS_Erebus_168	Documented Loss	Penrhyn Castle	Recorded loss of Penrhyn Castle, a smack/sloop sunk in 1873	Post Medieval	349595.4	5726822	null	272948	null	null	null	null	null	Study Area
MSDS_Erebus_169	Documented Loss	Prince William	Recorded loss of Prince William, a sailing vessel sunk in 1776	Post Medieval	351625.1	5723601	null	272419	null	null	null	null	null	Study Area
MSDS_Erebus_170	Documented Loss	Princess Augusta	Recorded loss of Princess Augusta, a sailing vessel sunk in 1755	Post Medieval	351747.4	5727515	null	272509	null	null	null	null	null	Study Area
MSDS_Erebus_171	Documented Loss	Providence	Recorded loss of Providence, a sailing vessel sunk in 1836	Post Medieval	349747	5727724	null	272832	null	null	null	null	null	Study Area
MSDS_Erebus_172	Documented Loss	Rainbow	Recorded loss of Rainbow, a sailing vessel sunk in 1807	Post Medieval	351747.4	5727515	null	273531	null	null	null	null	null	Study Area
MSDS_Erebus_173	Documented Loss	Rebecca	Recorded loss of Rebecca, a schooner built in 1859 sunk in 1886	Post Medieval	351747.4	5727515	null	272768	null	null	null	null	null	Study Area
MSDS_Erebus_174	Documented Loss	Respected Friends	Recorded loss of Respected Friends, a sailing vessel sunk in 1836	Post Medieval	349828.3	5727194	null	272835	null	null	null	null	null	Study Area
MSDS_Erebus_175	Documented Loss	Robert	Recorded loss of Robert, a sailing vessel sunk in 1774	Post Medieval	351747.4	5727515	null	272414	null	null	null	null	null	Study Area
MSDS_Erebus_176	Documented Loss	Rose	Recorded loss of Rose, a vessel lost in 1772	Post Medieval	351625.1	5723601	null	272800	null	null	null	null	null	Study Area

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MSDS_Erebus_177	Documented Loss	Royal Oak	Recorded loss of Royal Oak, a sloop built in 1814 and lost in 1831	Post Medieval	351625.1	5723601	null	544238	null	null	null	null	null	Study Area
MSDS_Erebus_178	Documented Loss	Salacia	Recorded loss of Salacia, a schooner built in 1841 sunk in 1841	Post Medieval	349828.3	5727194	null	273414	null	null	null	null	null	Study Area
MSDS_Erebus_179	Documented Loss	Santa Cruz	Recorded loss of Santa Cruz, a galleon sunk in 1679	Post Medieval	351747.4	5727515	null	272496	null	null	null	null	null	Study Area
MSDS_Erebus_180	Documented Loss	Sea Nymph	Recorded loss of Sea Nymph, a sailing vessel sunk in 1751	Post Medieval	351747.4	5727515	null	272502	null	null	null	null	null	Study Area
MSDS_Erebus_181	Documented Loss	Seaflower	Recorded loss of Seaflower, a sloop sunk in 1802	Post Medieval	351747.4	5727515	null	272961	null	null	null	null	null	Study Area
MSDS_Erebus_182	Documented Loss	Shamrock	Recorded loss of Shamrock, a schooner sunk in 1868	Post Medieval	351625.1	5723601	null	515782	null	null	null	null	null	Study Area
MSDS_Erebus_183	Documented Loss	Singleton	Recorded loss of Singleton, a brigantine built in 1852 sunk in 1861	Post Medieval	353714.3	5729973	null	272649	null	null	null	null	null	Study Area
MSDS_Erebus_184	Documented Loss	Sisters	Recorded loss of Sisters, a schooner built in 1826 sunk in 1847	Post Medieval	351625.1	5723601	null	525168	null	null	null	null	null	Study Area
MSDS_Erebus_185	Documented Loss	Speculation	Recorded loss of Speculation, a schooner built in 1850 sunk in 1861	Post Medieval	351625.1	5723601	null	518321	null	null	null	null	null	Study Area
MSDS_Erebus_186	Documented Loss	Speedwell	Recorded loss of Speedwell, a schooner sunk in 1854	Post Medieval	353021.9	5726364	null	272900	null	null	null	null	null	Study Area
MSDS_Erebus_187	Documented Loss	Speedwell	Recorded loss of Speedwell, a sailing vessel sunk in 1809	Post Medieval	351747.4	5727515	null	272590	null	null	null	null	null	Study Area
MSDS_Erebus_188	Documented Loss	Star O'tay	Recorded loss of Star O'tay, a paddle-tug built in 1870 sunk in 1889	Post Medieval	351747.4	5727515	null	273027	null	null	null	null	null	Study Area
MSDS_Erebus_189	Documented Loss	Suir	Recorded loss of Suir, a sailing vessel sunk in 1813	Post Medieval	351747.4	5727515	null	272724	null	null	null	null	null	Study Area
MSDS_Erebus_190	Documented Loss	Swallow	Recorded loss of Swallow, a sailing vessel sunk in 1809	Post Medieval	351625.1	5723601	null	272591	null	null	null	null	null	Study Area
MSDS_Erebus_191	Documented Loss	Swan	Recorded loss of Swan, a barque built in 1824 sunk in 1862	Post Medieval	351625.1	5723601	null	272924	null	null	null	null	null	Study Area
MSDS_Erebus_192	Documented Loss	Sydney	Recorded loss of Sydney, a sloop built in 1838 sunk in 1846	Post Medieval	351625.1	5723601	null	544285	null	null	null	null	null	Study Area
MSDS_Erebus_193	Documented Loss	Tantivy	Recorded loss of Tantivy, a schooner built in 1825 sunk in 1846	Post Medieval	351747.4	5727515	null	506288	null	null	null	null	null	Study Area
MSDS_Erebus_194	Documented Loss	Tart	Recorded loss of Tart, a sailing vessel sunk in 1810	Post Medieval	349828.3	5727194	null	273542	null	null	null	null	null	Study Area
MSDS_Erebus_195	Documented Loss	Thomas	Recorded loss of Thomas, a sailing vessel sunk in 1820	Post Medieval	351625.1	5723601	null	272687	null	null	null	null	null	Study Area
MSDS_Erebus_196	Documented Loss	Thomas And Lucy	Recorded loss of Thomas and Lucy, a sailing vessel sunk in 1811	Post Medieval	351747.4	5727515	null	273494	null	null	null	null	null	Study Area
MSDS_Erebus_197	Documented Loss	Thomas Mahoney	Recorded loss of Thomas Mahoney, a schooner built in 1835 sunk in 1868	Post Medieval	350983.5	5722484	null	272646	null	null	null	null	null	Study Area
MSDS_Erebus_198	Documented Loss	Tredegar	Recorded loss of Tredegar, a sloop built in 804 sunk in 1829	Post Medieval	351625.1	5723601	null	518303	null	null	null	null	null	Study Area
MSDS_Erebus_199	Documented Loss	True Blue	Recorded loss of True Blue, a sailing vessel sunk in 1811	Post Medieval	351747.4	5727515	null	273499	null	null	null	null	null	Study Area
MSDS_Erebus_200	Documented Loss	Union	Recorded loss of Union, a sailing vessel built in 1788 sunk in 1827	Post Medieval	351747.4	5727515	null	273366	null	null	null	null	null	Study Area

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MSDS_Erebus_201	Documented Loss	Unity	Recorded loss of Unity, a brigantine built in 1835 sunk in 1875	Post Medieval	349828.3	5727194	null	272659	null	null	null	null	null	Study Area
MSDS_Erebus_202	Documented Loss	Unnamed Brig	Recorded loss of Unnamed Brig sunk in 1771	Post Medieval	351747.4	5727515	null	272792	null	null	null	null	null	Study Area
MSDS_Erebus_203	Documented Loss	Unnamed Caravel	Recorded loss of Unnamed Caravel, sunk in 1629	Post Medieval	351747.4	5727515	null	272494	null	null	null	null	null	Study Area
MSDS_Erebus_204	Documented Loss	Unnamed wreck	Recorded loss of unnamed vessel sunk in 1814	Post Medieval	351625.1	5723601	null	273256	null	null	null	null	null	Study Area
MSDS_Erebus_205	Documented Loss	Unnamed wreck	Recorded loss of unnamed vessel sunk in 1814	Post Medieval	351625.1	5723601	null	519166	null	null	null	null	null	Study Area
MSDS_Erebus_206	Documented Loss	Unnamed wreck	Recorded loss of unnamed vessel sunk 1600	Post Medieval	351747.4	5727515	null	272551	null	null	null	null	null	Study Area
MSDS_Erebus_207	Documented Loss	Unnamed wreck	Recorded loss of unnamed vessel sunk in 1658	Post Medieval	351747.4	5727515	null	273257	null	null	null	null	null	Study Area
MSDS_Erebus_208	Documented Loss	Victoria	Recorded loss of Victoria, a schooner sunk in 1870	Post Medieval	350898.7	5728531	null	240955	null	null	null	null	null	Study Area
MSDS_Erebus_209	Documented Loss	Wellington	Recorded loss of Wellington, a brig built in 1812 sunk in 1843	Post Medieval	349828.3	5727194	null	273520	null	null	null	null	null	Study Area
MSDS_Erebus_210	Documented Loss	William And Mary	Recorded loss of William and Mary, a sailing vessel sunk in 1806	Post Medieval	351625.1	5723601	null	273526	null	null	null	null	null	Study Area
MSDS_Erebus_211	Documented Loss	Wish	Recorded loss of Wish, a brig built in 1847 sunk in 1886	Post Medieval	351747.4	5727515	null	272769	null	null	null	null	null	Study Area
MSDS_Erebus_212	Findspot	Anomaly	Rounded anomaly possibly associated with wreck of Thor 40 m to east	Post Medieval	351594.6	5729253	null	518620	null	null	null	null	null	Study Area
MSDS_Erebus_213	Findspot	Detonator Housing	Detonator Housing from Brass Wreck, Pembrokeshire Coast	Post Medieval	351625.1	5723601	null	240920	null	null	RCIM6/2/5/5	null	null	Study Area
MSDS_Erebus_214	Findspot	Find from wreck of Loch Shiel	1 x Bush (?) gland, lignum vitae, brass.	Post Medieval	353549	5728826	null	null	null	null	A/0165	null	null	Study Area
MSDS_Erebus_215	Findspot	Find from wreck of Loch Shiel	174 x Ballast bricks. 1 x 120" x 3" lead pipe.	Post Medieval	353549	5728826	null	null	null	null	A/0029	null	null	Study Area
MSDS_Erebus_216	Findspot	Find from wreck of Loch Shiel	2 x Fire bricks. 1 x Fragment earthenware jar. Various bits bottles & pottery.	Post Medieval	353549	5728826	null	null	null	null	A/3088	null	null	Study Area
MSDS_Erebus_217	Findspot	Find from wreck of Loch Shiel	3 x Pickle jars (1 x contents). 7 x Bricks.	Post Medieval	353549	5728826	null	null	null	null	A/1878	null	null	Study Area
MSDS_Erebus_218	Findspot	Find from wreck of Loch Shiel	2 x Bricks 2"x8" with inscription 'cartcraig'.	Post Medieval	353549	5728826	null	null	null	null	165/01	null	null	Study Area
MSDS_Erebus_219	Findspot	Find from wreck of Loch Shiel	1x brass lamp.	Post Medieval	353549	5728826	null	null	null	null	A/4301	null	null	Study Area
MSDS_Erebus_220	Findspot	Find from wreck of Loch Shiel	1 x Jar of pickles. 1 x Chess piece bishop black. 1 x Chess piece pawn black. 1 x Chess piece pawn wood colour.	Post Medieval	353549	5728826	null	null	null	null	141/18	null	null	Study Area
MSDS_Erebus_221	Findspot	Find from wreck of Loch Shiel	1 x House brick.	Post Medieval	353549	5728826	null	null	null	null	353/16	null	null	Study Area
MSDS_Erebus_222	Findspot	Find from wreck of Loch Shiel	120 x Fire bricks.	Post Medieval	353549	5728826	null	null	null	null	178/99	null	null	Study Area
MSDS_Erebus_223	Findspot	Find from wreck of Loch Shiel	2 x Bricks with 'Cartwright' mark.	Post Medieval	353549	5728826	null	null	null	null	A/2706	null	null	Study Area

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MSDS_Erebus_224	Findspot	Find from wreck of Loch Shiel	7 x Bottle of beer full and corked. 1 x Bottle empty.	Post Medieval	353549	5728826	null	null	null	null	136/99	null	null	Study Area
MSDS_Erebus_225	Findspot	Lifting Arm	Lifting Arm Find, Off Milford Haven	Post Medieval	351219.6	5728165	null	240750	null	null	null	null	null	Study Area
MSDS_Erebus_226	Quarry	Quarry	Quarry pit half lies at sea level with an 'entrance' into it for boat access with slipway on eastern side	Post Medieval	354217.5	5728412	null	524955	35016	null	null	null	null	Consent Boundary
MSDS_Erebus_227	Quarry	Quarry	Quarry at sea level and is used as a harbour	Post Medieval	354167.4	5728422	null	524955	35017	null	null	null	null	Consent Boundary
MSDS_Erebus_228	Seabed Feature	Anomaly	Anomaly possibly associated with wreck of Thor 42 m to east	Post Medieval	351588.8	5729241	null	518621	null	null	null	null	null	Study Area
MSDS_Erebus_229	Seabed Feature	Anomaly	Anomaly possibly associated with wreck of Thor 42 m to east	Post Medieval	351585.3	5729278	null	518622	null	null	null	null	null	Study Area
MSDS_Erebus_230	Seabed Feature	Unknown Object	Unknown contact. Considered dead by UKHO	Post Medieval	336938.5	5711807	69884	506384	null	null	null	null	null	Study Area
MSDS_Erebus_231	Structure	Angle Brickworks	Above ground remains comprise the stump of a stone-built chimney c.5 m high and low earthworks with no clear plan indicate the site of the rest of the brickworks. Functioning in the 1870's.	Post Medieval	354420.7	5728175	null	544027	33853	null	null	null	null	Study Area
MSDS_Erebus_232	Structure	Boat Mooring Points	A number of square rock cut hollows were noted in a sloping cliff face adjacent to the medieval cemetery site.	Post Medieval	354170	5728162	null	null	99103	null	null	null	null	Consent Boundary
MSDS_Erebus_233	Structure	Brick Kiln	Brick Kiln shown on 2nd edition OS historic mapping.	Post Medieval	354299.3	5727989	null	null	15878	null	null	null	null	Study Area
MSDS_Erebus_234	Structure	Kiln	A very substantial stone-built kiln. Sub-square in plan, c. 7 m across projecting out from a bank. Opposing draw holes, the one on the east side now collapsed. The pot is open, but also partially collapsed on the east side.	Post Medieval	354336.9	5728380	null	40733	33852	null	null	null	null	Study Area
MSDS_Erebus_235	Structure	Landing Stage	Concrete and steel landing place. Concrete steps lead down the coastal slope to a concrete slip. A steel jetty appears to have existed here originally, now virtually gone. Built to have served the blockhouse fort?	Post Medieval	350761.6	5728905	null	null	34780	null	null	null	null	Study Area
MSDS_Erebus_236	Structure	Ordnance Survey Trig Point	An Ordnance Survey trig point consisting of a copper stud embedded into bedrock	Post Medieval	354308.4	5728344	null	null	117041	null	null	null	null	Consent Boundary
MSDS_Erebus_237	Structure	Sea Wall	Sea wall of several phases and various construction techniques. Stone built towards lime kiln, PRN33852. Stone and concrete at the southern end near the car park. Combination of Post Med and Modern. Parts of it now are breached and the land behind is eroding.	Post Medieval	354376	5728347	null	null	35015	null	null	null	null	Study Area
MSDS_Erebus_238	Structure	Stone Built Structure	A stone-built structure with brick additions now in dense scrub. No plan	Post Medieval	354339.7	5728394	null	null	35029	null	null	null	null	Study Area

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			can be made out, function also uncertain. Walls stand to a maximum of 2 m.											
MSDS_Erebus_239	Structure	Structure	Square structure first identified on 1864 OS map.	Post Medieval	354237.7	5728397	null	null	null	null	null	null	null	Consent Boundary
MSDS_Erebus_240	Structure	Thorn Island Battery Fort	Fort built in 1854 as part of defence system of Milford Haven	Post Medieval	351669.4	5729270	null	120252	20602	null	null	null	null	Study Area
MSDS_Erebus_241	Structure	West Pill Farm, Angle	The farmhouse at West Pill Farm probably dates from the eighteenth-century but has been much modernised	Post Medieval	354312.1	5728588	null	30402	120912	null	null	null	null	Study Area
MSDS_Erebus_242	Unknown	Unknown Object	Unknown object	Post Medieval	349946.4	5727546	null	518624	null	null	null	null	null	Study Area
MSDS_Erebus_243	Unknown	Unknown Object	Unknown object	Post Medieval	349836.4	5727619	null	518625	null	null	null	null	null	Study Area
MSDS_Erebus_244	Wreck	Guanito	Wreck of Guanito, Italian barque reported lost in 1887, bell and pocket watch recovered.	Post Medieval	353204.8	5727172	null	240751	null	null	null	null	null	Study Area
MSDS_Erebus_245	Wreck	HMS Leda (probably)	Probably the wreck of HMS Leda, British sailing vessel, sunk in 1808	Post Medieval	353961.2	5728443	12147	272589	35094	null	null	null	null	Consent Boundary
MSDS_Erebus_246	Wreck	Loch Shiel	Wreck of Loch Shiel, British sailing vessel, sunk in 1894	Post Medieval	353549	5728826	12158	null	null	null	null	null	null	Study Area
MSDS_Erebus_247	Wreck	Mayflower	Wreck of Mayflower, a brig built in 1764 and lost in 1827	Post Medieval	350306.9	5726778	null	273352	null	null	null	null	null	Study Area
MSDS_Erebus_248	Documented Loss	Arravale	Recorded loss of Arravale, a smack sunk in 1928	Modern	351747.4	5727515	null	273197	null	null	null	null	null	Study Area
MSDS_Erebus_249	Documented Loss	Camelia	Recorded loss of Camelia, a schooner built in 1873 sunk in 1907	Modern	352873.6	5728651	null	272605	null	null	null	null	null	Consent Boundary
MSDS_Erebus_250	Documented Loss	Dunnet Head	Recorded loss of Dunnet Head, a steel-hulled steamship built in 1905 sunk in 1918	Modern	351138.1	5727254	null	273154	null	null	null	null	null	Study Area
MSDS_Erebus_251	Documented Loss	Eagle	Recorded loss of Eagle, a steam trawler built in 1903 sunk in 1912	Modern	354026.4	5729519	null	273172	null	null	null	null	null	Study Area
MSDS_Erebus_252	Documented Loss	Glenfeadon	Recorded loss of Glenfeadon, a schooner built in 1863 sunk in 1917	Modern	341863.5	5715778	null	273148	null	null	null	null	null	Study Area
MSDS_Erebus_253	Documented Loss	Glyndwr	Recorded loss of Glyndwr, a schooner built in 1878 sunk in 1910	Modern	353742.8	5730951	null	272615	null	null	null	null	null	Study Area
MSDS_Erebus_254	Documented Loss	Hannah Croasdell	Recorded loss of Hannah Croasdell, a schooner built in 1866 sunk in 1917	Modern	349828.3	5727194	null	240287	null	null	null	null	null	Study Area
MSDS_Erebus_255	Documented Loss	Hawker Hurricane I V7022	Recorded loss of Hawker Hurricane I V7022, ditched into the sea a mile off St Anne's Head 1941	Modern	349202.6	5725943	null	515772	null	null	null	null	null	Study Area
MSDS_Erebus_256	Documented Loss	HMS Active III	Recorded loss of HMS Active III, a stream drifter built in 1907 sunk in 1917	Modern	351625.1	5723601	null	273167	null	null	null	null	null	Study Area
MSDS_Erebus_257	Documented Loss	HMS Evangel	Recorded loss of HMS Evangel, a steel-hulled steam trawler built in 1914 sunk in 1917	Modern	351625.1	5723601	null	273185	null	null	null	null	null	Study Area
MSDS_Erebus_258	Documented Loss	HMS Ferndale	Recorded loss of HMS Ferndale, a steam drifter built in 1910 sunk in 1915	Modern	351747.4	5727515	null	273135	null	null	null	null	null	Study Area
MSDS_Erebus_259	Documented Loss	HMS Ladysmith	Recorded loss of HMS Ladysmith, a steam drifter built in 1904 sunk in 1915	Modern	351747.4	5727515	null	273136	null	null	null	null	null	Study Area

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MSDS_Erebus_260	Documented Loss	HMS Susanna	Recorded loss of HMS Susanna, a steam drifter built in 1907 sunk in 1915	Modern	349828.3	5727194	null	273137	null	null	null	null	null	Study Area
MSDS_Erebus_261	Documented Loss	Margaret And Ann	Recorded loss of Margaret and Ann, a sloop built in 1877 sunk in 1919	Modern	349828.3	5727194	null	544384	null	null	null	null	null	Study Area
MSDS_Erebus_262	Documented Loss	Reliance	Recorded loss of Reliance, a schooner built in 1865 sunk in 1902	Modern	355153.5	5729275	null	272409	null	null	null	null	null	Study Area
MSDS_Erebus_263	Documented Loss	Roger Bushell	Recorded loss of Roger Bushell, a side-winder trawler built in 1946 sunk in 1974	Modern	341753.3	5713599	null	273266	null	null	null	null	null	Study Area
MSDS_Erebus_264	Documented Loss	Rubens	Recorded loss of Rubens, a barque built in 1870 sunk in 1903	Modern	348677.1	5726204	null	272568	null	null	null	null	null	Study Area
MSDS_Erebus_265	Documented Loss	Short Sunderland Gr V Nj267	Recorded loss of Short Sunderland Gr V Nj267 which sank in 1954. Majority was recovered.	Modern	354382.2	5729163	null	515924	null	null	null	null	null	Study Area
MSDS_Erebus_266	Documented Loss	Tally Ho!	Recorded loss of Tally Ho! steel-hulled trawler built in 1900 sunk in 1933	Modern	351747.4	5727515	null	273207	null	null	null	null	null	Study Area
MSDS_Erebus_267	Documented Loss	Unnamed wreck	Recorded loss of unnamed vessel sunk in 1941	Modern	351747.4	5727515	null	240316	null	null	null	null	null	Study Area
MSDS_Erebus_268	Documented Loss	Unnamed wreck	Recorded loss of unnamed motorboat sunk in 1940	Modern	351747.4	5727515	null	240311	null	null	null	null	null	Study Area
MSDS_Erebus_269	Documented Loss	Unnamed wreck	Recorded loss of unnamed vessel sunk 1959	Modern	355241.6	5729334	null	240259	null	null	null	null	null	Study Area
MSDS_Erebus_270	Documented Loss	Victoria	Recorded loss of Victoria, a schooner built in 1876 sunk in 1910	Modern	351625.1	5723601	null	272613	null	null	null	null	null	Study Area
MSDS_Erebus_271	Documented Loss	Violet	Recorded loss of Violet, an iron-hulled steam barge sunk in 1902	Modern	341789.4	5715201	null	274597	null	null	null	null	null	Study Area
MSDS_Erebus_272	Findspot	Find from Sunderland Flying Boat	1 x Bristol Pegasus XXII Radial Engine and three-bladed propeller from a Mark I Sunderland Flying Boat.	Modern	null	null	null	null	null	null	154/03	null	null	Unknown
MSDS_Erebus_273	Findspot	Find from unknown submarine	1 x Drawer front. 2 x Brass plates.	Modern	null	null	null	null	null	null	A/3093	null	null	Unknown
MSDS_Erebus_274	Findspot	Find from unknown submarine	1 x Rail.	Modern	null	null	null	null	null	null	A/1509	null	null	Unknown
MSDS_Erebus_275	Findspot	Find from wreck of Adamantios J Pithis	1 x Brass/bronze ship's bell, clapper & bell arm, weight approx. 30 kg, engraved 'BARON MINTO', heavily encrusted. 1 x Brass ship's log, weight approx. 1kg, inscribed 'Vickers Log Cheru-2 ship's log, Birmingham, England'.	Modern	349826.4	5727698	null	null	null	null	301/04	null	null	Study Area
MSDS_Erebus_276	Findspot	Find from wreck of Adamantios J Pithis	1 x Pipework consisting of a connecting flange and pipework, brass, and copper, approx. 4.1kg, 320 mm high, badly dented and flattened, pitting on all areas.	Modern	349826.4	5727698	null	null	null	null	055/01	null	null	Study Area
MSDS_Erebus_277	Findspot	Find from wreck of Behar	1 x 4" Steam hose coupling.	Modern	353786.7	5730741	null	null	null	null	A/0025	null	null	Study Area
MSDS_Erebus_278	Findspot	Find from wreck of Behar	1 x Part of radio equipment.	Modern	353786.7	5730741	null	null	null	null	A/0166	null	null	Study Area

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MSDS_Erebus_279	Findspot	Find from wreck of Behar	1 x Copper pipe 1700 x 20 mm diam. 1 x Copper pipe 3000 x 6.5 mm diam. 3 x Copper pipes 500 x 6.5 mm diam. 1 x Copper pipe 1000 x 5 mm Diam. 3 x Copper pipes 1000 x 3.5 mm diam. 4 x Copper pipes 1000 x 2 mm diam. Various short lengths of copper wire total weight of which is c. 1.5 cwt.	Modern	353786.7	5730741	null	null	null	null	293/08	null	null	Study Area
MSDS_Erebus_280	Findspot	Find from wreck of Dakotian	1 x Ship's telegraph & stand. 1 x 4" Bristle pipe cleaner. 1 x Ink well holder. 1 x Brass gate valve. 2 x Brass bearing. Various copper & lead pipes.	Modern	352198.6	5730268	null	null	null	null	A/0019	null	null	Study Area
MSDS_Erebus_281	Findspot	Find from wreck of Dakotian	1 x Ship's 8" ventilator cowl. 1 x Wenoka diver's knife, 12", orange grip.	Modern	352198.6	5730268	null	null	null	null	A/3185	null	null	Study Area
MSDS_Erebus_282	Findspot	Find from wreck of Dakotian	1 x Brown bottle (glass) - marked Truman and Co Ltd. London and Burton.	Modern	352198.6	5730268	null	null	null	null	A/1771	null	null	Study Area
MSDS_Erebus_283	Findspot	Find from wreck of Dakotian	1 x Brass valve - flange bolts corroded, handle broken.	Modern	352198.6	5730268	null	null	null	null	163/01	null	null	Study Area
MSDS_Erebus_284	Findspot	Find from wreck of Dakotian	Numerous lengths of copper wire, 2.22 cwt.	Modern	352198.6	5730268	null	null	null	null	291/08	null	null	Study Area
MSDS_Erebus_285	Findspot	Find from wreck of Dakotian	1 x Silver plated 2 handled sugar bowl.	Modern	352198.6	5730268	null	null	null	null	A/1877	null	null	Study Area
MSDS_Erebus_286	Findspot	Find from wreck of HMS Caroline	1 x Control box.	Modern	351423.1	5728562	null	null	null	null	A/1388	null	null	Study Area
MSDS_Erebus_287	Findspot	Find from wreck of HMS Caroline	1 x Control panel. 1 x Adjuster. 1 x Gun handle. 1 x Porthole. 1 x Shellcase.	Modern	351423.1	5728562	null	null	null	null	A/4264	null	null	Study Area
MSDS_Erebus_288	Findspot	Find from wreck of HMSM E39	1 x Handwheel, brass. 1 x Water and oil tank status board, brass. 1 x Rating plate, electronic motor brass. 1 x Vickers Ltd electric motor plate, triangular, brass.	Modern	350973.9	5728809	null	null	null	null	348/18	null	null	Study Area
MSDS_Erebus_289	Findspot	Find from wreck of Matronna	1 x Brass letter 'A'.	Modern	352950.4	5730050	null	null	null	null	A/0027	null	null	Study Area
MSDS_Erebus_290	Findspot	Find from wreck of PLM 21	1 x Porthole. 1 x Cherub log.	Modern	354347.3	5729885	null	null	null	null	A/2927	null	null	Study Area
MSDS_Erebus_291	Findspot	Find from wreck of Thor	1 x Small porthole.	Modern	351669.4	5729270	null	null	null	null	469/00	null	null	Study Area
MSDS_Erebus_292	Findspot	Find from wreck of Thor	1 x Porthole.	Modern	351669.4	5729270	null	null	null	null	A/2928	null	null	Study Area
MSDS_Erebus_293	Findspot	Gun	Location of gun, mid-19th Century gun from one of the Haven forts. Now positioned in West Angle Beach car park.	Modern	354389.4	5728275	null	null	35014	null	null	null	null	Study Area
MSDS_Erebus_294	Findspot	Ordinance	Three 2inch shells, one 6inch brass shell, and three steel bars measuring 48inches in length recovered in the vicinity of St Annes' Head	Modern	349828.3	5727194	null	240732	null	null	RCIM6/2/5	null	null	Study Area

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MSDS_Erebus_295	Lifeboat Station	Lifeboat Station	Lifeboat station built in 1927 to replace the original built in 1869	Modern	356284.7	5728583	null	419978	null	null	null	null	null	Study Area
MSDS_Erebus_296	Lifeboat Station	Lifeboat Station	Angle Lifeboat Station built in 1992 replacing previous stations build in 1869 and 1927	Modern	356285.3	5728541	null	405198	null	null	null	null	null	Study Area
MSDS_Erebus_297	Military Feature	Defence Line	Defence line along perimeter of military camp, consisting of three parallel lines of fox holes clearly seen on AP's. Now only the southwestern section visible. Each hole approximately 2 m in diameter and 1 m deep.	Modern	353703.6	5727975	null	null	32647	null	null	null	null	Study Area
MSDS_Erebus_298	Military Feature	Field Boundary	Removed hedge depicted on the annotated 1916 map of Pembrokeshire defences.	Modern	353660	5727876	null	null	107743	null	null	null	null	Study Area
MSDS_Erebus_299	Military Feature	Infantry post	Infantry post depicted on the annotated 1916 map of Pembrokeshire defences.	Modern	353694	5727948	null	null	107742	null	null	null	null	Study Area
MSDS_Erebus_300	Military Feature	Milford Haven Defences	Milford Haven Defences related to WW1	Modern	349065.6	5724993	null	124077	null	null	null	null	null	Study Area
MSDS_Erebus_301	Military Feature	Minefield	One of 16 small detonation craters along the south perimeter of the battery	Modern	353753.3	5727996	null	270723	null	null	null	null	null	Study Area
MSDS_Erebus_302	Military Feature	Naval Range	A maritime naval range in use in 1945	Modern	352023.2	5728032	null	null	111336	null	null	null	null	Study Area
MSDS_Erebus_303	Military Feature	Searchlight Battery	Searchlight battery identified on the cliff face.	Modern	349897	5727793	null	null	35088	null	null	null	null	Study Area
MSDS_Erebus_304	Military Feature	Slipway	Possible slipway likely related to WW2 military activity in the area. First shown on 1946 aerial photo, does not appear in 1950 aerial photo.	Modern	354146.4	5728346	null	null	null	null	null	null	null	Consent Boundary
MSDS_Erebus_305	Seascape	Spoil Ground	Spoil Ground, Off The Row's Rocks, Milford Haven	Modern	350472.2	5725800	null	544195	null	null	null	null	null	Study Area
MSDS_Erebus_306	Structure	Beacon Light	Single beacon light on the cliff below West Block House Fort. Set up by Trinity House engineers in 1957.	Modern	350816.9	5728516	null	308197	null	null	null	null	null	Study Area
MSDS_Erebus_307	Structure	Concrete Post	Concrete post base within the section of the eastern edge of the quarry	Modern	354228.4	5728401	null	null	null	null	null	null	null	Consent Boundary
MSDS_Erebus_308	Structure	Landing Stage	Landing Stage/Jetty, now derelict. Inclined concrete boat landing stage built into side of cliff, reached by flight of concrete steps	Modern	350818.2	5728863	null	null	28738	null	null	null	null	Study Area
MSDS_Erebus_309	Structure	Possible Crane Base	Possible concrete crane base identified on the cliff above harbour entrance with iron fixings, accessed by concrete pathway. This structure was first identified on an OS map of the area from 1908.	Modern	354189.7	5728402	null	null	null	null	null	null	null	Consent Boundary
MSDS_Erebus_310	Structure	Pumping Station	Pumping station first identified on 1972 OS map.	Modern	354382.6	5728188	null	null	null	null	null	null	null	Study Area

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MSDS_Erebus_311	Structure	Slipway	Small modern concrete slip leading into the harbour, PRN 35017 from the eastern quarry, PRN 35016.	Modern	354187.4	5728422	null	null	35018	null	null	null	null	Consent Boundary
MSDS_Erebus_312	Structure	Structure	Structure possibly associated with car park or pumping station first identified on 1972 OS map.	Modern	354410.1	5728223	null	null	null	null	null	null	null	Study Area
MSDS_Erebus_313	Structure	Structure	Rectangular structure first identified on 1937 OS map.	Modern	354243.5	5728415	null	null	null	null	null	null	null	Consent Boundary
MSDS_Erebus_314	Wreck	Adamantios	Wreck of Adamantios J Pithis, Greek steamship, sunk in 1940	Modern	349826.4	5727698	11992	273218	null	null	null	null	null	Study Area
MSDS_Erebus_315	Wreck	Antonio	Wreck of Antonio, British steamship, sunk in 1945	Modern	349349.7	5720602	11959	273252	null	null	null	null	null	Study Area
MSDS_Erebus_316	Wreck	Behar	Wreck of Behar, British steamship, sunk in 1940	Modern	353786.7	5730741	12037	273239	null	null	null	null	null	Study Area
MSDS_Erebus_317	Wreck	Clapham	Wreck of Clapham, British steamship, sunk in 1943. Considered dead by UKHO	Modern	347635.5	5721303	11962	273233	null	null	null	null	null	Study Area
MSDS_Erebus_318	Wreck	Dakotian	Wreck of Dakotian, British liner, sunk in 1940	Modern	352198.6	5730268	12031	273217	null	null	null	null	null	Study Area
MSDS_Erebus_319	Wreck	Eminent (Probably)	Probably the wreck of Eminent, Belgian motor vessel sunk in 1941	Modern	322609	5707847	11909	null	null	null	null	null	null	Study Area
MSDS_Erebus_320	Wreck	Faith	Wreck of Faith, British sailing vessel, sunk in 1916. Considered dead by UKHO	Modern	349844.2	5727637	11990	273180	102466	null	null	null	null	Study Area
MSDS_Erebus_321	Wreck	Four Winds	Wreck of Four Winds, fishing vessel, sunk in 1974	Modern	351298.1	5728057	11998	null	null	null	null	null	null	Study Area
MSDS_Erebus_322	Wreck	Helene	Wreck of Helene, Belgian trawler, sunk in 1940	Modern	351875.3	5728101	11999	273240	null	null	null	null	null	Study Area
MSDS_Erebus_323	Wreck	HM MGB 12	Wreck of HM MGB 12, British gunboat, sunk in 1941. Considered dead by UKHO	Modern	352718.5	5729315	12017	273241	null	null	null	null	null	Study Area
MSDS_Erebus_324	Wreck	HMS Caroline	Aft part of wreck of HMS Caroline, British trawler, sunk in 1941	Modern	351423.1	5728562	12005	273248	null	null	null	null	null	Study Area
MSDS_Erebus_325	Wreck	HMS Caroline	Wreck of HMS Caroline, British trawler, sunk in 1941. Considered dead by UKHO	Modern	352004.1	5729210	12014	506385	null	null	null	null	null	Study Area
MSDS_Erebus_326	Wreck	HMS Examination Vessel No. 10	Wreck of HMS Examination Vessel no.10, British steamship, sunk in 1941. Also known as HMS Pilot Vessel No. 10	Modern	351934.2	5730079	12027	240886	null	null	null	null	null	Study Area
MSDS_Erebus_327	Wreck	HMS Minicoy	Wreck of HMS Minicoy, British launch, sunk in 1941. Alternative position supplied by UKHO considered dead (11989)	Modern	351648.3	5727598	11991	273549	null	null	null	null	null	Study Area
MSDS_Erebus_328	Wreck	HMSM E39	Wreck of HMSM E39, British submarine, sunk in 1922	Modern	350973.9	5728809	12008	273405	null	null	null	null	null	Study Area
MSDS_Erebus_329	Wreck	LCG-16	Wreck of LCG-16, British landing craft, sunk in 1943	Modern	348938.1	5726273	12183	240005	null	null	null	null	null	Study Area
MSDS_Erebus_330	Wreck	Lord Derby	Wreck of Lord Derby, British steamship, sunk in 1917	Modern	345141.1	5715259	11935	273163	null	null	null	null	null	Study Area
MSDS_Erebus_331	Wreck	Lord Derby (probably)	Probably the wreck of Lord Derby, British steamship, sunk in 1917	Modern	342023.1	5712078	11926	273163	null	null	null	null	null	Study Area
MSDS_Erebus_332	Wreck	Matronna	Wreck of Matronna, Greek steam ship, sunk in 1941	Modern	352950.4	5730050	12026	273406	null	null	null	null	null	Study Area

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MSDS_Erebus_333	Wreck	Olive Branch	Wreck of Olive Branch, British sailing vessel, sunk in 1925	Modern	352041.6	5729829	12022	273201	null	null	null	null	null	Study Area
MSDS_Erebus_334	Wreck	Pauline Elizabeth	Wreck of Pauline Elizabeth, barge, sunk in 1957	Modern	353815.9	5728757	12009	240260	null	null	null	null	null	Study Area
MSDS_Erebus_335	Wreck	PLM 21	Wreck of PLM 21, French steamship sunk in 1944	Modern	354347.3	5729885	12024	273245	null	null	null	null	null	Study Area
MSDS_Erebus_336	Wreck	PLM 21 (possibly)	Possibly the wreck of PLM 21. Considered dead by UKHO	Modern	355244.7	5729333	12019	null	null	null	null	null	null	Study Area
MSDS_Erebus_337	Wreck	Renfrew (possibly)	Possibly the wreck of Renfrew, British steamship, sunk in 1918. Two areas of wreckage reported 100 m apart	Modern	338268.2	5709844	11919	506390	null	null	null	null	null	Study Area
MSDS_Erebus_338	Wreck	St Jacques	Wreck of St Jacques, French steamship, sunk in 1917. Considered dead by UKHO.	Modern	350091.3	5726238	11984	null	102467	null	null	null	null	Study Area
MSDS_Erebus_339	Wreck	Thor	Wreck of Thor, Dutch motor vessel, sunk in 1943	Modern	351669.4	5729270	12016	273244	102470	null	null	null	null	Study Area
MSDS_Erebus_340	Wreck	Unknown Wreck	Wreck of unknown British launch sunk in 1941	Modern	352193.5	5727135	11989	null	null	null	null	null	null	Study Area
MSDS_Erebus_341	Wreck	Unknown Wreck	Wreck of unknown barge first identified in 1941	Modern	351223.8	5724726	11972	240879	null	null	null	null	null	Study Area
MSDS_Erebus_342	Wreck	Unknown Wreck	Wreck of unknown landing craft, sunk in 1951	Modern	355686.4	5729055	12013	240258	null	null	null	null	null	Study Area
MSDS_Erebus_343	Wreck	Wileysike	Wreck of Wileysike, British steamship, sunk in 1918	Modern	342730	5717850	11946	240300	null	null	null	null	null	Study Area
MSDS_Erebus_344	Channel	Channel	Rock cut channel between bay and small natural harbour in the northern part of the bay. Apparent in drone footage but also marked clearly in 1864 OS map.	Unknown	354178.6	5728406	null	null	null	null	null	null	null	Consent Boundary
MSDS_Erebus_345	Ditch	Ditch	A possible ditch seen eroding from the cliff to the west of the West Angle Bay cemetery site.	Unknown	354095.8	5728174	null	null	99102	null	null	null	null	Consent Boundary
MSDS_Erebus_346	Feature	Charcoal Horizon	Eroding charcoal horizon in section at the eastern edge of the beach	Unknown	354392.4	5728332	null	null	null	null	null	null	null	Study Area
MSDS_Erebus_347	Findspot	Find from unknown iron hulled barque	1 x Brass fairlead approx. 12" in length.	Unknown	null	null	null	null	null	null	100/01	null	null	Unknown
MSDS_Erebus_348	Findspot	Find from unknown wreck	5 x 2" Brown wood planks, approx. 13' long, 3 x 5" Square posts, approx. 5' long.	Unknown	null	null	null	null	null	null	631/00	null	null	Unknown
MSDS_Erebus_349	Findspot	Find from unknown wreck	1 x Metallic dagger shaped object, rusty and encrusted. Weight is 1074g, approx. 370 mm long x 50 mm at its widest point tapering to tip.	Unknown	null	null	null	null	null	null	141/13	null	null	Unknown
MSDS_Erebus_350	Findspot	Find from unknown wreck	1 x Brass (pump?). Approx. 14-1/2-inch diameter x 24 inches. Weight approx. 50kgs. No visible markings.	Unknown	null	null	null	null	null	null	116/18	null	null	Unknown
MSDS_Erebus_351	Findspot	Find from unknown wreck	1 x Aluminium lighting unit. Approx. 20" x 10" x 6". Weight approx. 10 kgs. No visible marks/dates etc.	Unknown	null	null	null	null	null	null	117/18	null	null	Unknown
MSDS_Erebus_352	Findspot	Find from unknown wreck	1 x Large Trotman anchor.	Unknown	null	null	null	null	null	null	062/19	null	null	Unknown

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MSDS_Erebus_353	Findspot	Find from unknown wreck	1 x Copper nail 18cms long, 0.8cms square at head tapering to 0.4cms at point ending in flat rounded end. Brown patina with what looks like tar deposits, weight 10g.	Unknown	null	null	null	null	null	null	004/20	null	null	Unknown
MSDS_Erebus_354	Findspot	Find from unknown wreck	1 x Danforth Anchor 15kg, 1 x CQR (?) Anchor 20kg, 5 m x 3/8 Galvanised chain.	Unknown	null	null	null	null	null	null	324/14	null	null	Unknown
MSDS_Erebus_355	Findspot	Find from unknown wreck	1 x 40' length steel pipe 10' diameter covered in insulation.	Unknown	null	null	null	null	null	null	b071/93/94	null	null	Unknown
MSDS_Erebus_356	Findspot	Find from unknown wreck	9 x Metal items from unknown wreck.	Unknown	null	null	null	null	null	null	171/99	null	null	Unknown
MSDS_Erebus_357	Findspot	Find from unknown wreck	6 x Hardwood planks - some weathering.	Unknown	null	null	null	null	null	null	627/00	null	null	Unknown
MSDS_Erebus_358	Findspot	Find from unknown wreck	1 x Timber steering wheel boss with brass bands and centre cap.	Unknown	null	null	null	null	null	null	121/01	null	null	Unknown
MSDS_Erebus_359	Findspot	Find from unknown wreck	Brass stand 1 m high, 3-Legged compass binnacle mass 25kg.	Unknown	null	null	null	null	null	null	136/02	null	null	Unknown
MSDS_Erebus_360	Findspot	Find from unknown wreck	1 x Mounting board, felted with 8 parts of a 19th century musket attached and 8 captions.	Unknown	null	null	null	null	null	null	A/4602	null	null	Unknown
MSDS_Erebus_361	Findspot	Find from unknown wreck	2 Bottles of beer, one full, the other half empty- both still corked.	Unknown	null	null	null	null	null	null	131/99	null	null	Unknown
MSDS_Erebus_362	Findspot	Find from unknown wreck	1 x Brass porthole.	Unknown	null	null	null	null	null	null	A/2135	null	null	Unknown
MSDS_Erebus_363	Findspot	Find from unknown wreck	1 x Bronze Prop. On shaft end, 2-3 cm.	Unknown	null	null	null	null	null	null	171/01	null	null	Unknown
MSDS_Erebus_364	Findspot	Find from unknown wreck	30 X ASS: Aluminium fragments totalling 11/2cwt.	Unknown	null	null	null	null	null	null	b069/93/94	null	null	Unknown
MSDS_Erebus_365	Findspot	Find from unknown wreck	1 x Ship's steam whistle.	Unknown	null	null	null	null	null	null	A/2145	null	null	Unknown
MSDS_Erebus_366	Findspot	Find from unknown wreck	1 x Brass 'course corrector'. 1 x Porthole & glass.	Unknown	null	null	null	null	null	null	152/01	null	null	Unknown
MSDS_Erebus_367	Findspot	Find from unknown wreck	1 x Brass boat hook.	Unknown	null	null	null	null	null	null	A/0894	null	null	Unknown
MSDS_Erebus_368	Findspot	Find from unknown wreck	1 x Bronze tool / spanner, 1 x Brass water gauge.	Unknown	null	null	null	null	null	null	187/99	null	null	Unknown
MSDS_Erebus_369	Findspot	Find from unknown wreck	1 x Brass window frame. 1 x Rudder pintle.	Unknown	null	null	null	null	null	null	A/1245	null	null	Unknown
MSDS_Erebus_370	Findspot	Find from wreck of Barbara	1 x Silver pocket watch. Inscribed 'Richard Prichard 1866 Abersoch North Wales'.	Unknown	null	null	null	null	null	null	039/03	null	null	Unknown
MSDS_Erebus_371	Findspot	Find from wreck of The Black Pig of Milford Haven	c 40' Fisher & gear.	Unknown	null	null	null	null	null	null	198/99	null	null	Unknown
MSDS_Erebus_372	Findspot	Natural stone	natural object	Unknown	351010	5729018	null	null	null	null	null	null	219892	Study Area
MSDS_Erebus_373	Historic Landscape Area	Angle	An historic landscape area featuring archaeological elements ranging from prehistory to the modern period.	Unknown	null	null	null	null	null	null	null	null	null	Unknown

MSDS ID	Type	Name	Description	Period	X	Y	UKHO ID	NPRN	PRN	Cadw ID	ROW ID	PAS ID	NMRW ID	Location
MSDS_Erebus_374	Historic Landscape Area	Dale to St Brides Coastal Strip	An historic landscape area featuring archaeological elements ranging from prehistory to the modern period.	Unknown	null	null	null	null	null	null	null	null	null	Unknown
MSDS_Erebus_375	Historic Landscape Area	Monk Haven to Gelliswick Coastal Strip	An historic landscape area featuring archaeological elements ranging from prehistory to the modern period.	Unknown	null	null	null	null	null	null	null	null	null	Unknown
MSDS_Erebus_376	Historic Landscape Area	Rhoscrowther	An historic landscape area featuring archaeological elements ranging from prehistory to the modern period.	Unknown	null	null	null	null	null	null	null	null	null	Unknown
MSDS_Erebus_377	Historic Landscape Area	St Ann's Head	An historic landscape area featuring archaeological elements ranging from prehistory to the modern period.	Unknown	null	null	null	null	null	null	null	null	null	Unknown
MSDS_Erebus_378	Historic Landscape Area	West Angle to Freshwater West Coastal Strip	An historic landscape area featuring archaeological elements ranging from prehistory to the modern period.	Unknown	null	null	null	null	null	null	null	null	null	Unknown
MSDS_Erebus_379	Named Location	Entrance Milford Haven	Entrance Milford Haven Maritime Named Location	Unknown	351747.4	5727515	null	506397	null	null	null	null	null	Study Area
MSDS_Erebus_380	Named Location	Off Milford Haven	Off Milford Haven Maritime Named Location	Unknown	351625.1	5723601	null	506396	null	null	null	null	null	Study Area
MSDS_Erebus_381	Seabed Feature	Anchor	Anchor	Unknown	354542.4	5729145	64520	null	null	null	null	null	null	Study Area
MSDS_Erebus_382	Seabed Feature	Anomaly	Seabed Anomaly (Man Made Origin)	Unknown	340287.2	5711427	null	525237	null	null	null	null	null	Study Area
MSDS_Erebus_383	Seabed Feature	Boilers and pieces of plate	Boilers and pieces of plate on the seabed	Unknown	350077	5727723	11993	506395	null	null	null	null	null	Study Area
MSDS_Erebus_384	Seabed Feature	Foul Ground	Foul ground	Unknown	340684.9	5710932	82280	null	null	null	null	null	null	Study Area
MSDS_Erebus_385	Seabed Feature	Linear feature	Linear feature	Unknown	353993	5729696	81369	null	null	null	null	null	null	Study Area
MSDS_Erebus_386	Seabed Feature	Linear Feature	Linear feature	Unknown	352103.6	5728877	81370	null	null	null	null	null	null	Study Area
MSDS_Erebus_387	Seabed Feature	Linear Feature	Linear feature	Unknown	352076.8	5728867	81371	null	null	null	null	null	null	Study Area
MSDS_Erebus_388	Seabed Feature	Obstruction	Obstruction	Unknown	340144.4	5711704	11928	506389	null	null	null	null	null	Study Area
MSDS_Erebus_389	Seabed Feature	Probable large rock	Probable large rock	Unknown	349372	5725759	67028	null	null	null	null	null	null	Study Area
MSDS_Erebus_390	Seabed Feature	Unknown Object	Unknown contact. Considered dead by UKHO	Unknown	341919.9	5712020	11925	null	null	null	null	null	null	Study Area
MSDS_Erebus_391	Seascape	Chapel Rocks, Entrance Milford Haven	A cluster of rocky pinnacles with water depths over of 2 1/2 fathoms to 5 fathoms are indicated on an historic chart	Unknown	352114.1	5727530	null	518596	null	null	null	null	null	Study Area
MSDS_Erebus_392	Seascape	Eastern Entrance to Milford Haven	Eastern Entrance to Milford Haven recorded in 1884	Unknown	351979.4	5726998	null	544031	null	null	null	null	null	Study Area
MSDS_Erebus_393	Seascape	Harbour Rock, Entrance Milford Haven	The Harbour Rock is shown with 1 fathom water depth clearance on an historic chart.	Unknown	353101.2	5728891	null	515102	null	null	null	null	null	Consent Boundary

MSDS ID	Type	Name	Description	Period	X	Y	UKHO ID	NPRN	PRN	Cadw ID	ROW ID	PAS ID	NMRW ID	Location
MSDS_Erebus_394	Seascape	Passage Between Thorn Island and Harbour Rock, Milford Haven	Admiralty Sailing Directions dating to 1884 note 'a passage a cable broad of from 3 3/4 to 5 fathoms'.	Unknown	353268.3	5728882	null	544029	null	null	null	null	null	Consent Boundary
MSDS_Erebus_395	Seascape	Porgus Bank	Shoals marked in 1748 map	Unknown	347065.1	5721558	null	525638	null	null	null	null	null	Study Area
MSDS_Erebus_396	Seascape	Rocks Off St Anns Head	The areas of shoals extending southwest from St Ann's head is shown on an historic chart.	Unknown	349283	5727222	null	518606	null	null	null	null	null	Study Area
MSDS_Erebus_397	Seascape	Sheep Rock	An isolated pinnacle is shown (with a water depth over of 3 1/2 fathoms) some 750 m to the west of Sheep Island on an historic chart.	Unknown	352424.9	5726224	null	518599	null	null	null	null	null	Study Area
MSDS_Erebus_398	Seascape	Shoal, Off Rat Island	A submerged rock with 1.5 to 2 fathom clearance is shown on an historic chart.	Unknown	352823.1	5727520	null	515103	null	null	null	null	null	Study Area
MSDS_Erebus_399	Seascape	The Row's Rocks	Submerged rocky pinnacles in Milford Haven	Unknown	351172	5726679	null	518595	null	null	null	null	null	Study Area
MSDS_Erebus_400	Seascape	Western Entrance to Milford Haven	Entrance To Milford Haven recorded in 1884	Unknown	350834.3	5727611	null	544030	null	null	null	null	null	Study Area
MSDS_Erebus_401	Structure	Pathway	Pathway on cliffs identified in drone footage and walkover survey. Possibly associated with potential structure on cliff edge.	Unknown	354202.7	5728399	null	null	null	null	null	null	null	Consent Boundary
MSDS_Erebus_402	Structure	Slipway	Concrete slipway associated with Chapel Bay Fort. Access is by a long flight of concrete steps down to the foreshore.	Unknown	355111.4	5728700	null	null	35024	null	null	null	null	Study Area
MSDS_Erebus_403	Unknown	Unknown	Possible feature of unknown origin	Unknown	339418.9	5712556	null	506389	null	null	null	null	null	Consent Boundary
MSDS_Erebus_404	Wreck	Unknown Wreck	A scuppered hulk against the rocks at the base of Thorn Island Fort. The hulk has apparently been filled with concrete.	Unknown	353714.1	5728890	12011	240884	35028	null	null	null	null	Study Area
MSDS_Erebus_405	Wreck	Unknown Wreck	Wreck of unknown vessel in two pieces	Unknown	322803.4	5702184	11902	516032	null	null	null	null	null	Study Area
MSDS_Erebus_406	Wreck	Unknown Wreck	Wreck of unknown vessel, considered dead by UKHO	Unknown	319109.2	5708822	11911	null	null	null	null	null	null	Study Area
MSDS_Erebus_407	Wreck	Unknown Wreck	Wreck of unknown vessel, considered dead by UKHO	Unknown	315162.7	5709057	11912	null	null	null	null	null	null	Study Area
MSDS_Erebus_408	Wreck	Wreck debris	Debris potentially related to nearby wreck	Unknown	322869.1	5702131	11912	516032	null	null	null	null	null	Study Area

11.0 Appendix 2: Grids and Isopaches

11.0.1 This appendix contains the grids and isopaches referred to in OWC (2021a) and GEOxyz (2021)

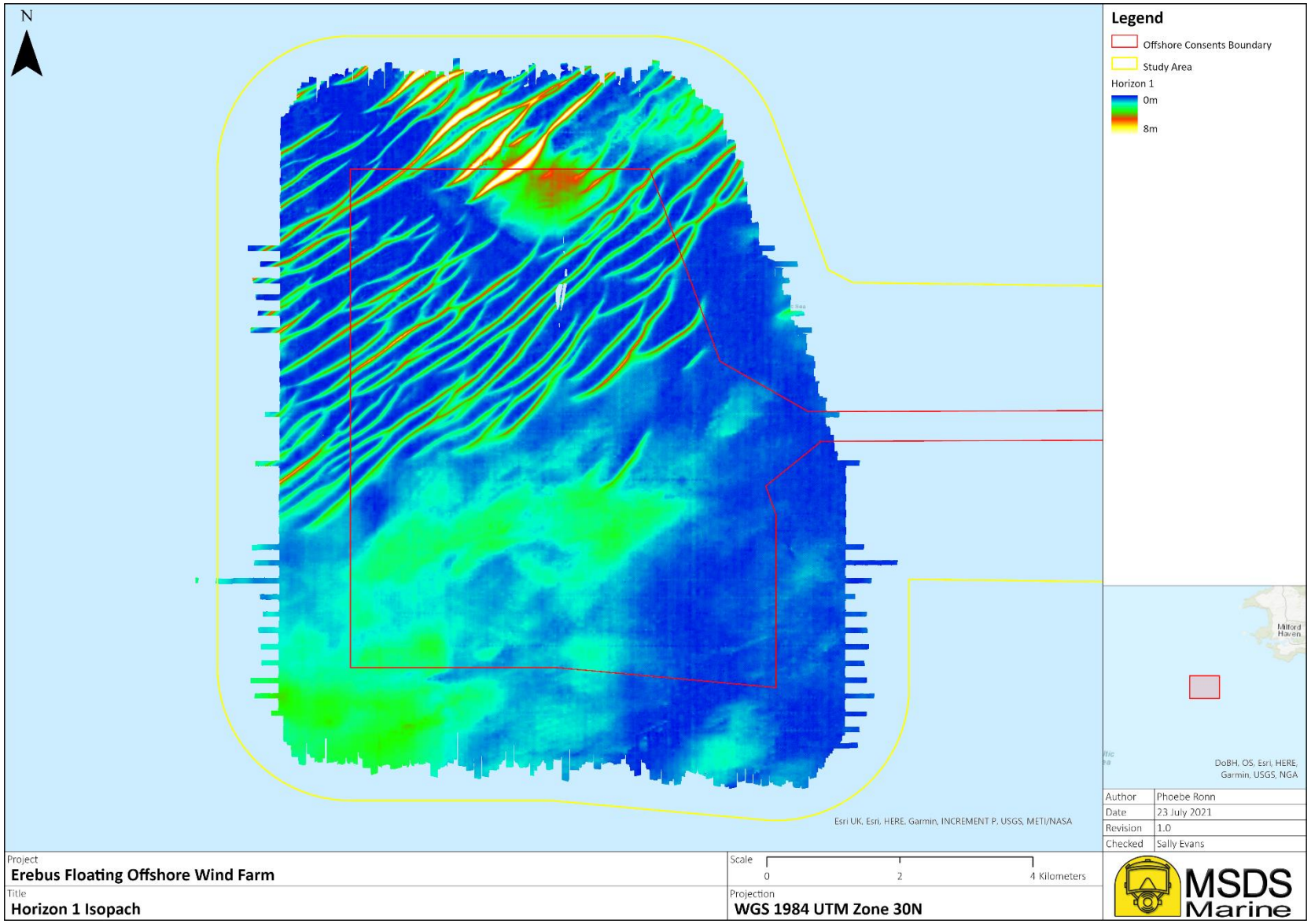

Figure 26: Horizon 1 Isopach

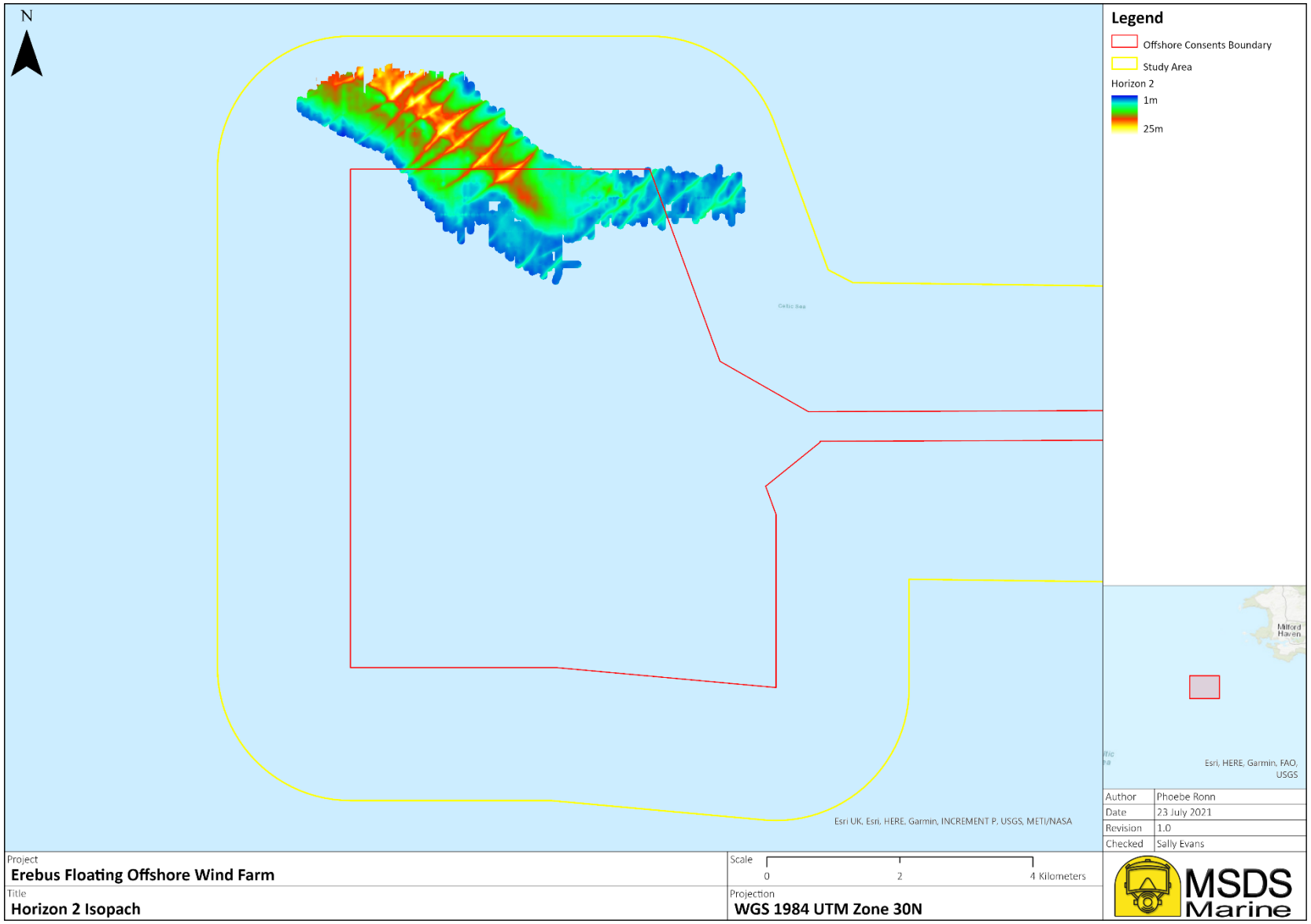

Figure 27: Horizon 2 Isopach

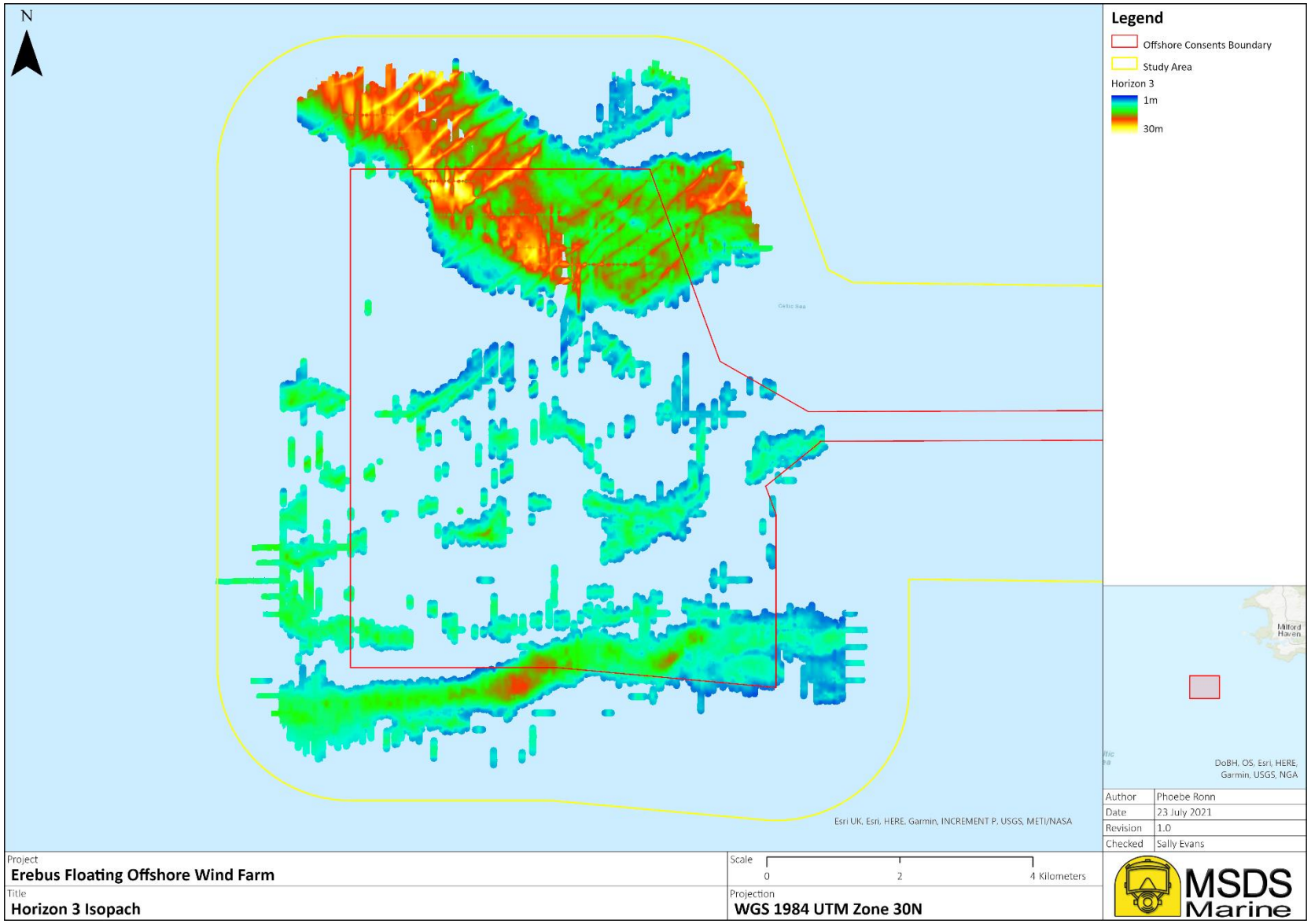

Figure 28: Horizon 3 Isopach

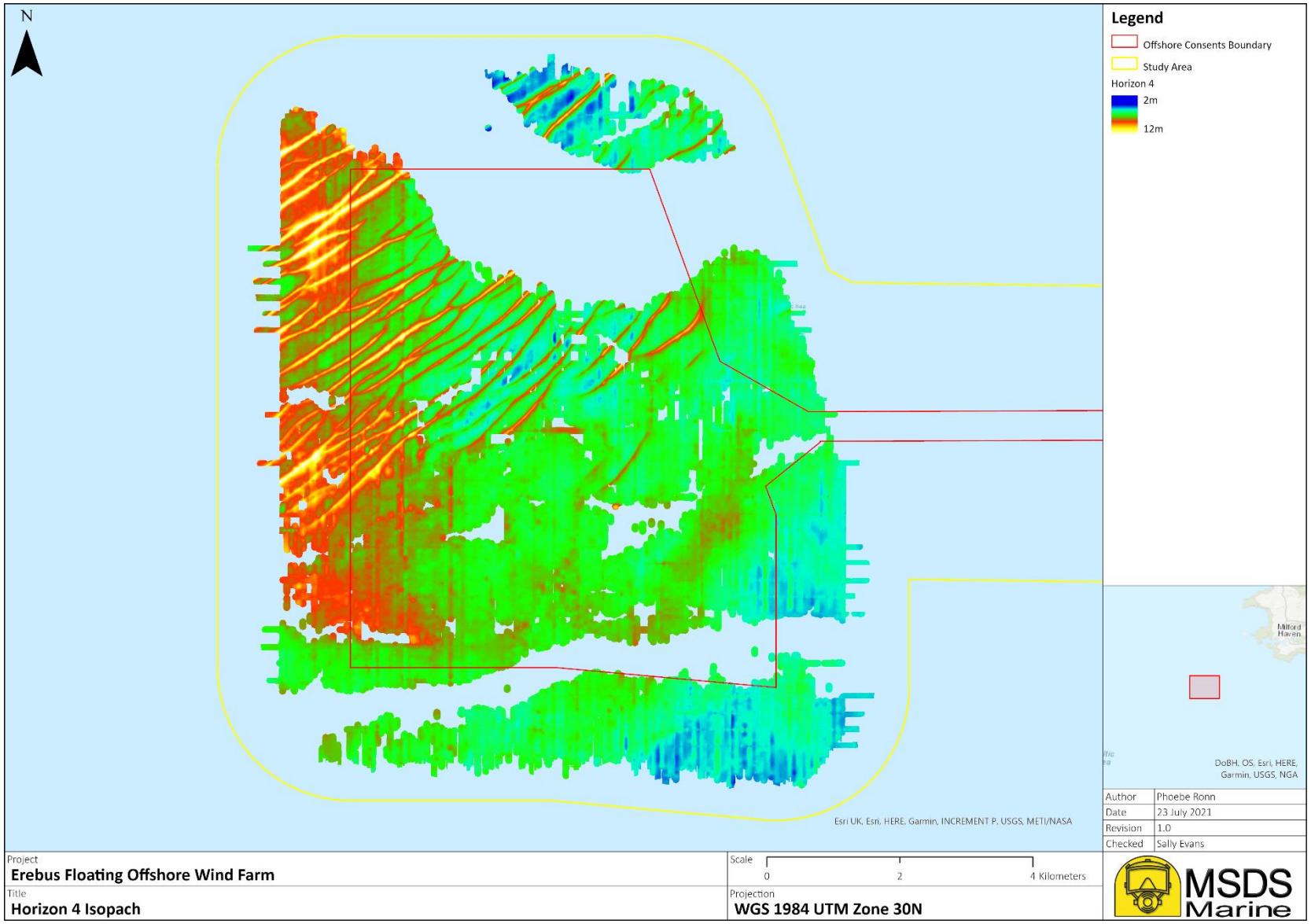

Figure 29: Horizon 4 Isopach

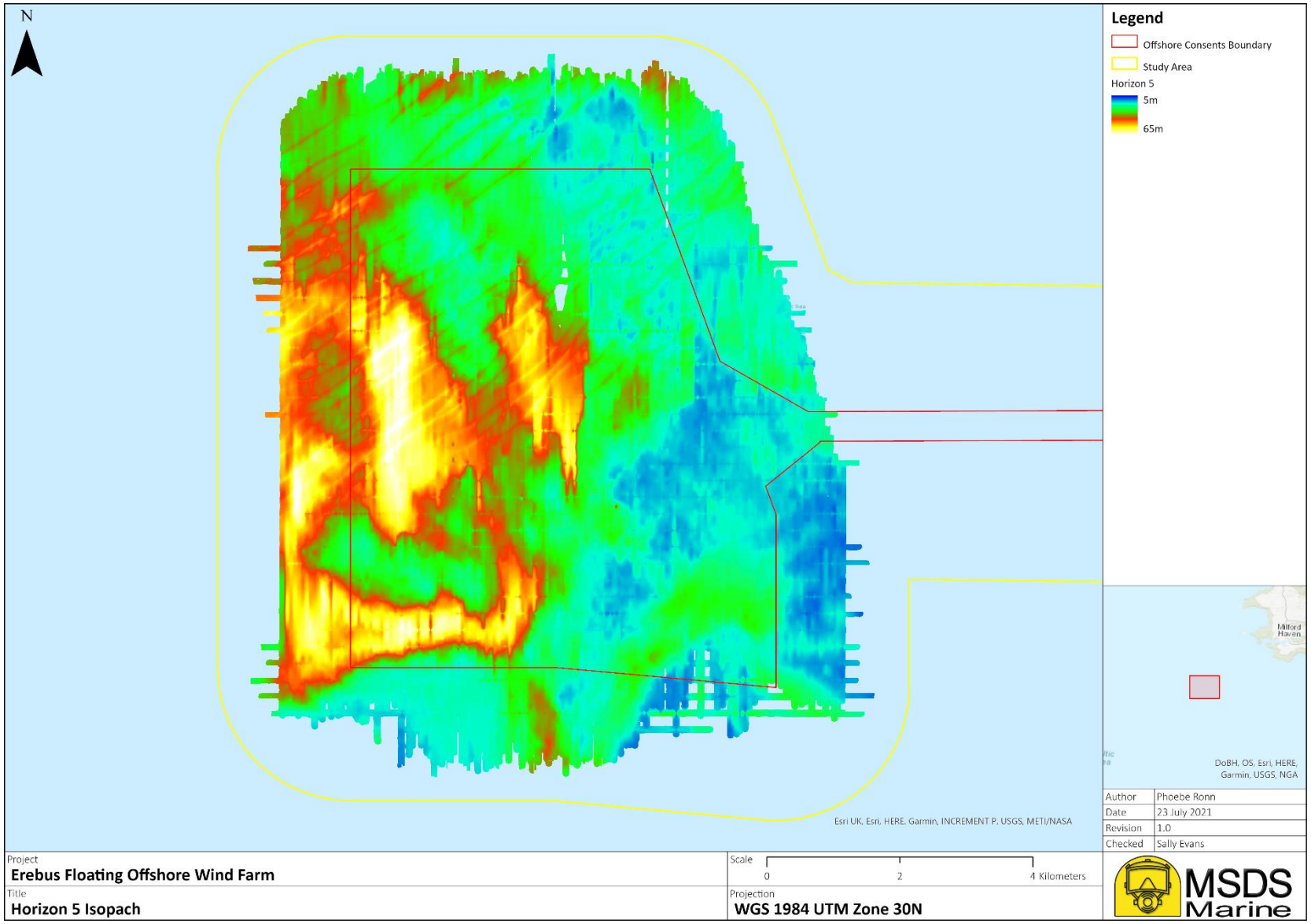

Figure 30: Horizon 5 Isopach

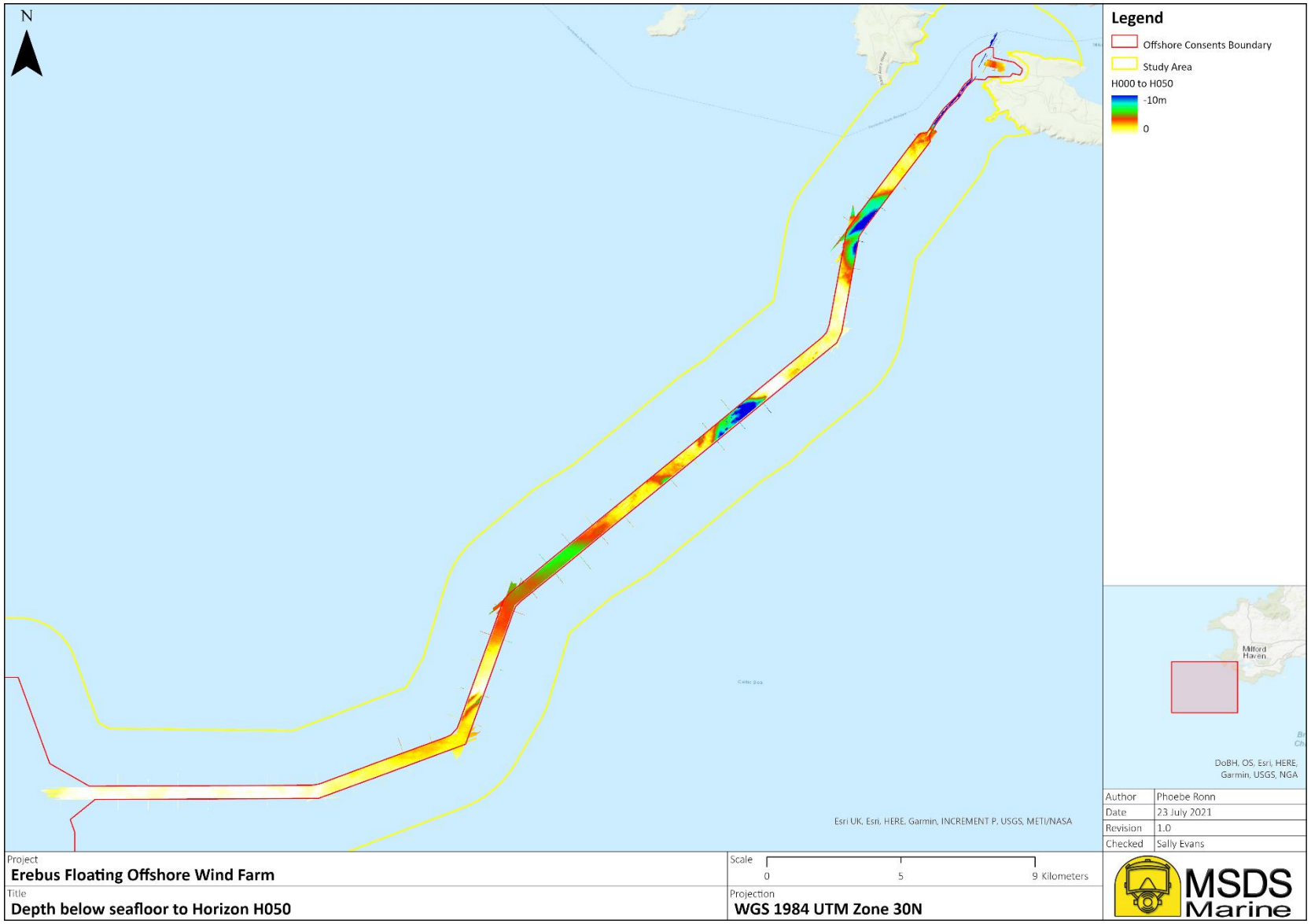

Figure 31: Depth below seafloor to Horizon H050

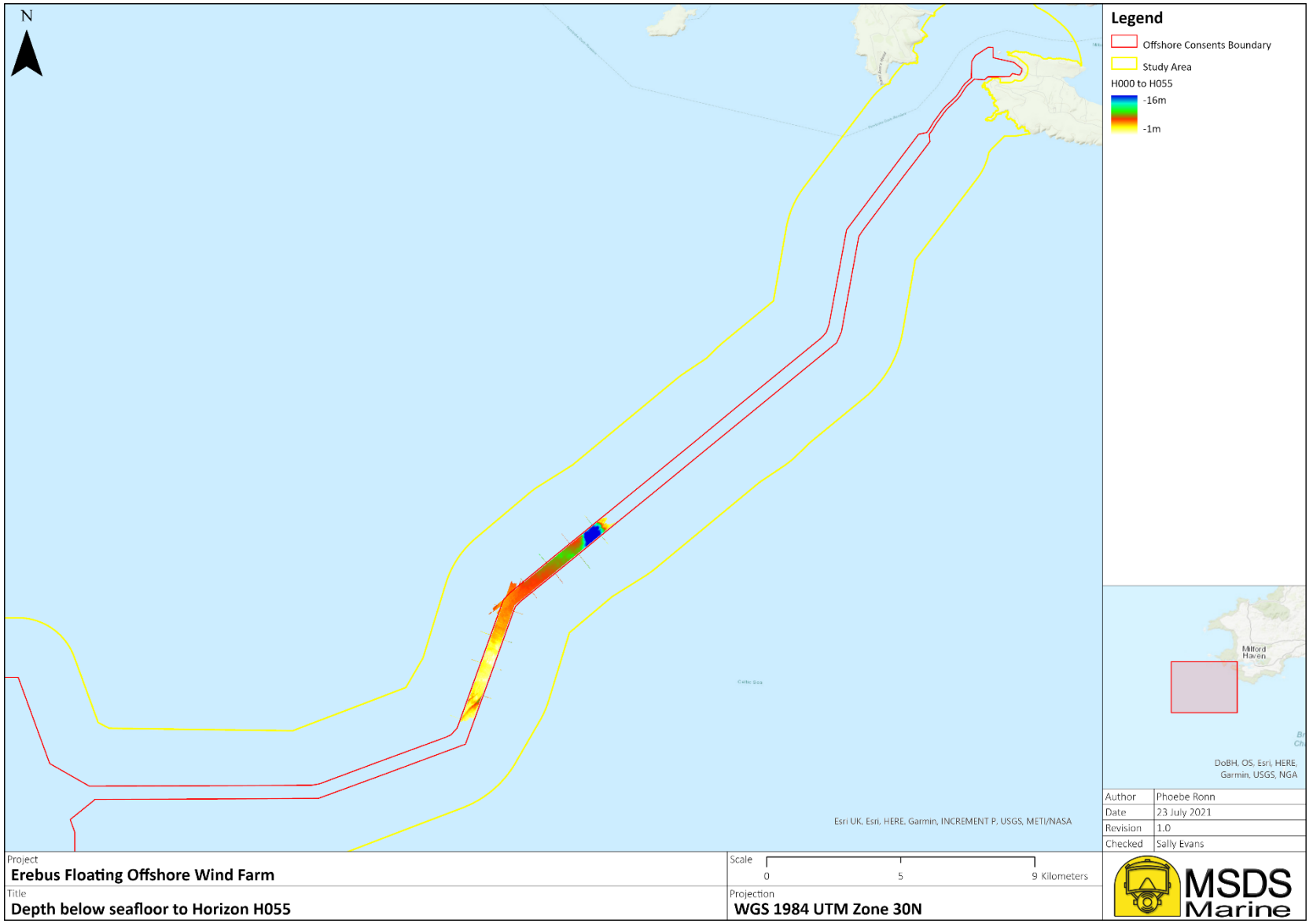

Figure 32: Depth below seafloor to Horizon H055

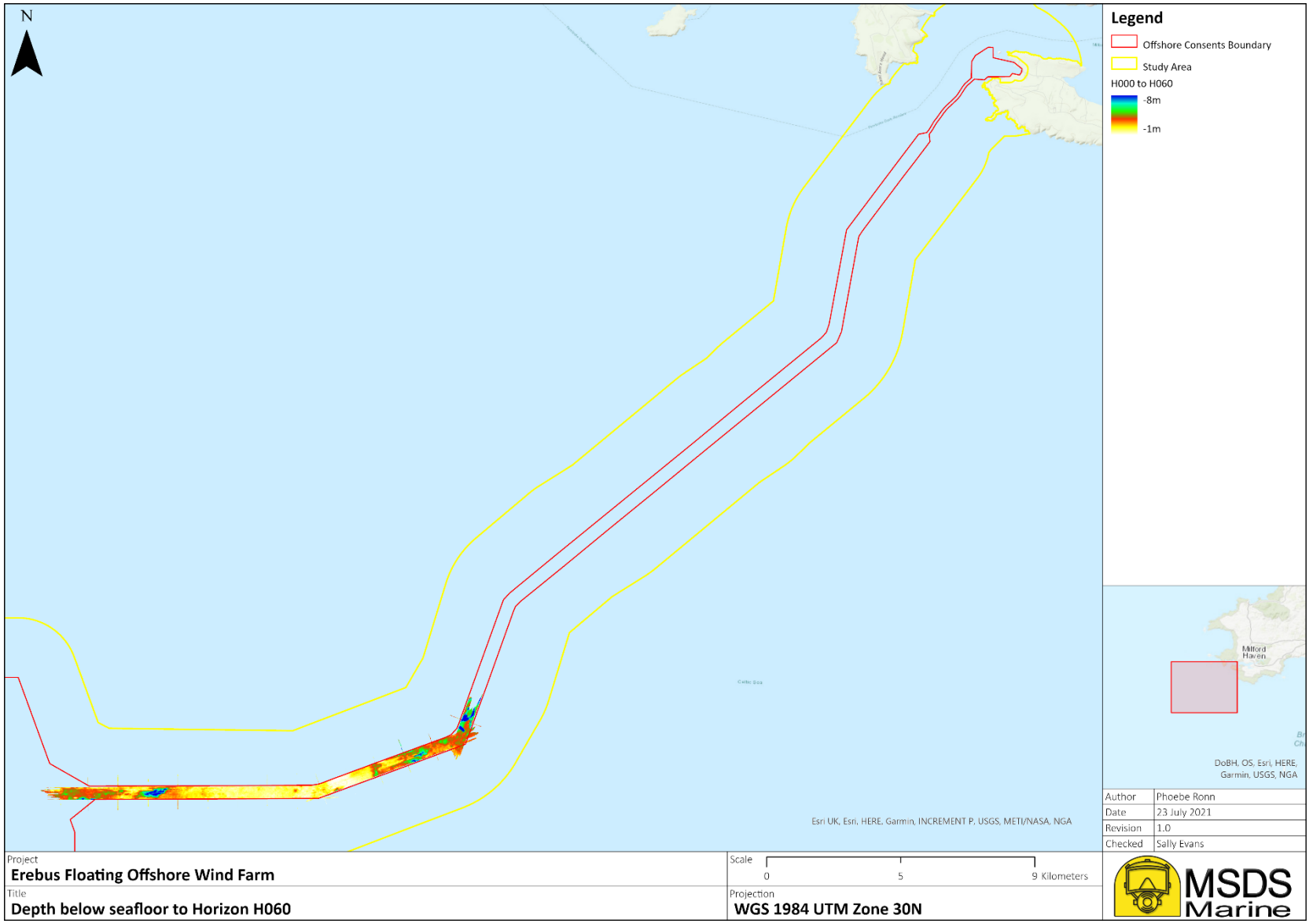

Figure 33: Depth below seafloor to Horizon H060

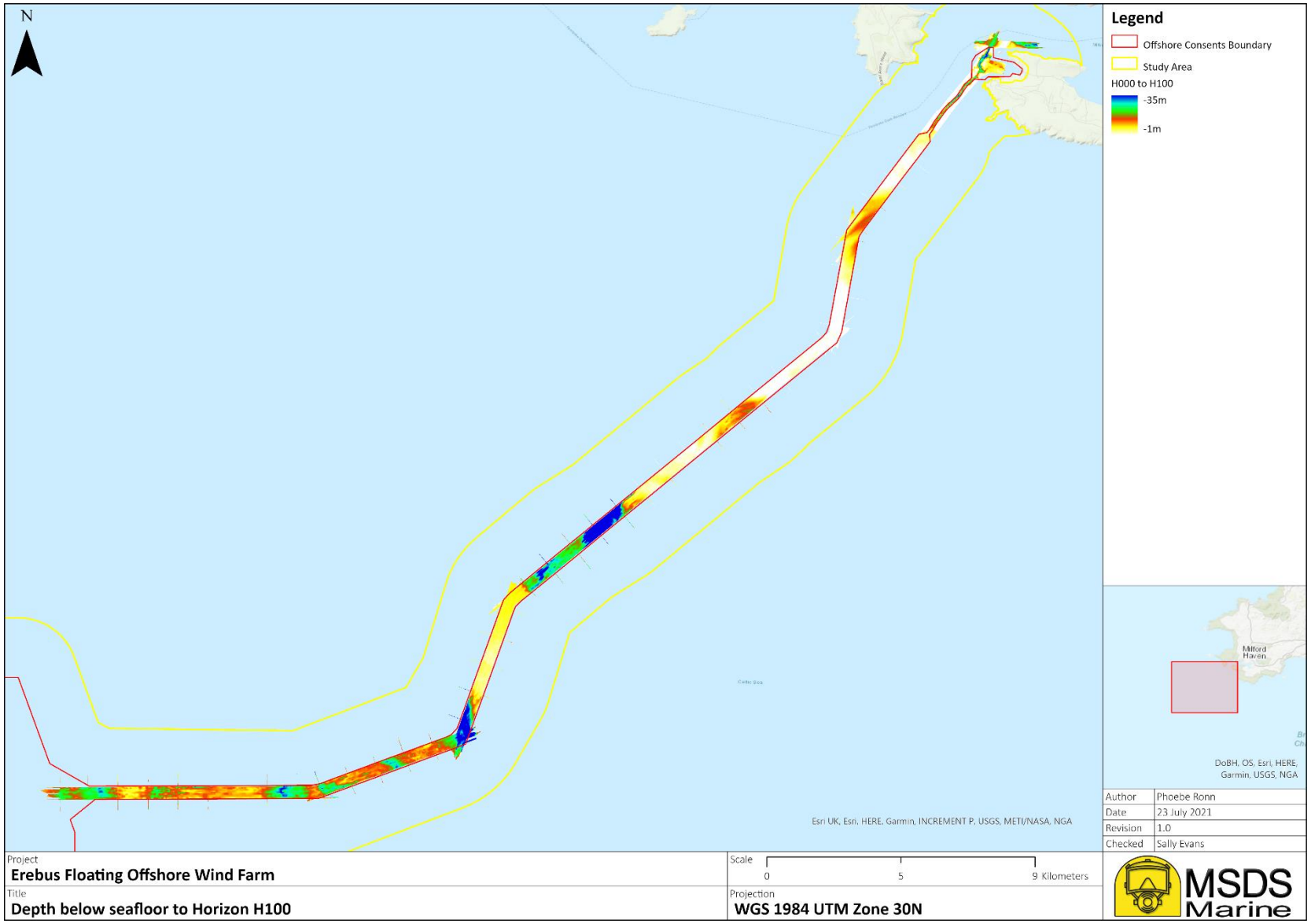

Figure 34: Depth below seafloor to Horizon H100

12.0 Appendix 3: Further information on geological deposits

12.1.1 This appendix provides further information on geological deposits mapped within the wider area. As deposits within the site are undated this further information is provided as contextual information to allow potential origins to be understood.

12.1.2 Bardsey Loom Formation: consists of clay, sand, pebbly sand, and gravel, with layers of peat (Tappin et al. 1994). The formation is believed to be of a pre-Anglian age and has been attributed to the Cromerian. In areas this formation fills incisions in the bedrock (see Figure 5) and is overlain by later deposits. Sampling of the Bardsey Loom Formation indicates that it was laid in a fluviatile/shallow marine cold environment, and that it possibly formed rudimentary bedding within shallow channel features (Tappin et al. 1994; Westley and Edwards 2017). This formation has been sub-divided into two members, a lower lenticular infill found within isolated incisions, and an upper tabular stratified member that is more ubiquitous across the wider area.

12.1.3 The BGS report suggests that this formation is only present in the St George's Channel, Celtic Deep Trough and Haig Fras Platform (Tappin et al. 1994). The site is not within any of these areas, although it is immediately adjacent to the east of the Celtic Deep Trough. A cross-section taken 20km south of the Array indicated that the Bardsey Loom Formation is only present in small pockets of the Celtic Deep Trough, and that the for the most part, post-Cromerian deposits lie directly atop bedrock (Tappin et al. 1994). Incisions 90km to the southwest of the site include Bardsey Loom Formation at their base; the site is known to cross other incisions which may include the Bardsey Loom Formation. Only the largest of incisions have been mapped, the Bardsey Loom Formation may be present within the site in smaller incisions.

12.1.4 Caernarfon Bay Formation: has been divided into four members:

- Lower Unstratified Member: has been dated to the early Anglian and was identified in the Celtic Deep Trough and Haig Fras Platform overlying either the Bardsey Loom Formation or the pre-Quaternary bedrock (Tappin et al. 1994). The interpreted depositional environment of the member is subglacial or ice-proximal. Although this member is believed to be restricted to the Celtic Deep Trough and Haig Fras Platform, it is possible for pockets of this deposit to have survived in any incisions into the bedrock with a base fill of Bardsey Loom Formation and the formation may have been deposited within the site.
- The Bedded Member: was identified in the Celtic Deep Trough and Haig Fras Platform. It consists of sand with occasional clay beds and scattered pebbles with shell debris. The member is truncated by a late Anglian erosion surface (Tappin et al. 1994). The depositional environment is unknown; however, the presence of shell debris may indicate a (glacio)marine environment. As with the Lower Unstratified Member, it is possible that this formation survives in incisions within the site.
- Incision Infill Member: infilled incisions cut into the Bedded Member, Lower Unstratified Member, and older stratigraphy, are likely the result of glacial action. The Incision Infill Member consists of diamictons of stiff clay with stones, muds with clasts from pebble to boulder size, sand, muds, and clays and was likely laid in glacial conditions. It may be contemporaneous with the incising of the incisions and thus may have been laid during the Anglian glacial advance (Tappin et al. 1994). Towards the top of this member are muds and clays. While these may be remnants of the late Anglian marine transgression, they

may also relate to a Hoxnian or even Wolstonian marine environment. It is possible that this member is present within the site in incisions.

- Upper Unstratified Member: was laid during the onset of the Wolstonian glaciation in an ice-proximal glaciomarine environment (Tappin et al. 1994). A borehole 80km to the north of the site identified this member as subglacial till, however another borehole 5 km south of the site identified it as a glaciomarine deposit evidenced by cold-water microbiota (Tappin et al. 1994). This suggests that this member was laid while the Wolstonian ice was in motion, as its glacial maximum extended up to 100km south of the site as indicated in Figure 7.

12.1.5 St George's Channel Formation: has been identified almost exclusively in the Celtic Deep Trough. The proposed extents of the Trough, based on BGS research, are within 500 m from the edge of the Array; thus, it is possible that the St George's Channel Formation is present within the site. There is uncertainty around the origin of the deposit; it has been attributed to a glacial phase within the Wolstonian based on stratigraphy, however the characteristics, inclusions and amino-acid dating suggest it is an earlier (Hoxnian), fluvially-derived interglacial deposit (Tappin et al. 1994).

12.1.6 Cardigan Bay Formation: has been divided into three members:

- Lower Till Member: has been interpreted as Wolstonian subglacial deposit becoming an ice-proximal glaciomarine deposit to the south (Tappin et al. 1994). To the north of the site the member appears to be stiff clay with pebbles, however a borehole 5 km south of the site identified sand with lithic granules which is evidence of at least two depositional environments equated with this member (Tappin et al. 1994). It is likely the site was glaciomarine during the deposition of this member but may possibly represent an interface between the southern extent of the Wolstonian glaciation and the sea.
- The Bedded and Infill Member: has been dated to the late Ipswichian, this formation was deposited in a boreal to arctic environment which possible represents the transition between the end of the temperate Ipswichian and the start of the colder Devensian stage (Tappin et al. 1994). During the Ipswichian, it is likely that the wider area was submerged due to the relatively high sea levels, and thus the Bedded and Infill Member of the Cardigan Bay Formation could represent a period of lower relative sea levels during the aforementioned transition.
- Upper Till Member: was laid as a subglacial till possibly relating to the late Devensian Dimlington Stadial, otherwise known as the Last Glacial Maximum (LGM) (Tappin et al. 1994). It is believed that during the LGM, the outer Bristol Channel region was subglacial (see Figure 9 part 2). The exact extents of the LGM are debated. However, the Upper Till Member is present sporadically across the Lundy Platform suggesting the ice sheets covered this area. The site lies on the Lundy Platform and may too therefore have been covered by ice. The identification of the subglacially derived Upper Till Member within the site would confirm that the site was indeed covered with ice during at least part of the LGM.

12.1.7 Western Irish Sea Formation: has been split into five facies:

- Chaotic facies: is a deposit of sandy gravel, till, clay, and cobbles with sparse microbiota laid in ice-proximal, glaciomarine or glaciolacustrine conditions (Tappin et al. 1994). This facie was identified in boreholes in the Bristol Channel and Celtic Deep Trough; the site lies between these areas and as such it is likely that the Chaotic Facies of the Western Irish Sea Formation was also laid down within the site.

- **Prograded facies:** is a sandy deposit which infills incisions in the wider area likely caused by subglacial fluvial action related to the Dimlington Stadial ice (Figure 5). The Prograded facies is believed to have been laid in a pro-deltaic and glaciomarine environment during marine transgression as the Devensian ice retreated toward the end of the Dimlington Stadial (Tappin et al. 1994). It is possible that this facies is present in the incisions crossed by parts of the site.
- **Mud facies:** is a deposit of silts with shell and cold-water marine microbiota indicating it was laid in an ice-proximal glaciomarine environment that was becoming temperate marine towards the end of the Devensian (Tappin et al. 1994).
- **Sarnau facies:** represents three smooth-topped ridges in Cardigan Bay, possible remnants of a possible piedmont glacier or late-glacial sandur (Tappin et al. 1994). These ridges are 130km from the site and thus this facie is not likely to be represented within the site.
- **Codling Bank facies:** is a series of upstanding features restricted to the Codling Bank off the County Wicklow coast (Tappin et al. 1994). This is 170km north of the site, thus this facie is not likely to be represented within the site.

12.1.8 **Surface Sands Formation:** represents Holocene deposits, it is split into three members:

- **Seabed Depression Member:** represents sandy silt infill of incisions also infilled by Western Irish Sea Formation facies. It contains shells and microbiota that suggest that it was laid in a temperate marine environment (Tappin et al. 1994). It is possible that this deposit is present in incisions within the site.
- **SL2 Member:** is a shallow-glaciomarine to estuarine deposit containing fossil evidence and estuarine silts with peats. Offshore there are relict tidal sand ridges indicative of a lower sea level (Tappin et al. 1994). In some places till deposits on the surface of this member suggests floating sea ice may have dropped material. This indicates that parts of the SL2 member are contemporaneous with Western Irish Sea Formation or Cardigan Bay Formation glacial melt deposits (Tappin et al. 1994).
- **SL1 Member:** sits on a marine erosion surface over the SL2 member in places. It is a sandy, mobile deposit that represents the seabed across the site and much of the wider area (Tappin et al. 1994).

13.0 Appendix 4: Gazetteer of Archaeological Anomalies – WGS84 Z31N

MSDS_ID	X	Y	Potential	Description	Height (m)	Length (m)	Width (m)	Amplitude (nT)	Location
ERS21_0001	322533.6	5700459.6	Low	Potential debris	0.2	1.8	0.7	134.7	Consent Boundary
ERS21_0002	320951.0	5700542.8	Low	Likely geological	0.1	1.1	1.0		Consent Boundary
ERS21_0003	320850.3	5705513.5	Low	Unidentified debris	0.4	5.0	2.3	9.2	Consent Boundary
ERS21_0004	320875.7	5705565.9	Low	Potential debris	0.0	1.5	0.4		Consent Boundary
ERS21_0005	320528.8	5703825.8	Low	Likely geological	0.4	3.2	2.2		Consent Boundary
ERS21_0006	321888.6	5702171.3	Low	Unidentified debris	0.3	1.4	0.4		Consent Boundary
ERS21_0007	321859.7	5704563.5	Low	Likely geological	0.4	4.6	1.2		Consent Boundary
ERS21_0008	321933.3	5701658.4	Low	Unidentified debris	0.1	4.9	0.3		Consent Boundary
ERS21_0010	317130.9	5703724.5	Low	Potential debris	0.2	2.5	0.4		Consent Boundary
ERS21_0011	317432.0	5701780.6	Low	Chain cable or rope	0.0	32.7	0.1		Consent Boundary
ERS21_0012	319835.4	5705777.1	Low	Anchor	0.5	10.2	0.8		Consent Boundary
ERS21_0013	320329.2	5701692.1	Medium	Unidentified debris	2.4	7.2	2.1		Consent Boundary
ERS21_0014	320251.8	5703112.0	Low	Unidentified debris	0.3	1.3	0.4		Consent Boundary
ERS21_0015	320239.5	5701948.7	Low	Likely geological	0.6	1.7	0.9		Consent Boundary
ERS21_0016	320280.2	5706849.4	Low	Likely geological	0.0	38.2	11.2		Consent Boundary
ERS21_0017	320758.2	5704324.4	Medium	Potential debris	0.5	7.8	0.6		Consent Boundary
ERS21_0018	321127.4	5704088.1	Low	Potential debris	0.1	2.2	1.4	9.1	Consent Boundary
ERS21_0019	321145.8	5704254.3	Medium	Unidentified debris	0.6	7.4	4.9		Consent Boundary
ERS21_0020	321329.5	5703348.4	Low	Chain cable or rope	0.0	31.7	0.1		Consent Boundary
ERS21_0021	321547.3	5704400.6	Low	Likely geological	0.2	4.3	0.6		Consent Boundary
ERS21_0022	315954.9	5701098.5	Low	Potential debris	0.2	1.5	0.3		Wider Study Area
ERS21_0023	315612.5	5703671.6	Low	Likely geological	0.4	3.5	1.0		Wider Study Area
ERS21_0024	315665.6	5706366.1	Medium	Unidentified debris	0.1	27.8	18.6	70.7	Wider Study Area
ERS21_0025	316120.4	5705136.2	Low	Likely geological	0.6	3.3	1.2		Wider Study Area
ERS21_0026	316167.3	5708591.0	Low	Linear feature	0.0	4.4	0.3	131.6	Wider Study Area
ERS21_0027	319040.6	5702022.4	Low	Potential debris	0.2	4.0	0.6		Consent Boundary
ERS21_0029	319239.4	5704734.0	Low	Anchor	0.3	2.5	0.6		Consent Boundary
ERS21_0030	317577.0	5703821.6	Low	Likely geological	0.2	3.7	1.0		Consent Boundary

MSDS_ID	X	Y	Potential	Description	Height (m)	Length (m)	Width (m)	Amplitude (nT)	Location
ERS21_0031	315398.4	5703705.2	Low	Likely geological	0.1	2.5	0.3		Wider Study Area
ERS21_0032	322809.0	5702192.5	High	Wreck	2.9	32.8	7.6		Wider Study Area
ERS21_0033	321037.4	5701198.9	Low	Unidentified debris	0.2	3.0	1.6		Consent Boundary
ERS21_0034	316414.5	5701235.8	Low	Linear feature	0.4	13.3	0.2		Consent Boundary
ERS21_0035	322268.1	5701978.8	Medium	Unidentified debris	0.7	8.4	1.9		Consent Boundary
ERS21_0036	317115.0	5699671.0	Low	Likely geological	0.2	8.6	2.2		Wider Study Area
ERS21_0038	315324.9	5707784.1	Low	Potential debris	0.4	7.1	9.9		Wider Study Area
ERS21_0039	315537.3	5701529.1	Low	Potential debris	0.2	0.6	3.9		Wider Study Area
ERS21_0040	315466.3	5702549.9	Low	Potential debris	1.2	1.6	0.2		Wider Study Area
ERS21_0041	316526.3	5708419.2	Low	Likely geological	0.2	4.6	0.5		Wider Study Area
ERS21_0042	316514.1	5706250.7	Low	Potential debris	0.4	9.9	0.7		Consent Boundary
ERS21_0043	316521.4	5704710.1	Low	Linear feature	0.1	4.6	0.2		Consent Boundary
ERS21_0044	316468.7	5707472.2	Low	Likely geological	0.3	1.3	0.8		Consent Boundary
ERS21_0045	315829.4	5705455.9	Low	Potential debris	0.2	3.3	1.2		Wider Study Area
ERS21_0046	315792.1	5704399.3	Low	Potential debris	0.4	2.8	0.8		Wider Study Area
ERS21_0047	315917.6	5700285.4	Low	Potential debris	0.1	4.3	0.2		Wider Study Area
ERS21_0048	316398.8	5702128.4	Low	Towed equipment	1.2	8.5	3.3		Consent Boundary
ERS21_0049	316399.6	5708820.3	Low	Likely geological	0.5	2.0	2.2		Wider Study Area
ERS21_0050	316464.6	5705238.9	Low	Likely geological	0.3	4.6	0.6		Consent Boundary
ERS21_0051	316469.5	5702932.7	Medium	Unidentified debris	0.5	9.1	3.3		Consent Boundary
ERS21_0053	316827.0	5702050.4	Low	Potential debris	1.8	3.7	0.6		Consent Boundary
ERS21_0054	317200.1	5706090.7	Low	Likely geological	0.5	12.1	3.8		Consent Boundary
ERS21_0055	317767.0	5706026.7	Low	Potential debris	0.2	6.0	2.0		Consent Boundary
ERS21_0056	317907.7	5705172.1	Low	Potential debris	0.1	1.8	1.3		Consent Boundary
ERS21_0057	317897.0	5705002.7	Low	Potential debris	0.3	2.5	1.1		Consent Boundary
ERS21_0058	318147.1	5705834.3	Low	Linear feature	0.1	5.6	0.5		Consent Boundary
ERS21_0059	319946.0	5708702.9	Low	Linear feature	0.0	6.5	0.2		Wider Study Area
ERS21_0060	320001.6	5702751.1	Low	Likely geological	0.5	2.6	0.3		Consent Boundary
ERS21_0061	320185.8	5701165.0	Low	Potential debris	0.5	1.6	1.8		Consent Boundary
ERS21_0062	320936.7	5701161.7	Low	Likely geological	0.3	2.4	0.8		Consent Boundary

MSDS_ID	X	Y	Potential	Description	Height (m)	Length (m)	Width (m)	Amplitude (nT)	Location
ERS21_0063	321332.0	5708034.0	Medium	Unidentified debris	0.5	27.9	16.8		Wider Study Area
ERS21_0064	321317.2	5707334.0	Low	Likely geological	0.6	9.5	2.2		Wider Study Area
ERS21_0065	321537.0	5701903.1	Low	Likely geological	0.1	3.5	1.9		Consent Boundary
ERS21_0066	321993.3	5701896.4	Low	Likely geological	0.2	8.7	2.0		Consent Boundary
ERS21_0069	322382.8	5700247.1	Low	Potential debris	0.4	2.0	0.8		Consent Boundary
ERS21_0070	322539.7	5702032.8	Low	Potential debris	0.0	2.6	0.8	65.8	Consent Boundary
ERS21_0071	322862.8	5702130.9	Medium	Wreck debris	0.4	17.7	8.5		Wider Study Area
ERS21_0072	323112.6	5704220.0	Low	Potential debris	0.3	5.6	4.1		Consent Boundary
ERS21_0073	323572.6	5701694.1	Low	Potential debris	0.0	3.4	1.5		Wider Study Area
ERS21_0074	321774.7	5707057.1	Low	Linear feature	0.2	4.5	0.2		Wider Study Area
ERS21_0075	350223.7	5725159.4	Low	Chain cable or rope	0.0	46.9	0.1	217.0	Consent Boundary
ERS21_0076	329619.8	5703980.9	Low	Likely geological	0.4	5.5	2.4		Consent Boundary
ERS21_0077	328348.9	5703903.2	Low	Mound	0.6	12.2	12.9		Consent Boundary
ERS21_0078	329750.0	5704182.6	Low	Likely geological	0.5	6.3	1.8		Consent Boundary
ERS21_0079	329055.6	5704311.8	Low	Potential debris	0.5	3.2	2.1		Wider Study Area
ERS21_0080	322874.1	5704034.5	Low	Seabed disturbance	0.0	17.5	8.5		Consent Boundary
ERS21_0081	328516.1	5704033.5	Low	Potential debris	0.3	2.8	1.5		Consent Boundary
ERS21_0082	326343.6	5704118.1	Low	Potential debris	0.6	4.7	0.7		Consent Boundary
ERS21_0083	332862.6	5705175.1	Medium	Potential debris	0.3	8.7	6.2		Wider Study Area
ERS21_0084	330820.8	5703830.2	Low	Likely geological	0.3	2.2	1.8	6.7	Wider Study Area
ERS21_0085	332750.3	5704587.3	Low	Likely dolphins	2.7	4.6	2.8		Consent Boundary
ERS21_0086	335502.5	5705846.2	Low	Linear feature	0.0	6.8	0.3		Consent Boundary
ERS21_0087	335790.9	5707491.8	Low	Potential debris	0.3	2.1	0.6		Wider Study Area
ERS21_0088	337406.0	5710673.3	Low	Potential debris	0.2	1.8	0.2		Consent Boundary
ERS21_0089	337230.9	5710799.7	Low	Potential debris	0.0	5.1	1.3		Wider Study Area
ERS21_0090	335630.5	5706718.9	Low	Linear feature	0.1	5.9	0.1		Consent Boundary
ERS21_0091	346006.2	5717330.6	Medium	Likely geological	1.7	88.7	23.7		Wider Study Area
ERS21_0092	337683.0	5710706.9	Low	Likely geological	0.0	8.9	1.7		Consent Boundary
ERS21_0093	348602.8	5719723.0	Medium	Potential debris	0.9	8.2	1.3		Wider Study Area
ERS21_0094	348571.0	5719691.5	Medium	Potential debris	0.7	16.9	3.0		Wider Study Area

MSDS_ID	X	Y	Potential	Description	Height (m)	Length (m)	Width (m)	Amplitude (nT)	Location
ERS21_0095	345488.9	5717407.2	Low	Potential debris	0.1	6.4	0.7		Consent Boundary
ERS21_0096	343315.5	5715644.0	Medium	Potential debris	0.2	43.9	5.6		Consent Boundary
ERS21_0097	348579.7	5719905.3	Medium	Likely geological	2.2	22.8	10.9		Wider Study Area
ERS21_0098	342944.4	5715141.0	Low	Likely geological	0.3	11.1	3.5		Consent Boundary
ERS21_0099	346455.1	5718238.0	High	Wreck	0.0	40.7	18.9		Consent Boundary
ERS21_0100	347289.5	5719015.7	Low	Linear feature	0.1	4.9	0.3		Wider Study Area
ERS21_0101	343512.5	5715112.1	Low	Seabed disturbance	0.1	10.3	9.1		Wider Study Area
ERS21_0102	338811.8	5711685.6	Low	Potential debris	0.6	4.5	0.4		Consent Boundary
ERS21_0103	341392.0	5713917.5	Medium	Mound	0.0	17.2	14.4	80.7	Consent Boundary
ERS21_0104	347534.4	5718917.0	Low	Potential debris	0.3	2.7	0.1	7.7	Consent Boundary
ERS21_0105	343617.5	5715724.2	Low	Potential debris	0.3	2.8	0.1		Consent Boundary
ERS21_0106	337286.5	5710386.1	Medium	Potential debris	0.3	49.7	5.9		Consent Boundary
ERS21_0107	345793.2	5717444.5	Low	Likely geological	1.2	25.1	14.0		Consent Boundary
ERS21_0108	341669.1	5714278.2	Low	Potential debris	0.5	2.9	0.6		Consent Boundary
ERS21_0109	343268.5	5715490.4	Low	Seabed disturbance	0.1	20.3	6.3		Consent Boundary
ERS21_0110	343163.6	5715527.3	Low	Likely geological	0.8	6.0	1.8		Consent Boundary
ERS21_0111	343164.2	5715585.6	Low	Chain cable or rope	0.0	18.1	0.5		Consent Boundary
ERS21_0112	348425.0	5721352.8	Low	Potential debris	0.2	2.5	0.4		Consent Boundary
ERS21_0113	348266.6	5721568.2	Low	Linear feature	0.2	5.6	0.3		Consent Boundary
ERS21_0114	350635.9	5725211.2	Medium	Unidentified debris	0.7	17.3	1.6		Consent Boundary
ERS21_0115	350546.3	5725100.7	Low	Chain cable or rope	0.1	17.3	0.2		Consent Boundary
ERS21_0116	350844.3	5725875.0	Low	Potential debris	1.0	4.3	2.8		Consent Boundary
ERS21_0117	349336.8	5723980.8	Low	Potential debris	0.0	11.2	4.2	9.5	Consent Boundary
ERS21_0118	350635.5	5725578.0	Low	Chain cable or rope	0.1	16.4	0.4		Consent Boundary
ERS21_0119	353428.8	5728348.8	Low	Potential debris	0.9	2.2	1.2		Consent Boundary
ERS21_0120	353439.7	5728406.5	Low	Likely geological	0.5	1.3	1.1	84.3	Consent Boundary
ERS21_0121	353203.0	5728665.1	Low	Linear feature	0.2	2.3	0.1		Consent Boundary
ERS21_0122	352989.2	5728309.3	Low	Chain cable or rope	0.0	41.5	0.1		Consent Boundary
ERS21_0123	352719.9	5727917.7	High	Wreck	1.0	16.7	7.8		Consent Boundary
ERS21_0124	353197.5	5729283.1	Low	Chain cable or rope	0.1	9.8	0.1		Wider Study Area

MSDS_ID	X	Y	Potential	Description	Height (m)	Length (m)	Width (m)	Amplitude (nT)	Location
ERS21_0125	353252.1	5729471.9	Medium	Anchor	1.8	3.5	3.3		Wider Study Area
ERS21_0126	352907.8	5728557.5	Low	Unidentified debris	0.1	2.9	3.0		Consent Boundary
ERS21_0128	352864.6	5728175.2	Low	Chain cable or rope	0.1	22.1	0.1	208.6	Consent Boundary
ERS21_0129	353363.1	5729094.5	Low	Potential debris	0.9	3.6	0.7	35.2	Wider Study Area
ERS21_0130	353340.9	5728682.6	Low	Linear feature	0.1	8.9	0.3		Consent Boundary
ERS21_0131	352661.8	5727585.5	Low	Chain cable or rope	0.0	12.5	0.1		Wider Study Area
ERS21_0132	353305.3	5728706.1	Medium	Anchor	0.6	2.8	2.2		Consent Boundary
ERS21_0133	353351.7	5728995.7	Low	Potential debris	1.7	2.3	2.0		Consent Boundary
ERS21_0134	353374.4	5729052.4	Low	Chain cable or rope	0.1	24.6	0.2	5.9	Wider Study Area
ERS21_0135	353409.0	5729103.8	Low	Potential debris	0.6	2.0	2.2	56.5	Wider Study Area
ERS21_0136	353454.1	5729105.0	Low	Potential debris	0.8	2.1	2.1		Wider Study Area
ERS21_0137	351655.3	5726857.8	High	Wreck	0.4	25.6	9.9		Consent Boundary
ERS21_0141	354178.0	5729034.3	Low	Chain cable or rope	0.2	22.4	0.1	8285.6	Wider Study Area
ERS21_0142	354234.8	5729025.5	Low	Chain cable or rope	0.1	30.3	0.4		Wider Study Area
ERS21_0143	354467.3	5729059.3	Low	Chain cable or rope	0.0	12.7	0.2		Wider Study Area
ERS21_0146	354306.6	5729010.8	Low	Chain cable or rope	0.1	32.1	0.1		Wider Study Area
ERS21_0147	354373.4	5728999.7	Low	Chain cable or rope	0.0	36.0	0.2		Wider Study Area
ERS21_0151	354903.9	5728864.7	Low	Fishing gear	0.4	13.1	0.4		Wider Study Area
ERS21_0152	353958.3	5729154.0	Low	Linear feature	0.1	12.5	0.1		Wider Study Area
ERS21_0153	353864.3	5729163.6	Low	Chain cable or rope	0.1	13.2	0.1		Wider Study Area
ERS21_0154	354245.9	5729287.2	Low	Fishing gear	0.1	48.5	0.3		Wider Study Area
ERS21_0155	354333.7	5729298.3	Low	Chain cable or rope	0.1	5.7	0.1		Wider Study Area
ERS21_0159	355060.1	5729054.9	Low	Chain cable or rope	0.0	26.4	0.2		Wider Study Area
ERS21_0165	354982.7	5729032.6	Low	Fishing gear	0.6	33.5	0.4		Wider Study Area
ERS21_0166	354392.5	5729095.3	Low	Potential debris	0.9	1.2	1.4		Wider Study Area
ERS21_0167	354143.5	5729052.4	Low	Chain cable or rope	0.0	53.3	0.2	39.0	Wider Study Area
ERS21_0168	354142.9	5729112.3	Low	Fishing gear	0.4	25.8	14.2	16.5	Wider Study Area
ERS21_0179	354583.9	5729152.2	Low	Unidentified debris	0.4	3.1	0.1		Wider Study Area
ERS21_0180	354356.6	5729104.3	Low	Chain cable or rope	0.0	36.8	0.1		Wider Study Area
ERS21_0181	354265.4	5728998.9	Low	Chain cable or rope	1.1	31.8	1.9		Wider Study Area

MSDS_ID	X	Y	Potential	Description	Height (m)	Length (m)	Width (m)	Amplitude (nT)	Location
ERS21_0182	354209.9	5728996.8	Low	Chain cable or rope	1.4	30.8	2.6		Wider Study Area
ERS21_0183	354786.3	5728877.8	Low	Fishing gear	0.0	52.0	0.2		Wider Study Area
ERS21_0195	353983.3	5728967.0	Low	Chain cable or rope	1.0	11.0	1.1		Wider Study Area
ERS21_0196	354031.3	5728961.9	Low	Chain cable or rope	0.6	4.4	2.0		Wider Study Area
ERS21_0197	354058.8	5728960.5	Low	Chain cable or rope	0.1	8.1	0.2		Wider Study Area
ERS21_0198	354545.4	5728934.3	Low	Unidentified debris	0.2	3.7	2.3		Wider Study Area
ERS21_0202	353831.5	5729129.0	Low	Chain cable or rope	0.0	8.7	0.1		Wider Study Area
ERS21_0203	354419.1	5729241.8	Low	Fishing gear	0.2	50.9	0.0		Wider Study Area
ERS21_0204	354396.9	5729306.2	Low	Chain cable or rope	0.1	28.5	0.1		Wider Study Area
ERS21_0205	354603.3	5729274.8	Medium	Mound	0.6	12.9	3.4		Wider Study Area
ERS21_0211	354423.8	5729217.5	Low	Fishing gear	0.0	19.4	10.4		Wider Study Area
ERS21_0220	354166.0	5728997.7	Low	Chain cable or rope	0.1	30.4	0.1		Wider Study Area
ERS21_0221	353856.5	5729066.8	Low	Linear feature	0.1	9.8	0.1	10.5	Wider Study Area
ERS21_0222	352897.7	5729037.3	High	Wreck	0.7	14.5	6.3	291.0	Wider Study Area
ERS21_0226	354750.7	5728874.6	Low	Fishing gear	0.3	36.3	0.1		Wider Study Area
ERS21_0241	353382.9	5728318.9	Low	Potential debris	0.9	1.3	0.1		Consent Boundary
ERS21_0242	353221.2	5728145.4	Low	Linear feature	0.2	4.0	0.2		Consent Boundary
ERS21_0243	353835.6	5728479.6	Low	Likely geological	0.4	10.0	9.3		Consent Boundary
ERS21_0244	353177.9	5728328.4	Low	Potential debris	0.0	2.2	0.1		Consent Boundary
ERS21_0245	353276.4	5728687.2	Low	Likely geological	0.5	5.1	1.5		Consent Boundary
ERS21_0246	353449.2	5728441.8	Low	Unidentified debris	0.0	3.5	2.4	20.8	Consent Boundary
ERS21_0247	353504.5	5728461.1	Low	Chain cable or rope	0.3	51.4	0.2		Consent Boundary
ERS21_0248	353574.9	5728137.9	Low	Chain cable or rope	0.0	44.3	0.0		Consent Boundary
ERS21_0249	353560.0	5728133.7	Low	Potential debris	1.6	1.2	0.6		Consent Boundary
ERS21_0250	353601.6	5728138.4	Low	Potential debris	0.5	9.4	1.3		Consent Boundary
ERS21_0251	353369.1	5728692.5	Low	Potential debris	0.6	1.9	1.7		Consent Boundary
ERS21_0252	353390.8	5728629.0	Low	Potential debris	0.0	1.3	1.0		Consent Boundary
ERS21_0253	353512.2	5728474.5	Low	Anchor	0.3	2.4	1.0		Consent Boundary
ERS21_0254	353172.9	5728621.1	Low	Unidentified debris	0.5	1.9	1.2		Consent Boundary
ERS21_0255	353233.1	5728212.9	Low	Chain cable or rope	0.1	2.4	0.2		Consent Boundary

MSDS_ID	X	Y	Potential	Description	Height (m)	Length (m)	Width (m)	Amplitude (nT)	Location
ERS21_0256	350838.9	5725494.5	Low	Potential debris	0.4	4.6	2.6		Consent Boundary
ERS21_0257	351182.4	5725869.7	Low	Chain cable or rope	0.0	12.7	10.5		Consent Boundary
ERS21_0258	351635.5	5726717.6	Low	Linear feature	0.3	4.2	0.1		Consent Boundary
ERS21_0259	350961.7	5725422.1	Low	Linear feature	0.1	5.3	1.8		Wider Study Area
ERS21_0260	350948.0	5725505.6	Low	Chain cable or rope	0.0	12.8	8.6		Consent Boundary
ERS21_0261	351785.2	5726634.2	Low	Chain cable or rope	0.1	13.9	0.0		Wider Study Area
ERS21_0262	350761.6	5725364.9	Low	Potential debris	0.2	8.8	0.0		Consent Boundary
ERS21_0263	350855.0	5725695.6	Low	Chain cable or rope	0.1	14.9	0.0		Consent Boundary
ERS21_0264	350243.1	5725174.2	Low	Chain cable or rope	0.0	29.0	0.2		Consent Boundary
ERS21_0265	350231.3	5725047.9	Medium	Unidentified debris	0.3	1.0	1.7	925.2	Consent Boundary
ERS21_0266	353110.1	5728631.4	Low	Unidentified debris		2.3	1.8	95.1	Consent Boundary
ERS21_0267	322304.7	5701200.3	Low	Potential debris		0.7	0.4	79.9	Consent Boundary
ERS21_0268	317430.9	5707134.9	Low	Potential debris		1.3	1.0	51.0	Consent Boundary
ERS21_0269	354746.4	5729160.1	Low	Unidentified debris	0.3	1.1	0.7	196.8	Wider Study Area
ERS21_0270	354856.8	5729091.2	Low	Unidentified debris	0.1	1.9	1.2	170.0	Wider Study Area
ERS21_0271	354449.1	5729242.6	Low	Fishing gear	0.0	47.9	0.2	155.8	Wider Study Area
ERS21_0272	354410.0	5729267.6	Low	Chain cable or rope	0.0	10.1	12.4	384.3	Wider Study Area
ERS21_0273	352938.6	5729049.6	Medium	Wreck debris		5.3	1.4	204.7	Wider Study Area
ERS21_0274	354250.0	5729084.3	Low	Unidentified debris		2.1	1.2	78.4	Wider Study Area

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MSDS_ID	X	Y	Altitude (m)	Amplitude (nT)	Type	Category	Location	Area
ERS21_MAG_0022	323070.8	5701461.3	1.6	112.7	Positive monopole	100 to 200	Consent Boundary	Array
ERS21_MAG_0030	315283.0	5702216.8	2.3	150.6	Dipole	100 to 200	Consent Boundary	Array
ERS21_MAG_0073	316564.3	5708206.8	3.0	167.3	Dipole	100 to 200	Consent Boundary	Array
ERS21_MAG_0075	316522.5	5708208.0	2.6	206.3	Negative monopole	200+	Consent Boundary	Array
ERS21_MAG_0076	319471.8	5708223.8	1.9	155.4	Positive monopole	100 to 200	Consent Boundary	Array
ERS21_MAG_0159	315276.0	5702736.5	2.0	143.1	Dipole	100 to 200	Consent Boundary	Array
ERS21_MAG_0166	315392.3	5707838.3	1.3	113.9	Dipole	100 to 200	Consent Boundary	Array
ERS21_MAG_0175	316478.3	5708219.0	2.6	157.2	Complex	100 to 200	Consent Boundary	Array
ERS21_MAG_0180	316510.5	5708227.0	3.0	148.0	Complex	100 to 200	Consent Boundary	Array
ERS21_MAG_0185	316554.8	5708206.3	1.6	770.6	Complex	200+	Consent Boundary	Array
ERS21_MAG_0186	316555.0	5708186.3	1.6	368.5	Complex	200+	Consent Boundary	Array
ERS21_MAG_0187	316555.0	5708229.5	2.1	236.0	Complex	200+	Consent Boundary	Array
ERS21_MAG_0191	316584.5	5708158.0	2.8	224.5	Complex	200+	Consent Boundary	Array
ERS21_MAG_0194	316586.8	5708271.0	3.2	137.0	Complex	100 to 200	Consent Boundary	Array
ERS21_MAG_0307	318319.8	5707994.0	2.2	157.4	Complex	100 to 200	Consent Boundary	Array
ERS21_MAG_0511	320672.0	5708428.8	3.1	167.4	Dipole	100 to 200	Consent Boundary	Array
ERS21_MAG_0512	320792.8	5708536.3	2.8	203.1	Dipole	200+	Consent Boundary	Array
ERS21_MAG_0517	320522.5	5708785.3	1.9	169.4	Dipole	100 to 200	Consent Boundary	Array
ERS21_MAG_0519	320495.3	5708796.0	1.3	460.3	Dipole	200+	Consent Boundary	Array
ERS21_MAG_0520	320522.8	5708816.0	2.0	553.8	Dipole	200+	Consent Boundary	Array
ERS21_MAG_0521	320621.3	5708823.5	2.0	105.2	Dipole	100 to 200	Consent Boundary	Array
ERS21_MAG_0522	320662.5	5708834.5	2.7	135.2	Positive Monopole	100 to 200	Consent Boundary	Array
ERS21_MAG_0524	320523.3	5708873.8	2.3	371.5	Dipole	200+	Consent Boundary	Array
ERS21_MAG_0541	321831.7	5700144.1	1.7	180.7	Dipole	100 to 200	Consent Boundary	Array
ERS21_MAG_0694	321491.4	5705995.0	2.8	107.1	Complex	100 to 200	Consent Boundary	Array
ERS21_MAG_0699	321491.5	5707671.0	2.1	604.2	Complex	200+	Consent Boundary	Array

MSDS_ID	X	Y	Altitude (m)	Amplitude (nT)	Type	Category	Location	Area
ERS21_MAG_0701	321663.2	5707856.2	2.1	455.1	Complex	200+	Consent Boundary	Array
ERS21_MAG_0787	316059.0	5705278.4	2.7	181.5	Dipole	100 to 200	Consent Boundary	Array
ERS21_MAG_0840	354491.9	5729265.2	0.5	2506.9	Positive monopole	200+	Consent Boundary	ECC
ERS21_MAG_0848	353399.2	5729243.3	1.0	136.1	Dipole	100 to 200	Consent Boundary	ECC
ERS21_MAG_0855	354877.2	5729213.2	0.5	536.4	Dipole	200+	Consent Boundary	ECC
ERS21_MAG_0871	353213.5	5729209.9	1.5	171.7	Dipole	100 to 200	Consent Boundary	ECC
ERS21_MAG_0873	353413.0	5729209.0	1.4	116.5	Dipole	100 to 200	Consent Boundary	ECC
ERS21_MAG_0885	353301.3	5729139.7	2.7	391.4	Dipole	200+	Consent Boundary	ECC
ERS21_MAG_0894	354584.5	5729103.9	2.1	122.8	Dipole	100 to 200	Consent Boundary	ECC
ERS21_MAG_0896	354683.5	5729100.4	1.8	122.5	Dipole	100 to 200	Consent Boundary	ECC
ERS21_MAG_0904	355009.2	5729079.8	1.8	108.2	Dipole	100 to 200	Consent Boundary	ECC
ERS21_MAG_0915	354618.9	5729062.5	1.0	373.1	Negative monopole	200+	Consent Boundary	ECC
ERS21_MAG_0924	353089.4	5729052.8	1.6	166.4	Dipole	100 to 200	Consent Boundary	ECC
ERS21_MAG_0931	353140.0	5729051.8	2.3	179.8	Dipole	100 to 200	Consent Boundary	ECC
ERS21_MAG_0934	353318.2	5729050.5	1.8	119.1	Dipole	100 to 200	Consent Boundary	ECC
ERS21_MAG_1059	350397.4	5725432.4	3.5	1022.8	Dipole	200+	Consent Boundary	ECC
ERS21_MAG_1062	350372.8	5725400.9	2.6	181.5	Positive monopole	100 to 200	Consent Boundary	ECC
ERS21_MAG_1068	350280.6	5725286.2	2.8	218.8	Dipole	200+	Consent Boundary	ECC
ERS21_MAG_1070	350237.8	5725232.8	2.4	210.7	Dipole	200+	Consent Boundary	ECC
ERS21_MAG_1287	338432.1	5711131.9	3.2	180.6	Dipole	100 to 200	Consent Boundary	ECC

15.0 Appendix 6: Intertidal Walkover Survey Photos

Figure 35 View from beach of eroding cliff at location of promontory port (MSDS_Erebus_073)

Figure 36 View from beach of eroding cliff at location of cist cemetery (MSDS_Erebus_075)

Figure 37 View from the east of the natural embayment used as a harbour, accessed by rock cut channel (MSDS_Erebus_344)

Figure 38 View from the west of natural embayment used as a harbour, accessed by rock cut channel (MSDS_Erebus_344) with recorded location of quarries (MSDS_Erebus_226and MSDS_Erebus_227)

Figure 39 Boat mooring points (MSDS_Erebus_232)

Figure 40 Sea wall (MSDS_Erebus_237)

Figure 41 Structure (MSDS_Erebus_239), Slipway (MSDS_Erebus_304) , and Structure (MSDS_Erebus_239)

Figure 42 Concrete post (MSDS_Erebus_307)

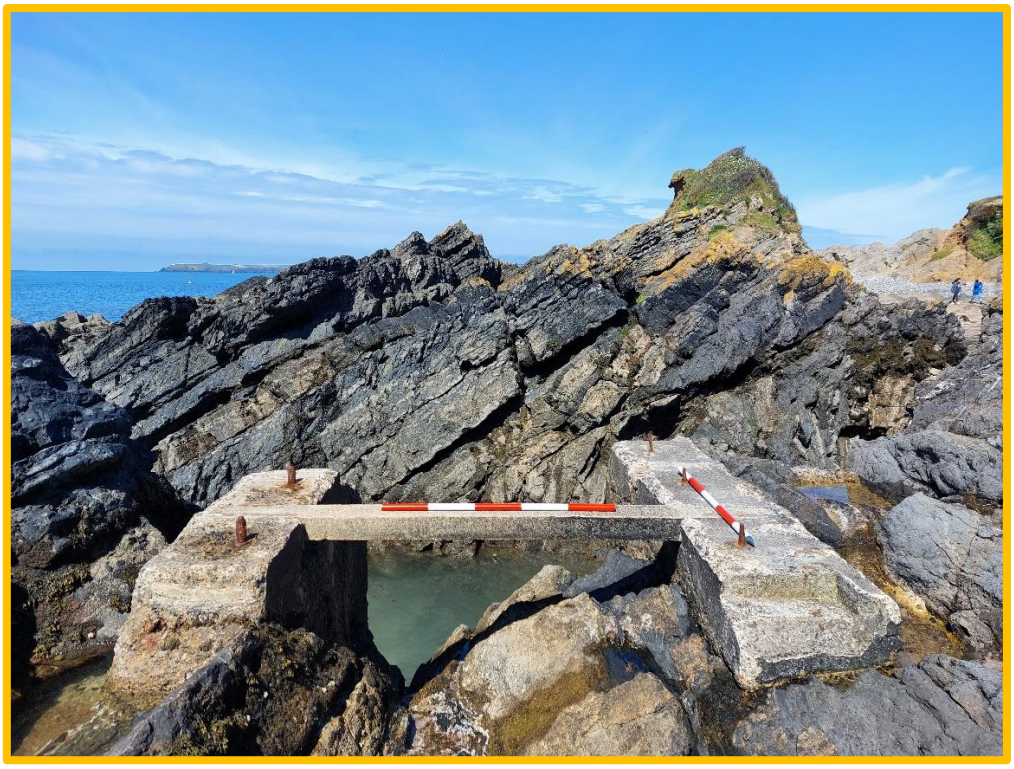

Figure 43 Possible crane base (MSDS_Erebus_309)

Figure 44 Slipway (MSDS_Erebus_311)

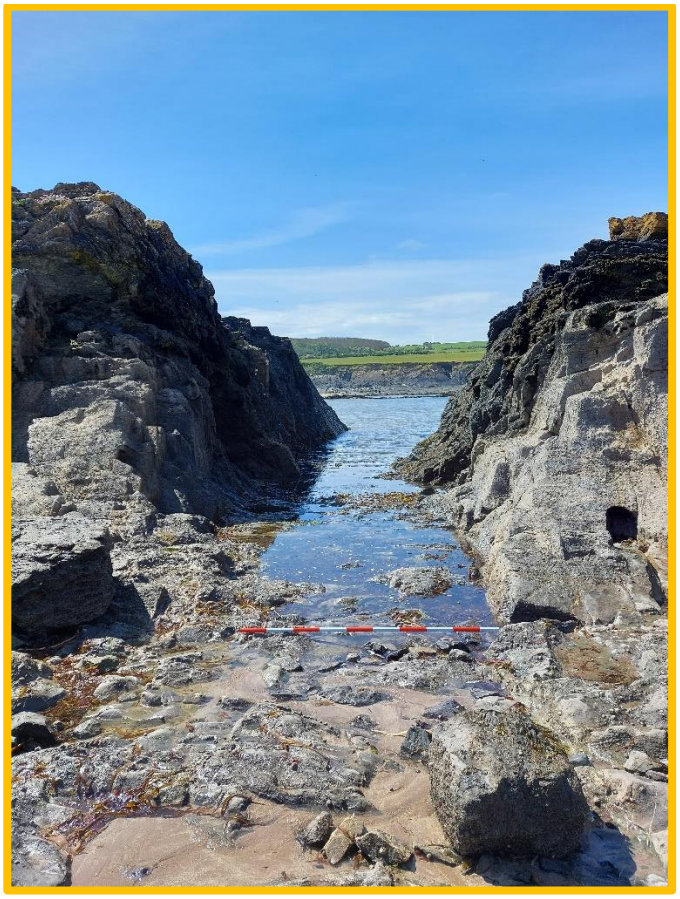

Figure 45 Rock-cut channel (MSDS_Erebus_344)

Figure 46 Charcoal horizon (MSDS_Erebus_346)

Figure 47 Charcoal horizon (MSDS_Erebus_346)

Figure 48 Pathway (MSDS_Erebus_401)

Figure 49 Intertidal photo locations and directions