Salamander Offshore Wind Farm

Offshore EIA Report

Volume ER.A.4, Annex 17.3: Marine Archaeology and Cultural Heritage Technical Report

SALAMANDER

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Simply Blue Group

Salamander
Offshore Wind Farm

Marine Archaeology Technical Report

Produced for ERM Limited

MSDS Marine

2023/MSDS23250/1

Salamander
Offshore Wind Farm

Project Name	Salamander Offshore Wind Farm	
Client	ERM Ltd.	
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1.0 Introduction

1.0.1 MSDS Marine Limited (MSDS Marine) have been contracted by ERM Ltd. to produce a Marine Archaeology Technical Report for the Salamander Offshore Floating Wind Farm project in the North Sea (hereafter referred to as "the Salamander Project"). The assessment area combines the Offshore Development Area (Offshore Array Area and Offshore Export Cable Area) and Landfall up to Mean High Water Springs (MHWS), enclosing terrestrial elements, to the north of Peterhead, Scotland, and marine elements within Scottish territorial waters of the North Sea.

1.0.2 This document forms the marine archaeology technical report. It sets out methods for the assessment and brings together desk-based assessment and assessment of geophysical survey and hydrographic data to provide details on the marine archaeology baseline environment of the site.

1.0.3 In addition to the results of desk-based research this report contains the archaeological assessment of geophysical survey data. The survey was conducted by Ocean Infinity between 8th August 2022 and 1st September 2022. The survey resulted in the mobilisation of a Multibeam Echo Sounder (MBES), a Sidescan Sonar (SSS), a Magnetometer, a parametric Sub-bottom Profiler (SBP), and 2-Dimensional Ultra High Resolution Seismic (2D UHRS). In addition, the survey campaign included the collection of environmental data[1].

2.0 Project location and status

2.0.1 The Salamander Project is located c. 35 km east of Peterhead in the northeast of Scotland, with an outline area of interest of 33.25 km^2 (Offshore Array Area) in waters up to 115 m deep. The Offshore Export Cable Corridor is c. 35 km in length with an area of c. 47 km^2. The Salamander Project location is shown in Figure 1.

[1] Ocean Infinity, 2022. *Integrated Geophysical and Habitat Assessment Report, Salamander Offshore Floating Wind*. Report for Simply Blue Energy (Scotland) Ref: 10452-SBE-OI-SUR-REP-SURVEYRE

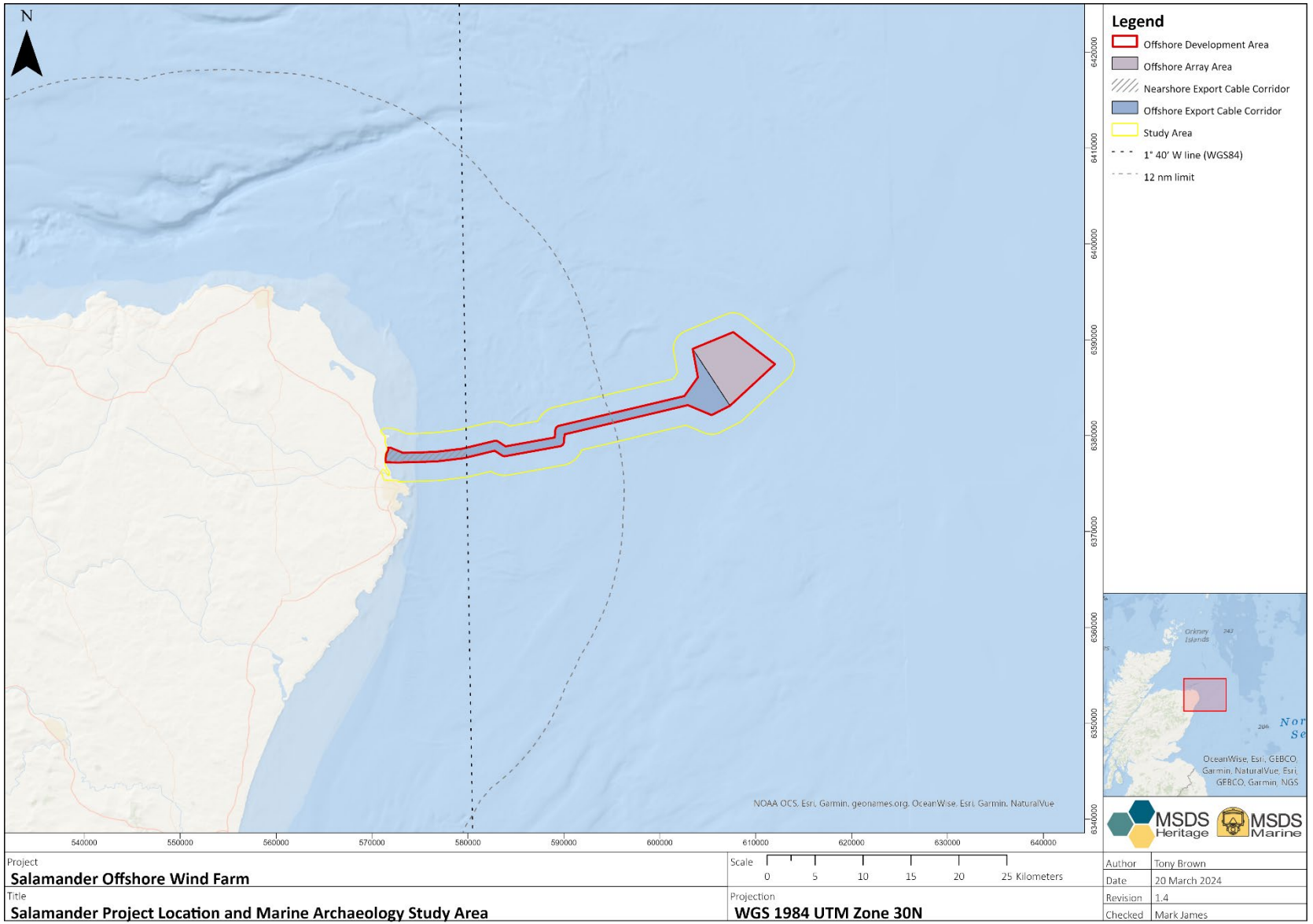


Figure 1: Salamander Project Location and Marine Archaeology Study Area.

3.0 Legislation, Policy and Guidance

3.0.1 The assessment has been conducted in line with relevant legislation, policy and guidance. The Salamander Project extends up to mean high-water springs (MHWS) and as such both marine and terrestrial legislation, policy and guidance will be relevant. A full list of legislation is provided as part of the EIAR in **Volume ER.A.2, Chapter 2: Legislative Context and Regulatory Requirements** and **Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage**, however of particular relevance are:

3.1 Key Legislation

- Marine (Scotland) Act (2010);
- Planning (Listed buildings and Conservation Areas) (Scotland) Act (1997);
- Ancient Monuments and Archaeological Areas Act (1979);
- Protection of Military Remains Act (1986);
- Historic Environment Scotland (HES) Act (2014); and
- Environmental Assessment (Scotland) Act (2005).

3.2 Key Policy, Plans, and Supporting Documents

- Marine Policy Statement (2011);
- Scottish National Marine Plan (2015);
- Scottish Planning Policy (SPP) (2014);
- Scottish Government Our Place in Time – The Historic Environment Strategy for Scotland (2014) (note this document is currently under review);
- Historic Environment Policy for Scotland (HEPS 2019);
- Historic Environment Scotland Circular 12; and
- Planning Advice Note 2/2011: Planning and Archaeology.

3.3 Key Guidance

UK and Scotland

- Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland (HES and NatureScot 2018);
- Standard and Guidance for Historic Environment Desk-Based Assessment (CIfA 2020);
- Designation Policy and Selection Guidance (DPSG 2019);

- Historic Environment Circulars;
- Historic Environment Scotland's Managing Change in the Historic Environment series;
- Key Agencies Group National and Major Developments: An Agency Joint Statement on Pre-application Engagement;
- Scottish Government Planning Advice Notes, in particular 2/2011: Planning and Archaeology; Planning Advice Note 1/2013: Environmental Impact Assessment (amended 2017); Planning Circular 1/2017: Environmental Impact Assessment Regulations (Scottish Government 2017); and
- Guidance on Heritage Impact Assessments for Cultural World Heritage Properties (ICOMOS 2011).

Marine

- Code of Practice for Seabed Development (Joint Nautical Archaeology Policy Committee, 2008);
- COWRIE Historic Environment Guidance for the Offshore Renewable Energy Sector; (Wessex Archaeology, 2007);
- Marine Geophysics Data Acquisition, Processing, and Interpretation: Guidance Note (EH, 2013, note MSDS Marine are currently in the process of updating this guidance on behalf of Historic England);
- Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (Gribble and Leather, 2011);
- Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (The Crown Estate 2021); and
- Protocol for Archaeological Discoveries: Offshore Renewables Projects (The Crown Estate 2014).

3.4 Marine legislation, policy and plans

3.4.1 The key legislation in the marine zone (seaward of MHWS) is the Marine (Scotland) Act 2010. Implementation of this act enables delivery for international obligations and Directives including the EU Marine Spatial Planning Directive and the Marine Strategy Framework Directive.

3.4.2 In accordance with Part 2 of the Marine (Scotland) Act 2010, Scottish Ministers and public authorities must, in carrying out any statutory function which affects the Scottish marine area, act in a way best calculated to further the achievement of sustainable development. This applies both to the marine planning functions and bodies as well as terrestrial planning functions made within the marine area (e.g., relating to fish farms).

3.4.3 The Marine (Scotland) Act 2010 refers to heritage specifically and sets out provision for the designation of Marine Protected Areas, including historic marine protected areas (HMPAs), by Scottish Ministers.

3.4.4 The UK Marine Policy Statement (MPS) (2011) underpins the Marine (Scotland) Act 2010 and other marine legislation in the UK and supports sustainable development in the UK marine area. The MPS sets out a shared vision for the whole UK marine area and provides a framework for the preparation of the emerging marine plans. The MPS sets out the approach to the historic environment, and states that:

'The view shared by the UK Administrations is that heritage assets should be enjoyed for the quality of life they bring to this and future generations, and that they should be conserved through marine planning in a manner appropriate and proportionate to their significance'[2].

3.4.5 In paragraph 2.6.6.8 the MPS further states that:

'The marine plan authority, working with the relevant regulator and advisors, should take account of the desirability of sustaining and enhancing the significance of heritage assets and should adopt a general presumption in favour of the conservation of designated heritage assets within an appropriate setting. The more significant the asset, the greater should be the presumption in favour of its conservation'[3].

3.4.6 The Scottish National Marine Plan (2015) conforms with the UK Marine Policy Statement. The National Marine Plan covers both the Scottish marine area (out to 12 nm) and the UK marine area which is adjacent to Scotland (12 to 200 nm). The National Marine Plan recognises that marine activities can affect the terrestrial environment and communities and therefore is consistent with the National Planning Framework 4. The National Marine Plan (2015) sets out policies in relation to heritage, in particular:

'GEN 6 Historic environment: Development and use of the marine environment should protect and, where appropriate, enhance heritage assets in a manner proportionate to their significance'[4].

3.4.7 Regional marine plans are also in development. The Scottish Marine Regions Order (2015) set out the boundaries of the 11 Scottish Marine Regions, which run from MHWS out to 12 nautical miles. These regions will each have Regional Marine Plans, which are currently in development by Marine Planning Partnerships (consisting of local authorities and communities of interest). Marine Planning Partnerships will be statutory consultees on marine licences applications submitted to Marine Scotland. Terrestrial planning authorities are advised to consult Marine Planning Partnerships on fish farming applications and other developments with implications for the marine environment.

3.4.8 The Offshore Development Area lies within the North East Marine Region. The regional plan is currently being developed.

[2] MPS. 2011. Paragraph 2.6.6.3.
[3] *Ibid*. Paragraph 2.6.6.8.
[4] https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2015/03/scotlands-national-marine-plan/documents/00475466-pdf/00475466-pdf/govscot%3Adocument/00475466.pdf Pp. 19.

4.0 Aims and objectives

4.0.1 The overall aim of this assessment is to set out appropriate baseline data relating to the Offshore Development Area, in order that any impacts associated with the proposals can be properly identified and mitigated where necessary. Following best practice guidance, including the Chartered Institute for Archaeologists (CifA[5]) and Historic Environment Scotland (HES), this assessment has the following objectives:

- Identify designated and non-designated heritage assets within the Offshore Development Area;
- Identify the potential for previously unrecorded heritage assets to be present within the Offshore Development Area;
- Identify heritage assets in the surrounding area that may be affected by the proposal;
- Establish the significance of the remains; and
- Identify any biases, uncertainties and gaps within the data and make recommendations for further work where required.

4.0.2 Assessment of impacts and recommended mitigation strategies are set out within the Environmental Impacts Assessment Report (EIAR) **Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage**, which this document supports.

[5] CIfA. 2020. *Standard and guidance for historic environment desk-based assessment*. https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf

5.0 Methodology

5.1 Consultation

5.1.1 Historic Environment Scotland was consulted during scoping for comment on both the marine and terrestrial elements of the Salamander Project with regards to archaeology and cultural heritage. The response welcomed the proposed assessment ensuring impacts to heritage assets located beyond the Offshore Development Area, via indirect methods, are to remain within the assessment. Full details on the scoping response and assessment are provided in Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage.

5.1.2 Aberdeenshire Council were also consulted during scoping. Their responses in regards to archaeology and cultural heritage focused on onshore assets alone and is presented as part of a separate onshore EIAR.

5.2 Scope

5.2.1 This section provides an overview of the methods used to inform the assessment. The Offshore Development Area and Study Area are described first, followed by data sources and detailed methods for the review of these. The Offshore Development Area comprises the Offshore Array Area and Offshore Export Cable Corridor, up to Mean High Water Springs (MHWS). This assessment focuses on the archaeological resource and potential of the Offshore Development Area.

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

- Palaeolandscape and submerged prehistory;
- Maritime and coastal remains; and
- Aviation remains.

5.2.3 The onshore heritage assets associated with the settings assessment are not discussed within this technical report. A separate report has been produced combining assets affected by the onshore and offshore development (Volume ER.A.4, Annex 17.2: Offshore Setting Assessment).

5.3 Study Area

5.3.1 The Study Area assessed includes the Offshore Development Area and a 2 km buffer measured from the boundaries of the Offshore Development Area (Figure 1). The detailed assessment extends to MHWS, although relevant information within the terrestrial part of the Study Area is also included in the discussion, to better characterise the archaeological character and potential for remains. In order to focus the discussion, non-designated heritage assets greater than 200 m from MHWS have not been examined in detail nor illustrated.

5.3.2 The scoping report originally recommended a larger study area of 15 km measured from the Offshore Array Area, noting that it may be possible to reduce this upon review of further information. Review of the surrounding maritime archaeological records alongside the Project Design Envelope and Volume ER.A.3, Chapter 7: Marine Physical Processes suggests that direct impacts would be contained within the Offshore Development Area and indirect impacts

(scour, sediment transportation, etc.) are unlikely to result in identifiable changes beyond 500 m from the source activity. As such, it is considered that a 2 km buffer from the Development Area to form the Study Area is suitable for capturing a proportionate scope of relevant data. The reduced Study Area was submitted to HES for comment in November 2023 and the absence of objection has been taken as acceptance (see **Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage, Table 17-2**).

5.4 Sources

5.4.1 The baseline survey involved consultation of readily available archaeological and historical information from documentary and cartographic sources and repositories including:

- List of wrecks designated under the Protection of Military Remains Act, 1986 (digitised and available online via the government Marine Map portal[6]);
- Historic Environment Scotland (designated heritage assets);
- The United Kingdom Hydrographic Office (UKHO) Wrecks, Obstructions and Fouls records;
- Canmore data from the National Record of the Historic Environment (NRHE);
- Aberdeenshire Historic Environment Record (HER) data;
- British Geological Survey (BGS) data and reports;
- Existing geological, geophysical, and geotechnical information accessed via the BGS GeoIndex (Offshore)[7];
- Other secondary sources consulted include relevant literature from journals, publications and unpublished archaeological reports; and
- Site-specific geophysical and hydrographic data collected by Ocean Infinity during August and September 2022 (see Section 6.0).

5.4.2 All sources have been used to develop an understanding of the heritage baseline within the Study Area throughout the Quaternary period. This data is assessed and presented chronologically within the report, beginning with the potential for submerged prehistoric landscapes. These sources were assessed, and information compiled into a gazetteer for the Study Area (Appendix A and B).

5.5 Chronology

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

[6] https://explore-marine-plans.marineservices.org.uk/
[7] BGS. Offshore GeoIndex. Accessed http://mapapps2.bgs.ac.uk/geoindex_offshore/home.html#

- 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 641 BC occurred 2,664 years ago and a date of 1066 AD occurred 957 years ago (correct as of 2023);

- 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 14C to 12C, making dating subsequent to this date unreliable). For example, a date of 11,700 Before Present (BP) occurred 11,773 years ago (correct as of 2023) and could also be presented as 9,749 BC, noting that there is no 'year zero', so 1 is subtracted from each date; and

- 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.

5.5.2 This assessment will use both BP and BC dates. For events or sites that pre-date 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, such as the development of the current coastlines of the UK in approximately 6,000 BP.

Archaeological periods and Quaternary chronology

5.5.3 The main archaeological periods discussed in Scotland are listed in Table 1 and are derived from HES's Scottish Archaeological Periods & Ages[8].

5.5.4 The Quaternary chronology of the UK is outlined in Table 2. Marine Isotope Stages (MIS) are alternating warm and cold periods derived from oxygen isotope data taken from deep sea core samples.

[8] https://heritagedata.org/live/schemes/scapa.html

Broad Period	Sub Period	Dates
Palaeolithic	Lower	790,000 – 300,000 BP
	Middle	300,000 – 45,000 BP
	Upper	45,000 – 12,000 BP
Mesolithic	Early	10,000 – 7000 BC*
	Late	7000 – 4000 BC
Neolithic	Early	4300 – 3500 BC
	Middle	3500 – 2900 BC
	Late	3000 – 2500 BC
Chalcolithic		2500 – 2200 BC
Bronze Age	Early	2200 – 1500 BC
	Middle	1500 – 1100 BC
	Late	1100 – 800 BC
Iron Age	Early	800 – 300 BC
	Middle	300 BC – 300 AD
	Late	300 – 500 AD
	Long	800 BC – 800 AD
Early Medieval		400 – 1093 AD
Medieval		1093 – 1603 AD
Post Medieval		1603 – 1900 AD
Modern		1901 – Present

Table 1: Archaeological periods in Scotland.

* From the Mesolithic, BC is the standard date format.

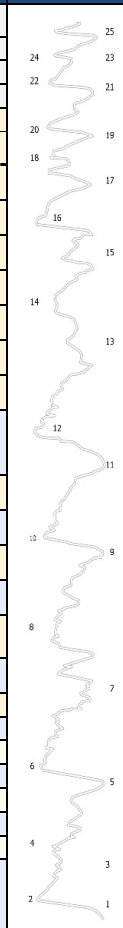
Stage		Age		Climate	Marine Isotope Stage		Epochs and Periods		
Main	Sub.	Start	End		Stages	Record			
Beestonian		970,000	936,000	Interglacial	25		Pleistocene	Early Pleisto.	Lower Palaeolithic
		936,000	917,000		24				
		917,000	900,000	Interglacial	23				
		900,000	866,000	Stadial	22				
		866,000	814,000	Sequence poorly understood but evidence for a series of small expansions of the British Ice Sheet marking at least 4 interstadials and 5 warm episodes.	21				
		814,000	790,000		20				
Bruhnes-Matuyama reversal (c. 780kBP)		790,000	761,000		19			Middle Pleistocene	
Cromerian Complex		761,000	712,000		18				
		712,000	676,000		17				
		676,000	621,000		16				
		621,000	563,000		15				
		563,000	524,000		14				
		524,000	478,000		13				
Anglian		478,000	424,000	Stadial	12				
Hoxnian		424,000	374,000	Interglacial	11				
Wolstonian/ Saalian complex	Unnamed	374,000	337,000	Stadial?	10				
	Purfleet	337,000	300,000	Interglacial	9				Middle Palaeolithic
	Early	300,000	243,000	Stadial?	8				
	Aveley	243,000	191,000	Interglacial	7				
	Late	191,000	123,000	Stadial	6				
Ipswichian		123,000	109,000	Interglacial	5e			Late Pleistocene	
Devensian		109,000	96,000	Stadial	5d				
	Early	Chelford	96,000	87,000	Interstadial	5c			
		87,000	82,000	Stadial	5b				
		Brimpton	82,000	71,000	Interstadial	5a			
		71,000	57,000	Stadial	4				
	Mid	Upton Warren	57,000	29,000	Interstadial	3			Upper Pal
	Late	Dimlington	29,000	14,700	Stadial	2			
		Windemere	14,700	12,900	Interstadial				
		Loch Lomond	12,900	11,700	Stadial				
Holocene		11,700	Present	Interglacial	1		Holocene		Meso.

Table 2: Quaternary chronology (based on Marshall et al. 2020[9], with dates from Lisiecki and Raymo[10])

[9] Marshall, P., Bayliss, A., Grant, M., Bridgland, D.R., Duller, G., Housley, R., Matthews, I., Outram, Z., Penkman, K.E.H., Pike, A., Schreve, D. & Xuan, C. 2020. *6390 Scientific dating of Pleistocene sites: guidelines for best practice. Consultation Draft*. Swindon: Historic England.

[10] Lisiecki, L. E. & Raymo, M. E. 'A Pliocene-Pleistocene stack of 57 globally distributed benthic 18O records'. *Paleoceanography*. **20**.

6.0 Methodology: Archaeological assessment of geophysical and hydrographic data

6.1 Data Collection

6.1.1 A survey was conducted by Ocean Infinity between 8th August 2022 and 1st September 2022. The survey resulted in the mobilisation of a Multibeam Echo Sounder (MBES), a Sidescan Sonar (SSS), a single Magnetometer, a parametric Sub-bottom Profiler (SBP), and Sparker system. In addition, the survey campaign included the collection of environmental data[11], not discussed further here.

6.1.2 The survey area covered the Offshore Development Area, part of the Study Area (particularly around the Offshore Array Area) and an area beyond the Study Area, as shown by Figure 2 to Figure 4. The survey area beyond the Offshore Development Area will be specifically termed the 'Wider Survey Area' henceforth, inclusive of that part of the survey area within the Study Area and beyond to the full extent of the survey area.

6.1.3 The SSS, Magnetometer and Sparker were towed behind the vessel and the MBES and SBP were mounted to the vessel. Survey operations were conducted from MV *Northern Franklin*, a dedicated survey vessel of 74 m. The equipment specification for the surveys is presented in Table 3 below.

6.1.4 The survey was planned with a line spacing of 85 m for the main lines, and 1,000 m for the cross lines; all sensors were acquired along each survey line with planned coverage largely achieved (Figure 2). The line spacing and coverage was suitable for the bathymetry data to achieve 100% coverage (including sufficient overlap) of the seabed. The line planning ensured that approximately 200% seabed coverage of SSS data was achieved across the majority of the survey area, noting the data gap detailed below.

6.1.5 The Salamander Project has been unable to acquire site specific data in the nearshore approximately 8 km region of the Offshore Export Cable Corridor (west of the 1°40 line to shore, hereafter referred to as the "Nearshore Export Cable Corridor"; see Figure 1). Due to safety restrictions related with deployed creels, it was not possible for surveys to take place in this nearshore region.

6.1.6 An example of the SSS coverage in Figure 3, and the MBES coverage in Figure 4.

[11] Ocean Infinity, 2022. *Integrated Geophysical and Habitat Assessment Report, Salamander Offshore Floating Wind*. Report for Simply Blue Energy (Scotland) Ref: 10452-SBE-OI-SUR-REP-SURVEYRE

Sensor	Manufacturer	Model	Frequency
Sidescan Sonar	EdgeTech	CSS-2200	300 / 600 kHz 75 m range
Multibeam	Kongsberg	EM2040D	300 kHz
Magnetometer	Geometrics	G-882	10 Hz sample rate
SBP	Innomar	Medium 100	8 kHz
2D UHRS (Sparker)	2 x Geo-Sense 96 2 x Geo-Spark	2 x Geo-Sense 96 2 x Geo-Spark	1000 j (power)

Table 3: Geophysical and hydrographic sensor specifications.

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

- Sidescan Sonar: ensonification of anomalies > 0.5 m
- Multibeam Bathymetry: ensonification of anomalies > 2.0 m
- Magnetometer (TVG): 5 nT threshold for anomaly picking
- Sub bottom profiler: penetration of up to 8-10 m (occasionally 30 m)
- Sparker: penetration of 76 m

6.2 Positioning

6.2.1 All data were collected with reference to the World Geodetic System 1984 (WGS84) datum and Universal Transverse Mercator (UTM) Zone 30 North projection (WGS84 Z30N). All vertical depths are relative to LAT and were reduced to LAT using Vertical Offshore Reference Frames (VORF). Positions and charts within this report are presented in World Geodetic System 1984 (WGS84) datum and Universal Transverse Mercator (UTM) Zone 30 North projection (WGS84 Z30N).

6.2.2 Towed sensors were positioned using an Ultra Short Baseline (USBL) positioning system to ensure positional accuracy throughout the survey. USBL ensures the actual position of the sensor is recorded, as opposed to when the position is estimated based upon the direction of the vessel and the amount of cable out (layback).

6.2.3 Although the accuracy of the USBL system is dependent on the angle, and the distance of the beacon from the transceiver, tolerances of between 0.5 m and 2.0 m can be achieved. Positional accuracy is further increased through the correlation of the SSS dataset with the MBES dataset.

6.2.4 Surface and sub-sea position sensors specifications are detailed below in Table 4 below.

Sensor	Manufacturer	Model	Accuracy
Surface positioning	Applanix	POS MV 320	Roll / pitch 0.015° Heading 0.03° Position 0.02 m
Sub-sea positioning	Kongsberg	HiPAP 502	1% slant range

Table 4: Position sensor specifications.

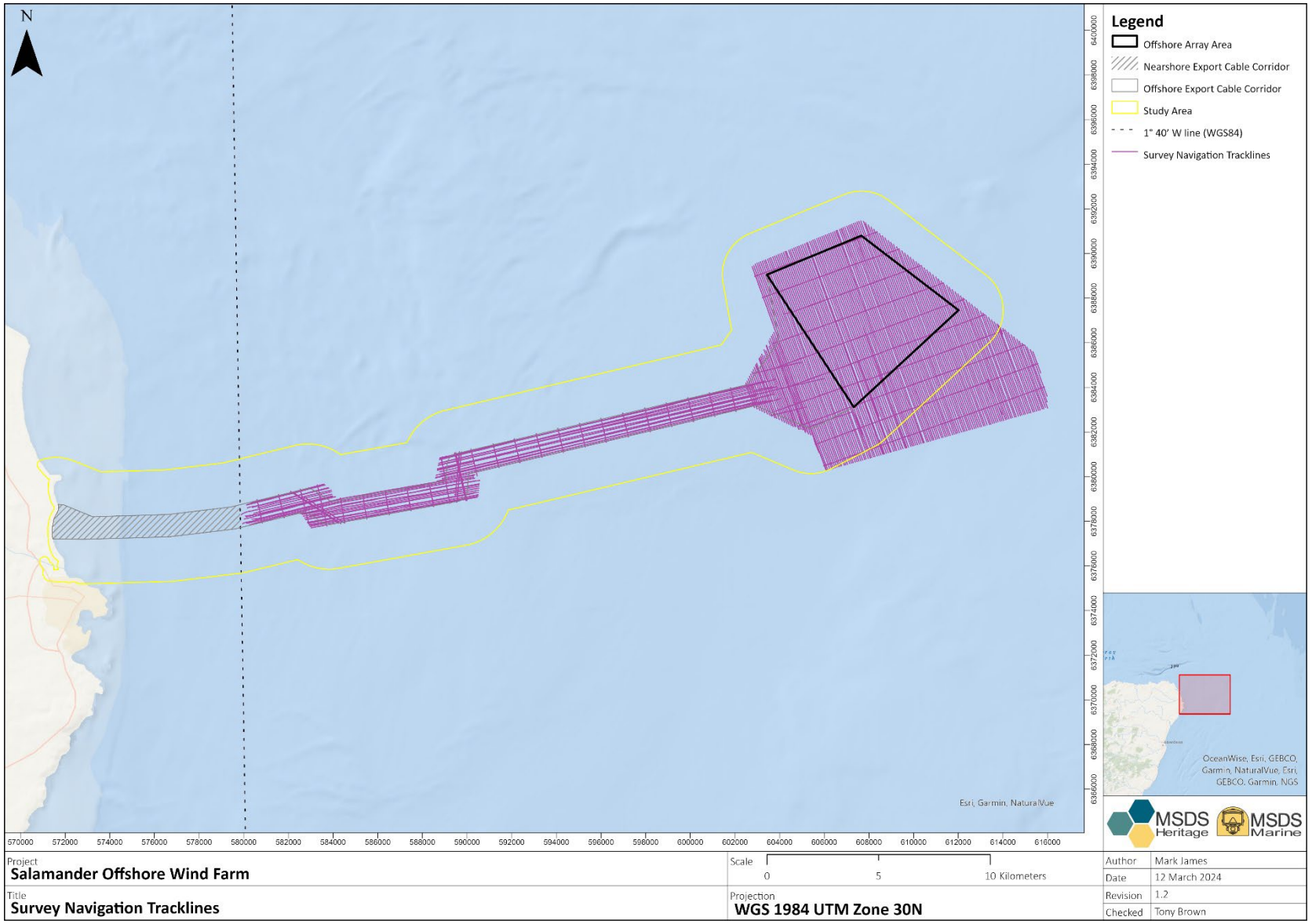


Figure 2: Survey Navigation Tracklines.

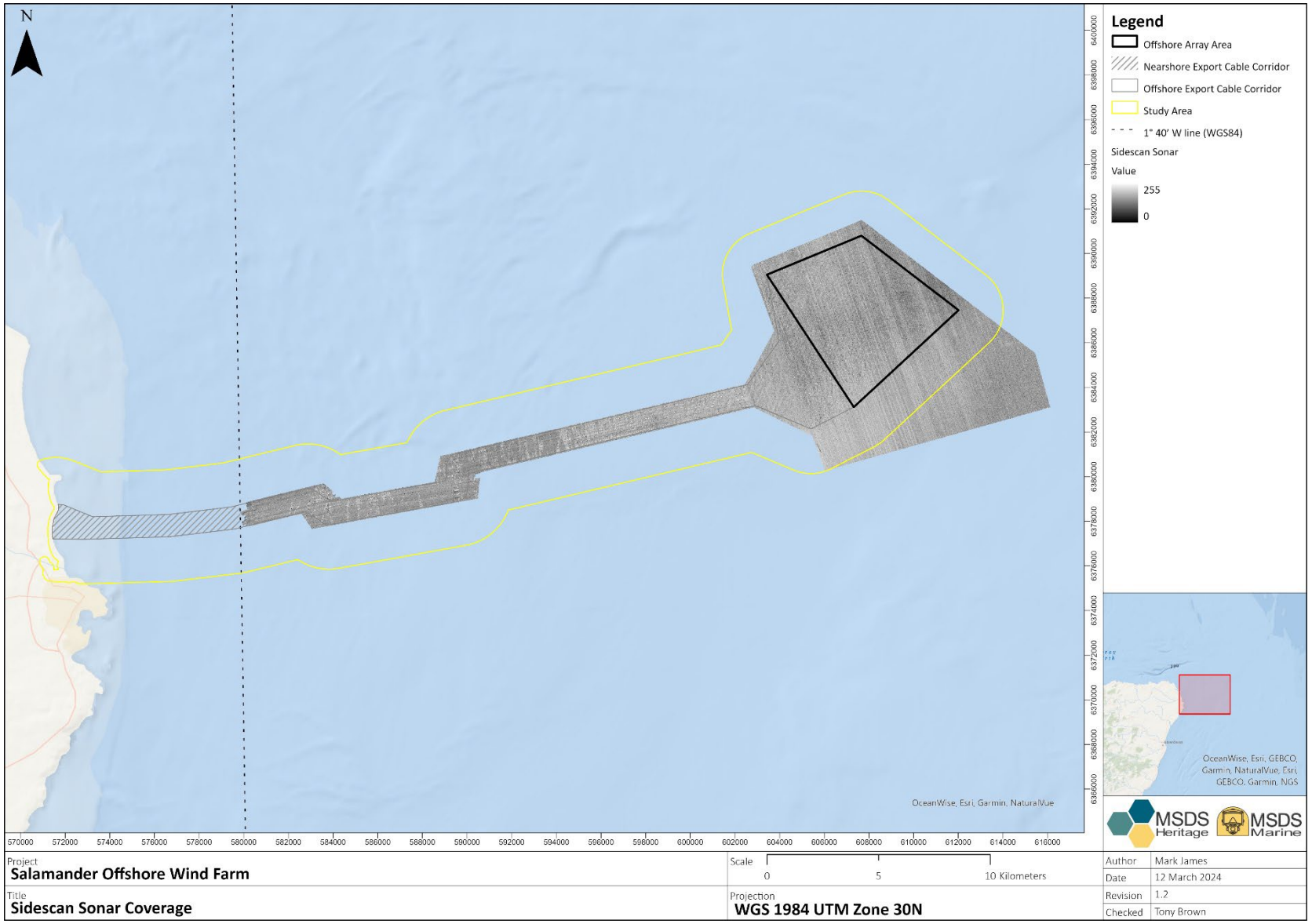


Figure 3: Sidescan Sonar Coverage.

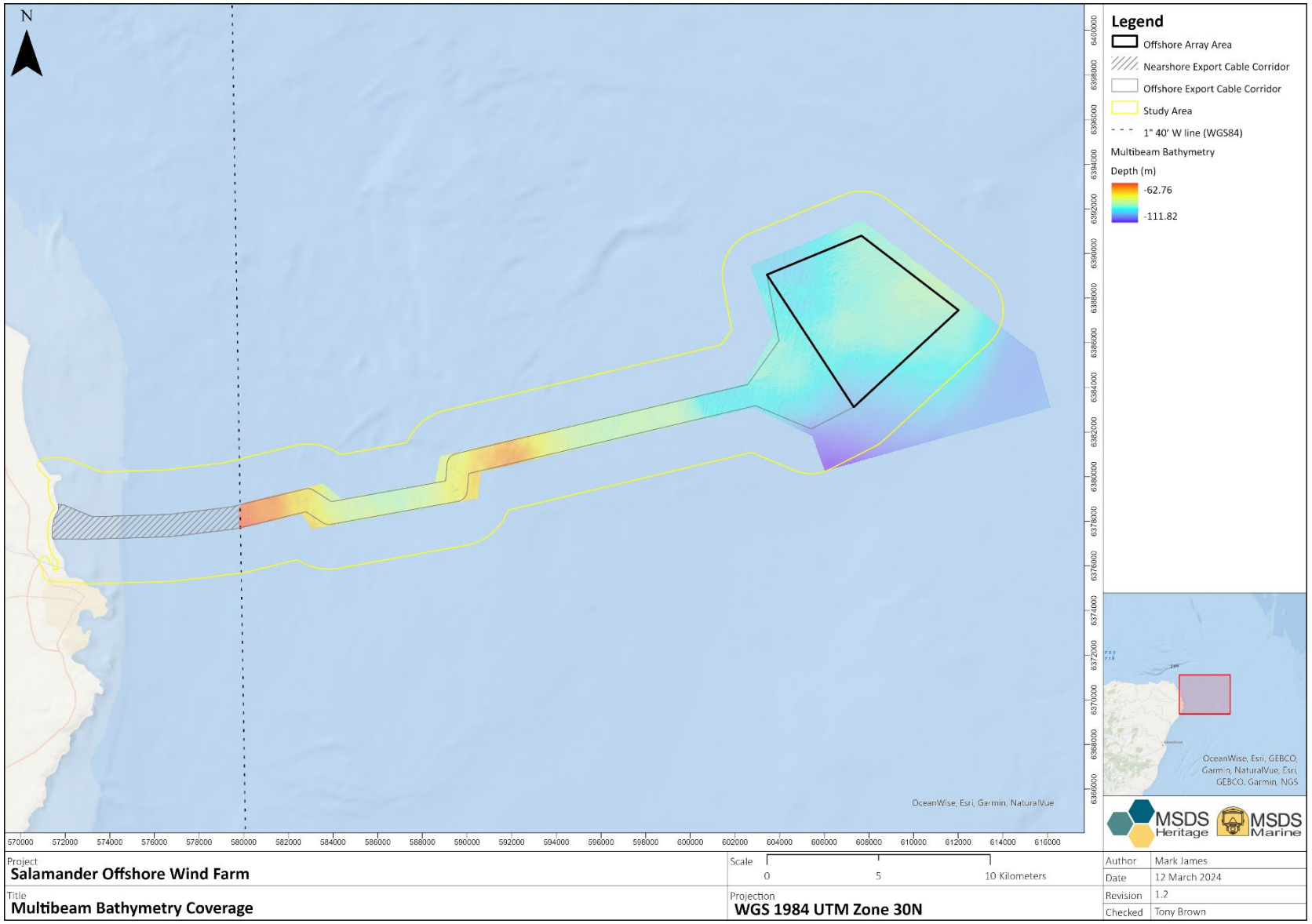


Figure 4: Multibeam Bathymetry Coverage.

6.3 Data deliverables to MSDS Marine

6.3.1 MSDS Marine were provided with the survey deliverables by ERM Ltd, including both raw and processed data, alongside interpretations and operations reports. The primary deliverables are detailed in Table 5 below.

Sensor	Data type	Format
Sidescan Sonar	Raw lines (LF and HF)	.xtf
	Processed lines (HF)	.xtf
	Mosaic (HF) 0.5 ppm	.tif
	Contacts	.shp and .csv
UHRS and SBP data (both)	Raw lines	.sgy
	Processed lines	.sgy
	Isopach	.shp
	Horizons	.tif
Magnetometer (TVG)	Raw lines	.csv
	Contacts	.csv
Multibeam bathymetry	Raw lines	.xyz
	Grids (at 0.2 and 1.0 m)	.xyz
	Mosaic (at 1.0 m)	.tiff
GIS	Geodatabase	.gdb
Reports	Interpretation report	.pdf
	Operations report	.pdf

Table 5: Data deliverables to MSDS Marine.

6.4 Data quality and limitations

6.4.1 The Salamander Project has been unable to acquire site-specific data in the nearshore approximately 8 km region of the Offshore Export Cable Corridor (west of the 1°40 line to shore, hereafter referred to as the "Nearshore Export Cable Corridor"). Due to safety restrictions related with deployed creels, it was not possible for surveys to take place in this nearshore region.

Sidescan Sonar (SSS)

6.4.2 The SSS data covered the extents of the Offshore Development Area seawards of c. 8 km from shore, providing coverage of between 200-300% (excluding the nadir – the area of no data retrieval directly below the SSS towfish). The data were generally of good quality, with minimal interference or data degradation caused by environmental factors, or the simultaneous use of different sensors. Some data degradation due to motion was noted in places likely a result of

poor weather, however, this was not significant and does not affect the overall quality of the data and the suitability for archaeological interpretation, particularly with 200% coverage being achieved.

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

6.4.4 Seabed sediment composition varies across the Offshore Development Area. Within the Offshore Export Cable Corridor the seabed is predominantly comprised of gravelly sand and sandy gravel to c. 28 km seawards of the shore. The remainder of the Offshore Export Cable Corridor and the majority of the Offshore Array Area is comprised of gravelly sand, with the exception of areas to the north-east and south-east which comprise predominantly sand (Figure 5).

6.4.5 Seabed features within the Offshore Export Cable Corridor seaward of c. 24 km, and the Offshore Array Area, are characterised by sand waves and ripples. The remainder of the Offshore Export Cable Corridor seaward of 8 km is largely characterised by large areas of occasional boulders interspersed with ripples, and some sand waves. Evidence of trawler activity is visible although largely confined within the area up to c.18 km seaward of the shore (Figure 6).

6.4.6 Prominent features, such ripples and sand waves, can cause obstructions to the line of sight of sonar data, in particular the SSS, the data from which is collected closer to the seabed. Typically, this is mitigated through the collection of 200% coverage SSS data, ensuring that the seabed is ensonified from two directions which was achieved. The assessment of the MBES data (which extends to 100% coverage) provides further mitigation due to the data being collected from above and thus not as susceptible to obstructions. However, the minimum object detection size is greater than that of SSS so there is always the potential that some features, particularly smaller ones of low archaeological potential, may not have been identified within the data.

Multibeam Bathymetry (MBES)

6.4.7 The MBES data covered the extents of the Offshore Development Area seawards of c. 8 km from shore, providing coverage of 100%. A review of the un-gridded point cloud data shows that the quality is good with no significant height or positioning errors that effect the overall dataset. The data density is good, and the data is able to be gridded to 1.0 m, increasing the ability to identify smaller features. Features identified within the MBES data generally correlate well with those identified in the SSS data.

6.4.8 Additional publicly available data from the Admiralty dataset were obtained for the area c. 3.2 km to c. 8 km seaward of the shore[12]. The data were obtained to establish the extents of two known wrecks within this section as data was not able to be collected in the nearshore area. The data, although listed as Single Beam Echosounder (SBES), are described as MBES data and were collected in 2009, at a resolution of 4 m. The data are referenced within this report as the '2009 MBES data'. Whilst the data appears to be of good quality, the resolution is not suitable for identifying small features of potential archaeological interest, and is limited to the

[12] Admiralty Maritime Data Solutions. *2009 HI 1155 Todhead Point to Bosies Bank Blk4 4m SB*.

identification of large features such as wrecks. As such, these data were only assessed within the extents of the Offshore Development Area boundary.

6.4.9 MBES data is considered to provide the most accurate positioning due to the direct, and fixed, correlation between the sensor, the DGPS antennas, and the Motion Reference Unit (MRU).

Magnetometer

6.4.10 Magnetometer data covered the extents of the Offshore Development Area seawards of c. 8 km from shore and was collected along the pre-defined survey line plan of 85 m. The data were sampled at 10 Hz and the data were suitable to identify anomalies with a peak-to-peak amplitude of 5 nT. It should be noted that the 85 m line spacing achieved is too great for the accurate positioning of magnetic anomalies at distances away from the survey lines but can indicate areas of archaeological potential or can be correlated with visible feature on the seabed that lie on the same plane. Due to the line spacing it is likely that buried ferrous material, particularly smaller objects, falling between the run lines will not have been identified within the data.

Sub-bottom profiler

6.4.11 The ground model is based on Innomar and Sparker data, compiled into a preliminary GIS Model and Design Considerations report[13]. The Sub Bottom Profiler (SBP) data achieved a penetration of up to c. 30 m below seafloor, while the Sparker penetrated up to 70 m and allowed interpretation of the main geological units within the survey areas. A data gap exists within the nearshore section of the Offshore Export Cable Corridor where site-specific survey data were not able to be acquired, extending to c. 8 km from the mean high-water springs (see Section 6.1). Nevertheless, the data provided an important source for understanding the geological and palaeolandscape potential.

6.4.12 SBP data is collected directly beneath the sensor and, beyond the identification of the palaeolandscape, SBP is not suited to the prospection for buried material of potential anthropogenic origin due to the wide line spacing. It can, however, be useful for the corroboration of other datasets where a survey line passes directly over a magnetic anomaly or a potentially buried feature, visible in the SSS or MBES data.

Summary

6.4.13 The data collected across the extents of the Offshore Development Area, seaward of 8 km from shore, are of good quality overall and, in the case of SSS and MBES, provided a minimum 100% coverage. SBP data were collected to a pre-determined line plan, largely providing suitable coverage and penetration for the interpretation of the palaeoenvironment. The Magnetometer data were collected to a pre-determined line plan suitable for the identification of ferrous material with a peak-to-peak amplitude of 5 nT, with the minimum detection size increasing with distance from the tracklines.

6.4.14 The data is considered of an appropriate specification, coverage and quality to undertake a robust archaeological assessment to inform the EIA process, noting that additional data collection and interpretation will be required prior to construction., including from shore to c. 8 km.

[13] Wood. 2023. *Salamander Offshore Windfarm Project: GIS Model and Design Considerations.* Unpublished report.

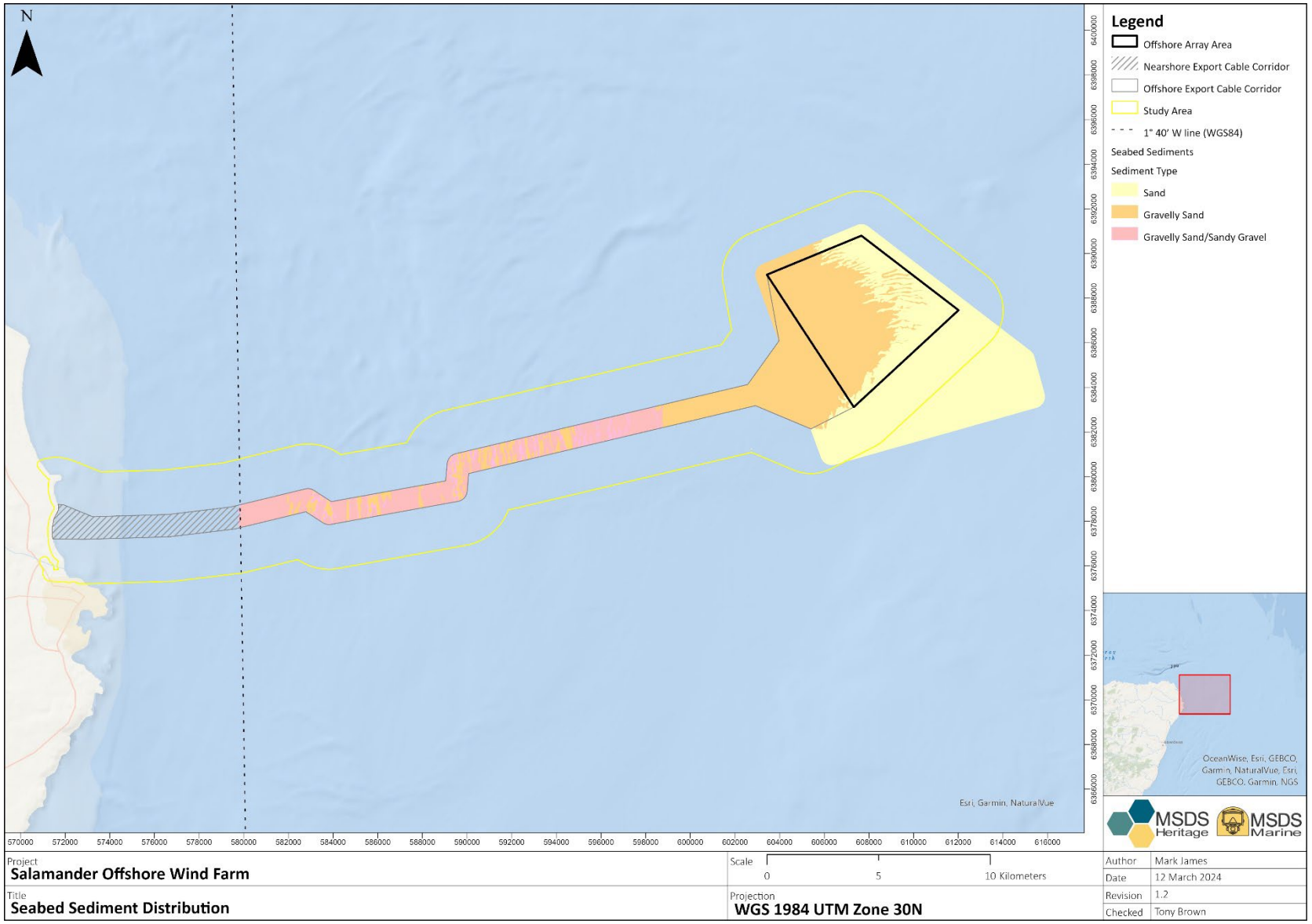


Figure 5: Seabed Sediment Distribution.

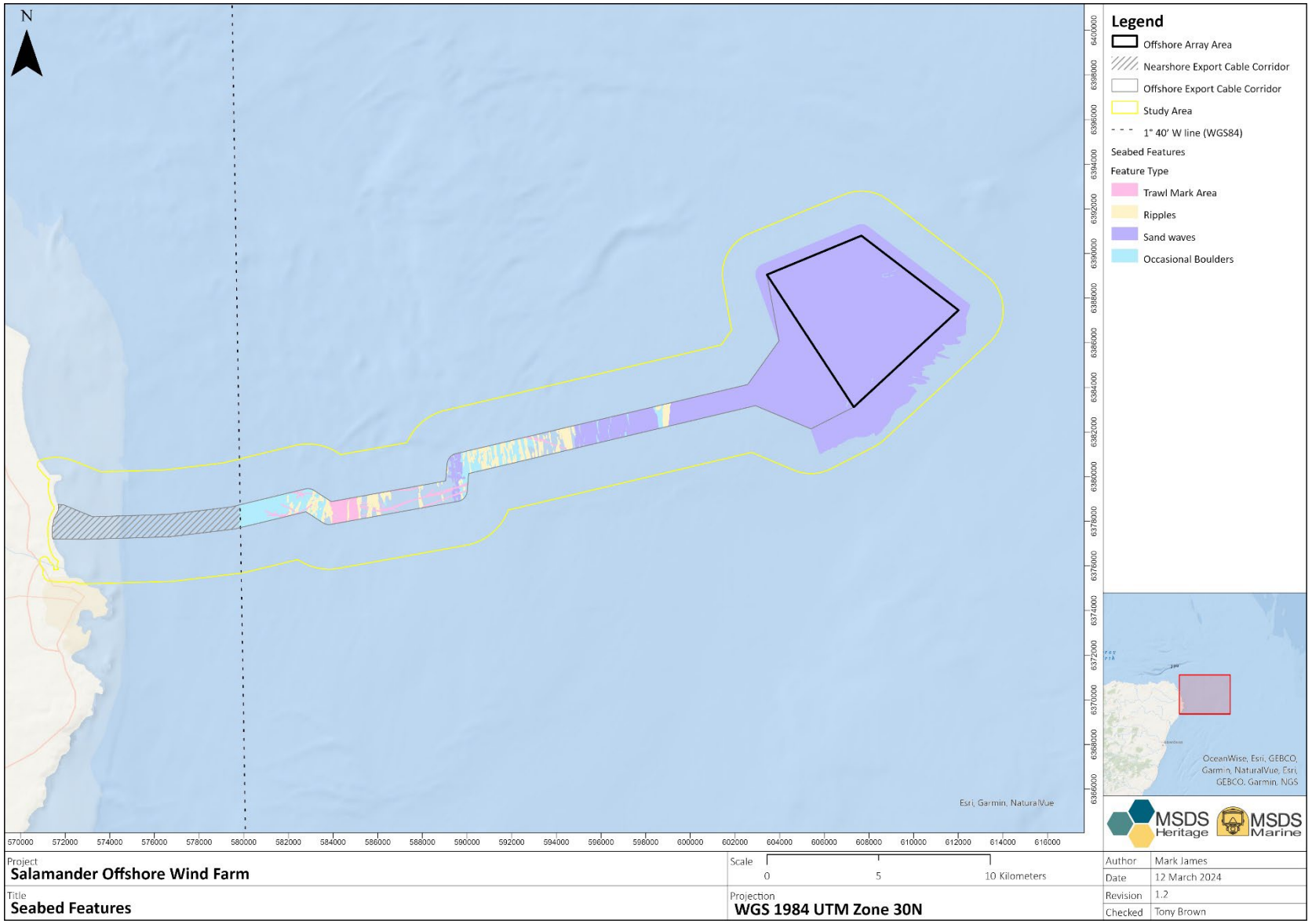


Figure 6: Seabed Features.

6.5 Archaeological assessment of data

6.5.1 The archaeological assessment of data was undertaken by a qualified and experienced maritime archaeologist with a background in geophysical and hydrographic data acquisition, processing, and interpretation.

6.5.2 Following delivery of the required datasets, an initial review was undertaken to gain an understanding of the geological and topographic make-up of the survey area. Within the extent of the survey area the potential for variations in the seabed are high and can affect the interpretation of anomalies (see Section 6.4).

6.5.3 The assessment considers the full extents of the survey data, including both the Offshore Development Area and Wider Survey Area (see Section 6.1.2). The assessment of the National Record of the Historic Environment Scotland (Canmore), Historic Environment Records (HER), and United Kingdom Hydrographic Office (UKHO) was undertaken within the extents of the Offshore Development Area and Study Area.

6.5.4 Whilst some of the data extends beyond the Offshore Development Area, the purpose of the assessment is to characterise the historic environment and therefore data from the Wider Survey Area were considered. The focus of the mitigation measures is, however, on anomalies within the extents of the Offshore Development Area, or where mitigation measures would impact within it. The Offshore Development Area (comprising the Offshore Array Area and Offshore Export Cable Corridor) and Study Area are presented in Figure 1.

Sidescan Sonar

6.5.5 SSS is considered the best tool for the identification of anthropogenic anomalies on the seabed due to the ability to ensonify small features and as such forms the basis of any archaeological assessment of data. SSS data in .xtf format were imported into Moga SeaView 5.3.64 software, navigation and positioning were checked and corrected where required, and optimal gains were applied to ensure the consistent presentation of data.

6.5.6 Data were reviewed on a line-by-line basis, and all anomalies of potential anthropogenic origin identified and recorded. Records include at a minimum an image of the anomaly (greyscale, with black as shadow), dimensions, and a description. Whilst typically only images of medium and high potential anomalies are presented with the assessment report, images of all anomalies are recorded as interpretations can change as the data assessment progresses. A rating of archaeological potential was assigned to the anomaly following the criteria outlined in Table 6 below.

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

Magnetometer

6.5.8 Magnetometer data indicates the presence of ferrous, and thus usually anthropogenic, material both on, and under the seabed. Where line spacing allows, typically to a specification for the detection of potential UXO, Magnetometer data can provide accurate positions of buried ferrous anomalies. The survey line spacing is c. 85 m which is too great for the accurate positioning of magnetic anomalies at distances away from the tracklines but can indicate areas of archaeological potential. Where possible, magnetic anomalies were correlated with

anomalies visible on the seabed.

6.5.9 Magnetometry data were provided as .csv files and as a gazetteer detailing all anomalies greater than 5 nT. An assessment was made by MSDS Marine as to the suitability of the gazetteer for archaeological interpretation. Where required the .csv Magnetometer data were imported into either Geometrics MagPick or Moga SeaView 5.3.64 software where the data was smoothed, and a 'baseline' identified and removed from the data to highlight ferrous anomalies whilst taking into account geological variations in the data.

6.5.10 Magnetic anomalies identified within the data had the position, amplitude and dimensions recorded. A rating of archaeological potential was assigned to the anomaly following the criteria outlined in Table 6 below. The data were gridded to visually identify areas where the distribution of anomalies may represent a wider feature such a buried but dispersed wreck, or modern features such as buried cable or chain.

Multibeam Bathymetry

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

6.5.12 Navigation corrected, but unprocessed, MBES data were provide to MSDS Marine as .xyz files, the data were imported into QPS Fledermaus where it was gridded and exported as a floating point raster, the raster was imported into ArcGIS Pro 3.1.2 and a hill-shaded surface applied, shading was adjusted to ensure the optimal presentation of data. The resulting 3-Dimensional image was viewed on a block-by-block basis, and all anomalies of potential anthropogenic origin identified and recorded.

6.5.13 Records include, at a minimum, an image of the anomaly, dimensions, and a description. A rating of archaeological potential was assigned to the anomaly following the criteria outlined in Table 6 below. Where the interpretation of an anomaly was unclear, the data were imported into point cloud visualisation software such as Cloud Compare, in order to view the un-gridded data. The gridded surface image was exported as a Geotiff to allow further assessment alongside other datasets.

Combined assessment

6.5.14 Following the assessment of all datasets the results were imported into ESRI ArcGIS Pro 3.1.2, 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 or span across two or more lines of data.

6.5.15 Data from the United Kingdom Hydrographic Office (UKHO), including the positions of wrecks and obstructions, and the relevant Canmore records, as well as all other relevant data such as third-party assets (cables, pipelines, etc.) 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 and a

shapefile.

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

6.5.17 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 mitigation for the historic environment.

6.5.18 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. Anomalies were named following the standard MSDS Marine convention, [PROJECTYEAR_ID], e.g., SAL23_XXX.

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 archaeological potential.

6.6 Palaeolandscape and Sub-bottom Profiler sources

6.6.1 Several sources were used for the palaeolandscape element of the assessment. The principal sources which were reviewed and assessed are set out below, while other published sources are referred to in-text.

6.6.2 The data available for the Offshore Development Area includes:

- Ground model: Wood. 2023. *Salamander Offshore Windfarm Project: GIS Model and Design Considerations;* and
- British Geological Survey (BGS) GeoIndex Offshore, Geology Viewer and Lexicon of Named Rock Units.

6.6.3 In addition, other research papers and publications from the wider area were also reviewed and have fed into this assessment including:

- Brooks *et al*. 2011. 'The Palaeogeography of Northwest Europe during the last 20,000 years';
- Clark *et al*. 2017. 'BRITICE Glacial Map, version 2: a map and GIS database of glacial landforms of the last British-Irish Ice Sheet';
- Gibbard & Clark. 2004. 'Pleistocene Glaciation Limits in Great Britain';
- Shennan *et al*. 2018. 'Relative sea-level changes and crustal movements in Britain and Ireland since the Last Glacial Maximum'; and
- Stoker *et al*. 2008. 'Lateglacial-Holocene shoreface progradation offshore eastern Scotland: a response to climatic and coastal hydrographic change'.

6.7 Palaeolandscape and Sub-bottom Profiler interpretation

6.7.1 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.

6.7.2 Sub-surface data acquired from seismic and geotechnical surveys is key to understanding the palaeolandscape potential of the Offshore Development Area. These data have been collected, reviewed and brought into an assessment which details geological conditions within the Offshore Development Area. The interpretations of the data have fed into the ground model, which incorporates both geological modelling and engineering conditions, knowledge of which is necessary for development design. Sedimentary units have been identified within the ground model, and tentatively correlated with known geological formations in the area based on the available data (see Section 8.1).

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

6.7.4 The assessment of submerged prehistoric remains seeks to identify periods in which the Offshore Development Area, or parts thereof, was dry land and inhabitable and periods in which the area lay under ice sheets or water masses, preventing habitation. Different geological formations are also associated with differing environmental conditions and thus different archaeological potential and the report therefore investigates the identified Quaternary sequence. The assessment also seeks to identify the previous environmental characteristics of the Offshore Development Area and Study Area (e.g., marine, terrestrial, lacustrine, fluvial, marsh, riverine, etc.) at different times during the Quaternary period, as this is key to understanding palaeolandscape and paleoenvironmental potential and also to how past human

populations may have interacted with these environments. Determining the potential for remains to survive is equally important. This involves consideration of the current geological makeup of the area, along with the effects of erosion and other geological forces, following the succession of glaciations and marine transgressions which have shaped the landscape.

6.8 Methodology: Assessment of significance

6.8.1 The UK Marine Policy Statement indicates that authorities should take account of the particular nature of the interest in the (heritage) assets and the value they hold for this and future generations. The Scottish National Marine Plan (2015) conforms with the UK Marine Policy Statement, and sets out policies in relation to heritage, in particular GEN 6 Historic environment: "Development and use of the marine environment should protect and, where appropriate, enhance heritage assets in a manner proportionate to their significance".

6.8.2 Both designated and non-designated heritage assets can hold significance. Significance relates to a number of factors, including, for example, whether the receptor is rare, has protected status or has importance at a local, regional, national or international scale. Designated heritage assets, such as Historic Marine Protected Areas, have high value. For non-designated remains significance is assessed with reference to a number of guidance documents including Historic Environment Scotland's Designation Policy and Selection Guidance (HES 2019) and relevant research frameworks, and in particular the Scottish Archaeological Research Framework (ScARF) Marine and Maritime theme.

7.0 Baseline Assessment

7.1 Summary of heritage assets

Designated Heritage Assets

7.1.1 No marine designated heritage assets lie within the Offshore Development Area or Study Area. This includes:

- No remains designated under the Protection of Military Remains Act (1986); and
- No Historic Marine Protected Areas.

7.1.2 One Scheduled Monument, two Listed Buildings and one Conservation Area lie within the terrestrial part of the Study Area (within 200 m of MHWS). These are listed below and shown by Figure 7:

- Scheduled Monument:
  - St Fergus's Church, old parish church (SM5622);
- Listed Buildings:
  - Old Churchyard of St Fergus (excluding SM5622), St Fergus Links, Peterhead (LB16536; Category B);
  - The Fish House, Golf Road, Peterhead (LB39847; Category B); and
- Conservation Area:
  - Peterhead Buchanhaven (CA425).

7.1.3 No World Heritage Sites, Registered Battlefields, Registered Gardens or Designed Landscapes or Properties in Care are recorded within the Study Area.

Non-Designated Heritage Assets

7.1.4 The assessment has identified 179 non-designated heritage assets within the Offshore Development Area and Study Area, comprising 15 wrecks, 36 terrestrial records (within 200 m of MHWS) and 104 documented losses (excluding 24 duplicate entries). Of the 15 wrecks, nine are represented by live UKHO records and two by dead UKHO records. The remaining four are represented by HER or Canmore records only (having no corresponding UKHO record; Figure 38; Section 11.4).

7.1.5 Three terrestrial assets (TI_016, TI_023 & TI_026) are recorded within the westernmost part of the Offshore Export Cable Corridor, however, these are understood to represent duplicate records of Second World War pillboxes situated slightly west beyond the Offshore Export Cable Corridor, above MHWS (Figure 8; Figure 39; Section 11.4.48).

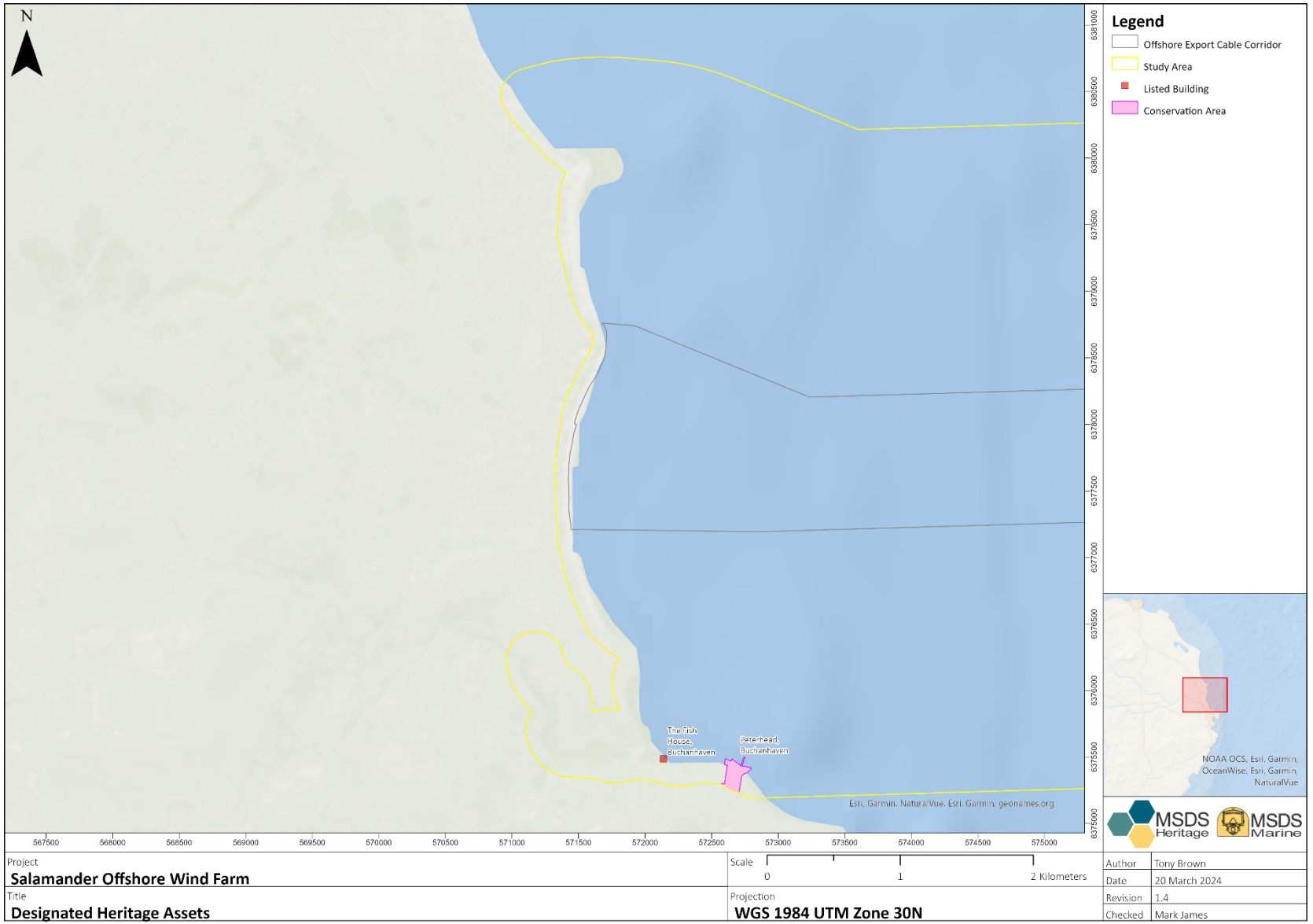


Figure 7: Designated Heritage Assets.

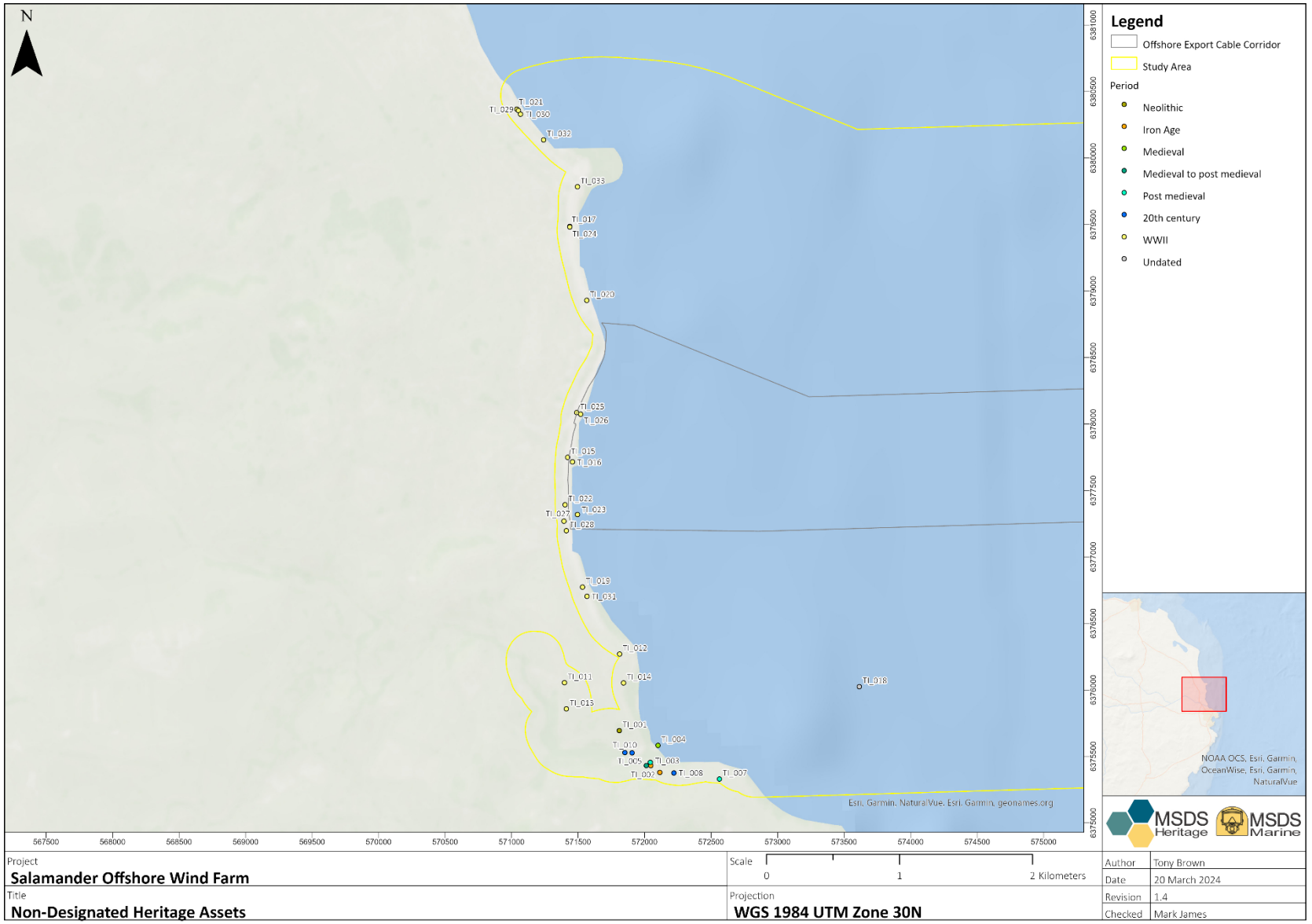


Figure 8: Non-Designated Heritage Assets.

8.0 Submerged prehistory

8.1 Geology

Pre-Quaternary Bedrock

8.1.1 Bedrock within the Offshore Development Area is shown by Figure 9 and consists of (from west to east):

- Unnamed igneous intrusion of granitic rock;
- Metasedimentary rock of the Neoproterozoic Argyll Group;
- Conglomerate of the Palaeozoic Old Red Sandstone Supergroup;
- Undifferentiated Permian/Triassic sandstone and siliciclastic/argillaceous rocks;
- Siliciclastic/argillaceous rock of the Early Cretaceous Cromer Knoll Group;
- Chalk of the Early Cretaceous Chalk Group;
- Undifferentiated mudstone, sandstone and lignite of the Cainozoic era; and
- Undifferentiated Eocene/Pliocene sandstone and siliciclastic/argillaceous rocks.

8.1.2 Faulting appears within the surrounding bedrock, although no such features appear within the Offshore Development Area.

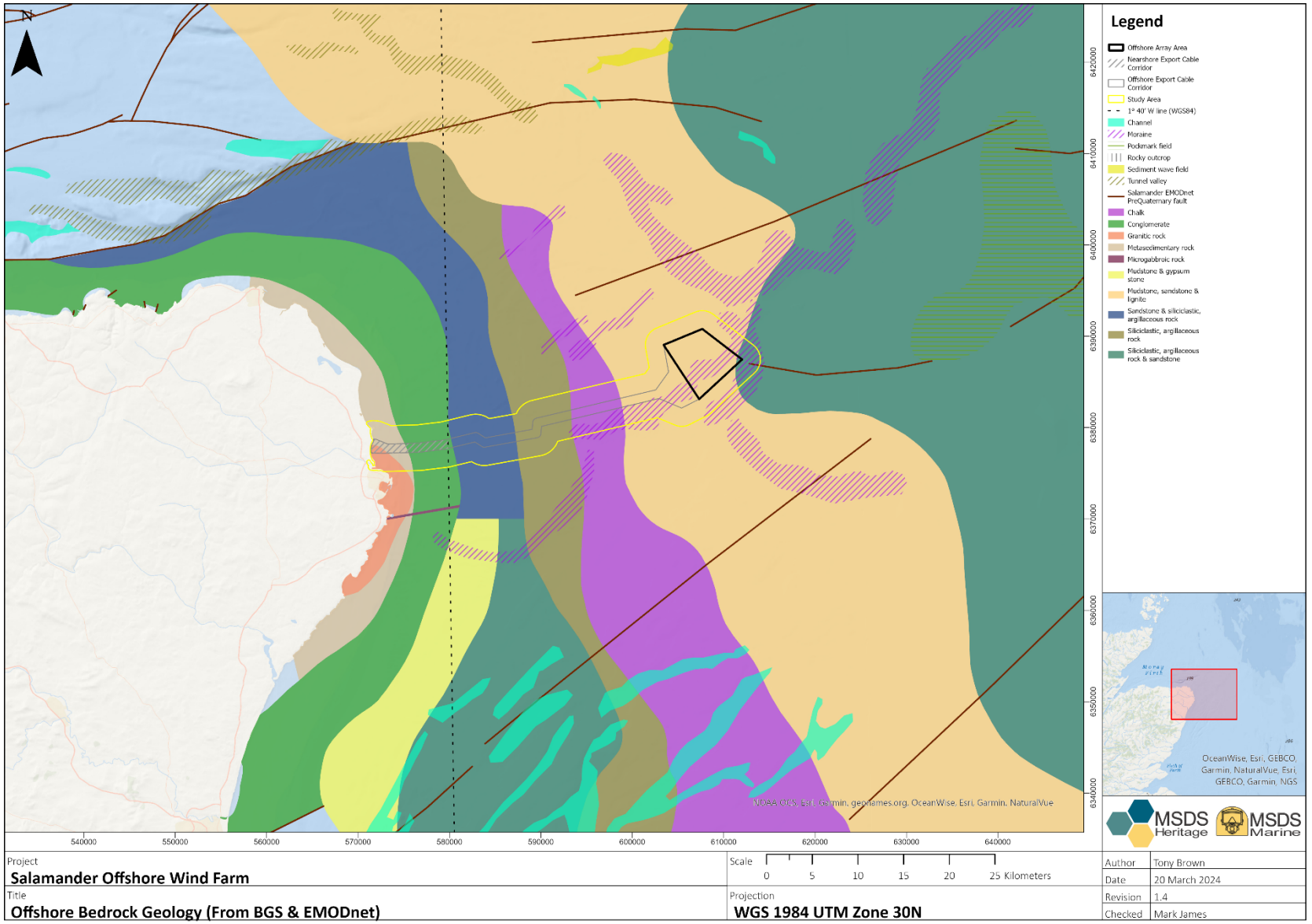


Figure 9: Offshore Bedrock Geology (From BGS and EMODnet).

Geology: Quaternary Deposits

8.1.3 Quaternary deposits overlay the bedrock within the Offshore Development Area. The BGS indicate that the Quaternary sequence within the Offshore Export Cable Corridor is 5-20 m in thickness in the nearshore area, out to c. 15 km from the shore. Further offshore and within the Offshore Array Area, the deposits thicken to 20 to 50 m and may be over 50 m thick in places.

8.1.4 The Quaternary sequence within the Development Area is set out within Table 7 and is discussed in detail below. Eight geotechnical units have been identified using geotechnical and geophysical data within the Offshore Development Area. The units have been correlated with five major formations: the Witch Ground, the Forth, the Coal Pit, the Ling Bank and the Aberdeen Ground Formations. Correlations between units identified within the Offshore Development Area and deposits known in the wider area are preliminary at this stage and further investigation is required to confirm the correlations.

8.1.5 The Quaternary units within the Offshore Development Area have been identified by the ground model[14], which utilised Innomar and Sparker sub-bottom profiling. The coverage of data included the Offshore Array Area and eastern and central sections of the Offshore Export Cable Corridor. The western (nearshore) section was excluded from the coverage, extending c. 8 km east from the MHWS.

8.1.6 In several instances, the description of an identified unit varies between the BGS entry and the information provided by the ground model. In such cases, BGS descriptions appear in bold and ground model descriptions in italics. Standard format text is used where the descriptions corroborate.

[14] Wood. 2023.

Unit	Horizon	Lithology	Correlated Formation and Member	Age	Depositional Environment	Archaeological potential
Unit 10	1	**Sand**	Surface sediments	***MIS 1*** Holocene	Marine	Low potential for *in situ* submerged prehistoric remains. High potential for redeposited remains and wreck (variable potential for period, ranging from Mesolithic to Modern; Section 8.6.5). Very low potential for palaeo-environmental remains (Section 8.6.6).
Unit 20	2	**Multilayered muds, some sand/gravel** *Upward transition from pebbly glaciomarine muds to fine sands and silts*	***Witch Ground Formation***	***MIS 2 to 1*** *Devensian, Holocene*	*Glaciomarine/ marine*	Very low potential for redeposited archaeological remains (Upper Palaeolithic to Mesolithic; Section 8.5.10). Very low potential for palaeo-environmental remains (Section 8.5.10).
Unit 30	3a	*Well layered sands*	*Internal reflector within Forth Formation*	***MIS 2 to 1*** *Devensian, Holocene* *Largo Bay Member: MIS 2 to 1 Devensian. Holocene (13,500 to 10,000 years BP)* *St Andrew's Bay member: MIS 1*	*Glaciomarine/ marine/ fluviomarine*	Very low potential for *in situ* or redeposited remains (Upper Palaeolithic) within upper strata of Largo Bay Member (Section 8.5.8). Low potential for *in situ* or redeposited remains (Upper Palaeolithic to Mesolithic) within upper strata of St Andrew's Bay Member (Section 8.5.8). Moderate palaeo-environmental potential for whole unit (Section 8.5.9).
	3b	**Varies from muds and silty muds to sands and gravelly sands – muddy lithologies tending towards lower part of sequence** *Largo Bay Member: upward transition from boreal marine muds to pebbly glaciomarine muds*	***Base of Forth Formation – subdivided into two units: St Andrew's Bay Member; Largo Bay Member***			

Unit	Horizon	Lithology	Correlated Formation and Member	Age	Depositional Environment	Archaeological potential
		St Andrew's Bay Member: fine to coarse sands		*Holocene (10,000 to 7,000 years BP)*		
Unit 40	4a	Unrecorded	Internal reflector within Coal Pit Formation	***MIS 6 to 3*** *Devensian, Ipswichian, Wolstonian*	Marine/ glaciomarine	Very low potential for archaeological remains (Middle to Upper Palaeolithic; Section 8.4.10). Moderate potential for palaeo-environmental remains (Section 8.4.11).
	4b	**Sandy/silty clay, interlaminated clay and fine-grained silty sand** *Marine sands and pebbly glaciomarine muds and sands*	***Base Coal Pit Formation***			
Unit 50	5	**Micaceous silt with sad and clay interbeds** *Marine silts with sand and clay interbeds; suggestion of gravelly sediments also, alongside water-lain sediments*	***Ling Bank Formation***	**MIS 12 to 10** **Anglian, Hoxnian, Wolstonian** *MIS 11 to 10* *Hoxnian, Wolstonian*	Arctic glacial to marine interglacial conditions, *with potential for Hoxnian overbank, intertidal or subaerial facies*	Very low potential for archaeological remains (Lower to Middle Palaeolithic; Section 8.4.7). Moderate potential for palaeo-environmental remains (Section 8.4.8).
Unit 60	6	**Fissured clay with lenses and laminae of silt and fine-grained sand** *Chaotic variety of temperate marine muds within thin sands to glaciomarine muds, sands and gravels (latter more common towards top of unit)*	***Aberdeen Ground Formation***	***MIS 100 to 13***	Varied (often glacial)	Very low potential for archaeological remains (Lower Palaeolithic; Section 8.4.3). Moderate potential for palaeo-environmental remains (Section 8.4.4).

Table 7: Units and reflectors identified in the Offshore Development Area.

*Source: **BGS**[15]; *Wood*[16]

[15] BGS. 'Lexicon of Named Rock Units'. https://webapps.bgs.ac.uk/lexicon/ Accessed 06/07/2023.
[16] Wood. 2023. *Salamander Offshore Windfarm Project: GIS Model and Design Considerations*

8.1.7 Unit 60, the lowest and earliest Quaternary unit identified within the Offshore Development Area, has been interpreted as the Aberdeen Ground Formation; laid down over a long period during the Early to Middle Pleistocene (MIS 100 to13) and identified only within a central part of the Offshore Export Cable Corridor[17]. Although dating of the formation is not fully resolved, the upper parts of the deposit in this region are thought to date to the Middle Pleistocene and the Brunhes-Matuyama (B-M) magnetic boundary, dated to c. 780,000 ±5,000 BP; Quaternary chronology provided in Table 2:), has been identified within the deposit in the central North Sea area[18] [19], indicating that parts of the formation post-date this period. The base of the formation is correlated with a distinctive acoustic reflector considered to correlate with the base of the Quaternary deposits in the central North Sea[20]. The formation is therefore extremely long-lived and covers a period of fluctuating climatic cycles, including warmer and cooler periods, correlating with the evidence of varied acoustic facies identified within the seismic data. The Early and Middle Pleistocene in Scotland saw a series of short-lived ice sheet advances into the North Sea (at least ten are known from this period)[21], and, in warmer periods, the North Sea area was characterised by the presence of a large delta system (the Eridanos delta). This delta system was disrupted by the large glaciations of the later Quaternary period.

8.1.8 Analysis of the Aberdeen Ground Formation has demonstrated the presence of clay units, with dipping clinoforms seen on seismic data and interpreted as evidence of deltaic environments, both toward its base and further up within the formation[22]. Analysis has shown that sub-aerial conditions may have been present during the later Early Pleistocene, though the Middle Pleistocene was dominated by increasingly glacial conditions.

8.1.9 Within the Offshore Development Area and surrounding environs, the muds, pebbles and sandy sediments of the upper Aberdeen Ground Formation are thought to have been deposited in glacial environments during the Cromerian stage[23]. Cold water foraminifera identified within this part of the formation are the product of sub-glacial or pro-glacial environments associated with a tide-water ice sheet. This is the earliest evidence of full glacial conditions in the wider

[17] *Wood*. 2023.

[18] Stewart, M., Lonergan, L., Hampson, G. 2012. '3D seismic analysis of buried tunnel valleys in the Central North Sea: tunnel valley fill sedimentary architecture', in Huuse, M., Redfern, J., Le Heron, D.P., Dixon, R.J., Moscariello, A. & Craig, J. (eds). *Glaciogenic reservoirs and Hydrocarbon Systems*. London: Geological Society Special Publications 368.

[19] Stoker, M. S., Skinner, A. C., Fyfe, J. A. & Long, D. 1983. 'Palaeomagnetic evidence for early Pleistocene in the central and northern North Sea'. *Nature*. 304, pp. 332–334.

[20] Stoker, M.S., Balson, P.S., Long, D., & Tappin, D.R. 2011. 'An overview of the lithostratigraphical framework for the Quaternary deposits on the United Kingdom continental shelf'. *British Geological Survey Research Report*. RR/11/03, pp. 48.

[21] Hall, A.M., Merritt, J.W., Connell, E.R. & Hubbard, A. 2018. 'Early and Middle Pleistocene environments, landforms and sediments in Scotland'. *Earth and Environmental Science Transactions of the Royal Society of Edinburgh*.

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area[24] [25]. Four lithofacies have been identified in the upper part of the Aberdeen Ground Formation: subglacial facies, proximal glaciomarine facies, distal glaciomarine facies and marine facies representing a series of different depositional environments during the Early to Middle Pleistocene[26]. Geotechnical investigation of other offshore developments concluded that the Aberdeen Ground Formation present was deposited in a fluvial, glacial, or marine environment[27].

8.1.10 Unit 50 within the Offshore Development Area is interpreted as the Ling Bank Formation, which was laid down during the Late Anglian and Hoxnian stages, correlating with the Late Lower Palaeolithic and Early Middle Palaeolithic periods (MIS 11 to 10)[28]. The BGS gives an earlier beginning date for the formation, during the Anglian glaciation (MIS 12)[29]. The Ling Bank Formation has been identified across the Offshore Array and eastern half of the Offshore Export Cable Corridor.

8.1.11 Palaeoenvironmental assessments have demonstrated that deposition of the formation largely took place under arctic glacial to marine conditions, with the upper parts of the unit deposited during an interglacial phase. The formation is broadly thought to originate in MIS 12 to 10[30], though there is debate over the precise dating[31] and some suggest that the basal parts of the unit originate in the Late Cromerian, during an interglacial phase (i.e., earlier than MIS 12)[32]. Overlying the lowest parts of the unit are arctic glaciomarine deposits dating to MIS 12[33] (relating to the Anglian glaciation). The upper parts of the Ling Bank Formation have been correlated with marine sediments originating in the Hoxnian interglacial (MIS 11).

8.1.12 The deposit is characterised as a greenish-grey micaceous silt, with sand and clay interbeds and an increasing abundance of shells towards the base, laid down during the Middle Pleistocene and filling a series of deep, erosive features cut into the underlying Aberdeen Ground Formation.

8.1.13 Unit 40 has been identified as the Coal Pit Formation, principally comprising sandy/silty clay interlaminated with clays and fine-grained silty sands and muds. An internal reflector (Horizon 4a) was identified by the ground model but not further characterised[34]. Stoker *et al*. (2011) have dated the formation to between MIS 6 to 3. This range spans the Late Wolstonian glacial stage (MIS 6), the Ipswichian interglacial (MIS 5e) and Early to Middle Devensian glacial stages (MIS 5d to 3), which included warmer interstadials (MIS 5c, a). The deposit is therefore long-

[24] *Ibid*.
[25] Gatliff, R.W., Richards, P.C., Smith, K., Graham, C.C., McCormac, M., Smith, N.J.P., Long, D., Cameron, T.D.J., Evans, D., Stevenson, A.G., Bulat, J. & Ritchie, J.D. 1994. *United Kingdom Offshore Regional Report: The Geology of the Central North Sea*. London: HMSO for the British Geological Survey.
[26] Vaughan-Hirsch & Phillips. 2017.
[27] Fugro. 2019. *SSE Seagreen 2 & 3 and ECR Seagreen Windfarm Zone Geophysical Survey Final Survey Results Report - Export Cable Route*. Report for SSE Seagreen Wind Energy Limited.
[28] Wood. 2023.
[29] BGS. https://webapps.bgs.ac.uk/lexicon/ Accessed 06/07/2023.
[30] Stoker *et al*. 2011.
[31] Gatliff *et al*. 1994.
[32] Stoker *et al*. 2011.
[33] Merritt, J.W., Auton, C.A., Connell, E.R., Hall, A.M. & Peacock, J.D. 2003. 'Cainozoic geology and landscape evolution of north-east Scotland'. *Memoir of the British Geological Survey, Sheets 66E, 67, 76E, 77, 86E, 87W, 87E, 95, 96W, 96E and 97 (Scotland).* Edinburgh: British Geological Survey.
[34] Wood. 2023.

lived and potentially spans a series of vastly different environmental conditions, including marine, glaciomarine and intertidal.

8.1.14 The primary glaciomarine mud and sand units were laid down during the latter part of the Wolstonian (MIS 6) glaciation. Onshore deposits relating to the subsequent Ipswichian interglacial stage (MIS 5e) have been identified at only four locations in Scotland[35], and during this period sea levels were generally higher than the current levels. The upper lithographic units of the formation date to the Early and Middle Devensian stage (MIS 5d to 3), when much of northern Europe was dominated by glacial activity.

8.1.15 The deposit appears within the Offshore Array Area and eastern half of the Offshore Export Cable Corridor as the fill of a series of broadly north/south aligned channels, up to 130 m in depth and incising lower Quaternary units. These erosive features are thought to be associated with a Wolstonian glaciation[36].

8.1.16 Unit 30 has been interpreted as the Forth Formation, laid down during the Late Devensian and early Holocene (MIS 2 to 1). The Forth Formation occurs across the Offshore Array Area (except for the southeast corner) and across much of the Offshore Export Cable Corridor, filling a series of linear depressions running parallel to the coastline. A basal reflector and internal reflector have been identified and mapped (Figure 10 and Figure 11).

8.1.17 The Forth Formation has been divided into four members, two of which have been identified within the Offshore Development Area[37]. The Largo Bay Member comprises boreal marine muds transitioning upward to pebbly glaciomarine muds, laid down during the Windermere interstadial and Loch Lomond stadial of the Late Devensian and continuing to form during the Early Holocene (13,500 to 10,000 BP; MIS 2 to 1). Although sea levels were likely regressing on the east coast during this period[38], deposits within the inner estuaries of eastern Scotland provide evidence of raised marine deposits during the Windermere interstadial[39] [40] (c. 14,700 to 12,900 BP), demonstrating the likelihood that the Offshore Development Area experienced marine to glaciomarine conditions during this period.

[35] Merritt *et al.* 2003.
[36] Wood. 2023.
[37] Wood. 2023.
[38] Stoker, M.S., Golledge, N.R., Phillips, E.R., Wilkinson, I.P. & Akhurst, M.C. 2008. ' Lateglacial-Holocene shoreface progradation offshore eastern Scotland: a response to climatic and coastal hydrographic change'. *Boreas* **38**, pp. 292-314.
[39] Holloway, L.K., Peacock, J.D., Smith, D.E. & Wood, A.M. 2002. 'A Windermere Interstadial marine sequence: environmental and relative sea level interpretation for the western Forth valley, Scotland'. *Scottish Journal of Geology*. **38**, pp. 41–54.
[40] Peacock, J.D. 1999. 'The Pre-Windermere Interstadial (Late Devensian) raised marine strata of eastern Scotland and their macrofauna: a review'. *Quaternary Science Reviews.* **18**, pp. 1655–1680.

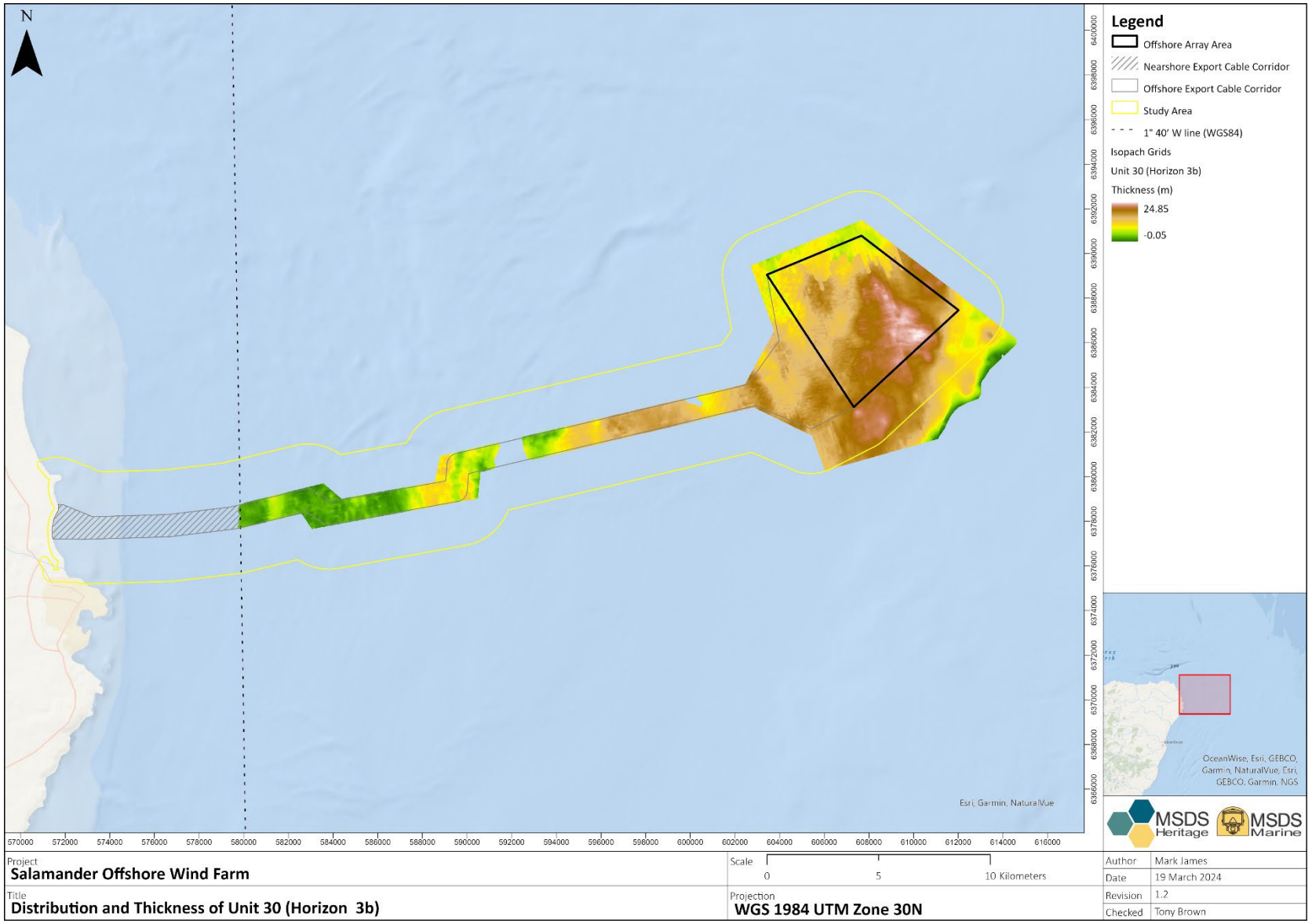

Figure 10: Distribution and Thickness of Unit 30 (Horizon 3b).

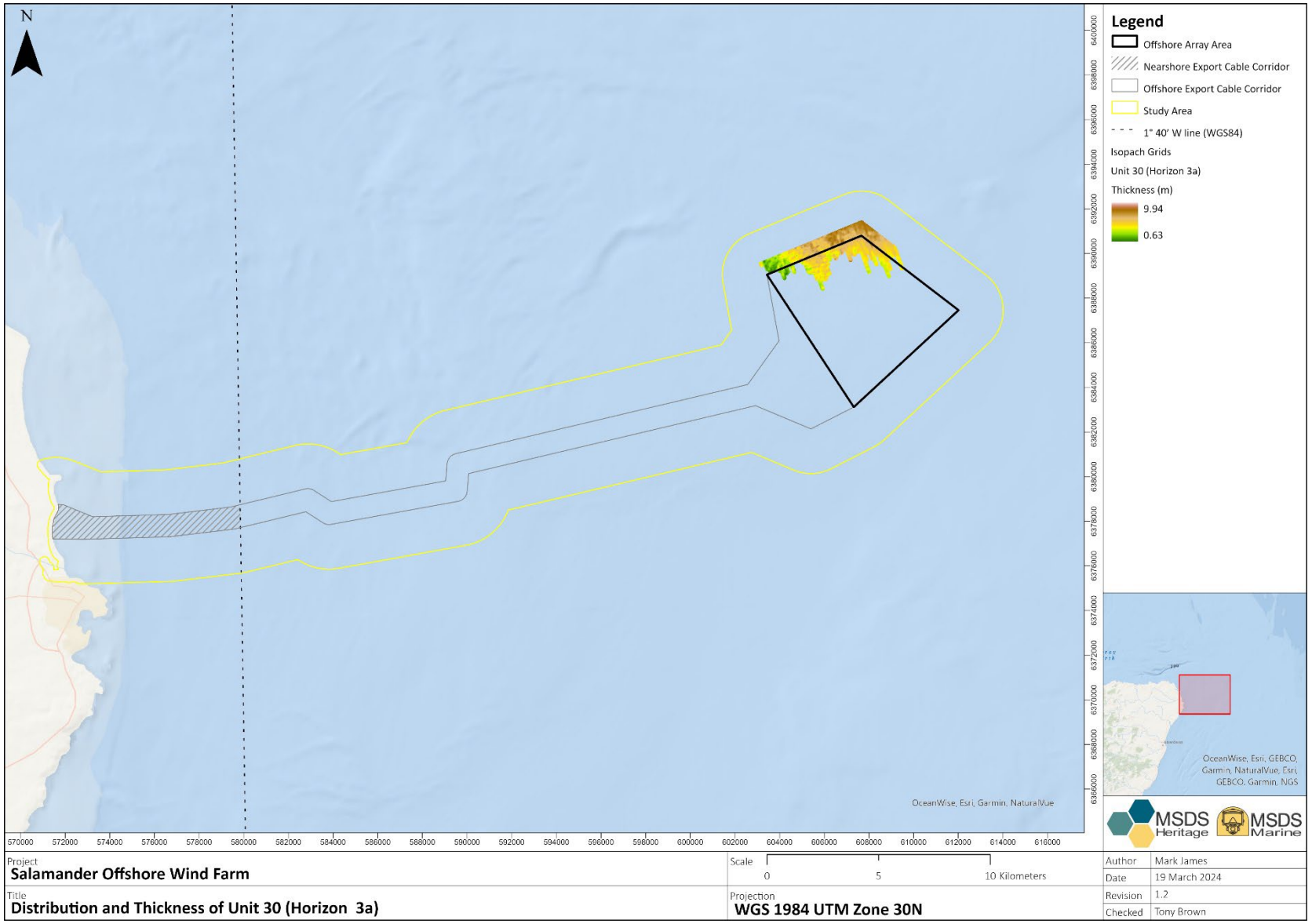

Figure 11: Distribution and Thickness of Unit 30 (Horizon 3a).

8.1.18 During the Loch Lomond Stadial (c. 12,900 to 11,700 BP), colder conditions were re-established, and there was a short-lived period of ice sheet expansion between c. 13,000 – 12,000 BP, during which sea levels fell[41]. Around the east coast of Scotland, evidence of this now-submerged shoreline, termed the 'Main Lateglacial Shoreline', has been encountered, including within the Firth of Forth[42]. Deposition of the **St. Andrews Bay Member** of the Forth Formation, atop the Largo Bay Member, is thought to have begun during this cold period and continued throughout the Early Holocene (10,000 to 7,000 BP)[43], representing shallow marine or estuarine environments[44]. The BGS records the St Andrew's Bay Member as a variety of pebbly/muddy sands, silty muds and interlaminated silts and muds[45], whereas the ground model defines it as fine to coarse fluviomarine sands arranged in a body parallel to the coastline[46].

8.1.19 Stoker *et al*. (2008) have divided the St Andrews Member into four separate lithozones, representing seaward-prograding clinoforms. Lithozone 1 was found to represent a fluvio-delta deposit dated to the Loch Lomond Stadial (Younger Dryas) and is thus thought to represent deposition during the lowstand. The seaward edge of the delta may have been around -20 to -30 m OD. These depths are greater than those estimated by other studies, which suggested that the Main Late Glacial Shoreline was around -10 m OD[47], though sea levels are discussed further below. Lithozones 2 and 3 (c. 8,000 to 2,000 BP) are believed to have been laid down during a phase of highstand, where the relative sea level (RSL) may have been up to 5 m OD, though other sources indicate a lower RSL which are discussed in more detail below. Lithozone 4 formed from 2,000 BP onwards, when RSLs closely correlate with that of the present.

8.1.20 The Offshore Array Area lies in deeper water depths (c. 98 m OD) and is therefore likely to have been submerged during this period, indicating very limited potential for archaeological remains. Much of the Offshore Export Cable Corridor lies within depths of 91 to 30 m (east to west), suggesting that the nearshore section may have been sub-aerial during the formation of the upper Largo Bay Member and St Andrew's Bay Member, if these are found to occur here.

8.1.21 **Unit 20** has been interpreted as the **Witch Ground Formation**, laid down during the Devensian and Holocene stages (18,000 to 8,400 BP; MIS 2 to 1). This formation has been identified only beyond the southeast corner of the Offshore Array Area (within the Wider Survey Area), adjacent to Forth Formation deposits (Figure 12)[48]. Here it is recorded as the fill of a basin, demonstrating an upward transition from glaciomarine muds to temperate marine fine-sands and silts. Sea level modelling suggests that the Witch Ground Formation was deposited in wholly marine conditions[49].

[41] Smith *et al*. 2019.
[42] Stoker *et al*. 2008. Pp 294.
[43] Stoker *et al*. 2008. Pp 307.
[44] Gatliff *et al*. 1994.
[45] BGS. https://webapps.bgs.ac.uk/lexicon/ Accessed 06/07/2023.
[46] Wood. 2023.
[47] Shennan, I., Bradley, S., Milne, G., Brooks, A., Bassett, S. & Hamilton, S. 2006. 'Relative sea-level changes, glacial isostatic modelling and ice sheet reconstructions from the British Isles since the Last Glacial maximum'. *Journal of Quaternary Science*. **21**, pp. 585–599.
[48] Wood. 2023.
[49] Brooks, A.J., Bradley, S.L, Edwards, R. & Goodwyn, N. 2011. 'The palaeogeography of Northwest Europe during the last 20,000 years'. *Journal of Maps.* **7**(1), pp. 573-587.

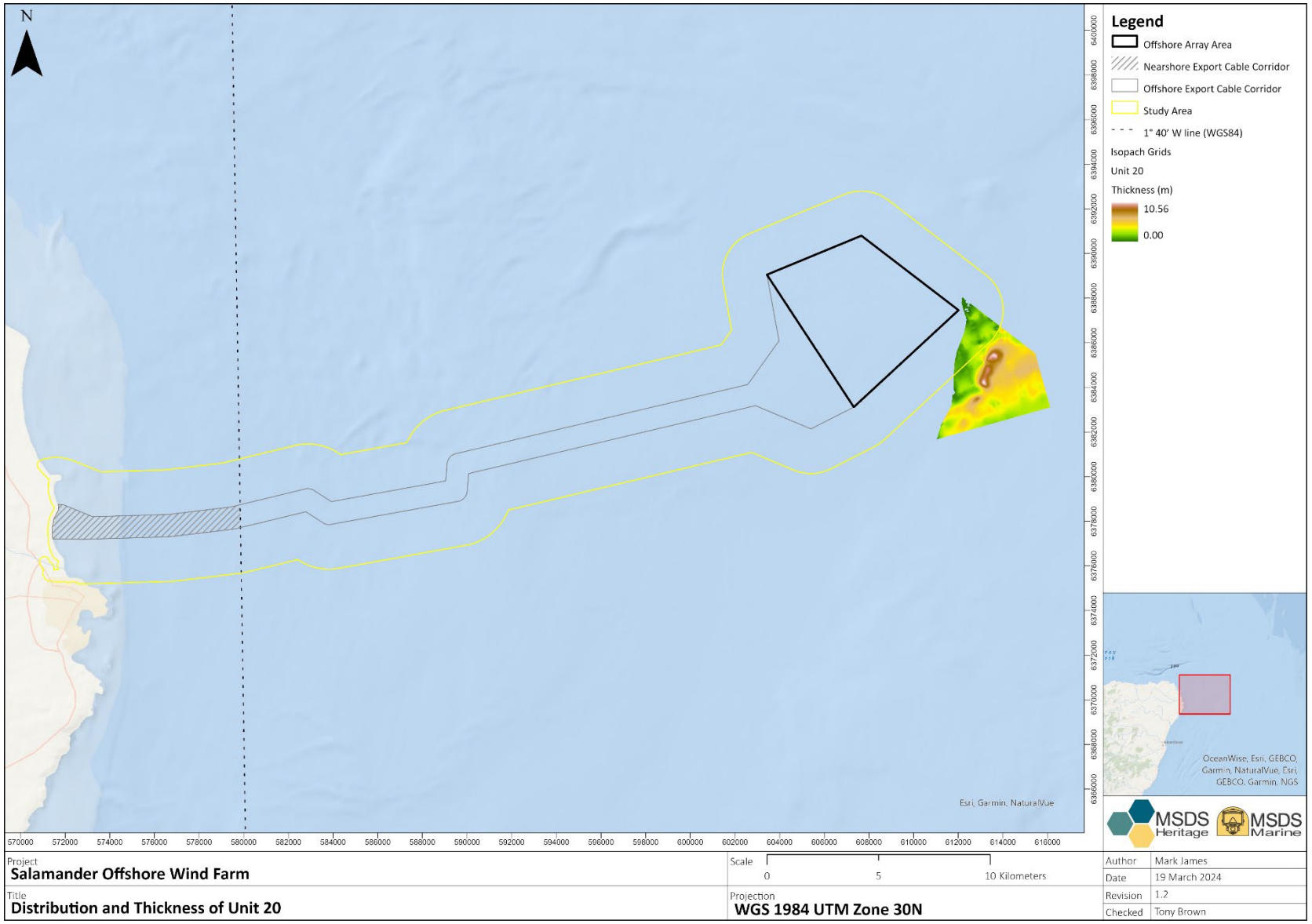

Figure 12: Distribution and Thickness of Unit 20.

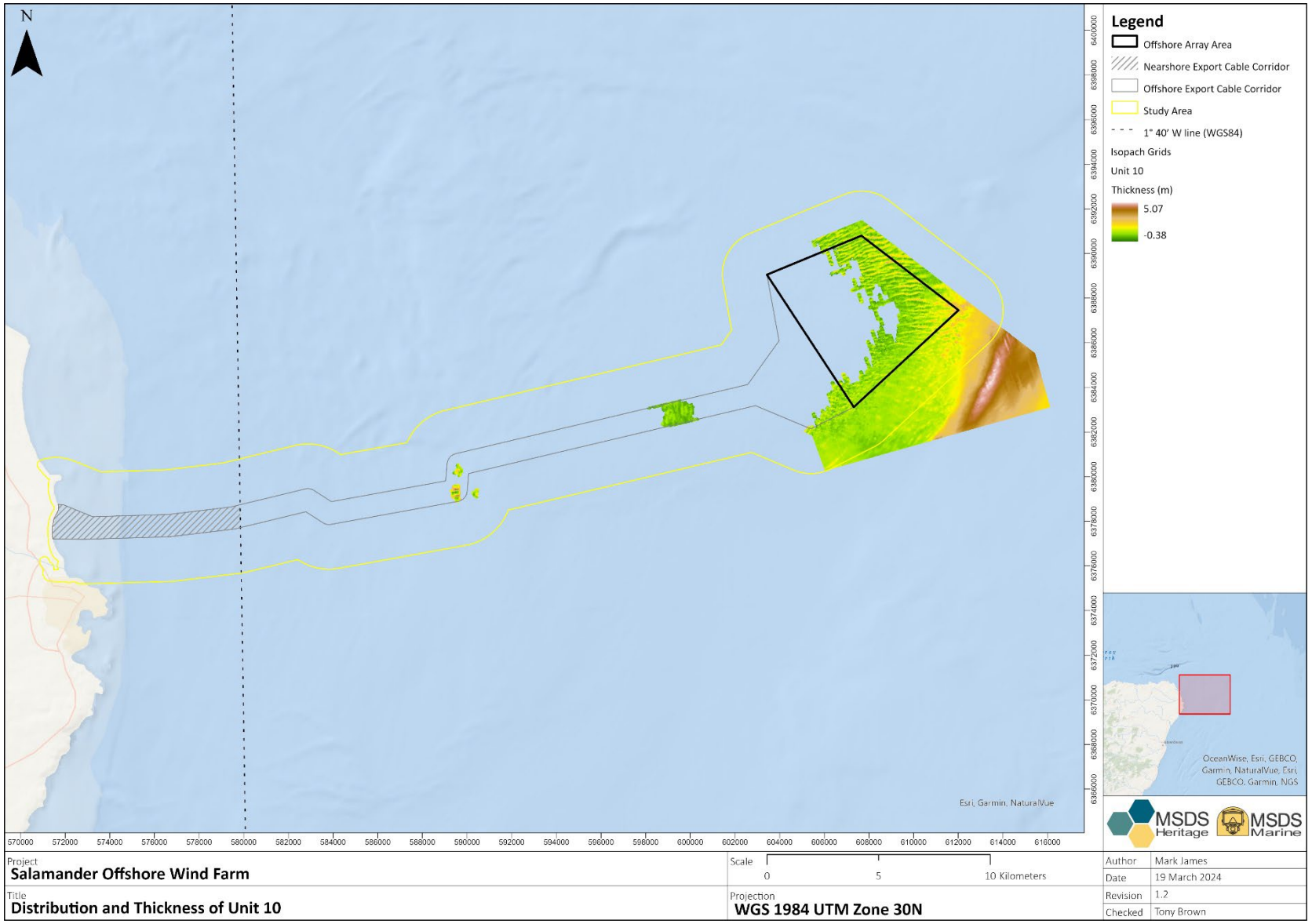

Figure 13: Distribution and Thickness of Unit 10.

8.1.22 Unit 10 is interpreted in the eastern part of the Offshore Development Area (Figure 13) and has been interpreted as surface sediments, comprised of fine to coarse sand, laid down during the Holocene (MIS 1). Situated stratigraphically above the Forth and Witch ground formations, these sediments date from 8,400 BP to the present. The BGS illustrates progressively coarser grains and higher gravel inclusion further offshore, also suggested by geophysical data, although the latter illustrates finer sands within the eastern and southern limits of the Offshore Array Area (Figure 5).

Potential for other units

8.1.23 In addition to the units identified within the Offshore Development Area, there is also potential for other deposits. The ground model data excludes the nearshore c. 8 km section of the Offshore Export Cable Corridor. Additional units and continuations of identified units may be present within this area.

8.2 Sea Level Data

8.2.1 There are few Sea Level Index Points (SLIPs) offshore in the North Sea and none within the central or northern regions. Most of the SLIPs are present along the current coastline and date to after the maximum extents of the Devensian glaciation (c. <13,000 BP; Last Glacial Maximum – LGM), though a small number provide evidence for the earlier late glacial period. Shennan *et al*.[50] have produced a recent and extensive study of RSL in Britain and Ireland since the LGM. Their study, incorporating over 2,000 data points including SLIPs and marine and terrestrial limiting data, provides regional insights into RSLs across the British Isles. Sea level data for the North Sea nearest to the Offshore Development Area indicate raised sea levels coinciding with points in the Dimlington Stadial (29,000 – 14, 700 BP), Windermere interstadial (14,700 to 12,900 BP), a subsequent fall during the Loch Lomond stadial (12,900 to 11,700 BP), and a relatively swift period of sea level rise after c. 10,000 BP, attributed to the Holocene transgression. This largely concurs with the findings of Stoker *et al.* (2008), discussed above.

8.2.2 The earliest SLIPs from the area date to c. 18,000 and 17,500 BP and demonstrate higher sea levels (c. + 13 m), coinciding with the late glacial period (Table 8:). Evidence of raised marine deposits has also been identified in the Windemere interstadial (c. 14,700 to 12,900 BP) by numerous authors including Peacock[40] and Holloway *et al.*[39]. The closest SLIP within the wider area (Table 8:, SLIP AA68681) support this and demonstrate a RSL of + 9.8 m at c. 14,000 BP.

8.2.3 The Offshore Development Area was periodically submerged as the coastline fluctuated following the LGM, however, the exact date(s) of submergence is debated and different models exist. The most widely recognised models, created by Brooks *et al*. (2011; Figure 15) and Shennan *et al*. (2018; Figure 14), largely concur that the westernmost section of the Offshore Development Area was terrestrial to intertidal at various points.

8.2.4 Sea levels fell during the Loch Lomond stadial (c. 12,900 to 11,700 BP), this is supported by data from Smith et al. (2019) and by local SLIPs which demonstrate sea levels were around – 9.7 m at c. 11,900 BP. Stoker's study (2008) found evidence of the late glacial shoreline also

[50] Shennan, I., Bradley, S.L. & Edwards, R. 2018. 'Relative sea-level changes and crustal movements in Britain and Ireland since the Last Glacial Maximum'. *Quaternary Science Reviews*. 188, pp. 143-159.

supporting lower sea levels during this period but placed this at -20 to -30m OD (discussed above).

8.2.5 Following the retreat of the ice sheets, sea levels rose and data presented by Shennan *et al.* (2018) indicates that the local RSL was between -9.66 and -9.81 m OD (Figure 14, D; Table 8, SLIPs SRR4707 & SRR5099, respectively) around 10,000 BP and between 1.75 and -0.55 m OD around 8,000 BP (Figure 14, J & E; Table 8:, SLIPs SRR869 & SRR4717, respectively). However, Stoker *et al.* (2008) indicate a highstand of c. +5 m OD from c. 8000 – 2000 BP. All sources indicate that much of the Offshore Development Area was submerged from the Middle Upper Palaeolithic onwards. The Landfall and nearshore part of the Offshore Export Cable Corridor transitioned to freshwater marsh environment from c. 9,500 BP, remaining as such throughout much of the Mesolithic (Figure 14, A; Table 8:, SLIPs SRR1655-1661 & SRR1686-1687).

MSDS ID	Unique sample ID	Corrected RSL (m)	Age (cal a BP)	Stage	Secondary indicator type
A	SRR1655	1.09	5499	Holocene	High marsh environment
	SRR1686	0.11	5888		Freshwater to high marsh transition
	SRR1660	-0.35	6498		Freshwater to high marsh transition
	SRR1687	-1.09	6973		Extreme water level
	SRR1656	0.37	7016		Freshwater/Terrestrial limiting
	SRR1661	-1.46	7227		Extreme water level
	SRR1657	0.33	7731		Freshwater/Terrestrial limiting
	SRR1658	0.26	8312		Freshwater/Terrestrial limiting
	SRR1659	0.2	9463		Freshwater/Terrestrial limiting
B	Beta101953	12.97	17483	Dimlington (Late Devensian – LGM)	Marine limiting
	LU3028	12.97	18143		Marine limiting
C	SRR4714	-1.24	8254	Holocene	High marsh environment
	SRR4715	-1.57	8266		High marsh environment
	SRR4716	-1.86	8332		High marsh environment
D	SRR4712	-5.04	8548		High marsh environment
	SRR4711	-4.75	8558		High marsh environment
	SRR4709	-5.4	8593		High marsh environment
	SRR4708	-5.07	8674		High marsh environment

MSDS ID	Unique sample ID	Corrected RSL (m)	Age (cal a BP)	Stage	Secondary indicator type
	SRR4713	-5.5	9030		High marsh environment
	SRR4710	-7.5	9081		High marsh environment
	SRR4706	-9.48	9303		High marsh environment
	SRR5099	-9.81	9519		Freshwater to high marsh transition
	SRR4707	-9.66	11882	Loch Lomond/Younger Dryas (Late Devensian)	Freshwater/Terrestrial limiting
E	SRR4719	1.76	6755	Holocene	High marsh environment
	SRR4717	-0.55	7970		High marsh environment
	SRR4718	-0.66	8245		Uniquely defined
F	SRR1192	1.57	4217		High marsh environment
	SRR1769	1.57	4481		High marsh environment
	SRR1193	1.1	7083		High marsh environment
	SRR1565	0.16	7707		Extreme water level
G	SRR2119	2.63	7691		High marsh environment
	SRR2120	2.03	7945		Uniquely defined
H	AA68681	9.82	13983		Marine limiting
I	BIRM823	2.62	7140		Freshwater/Terrestrial limiting
	SRR1148	4.09	7574		High marsh environment
	BIRM867	2.8	7730		High marsh environment
	SRR1149	3.62	7911		High marsh environment
J	SRR869	1.75	8153		High marsh environment

Table 8: Sea Level Index Points (selected from Shennan et al. 2018).

8.2.6 A theoretical model of the variable coastline throughout the late Upper Palaeolithic and the Mesolithic is presented by Brooks *et al.* (2011), visualising the coastline at six stages between 18,000 to 6,000 BP. By the end of the Mesolithic, the coastline largely followed the form as present today (Figure 15). In general, marine regression is illustrated from 18,000 to 13,000 BP and transgression from 13,000 to 6,000 BP. The model suggests that the greatest exposure of the Offshore Development Area (specifically elements of the Offshore Export Cable Corridor) during the period occurred around c. 13,000 BC, when the coastline lay c. 1.6 to 1.8 km east

from the present MHWS. This differs, however, from sea level curve data for eastern Scotland, which suggests that around 13,000 BP RSL was c. 15 m OD[51].

8.2.7 No geotechnical data for the nearshore part of the Offshore Export Cable Corridor was available at this time to suggest the characteristics of the sub-aerial environment during the late Upper Palaeolithic and Mesolithic.

8.2.8 While potential inundation dates and implications for the dating of landscape features has been discussed here based on existing data, further evidence on the timing of the transgression is required to determine when the inshore-section of the Intertidal and Offshore Export Cable Corridor was finally submerged, though a date in the Late Mesolithic appears likely (c. 8,000 to 6,000 BP). The majority of the rest of the Offshore Development Area is likely to have remained submerged throughout the late glacial and Holocene.

8.3 Prehistoric archaeological potential

8.3.1 This section considers the potential for submerged prehistoric remains, including archaeological sites, palaeolandscape elements and palaeoenvironmental evidence, to be present within the Offshore Development Area.

8.3.2 The prehistoric archaeological record of the UK covers the period from the earliest hominin occupation, potentially as far back as 970,000 BP, to the end of the Iron Age and the Roman invasion of Britain in AD 43. In Scotland, particularly the Highland zone where the Roman sphere of influence had less socio-cultural impact than in the rest of the UK, such as in England, the Iron Age is considered to last up to 400 AD, in the absence of a definitive Roman period. The coastline of the UK changed drastically during prehistory and large tracts of what is now the seabed were once sub-aerially exposed.

8.3.3 The UK has been affected by several glacial events over the last million years, including the Anglian (478,000 to 424,000 BP), the Wolstonian (380,000 to 132,000 BP) and the Devensian (115,000 to 11,700 BP), and intervening marine transgressions, all of which have influenced the archaeological potential. The potential is inferred from the presence of prehistoric landscapes within the North Sea, discussed in a variety of published reports and grey literature.

8.3.4 Prehistoric archaeological potential is gauged with reference to evidence for human activity in Britain during each period and the contemporary environment within the Offshore Development Area, also considering depositional and post-depositional factors through interpretation of geological deposits present. Deposits with potential are generally those laid during periods of sub-aerial exposure or by fluvial process, rather than sub-glacial or marine deposits. However, there is also potential for archaeological material to be redeposited or reworked within secondary contexts resulting from fluvial erosion or glacial processes[52].

8.3.5 Review of the geological stratigraphy indicates that Quaternary deposits formed throughout the Cromerian to Holocene stages, encompassing all periods of known hominin activity in Britain. Thus, the following discussion will relate to the archaeological and palaeoenvironmental potential of all deposits laid down during these periods.

[51] Stoker *et al*. 2008. Pp. 309.
[52] Hosfield, R. & Chambers, J. 2004. *The Archaeological Potential of Secondary Contexts*. ALSF Project 3361.

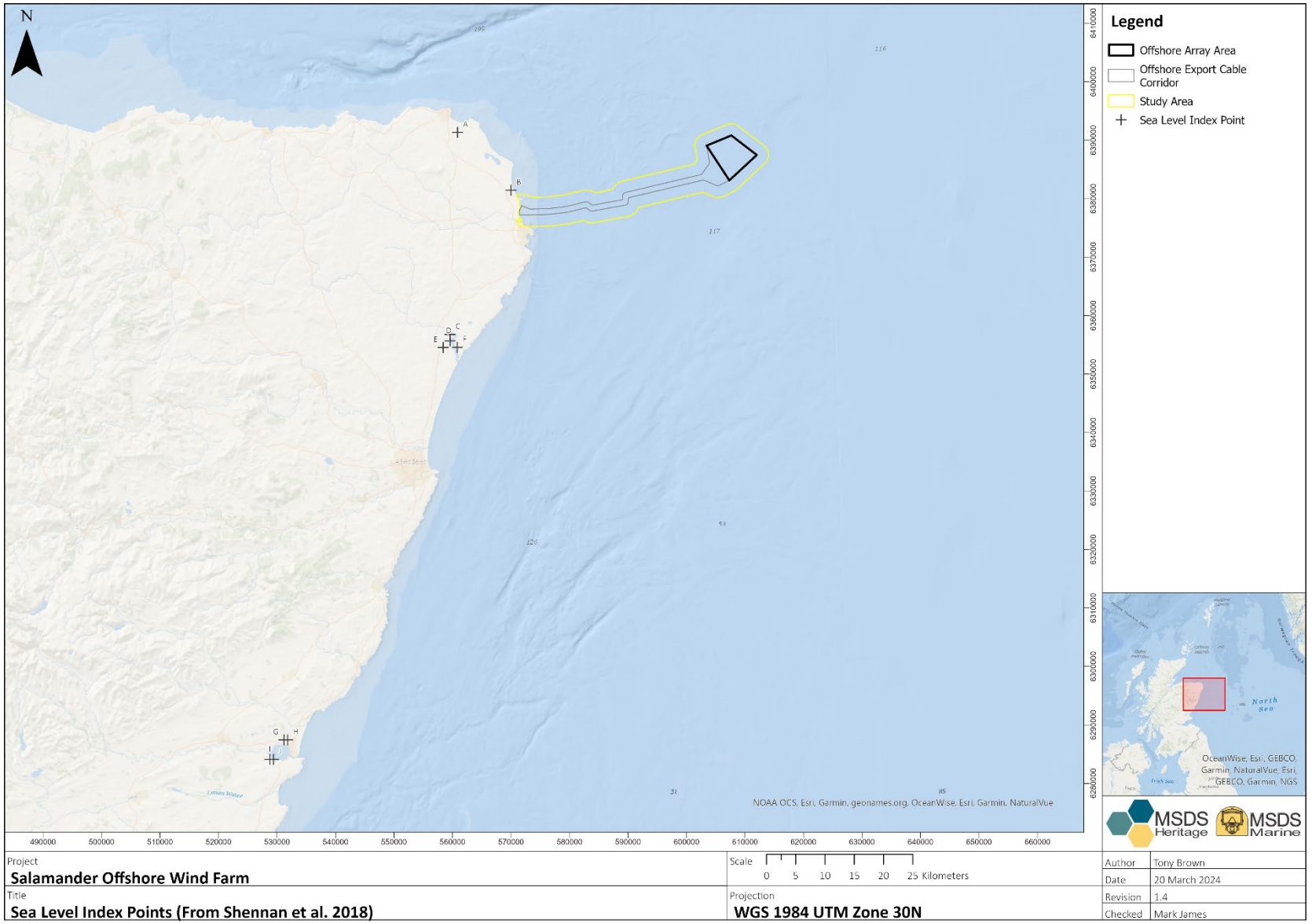

Figure 14: Sea Level Index Points (from Shennan et al. 2018).

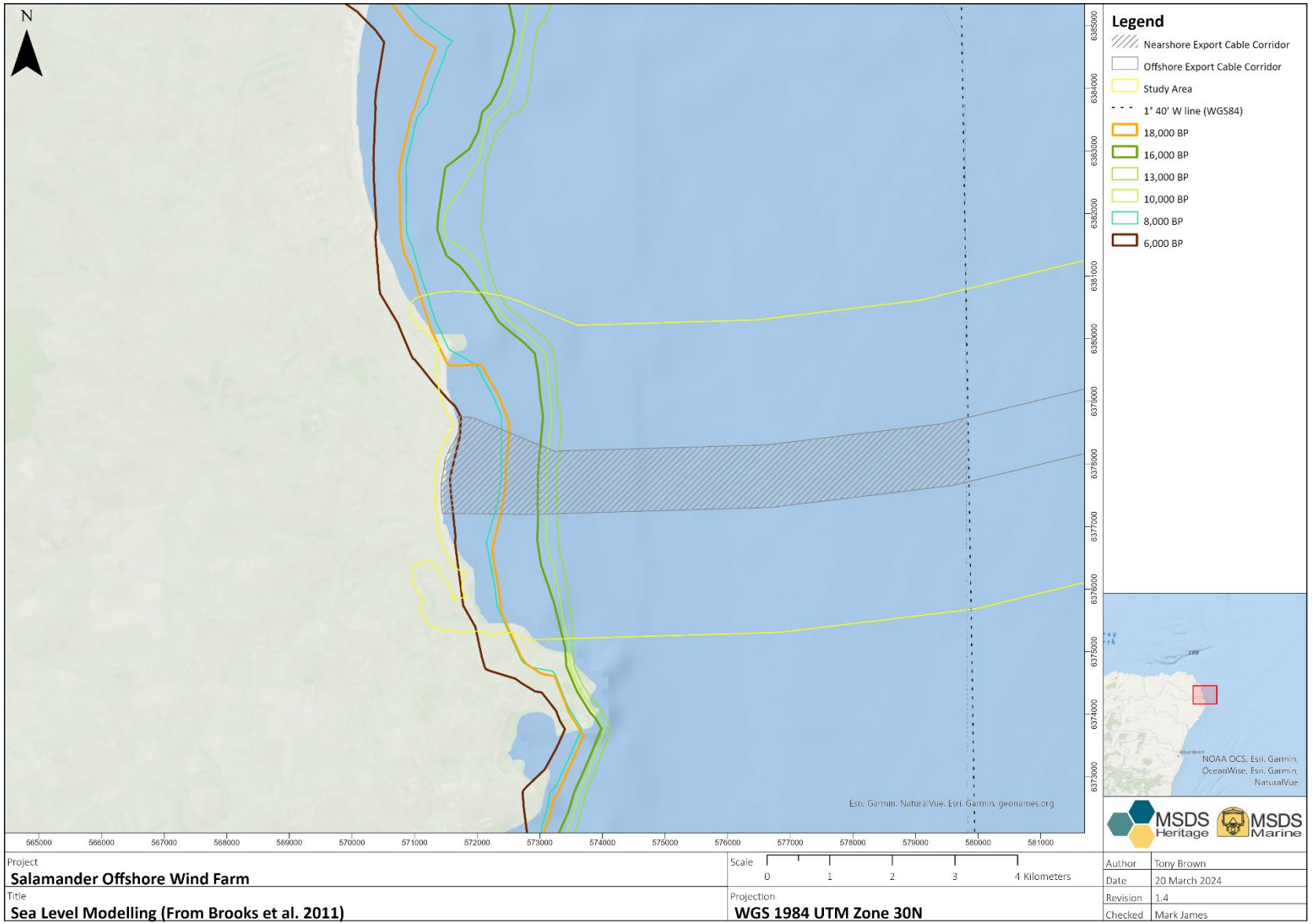

Figure 15: Sea Level Modelling (from Brooks et al. 2011).

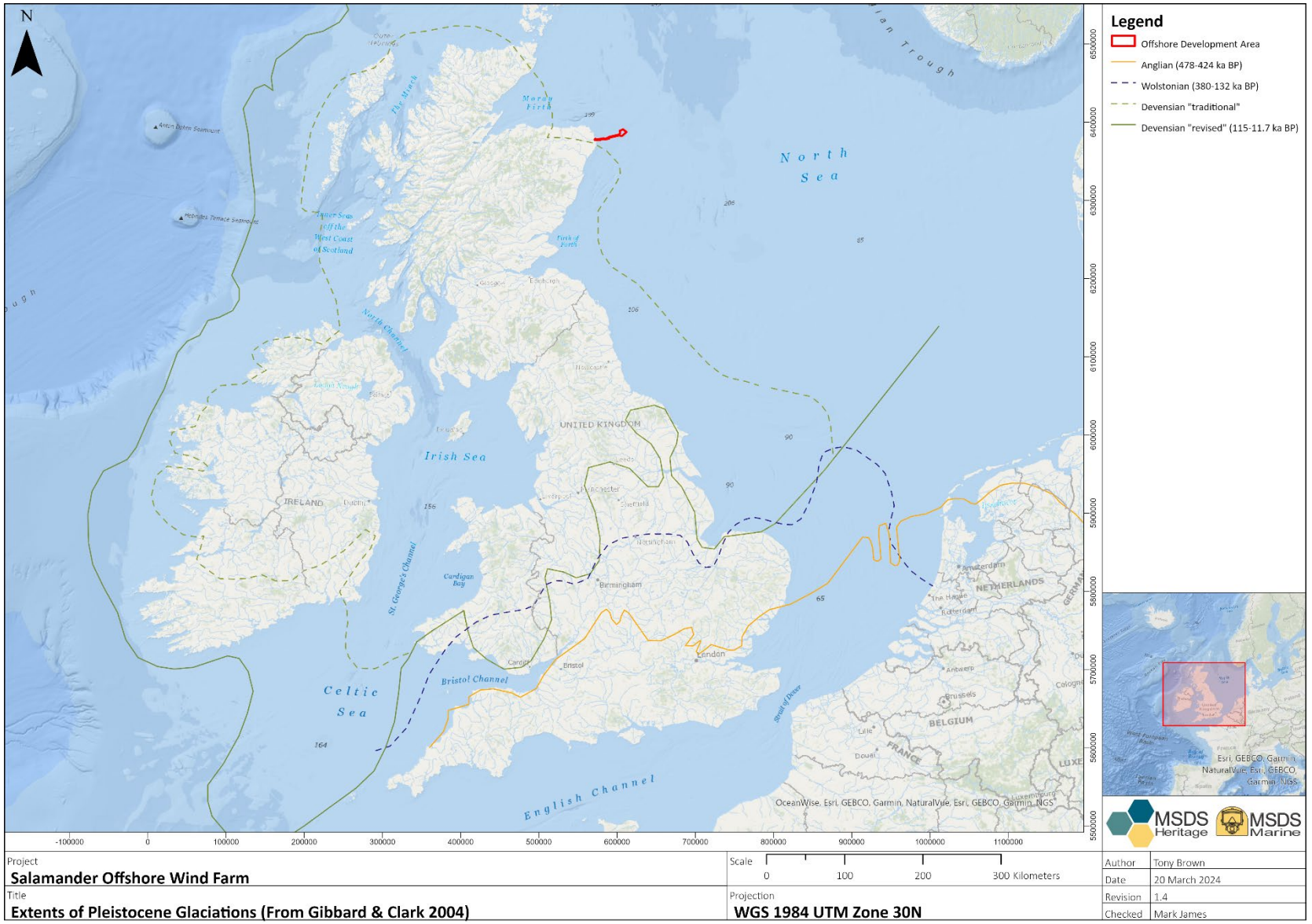

Figure 16: Extents of Pleistocene Glaciations (from Gibbard & Clark 2004).

8.4 Lower and Middle Palaeolithic (c. 970,000 to 60,000 BP; MIS 19 to 4)

8.4.1 Unit 60 has been interpreted as the Aberdeen Ground Formation, laid down over a long period during the Early to Middle Pleistocene (MIS 100 to13) and identified only within a central part of the Offshore Export Cable Corridor[53].

8.4.2 The date range of the formation (correlating with the Lower Palaeolithic archaeological period) suggests some contemporaneity with some of the earliest deposits associated with hominin activity identified within Britain, at Happisburgh, Norfolk. The remains from Happisburgh were found within the onshore Cromer Forest Bed Formation. Offshore, the Cromer Forest Beds are correlated (in part) with the Yarmouth Roads Formation, which is itself partly equivalent to the Aberdeen Ground Formation. The Yarmouth Roads Formation is also long lived (MIS 62 to 13) and associated with the large Eridanos delta system which characterised the North Sea area during the Early and Middle Pleistocene.

8.4.3 Although the Yarmouth Roads and Cromer Forest Beds formations hold archaeological potential, it is likely that the corresponding strata of the Aberdeen Ground Formation present within the Offshore Development Area (the upper parts of the formation) were characterised by glacial to marine environments colder than the delta system further south[54], which were not conducive to hominin activity. Furthermore, there is a general absence of secure evidence of Lower or Middle Palaeolithic activity in a Scottish context and the potential for *in situ* archaeological remains is therefore extremely limited[55] [56]. Redeposited remains could occur, where eroded and translocated from other formations, however, no such contemporary evidence has been found in Scottish contexts to date. As such, the potential for redeposited remains from these periods is extremely limited.

8.4.4 Remains of palaeoenvironmental interest may be present in Unit 60, particularly if identified within channel fills across the Offshore Development Area[57]. The sub-glacial facies of this formation lack faunal remains and are unlikely to contain palaeoenvironmental evidence[58]. The presence of glaciomarine and marine facies indicates that there were periods that the Offshore Development Area was periodically submerged. Although the potential for archaeological remains in these facies is very low, fine-grained sediments and organic remains have been found within the formation indicating a moderate palaeoenvironmental potential[59].

[53] Wood. 2023.
[54] Vaughan-Hirsch & Phillips. 2017.
[55] Saville, A. 1997. 'Palaeolithic handaxes in Scotland'. *Proceedings of the Society of Antiquaries of Scotland.* 127, pp. 1-16.
[56] Saville, A. 1998. 'Musselburgh (Inveresk parish): Palaeolithic flint handaxe'. *Discovery and Excavation in Scotland.* 33.
[57] Holmes, R. 1977. 'Quaternary deposits of the central North Sea, 5. The Quaternary geology of the UK sector of the North Sea between 56° and 58°N'. *Report of the Institute of the Geological Sciences*. 77.
[58] Gatliff *et al*. 1994.
[59] Holmes. 1977.

8.4.5 Unit 50 has been interpreted as the Ling Bank Formation, which was laid down during the Late Anglian and Hoxnian stages, correlating with the Late Lower Palaeolithic and Early Middle Palaeolithic periods (MIS 11 to 10)[60]. The BGS gives an earlier beginning date for the formation, during the Anglian glaciation (MIS 12)[61].

8.4.6 The interbedded silts, sands and clays of the Ling Bank Formation were deposited in a range of environmental conditions. During the Anglian (MIS 12) and Wolstonian (MIS 10 to 6) glaciations, it is understood that much of the British Isles at present, including the Offshore Development Area, lay under arctic glacial conditions (Figure 16). Such deposits have low archaeological potential due to inhospitable conditions.

8.4.7 The Hoxnian interglacial stage (MIS 11) characterises a distinct phase of warmer climatic conditions between the Anglian and Wolstonian glaciations. Palaeoenvironmental evidence recovered from the Kirkhill and Leys quarries, c. 10 km west from the Landfall, suggests an MIS 11 date, although an alternative date of MIS 7 has been suggested[62]. This environment hosted pine, alder and lime woodland and some of the more well-known sites exhibiting early hominid remains (Swanscombe, Kent; Beeches Pit, Suffolk; Marks Tey, Essex) demonstrate human occupation of parts of Britain during the Hoxnian stage. No similarly dated remains, however, have been encountered in a Scottish context and the likelihood of encountering such within the Offshore Development Area is very low. Any artefacts that may be present would likely have been reworked and redeposited by later glacial, fluvial or tidal processes.

8.4.8 Unit 50 holds potential for containing palaeoenvironmental remains, particularly relating to the Hoxnian interglacial stage. Such deposits, however, may have experienced widespread impacts from glacial activity during the subsequent Wolstonian stage and, considering the rarity and difficulty of defining Hoxnian deposits, a moderate overall potential for palaeoenvironmental remains is considered.

8.4.9 Unit 40 has been interpreted as the Coal Pit Formation, laid down during the late Wolstonian, Ipswichian and Early-Middle Devensian stages (MIS 6 to 3). The primary glaciomarine mud and sand elements of this formation were laid down during the latter part of the Wolstonian (MIS 6) glaciation. Onshore deposits relating to the subsequent Ipswichian interglacial stage (MIS 5e) have been identified at only four locations in Scotland, including the Kirkhill quarry site[63] and sea levels were generally higher during this period. The upper lithographic units of the formation date to the Early and Middle Devensian stage (MIS 5d to 3), when much of northern Europe was dominated by glacial activity.

8.4.10 While this formation is primarily glacial, its deposition also spans the Ipswichian interglacial (MIS 5e), though sediments of this date are either absent or not well defined within the regional geological record. The Ipswichian climatic amelioration may have allowed the development of environments which were more conducive to human activity than the preceding glacial stage, however, in addition to the recognised absence of human activity in Scotland prior to the Upper Palaeolithic, a general absence of human activity in Britain has been identified between

[60] Wood. 2023.
[61] BGS. https://webapps.bgs.ac.uk/lexicon/ Accessed 06/07/2023.
[62] Merritt *et al*. 2003.
[63] *Ibid*.

c. 180,000 to 60,000 BP (MIS 8 to 4) and sea levels were generally higher[64]. The likelihood for encountering archaeological remains within this unit is therefore extremely low.

8.4.11 Unit 40 holds a moderate potential for containing palaeoenvironmental remains, particularly relating to the Ipswichian interglacial stage.

8.5 Upper Palaeolithic (60,000 to 11,700 BP; MIS 3 to 1)

8.5.1 The Devensian glaciation (115,000 to 11,700 BP; MIS 5d to 1), which directly followed the Ipswichian interglacial, was the last glaciation to affect Britain. The maximum extents of the glaciation were achieved at various points between 27,000 to 17,000 BP, although there is some disparity in the scholarship (Figure 16). The 'traditional' view places much of northern England, Wales, northern and central Ireland and almost all of present Scotland under glacial conditions. This viewpoint suggests that southern Ireland and parts of northeast Scotland, including the Orkney and Shetland archipelagos and the northeast coast (approximately between Banff and Peterhead), were not directly affected by glacial activity during the Devensian stage. More recent review of the evidence and incorporation of new data, however, has significantly extended the perceived extent of glaciation to the southwest and northeast, concluding in the latter at a confluence of the British-Irish and the Fennoscandian ice sheets within the present North Sea[65].

8.5.2 Clark *et al*. (2017) present the post-glacial landscape within the environs of the Development Area as shown by Figure 17[66]. The surrounding seabed is shown as a series of meltwater channels and moraines, correlating with other studies which have demonstrated glacial movement eastward across northeast Scotland[67]. The onshore landscape is dominated by a complex arrangement of meltwater channels and drumlins, also illustrating eastward glacial movement. A series of moraines is present, principally following the coastline, and expressing the limit of a former ice sheet. These correlate with the pattern of meltwater channels to suggest a former coastline. The Landfall was enclosed within an ice-dammed lake, suggesting the presence of glaciolacustrine deposits, although such deposits are only mapped by the BGS within the northern spur of the lake form[68]. The form and limits of the lake and its implied ice dam are approximate; some lakes may not have entirely filled their basin, some may have been sub-glacial and no glaciostatic (isostatic/eustatic) adjustment has been made, whilst the length and orientation of ice dams has been estimated based on lake-form[69].

[64] Marshall *et al*. 2020.
[65] Gibbard, P.L. & Clark, C.D. 2004. 'Pleistocene Glaciation Limits in Great Britain'. *Developments in Quaternary Science.* **2**, pp. 47-82.
[66] Clark, C.D., Ely, J.C., Greenwood, S.L., Hughes, A.L.C, Meehan, R., Barr, I.D., Bateman, M.D., Bradwell, T., Doole, J., Evans, D.J.A., Jordan, C.J., Monteys, X., Pellicer, X.M. & Sheehy, M. 2017. 'BRITICE Glacial Map, version 2: a map and GIS database of glacial landforms of the last British-Irish Ice Sheet'. *Boreas* **47**(1), pp. 11-e8.
[67] Gibbard & Clark. 2004.
[68] BGS. *Geology Viewer.* https://geologyviewer.bgs.ac.uk/ Accessed 14/07/2023.
[69] Clark, C.D., Evans, D.J.A., Khatwa, A., Bradwell, T., Jordan, C.J., Marsh, S.H., Mitchell, W.A. & Bateman, M.D. 2004. 'Map and GIS database of glacial landforms and features related to the last British Ice Sheet. *Boreas* **33**, pp. 359-375.

8.5.3 There is evidence of human activity in Britain throughout the Devensian. Flint artefacts and skeletal remains indicating human presence have been identified in Kent's Cavern (Devon)[70], Dartford (Kent)[71], Gower (Wales)[72] and Creswell (Derbyshire)[73]. The earliest reliably dated human artefacts within a secure Scottish context (a large assemblage of flint tools) have been correlated with other northern European typologies to suggest a late Upper Palaeolithic date. In the absence of organic preservation at the site, a broad date range of 12,000 to 11,500 BP is currently accepted[74]. More locally, the findspot of a single flint blade is recorded c. 780m to the southwest of the Landfall. Its typology has informed the approximate date of c. 12,000 BP, placing it within the Upper Palaeolithic, although its loss of primary context limits this artefact's further utility in establishing archaeological potential[75]. This approximate date correlates with the Loch Lomond stadial of the Late Devensian (c. 12,900 to 11,700 BP), when local RSL is understood to have been lower, thus increasing the likelihood of the nearshore section of the Offshore Development Area being sub-aerially exposed.

8.5.4 Unit 30 is interpreted as the Forth Formation, laid down during the Late Devensian and Early Holocene stages (MIS 2 to 1). Two of the formation's four members have been identified within the Offshore Development Area: the Largo Bay Member and the St Andrew's Bay Member.

8.5.5 Given the likely submerged and glacial nature of the Offshore Development Area during much of the Devensian and absence of human activity prior to c. 12,500 BP, the Largo Bay Member is considered to have a very limited potential for *in situ* archaeological remains. However, material may survive on the surface where later sub-aerial exposure may have occurred.

8.5.6 Full submergence of the Offshore Development Area likely occurred between 8,000 to 6,000 BP, although there are contradictions in the scholarship and the exact date of submergence is uncertain. Toward the end of the Windemere Interstadial sea levels stood at c. -5m OD[76], lowering in association with the subsequent Loch Lomond Stadial. This correlates with the prehistoric coastline model laid out by Brooks *et al*. (2011), suggesting that shortly after the time humans are known to have been present in Scotland and during the formation of the upper strata of the Largo Bay Member and Lithozone 1 (earliest) of the St Andrew's Bay Member, the Landfall and nearshore part of the Offshore Export Cable Corridor likely lay within a proglacial environment, characterised by an intertidal zone to the east and lacustrine zone to the west, extending onshore (Figure 17). Later lithozones of the St Andrew's Bay Member correlate with the Mesolithic archaeological period and are examined in Section 8.6.

[70] Higham, T., Compton, T., Stringer, C., Jacobi, R., Shapiro, B., Trinkaus, E., Chandler, B., Groning, F., Collins, C., Hillson, S., O'Higgins, P., Fitzgerald, C. & Fagan, M. 2011. 'The Earliest Evidence for Anatomically Modern Humans in Northwestern Europe'. *Nature*. **479**, pp. 521-524.

[71] Wenban-Smith, F., Bates, M. and Schwenninger, J. 2010. 'Early Devensian (MIS 5d–5b) occupation at Dartford, southeast England'. *Journal of Quaternary Science*. **25**(8), pp. 1193-1199.

[72] Dinnis, R. 2012. 'Identification of Longhole (Gower) as an Aurignacian site'. *Lithics: The Journal of the Lithic Studies Society*. **33**, pp. 17–29.

[73] Pike, A.W.G., Gilmour, M., Pettitt, P., Jacobi, R., Ripoll, S., Bahn, P. & Munoz, F. 2005. 'Verification of the age of the Palaeolithic cave art at Creswell Crags, UK'. *Journal of Archaeological Science*. **32**(11), pp. 1649–1655.

[74] Saville, A. & Ballin, T.B. 2009. 'Upper Palaeolithic evidence from Kilmelfort Cave, Argyll: a re-evaluation of the lithic assemblage'. *Proceedings of the Society of Antiquities for Scotland.* **139**, pp. 9-45.

[75] Canmore ID 350857.

[76] Stoker *et al*. 2008. Pp 309.

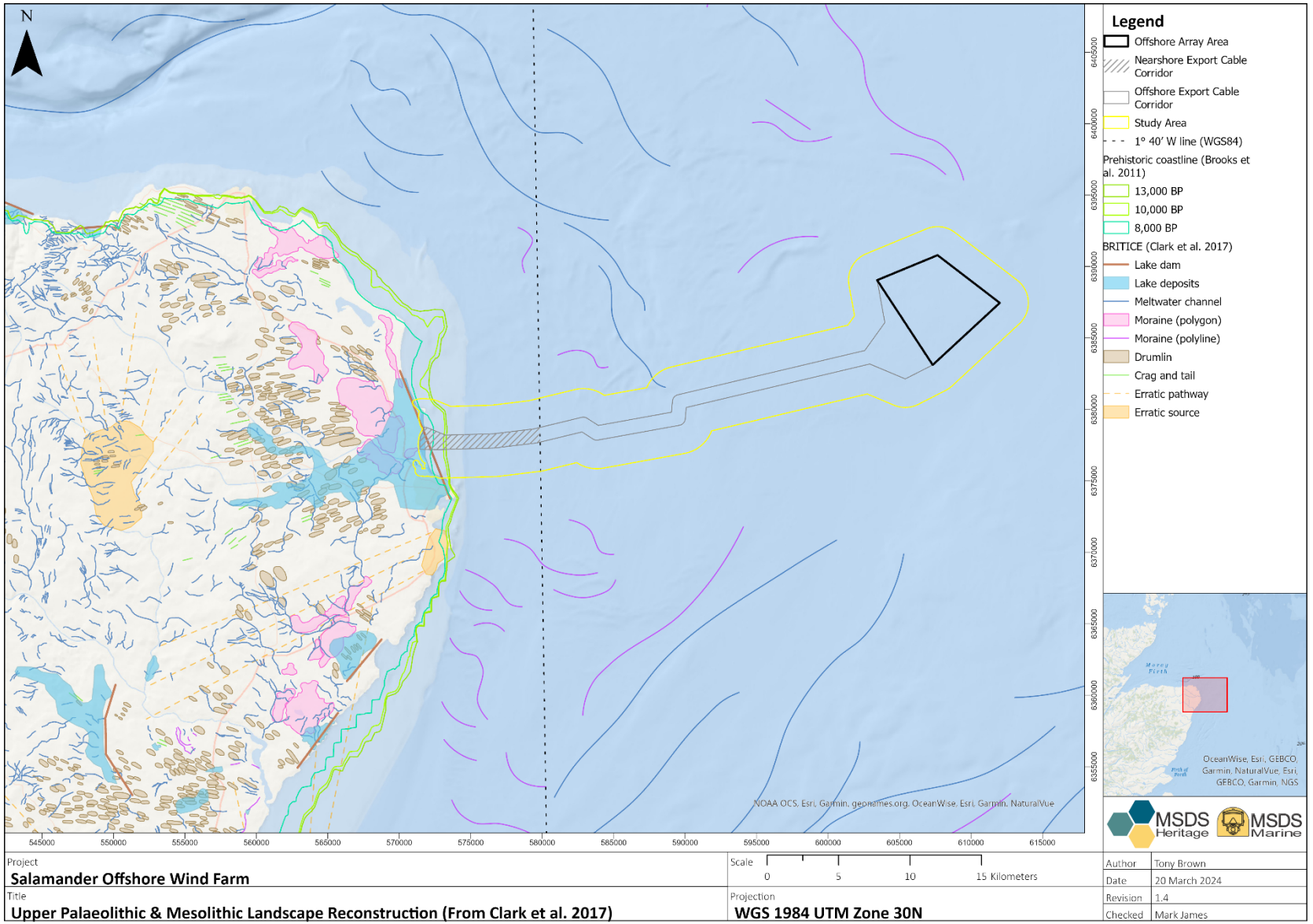

Figure 17: Upper Palaeolithic and Mesolithic Landscape Reconstruction (From Clark et al. 2017).

8.5.7 The ground model available at the time of writing did not include coverage of the nearshore section of the Offshore Export Cable Corridor and it has not been possible to identify the St Andrew's Bay Member here in correlation with sub-aerial proglacial environments. While wholly glacial or marine environments have no potential for *in situ* material, the peripheries of marine environments may have been attractive areas for human activity, where marine mammals and fish would have offered a diet rich in proteins and fats necessary for human survival in arctic or periglacial conditions.

8.5.8 The generally unfavourable contemporary conditions for human occupation suggest a low overall potential for encountering archaeological remains within the Largo Bay Member. The warmer climate and greater body of archaeological evidence for the wider region, coupled with the contemporary terrestrial environment conditions, suggest a greater potential for evidence of human activity within the St Andrew's Bay Member, although the overall potential for encountering such is low.

8.5.9 In addition to the potential for archaeological evidence, the Forth Formation is likely to contain remains of palaeoenvironmental interest, relating to the Devensian glaciation and post-glacial Holocene environments. In consideration of the lacustrine, estuarine and intertidal elements of these environments, it is possible that organic deposits may be present.

8.5.10 Unit 20 is interpreted as the Witch Ground Formation, laid down during the Devensian and Holocene stages (18,000 to 8,400 BP; MIS 2 to 1). This formation has been identified only beyond the southeast corner of the Offshore Array Area. Although part of the formation correlates with the earliest period of known human occupation of Scotland, this part of the Offshore Development Area was submerged throughout the laying down of the Witch Ground Formation. The archaeological and palaeoenvironmental potential for this unit is therefore very low.

8.6 Mesolithic (11,700 to 6,000 BP; MIS 1)

8.6.1 As the climatic conditions ameliorated during the onset of the Holocene, carr woodland would have developed in stable terrestrial areas which could support a much greater variety and density of fauna. Meltwater from the recently retreated Devensian glaciers shaped the landscape with river valleys and lakes, which, in turn, supported new and extensive flora and fauna. These fluvial and adjacent environments provided ideal conditions for human exploitation; available resources would have increased as the local flora and fauna became more diverse, and the range of environmental conditions would have presented more varied opportunities for exploitation.

8.6.2 The upper strata of the Forth Formation (Unit 30) and the Witch Ground Formation (Unit 20) continued to be deposited during the Mesolithic period, although the latter has only been identified within submerged, marine environments of the Offshore Array Area.

8.6.3 Should the St Andrew's Bay Member of the Forth Formation be present within the nearshore section of the Offshore Export Cable Corridor, Lithozones 2 and 3 of the member would have been laid down during a phase of marine transgression (c. 7,500 to 2,200 BP), as suggested by

palaeo-coastline modelling[77] and sea level curves for the east coast of Scotland[78]. At the start of deposition, the RSL may have been 5 m OD, suggesting a marine environment and very low potential for Mesolithic remains.

8.6.4 Unit 10 is interpreted as surface sediments, forming atop the Forth and Witch Ground Formations thus being laid down from c. 8,400 BP. Scant evidence of possible Mesolithic activity in the wider area demonstrates a slight, if dubious, potential for contemporary remains within the areas of the Offshore Development Area exposed during the Mesolithic period (i.e. the nearshore section of the Offshore Export Cable Corridor). Fluvial features, such as Cuttie Burn and the River Ugie, could have been focal points for resource exploitation and indicate areas of particular potential. The lacustrine environments suggested by Clark *et al*. (2017) to have characterised the Landfall present a potential for Mesolithic activity here, although the exposed coastline within the Offshore Development Area is likely to have been shunned for most Mesolithic maritime activity in favour of the more sheltered waters at the mouth of the River Ugie.

8.6.5 Contrary to the potential suggested by some elements of the landscape and environment, there is an absence of local, securely dated Mesolithic evidence. An overall rarity of such in the archaeological record of northeast Scotland present a low overall potential for encountering remains of this period within Unit 10 of the Offshore Development Area. Where these may occur, there is the additional potential that these have been translocated by tidal, fluvial or erosional processes.

8.6.6 As Unit 10 was laid down in a marine environment, there is likely a very low potential for remains of palaeoenvironmental interest.

8.7 Summary

8.7.1 Six main Quaternary units have been identified within the Offshore Development Area, representing the range of glacial, interglacial and post-glacial environments of the Cromerian to Holocene stages, correlating with the Lower Palaeolithic to Mesolithic archaeological periods. Each unit and its corresponding archaeological potential are summarised below and within Table 7.

Unit 60

8.7.2 Unit 60 is a chaotically varied temperate and glacio- marine deposit associated with the Aberdeen Ground Formation, laid down during the Cromerian stage (MIS 100 to 13; Lower Palaeolithic). This unit pre-dates the known hominin occupation of Scotland and characterises a primarily marine environment, suggesting a very low potential for archaeological remains.

8.7.3 There is a moderate potential for palaeoenvironmental remains within Unit 60.

Unit 50

8.7.4 Unit 50 is comprised of interbedded silts, sands and clays associated with the Ling Bank Formation, laid down during the Wolstonian, Hoxnian and possibly Anglian stages (MIS 12 to 10; Lower to early Middle Palaeolithic). This unit pre-dates the known hominin occupation of Scotland and characterises primarily glacial to marine interglacial environments, suggesting a

[77] Brooks *et al*. 2011.
[78] Stoker *et al*. 2008.

very low potential for archaeological remains.

8.7.5 There is a moderate potential for palaeoenvironmental remains within Unit 50, particularly relating to the Hoxnian interglacial.

Unit 40

8.7.6 Unit 40 is comprised of marine and glaciomarine muds and sands associated with the Coal Pit Formation, laid down during the Wolstonian, Ipswichian and Early to Middle Devensian stages (MIS 6 to 3; Middle to early Upper Palaeolithic). This unit pre-dates the known hominin occupation of Scotland and characterises a primarily marine environment, although intertidal deposits may be present dating to the Ipswichian, suggesting a very low potential for archaeological remains.

8.7.7 There is a moderate potential for palaeoenvironmental remains within Unit 40, particularly relating to the Ipswichian interglacial.

Unit 30

8.7.8 Unit 30 is comprised of two sub-units of the Forth Formation.

8.7.9 The Largo Bay Member is comprised of boreal marine and glaciomarine muds, laid down during the Late Devensian and Early Holocene stages (MIS 2 to 1; late Upper Palaeolithic to Mesolithic). The uppermost strata of this Member correlate with the earliest known hominin occupation in a Scottish context, however, the generally unfavourable post-glacial environmental conditions suggest a very low potential for archaeological remains.

8.7.10 There is a moderate potential for palaeoenvironmental remains, particularly within the upper strata of the Largo Bay Member, relating to Early Holocene intertidal and lacustrine environments.

8.7.11 The St Andrew's Bay Member is comprised of fine to coarse sands, laid down during the Early Holocene (MIS 1; Mesolithic). The post-glacial intertidal and lacustrine environments suggest conditions favourable for human occupation and an assemblage of flint artefacts, possibly containing Late Mesolithic examples, has been recorded within the vicinity. The St Andrew's Bay Member, if present within the nearshore part of the Offshore Export Cable Corridor, would hold a low overall potential for archaeological remains.

8.7.12 There is a moderate potential for palaeoenvironmental remains within the St Andrew's Bay Member, relating to Early Holocene intertidal and lacustrine environments.

Unit 20

8.7.13 Unit 20 is comprised of multilayered marine and glaciomarine muds associated with the Witch Ground Formation, laid down during the Late Devensian and Early Holocene stages (MIS 2 to 1; Upper Palaeolithic to Mesolithic). This unit correlates with the earliest known hominin occupation in a Scottish context, however, it was deposited in wholly marine environments and has only been identified within the southeast corner of the Offshore Array Area, a location understood to have been submerged throughout the period of human occupation of Scotland. This unit, unless identified within the nearshore part of the Offshore Export Cable Corridor, therefore holds a very low potential for archaeological and palaeoenvironmental remains.

Unit 10

8.7.14 Unit 10 is comprised of fine to coarse sands, containing an incrementally higher gravel addition

further offshore, not associated with a defined Quaternary unit and capping Units 20 and 30 (MIS 1; Mesolithic to present). This unit is contemporary with prehistoric remains from nearby terrestrial records spanning the Late Mesolithic, Neolithic, Bronze Age and Iron Age periods of prehistory, indicating some potential for activity within the intertidal area or nearshore parts of the site (when they were exposed, and taking into account RSL). Although no physical evidence has been recorded within a local marine context, there is a low potential for evidence of marine activities to be present within this unit. The wider potential of this unit, in relation to maritime remains, is discussed in further detail in Section 11.0. A very low potential is considered for palaeoenvironmental remains of interest.

9.0 Results of surface geophysical anomalies

9.0.1 A review of the results from the assessment of the surficial geophysical data, MBES, SSS and Magnetometer, have been provided in this section. The results of magnetic anomalies with no surface expression are presented in Section 10.0, a review of the UKHO and Canmore records in Section 11.0 and the palaeolandscape assessment in Section 8.0.

9.0.2 A total of 172 surface anomalies of potential archaeological interest were identified within the geophysical survey data extents, of these 86 are within the Offshore Development Area, the remaining 86 anomalies lie within the Wider Survey Area but within the extents of the geophysical data. The anomalies are categorised by potential in Table 9.

Potential	Offshore Development Area		Wider Survey Area
	Offshore Export Cable Corridor	Offshore Array Area	
Low	29	47	82
Medium	4	3	3
High	3	0	1
Total	86		86

Table 9: Distribution of archaeological anomalies by potential.

9.0.3 The distribution of anomalies is shown in Figure 18, as can be noted the distribution is fairly uniform across the surveyed area. The ratios, and distribution, of high, medium, and low potential anomalies are relatively consistent with a typical archaeological assessment of data.

9.0.4 The distribution of anomalies within the geophysical data shows a consistent approach to the assessment. The high, medium, and low potential anomalies are discussed below according to their assessed potential.

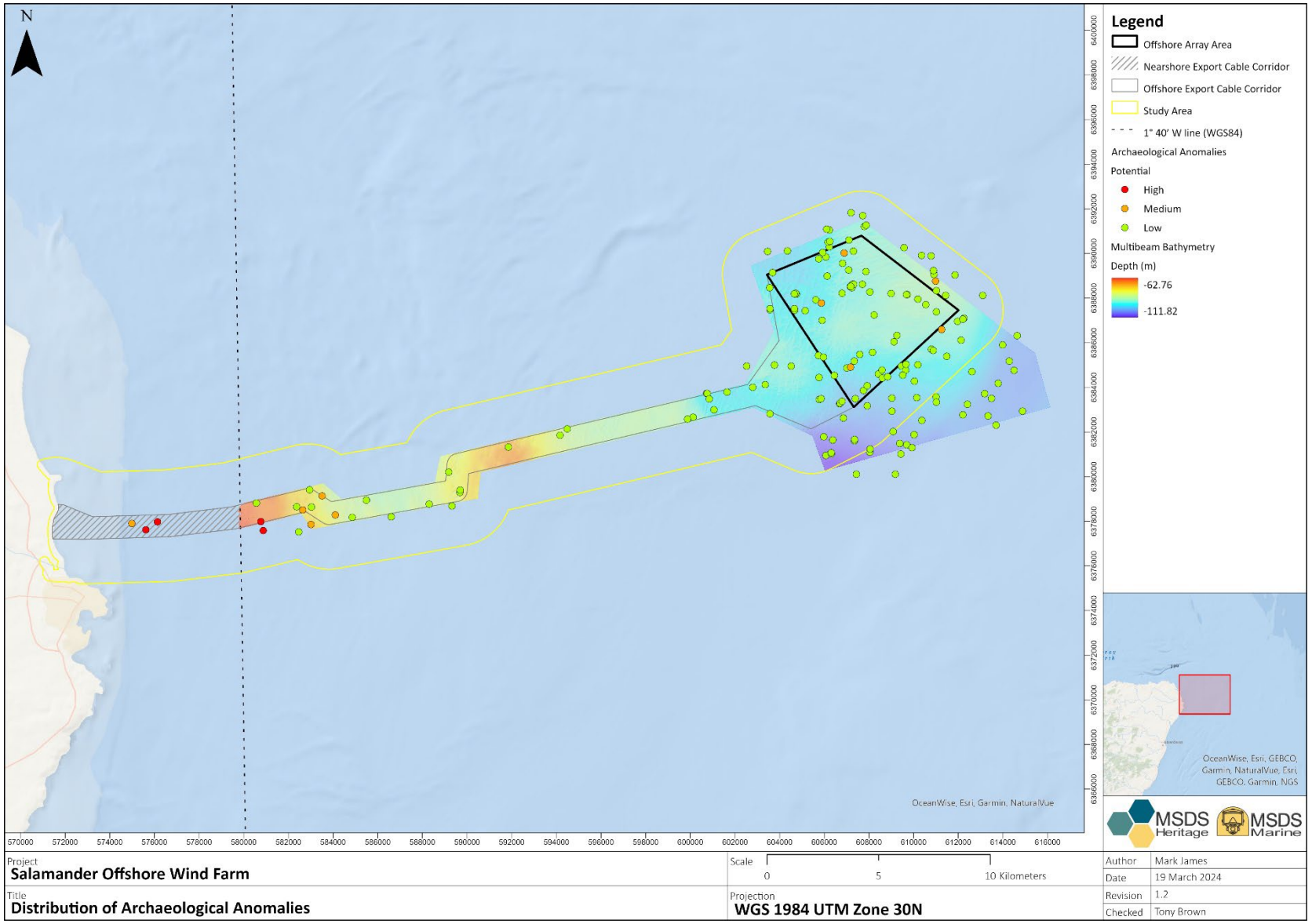

Figure 18: Distribution of Archaeological Anomalies.

9.1 Low potential anomalies

9.1.1 158 anomalies interpreted as of low archaeological potential were identified within the geophysical survey data extents. Of these, 76 are within the Offshore Development Area. The remaining 82 anomalies lie within the Wider Survey Area: 56 within the Study Area; 26 outside of the Study Area (Figure 19). The anomalies can be categorised as follows in Table 10.

Anomaly category	Offshore Development Area		Wider Survey Area
	Offshore Export Cable Corridor	Offshore Array Area	
Debris	1	0	5
Potential debris	12	3	29
Chain, cable, or rope	15	35	35
Fishing gear	1	1	2
Likely geological	1	0	4
Linear feature	2	5	7
Total	76		82

Table 10: Low potential anomaly categories.

9.1.2 The anomalies interpreted as of low archaeological potential (Table 10) are a mixture of small features, often boulder-like, or likely to represent modern debris such as infrastructure debris, chain, cable, or rope, or small items of debris with no features indicating archaeological potential. Each anomaly was reviewed and interpreted to be of low archaeological potential. A further review was undertaken following the assessment of the survey data extents to identify any correlations between anomalies that may indicate the potential may need to be revised.

9.1.3 Table 11 below provides a brief explanation for the interpretation of each category of low potential anomalies. To note, the descriptions below are generalised, and each anomaly is interpreted based on individual characteristics, other anomalies within the wider area, seabed characterisation, etc.

9.1.4 Low potential anomalies have been assessed against all available evidence and are deemed unlikely to be of archaeological significance and as such are not discussed further within the results section of this report. The identification of an anomaly as of low archaeological potential is commensurate with the mitigation for this category – *Maintain an operational awareness of the anomaly's location and reporting through the agreed protocol should material of potential archaeological significance be encountered*.

9.1.5 It is worth noting that the quantity of chain, cable, or rope (including wire) is disproportional when viewed alongside other categories such as potential debris. In some instances, this is in

association with modern features such as anchors, and potentially fishing gear, however a significant quantity is isolated, and either as coils or linear along the seabed. This is noted as in some instances it is hard to distinguish between coiled, and partially buried, wire and anomalies of potential archaeological interest. Thus, a precautionary approach will always be taken, and this is noted for each of the relevant medium potential anomalies which are discussed below.

Anomaly category	Description
Debris	Features identified as debris are generally of a form that is likely to indicate anthropogenic debris with a higher level of certainty than potential debris. The characteristics of the anomaly do not indicate archaeological potential.
Potential debris	Features identified as potential debris will generally display characteristics indicating anthropogenic origin, such as straight or angular edges. Boulder like features, with associated magnetic anomalies can also be categorised as potential debris.
Chain, cable, or rope	Features identified as chain, cable, or rope are generally identified as long, linear, or curvilinear features with little or no measurable height. The length and form will generally preclude their assessment as of a higher archaeological potential.
Linear Feature	Linear features are anomalies which primarily consist of a single linear element, but that don't appear to be chain cable of rope. A single isolated linear feature, whilst potentially indicative of anthropogenic debris, may not warrant an interpretation of higher archaeological interest.
Fishing gear	Features identified as fishing gear may include pot strings where small features are linked by rope like features, features with a mid-water component indicating snagged nets, or features associated with trawl scars.
Seabed disturbance	Features identified as seabed disturbances are where the main characteristic is a change in the seabed surface that may indicate either low lying material, or partially buried material. The potential will be determined based on the size, associated magnetic anomalies, and the surrounding environment.
Mound	Mounds can represent buried material of anthropogenic interest. The archaeological potential is determined through assessment of the size, form, related features, and associated magnetic anomalies.
Likely geological	Features identified as likely geological, are generally precautionary identifications where the form is indictive of a geological feature but may be of a size, or form, which is unusual in the surrounding area.

Table 11: Low potential anomaly descriptions.

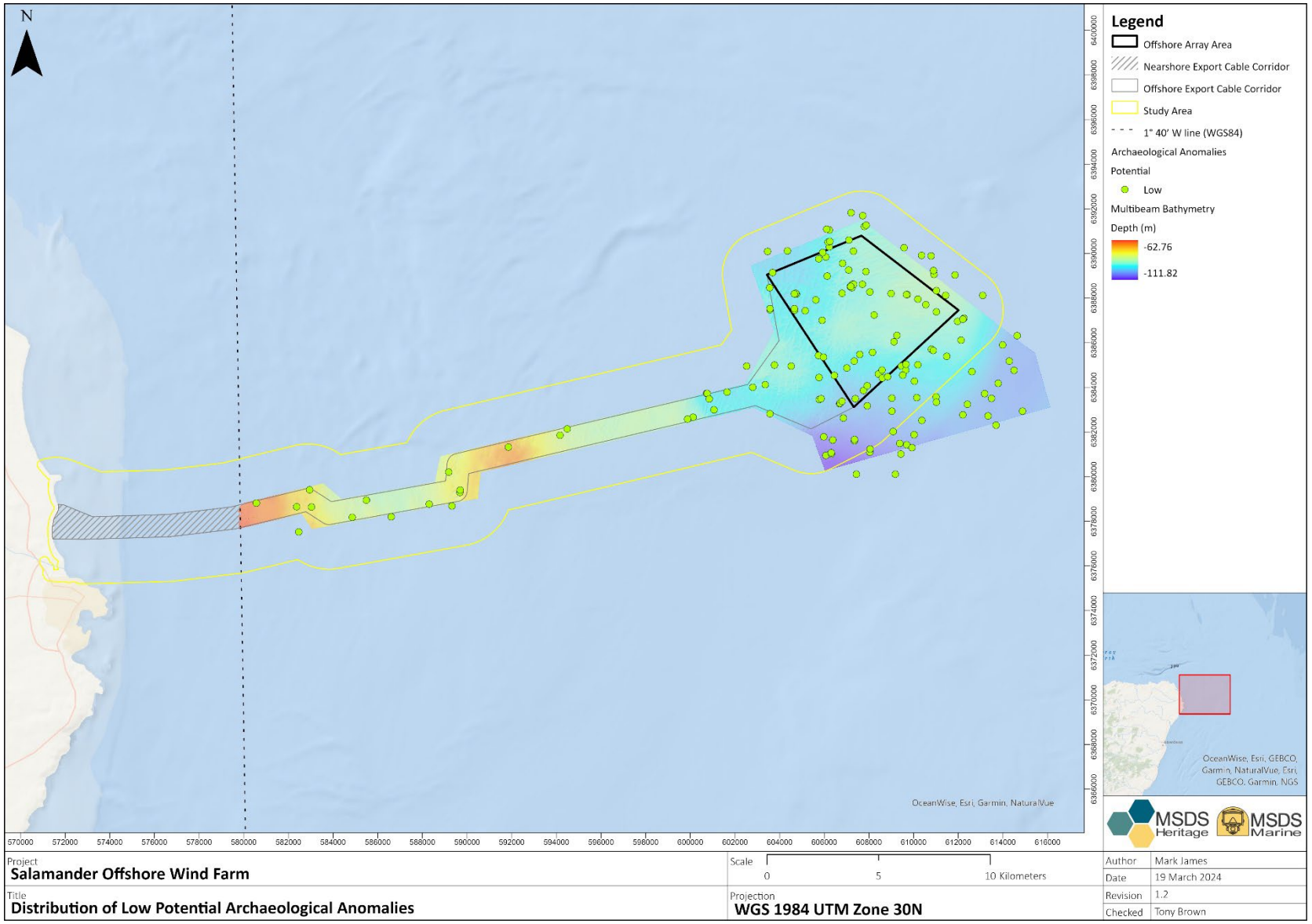

Figure 19: Distribution of Low Potential Archaeological Anomalies.

9.1.6 The distribution of low potential anomalies is shown in Figure 19. Further information regarding mitigation can be found within **Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage**, and a gazetteer of low potential anomalies, including positions and dimensions, can be found in *Appendix A – Anomalies of archaeological potential*.

9.2 Medium potential anomalies

9.2.1 Ten anomalies interpreted as of medium archaeological potential were identified within the geophysical survey data extents. Of these, seven are within the Offshore Development Area; the remaining three anomalies are within the Study Area (restricted to the extents of the survey area). The anomalies can be categorised as follows in Table 12 and the distribution is presented in Figure 20.

Anomaly category	Offshore Development Area		Wider Survey Area
	Offshore Export Cable Corridor	Offshore Array Area	
Debris	0	3	1
Potential debris	4	0	2
Total	7		3

Table 12: Medium potential anomaly categories.

9.2.2 The anomalies interpreted as of medium archaeological potential have characteristics that indicate a likelihood of representing anthropogenic material that has the potential to be of archaeological interest, or where a precautionary approach has been taken for anomalies where the identification is not clear.

9.2.3 The identification of an anomaly as of medium archaeological potential is commensurate with the mitigation for this category – *Avoidance of the anomaly's position and where appropriate an archaeological exclusion zone may be recommended. Ground truthing of the anomaly through the use of divers or an ROV would establish the archaeological potential.*

9.2.4 Each medium potential anomaly is discussed, along with an image, within this section of this report. Typically, associations with magnetic anomalies are discussed, and absence of a magnetic anomaly can indicate a potential geological origin, however, the current survey specifications provide a broad indication of ferrous contacts to support the geophysical assessment. It is noted that smaller contacts at a current linespacing (85 m) and altitude (variable) may not be identified.

9.2.5 Further information regarding mitigation can be found within **Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage**, and a gazetteer of medium potential anomalies, including positions and dimensions can be found in *Appendix A – Anomalies of archaeological potential*.

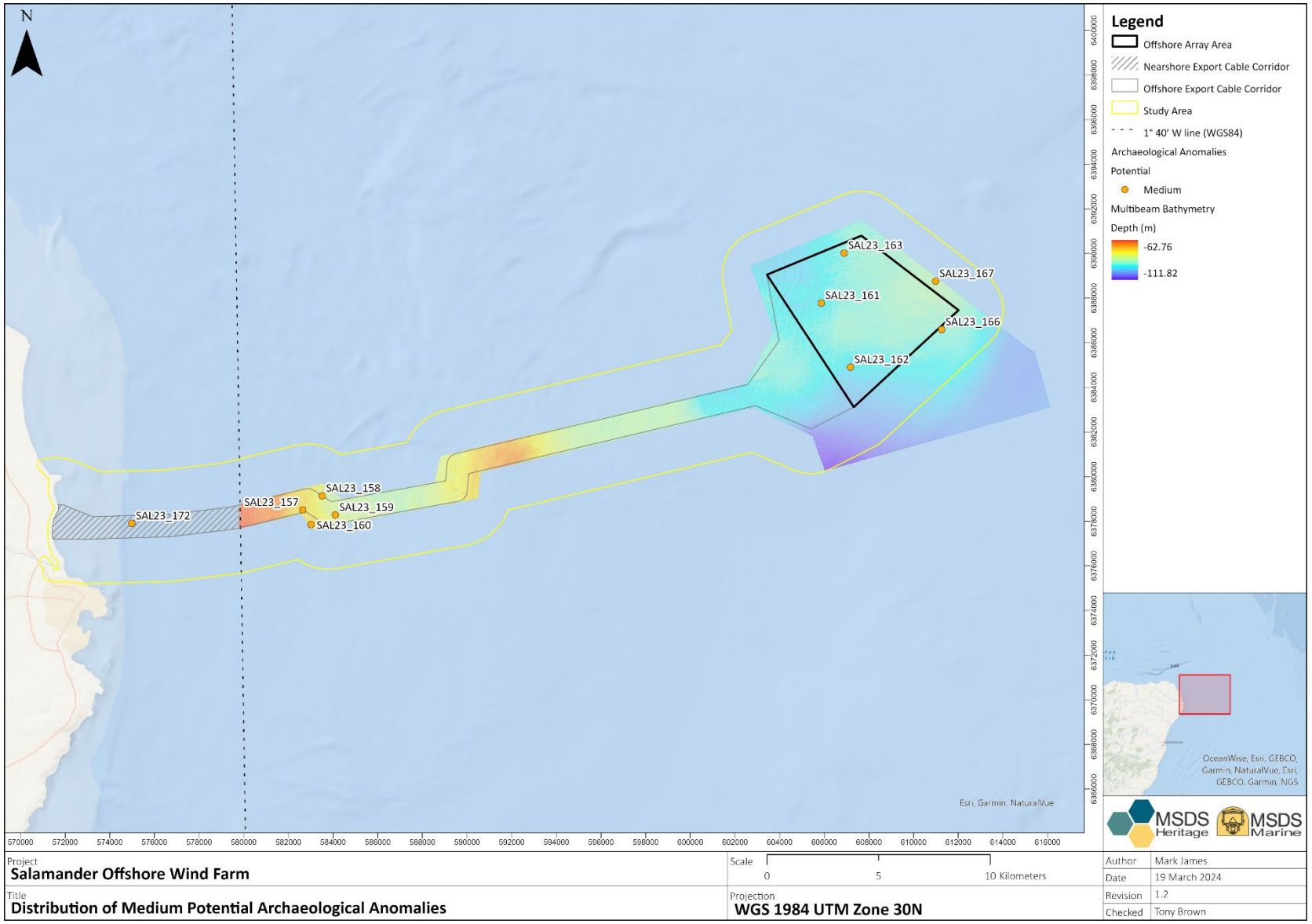

Figure 20: Distribution of Medium Potential Archaeological Anomalies.

Medium potential SAL23_157

9.2.6 Medium potential SAL23_157 (Figure 21) lies within the Offshore Export Cable Corridor, c. 100 m from the southern boundary and c. 11 km from the shore. The anomaly is visible in the SSS and MBES data and has no associated magnetic anomaly. The location does not correlate with any reviewed UKHO, HER, or Canmore records.

9.2.7 The anomaly is visible in the SSS as an area of thin linear features over an area 57.9 m x 9.9 m, with a measurable height of 0.1 m. Within the MBES data the anomaly is faintly visible as a linear feature, with small areas of potential scour, likely caused by disruption to the seabed dynamics further indicating the presence of material on the seabed. The anomaly does not directly correlate with any magnetic anomalies, however, anomalies of 23.8 nT and 8.0 nT lie 25 m to the north and to the west. The form of the anomaly is indicative of anthropogenic debris, although the origin is unclear. The form could represent a scatter of material of archaeological interest, but could equally represent a quantity of, for example, discarded steel wire. However, the size, and anthropogenic origin, means a precautionary approach, and the rating of medium potential, is appropriate.

9.2.8 Further assessment of Remotely Operated Vehicle (ROV) data would be required to better understand the origin, and therefore the archaeological potential, should works have the potential to impact within the recommended mitigation (see **Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage**).

Medium potential SAL23_158

9.2.9 Medium potential SAL23_158 (Figure 22) lies within the Offshore Export Cable Corridor, c. 6.0 m from the north-eastern boundary and c. 12 km from the shore. The anomaly is visible in the SSS and MBES data and has no associated magnetic anomaly. The location does not correlate with any UKHO, HER, or Canmore records.

9.2.10 The anomaly is visible in the SSS as a prominent, and irregular, feature measuring 4.2 m x 2.1 m, with a measurable height of 1.7 m. The feature sits within an area of scour, which is clear within the MBES data, although within the SSS data the edges of this area are irregular, potentially indicating protruding material. Outside of the area of scour are a number of linear features, the form of which indicates anthropogenic origin. The overall dimensions of the anomaly are 36.5 m x 12.1 m. The form of the anomaly is indicative of anthropogenic debris, although the origin is unclear. The form could represent material of archaeological interest, but could equally represent a geological feature in association with, for example, snagged fishing gear. However, the size, and the association with material of anthropogenic origin, means a precautionary approach, and the rating of medium potential, is appropriate.

9.2.11 Further assessment of Remotely Operated Vehicle (ROV) data would be required to better understand the origin, and therefore the archaeological potential, should works have the potential to impact within the recommended mitigation (see **Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage**).

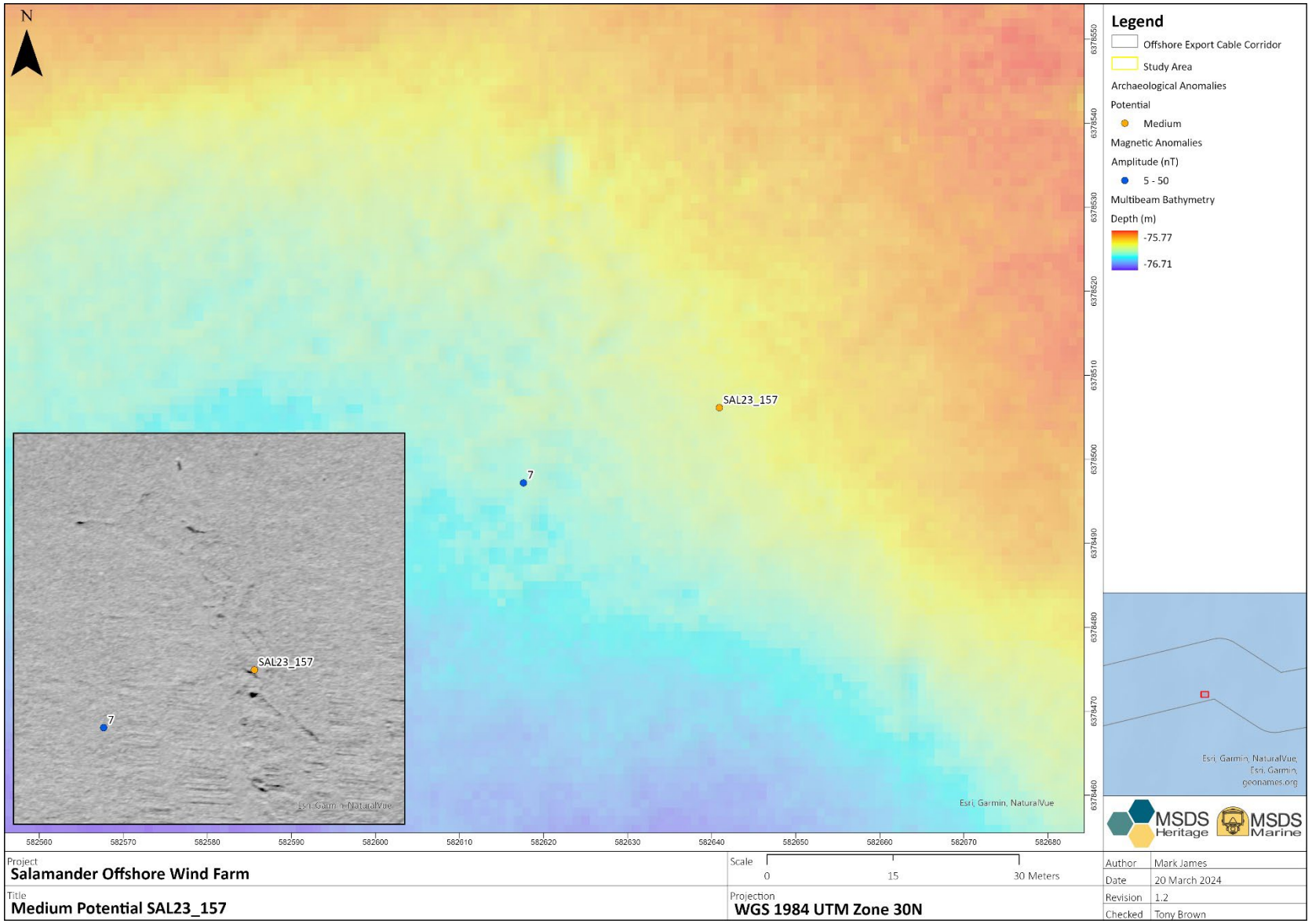

Figure 21: Medium Potential SAL23_157.

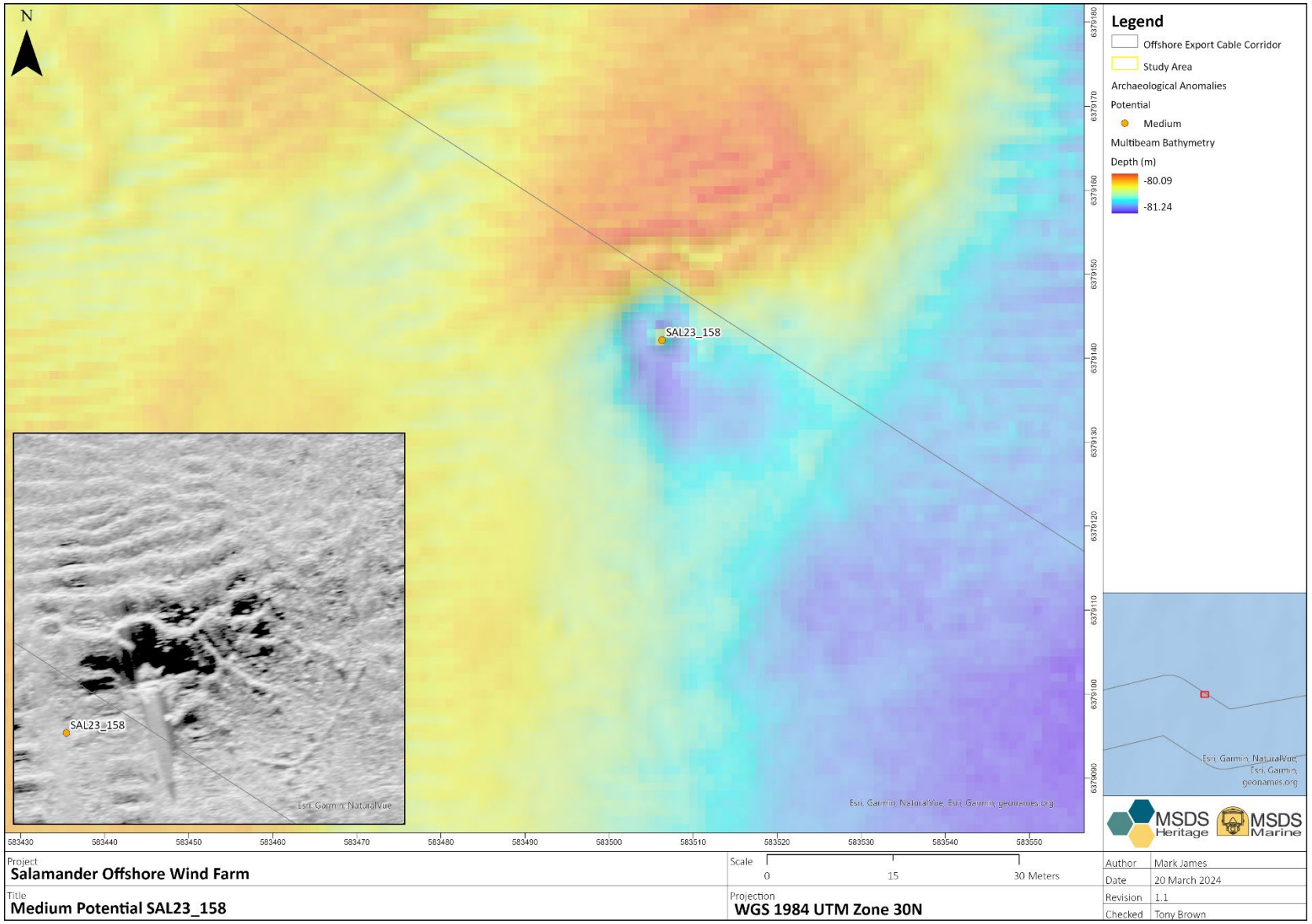

Figure 22: Medium Potential SAL23_158.

Medium potential SAL23_159

9.2.12 Medium potential SAL23_159 (Figure 23) lies within the Offshore Export Cable Corridor, c. 380 m from the southern boundary and c. 12.5 km from the shore. The anomaly is visible in the SSS and MBES data and has an associated magnetic anomaly of 10.7 nT. The location does not correlate with any UKHO, HER, or Canmore records.

9.2.13 The anomaly is predominantly visible in the SSS as a large, prominent, feature, measuring 17.1 m x 12.4 m, with a measurable height of 2.1 m, the form is not dissimilar to a large geological feature such as a boulder, or glacial erratic. To the north-west (c. 15 m) is another prominent feature measuring 14.7 m x 7.9 m, the feature is more mound-like in appearance with irregular edges to the south-west and south-east, potentially indicating partially exposed material that is buried to the north. Alongside, and to the west, is a curvilinear feature c. 19 m in length, to the south of the two main features lies a scatter of smaller features the full extents of which measure 76.8 m x 40.5 m. Within the MBES data the interpretation is relatively consistent with that observed in the SSS data, however, the form of the mounds, the curvilinear feature, and the distribution appear more anthropogenic and, whilst very precautionary, could potentially indicate the remains of a wreck vessel, however it is unclear and thus a medium potential rating is appropriate.

9.2.14 Further assessment of Remotely Operated Vehicle (ROV) data would be required to better understand the origin, and therefore the archaeological potential, should works have the potential to impact within the recommended mitigation (see **Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage**).

Medium potential SAL23_160

9.2.15 Medium potential SAL23_160 (Figure 24) lies outside the Offshore Export Cable Corridor, c. 360 m from the south-western boundary and c. 11.5 km from the shore. The anomaly is visible in the SSS and MBES data and has an associated magnetic anomaly of 54.8 nT. The location does not correlate with any UKHO, HER, or Canmore records.

9.2.16 The anomaly is largely incoherent within the SSS data, but is visible as a large irregular feature measuring 58.3 m x 32.4 m, with a measurable height of 2.1 m. Within the MBES data the feature is visible as a prominent mound measuring 40.6 m x 20.3 m, the mound has a very irregular surface, sloping towards the seabed along the north-west, but with a more sheer, linear, face to the south-east. To the east of, and connected to, the mound is a curvilinear distribution of irregular features, with smaller features visible to the north, west, and east. The anomaly is associated with a magnetic anomaly of 54.8 nT, a further magnetic anomaly of 108.8 nT.

9.2.17 The form of the anomaly is irregular, and unusual within the wider area, the form of which is potentially indicative of anthropogenic material. The presence of, and proximity to, large magnetic anomalies increases the likelihood of anthropogenic origin, therefore, a medium potential rating is considered appropriate.

9.2.18 Further assessment of Remotely Operated Vehicle (ROV) data would be required to better understand the origin, and therefore the archaeological potential, should works have the potential to impact within the recommended mitigation (see **Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage**).

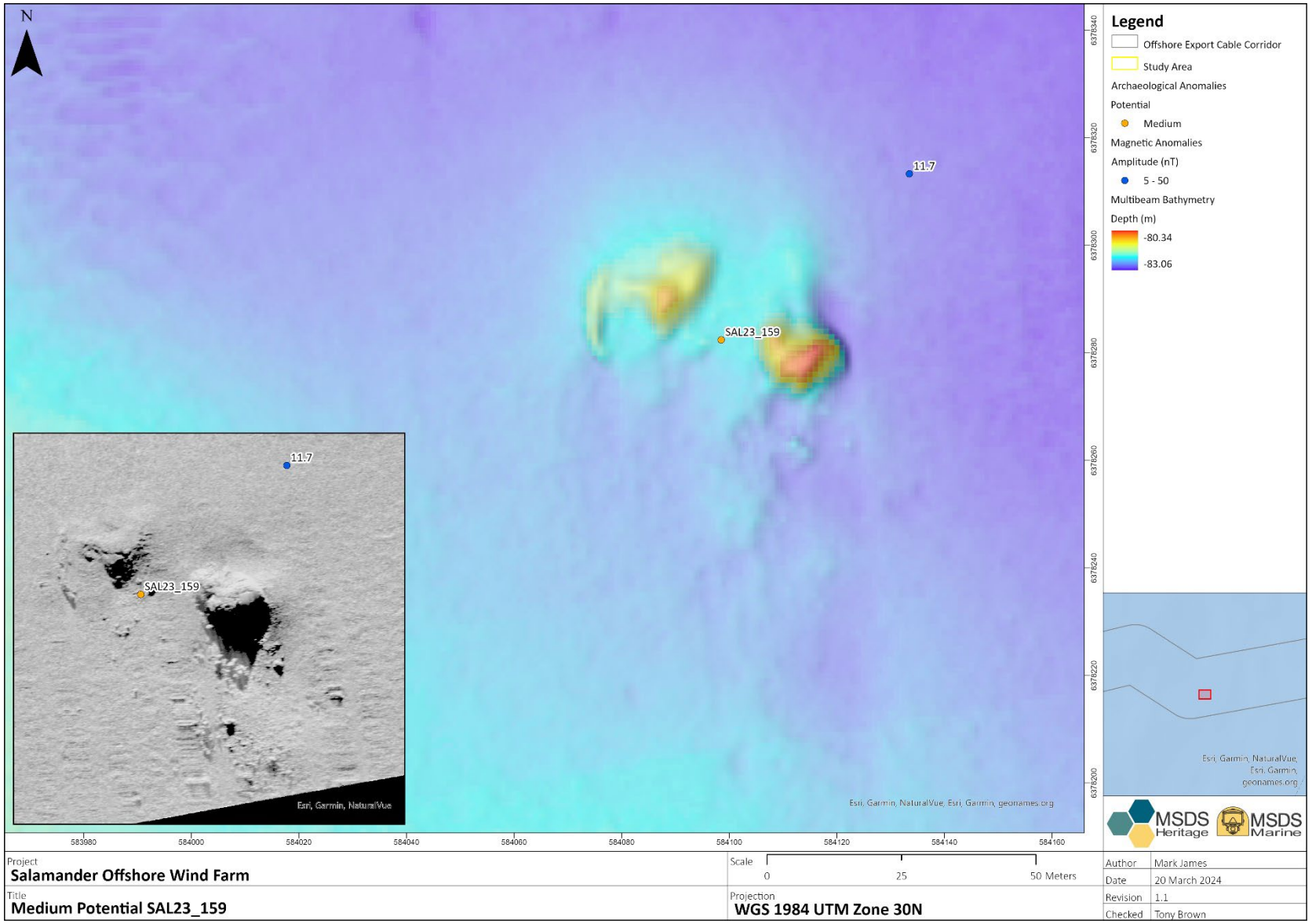

Figure 23: Medium Potential SAL23_159.

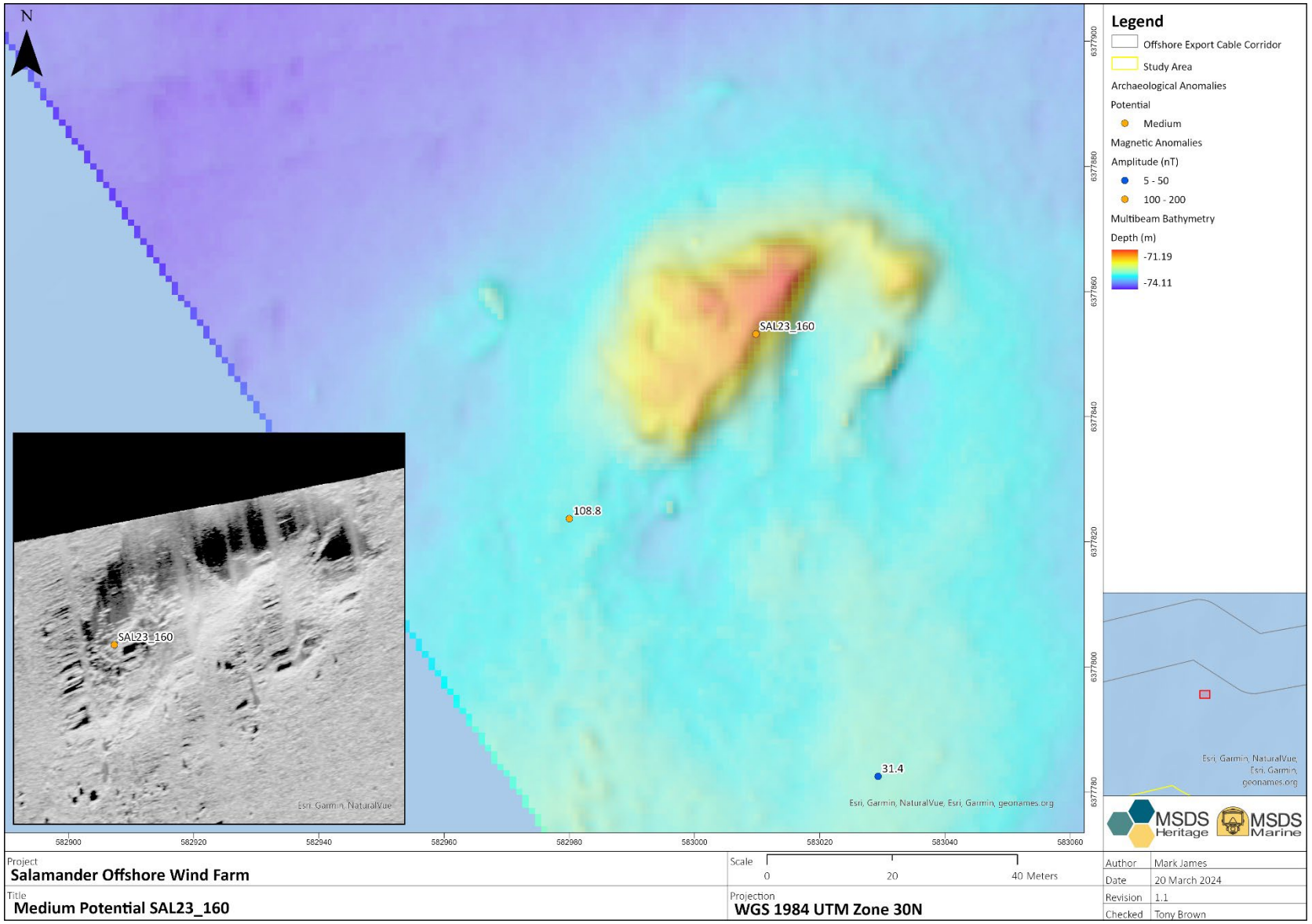

Figure 24: Medium Potential SAL23_160.

Medium potential SAL23_161

9.2.19 Medium potential SAL23_161 (Figure 25) lies within the Offshore Array Area, c. 2.7 km south-east of the north-eastern corner. The anomaly is visible in the SSS and MBES data and has no associated magnetic anomaly. The location does not correlate with any UKHO, HER, or Canmore records.

9.2.20 The anomaly is visible in the SSS data as an item of debris, characterised by a long linear feature extending to the north with an irregular mound, with protruding features, to the south. Overall, the contact measures 12.3 m x 2.4 m, with a measurable height of 0.5 m. Within the MBES data the anomaly is visible as a small mound. The origin of the anomaly is unclear; however, the form is highly likely to indicate anthropogenic material. The form may indicate a stockless anchor; however, this is unclear and therefore a precautionary medium potential rating is considered appropriate.

9.2.21 Further assessment of Remotely Operated Vehicle (ROV) data would be required to better understand the origin, and therefore the archaeological potential, should works have the potential to impact within the recommended mitigation (see **Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage**).

Medium potential SAL23_162

9.2.22 Medium potential SAL23_162 (Figure 26) lies within the Offshore Array Area, c. 1.8 km north of the southern corner. The anomaly is visible in the SSS and MBES data and has no associated magnetic anomaly. The location does not correlate with any UKHO, HER, or Canmore records.

9.2.23 The anomaly is visible in the SSS data as an incoherent cluster of debris, characterised by multiple linear and irregular features. Overall, the contact measures 11.67 m x 2.5 m, with a measurable height of 0.5 m. Within the MBES data the anomaly is visible as a small mound. The origin of the anomaly is unclear; however, the form is highly likely to indicate anthropogenic material, and the size means a medium potential rating is considered appropriate.

9.2.24 Further assessment of Remotely Operated Vehicle (ROV) data would be required to better understand the origin, and therefore the archaeological potential, should works have the potential to impact within the recommended mitigation (see **Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage**).

Medium potential SAL23_163

9.2.25 Medium potential SAL23_163 (Figure 27) lies within the Offshore Array Area, c. 420 m from the northern boundary. The anomaly is visible in the SSS, but not within the MBES data and has an associated magnetic anomaly 195.7 nT. The location does not correlate with any UKHO, HER, or Canmore records.

9.2.26 The anomaly is visible in the SSS data as a distribution of at least ten features, most of which are elongated, and ranging in size from c. 2 m to c. 10 m, the form of which indicate anthropogenic material. Overall, the anomaly measures 19.9 m x 19.0 m. The anomaly is associated with a large magnetic anomaly of 195.7 nT likely indicating a concentration of ferrous material. The anomaly lies on the outer edges of a sandwave, which could potentially indicate further buried material. The anomaly is highly likely to be of anthropogenic origin, however, the interpretation is unclear, thus a medium potential rating is considered appropriate.

9.2.27 Further assessment of Remotely Operated Vehicle (ROV) data would be required to better understand the origin, and therefore the archaeological potential, should works have the potential to impact within the recommended mitigation (see **Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage**).

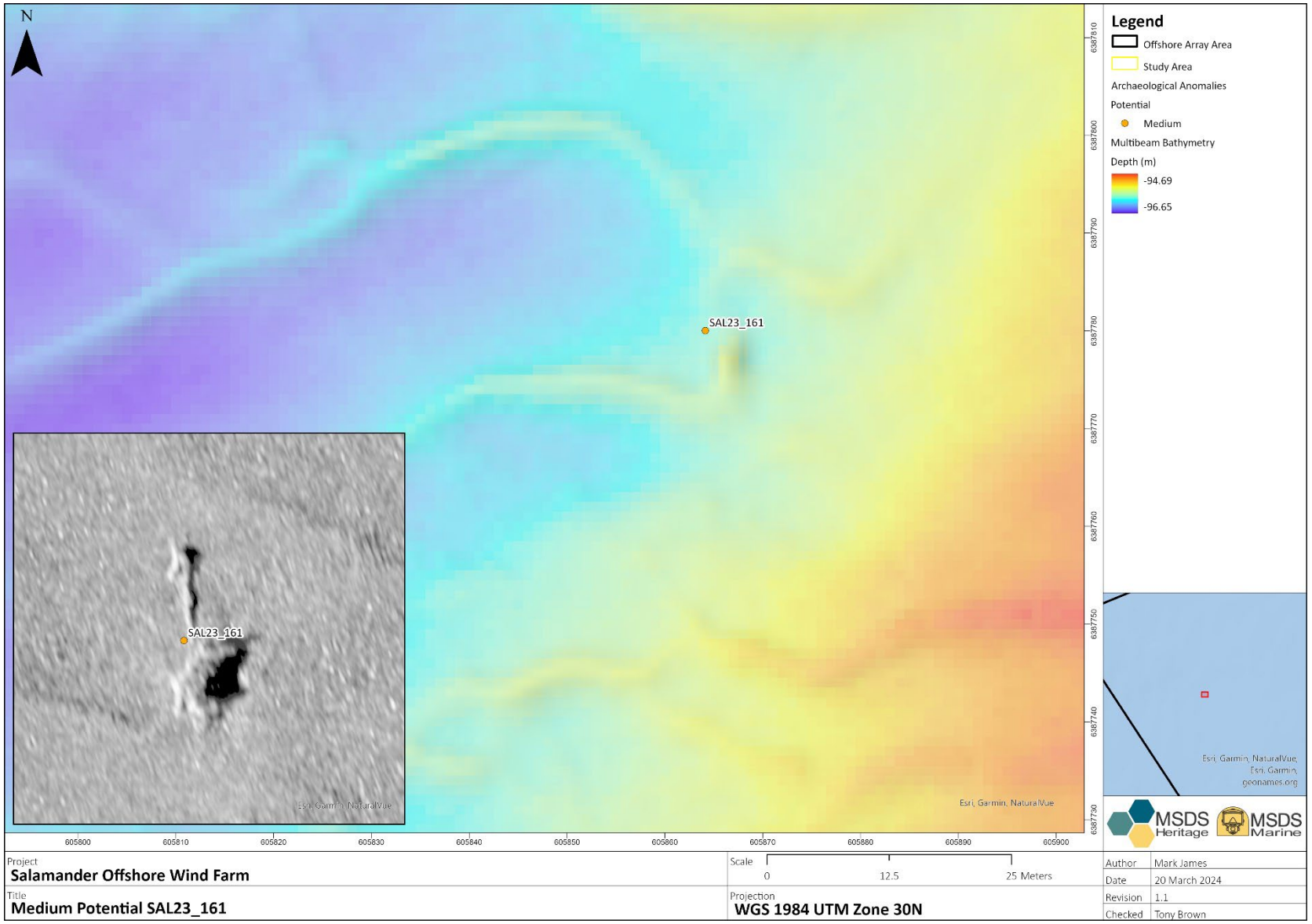

Figure 25: Medium Potential SAL23_161.

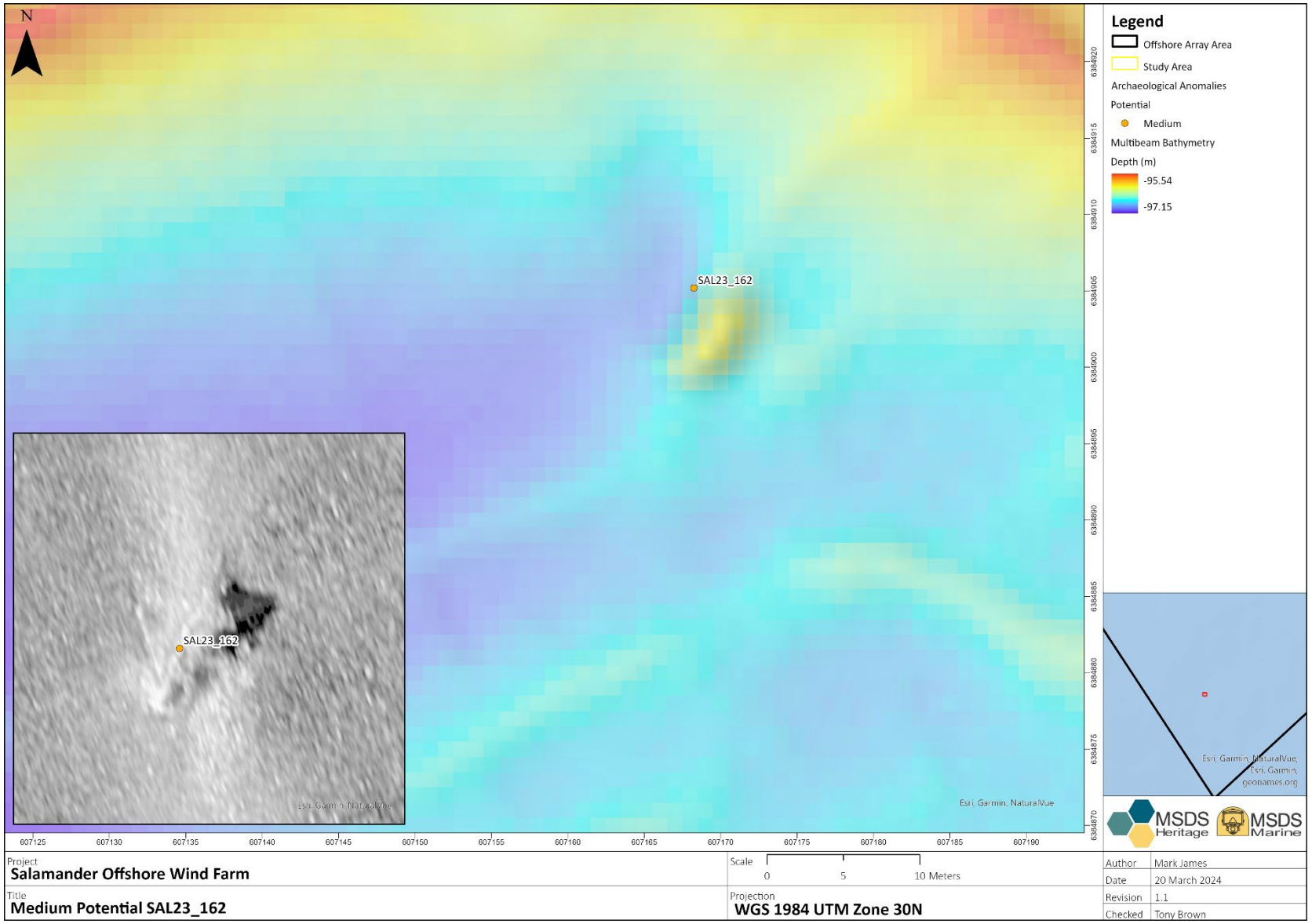

Figure 26: Medium Potential SAL23_162.

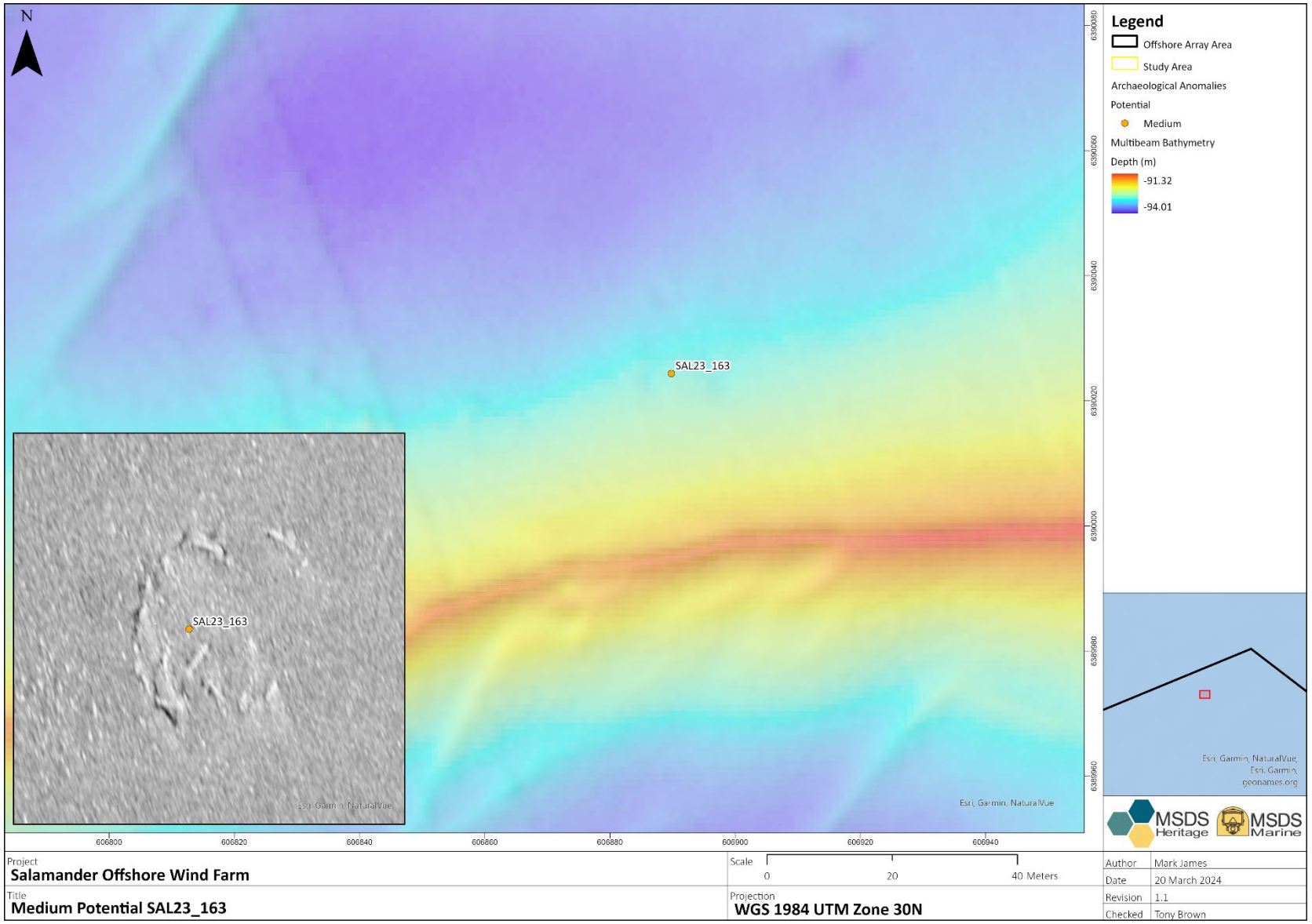

Figure 27: Medium Potential SAL23_163.

Medium potential SAL23_166

9.2.28 Medium potential SAL23_166 (Figure 28) lies outside the Offshore Array Area, c. 120 m from the south-eastern boundary. The anomaly is visible in the SSS and MBES data and has no associated magnetic anomaly. The location does not correlate with any UKHO, HER, or Canmore records.

9.2.29 The anomaly is visible in the SSS data as an incoherent cluster of debris, characterised by a long (17.3 m) irregular linear feature, with a connected shorter (6.2 m) linear feature to the east. Overall, the contact measures 17.3 m x 5.6 m, with a measurable height of 0.4 m. Within the MBES data the anomaly is visible as an 'S' shaped mound. The origin of the anomaly is unclear; however, the form is highly likely to indicate anthropogenic material, and the size means a medium potential rating is considered appropriate.

9.2.30 Further assessment of Remotely Operated Vehicle (ROV) data would be required to better understand the origin, and therefore the archaeological potential, should works have the potential to impact within the recommended mitigation (see **Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage**).

Medium potential SAL23_167

9.2.31 Medium potential SAL23_167 (Figure 29) lies outside the Offshore Array Area, c. 400 m from the north-eastern boundary. The anomaly is visible in the SSS and MBES data and has no associated magnetic anomaly. The location does not correlate with any UKHO, HER, or Canmore records.

9.2.32 The anomaly is visible in the SSS data as four distinct features in a row, potentially connected by smaller features. The overall dimensions are 22.4 m x 4.5 m, with a measurable height of 0.8 m, the form would suggest partial burial. Within the MBES data the anomaly is visible as a long, but irregular mound with scour around the majority of it, and bisecting a sandwave. The origin of the anomaly is unclear; however, the form is potentially indicative of anthropogenic material, and the size means a precautionary medium potential rating is considered appropriate.

9.2.33 Further assessment of Remotely Operated Vehicle (ROV) data would be required to better understand the origin, and therefore the archaeological potential.

Medium potential SAL23_172

9.2.34 Medium potential SAL23_172 (Figure 30) lies within the Offshore Export Cable Corridor, c. 350 m from the northern boundary and c. 3.4 km from the shore. The anomaly is outside the extents of the geophysical and hydrographic survey data, but within the 2009 MBES data obtained from the ADMIRALTY Marine Data Portal. The location does not correlate with any UKHO, HER, or Canmore records.

9.2.35 The anomaly is visible as a prominent mound measuring 96.5 m x 41.4 m, with a measurable height of 4.3 m. Extending from the south-western end of the mound is a 60.8 m x 10.4 m linear feature, with two further features to the north-west. Although the resolution of the SBES data is not as good as the SSS and MBES data, the form of the linear features are indicative of anthropogenic debris, the mound potentially indicates further buried material, as such a precautionary medium potential rating has been applied.

9.2.36 Further assessment of Remotely Operated Vehicle (ROV) data would be required to better

understand the origin, and therefore the archaeological potential, should works have the potential to impact within the recommended mitigation (see Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage).

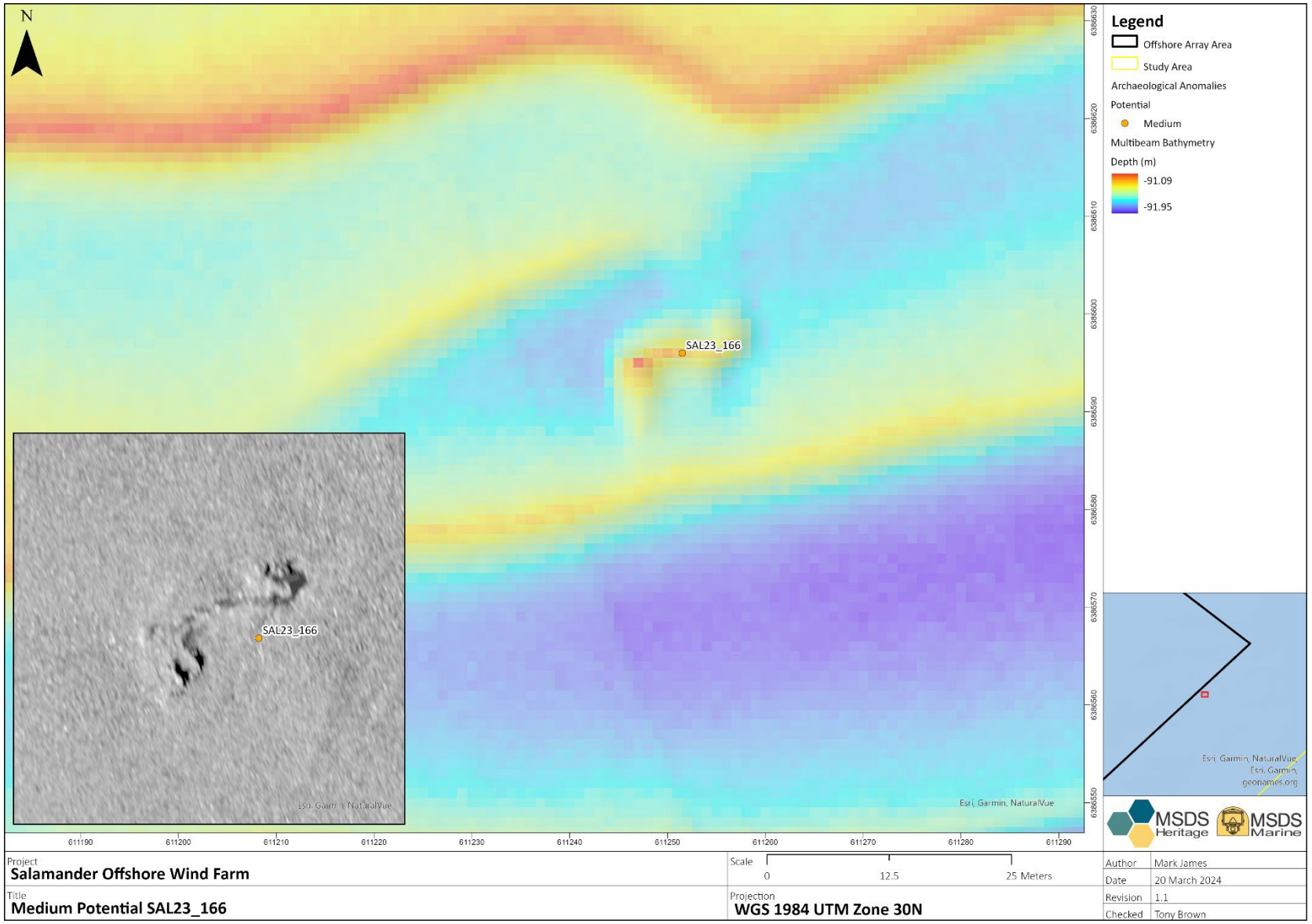

Figure 28: Medium Potential SAL23_166.

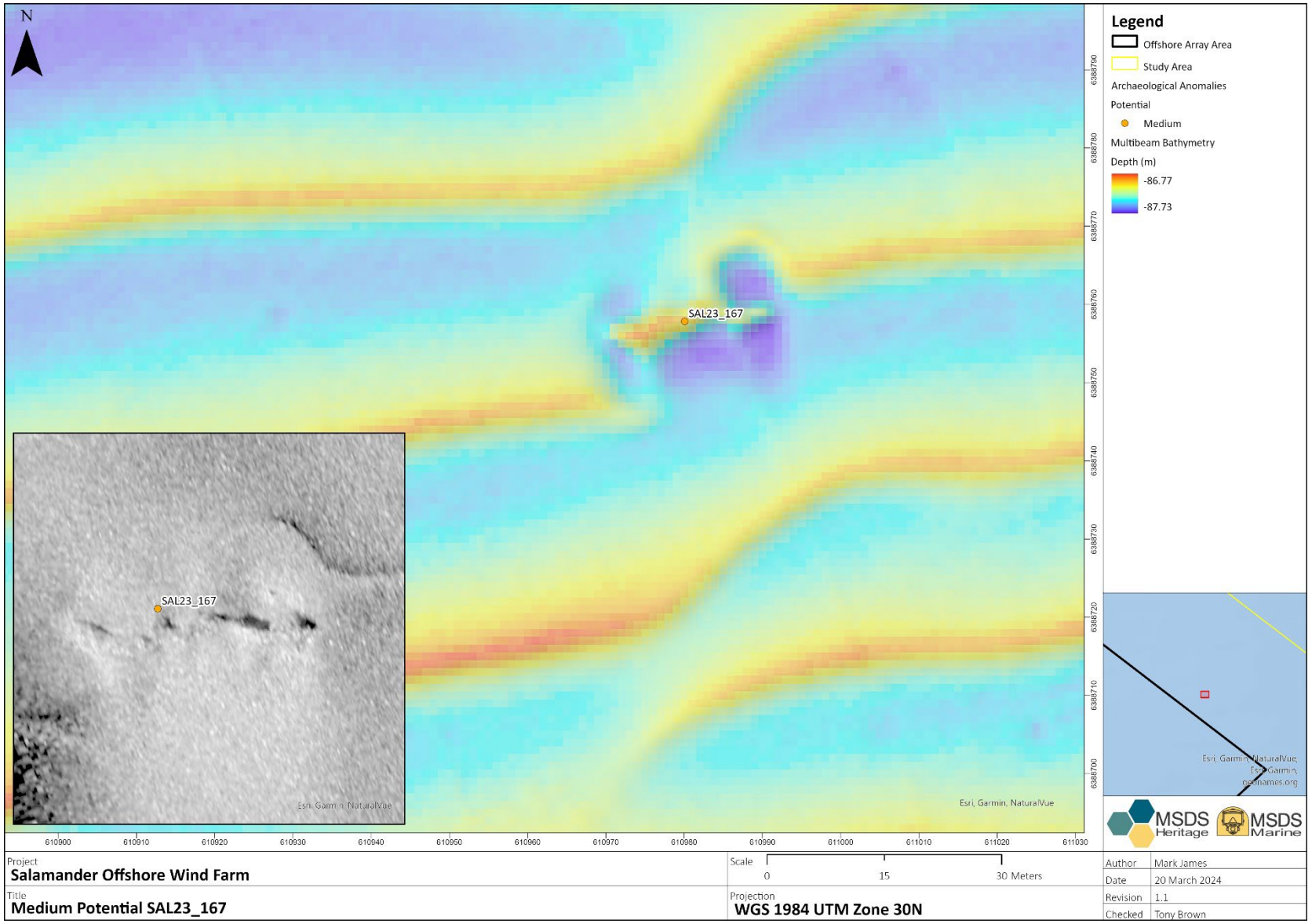

Figure 29: Medium Potential SAL23_167.

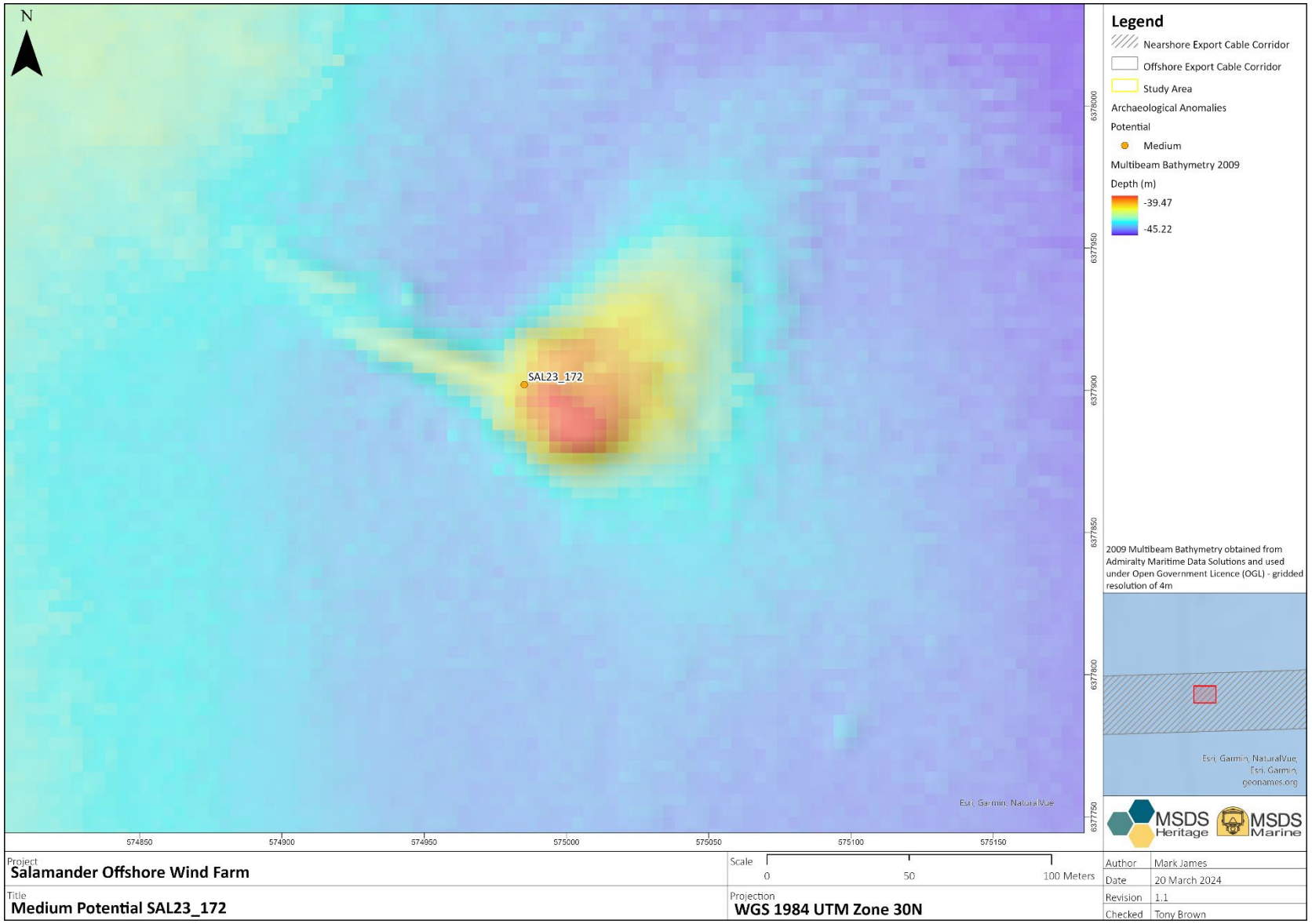

Figure 30: Medium Potential SAL23_172.

9.3 High potential anomalies

9.3.1 Four anomalies interpreted as of high archaeological potential were identified within the geophysical survey data extents. Of these, three are within the Offshore Development Area (all within the Offshore Export Cable Corridor); the single remaining anomaly lies within the Study Area (restricted to the extents of the survey area). The anomalies can be categorised as follows in Table 13 and the distribution is presented in Figure 31.

Anomaly category	Offshore Development Area	Wider Survey Area
Wreck	2	0
Potential wreck	1	1
Total	3	1

Table 13: High potential anomaly categories.

9.3.2 The anomalies interpreted as of high archaeological potential have characteristics that indicate a high likelihood of representing anthropogenic material that has a high potential to be of archaeological interest, or where a precautionary approach has been taken for anomalies where the identification isn't clear.

9.3.3 The identification of an anomaly as of high archaeological potential is commensurate with the mitigation for this category – *Archaeological exclusion zones will be recommended based on the size of the anomaly, any outlying debris and the seabed dynamics as interpreted from the SSS and MBES data*.

9.3.4 Each high potential anomaly is discussed, along with an image, within this section of this report. Further information regarding mitigation can be found within **Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage**, and a gazetteer of high potential anomalies, including positions and dimensions can be found in *Appendix A – Anomalies of archaeological potential*.

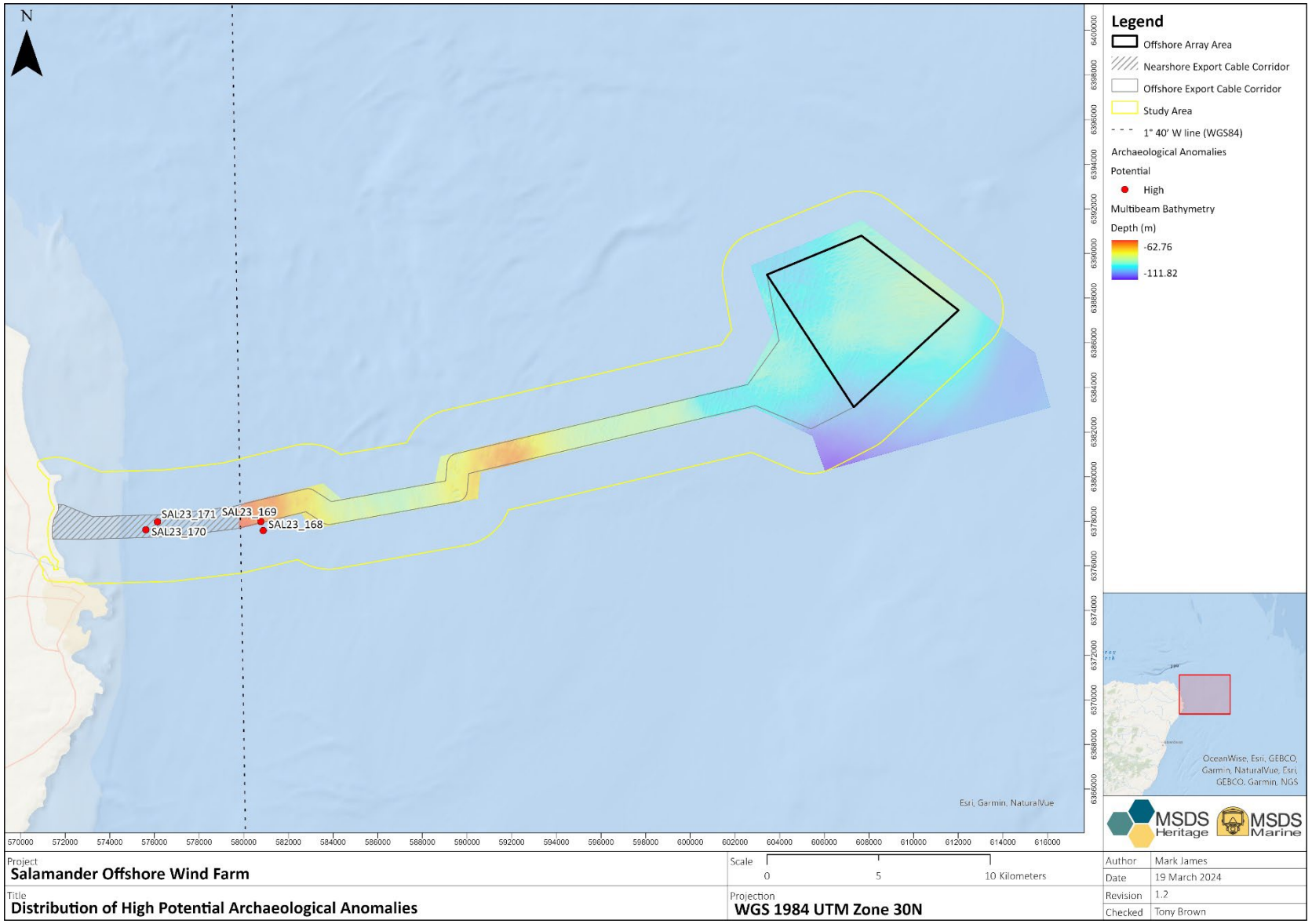

Figure 31: Distribution of High Potential Archaeological Anomalies.

High potential SAL23_168

9.3.5 High potential SAL23_168 (Figure 32) lies outside the Offshore Export Cable Corridor, c. 376 m from the southern boundary, and c. 9.3 km from shore. The anomaly is only partially covered by site-specific geophysical data; it is visible in the SSS, but is outside the extents of the MBES and Magnetometer data. It is within the extents of the 2009 MBES data obtained from the ADMIRALTY Marine Data Portal (4 m resolution). The location does not correlate with any UKHO, HER, or Canmore records.

9.3.6 The anomaly is visible in the SSS data as an almost rectangular feature 22.6 m x 2.9 m, with a measurable height of 0.5 m. Primarily based on the shadow, the southern third of the feature is almost level with the seabed, with the exception of a feature with height towards the southernmost point. Towards the north of the feature the shadow indicates a relativity box like, and complete structure, with the shadow becoming more irregular towards the middle suggesting potentially partially collapsed structure. The anomaly is unusual in that whilst the form of the feature and the shadow are not dissimilar to a wreck, the width, and the height seem low in relation to the length. The anomaly is not visible within the SBES data, however the low resolution of this data may explain this.

9.3.7 The anomaly has been assigned a precautionary high potential rating due to the potential for it to represent a wreck of unknown age and origin. Further assessment of Remotely Operated Vehicle (ROV) data would be required to better understand the origin, and therefore the archaeological potential.

High potential SAL23_169

9.3.8 High potential SAL23_169 (Figure 33) lies within the Offshore Export Cable Corridor, c. 376 m from the southern boundary, and c. 9.3 km from shore. The anomaly is visible in the SSS and MBES data and has an associated magnetic anomaly 61.4 nT. The location does not correlate with any UKHO, HER, or Canmore records.

9.3.9 The anomaly is characterised within the SSS data as a large mound 39.5 m x 16.6 m, with a measurable height of 1.4 m. The mound appears to be comprised of a conglomeration of multiple smaller, but incoherent, features, the form of which is indicative of anthropogenic debris. To the north-north-west and the north-north-east, c. 35 m and c. 25 m respectively, are two smaller mounds, however, within the SSS data these appear more geological in origin. Scatters of smaller features are also identifiable within the general vicinity covering an area 102.6 m x 70.8 m. Within the MBES data the anomaly is similar in form, however the material making up the main mound appears either elongate, or in linear concentrations, the overall form and distribution is wreck like, albeit broken up. The anomaly correlates with a magnetic anomaly of 61.4 nT, several other magnetic anomalies with amplitudes of between c. 30 and 65 nT lie within the immediate vicinity indicting a large ferrous content to the anomaly.

9.3.10 Whilst not conclusively the remains of a wrecked vessel, the form, potential material, and distribution of the features suggest a high probability of at least anthropogenic material, if not a wreck. As such, a high potential rating is considered appropriate. Further assessment of Remotely Operated Vehicle (ROV) data would be required to better understand the origin, and therefore the archaeological potential.

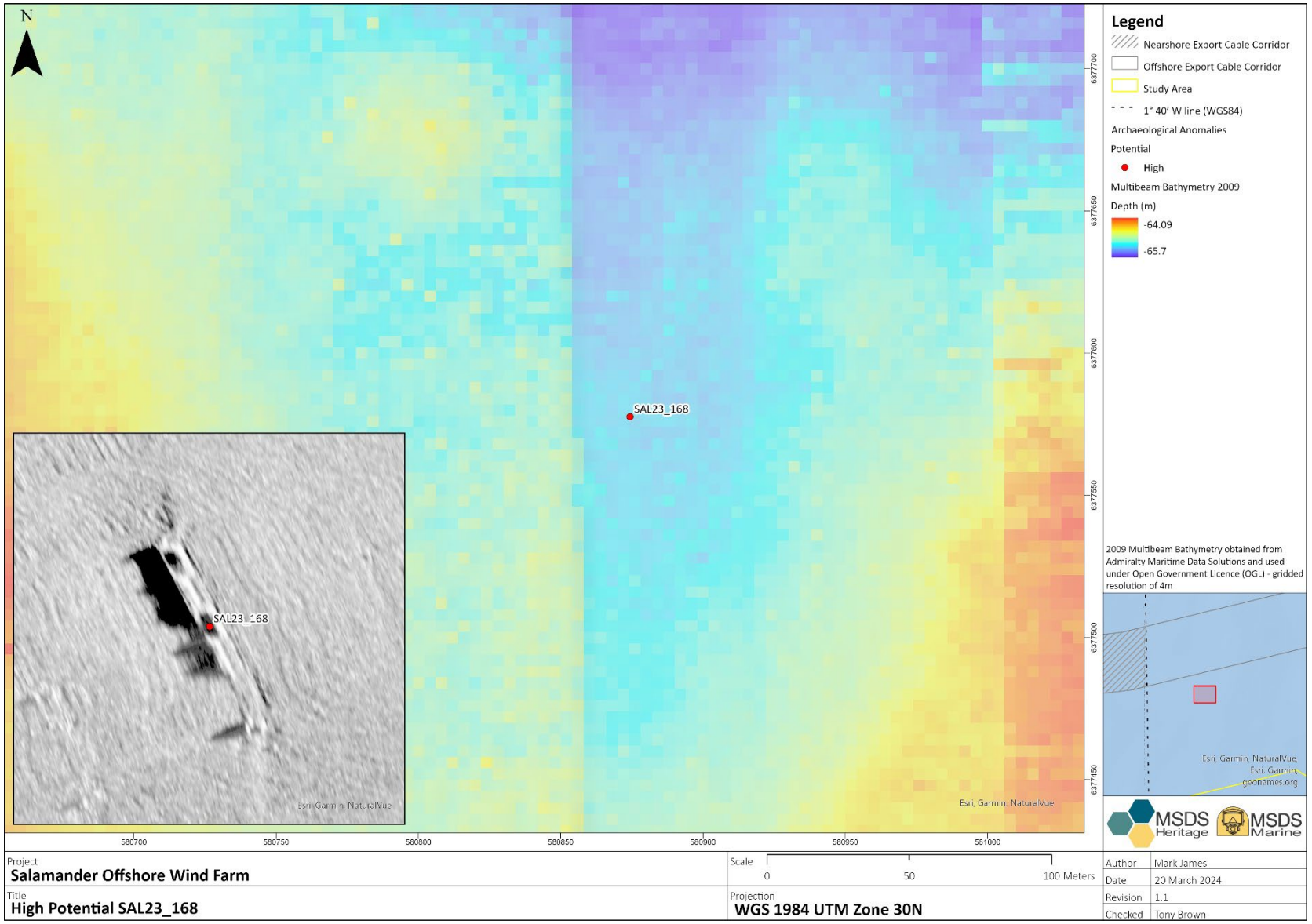

Figure 32: High Potential SAL23_168.

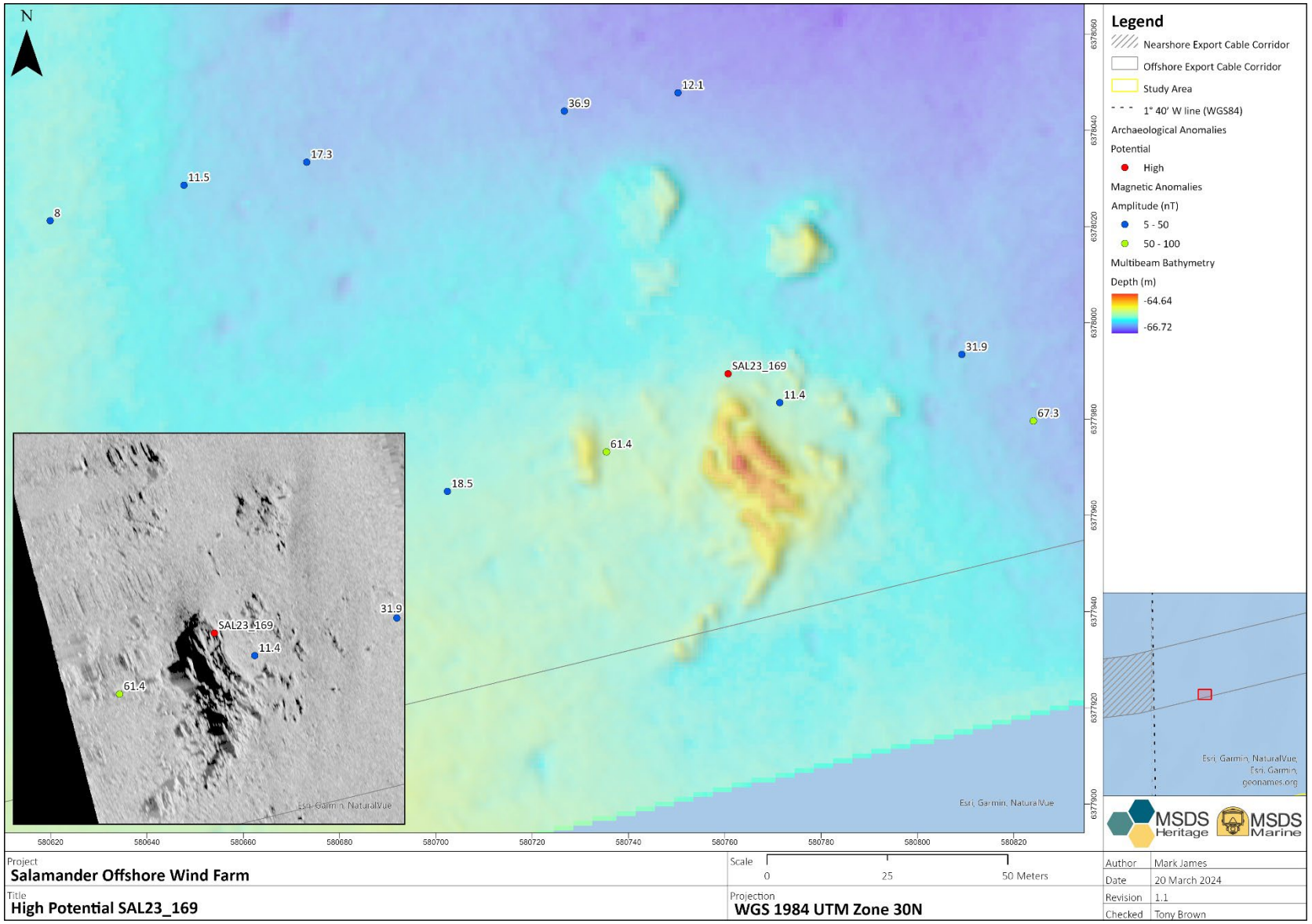

Figure 33: High Potential SAL23_169.

High potential SAL23_170

9.3.11 High potential SAL23_170 (Figure 34) lies within the Offshore Export Cable Corridor, c. 340 m from the southern boundary, and c. 4.0 km from shore. The anomaly is outside the extents of the site-specific geophysical and hydrographic survey data, but within the 2009 MBES data obtained from the ADMIRALTY Marine Data Portal (4 m resolution). The location correlates with UKHO record 2282, but does not directly correlate with any HER, or Canmore records.

9.3.12 The anomaly is visible within the 2009 MBES data as the remains of a wrecked vessel measuring 98.2 m x 24.2 m, with a measurable height of 8.9 m. The wreck appears collapsed to the southern end, and two items of potential debris are noted c. 25 m to the south. Whilst the resolution of the 2009 MBES data makes any further interpretation difficult, the data is sufficient to determine the anomaly is that of a wreck, and to determine the extents for the recommendation of mitigation.

9.3.13 The UKHO record the wreck as that of the *Muriel*, a British steam ship, built in 1898 and sunk in 1918 whilst enroute from Tyne to Scapa Flow. The cause of sinking is unknown, a loud explosion was heard under the vessel, however no torpedo or submarine tracks were sighted. Geophysical, hydrographic, and diver surveys have confirmed the presence of a wreck at the anomaly location.

High potential SAL23_171

9.3.14 High potential SAL23_171 (Figure 35) lies within the Offshore Export Cable Corridor, c. 320 m from the northern boundary, and c. 4.5 km from shore. The anomaly is outside the extents of the site-specific geophysical and hydrographic survey data, but within the 2009 MBES data obtained from the ADMIRALTY Marine Data Portal (4 m resolution). The location correlates with UKHO record 2286, HER record NK14NE0022, and Canmore record 101844.

9.3.15 The anomaly is visible within the 2009 MBES data as the remains of a wrecked vessel measuring 75.7 m x 16.9 m, with a measurable height of 6.7 m. The wreck appears partially collapsed at the southern half. Whilst the resolution of the SBES data makes any further interpretation difficult, the data is sufficient to determine the anomaly is that of a wreck, and to determine the extents for the recommendation of mitigation.

9.3.16 The UKHO, the HER, and Canmore record the wreck as that of the *St Magnus*, a British steam ship, built in 1912 and sunk in 1918. The ship was torpedoed by Submarine UC-58 whilst enroute from Lerwick to Aberdeen.

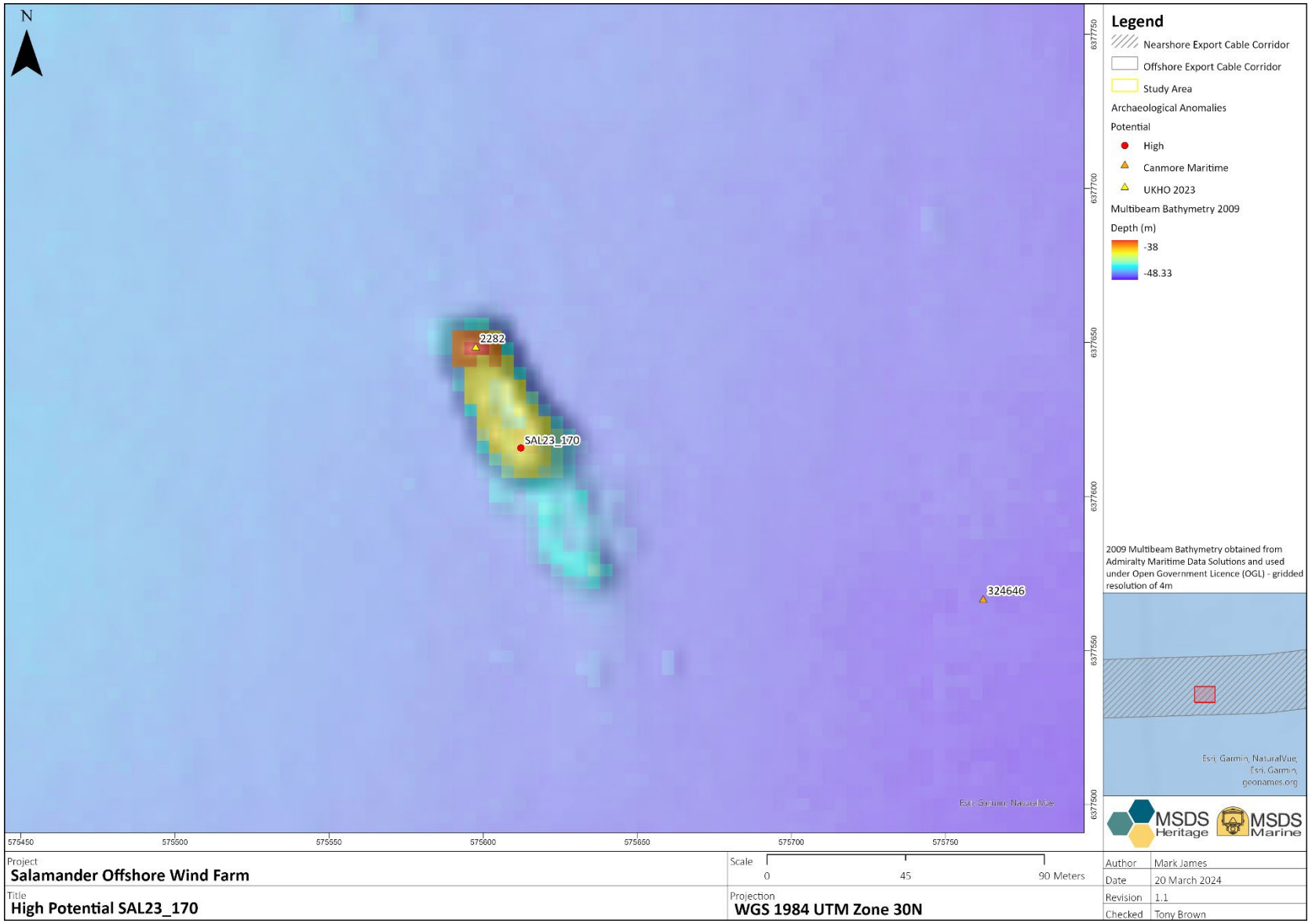

Figure 34: High Potential SAL23_170.

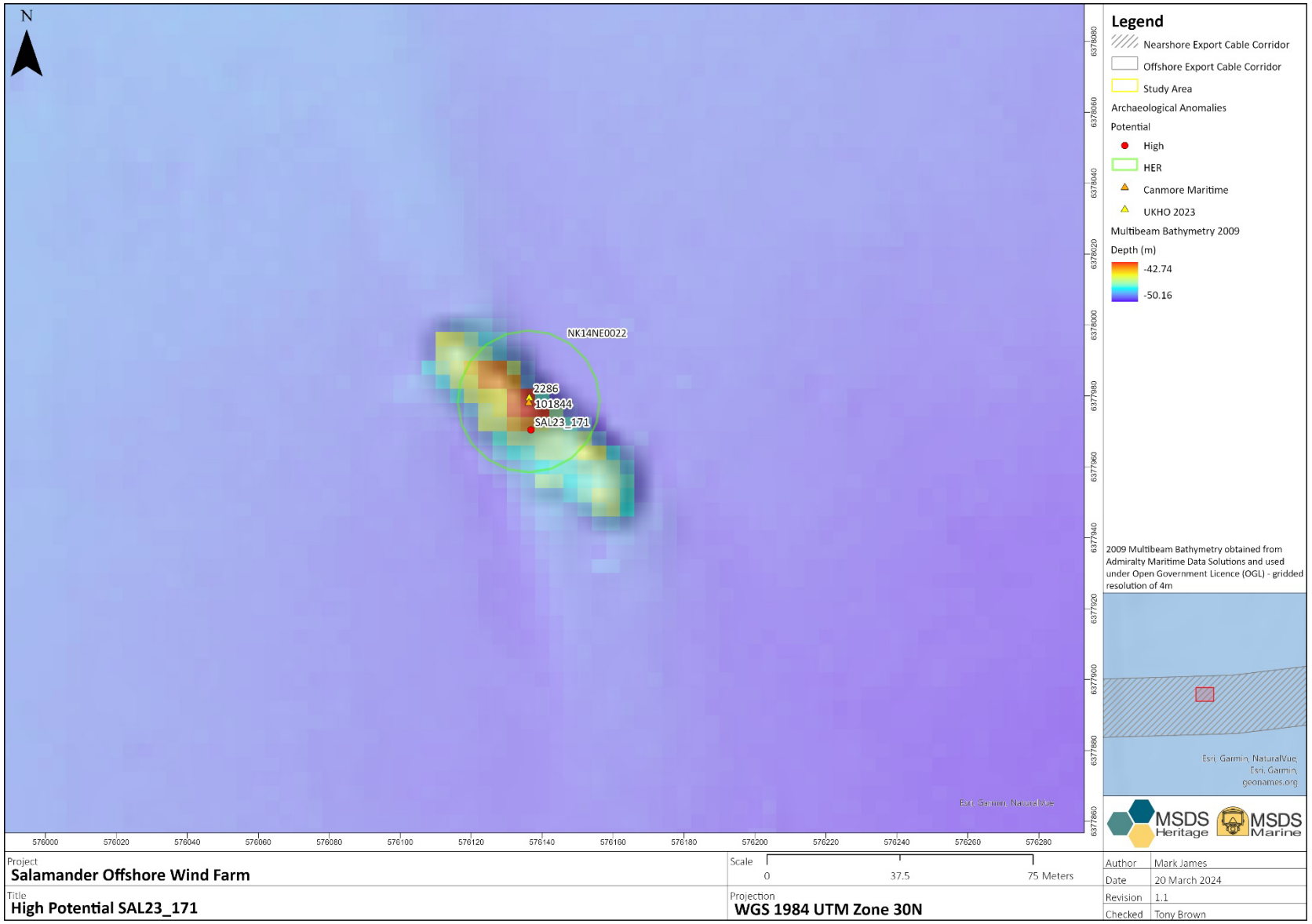

Figure 35: High Potential SAL23_171.

10.0 Magnetic anomalies

10.0.1 A total of 630 magnetic anomalies, ranging between 5.0 nT and 11,663.7 nT, were identified within the extents of the geophysical data. Of these, 501 do not directly correlate with known, or visible, features. The distribution of anomalies by amplitude is shown below in Table 14 with their spatial distribution presented in Figure 36.

Intensity (nT)	Offshore Development Area		Wider Survey Area
	Offshore Export Cable Corridor	Offshore Array Area	
5 to 50	319	22	101
50 to 100	26	3	11
100 to 200	11	0	3
200 +	4	0	1
Total	385		116

Table 14: Magnetic anomalies.

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

10.0.3 The Magnetometer data collection methodology was to run lines at 85 m concurrently with the SSS and MBES, thus the line spacing is not sufficient for the detailed assessment of small, ferrous features on or below the seabed. The position for a magnetic anomaly can only be determined from directly below a single sensor, or where lines are run close enough together to be able to confidently position an anomaly seen on two, or more, lines. However, in combination with SSS and MBES data the Magnetometer specification is considered sufficient to develop a broad understanding of the potential of the survey area, and to identify larger features of potential archaeological significance.

10.0.4 The positions of magnetic anomalies were viewed in the available datasets and where there was a strong correlation with a seabed anomaly, they were assessed for archaeological potential and discussed in relation to low, medium, and high potential anomalies. All remaining anomalies have been included within this section.

10.0.5 All isolated magnetic anomalies of 50 nT or less are considered to be of limited potential to be of archaeological significance. This is, however, dependant on the distance from the sensor.

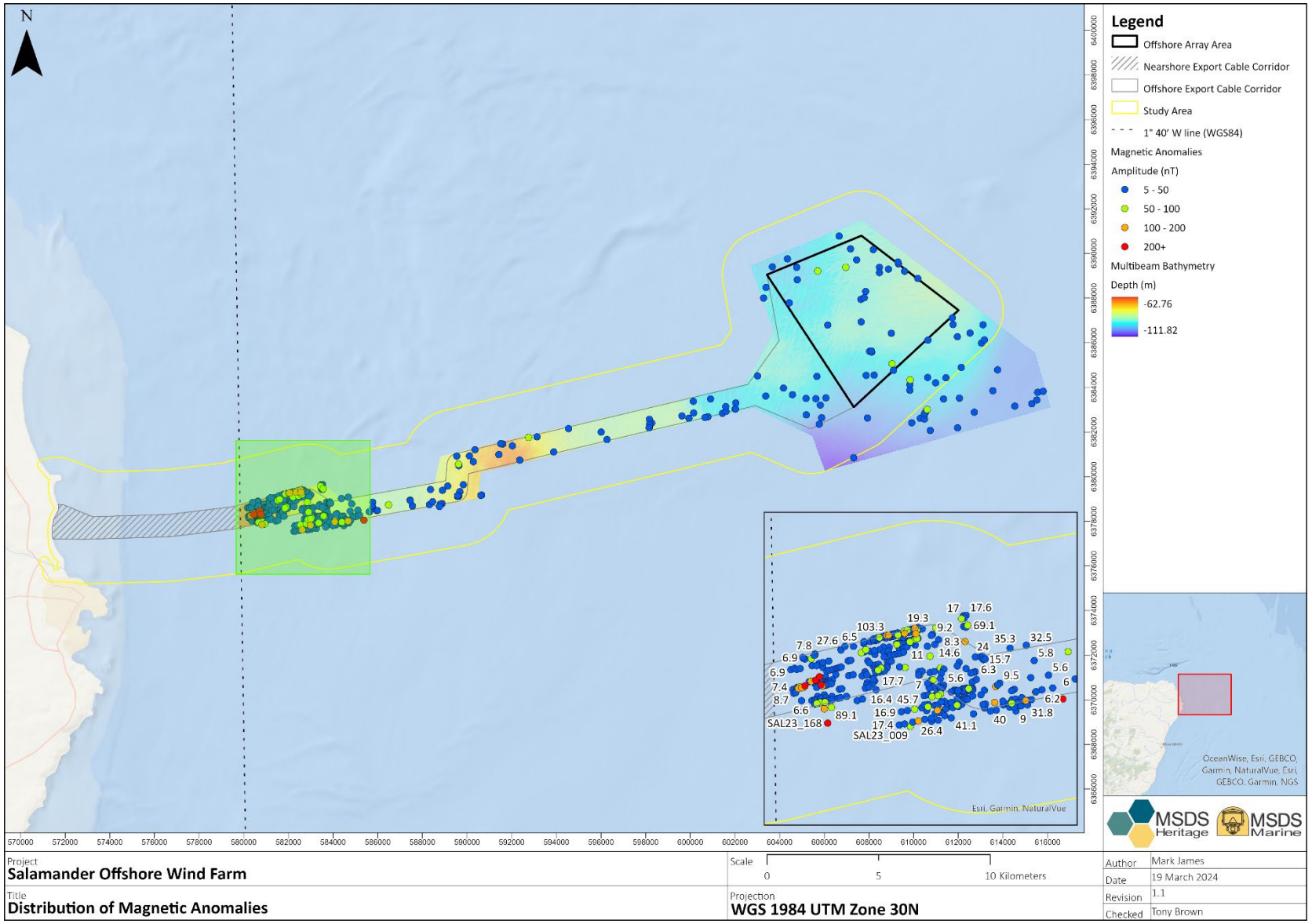

Figure 36: Distribution of Magnetic Anomalies.

10.1 Overview of magnetic anomaly distribution

10.1.1 With the exception of the western c. 4.0 km of the data extents, the distribution of magnetic anomalies is fairly uniform within the geophysical survey data extents, primarily consisting of anomalies <50 nT. Due to the wide line spacing used during data collection this is a fairly typical distribution both geographically and in terms of recorded amplitude. The size (in nT) of a magnetic anomaly is dependent on both the amount (size/weight) of ferrous material, and the distance from the sensor. Therefore, unless there is a strong correlation between a magnetic anomaly and a seabed feature perpendicular to the track, it is not possible to accurately position or determine the size of an anomaly.

10.1.2 For example, an anomaly of <50 nT relating to a feature direct below the track could, and often does, represent small pieces of debris, steel cable, fishing gear, etc. whilst an anomaly of <50 nT 100 m from the track could indicate a much larger feature. If that feature is not visible in the other geophysical datasets (potentially due to being buried) then the position is unable to be reconciled.

10.1.3 As such, a bias towards anomalies <50 nT is expected as the range to the sensor is greater than 10.0 m for c. 75% of the seabed at a 85 m line spacing.

10.2 Discussion of potential within the Offshore Development Area

10.2.1 Magnetic anomalies >100 nT are typically described as large and have the potential to be of archaeological significance. It should be noted that these anomalies, and any interpretations, are based on a magnetic signature rather than a visible image of the anomaly on the seabed. When available, it is often the case that during intrusive investigations these anomalies are identified as modern marine debris, including cable, chain, modern anchors, fishing gear, and parts of modern vessels such as outboard engines, and other detritus either deliberately or accidentally, put overboard. Where anomalies are largely isolated, or relating to a single feature, the most commonly identified material of archaeological interest are isolated anchors, often of indeterminate age. The difficulties in determining the age of concreted anchors, and the lack of a wider context means these are often classed as of low or medium potential to be of archaeological significance. However, whilst the chances of isolated magnetic anomalies being of archaeological interest is potentially low, this does not reduce the potential of anomalies to be of archaeological significance, and both must be considered during the recommendation of mitigation set out within Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage.

10.2.2 There is a notable increase in the density of magnetic anomalies towards the western extents of the survey data, and within the Offshore Export Cable Corridor, between c. 8 km and 12.5 km from shore. Within this area there are 291 anomalies ranging between 5.0 nT and 580.0 nT, with 38 of these being >50.0 nT. The significant increase in magnetic anomalies indicates a likely increased presence of ferrous material, however, the distribution does not necessarily indicate an increased potential for archaeological material to be present, and given the presence of outcropping bedrock within the area the anomalies may relate to geological features.

10.2.3 As discussed, given the vagaries with positioning, size, etc. it would not be proportional to assign potential, and therefore mitigation of avoidance, to anomalies where there is no

correlating seabed feature – the anomalies to which this section pertains. Therefore, a broad statement of potential is provided below, and mitigation discussed further within Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage.

10.2.4 Three hundred and eighty-five (385) magnetic anomalies of between 5.0 nT and 580.0 nT, with no definitive correlation with archaeological anomalies, seabed features, or infrastructure, have been identified within the extents of the geophysical survey data and Offshore Development Area boundaries. Magnetic anomalies are ferrous and thus generally anthropogenic in origin, anthropogenic material has the potential to be of archaeological significance. Therefore, there is broad potential to identify additional material of potential archaeological within the extents of the geophysical survey data.

11.0 Coastal and maritime archaeology

11.0.1 This section considers the potential for remains relating to coastal and maritime cultural landscapes to be present within the Offshore Development Area, defined as evidence of 'human utilisation of maritime space by boat, settlement, fishing, hunting, shipping and its attendant subcultures, such as pilotage, lighthouse and seamark maintenance'[79]. Remains considered range from shipwrecks or other durable evidence, such as cargo and ballast, to features including navigational aids, sailing marks, ports, harbours and jetties. Navigational hazards such as shallow reefs or sand banks influence archaeological potential (particularly for wrecks), as does the preservation environment. All can inform our understanding of the archaeological potential.

11.0.2 Other coastal remains which do not necessarily relate to boat use are also considered, including fish traps and other evidence of human interaction with the sea. In addition, other coastal features are reported on where they inform the archaeological potential of the Offshore Development Area, such as eroded remains from nearby coastal features or settlements.

11.1 Preservation environment

Seabed characteristics

11.1.1 The physical characteristics of an area can determine the rate of preservation of materials and thus archaeological potential. The 'Areas of Maritime Archaeological Potential 2 – Characterising the Potential for Wrecks (AMAP2)' project assessed the environmental factors affecting the preservation of maritime archaeological remains on the seabed[80]. These factors included: sediment type, sediment thickness, water depth, and sediment transport. The project concluded that the best preservation environment was burial in fine-grained sediments. However, it was also concluded that this environment can cause instability in archaeological materials, as even low-energy sediment transport can cause the repeated covering and uncovering of remains by shifting sediment.

11.1.2 Although the Offshore Development Area and surrounding environs were not included in the project, the results can be extrapolated based on the local sediment type. The uppermost stratigraphic unit of the seabed within the Offshore Development Area is characterised by fine to coarse sands, generally becoming more gravelly further offshore. Correlation with similar sediment environments included within the AMAP2 project suggest a preservation level within the Offshore Development Area from 1 to 4, on a scale of 1 to 19 with 1 representing the best preservation environment[81]. The Offshore Development Area therefore represents a good preservation environment, with a more conducive environment anticipated in finer grained sands closer to the shore.

11.1.3 The MBES data shows evidence of mobile bedforms, which are illustrated within the eastern

[79] Westerdahl, C. 1992. 'The maritime cultural landscape'. *The International Journal of Nautical Archaeology.* **21**.I, 5-14.

[80] SeaZone Solutions Ltd. 2012. *AMAP2 – Characterising the Potential for Wrecks*. University of Southampton project for English Heritage. https://archaeologydataservice.ac.uk/archives/view/amap2_eh_2011/

[81] Gregory, D. 2006. *Mapping Navigational Hazards as Areas of Maritime Archaeological Potential: The effects of sediment type on the preservation of marine archaeological materials*. Report from the Department of Conservation National Museum of Denmark.

half of the Offshore Array Area and central part of the Offshore Export Cable Corridor by Figure 5. The finer grained material forming these features can typically provide a higher level of preservation than may be seen within areas of coarser gravels and glacial tills. Thus, whilst the bedform environment can cause instability of archaeological material, these present areas of higher preservation potential within the Offshore Development Area.

Historic coastline development

11.1.4 Historic coastal erosion within the Development Area is first recorded in the early 17th century[82] and likely for some time prior, however, the extent and impacts are difficult to quantify, given the lack of recorded detail. Georeferenced historic mapping (ranging in date from 1872 to 1972[83]) and aerial photographs (sourced from satellite[84] and aircraft photography[85], ranging in date from 1941 to 2022) illustrate a generally consistent coastal landform, with no notable areas of erosion or other remodelling. However, 17th century sources describe the abandonment of a nearby settlement due to encroachment from the sea, and modern heritage assets which line the shore (including pillboxes) show evidence of coastal erosion.

11.1.5 The earliest maps illustrating the Offshore Development Area in detail, specifically the Landfall, date to the late 18th and early 19th centuries[86] and generally illustrate a coastal landform only slightly differing from that at present. These less significant variations may be attributed to less accurate cartographic methods or minor coastal remodelling. A notable variation is the presence of a deltaic mouth to Cuttie Burn, occupying part of the Landfall (Figure 37). The earliest available Ordnance Survey map (1872 – not reproduced)[87] does not show such a feature, instead illustrating a sinuous channel leading through the coastal dunes to the high-water mark.

11.1.6 The following sections provide a chronological discussion of the potential for maritime and coastal remains from each period.

11.2 Prehistoric (8,000 BC to AD 400)

11.2.1 While trade networks and maritime travel are evidenced throughout prehistory by the movement of ideas, goods and people, faunal assemblages indicate that maritime activities, such as fishing, took place in coastal areas during the prehistoric periods from the Mesolithic onwards. Maritime transport was also undertaken, as suggested by the Mesolithic and later occupation of offshore islands, such as the Outer Hebrides. Evidence also indicates that some of these activities were not consistently practiced, as suggested by the sharp decrease in marine-sourced food which marked the onset of the Neolithic period[88] [89].

[82] https://online.aberdeenshire.gov.uk/smrpub/master/detail.aspx?tab=main&refno=NK15SW0001
[83] *Ibid.*
[84] Google Earth Pro. Accessed 06/07/2023.
[85] https://ncap.org.uk/ Accessed 06/07/2023.
[86] National Library of Scotland. Ainslie, 1785 Map; Thomson, *1826 Map of Aberdeenshire.* https://maps.nls.uk/ Accessed 30/06/2023.
[87] *Ibid*. Ordnance Survey Six-inch First Edition, Aberdeenshire, Sheet XV.
[88] Cramp, L.J.E., Evershed, R.P., Lavento, M., Halinen, P., Mannermaa, K., Oinonen, M., Kettunen, J., Perola, M., Onkamo, P. & Heyd, V. 2014. 'Neolithic dairy farming at the extreme of agriculture in northern Europe' *Proceedings of the Royal Society*. **281**; Richards *et al*., 2003
[89] Richards, M., Schulting, R. & Hedges, R. 2003. 'Sharp shift in diet at onset of Neolithic'. *Nature* **425**. Pp. 366.

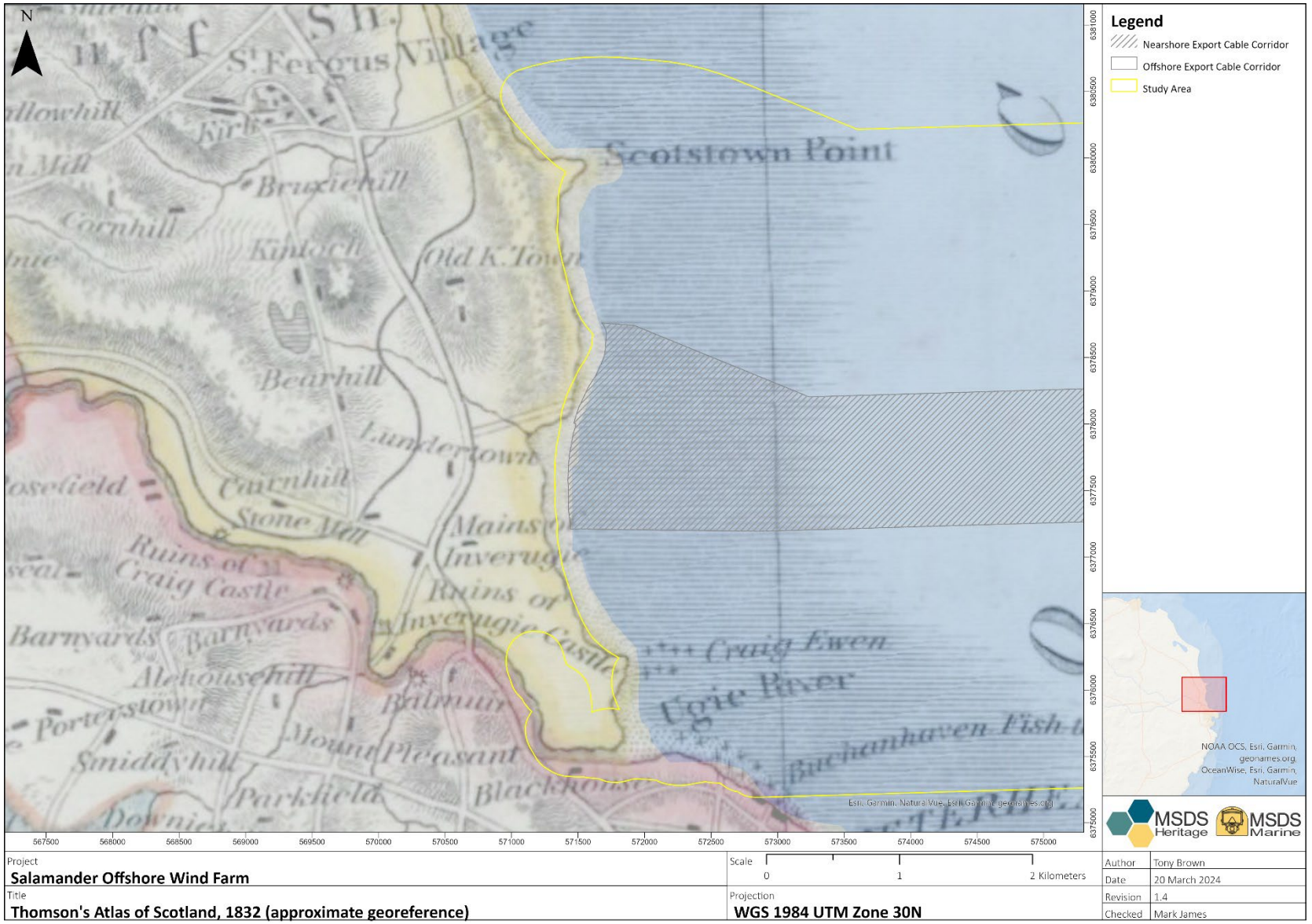

Figure 37: Thomson's Atlas of Scotland, 1832 (reproduced by courtesy of National Library of Scotland).

11.2.2 While there is evidence of trade networks, maritime travel and marine exploitation throughout prehistory (albeit at low levels), direct physical evidence in the form of vessels is extremely rare. From a wider context, logboats and paddles are known from the Mesolithic period onward[90] [91] [92] and planked vessels were in use from the 1st millennium BC (the Bronze Age). The known examples of logboats in Scottish contexts demonstrate a long history of use, from the Bronze Age (and potentially earlier) to the medieval period and historical evidence demonstrates their continued use into the 19th century[93] [94]. It has been suggested that skin vessels (coracles and curraghs) were used, though no direct evidence has yet been found[95].

11.2.3 In Scotland, logboats are most commonly encountered in lacustrine sediments and those from Aberdeenshire (and elsewhere in Scotland) are typically associated with lochs and are often found in association with crannogs. Examples from river terraces are also well known[96], such as those associated with the River Clyde, though the Forth and Tay have also produced numerous examples. Examples from riverine contexts are also represented within the Aberdeenshire landscape, for example at the Glen of Craigston, where a Bronze Age logboat (dating to c. 1,890 to 1,600 cal. BC) was identified, c. 31 km to the west of the Landfall[97]. While lacustrine and riverine deposits have produced most examples of logboats in Scottish contexts, maritime finds are rare.

11.2.4 The mouth of the River Ugie lies c. 1.6 km to the south of the Landfall. While no prehistoric vessels have been identified in association with the river, prehistoric sites are well attested within the surrounding landscape, demonstrating a focus on the river during several prehistoric periods. Approximately 150 Neolithic flint flakes have been identified on the north bank of the River Ugie, overlooking the mouth of the river, c. 1.5 km south from the Landfall (Figure 8; TI_001)[98], while to the south of the river mouth, Late Iron Age/Pictish deposits have been identified along with other settlement evidence and several stone cist burials (TI_002; TI_003)[99]. Further upstream and beyond the Study Area, between c. 1.4 to 2 km west from the Landfall, a series of cropmarks, flint artefacts and pottery sherds illustrate settlement during the Bronze Age and Iron Age[100]. Slightly beyond the Study Area, an assemblage of 34 Late Mesolithic or Early Neolithic flints was recovered during development at St Fergus in 2019, c. 1.4 km north-west from the Landfall[101]. Isolated findspots of polished stone and socketed axeheads, flint arrowheads and other implements illustrate further Neolithic and Bronze Age

[90] Crumlin-Pedersen, O. & Trakadas, A. (eds.). 2003. *Hjortspring: a pre-Roman Iron-Age warship in context*. Roskilde: Viking Ship Museum. Pp.219.
[91] Johnstone, P. 1980. *The Sea-craft of Prehistory*. New York: Routledge.
[92] Cunliffe, B. *Facing the Ocean: The Atlantic and its Peoples.* New York: Oxford University Press. Pp. 65.
[93] Mowat, R. J. C. 1998. 'The logboat In Scotland'. *Archaeonautica* **14**, pp. 29-39.
[94] Cunliffe. 2001. Pp. 65.
[95] Bosnall, C., Pickard, C. & Groom, P. 2013. 'Boats and Pioneer Settlement: The Scottish Dimension'. *Norwegian Archaeological Review*. **46**(1), pp. 87-90.
[96] Gregory, N.T.N. 1997. *Comparative study of Irish and Scottish logboats*. University of Edinburgh: unpublished PhD thesis.
[97] Aberdeenshire HER Ref: NJ75NE0027.
[98] Aberdeenshire HER Ref: NK14NW0073.
[99] Aberdeenshire HER Refs: NK14NW0008, NK14NW0065.
[100] https://canmore.org.uk/site/137827/north-ednie; https://canmore.org.uk/site/142706/north-ednie; https://canmore.org.uk/site/131199/ednie; https://canmore.org.uk/site/142708/ednie
[101] https://canmore.org.uk/site/365019/st-fergus-newton-road

activity within the wider landscape.

11.2.5 While no evidence of maritime activity is recorded at these nearby terrestrial prehistoric sites, the location of the remains, in close proximity to the river and coastline, may suggest waterborne activity within the Study Area during the Scottish Neolithic, Bronze Age and Iron Age. The presence of a post-glacial lake at the western boundary of the Offshore Export Cable Corridor during the Mesolithic period (Figure 17) raises the potential for evidence of maritime activity, such as fish traps, logboats and associated artefacts.

11.0.3 Despite this potential, evidence of prehistoric maritime activity is rare both within the UK and internationally and no evidence of vessels from these periods has been identified within the Offshore Development Area or Study Area. Additionally, the Offshore Development Area lies on a stretch of exposed coast which would likely have been a less favourable location for maritime activity than the more sheltered nearby locations such as the River Ugie and Loch of Strathbeg. The terrestrial archaeological remains dating to prehistory suggest that the River Ugie mouth and valley were the foci of activity during this period, with the Offshore Development Area likely peripheral to this.

11.3 Early Medieval to Medieval

11.0.4 Maritime technology and activity continued to develop in the early medieval and medieval periods. Raiders, invaders and settlers from Ireland, Scandinavia and northern Europe brought new boat building technologies and opportunities for trade which led to the growth of several major ports on the east coast of the UK[102] [103].

11.0.5 Improvements in shipbuilding and seafaring technology, coupled with expanding trade, fishing and commercial activity, gave rise to new vessel types, such as cogs, hulks and carracks. In addition to the expansion of fisheries in the medieval period[104]. A further catalyst for increased commercial shipping activity and the development and growth of ports across northwestern Europe, including Scotland, was the establishment of the Hanseatic League in 1169. This multinational economic alliance encouraged and facilitated trade between northwestern European nations, utilising seaborne links between the North Sea and the Baltic. At its height, the League represented some 84 cities, including ports on the eastern coast of England and Scotland, which developed rapidly to accommodate the growing trade in cargos such as coal, timber and wine[105]. Aberdeen was an early member of the League, providing trading links throughout northern Europe, including the key member city of Bergen in Norway[106]. The most direct sea route between the two would take vessels through the Offshore Array Area and Study Area.

11.0.6 Medieval occupation of the Landfall is inferred by the presence of the Scheduled remains of the parish church of St Fergus[107], enclosed by but excluded from the Landfall (Figure 7). The

[102] Hutchinson, G. 1997. *Medieval Ships and Shipping.* Leicester: Leicester University Press.
[103] Friel, I. 2003. *Maritime History of Britain and Ireland.* London: British Museum Press.
[104] Müldner, G. 2016. 'Marine fish consumption in medieval Britain: the isotope perspective from human skeletal remains', in Barrett, J. & Orton, D. (eds.) *Cod and herring: the archaeology and history of medieval sea fishing*. Oxford: Oxbow Books. Pp. 239-249.
[105] Hutchinson. 1997.
[106] https://www.hanse.org/en
[107] Scheduled Monument No. SM5622.

HER entry quotes an early 17th century source, explaining the reason for the church's abandonment as the sea encroaching on the settlement[108].

11.0.7 The site of the old castle of Inverugie is present within the Study Area, c. 1.6 km to the south of the Landfall, at the mouth of the River Ugie (Figure 8; TI_004). The location given by Canmore and the HER lies below the high-water mark, though a description of the castle given in the early 19th century indicates that it may have been situated on slightly higher ground: "*There are still to be seen, on a rising ground, near the mouth of the Ugie, the remains of (a) castle…which is supposed… to be the original site of the Castle of Inverugie"*[109] [110]. A later account indicates that the castle was situated on the north bank of the River Ugie mouth and that there may have been a harbour associated with the castle[111] [112]. Later accounts also indicate this general location and it is suggested that *"As recently as 1895 traces of the moat and massive rubble foundations were visible…. As recently as 1796 the old harbour was kept clear of sand by James Ferguson of Pitfour; 1797 he lost the struggle"*[113]. Field visits in 1962 and 1968 found no evidence of the harbour or castle. While the exact location of the remains is unclear, the historical evidence suggests that the castle likely pre-dated the 13th century, indicating a continued importance on the river mouth, as demonstrated by the prehistoric evidence. If the associated harbour also dated to the medieval period, this may suggest contemporary maritime activity within the Study Area.

11.0.8 An alternative location for Inverugie castle, or perhaps the site of an earlier fortification, is recorded c. 500 m southwest from the Landfall[114]. The Scheduled remains of an earthen motte known as Castle Hill, situated on a slight natural rise on the north bank of the River Ugie[115], are believed to have been constructed in the late 12th century[116].

11.0.9 Furthermore, a third Scheduled Monument associated with Inverugie castle is recorded c. 800 m southwest from the Landfall[117] [118]. Although much of the extant masonry relates to the 17th century (possibly late 16th century), a late 19th century record notes that one of the towers flanking the gateway, known as Cheyne tower, dates to the 13th or 14th century[119]. The Cheyne family held the barony of Inverugie during the 13th century and are also associated with the motte site through the Canmore records.

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[108] https://online.aberdeenshire.gov.uk/smrpub/master/detail.aspx?tab=main&refno=NK15SW0001
[109] https://canmore.org.uk/site/21270/inverugie-castle.
[110] Quote from: Arbuthnot, J. 1815. *An historical account of Peterhead from the earliest period to the present time, comprehending an account of its trade, shipping, commerce and manufactures, mineral wells, baths &c, with an appendix containing a copy of the original charter of erection together with all the bye-laws and regulations relative to the harbour &c, also a natural history of the fishes found on the coasts of Buchan*. Aberdeen. Pp. 82. RCAHMS Shelf Number: D.5.13.ARB.R.
[111] https://canmore.org.uk/site/21270/inverugie-castle.
[112] Findlay, J.T. 1933. *A History of Peterhead, from prehistoric times to AD 1896*. Peterhead: P. Scrogie Ltd.. Pp. 50 RCAHMS Shelf Number: D5AB3.
[113] Neish, R. 1950. *Old Peterhead: an authentic account of the origin and development of the burgh of barony of Peterhead*. Peterhead: P. Scrogie Ltd. Pp. 8-12. RCAHMS Shelf Number: D.5.13.PET.
[114] Aberdeenshire HER Ref: NK14NW0006.
[115] Scheduled Monument No. SM3259.
[116] https://canmore.org.uk/site/21259/castle-hill-inverugie
[117] Aberdeenshire HER Ref: NK14NW0003.
[118] Scheduled Monument No. SM98.
[119] https://canmore.org.uk/site/21204/inverugie-castle

11.0.10 A fourth fortified and Scheduled site is recorded c. 1 km southwest from the Landfall, now known as *Ravenscraig Castle* and formerly the *Craig of Inverugie* (*craig* stemming from the Gaelic for 'rocky hill')[120]. The construction date is not known, although the earliest available record relates to a property transfer from the Cheynes in the mid-14th century[121].

11.0.11 The increase in maritime activity during the medieval period demonstrates a greater potential for archaeological remains compared with earlier periods. However, loss locations are notoriously vague and inaccurate for this period, providing only a general indication of vessels lost in the wider area. A general absence of medieval wrecks has been noted for the surrounding coastline, although these are typically more difficult to identify than those of sturdier construction dating to the post-medieval and modern periods.

11.0.12 Whilst there is no evidence to suggest an early medieval presence, there is potential for maritime archaeological remains to be present within the Development Area and Study Area dating to the medieval period. The number of fortified locations within the River Ugie valley and mouth signify the importance of the locality and the former medieval settlement within the vicinity of the Church of St Fergus suggests a potential for archaeological remains to exist within the intertidal zone, possibly represented by structures, such as fish traps and stray artefacts. Furthermore, the proximity of the Offshore Development Area to the conjectured trade route between two Hanseatic League towns raises the potential for medieval wrecks and durable cargoes, such as bricks or metal. The positive preservation environment increases the likelihood that such evidence may survive within the Development Area.

11.0.13 However, as with earlier periods, survival of wrecked vessels, cargoes and other evidence of maritime activity is relatively rare. Medieval vessels are extremely rare in the archaeological record of northern Europe and represent a very small percentage of this site type for the east coast of Scotland[122]. Considering the local history and environment, the majority of medieval vessels operating within the Development Area would likely be small craft related to low level fishing and local trade. Vessels were typically smaller and less robust than those of the post-medieval and modern periods, decreasing their likelihood for detection and survival. Also, recording of wrecks and losses was less vigorous during the medieval period and, as modern survey techniques tend to favour the detection of metal objects and vessels, the small metallic components of medieval craft (such as fixtures, fittings and personal artefacts) are more likely to remain undetected. Water conditions here tend to be silty with poor visibility, acting as a deterrent to diving activities, which are often a key contributor to marine archaeological discoveries.

11.4 Post-medieval to modern

11.4.1 The recording of maritime history became common practice by the post-medieval period and our knowledge of contemporary and later maritime activity is therefore much more robust than for earlier periods. Documentary evidence of vessels lost during these periods provides evidence of maritime activity in the waters surrounding, and within, the Offshore Development

[120] Scheduled Monument No. SM2496.
[121] https://online.aberdeenshire.gov.uk/smrpub/master/detail.aspx?tab=main&refno=NK04NE0001
[122] Wessex Archaeology. 2012. *Characterising Scotland's Marine Archaeological Resource.* Report produced for Historic Scotland. Pp. 13-17.

Area.

11.4.2 A total of 128 records relating to positions describing the locations of lost vessels (documented losses) are recorded by Canmore and the HER within the Study Area. However, the number of vessels indicated by these positions is lower, owing to several instances where Canmore and the HER record the same vessel and loss location in different positions, such as DL_006 and DL_007 (different positions for the loss of the *Resolute*) and DL_021 and DL_022 (different positions for the loss of the *Martha and Mary*). Where this is the case, the duplicate records have been listed consecutively within the gazetteer (Appendix B). Such duplication affects 24 different records and the total number of documented losses within the Study Area is therefore numbered at 104. These 104 vessels were lost during the 18th, 19th and 20th centuries (Table 15), representing records of vessels lost (88 records) and of wreck remains washed ashore (16 records).

Date lost	Vessels reported lost	Wreckage washed ashore	Totals
18th century	8	1	9
19th century	51	15	66
20th century	29	-	29
Total	88	16	104

Table 15: Documented losses by period.

11.4.3 In addition to demonstrating the increase in loss records and implied increase in vessel activity in the 19th century, the documented losses also give an insight into the type of maritime activity carried out in nearby waters, through assessment of vessel types (Table 16).

11.4.4 While many of the vessels could be put to multiple uses, trade and transport are indicated by the presence of fast-moving schooners and also probably by the brigs and barques, though all vessel types could also be used for other purposes. The paddle-steamer was likewise carrying cargo and passengers when lost and (where specified) the loss records for the steamships indicate their role as cargo carriers. Others, such as the array of steam drifters, trawlers, smacks and the motor fishing vessel, indicate fishing activities, while more specialised vessels are present, such as the pilot boats and salvage steamer. Other types, represented primarily by single losses, represent the wider variety of maritime activities in the area, such as recreation (as represented by the yacht).

Vessel type	18th century	19th century	20th century	Totals
Armed Steamship			1	1
Barge			1	1
Barque	1	4		5
Brig		11		11
Drifter			1	1
Fishing vessel			1	1
Full rigged ship		1		1
Galliot		1		1
Ketch		1		1
Lugger			2	2
Motor Fishing Vessel			1	1
Paddle-steamer		1		1
Pilot boat		2		2
Salvage Steamer			1	1
Schooner		11		11
Sloop		4		4
Smack		2		2
Snow	1			1
Steamship (iron and steel)			4	4
Steam Drifter			1	1
Steam Trawler		1	4	5
Steam Trawler (iron)			1	1
Steam Trawler (steel)			8	8
Wooden Steam Drifter			1	1
Yacht			1	1

Vessel type	18th century	19th century	20th century	Totals
Unknown- carrying cargo	3			**3**
Unknown	3	12	1	**16**
Total	**8**	**51**	**29**	**88**

Table 16: Vessel types indicated by documented losses.

11.4.5 The documented losses indicate maritime activity in and around the Development Area from the 18th century onward and can be understood within the wider context of activity on land. Historic maps and terrestrial archaeological records give an indication of landward activity, which provides further information on the archaeological potential of the Offshore Development Area.

11.4.6 The evidence of fishing, well-attested by the documented losses, is represented on land by the settlement evidence. Peterhead was founded as a fishing settlement in 1593, later becoming a major centre for the whaling industry[123]. Closer to the Development Area, Listed fish-houses in Buchanhaven (Figure 7; **TI_006**)[124] date to 1585 and Buchanhaven itself (now protected as a Conservation Area) was established in 1760 as a fishing village (**TI_007**), though it may have had earlier origins. Both the Listed Building and Conservation Area lie c. 1.7 km to the south of the Landfall. Historic maps show the development of settlements within the area, indicating local foci of activity.

11.4.7 Stral'ch's *Map of Scotland, and, The West coast from Glen Elg to Knap-dail*, published by mapmaker Robert Gordon (not reproduced), depicts the Landfall from 1636 to 1652. The map shows settlements to the south of the River Ugie at Peterhead and *Buquhannels Promont* (Buchanhaven), indicating that the area to the north of the river, including the Landfall, did not have any major coastal settlements. This is shown more clearly on other maps published by Robert and James Gordon, including a map of the *Lower part of Buquhan* (1636 to 1652; not reproduced), which shows no settlements in the Landfall. Bleau's *Atlas* from 1654 (not reproduced) similarly shows no settlements in the Landfall, though settlements inland, such as Inner/Inver Ugie, are shown, c. 2 km inland. The 17th century cartographic evidence correlates with the documented record of the settlement associated with the Church of St Fergus having been abandoned by the beginning of the century.

11.4.8 The earliest charts of the area include John Ainslie's 1785 chart (not reproduced), which depicts more detail than the earlier maps and shows small scattered coastal settlements inland of the Landfall. *St Fergus old kirk* is depicted and the Landfall is shown as an area of beachfront backed by *White Links* (likely indicating the dune system which backs the beach today). Midway along the Landfall an inlet is shown, likely preserved in today's landscape by a small watercourse mapped at this location, known as Cuttie Burn. No anthropogenic features are noted within the Offshore Development Area.

11.4.9 John Thomson's 1832 map of Aberdeenshire (Figure 37) shows greater detail and indicates a

[123] https://www.britannica.com/place/Peterhead
[124] Listed Building No. 385713.

trackway leading to the coastal edge, crossing Cuttie Burn. No evidence of a trackway is noted in the HER or Canmore records, though the depiction on this map is likely to indicate use of the coastal strip during the early 19th century. The nature of this implied use is uncertain. The track is not depicted on the 1842 Admiralty Chart (not reproduced), which instead depicts no features within the Development Area, though less prominent terrestrial features were unlikely to have been considered relevant by the Admiralty cartographers. There is no indication on the 1842 chart, or later charts, that the Offshore Development Area was used as an anchorage and it is likely that vessels chose to anchor in the shelter of Peterhead Bay, c. 3 km to the south.

11.4.10 Later Ordnance Survey (OS) maps depict tracks running eastward toward the coast, terminating at the edge of the dune system and not appearing to extend to the intertidal zone. These indicate general connectivity between the coast and settlements further inland, suggesting some potential for features to be present, though none have been recorded within the Development Area. From the mid-19th century, the OS depict the area in detail. The first edition map (dating to c. 1872; not reproduced) shows the intertidal zone within the Landfall, depicting no anthropogenic features. Further inland, the dune system is noted, on which lie the remains of the Church of St Fergus and associated graveyard. These features lie c. 250 m inland from the high-water mark and remains are therefore not anticipated to be present within the Offshore Development Area. Behind the dune system, small, scattered settlements are depicted, surrounded by agricultural land, each lying close to tracks which head eastward toward the dune system. Cuttie Burn is depicted along with another small burn, following the southern boundary of the Landfall to meet the foreshore at the southwest corner of the Offshore Export Cable Corridor. A well is marked at this watercourse where the cultivated fields meet the dune system. Later OS maps depict a similar picture.

11.4.11 In 1868, a submarine telegraph cable was laid between Peterhead and Norway, survived by the record of the former telegraph office building in Peterhead (now demolished) and sections of the cable itself on the shore[125]. Although the exact bedding route of the cable and submarine survival are unknown, the route may have passed through the Offshore Development Area.

11.4.12 The 20th century saw further increases in local activity, both on land and at sea, driven particularly by the two world wars. During the First World War, national maritime activity intensified affecting even the small fishing town of Peterhead. Three hundred and sixty-eight residents called up for war duties lost their lives[126]. In the waters around Peterhead, several vessels were lost, including the *Egenaes*, the *Bel Lily*, the *St Magnus* and the *Muriel*. Wrecks thought to represent the remains of these vessels have been identified within the Study Area (Figure 38). Other vessels lost during this period are recorded as documented losses with no identified seabed remains (DL_090-092).

[125] Aberdeenshire HER Ref: NK14NW0396.

[126] https://www.iwm.org.uk/memorials/item/memorial/8621

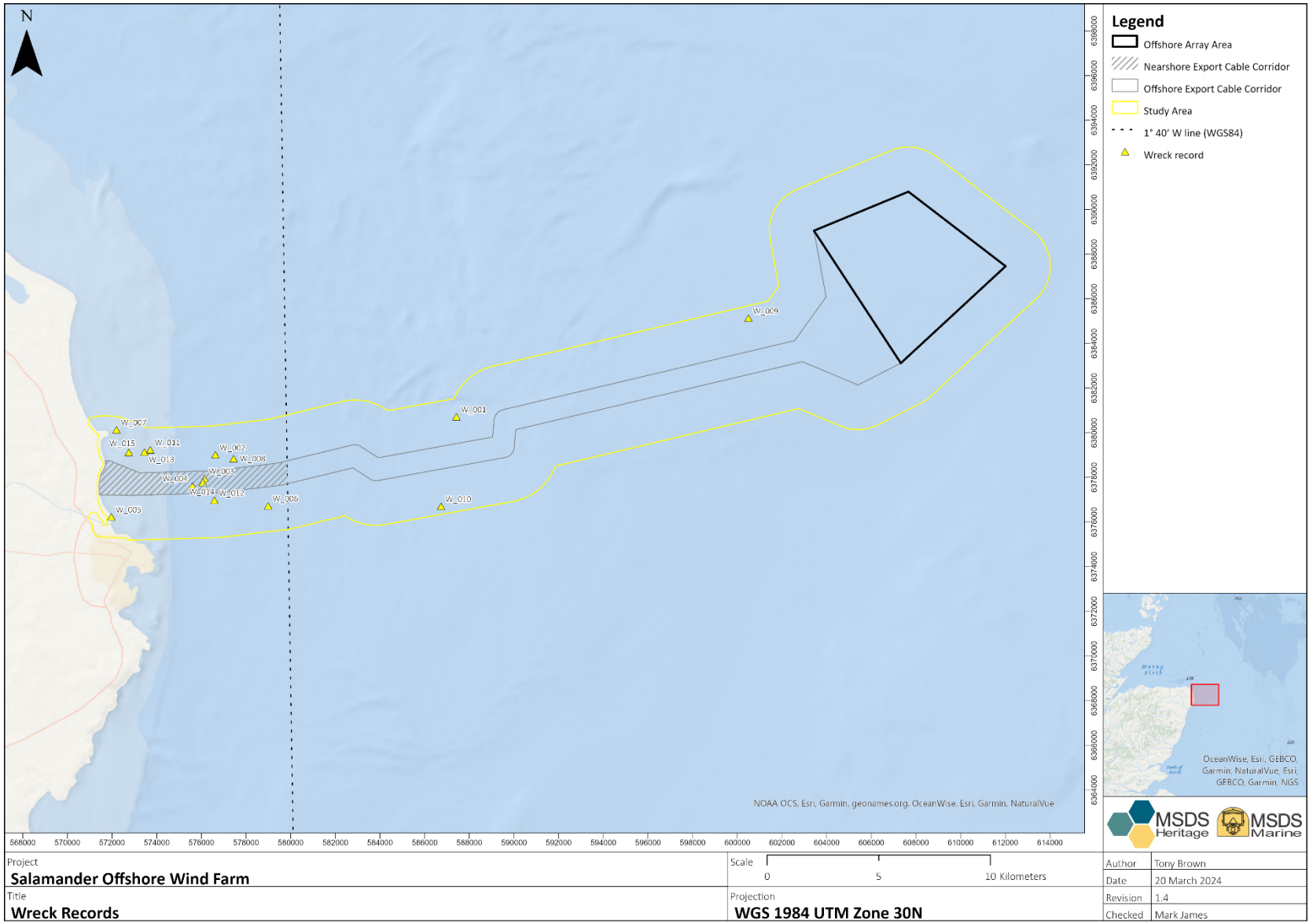

Figure 38: Wreck Records.

11.4.13 Fifteen wreck locations have been identified within the Offshore Development Area from UKHO, Canmore and HER records. A brief description of each record, any physical remains, history and condition is given below, where information is available. All datable wrecks relate to 20th century losses.

W_001: Possible wreck of the *Egenaes*

11.4.14 Wreck (W_001), located c. 1.2 km north outside of the Offshore Export Cable Corridor was first identified in geophysical survey data in 1983. The surveying details indicate that the wreck is intact and associated with scour, lying on a sandy seabed. The vessel dimensions given indicate a length of 29 m, width of 10 m and height of 4.4 m, in water depth of 84 m.

11.4.15 The records from the HER and Canmore indicate that this wreck was identified as the possible remains of the *Egenaes* (the correlation being indicated tentatively by Whittaker[127]), though the UKHO do not indicate this and it is possible that this identity is incorrect. The *Egenaes* was a Norwegian cargo vessel, carrying herring from Haugesund to Hull. It was torpedoed on 22nd March 1917 by German submarine UC-45[128], just one month after the recommencement of unrestricted submarine warfare which saw German attacks on merchant vessels with no warning[129].

W_002: *Bel Lily*

11.4.16 Wreck (W_002) was recorded as lost in 1917 and first identified in geophysical survey data in 1959, approximately 730 m to the north outside of the Offshore Export Cable Corridor. The current surveying details indicate that the wreck is intact and upright, with the bow facing west-southwest. The wreck reportedly has a length of 37 m, a width of 11 m and a height of 4.7 m, in water depth of 47 m. The UKHO indicate that this wreck is thought to be that of the *Bel Lily*. This is also reflected in the Canmore and HER data, however, the identification is unverified.

11.4.17 The *Bel Lily* was a steam trawler, sunk on 14th May 1917 following a mine strike. The mine was laid by the German submarine UC-49. The UKHO indicate that the vessel was on passage for fishing grounds at Grimsby when sunk.

W_003: *St Magnus*

11.4.18 Wreck (W_003) was originally detected in 1923 and is currently recorded as lying within the Offshore Export Cable Corridor, c. 4.5 km from the shore. The wreck is reportedly intact, upright and with the bow facing to the southeast. The UKHO indicate that the wreck has a length of 69 m, a width of 22 m and a height of 6.5 m, lying on a sandy seabed at a depth of 49 m. The UKHO indicate that this is the wreck of the *St Magnus*. This is also reflected in the Canmore and HER data, however, the identification is unverified. The geophysical survey has identified a wreck at this location (SAL23_171; Figure 35; Section 9.3.14).

11.4.19 The *St Magnus* was an Armed Steamship in use as a general cargo and mail vessel. The vessel was lost on 12th February 1918, when torpedoed by the German submarine UC-58.

W_004: *Muriel*

11.4.20 Wreck (W_004) was originally reported in 1918, though this first record relates to the sinking

[127] Whittaker, I G. (1998) Off Scotland: a comprehensive record of maritime and aviation losses in Scottish waters. Edinburgh, 145- 146

[128] https://wrecksite.eu/wreck.aspx?146247

[129] https://www.iwm.org.uk/history/the-u-boat-campaign-that-almost-broke-britain

position of the vessel. The wreck was first identified on geophysical survey data in 1959 and was swept clear. The wreck is currently recorded as lying within the Offshore Export Cable Corridor, c. 4.1 km from the shore. The bow of the wreck reportedly faces to the southeast. The UKHO indicate that the wreck has a length of 88 m, a width of 19 m and a height of 9.8 m, lying on a gravel seabed at a depth of 46 m. In addition to geophysical surveys, the UKHO indicate that the site has been dived. The diver records indicate that the wreck lies intact, but the bow is badly damaged and the area is flatted forward of the triple expansion engine. Two large boilers lie on the seabed, forward of the engine. The stern is reported to be intact, with a mounted gun present (possibly a 12-pounder). No large ordnance was noted though rifle cartridge bullets (.303 calibre) were found to be lying across the back deck. The rudder and propeller were reportedly *in situ* and remnants of a cargo of coal were reported.

11.4.21 The UKHO indicate that this is the wreck of the *Muriel*. Canmore and the HER do not record the *Muriel* at this position, instead recording the wreck at a position the UKHO formerly correlated with the *Muriel*, but have now registered as a dead position (W_011). This latter position is c. 2.5 km to the northwest of the UKHO's revised position, beyond the Offshore Export Cable Corridor, though within the Study Area. The position is considered to be approximate, based on the loss location. The diver investigation places more certainty on the identification of wreck W_004, owing to the correlation between the number of boilers and general form of the wreck, armament and cargo compared with the known details of the *Muriel*. Additionally, web reports indicate that the Buchan Dive group, who identified the wreck, recovered a Grangemouth Dockyard maker's plate in 1999[130], further supporting the identity of the wreck as the *Muriel*, constructed in Grangemouth in 1898.

11.4.22 The site-specific geophysical survey has identified a wreck at this location (SAL23_170; Figure 34; Section 9.3.11).

11.4.23 The Muriel was a steel steamship lost while carrying a cargo of coal from the Tyne to Scapa Flow. The vessel was recorded as torpedoed by German submarine UC-58 on 17th September 1918, however, this explanation is uncertain. No lives were lost in the sinking.

W_005: *Magician*

11.4.24 Wreck (W_005) relates to the *Magician*, recorded c. 950 m south outside of the Offshore Export Cable Corridor and c. 22 m from the shore. The UKHO records the wreck having a length of 120.4 m, a width of 16.2 m and a height of 8.5 m, lying at an unknown depth.

11.4.25 The steel steamship *Magician* was built in 1925 and ran aground on 14th April 1944 at Craig Ewan, two miles north of Peterhead, carrying a general cargo from Trinidad to London[131].

W_006: Unknown wreck

11.4.26 Wreck (W_006) relates to an unknown and undated vessel, located c. 830 m south outside of the Offshore Export Cable Corridor and 7 km east from the shore.

11.4.27 The UKHO reports that the wreck is upright and intact, with its bow to the east, measuring 41 m in length, 8 m in width and 5.6 m in height, at 57 m deep. Wreck (W_006) was originally detected in 1945 and identified in repeat surveys up to 2009 (no subsequent surveys recorded

[130] https://www.scottishshipwrecks.com/muriel/
[131] https://www.wrecksite.eu/wreck.aspx?62074

by the UKHO).

W_007: Possible wreck of the *Ocean Herald II*

11.4.28 Wreck (W_007) is possibly related to the *Ocean Herald II*, a Motor Fishing Vessel reported sinking in 1984 when it ran aground at Scotstown Head. The UKHO report the position, 1.5 km north outside of the Offshore Export Cable Corridor and 450 m east from the shore, is for filing, though the grounding position is given precisely.

11.4.29 The vessel's length is recorded as 21.6 m, although no measurements are held for width, height or depth, and it has likely broken up.

W_008: Unknown wreck

11.4.30 Wreck (W_008) relates to an unknown wreck, located c. 450 m north outside of the Offshore Export Cable Corridor and 5.8 km from the shore.

11.4.31 The wreck was originally recorded in 1956 and identified in repeat surveys up to 2009 (no subsequent surveys recorded by the UKHO). It is recorded as upright and probably intact, measuring 32 m in length, 22 m in width and 5 m in height, at 44 m deep.

11.4.32 Wreck (W_008) has also appeared as a moderate magnetic anomaly and scour is recorded up to 6.5 m to the northeast, with a depth of 1.8 m.

W_009: Unknown wreck

11.4.33 Wreck (W_009) relates to an unknown wreck, located c. 1.4 km north outside of the Offshore Export Cable Corridor, c. 4.6 km west from the Offshore Array Area and c. 30 km east from the shore.

11.4.34 The wreck was originally detected in 1965 and recorded by the UKHO as upright and intact, with its bow to the northeast. It has been identified in repeat surveys, measuring 88 m in length, 15 m in width and 10.9 m in height, at 83 m deep.

11.4.35 Wreck (W_009) has also appeared as a strong magnetic anomaly and scour is recorded up to 4.8 m to the northeast and southwest, with a depth of 1.2 m.

W_010: Position dead

11.4.36 Wreck (W_010) relates to a dead position recorded by the UKHO, c. 1.6 km south outside of the Offshore Export Cable Corridor and c. 13 km east from the shore.

11.4.37 The record was last amended in 2010.

W_011: *Muriel*

11.4.38 Wreck (W_011) relates to the former location of the *Muriel*, as recorded by the UKHO. Although now recorded by the UKHO as a dead position, Canmore and the HER maintain this former position, c. 1 km north outside of the Offshore Export Cable Corridor and c. 2.2 km east from the shore.

11.4.39 The updated UKHO record with the current location of the *Muriel*, supported by diver investigation reports, is given by Wreck W_004.

W_012: Possible wreck of the *Cransdale*

11.4.40 Wreck (W_012) is the supposed location of the *Cransdale*, wrecked at Scotstown Head with no casualties. The vessel was refloated and towed, but later sank[132]. The HER recorded position is

[132] https://www.wrecksite.eu/wreck.aspx?238934

c. 300 m south outside of the Offshore Export Cable Corridor and c. 4.7 km east from the shore.

11.4.41 Originally recorded by a sonar contact reported by the 17th Escort Group in 1945, the UKHO does not record a physical wreck in this position.

W_013: Unknown wreck

11.4.42 Wreck (W_013) is recorded from a diver sighting, c. 940 m north from the Offshore Export Cable Corridor and c. 1.8 km east from the shore.

11.4.43 The UKHO do not record wreck remains in this position and the source given is a dive guide indicating diver sightings. The position may not therefore be accurate or indicative.

W_014: Unknown wreck

11.4.44 Wreck (W_014) is recorded within the Offshore Export Cable Corridor, c. 4.6 km east from the shore.

11.4.45 The UKHO do not record physical wreck remains in this position and the source given is a dive guide indicating diver sightings. The position may not therefore be accurate or indicative. The position does, however, lie between two known wrecks (W_004 *Muriel*, UKHO ID 2282 and W_003 *Magnus*, UKHO ID 2286), lying 490 m from the former and 190 m from the latter. No remains were observed on the seabed within the 2009 MBES data at the given location for W_014, and the proximity indicates the likelihood that the record relates to one of the above vessels (W_003 or W_004). No seabed remains are therefore expected at this location.

W_015: Unknown wreck

11.4.46 Wreck (W_015) relates to the possible site of a hulk, c. 690 m north outside of the Offshore Export Cable Corridor and c. 1.2 km east from the shore.

11.4.47 The Canmore record describes a 'hulk seen at 5733/0147, now reported ashore' and attributes a loss date of 1937. However, no correlating shore location is known and it is uncertain if seabed remains exist at this position.

Second World War features

11.4.48 In the second half of the 20th century, maps begin to depict wartime features, including pillboxes[133] shown on the 1964 1:2500 scale map (not reproduced), lying to the north and south of Cuttie Burn. Three fall within the Landfall, slightly beyond the Offshore Development Area and close to the high-water mark (Figure 39). The positions are marked by Canmore and the HER[134], although the intertidal survey only identified two pillboxes, both at slightly different positions (TI_015, TI_025; Photo 1; Photo 2). One of these is situated against the dune system and both are partially buried. The southernmost pillbox (TI_022; including a series of anti-tank blocks and a trench within the HER/Canmore record[135]) was not identified, although this may have lain outside of the intertidal survey area or buried by sands. Adjacent HER/Canmore records for each of the three pillboxes, laying within the intertidal zone, are understood to represent duplicate records with no additional physical remains (TI_016, TI_023, TI_026).

[133] Aberdeenshire HER Refs: NK1049-NK1149 – AA.
[134] https://canmore.org.uk/site/367562/craigewan-links-cuttie-burn; https://canmore.org.uk/site/250618/st-fergus-craigewan-links; https://canmore.org.uk/site/367561/craigewan-links
[135] https://canmore.org.uk/site/367561/craigewan-links

Photo 1: WWII Pillbox (TI_015).

Photo 2: WWII Pillbox (TI_025).

Photo 3: Anti-tank Blocks (TI_034).

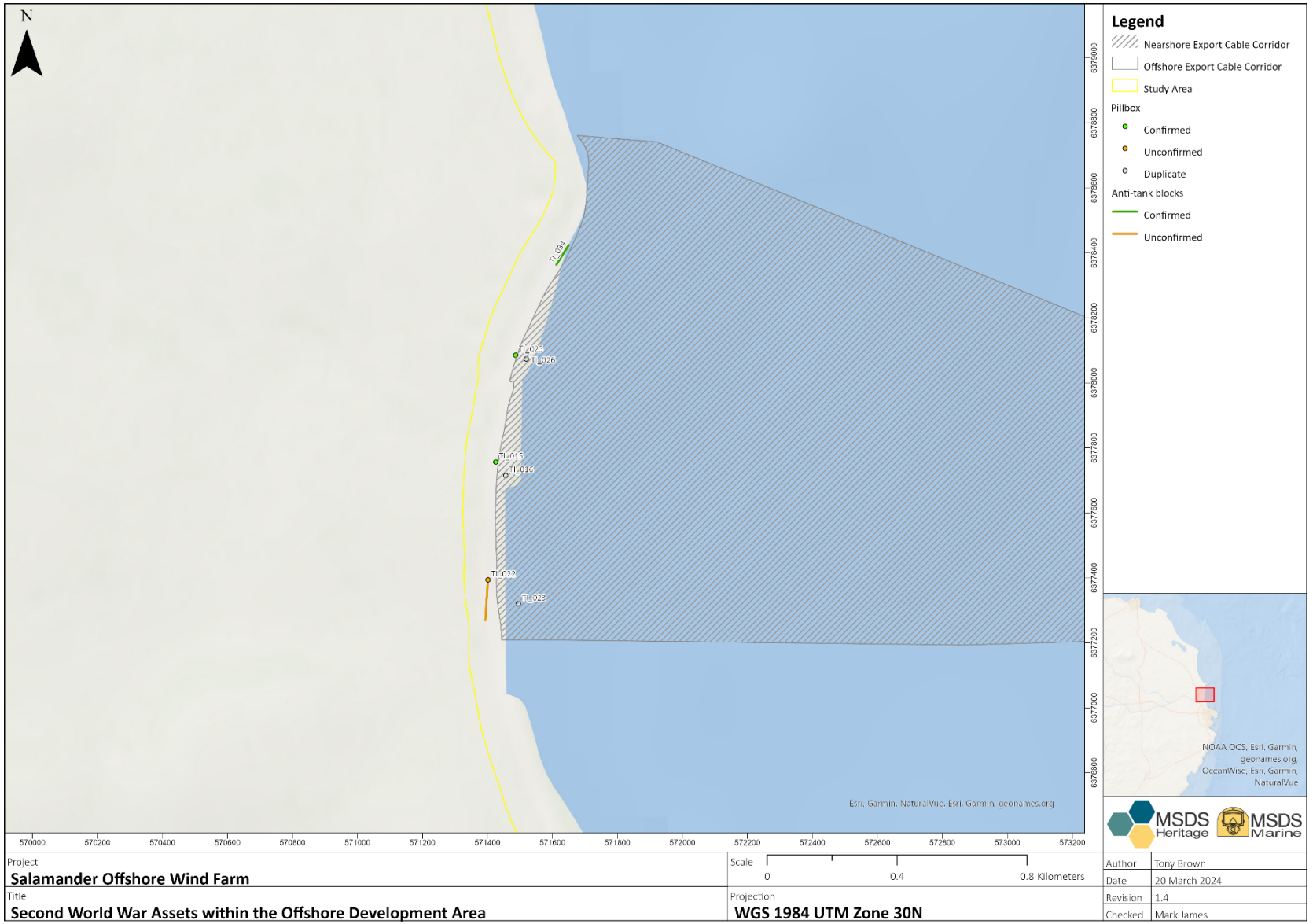

Figure 39: Second World War Assets Within the Development Area.

11.4.49 A row of anti-tank blocks, unrepresented by an HER or Canmore record, was noted during the intertidal survey north of the pillboxes (TI_034; Photo 3). Also set against the dune edge, coastal erosion is suggested by the present haphazard arrangement.

11.4.50 Additional anti-tank block formations are recorded elsewhere along the shore and several anti-glider ditches further west[136]. Similar defensive features are present northwards along the coastline, to Fraserburgh, and southwards, to Peterhead.

11.5 Summary

11.5.1 Fifteen (15) wreck locations have been identified within the Offshore Development Area and Study Area from existing records, comprising:

- Two (2) wrecks with corresponding UKHO records confirmed through 2009 MBES data (the *Muriel* and the *St Magnus*; both within the Nearshore Export Cable Corridor);
- Seven (7) further wrecks with live UKHO records (all within the Study Area);
- Two (2) dead positions recorded by the UKHO (both within the Study Area); and
- Four (4) HER or Canmore records of wreck with no corresponding UKHO record or supporting evidence (one within the Nearshore Export Cable Corridor and three within the Study Area).

11.5.2 Furthermore, the site-specific geophysical survey has identified two (2) anomalies of high potential in addition to those relating to the *Muriel* and the *St Magnus* (identified from 2009 MBES data partly covering the nearshore data gap), likely to each represent a wreck, and ten (10) medium potential anomalies. One additional high potential anomaly lies within the Offshore Export Cable Corridor, while the second lies within the Study Area, c. 380 m south outside of the Offshore Export Cable Corridor. Four medium potential anomalies were identified within the Offshore Export Cable Corridor, three within the Offshore Array Area and three outside of these, within the Study Area.

11.5.3 A total of 104 documented losses (excluding 24 duplicate records) are also recorded within the Study Area (11 within the Offshore Development Area), raising the potential for further wreckage or cargo to be present on the seabed or within the surface sediments.

11.5.4 A current data gap in the nearshore section of the Offshore Export Cable Corridor (as of the time of writing) presents a possibility for further geophysical anomalies of archaeological potential to exist therein. The proposed approach for addressing the data gap (through future survey, archaeological assessment and dissemination of the results) has been agreed with HES (see Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage for further detail). The data gap did not affect the gathering of UKHO, HER and Canmore data, which are considered comprehensive for the Offshore Development Area (as publicly available).

11.5.5 The terrestrial zone within the environs of the Landfall demonstrates human occupation since at least the Neolithic period, with notable high points of local activity in the Iron Age, medieval, post-medieval and modern periods. There is the potential for evidence of maritime activities

[136] https://canmore.org.uk/site/367239/drumlinnie

dating to these periods to be present within the Offshore Development Area, as summarised in Table 17. The overall level of potential for each period has been determined quantity, frequency and character of background evidence, perceived character and use of the Offshore Development Area during that period and the preservation environment (see Section 11.1).

Period	Level of potential	Possible character
Neolithic	Very low	Isolated findspots
Bronze Age	Very low	Isolated findspots
Iron Age	Low	Isolated findspots
Early medieval	Very low	Isolated findspots
Medieval	Low	Isolated findspots; wreck; cargo
Post-medieval	Moderate	Isolated findspots; wreck; cargo
Modern	Very high	Isolated findspots; wreck; cargo

Table 17: Summary of coastal and marine archaeological potential

11.5.6 No Second World War defensive structures have been identified within the Offshore Development Area, however, three pillboxes (two confirmed, one unconfirmed) and two formations of concrete anti-tank blocks (one confirmed, one unconfirmed) are situated slightly to the west, within the Landfall. These are outside the scope of the present assessment and will be considered within a separate onshore EIAR.

12.0 Aviation Archaeology

12.0.1 Aviation technology has been available since the early 20th century, though air travel became more prevalent after the First World War. During the inter-war years, commercial air travel boomed and, during the Second World War, the skies were dominated by military aircraft. After the war, commercial aviation steadily increased and improved. The remains of thousands of aircraft casualties, both civil and military, are present in UK waters.

12.1 Aviation Archaeological Remains and Potential

12.1.1 There are no known aviation remains nor documented losses within the Offshore Development Area or Study Area. The wider landscape, however, did hold associations with wartime aviation, particularly during the First World War.

12.1.2 Seaplane bases are recorded at the Loch of Strathbeg, c. 7 km north from the Landfall[137], and at Invernettie, Peterhead, c. 4 km to the south[138]. Lenabo airship station is recorded c. 9 km to the southwest of the Landfall[139] and the Second World War Peterhead Airfield c. 3.5 km to the southwest[140]. The latter was closed in January 1946, reopening in 1975 and remaining in use as a helicopter fuelling station associated with offshore gas and oil installations[141].

12.1.3 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. Aircraft, particularly military aircraft, are typically small and constructed of light materials; wreckage may travel on the surface before sinking and settling on the seabed. Therefore, it is rare for remains to be identified articulated and *in situ*.

12.1.4 While wartime and later aviation activity is known within the area, there are no confirmed aviation remains within the Offshore Development Area or Study Area. Additionally, the nature of aircraft crash sites leads to the majority representing disarticulated remains. Thus, while the general background of aviation activity indicates an inferred potential for aircraft remains to occur, any such remains are likely to be disarticulated. Potential is therefore relatively limited, though chance finds may occur.

12.2 Aviation Summary

12.2.1 There have been no identifications of aviation remains within the Offshore Development Area or Study Area, and no documented losses are reported. There is a limited potential for remains to be present, in consideration of nearby aviation activities.

[137] https://canmore.org.uk/site/107257/loch-of-strathbeg-seaplane-base
[138] https://canmore.org.uk/site/107269/peterhead-invernettie-seaplane-base
[139] https://canmore.org.uk/site/81604/lenabo-longside-airship-station-forest-of-deer
[140] https://canmore.org.uk/site/267769/peterhead-airfield-technical-site
[141] https://www.abct.org.uk/airfields/airfield-finder/peterhead-landplane/

13.0 Assessment of Significance

13.1 Submerged prehistory

13.1.1 No prehistoric archaeological remains were identified within the Offshore Development Area. While a series of Quaternary formations have been identified, the majority of these deposits represent glacial and marine sediments and the impact area is likely to have been mostly submerged under ice or water during the deposition of these deposits. Where sub-aerial conditions have been identified, these are often associated with unfavourable environments for human occupation or periods where human activity is absent from the archaeological record.

13.1.2 The area of highest potential comprises the nearshore section of the Offshore Export Cable Corridor, however, no geotechnical or geophysical data were available at the time of writing to provide further refinement of archaeological potential. Consultation with HES has agreed a project commitment to obtain geophysical data for this data gap, conduct an archaeological review of the data and discuss the results with HES prior to construction activities commencing (see Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage for further detail). This approach will ensure that the archaeological potential identified in this document can be reviewed and any proportionate next steps undertaken.

13.1.3 In consideration of the absence of evidence for human activity in a Scottish context prior to c. 12,000 BP, any remains pertaining to this in an earlier context would be of the highest significance, of at least national importance (i.e. in Units 40, 50, 60 or the Largo Bay Member of Unit 30). The likelihood of encountering such, however, is very low.

13.1.4 Any archaeological remains encountered within Lithozone 4 of the St Andrew's Bay Member would date to the Upper Palaeolithic or Early Mesolithic and remains within Lithozones 2 or 3 would date to the Mesolithic. Any such remains would likely be considered of high significance, in consideration of their relative scarcity in the local archaeological record and their potential to improve our understanding of human activities and diaspora during these periods.

13.1.5 Units 30, 40, 50 and 60 each have a moderate potential for remains of palaeoenvironmental interest. While such palaeoenvironmental remains do not tend to warrant designation and are not considered highly significant, they may be capable of contributing to our understanding of palaeolandscapes. These deposits may hold palaeoenvironmental remains, sea level data and dating evidence, which is considered a priority by research frameworks including the *North Sea Prehistory Research and Management Framework*[142] (Peeters *et al*. 2009 - document currently under revision). The remains may therefore be capable of addressing priorities within these agendas and therefore may be considered to hold a moderate level of significance.

13.2 Coastal and maritime archaeology

13.2.1 The baseline assessment identified the presence of 15 wreck locations within the Offshore Development Area and Study Area, comprising:

[142] Peeters, H., Murphy, P. & Flemming, N. (eds.). 2009. *North Sea Prehistory Research and management Framework*. Report for Rijksdienst voor het Cultureel Erfgoed and English Heritage.

- Two (2) wrecks with corresponding UKHO records confirmed through Admiralty geophysical data (the *Muriel* and the *St Magnus*; both within the Offshore Export Cable Corridor);
- Seven (7) wrecks with live UKHO records (all within the Study Area);
- Two (2) dead positions recorded by the UKHO (both within the Study Area); and
- Four (4) HER or Canmore records of wreck with no corresponding UKHO record or supporting evidence (one within the Offshore Export Cable Corridor and three within the Study Area).

13.2.2 The two wrecks recorded by the UKHO as the *Muriel* and the *St Magnus* were identified through 2009 MBES survey data as anomalies of high archaeological potential. In addition, a third anomaly of high archaeological potential was identified within the site-specific geophysical survey data within the Offshore Export Cable Corridor and a fourth slightly further south, beyond the Offshore Development Area. Furthermore, seven (7) medium potential anomalies were identified within the Offshore Development Area (three through site-specific survey within the Offshore Array Area; three through site-specific survey within the Offshore Export Cable Corridor; and one within the Offshore Export Cable Corridor through the 2009 MBES data). Medium potential anomalies may represent wrecks or associated debris.

13.2.3 Wreck remains can be of high significance, at times warranting designation as Historic Marine Protected Areas. However, this level of significance is dependent on a number of factors including rarity, age and level of preservation, the latter of which may be influenced by coastal or marine erosion. Further investigation at each identified wreck site would enable further confirmation of this significance. As a precautionary measure all wrecks are therefore considered to be of high significance in lieu of further investigation.

13.2.4 Military features line the coast of the Study Area and in some cases (e.g. the pillboxes and anti-tank blocks) lie within the boundaries of the Landfall. No such features have been identified within the Offshore Development Area. Questions regarding national defence are included within the Scottish Archaeological Research Framework[143] and include recommendations such as:

'*In researching the construction and meaning of the modern state, particular attention might be paid to the materiality of borders and border zones: How were they implemented or circumvented in practice?*'

'*Particular attention should also continue to be paid to the archaeology of national defence*'.

13.2.5 Wartime features on coastal strips have the potential to contribute to research on boundaries and national defence. Some of these questions may be addressed in part by the distribution of such sites, which forms a key part of their role as linear coastal barriers and defences. Their significance is also held within their physical fabric and in contextual historical information which allows us to understand the role they played in the defence of Britain.

13.2.6 The Second World War defensive assets identified within the Study Area during the intertidal

[143] ScARF. No date. *Modern Scotland Panel Report*. https://scarf.scot/national/scarf-modern-panel-report/9-modern-past-modern-present/ Accessed 26/07/2023.

survey appear to be *in situ* and have a good level of preservation, although the anti-tank blocks have been moved slightly through erosion and the pillboxes are partially buried beneath sand. Forming part of the coastal defensive network, alongside similar structures further north, they may be capable of contributing to our understanding of research questions set out by ScARF and are considered to be of regional importance (medium value/importance).

13.2.7 Isolated findspots may be encountered for remains dating from the Mesolithic to Modern periods. Isolated findspots typically comprise cultural material which is no longer *in situ*. The key contributors to significance of this material are typically held within its physical fabric, where many other contributors to significance, such as original context, have been lost. While such finds do hold some significance, this is generally limited.

13.3 Aviation archaeology

13.3.1 There are no records of aviation remains within the Offshore Development Area.

14.0 Conclusion

14.0.1 This assessment has considered desk-based and geophysical sources to provide a baseline review of the known and potential marine archaeological remains within the Offshore Development Area, up to MHWS. The assessment has then considered the potential significance of these remains.

14.0.2 Six (6) main Quaternary units have been identified within the Offshore Development Area, representing the range of glacial, interglacial and post-glacial environments of the Cromerian to Holocene stages, correlating with the Lower Palaeolithic to Mesolithic archaeological periods. The majority of the units, representing the Aberdeen Ground Formation (Unit 60), the Ling Bank Formation (Unit 50) and Coal Pit Formation (Unit 40) were laid down prior to the earliest evidence of hominid activity in Scotland, and largely represent glacial to marine environments, demonstrating very low archaeological potential. Likewise, Unit 20 (representing the Witch Ground Formation) also represents marine and glaciomarine environments with very low archaeological potential.

14.0.3 Unit 30 is interpreted as the Forth Formation, which may hold late Upper Palaeolithic to Mesolithic archaeological potential (particularly within the St Andrews Bay Member) if identified within the nearshore area. The data gap currently places uncertainty on its distribution in this area. However, such potential is limited by the general rarity of submerged prehistoric remains from these periods. Palaeoenvironmental evidence may survive within this, and earlier units. Unit 10 is a marine unit, however, the nearshore and intertidal zone may have seen activity during the phase of its deposition (from the Mesolithic onwards), though again this potential is considered to be limited. Any remains of submerged prehistoric sites would potentially be of high significance, while palaeoenvironmental remains would be of up to moderate significance.

14.0.1 The area of highest potential for submerged prehistoric remains comprises the nearshore section of the Offshore Export Cable Corridor, laying within a geophysical survey data gap at the time of writing. Consultation with HES has agreed a project commitment to obtain geophysical data for this data gap, conduct an archaeological review of the data and discuss the results with HES prior to construction activities commencing (see Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage for further detail). This approach will ensure that the archaeological potential identified in this document can be reviewed and any proportionate next steps undertaken.

14.0.4 Two (2) wrecks recorded by the UKHO and identified within publicly available 2009 MBES geophysical survey data (representing the *Muriel* and the *St Magnus*) lie within the Offshore Development Area boundaries. Further potential for wrecks is suggested by a third anomaly of high archaeological potential and seven (7) of medium potential within the Offshore Development Area. Other wrecks and maritime remains are recorded within the Study Area, and potential for further remains from the post-medieval period and modern period in particular has been identified. All wrecks are considered to be of potential high significance.

14.0.5 Other coastal features in the area are dominated by Second World War installations. While no Second World War defensive structures have been identified within the Offshore Development Area, three pillboxes (two confirmed, one unconfirmed) and two formations of concrete anti-

tank blocks (one confirmed, one unconfirmed) are situated slightly to the west, within the Landfall (just above MHWS). These show evidence of coastal erosion in places, however, may be considered to be of up to moderate significance.

14.0.6 No known aircraft crash sites lie within the Offshore Development Area or Study Area, and no aircraft documented losses are reported. There is a limited potential for remains to be present, in consideration of nearby aviation activities.

14.0.7 Volume ER.A.3, Chapter 17: Marine Archaeology and Cultural Heritage will consider potential impacts to these remains and will recommend mitigation actions or further work where considered necessary to ensure there are no significant effects upon marine archaeological receptors arising from the Salamander Project.

15.0 Appendix A – Anomalies of Archaeological Potential

MSDS ID	Potential	Description	Lenth (m)	Width (m)	Height (m)	Depth (m)	Amplitude (nT)	UKHO ID	Canmore ID	HER ID	Wreck Name	Location
SAL23_001	Low	Chain, cable, or rope	14.13	7.74	0.07	79.62						Offshore Development Area
SAL23_002	Low	Chain, cable, or rope	51.23	30.05	0.3	77.01						Offshore Development Area
SAL23_003	Low	Potential debris	13.82	5.83	0.13	69.49						Offshore Development Area
SAL23_004	Low	Potential debris	8.87	0.45	0.11	88.94						Offshore Development Area
SAL23_005	Low	Potential debris	2.76	1.58	0.67	82.84						Offshore Development Area
SAL23_006	Low	Potential debris	3.44	1.88	0.28	83.14						Offshore Development Area
SAL23_007	Low	Potential debris	6.51	4.84	0.12	81.31						Offshore Development Area
SAL23_008	Low	Chain, cable, or rope	53.27	0.31	0.18	85.89						Offshore Development Area
SAL23_009	Low	Chain, cable, or rope	106.46	0.39	0.09	78.88						Study Area
SAL23_010	Low	Fishing gear	32.22	16.07	0.09	85.82						Offshore Development Area
SAL23_011	Low	Likely geological	4.11	1.9	0.87	86.21						Offshore Development Area
SAL23_012	Low	Potential debris	9.35	0.12	0.02	97.88						Study Area
SAL23_013	Low	Chain, cable, or rope	51.91	0.6	0.09	100.33						Offshore Development Area
SAL23_014	Low	Potential debris	5.41	0.64	0.2	75.05						Offshore Development Area
SAL23_015	Low	Potential debris	4.24	1.52	1.23	87						Offshore Development Area
SAL23_016	Low	Potential debris	14.5	0.65	0.16	99.31						Study Area
SAL23_017	Low	Potential debris	11.89	0.13	0.04	99.32						Study Area

MSDS ID	Potential	Description	Lenth (m)	Width (m)	Height (m)	Depth (m)	Amplitude (nT)	UKHO ID	Canmore ID	HER ID	Wreck Name	Location
SAL23_018	Low	Chain, cable, or rope	232.75	0.32	0.06	98.95						Offshore Development Area
SAL23_019	Low	Chain, cable, or rope	40.85	0.22	0.05	83.23						Offshore Development Area
SAL23_020	Low	Chain, cable, or rope	63.07	0.28	0.26	92.66						Offshore Development Area
SAL23_021	Low	Chain, cable, or rope	268.52	0.31	0.04	91.15						Offshore Development Area
SAL23_022	Low	Chain, cable, or rope	192.25	0.17	0	95.3						Study Area
SAL23_023	Low	Potential debris	5.05	1.8	0.18	98.02						Offshore Development Area
SAL23_024	Low	Chain, cable, or rope	39.26	15.2	0.09	99.15						Study Area
SAL23_025	Low	Chain, cable, or rope	93.79	0.3	0.03	96.4						Offshore Development Area
SAL23_026	Low	Chain, cable, or rope	47.31	0.3	0.08	96.79						Offshore Development Area
SAL23_027	Low	Potential debris	8.08	3.49	0.24	97.15	6					Study Area
SAL23_028	Low	Potential debris	7.61	3.21	0.1	97.87						Study Area
SAL23_029	Low	Chain, cable, or rope	85.77	0.47	0.05	111.96						Study Area
SAL23_030	Low	Chain, cable, or rope	110.61	0.41	0.04	99.65						Offshore Development Area
SAL23_031	Low	Potential debris	5.41	1.85	0.06	110.9						Study Area
SAL23_032	Low	Potential debris	3.75	0.38	0.06	112.78						Study Area
SAL23_033	Low	Potential debris	6.08	0.56	0.02	112.74						Study Area
SAL23_034	Low	Chain, cable, or rope	48.3	0.63	0.03	110.92						Study Area
SAL23_035	Low	Chain, cable, or rope	17.81	4.79	0.03	100.45						Offshore Development Area
SAL23_036	Low	Potential debris	5.63	0.5	0.11	100.17						Offshore Development Area

MSDS ID	Potential	Description	Lenth (m)	Width (m)	Height (m)	Depth (m)	Amplitude (nT)	UKHO ID	Canmore ID	HER ID	Wreck Name	Location
SAL23_037	Low	Chain, cable, or rope	142.57	0.27	0.03	99.85						Offshore Development Area
SAL23_038	Low	Chain, cable, or rope	70.19	0.08	0.05	98.23						Offshore Development Area
SAL23_039	Low	Potential debris	6.1	0.41	0.05	97.65						Offshore Development Area
SAL23_040	Low	Potential debris	2	0.49	0.44	98.41						Offshore Development Area
SAL23_041	Low	Chain, cable, or rope	86.62	0.48	0.01	97.78						Offshore Development Area
SAL23_042	Low	Chain, cable, or rope	20.97	0.4	0.09	115.92						Study Area
SAL23_043	Low	Chain, cable, or rope	15.14	0.18	0.03	101.25						Study Area
SAL23_044	Low	Chain, cable, or rope	92.15	0.14	0.02	101.55						Offshore Development Area
SAL23_045	Low	Fishing gear	35.62	21.04	0.02	105.86						Study Area
SAL23_046	Low	Chain, cable, or rope	47.18	0.16	0.02	104.36						Offshore Development Area
SAL23_047	Low	Linear feature	63.67	0.76	0	97.18						Offshore Development Area
SAL23_048	Low	Chain, cable, or rope	109.98	0.22	0	100.06						Offshore Development Area
SAL23_049	Low	Chain, cable, or rope	24.91	0.3	0.01	98.49						Offshore Development Area
SAL23_050	Low	Chain, cable, or rope	65.15	0.16	0	109.08						Study Area
SAL23_051	Low	Potential debris	1.94	0.94	0.33	109.08						Study Area
SAL23_052	Low	Chain, cable, or rope	293.76	0.55	0.14	96.54						Offshore Development Area
SAL23_053	Low	Potential debris	6.22	0.5	0.12	102.61						Study Area
SAL23_054	Low	Chain, cable, or rope	48.26	0.32	0.05	104.25						Offshore Development Area
SAL23_055	Low	Chain, cable, or rope	82.61	0.31	0.05	102.62						Offshore Development Area

MSDS ID	Potential	Description	Lenth (m)	Width (m)	Height (m)	Depth (m)	Amplitude (nT)	UKHO ID	Canmore ID	HER ID	Wreck Name	Location
SAL23_056	Low	Chain, cable, or rope	89.39	0.37	0.03	109.87						Study Area
SAL23_057	Low	Potential debris	1.09	1.22	0.99	105.38						Offshore Development Area
SAL23_058	Low	Linear feature	47.02	0.68	0.06	95.92						Offshore Development Area
SAL23_059	Low	Chain, cable, or rope	58.62	0.35	0.05	110.18						Study Area
SAL23_060	Low	Chain, cable, or rope	6.28	0.42	0.06	98.12						Offshore Development Area
SAL23_061	Low	Chain, cable, or rope	35.67	0.61	0.08	100.68						Offshore Development Area
SAL23_062	Low	Chain, cable, or rope	106.69	0.29	0.06	100.72						Offshore Development Area
SAL23_063	Low	Chain, cable, or rope	42.24	0.85	0.03	102.46						Study Area
SAL23_064	Low	Chain, cable, or rope	42.54	0.11	0	115.82						Study Area
SAL23_065	Low	Chain, cable, or rope	31.41	11.15	0.06	102.92						Offshore Development Area
SAL23_066	Low	Chain, cable, or rope	65.86	0.28	0.05	98.96						Offshore Development Area
SAL23_067	Low	Chain, cable, or rope	60.49	0.16	0.02	102.22						Offshore Development Area
SAL23_068	Low	Chain, cable, or rope	162.39	0.27	0.04	99.24						Offshore Development Area
SAL23_069	Low	Chain, cable, or rope	34.68	0.32	0.04	97.59						Offshore Development Area
SAL23_070	Low	Chain, cable, or rope	115.94	0.62	0.05	98.23						Offshore Development Area
SAL23_071	Low	Chain, cable, or rope	118.68	0.17	0.02	97.69						Offshore Development Area
SAL23_072	Low	Chain, cable, or rope	124.38	0.11	0.03	99.14						Offshore Development Area
SAL23_073	Low	Potential debris	4.17	0.45	0.08	108.68						Study Area
SAL23_074	Low	Chain, cable, or rope	26.49	0.1	0.03	104.66						Study Area

MSDS ID	Potential	Description	Lenth (m)	Width (m)	Height (m)	Depth (m)	Amplitude (nT)	UKHO ID	Canmore ID	HER ID	Wreck Name	Location
SAL23_075	Low	Potential debris	9.27	0.64	0.11	97.64						Study Area
SAL23_076	Low	Chain, cable, or rope	37.71	0.25	0.01	97.53						Study Area
SAL23_077	Low	Fishing gear	71.77	0.33	0.07	100.61	16.3					Offshore Development Area
SAL23_078	Low	Potential debris	8.26	1.69	0.11	100.35						Offshore Development Area
SAL23_079	Low	Chain, cable, or rope	18.35	0.19	0.04	106.77						Study Area
SAL23_080	Low	Likely geological	9.4	4.99	0.54	108.24						Study Area
SAL23_081	Low	Chain, cable, or rope	38.93	3.38	0.03	98						Study Area
SAL23_082	Low	Chain, cable, or rope	83.58	1.02	0.09	96.71						Study Area
SAL23_083	Low	Potential debris	10.52	5.32	0.08	98.21						Study Area
SAL23_084	Low	Linear feature	11.76	0.41	0.04	102.47						Study Area
SAL23_085	Low	Chain, cable, or rope	76.82	0.34	0.05	94.56						Offshore Development Area
SAL23_086	Low	Linear feature	10.52	0.17	0.04	95.6						Offshore Development Area
SAL23_087	Low	Chain, cable, or rope	59.44	0.13	0.03	95.78						Offshore Development Area
SAL23_088	Low	Chain, cable, or rope	41.16	0.33	0.05	95.75						Offshore Development Area
SAL23_089	Low	Chain, cable, or rope	51.4	0.36	0.01	95.75						Offshore Development Area
SAL23_090	Low	Chain, cable, or rope	35.39	0.39	0.02	95.59						Offshore Development Area
SAL23_091	Low	Potential debris	19.26	0.66	0.06	98.16	22.4					Offshore Development Area
SAL23_092	Low	Potential debris	23.72	7.14	0.06	100.38						Offshore Development Area
SAL23_093	Low	Potential debris	9.1	1.56	0.1	108.15						Study Area

MSDS ID	Potential	Description	Lenth (m)	Width (m)	Height (m)	Depth (m)	Amplitude (nT)	UKHO ID	Canmore ID	HER ID	Wreck Name	Location
SAL23_094	Low	Potential debris	30.73	4.61	0.09	100.95						Study Area
SAL23_095	Low	Chain, cable, or rope	135.48	0.16	0.07	95.84						Offshore Development Area
SAL23_096	Low	Chain, cable, or rope	67.9	0.92	0.09	99.21						Study Area
SAL23_097	Low	Potential debris	3.76	1.04	0.93	96.52						Study Area
SAL23_098	Low	Chain, cable, or rope	62.14	15.63	0.08	94.94						Offshore Development Area
SAL23_099	Low	Linear feature	20.06	0.56	0.06	94.82						Offshore Development Area
SAL23_100	Low	Chain, cable, or rope	166.95	0.21	0.06	95.61						Offshore Development Area
SAL23_101	Low	Chain, cable, or rope	45.47	0.12	0.07	95.97						Offshore Development Area
SAL23_102	Low	Chain, cable, or rope	175.18	0.09	0.06	94.94						Offshore Development Area
SAL23_103	Low	Chain, cable, or rope	40.19	0.44	0.08	96.28						Offshore Development Area
SAL23_104	Low	Chain, cable, or rope	51.93	0.64	0.11	99.46						Study Area
SAL23_105	Low	Chain, cable, or rope	77.34	0.36	0.02	96.6						Study Area
SAL23_106	Low	Potential debris	8.35	2.41	0.03	99.34						Study Area
SAL23_107	Low	Chain, cable, or rope	12.38	0.2	0.09	95.06						Offshore Development Area
SAL23_108	Low	Potential debris	5.76	4	0.12	103.48						Study Area
SAL23_109	Low	Linear feature	10.42	0.24	0.02	101.12						Study Area
SAL23_110	Low	Potential debris	7.8	0.36	0.03	98.8						Study Area
SAL23_111	Low	Likely geological	4.83	1.56	0	95.79						Study Area
SAL23_112	Low	Chain, cable, or rope	81.27	0.24	0.03	93.07						Offshore Development Area

MSDS ID	Potential	Description	Lenth (m)	Width (m)	Height (m)	Depth (m)	Amplitude (nT)	UKHO ID	Canmore ID	HER ID	Wreck Name	Location
SAL23_113	Low	Potential debris	6.19	0.66	0.18	94.62						Study Area
SAL23_114	Low	Potential debris	4.42	0.84	0.13	94.55						Study Area
SAL23_115	Low	Potential debris	5.45	0.26	0.06	98.5						Study Area
SAL23_116	Low	Potential debris	2.54	1.2	0.84	102.04						Study Area
SAL23_117	Low	Debris	1.66	1.42	0.14	101.69	5.8					Study Area
SAL23_118	Low	Chain, cable, or rope	39.19	0.31	0.06	91.65						Offshore Development Area
SAL23_119	Low	Linear feature	9.25	0.22	0.05	91.62						Offshore Development Area
SAL23_120	Low	Chain, cable, or rope	33.08	0.23	0.03	97.76						Study Area
SAL23_121	Low	Chain, cable, or rope	137.03	0.16	0.02	96.42						Study Area
SAL23_122	Low	Chain, cable, or rope	72.87	0.39	0.03	90.52						Offshore Development Area
SAL23_123	Low	Chain, cable, or rope	36.78	0.24	0.02	92.79						Offshore Development Area
SAL23_124	Low	Chain, cable, or rope	64.28	0.33	0.03	93.23						Study Area
SAL23_125	Low	Chain, cable, or rope	17.97	0.19	0.02	89.18						Study Area
SAL23_126	Low	Chain, cable, or rope	194.04	0.29	0.04	92.93						Offshore Development Area
SAL23_127	Low	Chain, cable, or rope	200.78	0.23	0.07	90.22						Study Area
SAL23_128	Low	Debris	8.98	0.78	0.49	101.22						Study Area
SAL23_129	Low	Linear feature	21	0.37	0.03	104.04						Study Area
SAL23_130	Low	Chain, cable, or rope	286.99	0.36	0.02	89.15						Study Area
SAL23_131	Low	Chain, cable, or rope	318.47	0.21	0.02	89.9						Study Area

MSDS ID	Potential	Description	Lenth (m)	Width (m)	Height (m)	Depth (m)	Amplitude (nT)	UKHO ID	Canmore ID	HER ID	Wreck Name	Location
SAL23_132	Low	Chain, cable, or rope	162.44	0.29	0.02	90.71						Study Area
SAL23_133	Low	Debris	1.69	1.53	0.04	90.57	6					Study Area
SAL23_134	Low	Potential debris	4.73	0.68	0.22	105.93						Study Area
SAL23_135	Low	Potential debris	11.31	3.76	0.22	96.77						Study Area
SAL23_136	Low	Potential debris	6.36	0.55	0.18	105.41						Study Area
SAL23_137	Low	Potential debris	4.01	0.42	0.03	105.89						Study Area
SAL23_138	Low	Chain, cable, or rope	26.75	0.2	0.04	95.52						Study Area
SAL23_139	Low	Debris	8	1.07	0.15	95	4.9					Study Area
SAL23_140	Low	Likely geological	4.01	0.87	0.09	105.29						Study Area
SAL23_141	Low	Chain, cable, or rope	151.23	0.23	0.02	90						Study Area
SAL23_142	Low	Debris	2.51	1.85	0.36	105.15	13.7					Study Area
SAL23_143	Low	Linear feature	80.28	0.39	0.04	92.97						Study Area
SAL23_144	Low	Chain, cable, or rope	114.76	0.09	0	104.77						Study Area
SAL23_145	Low	Potential debris	26.22	25.03	0.08	106.66						Study Area
SAL23_146	Low	Likely geological	7.44	2.13	0.34	97.67						Study Area
SAL23_147	Low	Linear feature	32.67	1.2	0.16	106.16						Study Area
SAL23_148	Low	Chain, cable, or rope	74.04	0.21	0.04	104.57						Study Area
SAL23_149	Low	Linear feature	27.52	0.2	0.05	89.89						Study Area
SAL23_150	Low	Linear feature	12.19	0.53	0.13	97.18						Offshore Development Area

MSDS ID	Potential	Description	Lenth (m)	Width (m)	Height (m)	Depth (m)	Amplitude (nT)	UKHO ID	Canmore ID	HER ID	Wreck Name	Location
SAL23_151	Low	Linear feature	51.45	0.1	0.02	83.35						Study Area
SAL23_152	Low	Chain, cable, or rope	46.53	8.53	0.04	104.98						Study Area
SAL23_153	Low	Debris	6.76	0.95	0.45	98.56						Offshore Development Area
SAL23_154	Low	Chain, cable, or rope	8.46	15.26	0.07	104.69						Study Area
SAL23_155	Low	Linear feature	21.12	0.31	0.1	98.96						Offshore Development Area
SAL23_156	Low	Chain, cable, or rope	170.03	0.17	0.02	104.87						Study Area
SAL23_157	Medium	Potential debris	57.92	9.92	0.13	78.9						Offshore Development Area
SAL23_158	Medium	Potential debris	36.45	12.06	1.65	83.13						Offshore Development Area
SAL23_159	Medium	Potential debris	76.79	40.54	2.18	86.79	10.7					Offshore Development Area
SAL23_160	Medium	Potential debris	32.35	58.28	2.11	75.32	54.8					Study Area
SAL23_161	Medium	Debris	12.25	2.43	0.47	100.75						Offshore Development Area
SAL23_162	Medium	Debris	11.67	2.56	0.53	98.85						Offshore Development Area
SAL23_163	Medium	Debris	19.86	18.95	0.1	97.29	195.7					Offshore Development Area
SAL23_164	Low	Fishing gear	15.14	4.07	0.12	102.43						Study Area
SAL23_165	Low	Potential debris	6.75	1.09	0.62	97.22						Study Area
SAL23_166	Medium	Potential debris	17.25	5.61	0.36	95.49						Study Area
SAL23_167	Medium	Debris	22.44	4.54	0.78	90						Study Area
SAL23_168	High	Potential wreck	22.62	2.89	0.5	67.7						Study Area
SAL23_169	High	Potential wreck	102.57	70.81	1.44	68.63	61.4					Offshore Development Area

MSDS ID	Potential	Description	Lenth (m)	Width (m)	Height (m)	Depth (m)	Amplitude (nT)	UKHO ID	Canmore ID	HER ID	Wreck Name	Location
SAL23_170	High	Wreck	98.24	24.24	8.91			2282			Muriel	Offshore Development Area
SAL23_171	High	Wreck	75.68	16.89	6.7			2286	101844	NK14NE0022	St Magnus	Offshore Development Area
SAL23_172	Medium	Potential debris	96.52	41.37	4.34							Offshore Development Area

16.0 Appendix B – Gazetteer

MSDS ID	Description	Period	Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
Wrecks and geophysical anomalies (W)										
W_001	Wreck: Intact. An object, possibly the wreck of the EGENAES, was recorded at this location on the 24th July 1983 using sonar. Its length was 15m, and its height above seabed was 12m. The EGENAES was torpedoed and sunk 22 March 1917. The wreck is reportedly intact and associated with scour.	20th century (sunk 1917)	587415.8	6380734.7		101866	NK25SE0002	2364		UKHO
W_002	Wreck: Upright, intact. On May 14th 1917, the steam trawler BEL LILY was sunk by a mine laid by the German submarine UC-49 (under the command of Alfred Arnold) 1.5 miles ENE of Peterhead. Ten of the crew were killed. HMS SCOTT reported in April 1959 that it had located the wreck.	20th century (sunk 1917)	576622.5	6379033.9		101842	NK15SE0002	2283		UKHO
W_003	Wreck: Intact, upright, bows NE. The armed steamship ST MAGNUS, under Captain John Mackenzie, carrying passengers, mail and general cargo from Lerwick to Aberdeen, was torpedoed and sunk by the submarine UC-58 (Karl Vesper) 3 miles north-northeast of Peterhead on the 12th February 1918.	20th century (sunk 1917)	576136.4	6377979.9		101844	NK14NE0022	2286	SAL23_171	UKHO
W_004	Wreck, thought to be the Muriel. The wreck lies with its bows to the south-east and was identified on MBES data. Length 88m, width 19m and height 9.8m	20th century (sunk 1918)	575597.6	6377648.7				2282	SAL23_170	UKHO
W_005	Wreck: The steel steamship MAGICIAN , carrying a general cargo from Trinidad to London was wrecked on Craigewan, 2 miles north of Peterhead, on the 14th April 1944.	20th century	571967.2	6376253.5		101741	NK14NW0112	2279		UKHO

MSDS ID	Description	Period	Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
W_006	Wreck reported by the UKHO. Upright, intact, bow to the E. Originally detected in 1945 and identified in repeat surveys.	Unknown	578989.9	6376746.3		321927	-	2281		UKHO
W_007	Wreck thought to be the Ocean Herald II, a Motor Fishing Vessel reported sinking in 1984 when it ran aground at Scotstown head. Likely to have broken up. The UKHO report the position is for filing, though the grounding position is given precisely. This is likely because remains are thought to have broken up.	20th century	572197.2	6380154.4		321962		2365		UKHO
W_008	Wreck: Upright and probably intact. A non dangerous wreck was reported at location in 1956.	Unknown	577440	6378860.1		202103	NK15SE0001	2284		UKHO
W_009	Wreck reported by the UKHO. Upright, intact, bow to the NE. Originally detected in 1965 and identified in repeat surveys.	Unknown	600495.6	6385152.6		321928		2289		UKHO
W_010	Position considered dead.		586733	6376727.7				2280		UKHO (dead)
W_011	Dead Wreck Position. The steel steamship MURIEL, carrying a cargo of coal from Tyne to Scapa Flow was torpedoed by the submarine UC-58 (Kurt Schwarz) on the 17th September 1918 and sank 3.5 miles northeast (or east-northeast) from Peterhead. After being hit, she sank in 12 minutes. No lives were lost. The wreckage was recorded at this approximate location on the 3rd September 1923. Position considered dead by the UKHO, however, the Muriel may have been identified elsewhere within the study area (UKHO ID 2282)	20th century (sunk 1918)	573709.6	6379253.8		101843	NK15SW0028	2285		UKHO (dead)
W_012	Supposed site of wreck. Originally recorded by a sonar contact reported by the 17th Escort Group (1945), thought to be possibly correlated with the lost vessel the Cransdale.	20th century	576580.7	6376998.8		101840	NK14NE0001			HER data

MSDS ID	Description	Period	Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
	However, the UKHO do not record a wreck in this position and as such the site is unverified.									
W_013	Supposed site of wreck. The UKHO do not record wreck remains in this position and the source given is a dive guide indicating diver sightings. The position may not be accurate.	Unknown	573448.5	6379153		202100	NK15SW0029			HER (diver sighting)
W_014	Supposed site of wreck. The UKHO do not record wreck remains in this position and the source given is a dive guide indicating diver sightings. The position may not be accurate.	Undated	576069	6377791.4		202099	NK14NE0004			HER data
W_015	Possible site of a hulk (1937), seen at 5733/0147, now reported ashore. However, the location ashore is not known and it is uncertain if seabed remains exist at this position.	20th century	572748.6	6379142.7		324680				Canmore
Terrestrial and Intertidal Remains (TI)										
TI_001	A deposit of circa 150 flints, thought to date to the Neolithic, and many showing signs of burning, was uncovered at this site while trench-digging for the new golf course club house. The collection comprises mostly undiagnostic cores and waste flakes.	Neolithic	571809.9	6375693.4			NK14NW0073			HER data
TI_002	Site of a Pictish settlement, established by documentary evidence and by discovery of stone coffins (NK 1230 4725) in the field immediately to the rear of the Fish House. Canmore indicates that no trace of remains were found during surveys in 1962, though the previous reports indicate the presence of Iron Age settlement activity in the area.	Iron Age	572115.5	6375380.4		21153	NK14NW0008			HER/Canmore
TI_003	A number of stone coffins were found to the rear of the Fish House. They were construed as	Iron Age	572047.1	6375430.7		21153	NK14NW0065			HER/Canmore

MSDS ID	Description	Period	Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
	evidence of the existence of Pictish settlement at the mouth of the River Ugie.									
TI_004	Castle of Inverugie. The motte and bailey castle was immediately to seaward of Peterhead Golf Club Pavilion. The harbour was constructed in front of where the Fish House now stands and both were removed to facilitate the building of Ravenscraig. Until around 1895, traces of the moat and massive rubble foundations could still be seen. The old harbour (NK1240 4743) was filled with sand by 1799. Now no trace of the of the castle or harbour. Inference from historical documents indicates that the castle may have pre-dated the 13th century.	Medieval	572101	6375582.6		21270	NK14NW0007			HER/Canmore
TI_005	Medieval and post medieval rig and furrow, and pottery.	Medieval to post-med	572013.2	6375431.3		86533				Canmore
TI_006	Listed building. Fish-houses, consisting of two separate blocks at right angles. One is a single-storey and loft house, with crow-stepped gables and a forestair at the S end. The date “1585” is carved at the bottom of one of the crow-steps.	Post medieval	572043.3	6375455.3	LB39847	77146	NK14NW0024			HER/Canmore
TI_007	Peterhead and Buchanhaven Conservation Area and structures within, the majority of which are recorded as cottages by the HER and Canmore. The village of Buchanhaven was originally a fishing village dating to 1760. The settlement grew and a school was established in the 19th century, and a harbour built in 1850 is thought to have replaced an earlier structure. The Conservation Area primarily encompasses the area of the harbour and fishermen's cottages	Post medieval	572562	6375330		21262 - 69, 21271-72, 21276-80, 21154-63, 21165-74, 21223-25, 21227-31,	NK14NW0635, NK14NW0612, NK14NW0661, NK14NW0413, NK14NW0669, NK14NW0623, NK14NW0649, NK14NW0641, NK14NW0629, NK14NW0609, NK14NW0632, NK14NW0615, NK14NW0652, NK14NW0658,			Centre point of CA

MSDS ID	Description	Period	Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
						21234-36, 21238-44, 21253-58, 21260-61, 165084	NK14NW0626, NK14NW0667, NK14NW0644, NK14NW0610, NK14NW0411, NK14NW0621, NK14NW0414, NK14NW0653, NK14NW0627, NK14NW0647, NK14NW0063, NK14NW0664, NK14NW0670, NK14NW0656, NK14NW0618, NK14NW0650, NK14NW0638, NK14NW0624, NK14NW0630, NK14NW0633, NK14NW0659, NK14NW0665, NK14NW0619, NK14NW0651, NK14NW0639, NK14NW0625, NK14NW0668, NK14NW0645, NK14NW0636, NK14NW0613, NK14NW0662, NK14NW0412, NK14NW0622, NK14NW0616, NK14NW0648, NK14NW0642, NK14NW0608, NK14NW0646, NK14NW0637, NK14NW0614, NK14NW0663, NK14NW0657,			

MSDS ID	Description	Period	Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
							NK14NW0617, NK14NW0631, NK14NW0643, NK14NW0611, NK14NW0634, NK14NW0660, NK14NW0666, NK14NW0620, NK14NW0415, NK14NW0654, NK14NW0628, NK14NW0640			
TI_008	Ugie Hospital. Hospital, still in use, formerly the infectious diseases hospital for Peterhead, dating to 1905-1907 with later alterations.	20th century	572220.8	6375375.5		164925	NK14NW0401			HER/Canmore
TI_009	Footbridge, 1991.	20th century	571905.4	6375527.5			NK14NW0395			HER data
TI_010	Footbridge, 1991.	20th century	571851.7	6375528.9		165077	NK14NW0395			HER/Canmore
TI_011	WWII: Anti Glider Ditches	WWII	571398	6376054.6		50915				Canmore
TI_012	Anti invasion defence site	WWII	571811.7	6376268.7		14639				Canmore
TI_013	WWII: Anti Glider Ditches	WWII	571412.6	6375857.3		50914; 367238				Canmore
TI_014	World War II Type 22 Pill box, still in fairly good condition.	WWII	571842	6376052.8		88887; 14640	NK14NW0067			HER position, centre point
TI_015	Pillbox adjacent to site	WWII	571420.9	6377749.9		250618				Canmore
TI_016	WWII Pillbox of Type 24 construction. 4th in a line of eight from Craigewan to Scotstown beach. Shown within the site, but is likely to be the same as the pillbox above, with different positions recorded potentially due to erosion or inaccurate positioning.	WWII	571456.5	6377714.9			NK14NW0081			HER data

MSDS ID	Description	Period	Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
TI_017	Rattery Head Anti tank line, including anti tank blocks and pillbox	WWII	571438.4	6379485.4		250620; 71829	NK14NW0084			HER/Canmore
TI_018	Peterhead Harbour north, entrance beacon.	Undated	573614.7	6376025		278078	NK14NW0711			HER/Canmore
TI_019	Pillbox located in the dunes and almost buried when recorded in 2012.	WWII	571533.3	6376774.4		319941	NK14NW0084			HER/Canmore
TI_020	Two pillboxes located c. 75 m apart, almost completely buried in sand.	WWII	571564.6	6378929.2		319942	NK14NW0084			HER/Canmore
TI_021	Anti tank blocks	WWII	571040.3	6380367.7		319944	NK14NW0084			HER/Canmore
TI_022	Anti tank blocks, pillbox and trench	WWII	571401.2	6377393.5		367561, 44026	NK14NW0084			HER/Canmore
TI_023	WWII Pillbox of Type 24 construction. 3rd in a line of eight from Craigewan to Scotstown beach. May relate to pillbox recorded at Canmore position 367561, 44026	WWII	571495	6377320			NK14NW0080			HER data
TI_024	Remains of a WWII line of anti-tank blocks lining the beach. Several hundred blocks are present in total. They are supported by regularly spaced pillboxes.	WWII	571437.8	6379481.5			NK14NW0084			Centre point of a large polygon running down the coast
TI_025	Pillbox close to Cuttie Burn	WWII	571490	6378085		367562; 55943	NK14NW0084			HER/Canmore
TI_026	Pillbox close to Cuttie Burn. May be the same as the above (Canmore ID 55943)	WWII	571519.1	6378073.7			NK14NW0082			HER data
TI_027	Anti tank blocks	WWII	571393.3	6377268.8			NK14NW0084			Centre point of polygon
TI_028	Anti tank blocks and pillbox	WWII	571412.4	6377198.4		44027	NK14NW0084			HER/Canmore

MSDS ID	Description	Period		Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
TI_029	Anti tank blocks and pillbox	WWII		571051.4	6380358.5		64774	NK14NW0084			HER/Canmore
TI_030	A World War II pillbox of the type 24 variety with associated anti-tank concrete blocks. Lies partially buried by sand dune.	WWII		571068	6380330.5			NK15SW0008			HER data
TI_031	WWII Pillbox of Type 24 construction. Second in a line of eight from Craigewan to Scotstown beach.	WWII		571567.9	6376703.3			NK14NW0079			HER data
TI_032	WWII Pillbox of Type 24 construction. Seventh in a line of eight from Craigewan to Scotstown beach.	WWII		571241	6380137.4			NK15SW0009			HER data
TI_033	WWII Pillbox of Type 24 construction. Sixth in a line of eight from Craigewan to Scotstown beach.	WWII		571494.9	6379784			NK15SW0021			HER data
TI_034	Formation of 11 concrete anti-tank blocks	WWII		411722 (N) 411852 (S)	850296 (N) 850236 (S)						Intertidal survey
Documented losses (DL)			**Vessel Type**								
DL_001	A quantity of wreckage was reportedly washed ashore near Peterhead in January 1786.	18th century	Unknown	572789.6	6376362.9			NK14NW0356			HER data
DL_002	Part of the stern of a 'foreign schooner' was washed ashore North of Peterhead on the 15th March 1833. Canmore record (291520) for the same wreck lies onshore, beyond the study area.	19th century	Schooner	571771.1	6376927.9			NK14NW0296			HER data
DL_003	It was reported on the 3rd January 1861 that a name-board, with 'FANNY NICHOLSON' written on it, was picked up at Scotstown Head.	19th century	Unknown	571731.9	6380267.8			NK15SW0068			HER data

MSDS ID	Description	Period		Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
DL_004	It was reported that on the 13th April 1856, a board with OLIVIA written on it in gilt letters, with a laurel branch, supposed to be a head-board, and a capstan of oak, painted green, were driven on shore between Peterhead and Rattray Head	19th century	Unknown	571733.3	6380167.8			NK15SW0054			HER data
DL_005	It was reported on the 15th April 1856 that a head-board, marked 'SIR WM. PULTENEY', measuring six feet six inches in length, and six inches in breadth, been found 16 miles to the North of Aberdeen.	19th century	Unknown	571732.5	6380227.8			NK15SW0065			HER data
DL_006	The after-part of the maindeck of a large ship, apparently the American-built RESOLUTE, was washed on shore at Buchanhaven on the 21st December 1860.	19th century	Unknown	572744	6375382			NK14NW0275			HER data
DL_007	The after-part of the maindeck of a large ship, apparently the American-built RESOLUTE, was washed on shore at Buchanhaven on the 21st December 1860. Canmore position	19th century	Unknown	572704.6	6375341.5		275991				Canmore
DL_008	Wreckage was reportedly washed ashore at this location on the 2nd December 1860. No further information.	19th century	Unknown	571732.2	6380247.8			NK15SW0066			HER data
DL_009	It was reported on the 15th April 1856 that a quarter-board, with 'YORK' written on it was found 16 miles to the North of Aberdeen.	19th century	Unknown	571732.7	6380207.8			NK15SW0064			HER data
DL_010	Wreckage and barrels of tar were washed ashore at Peterhead on the 10th January 1848.	19th century	Unknown	572790.2	6376322.9			NK14NW0331			HER data
DL_011	Wreckage was reportedly washed ashore at Scotstown Head on the 22nd January 1862.	19th century	Unknown	571731.6	6380287.8			NK15SW0070			HER data

MSDS ID	Description	Period		Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
DL_012	Wreckage was reportedly washed ashore at Scotstown Head on the 22nd January 1862. Canmore position	19th century	Unknown	571739.8	6379727.9		327158				Canmore
DL_013	Wreckage was picked up off Peterhead on the 25th January 1851.	19th century	Unknown	572790.7	6376282.9			NK14NW0299			HER data
DL_014	It was reported on the 7th March 1864 that the stern of a boat had been picked up near Montrose, marked 'WARE, of Peterhead, Alexander Taylor, master'. The WARE had last been seen off Aberdeen two hours before a great storm on the 13th February 1864	19th century	Unknown	572791	6376262.9			NK14NW0284			HER data
DL_015	A vessel's name board, with the name 'CABRAL' cut in and painted yellow on a dark ground, was picked up on the 27th November 1875 about three miles North of Peterhead.	19th century	Unknown	571733	6380187.8			NK15SW0056			HER data
DL_016	It was reported that on the 13th April 1856, between 15 and 20 battens, some deals, and a board, supposed the front part of a top, with MINERVA written on it in gilt letters, were driven on shore between Peterhead and Rattray Head,	19th century	Unknown	571733.6	6380147.8			NK15SW0053			HER data
DL_017	A small boat, with 'LE LION' on the stern, was washed ashore near Peterhead on the 13th January 1854.	19th century	Small vessel	572791.3	6376242.9			NK14NW0277			HER data
DL_018	Loss of an unknown vessel in 1851 indicated by 'Coffin Furniture' picked up off Peterhead	19th century	Unknown	574777.9	6377172.3		327437				Canmore
DL_019	A barque, under Captain Morisone, was stranded at Scotstown Head in January 1707. Canmore position	18th century	Barque	571739.8	6379727.9		326985				Canmore

MSDS ID	Description	Period		Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
DL_020	A barque, under Captain Morisone, was stranded at Scotstown Head in January 1707.	18th century	Barque	571731	6379647.7			NK15SW0081			HER data
DL_021	The snow MARTHA AND MARY, under Captain Robson, carrying a cargo of flax, hemp and iron bars, was wrecked at Scotstown Head on the 6th February 1760.	18th century	Snow - carrying cargo	571773.9	6380128.4			NK15SW0086			HER data
DL_022	The snow MARTHA AND MARY, under Captain Robson, carrying a cargo of flax, hemp and iron bars, was wrecked at Scotstown Head on the 6th February 1760.	18th century	Snow - carrying cargo	571636.9	6379926.4		291459				Canmore
DL_023	The ST PETER, carrying a cargo of deals and iron, was stranded at Scotstown Head on the 20th December 1753.	18th century	Unknown - carrying cargo	571731.3	6379627.7			NK15SW0080			HER data
DL_024	The KATHARINE, under Captain Young, carrying a cargo of paving stones, was wrecked on Outers of Scotstown on the 4th November 1772.	18th century	Unknown - carrying cargo	571730.1	6379707.7			NK15SW0084			HER data
DL_025	The SUN, under Captain Pander, carrying a cargo of staves and timber, was stranded on St Fergus Sands on the 17th January 1728.	18th century	Unknown - carrying cargo	571433.7	6380143.4			NK15SW0076			HER data
DL_026	A Danish-built vessel was reportedly wrecked near Peterhead in March 1786.	18th century	Unknown	572789.9	6376342.9			NK14NW0355			HER data
DL_027	A vessel was driven ashore on rocks near Peterhead in November 1745 while being chased by the privateer SALTASH.	18th century	Unknown	572790.4	6376302.9			NK14NW0325			HER data
DL_028	The ELEONORA, under Captain English, was wrecked at Scotstown on the 6th April 1794.	18th century	Unknown	571432.8	6380203.4			NK15SW0079			HER data
DL_029	Documented loss: The schooner ELISE, with a crew of 4 under Captain and Owner J. Zobel, carrying a cargo of oil cake from St Petersburg to Liverpool, was stranded on Scotstown Head	19th century	Schooner	571737.2	6379227.8			NK15SW0036			HER data

MSDS ID	Description	Period		Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
	on the 23rd October 1883. Canmore record (206827) for the same wreck lies onshore, beyond the study area.										
DL_030	Documented loss: The schooner DARLING was stranded and wrecked on a sandy beach 4 miles from Peterhead on the 1st November 1859.	19th century	Schooner	571433.4	6380163.4			NK15SW0077			HER data
DL_031	The schooner LADY ABERCROMBY, with a crew of 4, carrying cargo of herrings, foundered and was lost with all hands on the 3rd October 1860 off Scotstown Head.	19th century	Schooner carrying herring cargo	571738.1	6379167.8			NK15SW0033			HER data
DL_032	The schooner SARAH, under Captain Waatman, travelling from Seaham to Nairn, was stranded at Scotstown Head on the 13th September 1862.	19th century	Schooner	571731.9	6379587.7			NK15SW0071			HER data
DL_033	The schooner FRIENDS, under Captain Short, travelling from the Forth to Peterhead, was stranded on Scotstown Head on the 18th March 1861.	19th century	Schooner	571732.2	6379567.7			NK15SW0069			HER data
DL_034	The schooner MELLEDGAN, with a crew of 5 under Captain and Owner J. B. Jewitt, travelling from Burghead to Sunderland, in ballast, was stranded at Scotstown Head on the 4th April 1877.	19th century	Schooner	571737.8	6379187.8			NK15SW0034			HER data
DL_035	The schooner GAZELLE, with a crew of 5 men under Captain J. Reid, carrying a cargo of coal from Sunderland to Inverness, was stranded on Scotstown Head on the 15th March 1893.	19th century	Schooner	571736.6	6379267.8			NK15SW0040			HER data
DL_036	The schooner DARLING, under Captain Wilson, carrying a cargo of pit-props from Nairn to Sunderland or Newcastle, was stranded and wrecked on a sand beach four miles from	19th century	Schooner	572791.6	6376222.9			NK14NW0274			HER data

MSDS ID	Description	Period		Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
	Peterhead on the 1st November 1859. Four of the crew, and the cargo, were saved										
DL_037	The schooner SWIFT, with a crew of 4 men under Captain T. B. Robinson, carrying a cargo of oats and two passengers from Banff to Leith, was stranded on a reef off Scotstown Head on the 15th January 1896. The two passengers and four crew were lost.	19th century	Schooner	571736.3	6379287.8			NK15SW0041			HER data
DL_038	The schooner DUNROBIN, under Captain Morrison, travelling from Newcastle to Dingwall, was wrecked at Scotstown Head on the 28th October 1868.	19th century	Schooner	571733.4	6379487.7			NK15SW0061			HER data
DL_039	The schooner JANE, under Captain Spence, carrying cargo from Leith to Cromarty, was stranded on Kirkton Head on the 4th February 1857. The crew and part of the materials were saved.	19th century	Schooner	571762.2	6378208			NK15SW0059			HER data
DL_040	The schooner JANE, under Captain Spence, carrying cargo from Leith to Cromarty, was stranded on Kirkton Head on the 4th February 1857. The crew and part of the materials were saved.	19th century	Schooner	571763.4	6378128		273803				Canmore
DL_041	The brig MAGNET, under Captain Davidson, in ballast, was wrecked 3 miles North of Peterhead on the 9th January 1820.	19th century	Brig	571763.4	6378128		206219	NK15SW0031			HER data
DL_042	The brig HENRY, under Captain Wilson, carrying a cargo of slates, was driven ashore at Kirkton Head on the 29th November 1832.	19th century	Brig	571761.6	6378248			NK15SW0088			HER data
DL_043	The brig HENRY, under Captain Wilson, carrying a cargo of slates, was driven ashore at Kirkton Head on the 29th November 1832. Canmore position	19th century	Brig	571763.4	6378128		291502				Canmore

MSDS ID	Description	Period		Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
DL_044	The brig HENRY, under Captain Wilson, carrying a cargo of slates, was driven ashore at Kirkton Head on the 29th November 1832. Canmore position (#2)	19th century	Brig	572383.4	6378137.1		326841				Canmore
DL_045	The brig ALBION was abandoned off Peterhead in a sinking state during the night of the 27th December 1852. The crew were saved.	19th century	Brig	572792.2	6376182.9			NK14NW0267			HER data
DL_046	The brig ALBION was abandoned off Peterhead in a sinking state during the night of the 27th December 1852. The crew were saved. Canmore position	19th century	Brig	571763.4	6378128		206486				Canmore
DL_047	The brig EDWARD, under Captain Smith, carrying a cargo of tobacco from Virginia to Leith, was wrecked at Kirkton Head, 4 miles north of Peterhead, on the 22nd September 1822. The crew were saved.	19th century	Brig	571762.5	6378188			NK15SW0058			HER data
DL_048	The brig EDWARD, under Captain Smith, carrying a cargo of tobacco from Virginia to Leith, was wrecked at Kirkton Head, 4 miles north of Peterhead, on the 22nd September 1822. The crew were saved. Canmore position	19th century	Brig	571763.4	6378128		268836				Canmore
DL_049	The brig ROSE, under Captain Ostrick, carrying a cargo of coal from Shields to Cromarty, was stranded at Scotstown Head on the 30th November 1815. The crew and materials were saved.	19th century	Brig	571733.7	6379467.7			NK15SW0057			HER data
DL_050	The German brig STAATSRATH VON BROCK, with a crew of 9 men under Captain H. Zander, carrying a cargo of timber from Danzig (Gdansk) to Peterhead, was stranded circa 0.5 miles north of Scotston Head on the 8th January 1889.	19th century	Brig	571736.9	6379247.8			NK15SW0037			HER data

MSDS ID	Description	Period		Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
DL_051	A brig was wrecked on Craigewan Rock, near Peterhead, in January 1849.	19th century	Brig	571971.4	6376230.8			NK14NW0264			HER data
DL_052	The brig HELEN, under Captain Boyd, carrying a cargo of tar, was wrecked at Scotstown Head on the 13th October 1815.	19th century	Brig	571753.9	6380128.1			NK15SW0085			HER data
DL_053	The brig HELEN, under Captain Boyd, carrying a cargo of tar, was wrecked at Scotstown Head on the 13th October 1815. Canmore position	19th century	Brig	571636.9	6379926.4		291456				Canmore
DL_054	The brig HELEN, under Captain Boyd, carrying a cargo of tar, was wrecked at Scotstown Head on the 13th October 1815. Canmore position (#2)	19th century	Brig	571739.8	6379727.9		326277				Canmore
DL_055	Documented loss of a 19th century Brig	19th century	Brig	571991.4	6376231.1		275871				Canmore
DL_056	Brig, lost on Craig Ewan Rock in 1849	19th century	Brig	572416.2	6375907.3		328253				Canmore
DL_057	A brig, in ballast, was stranded between Boddam and Cruden Bay on the 9th January 1803. No further information.	19th century	Brig	572788.4	6376442.9			NK14NW0382			HER data
DL_058	The sloop FORTH, travelling from Sunderland to Sheerness, was wrecked between Kirkton Head and Scotstown Head on the 26th October 1838.	19th century	Sloop	571733.9	6380127.8			NK15SW0060			HER data
DL_059	The sloop FORTH, travelling from Sunderland to Sheerness, was wrecked between Kirkton Head and Scotstown Head on the 26th October 1838. Canmore position	19th century	Sloop	571636.9	6379926.4		274667				Canmore
DL_060	The sloop ST. GEORGE, under Captain Dewar, carrying a cargo of wood from Inverness, was stranded at Scotstown Head on the 17th December 1819. The crew were saved.	19th century	Sloop	571756.1	6379978.2			NK15SW0095			HER data

MSDS ID	Description	Period		Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
DL_061	The sloop ST. GEORGE, under Captain Dewar, carrying a cargo of wood from Inverness, was stranded at Scotstown Head on the 17th December 1819. The crew were saved. Canmore position	19th century	Sloop	571739.8	6379727.9		206218				Canmore
DL_062	Lord Fife, a 19th century Sloop, was found upside-down and towed to port. Capt. Watson	19th century	Sloop	571739.8	6379727.9		326872				Canmore
DL_063	Sloop, Bridport, lost in 1800. Stranded 2 miles north of Peterhead. Capt. Ellis	19th century	Sloop	571778.1	6377128.1		326833				Canmore
DL_064	The Norwegian barque HYACK, with a crew of 10 under Captain and Owner S. Lassen, Langesund, carrying a cargo of coal from Sunderland to Christiania, was stranded 2 miles N of Scotstown Head on the 22nd October 1875. The crew were rescued.	19th century	Barque	571734.2	6379427.7			NK15SW0051			HER data
DL_065	On the 22nd October 1875, a large German barque, thought to have been the MEMEL, was reportedly wrecked at Blackwater, 4 miles S of Rattray Head, and her crew of 10 were rescued.	19th century	Barque	571734.2	6380107.8			NK15SW0052			HER data
DL_066	The Norwegian barque FORTUNA, with a crew of 10 under Captain G. Reiersen, travelling from Arendal to Aberdeen in ballast, was stranded near Scotstown Head on the 15th October 1882. The crew were saved.	19th century	Barque	571737.5	6379207.8			NK15SW0035			HER data
DL_067	The barque ALBION, under Captain Dade, carrying a cargo of timber, was wrecked at Kirkton Head on the 19th November 1871.	19th century	Barque	571761.9	6378228			NK15SW0073			HER data
DL_068	The smack EAGLE, carrying a cargo of fish from Faroe to Grimsby, was stranded on the 3rd September 1869 on Scotstown head. The crew were saved.	19th century	Smack	571732.5	6379547.7			NK15SW0067			HER data

MSDS ID	Description	Period		Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
DL_069	The smack BANFFSHIRE, under Captain Watson, travelling from London to Banff, was stranded at Scotstown Head the 8th April 1831.	19th century	Smack	571738.4	6379147.8			NK15SW0032			HER data
DL_070	A Pilot Boat was wrecked near Peterhead on the 30th April 1854. No further information.	19th century	Pilot boat	572789.3	6376382.9			NK14NW0372			HER data
DL_071	A pilot boat was upset off Peterhead on the 27th June 1835, with the loss of five of the crew.	19th century	Pilot boat	574777.9	6377172.3		291525	NK14NE0026			HER data
DL_072	The galliot HARMANNA (or HERMANNE), under Captain Eefting, carrying a cargo of bones, was stranded at Scotstown Head on the 1st April 1859.	19th century	Galliot - cargo vessel	571732.8	6379527.7			NK15SW0063			HER data
DL_073	The ketch NILE, with a crew of 4 men under Captain A. Hansen, carrying a cargo of potatoes from Invergordon to West Hartlepool, was stranded about 4 miles S of Rattray Head on the 25th January 1890.	19th century	Ketch	571766.4	6377928		206949	NK14NW0378			HER data
DL_074	The iron paddle steamship HAMBURG, with a crew of 30 under Captain Hugh Geddes, carrying a cargo of livestock and three passengers from Kirkwall to Aberdeen, was stranded, and later wrecked, at Scotstown Head, about 3 miles north of Peterhead on the 12th October 1862	19th century	Iron paddle steamer	571734.5	6379407.7			NK15SW0050			HER data
DL_075	The steam trawler CRAIG GOWAN (registration A779), with a crew of 8 men under Captain J. Morrice, fishing out of Aberdeen, in ballast, was stranded at Scotstown Head on the 12th November 1896.	19th century	Steam trawler	571736	6379307.8			NK15SW0042			HER data

MSDS ID	Description	Period		Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
DL_076	The full-rigged ship BERRY CASTLE, under Captain Pratt, carrying a cargo of timber from Miramichi to Aberdeen, was stranded at Scotstown Head on the 5th November 1817.	19th century	Full rigged ship carrying cargo	571738.7	6379127.8			NK15SW0030			HER data
DL_077	The HOPE, under Captain Cormack, was stranded at Scotstown Head on the 24th November 1805.	19th century	Unknown	571730.4	6379687.7			NK15SW0083			HER data
DL_078	The GOLDFINDER, under Captain Jackson, travelling from Newcastle to Dublin, was wrecked at Scotstown Head on the 26th March 1863.	19th century	Unknown	571731.6	6379607.7			NK15SW0072			HER data
DL_079	The LIZARD, under Captain Palmer, carrying a cargo of coal from Sunderland to Newburgh, was wrecked at the mouth of the River Ugie on the 25th October 1808.	19th century	Unknown	572299.6	6375675.5			NK14NW0126			HER data
DL_080	The LIZARD, under Captain Palmer, carrying a cargo of coal from Sunderland to Newburgh, was wrecked at the mouth of the River Ugie on the 25th October 1808. Canmore position.	19th century	Unknown	572103.2	6375432.6		206021				Canmore
DL_081	Six vessels were reported to have been lost near Peterhead on the 10th January 1849. The crews of two of them were lost.	19th century	Unknown	572792.8	6376142.9			NK14NW0263			HER data
DL_082	The ELIZABETH is presumed to have foundered between Rattray Head and Boddam in December 1860, as wreckage washed ashore at this location.	19th century	Unknown	579748.1	6379245.9		291475	NK25SW0001			HER data
DL_083	The PALLAS, under Captain Green, bound to Saint John, New Brunswick, was totally lost on the 15th April 1857 at Little Menan. The crew were saved.	19th century	Unknown	572791.9	6376202.9			NK14NW0270			HER data

MSDS ID	Description	Period		Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
DL_084	The JOHN was wrecked near Peterhead on the 5th November 1834.	19th century	Unknown	572789	6376402.9			NK14NW0373			HER data
DL_085	The CONFIDENCE, under Captain Petersen, carrying a cargo of staves and battens from Porsgrund to Fraserburgh, struck on Scotstown Head on the 2nd September 1875, and, when the tide rose, drifted over the rocks on to the beach with loss of rudder	19th century	Unknown	571733.9	6379447.7			NK15SW0055			HER data
DL_086	The HARRISON CHILTON, under Captain McGregor, travelling from Sunderland to Quebec, was driven ashore on Scotstown Head on the 6th August 1841. She was later got off and taken in to Peterhead harbour.	19th century	Unknown	571733.1	6379507.7			NK15SW0062			HER data
DL_087	The ANN AND ELIZA, of Sunderland, under Captain Cogle, travelling from Glasgow to Stettin, left Fraserburgh on the 5th September 1850 after repairing damage sustained in having been ashore on Cairnbulg Point but she sprang a leak and foundered	19th century	Unknown	572792.5	6376162.9			NK14NW0265			HER data
DL_088	The WILLIAM AND MARION foundered off Peterhead on the 10th July 1855.	19th century	Unknown	589777	6377393.5		291527	NK34NW0003			HER data
DL_089	A fishing vessel was stranded near Peterhead on the 3rd July 1941. No further information.	20th century	Fishing vessel	572788.7	6376422.9			NK14NW0374			HER data
DL_090	The wooden steam drifter GEM (registration number cited as BF 313), fishing in the North Sea, sunk by gunfire from German submarine UC 33 (a UC II type submarine, under the command of Kptlt. Martin Schelle) 18 miles ExS from Rattray Head on the 29th June 1917.	20th century (1917)	Wooden Steam Drifter	603673.3	6384599.7		208203	NK45NW0001			HER data
DL_091	The steam drifter MANX PRINCESS (registration number cited as SY 331), under Captain McIver, was stopped and sunk by	20th century (1917)	Steam drifter	603693	6384620			NK45NW0002			HER data

MSDS ID	Description	Period		Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
	gunfire from German submarine UC 33 (a UC II type submarine, under the command of Kptlt. Martin Schelle) 18 miles ExS from Rattray Head on the 29th June 1917. No casualties were reported.										
DL_092	The steam drifter MANX PRINCESS (registration number cited as SY 331), under Captain McIver, was stopped and sunk by gunfire from German submarine UC 33 (a UC II type submarine, under the command of Kptlt. Martin Schelle) 18 miles ExS from Rattray Head on the 29th June 1917. No casualties were reported. (Canmore position)	20th century (1917)	Steam drifter	603673.3	6384599.7		208205				Canmore
DL_093	Canmore position for the St Magnus. The Canmore position lies c. 185 m to the south-east of the UKHO position for the Muriel. The position may be the documented loss record for the St Magnus, now identified elsewhere (see above).	Modern (sunk 1917)	Armed steamship	575762.3	6377566.9		324646				Canmore
DL_094	A drifter, on tow, was abandoned and stranded 1.5 miles North of Peterhead on the 31st January 1946.	20th century	Drifter	571770.8	6376947.9			NK14NW0297			HER data
DL_095	A drifter, on tow, was abandoned and stranded 1.5 miles North of Peterhead on the 31st January 1946.	20th century	Drifter	571778.1	6377128.1		325279				Canmore
DL_096	On the 15th May 1911, the iron steam trawler SKOMER (A 194), in ballast, was in collision with the BARBADOS circa 7 miles ENE of Buchan Ness.	20th century	Iron steam trawler	585537.6	6376630.8		207488	NK24NE0001			HER data
DL_097	The steel steam trawler STRATHBRAN (registration A 536) was stranded 0.5 miles S of Scotstown Head on the 5th October 1924.	20th century	Steel steam trawler	571762.8	6378168			NK15SW0045			HER data

MSDS ID	Description	Period		Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
DL_098	The steel steam trawler STRATHBRAN (registration A 536) was stranded 0.5 miles S of Scotstown Head on the 5th October 1924.	20th century	Steel steam trawler	571763.4	6378128		208219				Canmore
DL_099	The steel steam trawler BEN NEVIS (registration A821),with a crew of 8 under Captain Rivett, in ballast, was stranded between Kirkton Head and Scotstown Head on the 15th February 1900.	20th century	Steel steam trawler	571748.7	6379127.9		207242	NK15SW0043			HER data
DL_100	The steel steam trawler CRANSDALE (formerly named HARRY ROOS, registration A453) foundered under tow on the 21st January 1931 after being driven ashore near St Fergus.	20th century	Steel steam trawler	571735.7	6379327.8			NK15SW0046			HER data
DL_101	The steel steam trawler DANEARN (formerly named PELAGOS, registration A 395) was stranded between outer Scotstown Head and the beach on the 15th March 1942.	20th century	Steel steam trawler	571734.8	6379387.8			NK15SW0049			HER data
DL_102	The steel steam trawler STRUAN (formerly named WILLIAM COGSWELL, registration A718), under Captain Shepherd, was stranded off Scotstown Head, on Outers Reef, on the 18th January 1933.	20th century	Steel steam trawler	571735.4	6379347.8			NK15SW0047			HER data
DL_103	The steel steam trawler DEESIDE (A 397), in ballast, was stranded at Craigewan Rock on the 21st January 1917.	20th century	Steel steam trawler	571991.1	6376251.1			NK14NW0303			HER data
DL_104	The steel steam trawler DEESIDE (A 397), in ballast, was stranded at Craigewan Rock on the 21st January 1917. Canmore position	20th century	Steel steam trawler	571991.4	6376231.1		291547				Canmore
DL_105	The steel steam trawler SUZETTE (A 346) (formerly named as EDWARD GREY) was stranded one mile North of Peterhead, on Girdle Reef, on the 11th July 1941.	20th century	Steel steam trawler	572040.8	6376271.8			NK14NW0186			HER data

MSDS ID	Description	Period		Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
DL_106	The steel steam trawler SUZETTE (A 346) (formerly named as EDWARD GREY) was stranded one mile North of Peterhead, on Girdle Reef, on the 11th July 1941.	20th century	Steel steam trawler	571792.9	6376128.1		208496				Canmore
DL_107	The steel steam trawler LOCH TAY (registration A888), in ballast, under Captain Fitzpatrick, was stranded off Kirkton Head on the 21st March 1905.	20th century	Steel steam trawler	571763.1	6378148			NK15SW0044			HER data
DL_108	The steel steam trawler LOCH TAY (registration A888), in ballast, under Captain Fitzpatrick, was stranded off Kirkton Head on the 21st March 1905. Canmore position	20th century	Steel steam trawler	571763.4	6378128		207413				Canmore
DL_109	The Danish steam trawler LORD NELSON, in ballast, was in collision with the NORTHMAN somewhere between Peterhead and Rattray Head on the 22nd November 1911.	20th century	Steam trawler	579747.8	6379265.9			NK25SW0002			HER data
DL_110	The Danish steam trawler LORD NELSON, in ballast, was in collision with the NORTHMAN somewhere between Peterhead and Rattray Head on the 22nd November 1911. Canmore position	20th century	Steam trawler	579748.1	6379245.9		207491				Canmore
DL_111	The steam trawler BALNAGASK was stranded at Scotstown Head on the 19th December 1961.	20th century	Steam trawler	571730.7	6379667.7			NK15SW0082			HER data
DL_112	The steam trawler PORT JACKSON (registration A 222), under Captain Bavidge, was stranded at Scotstown Head on the 24th August 1935.	20th century	Stream trawler	571735.1	6379367.8			NK15SW0048			HER data
DL_113	The steel trawler RENAISSANCE (formerly named as JOHN H IRVINE), carrying a cargo of fish, was stranded on Craigewan Rock, about 0.5 mile northeast of the mouth of the River Ugie, on the 25th March 1928.	20th century	Steel trawler	571991.4	6376231.1		208258	NK14NW0185			HER data

MSDS ID	Description	Period		Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
DL_114	The Motor Fishing Vessel OCEAN HERALD II, under Captain Patient, was stranded near St Fergus on the 28th January 1984.	20th century	Motor Fishing Vessel	571433.9	6380123.4			NK15SW0075			HER data
DL_115	The wooden lugger ELIZABETH REID (registration number cited as PD 106), in ballast, burnt whilst laid-up at the River Ugie on the 30th November 1902.	20th century	Wooden lugger	572299.3	6375695.5			NK14NW0302			HER data
DL_116	The wooden lugger ELIZABETH REID (registration number cited as PD 106), in ballast, burnt whilst laid-up at the River Ugie on the 30th November 1902.	20th century	Wooden lugger	572101.7	6375532.6		291542				Canmore
DL_117	Eliza Jane, 20th century lugger lost at the river Ugie. May be the same as the Elizabeth Reid.	20th century	Lugger	572101.7	6375532.6		291543				Canmore
DL_118	The yacht AMBROSIA was wrecked at St Fergus on the 8th October 1993.	20th century	Yacht	571433.1	6380183.4			NK15SW0078			HER data
DL_119	The iron steamship TRIESTE (formerly named as DAISY MORRIS), carrying a cargo of coal, was stranded on Girdle Shoal, 0.75 mile north of Peterhead, on the 16th July 1918.	20th century	Iron steamship	572041.1	6376251.8			NK14NW0181			HER data
DL_120	The iron steamship TRIESTE (formerly named as DAISY MORRIS), carrying a cargo of coal, was stranded on Girdle Shoal, 0.75 mile north of Peterhead, on the 16th July 1918. Canmore position	20th century	Iron steamship	571792.9	6376128.1		208211				Canmore
DL_121	The steel steamship PRINCESS MARY, under Captain Kerr, carrying a general cargo, was stranded 0.5 mile North of Peterhead on the 30th May 1908.	20th century	Steel steamship	571792.9	6376128.1		207442				Canmore
DL_122	The steel steamship PRINCESS MARY, under Captain Kerr, carrying a general cargo, was	20th century	Steel steamship	572041.4	6376231.8			NK14NW0172			HER data

MSDS ID	Description	Period		Eastings	Northings	HES ID	Canmore ID	HER ID	UKHO ID	Geophysical ID	Position taken from
	stranded 0.5 mile North of Peterhead on the 30th May 1908.										
DL_123	The steel steamship ELNA (formerly named as DAN F HANLON) was lost off Rattray Head on the 27th December 1943. May be same as record NK55NE0001.	20th century	Steel steamship	600974.9	6384459.9		291879	NK45NW0003			HER data
DL_124	The steel steamship ST FERGUS was in collision with the FIDRA on the 31st December 1940 and sank off Rattray Head.	20th century	Steel steamship	581748	6379275.4		208451	NK25SW0003			HER data
DL_125	A barge was seen adrift off Buchan Ness, bearing SW, Rattray Head bearing NWxW on the 11th December 1919. Presumed to have sunk in this area. No further information.	20th century	Barge	588703.4	6382378.5		291434	NK25SE0004			HER data
DL_126	The salvage steamer WRANGLER (formerly named as PENHOET and FIVES LILLE) sank one mile North of Peterhead after being driven ashore on the 6th October 1941. She was later refloated.	20th century	Salvage steamer	573794.2	6376057.6		325255				Canmore
DL_127	The salvage steamer WRANGLER (formerly named as PENHOET and FIVES LILLE) sank one mile North of Peterhead after being driven ashore on the 6th October 1941. She was later refloated. Canmore position	20th century	Salvage steamer	572661.7	6375540.9			NK14NW0187			HER data
DL_128	A wreck was reported in this general area on the 15th January 1937.	20th century	Unknown	571731.3	6380307.8			NK15SW0087			HER data