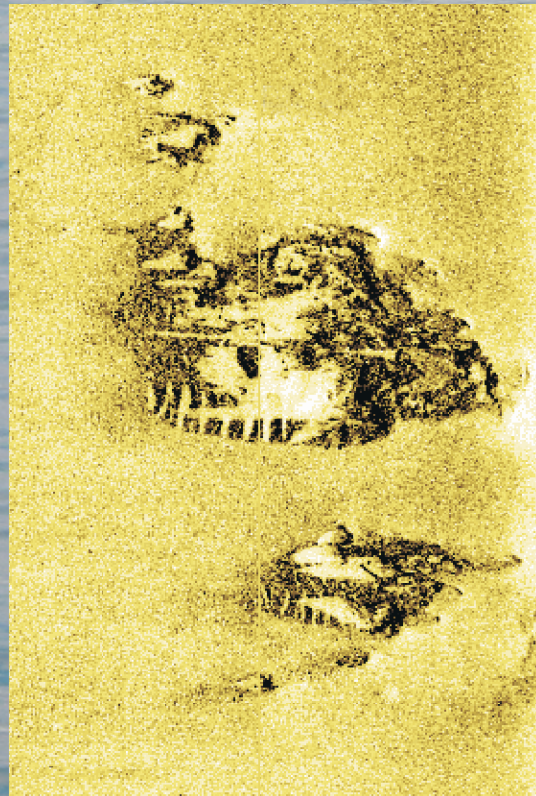




Teesside Offshore Wind Farm

Archaeological Assessment of Geophysical Data



TEESSIDE OFFSHORE WIND FARM

Archaeological Assessment of Geophysical Data

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TEESSIDE OFFSHORE WIND FARM

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Summary

Wessex Archaeology was commissioned by Entec UK Ltd on behalf of Teesside Windfarm Ltd to carry out an archaeological assessment of geophysical data as part of evaluation works prior to the construction of the Teesside offshore wind farm. The geophysical data consisted of sidescan sonar acquired by Pelorus Surveys during December 2009.

This assessment focussed on the potential for the remains of maritime craft or aircraft of cultural heritage importance to be present within the footprint of the proposed scheme.

A total of 82 sidescan sonar anomalies of potential archaeological interest were observed across the survey area. The majority of these anomalies were flagged as being of potential archaeological interest, as they could not be definitively identified as of anthropogenic origin, and thus could represent natural features. Six anomalies were identified as being sites of archaeological interest because their geophysical signature was more positively anthropogenic.

The geophysical anomalies of archaeological interest and previously known wreck sites are all located outside the areas directly affected by development (i.e. the turbine sites, and the inter-array and export cable routes). In addition, some of the charted wrecks were not identified within the sidescan survey data. However, it is recommended that the existing exclusion zones for the known wreck locations should be maintained, as a precautionary measure. Two geophysical anomalies identified as wrecks are located outside the existing exclusion zones of the wrecks they most likely represent. As a result, it is recommended that two new 100m exclusion zones are placed around these anomalies.

In addition to anomalies of archaeological interest, 157 anomalies of potential anthropogenic origin were identified. These latter features have not been subject to exclusion zones, however their nature will need to be further clarified if they will be impacted by the development.

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Sophie Thorogood and Patrick Dresch carried out this assessment and compiled this report with the assistance of David Howell and Dr Paul Baggaley. Kitty Brandon prepared the illustrations, and the project was managed for Wessex Archaeology by Steve Webster.

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1. BACKGROUND

1.1. INTRODUCTION

- 1.1.1. Wessex Archaeology was commissioned by Entec UK Ltd on behalf of Teesside Windfarm Ltd (EDF- Energy Renewables) to carry out an archaeological assessment of geophysical data acquired by Pelorus Surveys in 2009.
- 1.1.2. The proposed scheme involves the positioning of 27 wind turbines and associated cable infrastructure within Tees Bay, off Middlesbrough (**Figure 1**).
- 1.1.3. The Development Area is located 1.5km offshore from Coatham Sands, Redcar and Cleveland, and is delineated by the following co-ordinates:

Development Area	Easting	Northing
A	457859	526080
B	457460	526215
C	458475	526913
D	456031	528885
E	457426	530686
F	461293	527616

Table 1: Approximate co-ordinates of the Development Area (British National Grid)

1.2. AIMS AND OBJECTIVES

- 1.2.1. The aim of the archaeological assessment is to determine whether or not any sites of archaeological potential lie within the Development Area.
- 1.2.2. The objectives of the review of the geophysical data were as follows:
- To confirm the presence of any previously located marine sites and to comment on their apparent character; and
 - To identify, locate and characterise previously unrecorded sites.

2. METHODOLOGY

2.1. DATA SOURCES

- 2.1.1. Pelorus Surveys provided the sidescan sonar and bathymetry data from their investigation of the site in December 2009, all available lines of data were assessed.
- 2.1.2. BACTEC had previously conducted a magnetometer survey of part of the study area. The raw data from this survey was not provided but the results of their

interpretation were used and correlated with the results of the archaeological assessment of the data provided by Pelorus Surveys.

- 2.1.3. The sidescan sonar data were assessed for quality and were rated as 'Average' using the following criteria:

Data Quality	Description
Good	Data which are clear and unaffected by weather conditions or sea state. The dataset is suitable for the interpretation of standing and partially buried metal wrecks and their character and associated debris field. These data also provide the highest chance of identifying wooden wrecks and debris.
Average	Data which are affected by weather conditions and sea state to a slight or moderate degree. The dataset is suitable for the identification and partial interpretation of standing and partially buried metal wrecks, and the larger elements of their debris fields. Wooden wrecks may be visible in the data, but their identification as such is likely to be difficult.
Variable	This category contains datasets with the quality of individual lines ranging from good to average to below average. The dataset is suitable for the identification of standing and some partially buried metal wrecks. Detailed interpretation of the wrecks and debris field is likely to be problematic. Wooden wrecks are unlikely to be identified.

Table 2: Criteria for assigning data quality rating

- 2.1.4. Weather noise was a problem with the dataset, as was the shallow nature of the survey area. Lines were affected by noise in the water column, probably caused by both factors.
- 2.1.5. Manual fixed laybacks had to be applied during processing, as corrected navigation files were not supplied with the data. The layback values were estimated by Wessex Archaeology using features which could clearly be identified from multiple survey lines, as no survey logs were provided with the data set. Based on this, positional accuracy is deemed to be +/-10m.

2.2. GEOPHYSICAL DATA - TECHNICAL SPECIFICATIONS

Sidescan Sonar and Bathymetry

- 2.2.1. The sidescan sonar and bathymetric datasets assessed for this report were acquired by Pelorus Surveys between the 2nd December and the 9th December 2009.
- 2.2.2. Data was acquired by Pelorus Surveys using a GeoAcoustics 160 sidescan sonar system with a 159D dual frequency tow-fish operating at 410kHz. The survey was carried out using the survey vessel *Sea Cat*. Lines were surveyed at a range of 75m per channel, producing a swathe width of 150m. All files were saved in the format .cod, except the first which was in .sgy format.
- 2.2.3. The multibeam bathymetric survey was carried out using a GeoAcoustics GeoSwath Plus interferometric swathe echo sounder. The system was operated at a frequency of 250Hz with an across track resolution of 1.5cm. The achievable swathe width was in the order of 5 times the water depth, with data collected with 100% overlap.

- 2.2.4. For this assessment all positions were recorded and expressed in British National Grid.

Magnetometer

- 2.2.4. The magnetometer data were acquired by BACTEC between the 20th of June and the 15th of July 2008 using the survey vessel *MV Wenymarc*, operated by Eastern Marine Ltd.
- 2.2.5. A 7-sensor Geometrics G882a caesium vapour optically-pumped magnetometer array mounted on a rigid aluminium framework (BACTEC 2008). The 7 sensors were arranged on a cross boom of the survey frame at 1m intervals and were positioned approximately 1m above the skid which touched the sea-bed. Each pass surveyed a swath of 8m of the sea-floor. Data were recorded to a laptop PC using AGSProc software.
- 2.2.6. The magnetometer survey was limited to focused areas around selected turbines and cable routes. These included three 100m wide tracks between turbine bases 1-10, 11-20 and 21-30. The cable routes chosen were between turbine bases 5 and 15; 6 and 16; 15/16 and 25/26; 9 and 20; 10 and 20; 20 and 30; and 30 to shore (as close inshore as practical).
- 2.2.7. The magnetometer survey line spacing was 8m with typically 13 survey runs per turbine string.
- 2.2.8. For this assessment all positions were recorded and expressed in British National Grid

Multibeam Bathymetry

- 2.2.5. The multibeam bathymetric data were provided as a 1m gridded.XYZ file. This was used to produce a surface model with a 0.5m cell size.
- 2.2.6. The surface model derived from the bathymetric data was reviewed and compared to anomaly locations identified in the sidescan sonar survey.

2.3. GEOPHYSICAL DATA PROCESSING

Sidescan Sonar

- 2.3.1. The sidescan sonar data were processed by WA using Coda Geosurvey software. This allowed the data to be replayed with various gain settings in order to optimise the quality of the images. The data were initially scanned to give an understanding of the geological nature of the area and were then interpreted for any objects of possible anthropogenic origin: the position and dimensions of any such objects were recorded into a gazetteer and an image of each anomaly acquired.
- 2.3.2. The form, size and/or extent of an anomaly is a guide to its potential to be an anthropogenic feature, and therefore its archaeological interest. A single small but prominent anomaly may be part of a much more extensive feature that is largely buried. Similarly, a scatter of minor anomalies may define the edges of a buried but intact feature, or it may be all that remains as a result of past impacts from, for example, dredging or fishing. The application of a ratings system is therefore a means of prioritising sites in order to inform further stages of the interpretation process and on its own is not definitive.

Magnetometer

- 2.3.3. The magnetometer data were collected and processed by BACTEC International Ltd with the anomalies listed by BACTEC as mass of iron interpreted as causing the

anomaly rather than as nanoTeslas. The raw data was not assessed by Wessex Archaeology, and it is not possible to infer the likely archaeological potential of these magnetic anomalies from the mass of material alone.

- 2.3.4. All magnetic anomalies with a mass of less than 100kg were removed from the archaeological interpretation as they are likely to have been caused by magnetic anomalies of 5nT or less. Without being able to assess the raw data it is not possible to determine if these small anomalies were likely to have been caused noise or not. A total of 143 anomalies below 100kgs were removed from BACTEC's original assessment.

2.4. GEOPHYSICAL DATA - ANOMALY GROUPING AND DISCRIMINATION

- 2.4.1. The previous section describes the initial interpretation of all available geophysical data sets which were conducted independently of each other. This inevitably leads to the possibility of any one object being the cause of numerous anomalies in different data sets and apparently overstating the number of archaeological features in the study area.
- 2.4.2. To address this fact the anomalies were grouped together. This allows one ID number to be assigned to a single object for which there may be, for example, a UKHO record, a magnetic anomaly and multiple sidescan sonar anomalies.
- 2.4.3. Once all the geophysical anomalies had been grouped, a discrimination flag was added to the record in order discriminate against those which are not thought to be of an archaeological interest. These flags were ascribed as follows:

Non-Archaeological	U1	Not of anthropogenic origin
	U2	Known non-archaeological feature
	U3	Non-archaeological hazard
Archaeological	A1	Anthropogenic origin of archaeological interest
	A2	Uncertain origin of possible archaeological interest
	A3	Historic record of possible archaeological interest with no corresponding geophysical anomaly

Table 4: Criteria for discriminating relevance of feature to proposed scheme

- 2.4.4. All the sites that have been identified within the study areas are presented in **Appendix I** and discussed in this report. Recommendations have been made for mitigation measures should the sites be impacted by the proposed development scheme.
- 2.4.5. The grouping and discrimination of information at this stage is based on all available information and is not definitive. It allows for all features thought to be of archaeological interest to be highlighted while retaining all the information produced during the course of the geophysical interpretation for further evaluation should more information become available.

2.5. ARCHAEOLOGICAL BASELINE

- 2.5.1. Within the survey area the surface geological deposits comprise sand and gravel with some glacial clays and soft organic clay – the organic clay may have some archaeological value (Entec 2004: Chapter 19). These deposits overlay bedrock of the Mercia Mudstone Group, with some Redcar Mudstone in the very southeast of the area (Entec 2004: Chapter 19; BGS 1986). The survey area has the same geological background as the coast alongside; therefore the shallow sloping seabed

indicates that during the Palaeolithic and Mesolithic the Study Area would have been upon a coastal plain (2004: Chapter 19). A former channel has been discovered which runs roughly north-south through the survey area (2004: Chapter 19). This may contain remains of archaeological or environmental value (2004: Chapter 19).

- 2.5.2. Although there are no known wrecks within the footprint of the development, considerable shipping activity occurred in the area from the medieval period onwards, with Coatham and a port at Tees seeing trade with the northeast, Scandinavia, the Baltic ports and northern Europe (Entec 2004: Chapter 19). Therefore there is some potential for the discovery of new wrecks within the development area.

3. RESULTS

3.1. GEOPHYSICAL DATA ASSESSMENT

- 3.1.1. The results of this assessment are collated and detailed in **Appendix I** and illustrated in **Figure 2**.
- 3.1.2. The survey area, which is larger than the development area, contained records for 15 wrecks. When the development area was given a 200m buffer (the Study Area used for this assessment), records for 16 wrecks were present. These data were taken from the Environmental Statement produced by Entec Ltd (2004) and the Admiralty Chart for the area 'River Tyne to Flamborough Head' (1191). UKHO and NMR data was not accessed for this assessment and therefore cannot be commented upon directly.
- 3.1.3. A total of 82 sidescan sonar anomalies and 80 magnetic anomalies of possible archaeological interest were identified within the Study Area (**Figure 2**). In addition 12 wrecks recorded by the UKHO were not seen within this data set, but have been retained within the list due to their previous survey history. The total numbers of anomaly classifications are specified in **Tables 5** and **6**.

Archaeological Discrimination	Number of Anomalies	Interpretation
A1	6	Anomaly of anthropogenic origin, of probable archaeological interest
A2	155	Anomaly of uncertain origin, of possible archaeological interest
A3	12	Historic record of possible archaeological interest with no corresponding geophysical anomaly
Total	173	

Table 5: Number of anomalies rated by archaeological potential

Anomaly Classification	Number of Anomalies
Recorded Wreck / Obstruction	12
Wreck	4
Debris	16
Linear	8
Seafloor Disturbance	1
Dark Reflector	49
Bright Reflector	3
Magnetic	80
Total	173

Table 6: Number of anomalies presented by classification

Wrecks Identified within the Geophysical Data

- 3.1.4. Despite 15 wrecks being recorded in the survey area (Entec 2004: Figure 19.1), only four wrecks were noted during analysis of the sidescan data, and designated A1. These were **7019**, **7060**, **7081** and **7082** (Figures 3 and 4). Two features, **7079** and **7080** (Figure 5), were assigned the archaeological designation A1 (Anthropogenic origin of archaeological interest). The others were all given the archaeological designation A2 (Uncertain origin of possible archaeological interest), according to the scheme outlined in Table 4.
- 3.1.5. The four wrecks assigned designation A1, **7019**, **7060**, **7081** and **7082** (Figures 3 and 4) were not obvious features. All the wreck sites appeared to be partially buried (Figures 3 and 4) and sand waves were apparent throughout the survey area (Figure 4). Therefore it is possible that the UKHO wrecks that were not seen in this data set are buried.
- 3.1.6. Anomaly **7019** represents the wreck of the tug *Ida Duncan*. The anomaly lies 168m from the previously recorded location of the wreck (5604 from Entec Report 2004). This site is seen as a long curvilinear feature, ending in a section that is bowed in two locations, almost at right angles. This is visible in the sidescan data as a dark reflector without shadow. The midsection of this linear seems to have become buried, presumably with the rest of the surviving wreck. The anomaly is located within an area of seabed which appears to have experienced some disturbance. Small sand waves and dispersed geological features are noted within the wider area.
- 3.1.7. Anomaly **7060** is likely to represent all or part of the remains of the wreck *La Basiase* (*La Bastaise*) and lies 6m from the recorded location of the wreck (5612 from Entec Report 2004). This anomaly is visible as multiple areas of disturbed seafloor, which appears to be mounded. Two larger areas of disturbance can be identified, with three smaller areas surrounding them. Small sand waves are located around the disturbance and the wider area contains more sand waves. The surrounding area does not show evidence of seafloor disturbance.
- 3.1.8. Anomaly **7081** is probably the remains of the wreck *SS Harraton*, it lies 116m from the recorded location of the wreck (5609 from Entec Report 2004). This anomaly is seen as two areas of seafloor disturbance; one substantially larger than the other. These areas are visible as groups of small dark reflectors that cast long shadows. The surrounding seabed is mainly smooth, with some disturbance.
- 3.1.9. Anomaly **7082** is likely to be the wreck of the *Victory* and lies 44m from the known location of the wreck (5606 from Entec Report 2004). This anomaly is visible as a lighter area of seafloor than the surrounding seabed, with no visible structure. The

feature is an elongated shape, pointed at two ends. It is located within a large area of sand waves.

Additional A1 Anomalies

- 3.1.10. The other anomalies assigned designation A1, **7079** and **7080 (Figure 5)**, have obvious standing structures. These are anthropogenic debris and represent remains with archaeological potential, but of an unknown date.
- 3.1.11. Anomaly **7079** is a feature comprised of a number of dark reflectors. One feature is particularly distinct, while others are less so and appear to represent a series of linears. These linears form an irregular hexagonal shape, but lie in a variety of unorganised orientations. The whole anomaly has a large shadow. It is located within an area of smooth seabed with few geological features.
- 3.1.12. Anomaly **7080** is a large feature, comprising a number of linears visible as dark reflectors. The anomaly has a large shadow. It is roughly rectangular and appears to have a distinct outline, with internal linear features running along the length of the anomaly. From a different angle these internal linears appear to have no common orientation. The area surrounding is smooth seabed, with no nearby features.

A2 Anomalies

- 3.1.13. Although flagged as of potential archaeological interest, all A2 anomalies are point contacts without any visible structure, and are as likely to be large natural boulders as anthropogenic debris. The large number of similar, smaller contacts identified across the site and interpreted as natural features (SM Pelorus 2010:10), further indicates that this could be the case. Without accompanying magnetometer data, it is difficult to ascertain which of these contacts are more likely to be anthropogenic, and which are more likely to be 'natural/geological'.
- 3.1.14. Of possible interest are anomalies **7006**, **7051**, **7063** and **7076**. The position of these anomalies in relation to the nearest wreck records has been highlighted because they may represent debris detached during the wrecking process or, in the case of MV *Guildford* and *Afridi*, they may be candidates for the wreck sites. MV *Guildford* and *Afridi* are recorded as 'live' in the Environmental Statement (Entec 2004) but not seen in the data set assessed for this report, therefore there may be some doubt as to actual position of the wrecks.
- 3.1.15. Anomaly **7006** lies 340m southeast from the recorded location for the MV *Guildford* (**7084**). This feature comprises three short linear dark reflectors which run parallel to one another. The anomaly is located in an area of large sand waves and is orientated in opposition to the sand waves, therefore increasing the possibility that it may be anthropogenic in origin.
- 3.1.16. Anomaly **7051** is located 547m south of the recorded location of 5609, SS *Harraton* (**7081**). This anomaly takes the form of a group of dark reflectors. The small anomaly is located within a depression in the seafloor. A great many depressions are seen within the area, which implies a natural origin; however it is possible that the feature is debris from the wrecking of SS *Harraton*.
- 3.1.17. Anomaly **7063** is located 551m west of the recorded location of SS *Harraton* (**7081**) and 666m southwest of the location of record *Afridi* (**7089**). It has been classified as an area of disturbed seafloor. This is visible as two groups of small linear dark reflectors. These run in parallel from a main dark reflector, none of which cast a shadow (and are therefore not obviously upstanding). This anomaly is located in a smooth area of seabed containing dispersed geological features.

- 3.1.18. Anomaly **7076** is located within an area of UKHO wreck records (**7092** and **7094**) which relate to two wrecks, the names of which are not known. The anomaly is a linear feature, visible as a distinct dark reflector. An area of seafloor disturbance runs the length of the linear; this is tapered towards one end of the linear feature. The surrounding area is smooth seabed with some seafloor disturbance, rocky outcrops and dispersed geological features. Two small probable anthropogenic disturbances (**7074** and **7075**) are also located close by.

Magnetic Anomalies

- 3.1.19. The magnetometer survey was focused around the centre of the wider survey area and did not cover wreck locations listed by the UKHO. None of the magnetic anomalies identified by BACTEC with a mass of over 100kg were located within 40m of a sidescan sonar anomaly. Therefore as it has not been possible to group any magnetic anomalies with sidescan sonar anomalies, all of the magnetic anomalies have been given an archaeological discrimination of A2, defined as being of uncertain origin of possible archaeological interest. Without access to the raw data, higher resolution sidescan sonar data or ground truthing by diver or ROV survey it is not possible to provide a definitive interpretation of what may be causing these anomalies.
- 3.1.20. The magnetic anomalies are generally evenly distributed over the area surveyed. There area, however, several clusters of anomalies with high magnetic mass which may be of particular interest. The first of these clusters is near the centre of the survey area on the northern side. This is a group of eight anomalies with **7173** furthest to the south with the largest magnetic mass of 2692 kg. The cluster extends roughly 45m to the north with anomalies **7158**, **7159**, **7160**, **7161** and **7165** with masses between 500 and 1000kg. The remaining two anomalies in the cluster, **7150** and **7156**, have masses between 100 and 500kg.
- 3.1.21. Further to the north, along the same survey corridor, there is a second cluster of five anomalies spread out over an 85m area. The largest of these is **7167** with a mass of 877kg, located furthest to the south. The other four anomalies (**7112**, **7121**, **7138** and **7143**) all have masses between 100 and 500kg.
- 3.1.22. The next cluster is composed of three anomalies spread over a distance of roughly 30m. These are located on the southern side of the survey area with anomaly 7171 in the centre with a mass of 2315kg. The other two anomalies, 7095 and 7128, have masses between 100 and 500kg. There is a wider spread of eight anomalies, (**7098**, **7105**, **7111**, **7119**, **7124**, **7137**, **7140** and **7157**) extending 200m to the north west, all of which have masses between 100 and 500kg.
- 3.1.23. Further to the northwest there is another cluster of five anomalies spread out over 140m along the survey line. **7163** has the largest mass at 758kg while the other four anomalies (**7097**, **7104**, **7108** and **7152**) all have masses between 100 and 500kg. UKHO wreck **5595** is located to the southwest of this cluster, 108m from **7104**.
- 3.1.24. There is a spread of five magnetic anomalies over 140m on the survey line between sidescan sonar anomalies **7010** and **7013**. Among these, **7169** has the largest mass at 1362kg and is located roughly 43m southeast of **7013**. The next largest magnetic anomaly is **7164** with a mass of 767kg, located 48m northwest of **7010**. The remaining anomalies (**7096**, **7107** and **7120**) do not appear to be focused around a specific point and all have masses between 100 and 500kg.

- 3.1.25. The remaining high magnetic masses appear to be isolated anomalies. The largest of these is **7172** with a mass of 2389kg, located towards the southeast corner of the survey area. To the southwest of this, near the corner of the survey area is anomaly **7168** with a mass of 1085kg. The final anomaly with a mass over 500kg is **7166** located near the northwest limit of the area with a mass of 849kg. The remaining anomalies appear relatively evenly distributed and all have masses between 100 and 500kg.

4. IMPACT ASSESSMENT

4.1. DEVELOPMENT PROPOSALS

- 4.1.1. The proposed development scheme involves the erecting of 27 wind turbines, in a new offshore windfarm development. Inter-array cables will also be installed between the turbines. Associated export cables will link the wind farm to the electricity network in a subsequent phase; it is anticipated that these will make landfall at up to three locations.
- 4.1.2. The horizontal impact of erecting wind turbines on the seabed is expected to be fairly limited, though some seafloor disturbance away from the turbine foundations may be expected from the construction vessel(s) legs/anchors/etc. Cable laying will impact any features directly along the line of the cable routes, though typically this will only affect features within the upper 1.5m of the seabed sediments.

4.2. KNOWN AND POTENTIAL ARCHAEOLOGY

- 4.2.1. Four wrecks (**7019, 7060, 7081** and **7082**) and two other features of archaeological interest (**7079** and **7080**) have been noted in the sidescan data and designated A1. In addition there are 155 sonar and magnetic contacts of possible archaeological interest (designated A2) and 12 records for wrecks presented in the Environmental Statement (Entec Report 2004) but not seen in the geophysical data analysed for this report (designated A3).
- 4.2.2. In addition to the known wrecks, further vessels are likely to have been lost during the period since the inundation of the area during the Mesolithic (8,500-4,000 BC). Most currently unknown wrecks will be wooden. Survival of the organic hull elements of wooden wrecks (i.e. the largest part of such sites) requires burial in anaerobic conditions (i.e. within seabed sediments), therefore there is often little to see on the surface of the seabed for these sites. However, there is the potential for the movement of mobile sands within the survey area to uncover such wreck sites.

5. MITIGATION

- 5.1. Six sites (**7019, 7060, 7079, 7080, 7081** and **7082** all designated as A1) have been identified as being of anthropogenic origin and archaeological interest. None of the sites are located within the proposed turbine sites, or export cable areas.
- 5.2. The known wreck locations are subject to exclusion zones of 100m radius placed around them (WA 2011: Figure 1). It is recommended that these are maintained, even where wrecks were not identified during this assessment as the wrecks previously recorded by the UKHO may now be buried. Two of the four probable wrecks identified during this assessment fall well within existing exclusion zones (**7060** and **7082**); however it would be advisable to implement two new 100m

exclusion zones to protect site **7019** and **7081**, which lie away from the previously recorded positions for these wrecks. **Figure 9** presents the existing exclusion zones which should be maintained and the two new exclusions zones which are recommended.

- 5.3. The partially buried nature of the wrecks identified from geophysical analysis suggests the presence of ephemeral bed forms, such as sand waves. As these are capable of concealing large archaeological sites, such as the wrecks recorded by the UKHO but not seen in the data assessed for this report, a watching brief may be appropriate during the construction phase of the development (practically this could only happen during the pre-lay grapple run conducted in advance of cable laying).
- 5.4. 157 anomalies described in this report have been flagged as of potential archaeological interest (A2). Most of these sites lie too far from the scheme footprint to be of any concern; however six anomalies (**7010, 7011, 7013, 7014, 7035** and **7051**) lie within 50m of the inter-array cable routes. If these anomalies will be impacted by the scheme they will require further assessment in order to determine their nature. This might take the form of further, higher resolution, geophysics or diver/ROV survey.

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APPENDIX I: LIST OF GEOPHYSICAL ANOMALIES

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7002	Dark reflector	458679	527275	A2	3.9	0.4	0.0	-	-	A thin, elongated feature visible as a distinct dark reflector. This is located within an area of smooth seabed with few geological features. Alongside is located feature 6003.	6002	-
7003	Dark reflector	458632	527317	A2	1.5	3.1	0.0	-	-	A wide, elongated feature expressed as a dark reflector. This feature does not have a distinct outline, but is clearly visible. It lies within an area of smooth seafloor with few geological features. A similar feature 6002 is located nearby.	6003	-
7004	Dark reflector	458179	527396	A2	0.9	3.6	0.0	-	-	A linear feature visible as a dark reflector. This feature does not have a distinct outline and is quite pale. It lies in an area of smooth seabed, close to feature 6005.	6004	-
7005	Dark reflector	458161	527404	A2	0.9	1.5	0.0	-	-	A small, indistinct feature visible as a dark reflector. This is located within an area of smooth seabed and is close to feature 6004.	6005	-
7006	Debris	458168	527598	A2	6.0	14.9	0.0	-	-	Linear striations running parallel to one another, but in the opposite direction to the sand waves upon which they lie. These appear to form three distinct groups. This feature lies 340m southeast from the recorded location for the <i>MV Guildford</i> .	6006	5595 (from Entec Report 2004)
7007	Dark reflector	458221	527860	A2	3.4	2.7	0.0	-	-	A large, irregularly shaped feature, visible as an indistinct dark reflector. This may have a scour. This is located within an area of smooth seabed. Close by is located feature 6008.	6007	-
7008	Dark reflector	458247	527838	A2	2.5	2.5	0.0	-	-	A small, elongated feature visible as a dark reflector. It is surrounded by a lighter coloured area of seafloor. This is located within an area of smooth seabed. Feature 6007 is located nearby.	6008	-
7009	Dark reflector	457900	528155	A2	1.9	2.2	0.0	-	-	Small, round feature visible as a dark reflector in an area of smooth, undisturbed seabed.	6009	-

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7010	Dark reflector	457682	528129	A2	3.0	1.2	0.0	-	-	A solid dark reflector of circular shape with one pointed end and a distinct outline. This is located within an area of undisturbed seabed. Another dark reflector of smaller size 6011 is alongside.	6010	-
7011	Dark reflector	457679	528117	A2	2.2	1.5	0.0	-	-	A rounded dark reflector with an indistinct outline. This feature is located within an area of undisturbed seabed. Another feature 6010 lies close by.	6011	-
7012	Dark reflector	457538	528081	A2	0.9	2.6	0.0	-	-	A dark reflector representing a small feature with small, but distinct shadow. This is located within an area characterised by a smooth seafloor with few geological features.	6012	-
7013	Dark reflector	457520	528276	A2	3.9	2.7	0.0	-	-	A backward s-shaped dark reflector with a shadow, visible in an area of smooth seabed with few other features.	6013	-
7014	Dark reflector	457329	528428	A2	1.8	0.9	0.5	-	-	A small, almost circular solid dark reflector with a tall shadow. This is located within an area of smooth seabed with few other features.	6014	-
7015	Dark reflector	456849	528379	A2	3.2	2.9	0.0	-	-	A rounded feature, visible as a dark reflector. This has an unusual shape, with a rounded exterior and hollow interior, through which two small dark lines run. The feature lies within an area of smooth seabed. This feature is set apart from others, but located nearby are two features 6016 and 6017.	6015	-
7016	Dark reflector	456903	528403	A2	1.8	0.7	0.0	-	-	Small elongated feature visible as a dark reflector. This is located within an area of smooth seabed. Alongside is located another feature 6017.	6016	-
7017	Dark reflector	456919	528410	A2	2.1	2.3	0.0	-	-	A varied feature consisting of a linear element and elongated, rounded feature. These are visible as dark reflectors. The surrounding area is smooth seabed with some geological features. Close by lies feature 6016, a dark reflector.	6017	-

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7018	Dark reflector	456585	528500	A2	1.8	1.1	0.2	-	-	Small dark reflector with a distinct shadow. This feature lies within an area of naturally varied seabed, with a nearby rocky outcrop.	6018	-
7019	Wreck	456397	528625	A1	50.1	40.8	0.0	-	-	Wreck visible as a long curvilinear, ending in a section that is bowed in two locations, almost at right angles. This is visible as a dark reflector without shadow. The midsection of this linear seems to have become buried, presumably with the rest of the surviving wreck. This is located within an area of seabed which appears smooth, but also seems to have experienced some natural disturbance. Some small sand waves and dispersed geological features are noted within the wider area. Another similar linear 6021 is also located nearby, as is feature 6020. This lies 169m southeast of the tug <i>Ida Duncan</i> .	6019	5604 (from Entec Report 2004)
7020	Dark reflector	456439	528606	A2	2.3	1.4	0.2	-	-	Backward C-shaped dark reflector which forms a circular shadow within the data. The feature was located within an area of smooth seafloor, but which appeared disturbed, likely due to natural factors. Features 6021 and 6019 were located nearby and indicate an area of disturbance.	6020	-
7021	Linear	456354	528632	A2	2.8	9.0	0.0	-	-	Linear dark reflector with a slightly indistinct outline. This is visible in an area of smooth seabed, which appears disturbed by natural processes. Two similar linear features are located in the vicinity.	6021	-
7022	Dark reflector	456281	528873	A2	5.2	0.7	0.5	-	-	A thin, possibly almost right-angled feature visible as a dark reflector. This has a very distinct square shaped shadow. The feature is located within an area of varied seabed, with sand waves, striations and small geological features.	6022	-

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7023	Dark reflector	456255	528955	A2	3.4	0.9	0.3	-	-	Small, almost linear feature visible as a dark reflector. This feature has a distinct almost semi-circular shadow. The feature is located upon an area of sand waves, which characterise the wider area. Features 6024, 6025 and 6026 are located nearby, upon the same band of sand waves.	6023	-
7024	Bright reflector	456260	528962	A2	4.7	2.2	0.0	-	-	Irregularly shaped feature visible as a bright reflector. This feature is similar to the shadow of the nearby feature 6023; so may represent the shadow to a dark reflector which has not been noted. This feature is located within an area characterise by	6024	-
7025	Bright reflector	456263	528965	A2	2.0	1.3	0.0	-	-	Almost ovoid feature visible as a bright reflector. This feature is similar to the shadow cast by feature 6023; which suggests that this feature could be the shadow for a dark reflector which has not been noted. The area in which this feature is located is characterised by sand waves. It is located upon the same band of sand waves as features 6023, 6024 and 6026.	6025	-
7026	Bright reflector	456266	528964	A2	4.1	1.9	0.0	-	-	Irregularly shaped feature, visible as a bright reflector. This bright reflector is comparable to the shadow cast by the nearby feature 6023. Therefore this feature may represent the shadow cast by a dark reflector which has not been noted. It is located within an area of sand waves and the features 6023, 6024 and 6025 are all located upon the same band.	6026	-
7027	Dark reflector	456479	529046	A2	1.5	1.9	0.0	-	-	Elongated, narrow dark reflector in an area of smooth seabed. A similar feature 6028 lies parallel with this.	6027	-
7028	Dark reflector	456487	529038	A2	2.4	2.5	0.0	-	-	An elongated dark reflector in an area of smooth seafloor. A comparable feature 6027 lies in the vicinity and runs parallel, though it is shorter in length than this feature.	6028	-

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7029	Dark reflector	456584	529008	A2	3.3	5.4	0.0	-	-	An area of disturbed seabed, comprising small dark reflectors in a linear arrangement. The surrounding area contains small geological features. Feature 6030 is located nearby.	6029	-
7030	Linear	456630	528979	A2	13.1	4.2	0.0	-	-	Curvilinear dark reflector with a distinct outline and shadow. This feature is located within a wider area of smooth seafloor, but is immediately located upon a small band of disturbed seafloor. Feature 6029 is located nearby.	6030	-
7031	Dark reflector	456798	528892	A2	2.2	1.8	0.0	-	-	Dark reflector of open rounded shape with an internal feature. Similar features are located within the vicinity, but are of geological origin. This feature is differentiated by its comparative clarity.	6031	-
7032	Linear	456714	528905	A2	4.0	7.7	0.0	-	-	Fine linear dark reflector with a small shadow. The feature is comprised of two parts, indicating that the midsection is probably buried. This is located within a small area of discrete geological features which appear in a band within a wider area of smooth seafloor.	6032	-
7033	Dark reflector	456772	528702	A2	2.4	2.4	0.0	-	-	Two distinct linear dark reflectors running parallel to one another. These are located within a wider area of disturbed seafloor.	6033	-
7034	Dark reflector	456783	528704	A2	6.6	2.3	0.0	-	-	Clear, dark reflector distinctly visible in area of disturbed seafloor. Data is noisy in this area.	6034	-
7035	Dark reflector	456920	528640	A2	4.9	4.8	0.0	-	-	An area of disturbed seabed visible as a series of dark reflectors in a cross-hatched pattern. This is located within an area of varied seabed, with many geological features.	6035	-
7036	Dark reflector	456452	529286	A2	5.2	1.3	0.2	-	-	C-shaped feature visible as a distinct dark reflector, with a rounded shadow. Located upon a small band of sand waves, which are common within the surrounding area. Small geological features are also dispersed within the area.	6036	-

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7037	Dark reflector	456462	529324	A2	4.4	0.5	0.0	-	-	A short linear feature visible as a distinct dark reflector. This is located within an area of dispersed geological features.	6037	-
7038	Dark reflector	456486	529320	A2	4.9	2.8	0.0	-	-	A feature comprised of a series of small striations running in roughly the same direction. These are visible as dark reflectors. The area of seabed in which this is located is based upon a smooth background, but has many discrete areas of rocks and small sand waves.	6038	-
7039	Dark reflector	456507	529306	A2	3.4	2.7	0.0	-	-	Short linear visible as a dark reflector. This feature has not shadow and is located within an area with many small geological features.	6039	-
7040	Dark reflector	456567	529326	A2	3.4	1.4	0.6	-	-	Angular, thin feature visible as a dark reflector, with a distinct, rounded shadow. This is located within an area of varied seabed, with many features of geological origin nearby. Features 6041, 6043 and 6042 are located in the vicinity.	6040	-
7041	Dark reflector	456560	529330	A2	3.1	0.8	0.4	-	-	Angled, thin feature visible as a dark reflector with a distinct, ovoid shadow. This is located within an area of varied seabed containing rocky areas and many features of geological origin. Features 6040, 6043 and 6042 are located nearby.	6041	-
7042	Dark reflector	456558	529308	A2	0.1	0.7	0.6	-	-	Small v-shaped feature visible as a dark reflector. This has a long tapered shadow. It is located within an area of varied seafloor, with rocky areas and dispersed geological features. Similar features 6040, 6041 and 6043 are located nearby.	6042	-
7043	Dark reflector	456601	529326	A2	4.8	0.7	0.4	-	-	Angled, thin feature visible as a dark reflector. This has an almost square area of shadow. It is located within an area of varied seafloor with rocky areas and geological features. Similar features are located in the area 6040, 6041 and 6042).	6043	-

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7044	Dark reflector	456625	529288	A2	4.1	0.6	0.0	-	-	Fine striation, visible as a distinct dark reflector. Located within an area of small geological features and larger rocky outcrops.	6044	-
7045	Dark reflector	456710	529131	A2	3.1	2.0	0.0	-	-	Fine, curvilinear feature visible as a very distinct dark reflector. This is located within an area of smooth seabed with a dispersed band of rocks nearby.	6045	-
7046	Dark reflector	457037	529215	A2	4.8	2.3	0.0	-	-	An elongated, extended u-shaped feature, visible as a distinct dark reflector, with an internal lighter area. This is located within an area of smooth seabed. Some similar features, of geological origin, are located within the area.	6046	-
7047	Dark reflector	457353	528688	A2	1.5	4.6	0.0	-	-	Linear feature visible as a fine, indistinct dark reflector, possibly with a small shadow. This is located at the edge of a band of sand waves, and is orientated in opposition to the sand waves.	6047	-
7048	Dark reflector	458131	528258	A2	3.4	0.7	0.0	-	-	Small, fine curved feature visible as a distinct dark reflector. This feature is set within an area of smooth seabed.	6048	-
7049	Dark reflector	458648	528178	A2	6.7	0.9	0.0	-	-	A narrow elongated, almost linear feature, visible as a dark reflector. One end of the feature is very distinct, while the other is more ambiguous. This is located within an area of smooth seabed with few geological features.	6049	-
7050	Dark reflector	458518	528704	A2	0.8	0.3	0.2	-	-	Small, angled feature visible as a dark reflector. This casts an almost square shadow. It is located within a smooth area of seabed with no surrounding features.	6050	-
7051	Debris	458589	528768	A2	2.4	1.9	0.0	-	-	An irregular group of dark reflectors, with no, or a very small shadow. These are located within a natural depression in the seafloor. This feature is located 547m south of the recorded location of the <i>SS Harraton</i> .	6051	5609 (from Entec Report 2004)

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7052	Dark reflector	457910	528979	A2	3.6	1.2	0.0	-	-	Rectangular feature visible as a number of distinct dark reflectors. The feature has two parallel linears which are connected by a number of perpendicular linears (at top, bottom and through the centre section). A shadow is also seen. This feature is located within an area of varied seabed with a large rocky outcrop, bands of sand waves and sporadic natural debris.	6052	-
7053	Dark reflector	457683	528993	A2	3.5	1.1	0.1	-	-	A semi-circular shaped feature visible as a dark reflector. This has a similarly shaped semi-circular shadow. The area in which it is located has rocky outcrops and dispersed geological features.	6053	-
7054	Debris	457276	529454	A2	1.8	1.0	0.3	-	-	An irregularly shaped feature visible as a dark reflector. This has a circular shaped shadow. It is located within an area of smooth seabed, with nearby bands of sand waves and rocky outcrops.	6054	-
7055	Debris	457093	529579	A2	2.3	1.3	0.5	-	-	A feature visible as a dark reflector. This casts an almost square shadow. The surrounding area is smooth seabed combined with areas of sand waves and geological features.	6055	-
7056	Dark reflector	457276	529644	A2	3.6	1.0	0.0	-	-	A short linear feature visible as a dark reflector without a shadow. This is present within an area of seabed with rocky outcrops and sand waves. The feature may form an extension of the linear 6057, which is located close by in almost the same orientation. The portion joining these features could be buried.	6056	-
7057	Linear	457270	529654	A2	7.4	2.3	0.0	-	-	A linear feature visible as a dark reflector. This feature is slightly tapered toward one end. It is located within an area of seabed with rocky outcrops and sand waves. Feature 6056 may form an extension to this linear, with the adjoining portion possibly buried.	6057	-

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7058	Dark reflector	456582	529687	A2	11.4	3.0	0.0	-	-	Elongated, irregularly shaped feature visible as a dark reflector. The path of the feature is varied. This is set within an area which contains rocky outcrops and dispersed geological features.	6058	-
7059	Debris	456810	529747	A2	4.0	1.1	0.4	-	-	A feature comprised of many small dark reflectors with shadows. This is located within an area of smooth seabed and rocky outcrops.	6059	-
7060	Wreck	456909	529802	A1	79.3	27.5	0.6	-	-	Wreck visible as an area of disturbed seafloor, which appears to be mounded. This feature is seen as a number of discrete areas of disturbance, two of which are more substantial than the others. An area of fishing gear is located close by. Small sand waves are located around the disturbance and the wider area contains more sand waves. The surrounding area does not show evidence of seafloor disturbance. This site represents the <i>La Basiase (La Bastaise)</i> .	6060	5612 (from Entec Report 2004)
7061	Dark reflector	459084	529168	A2	1.2	1.8	0.0	-	-	An irregularly shaped feature visible as a dark reflector. This is located within an area of smooth seabed. Feature 6062 is located in the vicinity.	6061	-
7062	Dark reflector	459103	529151	A2	1.4	2.1	0.0	-	-	An elongated feature visible as a dark reflector. This is located within an area of smooth seabed that contains few geological features. Feature 6061 is located nearby.	6062	-
7063	Seafloor disturbance	458342	529191	A2	8.5	8.8	0.0	-	-	An area of disturbed seafloor visible as a series of dark reflectors. These appear to cast no shadow. Two groups of small linear dark reflectors run in parallel from a main dark reflector. This feature is located in a smooth area of seabed with dispersed geological features. This feature is located 551m west of the recorded location of the SS Harraton, and 666m southwest of the location of the <i>Afridi</i> .	6063	5609 and 5611 (from Entec Report 2004)

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7064	Debris	458322	529163	A2	3.0	1.7	0.0	-	-	Small pointed feature visible as a distinct dark reflector without shadow. This is located within an area of smooth seafloor which also contains sporadic geological features.	6064	-
7065	Debris	458335	529534	A2	2.4	4.4	0.0	-	-	A feature visible as an indistinct dark reflector with a rectangular shadow. This is located upon an area of sand waves, which are common within the surrounding area.	6065	-
7066	Debris	457774	529612	A2	1.1	1.1	0.0	-	-	Small feature visible as a dark reflector. This casts an almost square shaped shadow. The surrounding area is characterised by smooth seabed with areas of sand waves.	6066	-
7067	Linear	457785	530021	A2	34.3	6.8	0.0	-	-	Curvilinear feature with a double curve, visible as a dark reflector. This is located upon a rocky outcrop, but is distinct from the background features. The wider area is a combination of smooth seabed, rocky outcrops and sand waves.	6067	-
7068	Debris	457845	529982	A2	1.7	0.7	0.4	-	-	A curved, c-shaped feature visible as a dark reflector. This has a large, elongated shadow. It is located upon smooth seabed, in a wider area of rocky outcrops.	6068	-
7069	Linear	457503	529926	A2	12.2	10.8	0.0	-	-	A linear feature visible as an indistinct dark reflector with possibly a small shadow. This is located directly alongside a rocky outcrop, within an area of rocky outcrops and sand waves.	6069	-
7070	Debris	457694	530506	A2	1.1	0.8	0.5	-	-	A slightly curved slim feature visible as a dark reflector. This has an elongated oval shaped shadow. The feature is located within an area of smooth seabed with nearby sand waves and rocky outcrops.	6070	-
7071	Debris	457137	530343	A2	3.9	1.2	0.5	-	-	Irregularly shaped feature visible as a dark reflector. This casts an almost square shadow. This is located in an area of smooth seabed with nearby rocky outcrops.	6071	-

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7072	Debris	457341	530350	A2	1.9	2.7	0.1	-	-	Small linear feature visible as a dark reflector with a shadow. This is located in an area of smooth seabed, with a large rocky outcrop close by. A similar feature is located alongside (6073).	6072	-
7073	Debris	457345	530340	A2	1.0	0.9	0.0	-	-	Small linear feature visible as a dark reflector with a small shadow. This is located in an area of smooth seabed with a nearby rocky outcrop. A similar feature is located close by (6072).	6073	-
7074	Debris	457238	530562	A2	1.7	1.6	0.0	-	-	Small elongated, almost linear, feature visible as a dark reflector with some shadow. This is located within an area which contains rocky outcrops and dispersed features of geological origin. Features 6075 and 6076 are located in the vicinity.	6074	-
7075	Linear	457235	530542	A2	9.0	6.8	5.9	-	-	Linear feature visible as a dark reflector with shadow. This feature is tapered toward one end and is almost rounded at the other. A slight area of seafloor disturbance is located close to this feature, but appears to be natural. The surrounding area contains rocky outcrops and dispersed features of geological origin. Features 6074 and 6076 are also close by.	6075	-
7076	Linear	457233	530564	A2	16.8	12.8	0.0	-	-	A linear feature visible as a distinct dark reflector. This is set within an area of seafloor disturbance which runs the length of the linear. The disturbance is tapered towards one end of the linear feature. It is uncertain whether the disturbance is associated with the linear feature, or is natural. The surrounding area is smooth seabed with some natural seafloor disturbance, rocky outcrops and dispersed geological features. Features 6075 and 6074 are located nearby. This feature is located close to the recorded locations for four nearby wrecks.	6076	60694, 60695, 60697 and 60698 (from Entec Report 2004)

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7077	Dark reflector	460599	527298	A2	1.7	1.2	0.0	-	-	Small ovoid feature visible as a dark reflector with an internal lighter area. This is set within an area of lighter seafloor, which may be natural, as similar natural disturbance is seen all around.	6077	-
7078	Dark reflector	460971	527452	A2	1.5	1.5	0.0	-	-	Small ovoid, almost circular, feature visible as a dark reflector with an internal lighter area. This is set within a small area of lighter seafloor, which may be natural. Some dispersed geological features are located nearby.	6078	-
7079	Debris	460781	527730	A1	8.9	5.4	0.9	-	-	A feature comprised of a number of dark reflectors. One feature is particularly distinct, while others are less so and appear to represent a series of linears. These linears form an irregular hexagonal shape, but lie in a variety of unorganised orientations. The whole feature has a large shadow. This feature is located within an area of smooth seabed with few geological features.	6079	-
7080	Debris	460759	527702	A1	5.9	9.5	0.4	-	-	A large feature of probable anthropogenic origin, comprising a number of linears visible as dark reflectors. The feature has a large shadow. The feature is roughly rectangular and appears to have a distinct outline, with internal linear features running along the length (longest measurement) of the shape. From a different angles these internal linears appear to have no common orientation. The area surrounding is smooth seabed with no features.	6080	-
7081	Wreck SS Harraton	459008	529122	A1	36.6	12.9	0.6	-	-	Two areas of seafloor disturbance representing a wreck, one substantially larger than the other. These area are visible as groups of small dark reflectors, which cast long shadows. The surrounding seabed is smooth with some apparently natural disturbance. This is likely to represent the wreck <i>SS Harraton</i> .	6082	5609 (from Entec Report 2004)

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7082	Wreck	456090	528791	A1	32.4	13.6	0.0	-	-	Wreck visible as a lighter area of seafloor than its surroundings. This feature possibly represents a buried wreck. It is an elongated shape, pointed at two ends. It is located within a large area of sand waves. This likely represents the wreck of the <i>Victory</i> .	6083	5606 (from Entec Report 2004)
7083	Unknown	460872	527800	A3	-	-	-	-	-	Record from ES – not seen in geophysical data analysed by WA.	-	5593 (from Entec Report 2004)
7084	MV Guildford	457844	527807	A3	-	-	-	-	-	Record from ES – not seen in geophysical data analysed by WA.	-	5595 (from Entec Report 2004)
7085	SS Ernrix	460835	528063	A3	-	-	-	-	-	Record from ES – not seen in geophysical data analysed by WA. Built in 1921 by Cochrane & Sons, Selby. Owned at time of loss by Humber Steam Coasters Ltd	-	5598 (from Entec Report 2004)
7086	SS Harvest	456142	528598	A3	-	-	-	-	-	Record from ES – not seen in geophysical data analysed by WA. Built of iron in 1881 by Irvine & Co, West Hartlepool. Owned at time of loss by H Smurthwaite, Middlesborough	-	5602 (from Entec Report 2004)
7087	Motor lighter	456028	528912	A3	-	-	-	-	-	Record from ES – not seen in geophysical data analysed by WA.	-	5607 (from Entec Report 2004)
7088	M Auxillary SV Stirling	456623	529461	A3	-	-	-	-	-	Record from ES – not seen in geophysical data analysed by WA. Built of iron in 1897 by Hiestern & TE Velde, Martenshoek. Owned at time of loss by Theodor Shipping co Ltd	-	5610 (from Entec Report 2004)

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7089	Afridi	458652	529765	A3	-	-	-	-	-	Record from ES – not seen in geophysical data analysed by WA. British ex destroyer	-	5611 (from Entec Report 2004)
7090	Unknown	459449	527086	A3	-	-	-	-	-	Record from ES – not seen in geophysical data analysed by WA.	-	5760 (from Entec Report 2004)
7091	Unknown	455985	528715	A3	-	-	-	-	-	Record from ES – not seen in geophysical data analysed by WA. Small wk embedded in sand, well buried, ribs protrude above sand	-	5767 (from Entec Report 2004)
7092	Unknown	457201	530537	A3	-	-	-	-	-	Record from ES – not seen in geophysical data analysed by WA.	-	60694 (from Entec Report 2004)
7093	Unknown	456922	530211	A3	-	-	-	-	-	Record from ES – not seen in geophysical data analysed by WA.	-	60695 (from Entec Report 2004)
7094	Unknown	457319	530650	A3	-	-	-	-	-	Record from ES – not seen in geophysical data analysed by WA.	-	60698 (from Entec Report 2004)
7095	Magnetic	458391.1	527653.8	A2	-	-	-	100	4.1	Magnetic anomaly identified by BACTEC International LTd.	6083	BACTEC report: 942MS R
7096	Magnetic	457579	528217.4	A2	-	-	-	106	1.1	Magnetic anomaly identified by BACTEC International LTd.	6084	BACTEC report: 942MS R

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7097	Magnetic	457979.3	527897.7	A2	-	-	-	107	3.4	Magnetic anomaly identified by BACTEC International LTd.	6085	BACTEC report: 9428MS R
7098	Magnetic	458263.7	527704.3	A2	-	-	-	108	1.5	Magnetic anomaly identified by BACTEC International LTd.	6086	BACTEC report: 9428MS R
7099	Magnetic	458853	526885.7	A2	-	-	-	108	1.8	Magnetic anomaly identified by BACTEC International LTd.	6087	BACTEC report: 9428MS R
7100	Magnetic	458452	526672.1	A2	-	-	-	108	0.9	Magnetic anomaly identified by BACTEC International LTd.	6088	BACTEC report: 9428MS R
7101	Magnetic	458718.7	528248.1	A2	-	-	-	109	3.7	Magnetic anomaly identified by BACTEC International LTd.	6089	BACTEC report: 9428MS R
7102	Magnetic	458983.7	528462.5	A2	-	-	-	112	6.1	Magnetic anomaly identified by BACTEC International LTd.	6090	BACTEC report: 9428MS R
7103	Magnetic	458790.1	528638.3	A2	-	-	-	112	4.3	Magnetic anomaly identified by BACTEC International LTd.	6091	BACTEC report: 9428MS R
7104	Magnetic	457931	527876.2	A2	-	-	-	114	2	Magnetic anomaly identified by BACTEC International LTd.	6092	BACTEC report: 9428MS R
7105	Magnetic	458260.9	527726.9	A2	-	-	-	115	2.1	Magnetic anomaly identified by BACTEC International LTd.	6093	BACTEC report: 9428MS R

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7106	Magnetic	459322.6	528262.3	A2	-	-	-	119	1	Magnetic anomaly identified by BACTEC International LTd.	6094	BACTEC report: 9428MS R
7107	Magnetic	457580.5	528144.5	A2	-	-	-	119	1.2	Magnetic anomaly identified by BACTEC International LTd.	6095	BACTEC report: 9428MS R
7108	Magnetic	458017.5	527909.4	A2	-	-	-	120	3.9	Magnetic anomaly identified by BACTEC International LTd.	6096	BACTEC report: 9428MS R
7109	Magnetic	459293.7	527226.5	A2	-	-	-	128	2.5	Magnetic anomaly identified by BACTEC International LTd.	6097	BACTEC report: 9428MS R
7110	Magnetic	456969.4	528663.1	A2	-	-	-	129	2.9	Magnetic anomaly identified by BACTEC International LTd.	6098	BACTEC report: 9428MS R
7111	Magnetic	458238.9	527687.4	A2	-	-	-	133	3.4	Magnetic anomaly identified by BACTEC International LTd.	6099	BACTEC report: 9428MS R
7112	Magnetic	458402.5	529002.8	A2	-	-	-	143	3.9	Magnetic anomaly identified by BACTEC International LTd.	6100	BACTEC report: 9428MS R
7113	Magnetic	458301.3	528327.4	A2	-	-	-	143	2.2	Magnetic anomaly identified by BACTEC International LTd.	6101	BACTEC report: 9428MS R
7114	Magnetic	459090.5	527818.3	A2	-	-	-	146	5.4	Magnetic anomaly identified by BACTEC International LTd.	6102	BACTEC report: 9428MS R

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7115	Magnetic	458134.3	529144.9	A2	-	-	-	148	3.3	Magnetic anomaly identified by BACTEC International LTd.	6103	BACTEC report: 9428MS R
7116	Magnetic	458677.1	527337.2	A2	-	-	-	153	3.3	Magnetic anomaly identified by BACTEC International LTd.	6104	BACTEC report: 9428MS R
7117	Magnetic	457251.8	528391.6	A2	-	-	-	157	1.6	Magnetic anomaly identified by BACTEC International LTd.	6105	BACTEC report: 9428MS R
7118	Magnetic	459998	527540	A2	-	-	-	158	1.6	Magnetic anomaly identified by BACTEC International LTd.	6106	BACTEC report: 9428MS R
7119	Magnetic	458325	527668	A2	-	-	-	162	0.1	Magnetic anomaly identified by BACTEC International LTd.	6107	BACTEC report: 9428MS R
7120	Magnetic	457640	528142	A2	-	-	-	172	3.3	Magnetic anomaly identified by BACTEC International LTd.	6108	BACTEC report: 9428MS R
7121	Magnetic	458390	528991	A2	-	-	-	173	2.6	Magnetic anomaly identified by BACTEC International LTd.	6109	BACTEC report: 9428MS R
7122	Magnetic	458996	528598	A2	-	-	-	176	6.2	Magnetic anomaly identified by BACTEC International LTd.	6110	BACTEC report: 9428MS R
7123	Magnetic	458643	528761	A2	-	-	-	178	4.5	Magnetic anomaly identified by BACTEC International LTd.	6111	BACTEC report: 9428MS R

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7124	Magnetic	458193	527746	A2	-	-	-	182	1.2	Magnetic anomaly identified by BACTEC International LTd.	6112	BACTEC report: 9428MS R
7125	Magnetic	458010	529238	A2	-	-	-	186	2.3	Magnetic anomaly identified by BACTEC International LTd.	6113	BACTEC report: 9428MS R
7126	Magnetic	457196	528451	A2	-	-	-	187	5.1	Magnetic anomaly identified by BACTEC International LTd.	6114	BACTEC report: 9428MS R
7127	Magnetic	458477	528239	A2	-	-	-	197	5	Magnetic anomaly identified by BACTEC International LTd.	6115	BACTEC report: 9428MS R
7128	Magnetic	458365.6	527673.5	A2	-	-	-	205	2	Magnetic anomaly identified by BACTEC International LTd.	6116	BACTEC report: 9428MS R
7129	Magnetic	458517.1	527488.7	A2	-	-	-	207	3.1	Magnetic anomaly identified by BACTEC International LTd.	6117	BACTEC report: 9428MS R
7130	Magnetic	458886.7	528511.7	A2	-	-	-	209	1.7	Magnetic anomaly identified by BACTEC International LTd.	6118	BACTEC report: 9428MS R
7131	Magnetic	458637.7	527455.7	A2	-	-	-	212	1.7	Magnetic anomaly identified by BACTEC International LTd.	6119	BACTEC report: 9428MS R
7132	Magnetic	459046	528438.6	A2	-	-	-	219	3.1	Magnetic anomaly identified by BACTEC International LTd.	6120	BACTEC report: 9428MS R

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7133	Magnetic	457709.4	528071.8	A2	-	-	-	234	4.1	Magnetic anomaly identified by BACTEC International LTd.	6121	BACTEC report: 9428MS R
7134	Magnetic	458000.1	529258.7	A2	-	-	-	235	1	Magnetic anomaly identified by BACTEC International LTd.	6122	BACTEC report: 9428MS R
7135	Magnetic	458973.3	528348.9	A2	-	-	-	240	6.6	Magnetic anomaly identified by BACTEC International LTd.	6123	BACTEC report: 9428MS R
7136	Magnetic	457764.1	528019.5	A2	-	-	-	243	2.7	Magnetic anomaly identified by BACTEC International LTd.	6124	BACTEC report: 9428MS R
7137	Magnetic	458321.4	527673.6	A2	-	-	-	245	1.4	Magnetic anomaly identified by BACTEC International LTd.	6125	BACTEC report: 9428MS R
7138	Magnetic	458461	528976.9	A2	-	-	-	246	4.1	Magnetic anomaly identified by BACTEC International LTd.	6126	BACTEC report: 9428MS R
7139	Magnetic	457313.4	529121.8	A2	-	-	-	248	5.3	Magnetic anomaly identified by BACTEC International LTd.	6127	BACTEC report: 9428MS R
7140	Magnetic	458335.2	527700.2	A2	-	-	-	249	1.3	Magnetic anomaly identified by BACTEC International LTd.	6128	BACTEC report: 9428MS R
7141	Magnetic	458567	526728.9	A2	-	-	-	257	3.1	Magnetic anomaly identified by BACTEC International LTd.	6129	BACTEC report: 9428MS R

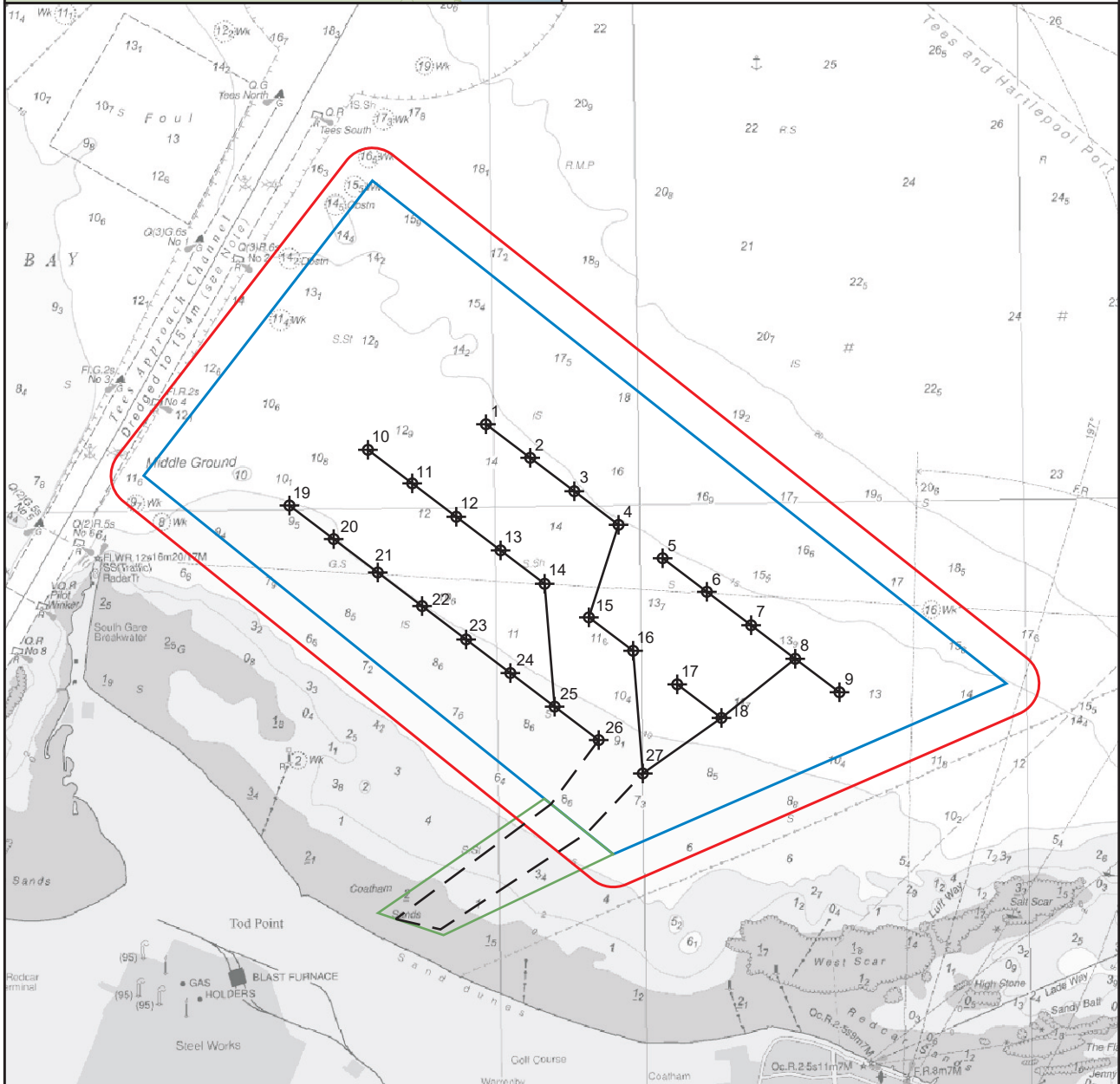
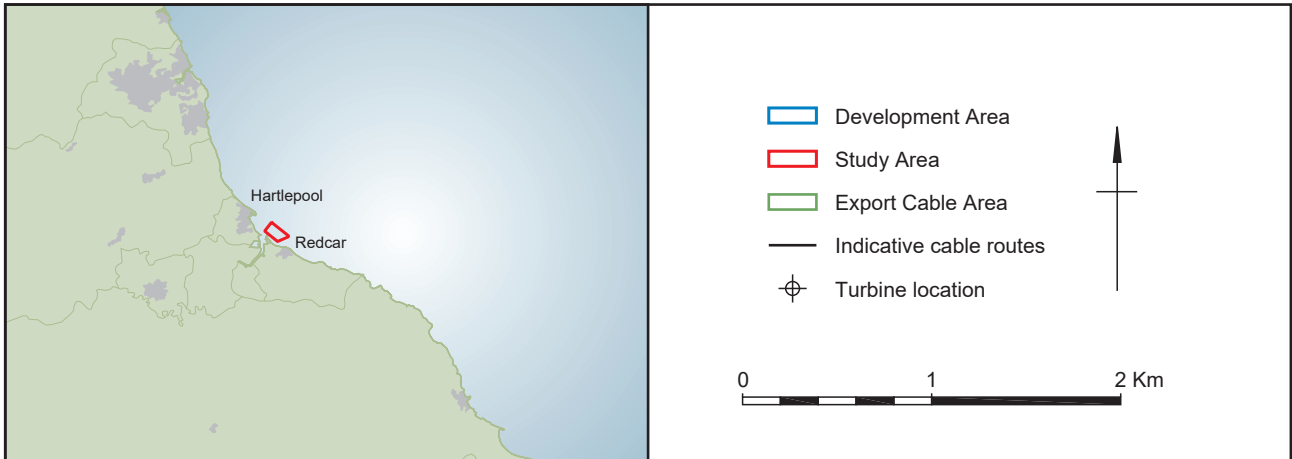
WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7142	Magnetic	456902.6	528817.1	A2	-	-	-	267	0	Magnetic anomaly identified by BACTEC International LTd.	6130	BACTEC report: 9428MS R
7143	Magnetic	458415.7	529034.8	A2	-	-	-	272	8	Magnetic anomaly identified by BACTEC International LTd.	6131	BACTEC report: 9428MS R
7144	Magnetic	458139.5	529204	A2	-	-	-	279	0.2	Magnetic anomaly identified by BACTEC International LTd.	6132	BACTEC report: 9428MS R
7145	Magnetic	458641.1	528858.1	A2	-	-	-	304	4.4	Magnetic anomaly identified by BACTEC International LTd.	6133	BACTEC report: 9428MS R
7146	Magnetic	457578	528961.1	A2	-	-	-	304	4.7	Magnetic anomaly identified by BACTEC International LTd.	6134	BACTEC report: 9428MS R
7147	Magnetic	457961.3	529243	A2	-	-	-	306	2.3	Magnetic anomaly identified by BACTEC International LTd.	6135	BACTEC report: 9428MS R
7148	Magnetic	458934.7	526920.8	A2	-	-	-	308	1.2	Magnetic anomaly identified by BACTEC International LTd.	6136	BACTEC report: 9428MS R
7149	Magnetic	458783.6	528693.3	A2	-	-	-	316	2.1	Magnetic anomaly identified by BACTEC International LTd.	6137	BACTEC report: 9428MS R
7150	Magnetic	458873.5	528666.2	A2	-	-	-	320	3.7	Magnetic anomaly identified by BACTEC International LTd.	6138	BACTEC report: 9428MS R

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7151	Magnetic	458433	527518.2	A2	-	-	-	361	3.5	Magnetic anomaly identified by BACTEC International LTd.	6139	BACTEC report: 9428MS R
7152	Magnetic	458058.8	527940.7	A2	-	-	-	372	2.3	Magnetic anomaly identified by BACTEC International LTd.	6140	BACTEC report: 9428MS R
7153	Magnetic	458315.5	528283.3	A2	-	-	-	377	6.1	Magnetic anomaly identified by BACTEC International LTd.	6141	BACTEC report: 9428MS R
7154	Magnetic	457653.9	528821.5	A2	-	-	-	379	3.8	Magnetic anomaly identified by BACTEC International LTd.	6142	BACTEC report: 9428MS R
7155	Magnetic	459972.1	527643.7	A2	-	-	-	395	2	Magnetic anomaly identified by BACTEC International LTd.	6143	BACTEC report: 9428MS R
7156	Magnetic	458853.9	528655.5	A2	-	-	-	492	0.9	Magnetic anomaly identified by BACTEC International LTd.	6144	BACTEC report: 9428MS R
7157	Magnetic	458312.1	527627.1	A2	-	-	-	500	3.9	Magnetic anomaly identified by BACTEC International LTd.	6145	BACTEC report: 9428MS R
7158	Magnetic	458862.7	528650.7	A2	-	-	-	503	2.5	Magnetic anomaly identified by BACTEC International LTd.	6146	BACTEC report: 9428MS R
7159	Magnetic	458862.4	528665.7	A2	-	-	-	540	3.3	Magnetic anomaly identified by BACTEC International LTd.	6147	BACTEC report: 9428MS R

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7160	Magnetic	458868.1	528640.5	A2	-	-	-	604	0.2	Magnetic anomaly identified by BACTEC International LTd.	6148	BACTEC report: 9428MS R
7161	Magnetic	458847.5	528669.5	A2	-	-	-	629	3.6	Magnetic anomaly identified by BACTEC International LTd.	6149	BACTEC report: 9428MS R
7162	Magnetic	457836.1	527979.7	A2	-	-	-	710	5.5	Magnetic anomaly identified by BACTEC International LTd.	6150	BACTEC report: 9428MS R
7163	Magnetic	458048.7	527933.1	A2	-	-	-	758	5	Magnetic anomaly identified by BACTEC International LTd.	6151	BACTEC report: 9428MS R
7164	Magnetic	457642.9	528156.4	A2	-	-	-	767	2.2	Magnetic anomaly identified by BACTEC International LTd.	6152	BACTEC report: 9428MS R
7165	Magnetic	458857.7	528636	A2	-	-	-	847	3.4	Magnetic anomaly identified by BACTEC International LTd.	6153	BACTEC report: 9428MS R
7166	Magnetic	457367.2	529144.3	A2	-	-	-	849	6.5	Magnetic anomaly identified by BACTEC International LTd.	6154	BACTEC report: 9428MS R
7167	Magnetic	458461.3	528964.9	A2	-	-	-	877	5.9	Magnetic anomaly identified by BACTEC International LTd.	6155	BACTEC report: 9428MS R
7168	Magnetic	458991.3	527171.2	A2	-	-	-	1085	1.8	Magnetic anomaly identified by BACTEC International LTd.	6156	BACTEC report: 9428MS R

WA ID	Name / Classification	Easting	Northing	Archaeological Discrimination	L (m)	W (m)	H (m)	Magnetic mass (kg)	Magnetic depth (m)	Description	WA Sources	External Refs
7169	Magnetic	457553.1	528250.4	A2	-	-	-	1362	5.2	Magnetic anomaly identified by BACTEC International LTd.	6157	BACTEC report: 9428MS R
7170	Magnetic	457689.4	528850.9	A2	-	-	-	1518	6.1	Magnetic anomaly identified by BACTEC International LTd.	6158	BACTEC report: 9428MS R
7171	Magnetic	458373.1	527663.6	A2	-	-	-	2315	1.9	Magnetic anomaly identified by BACTEC International LTd.	6159	BACTEC report: 9428MS R
7172	Magnetic	459893.7	527805.7	A2	-	-	-	2389	3.4	Magnetic anomaly identified by BACTEC International LTd.	6160	BACTEC report: 9428MS R
7173	Magnetic	458873.5	528633.8	A2	-	-	-	2692	6.8	Magnetic anomaly identified by BACTEC International LTd.	6161	BACTEC report: 9428MS R
7174	Magnetic	459987	527456.2	A2	-	-	-	26348	4.9	Magnetic anomaly identified by BACTEC International LTd.	6162	BACTEC report: 9428MS R

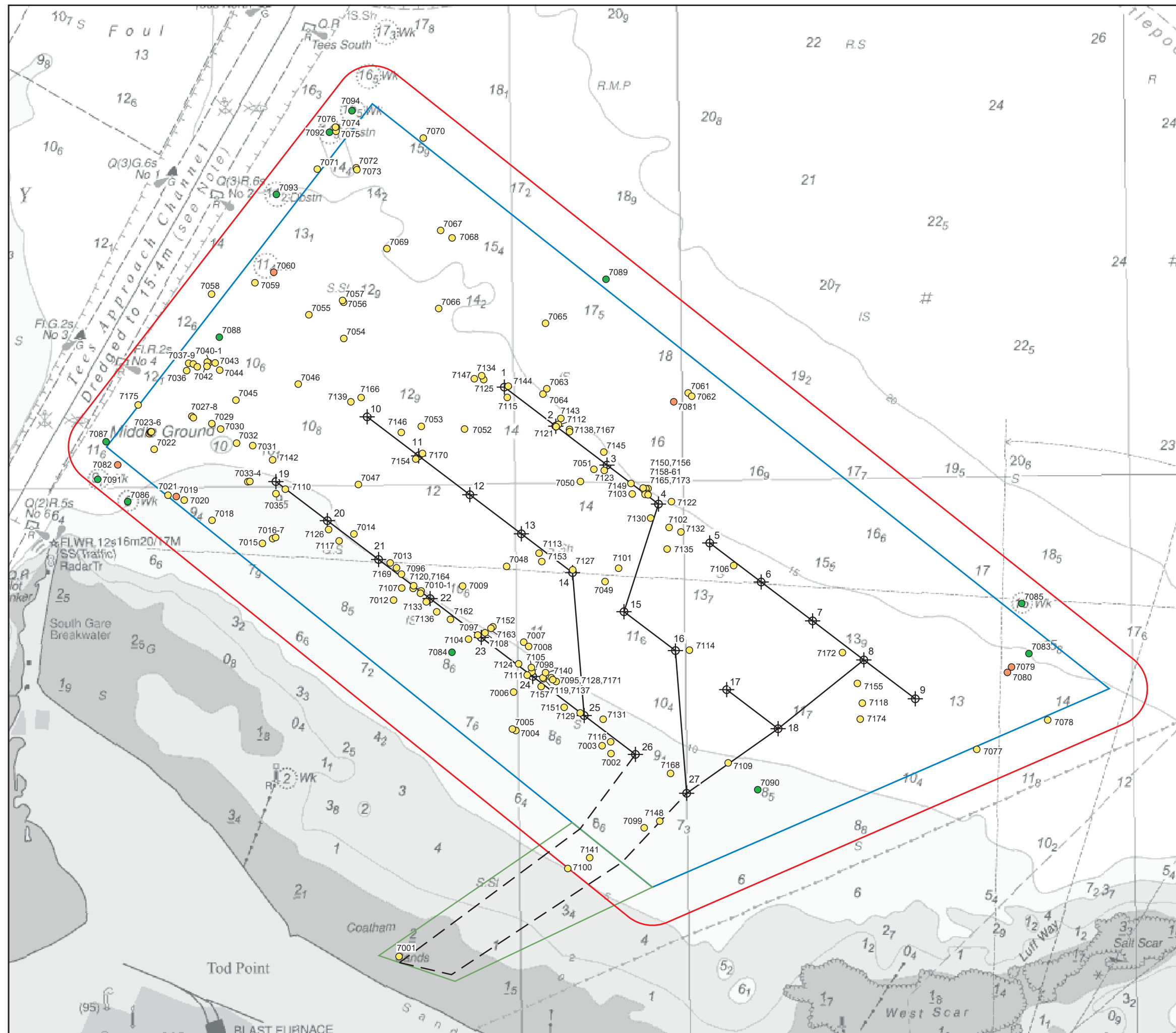
1. Co-ordinates are in British National Grid
2. Positional accuracy estimated $\pm 10\text{m}$



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Study Area location

Figure 1



0 1 km

- ▭ Development Area
- ▭ Study Area
- ▭ Export Cable Area
- Indicative cable routes
- ⊕ Turbine location
- A1 - Anthropogenic origin of archaeological interest
- A2 - Uncertain origin of possible archaeological interest
- A3 - Historic record of possible archaeological interest

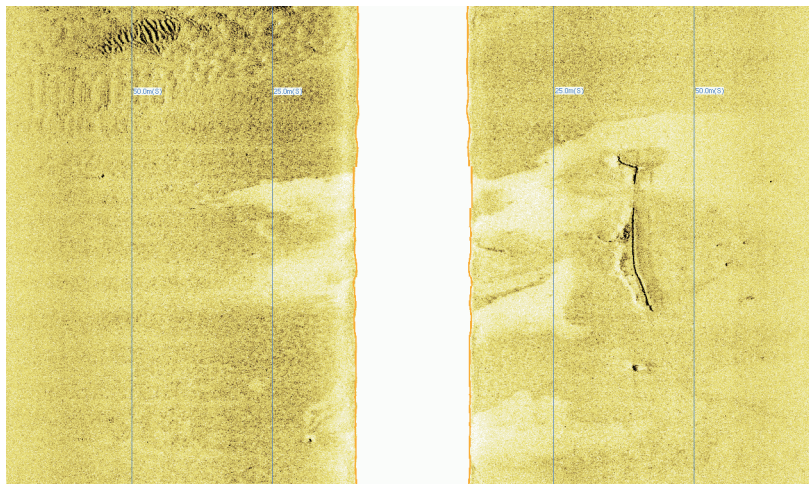
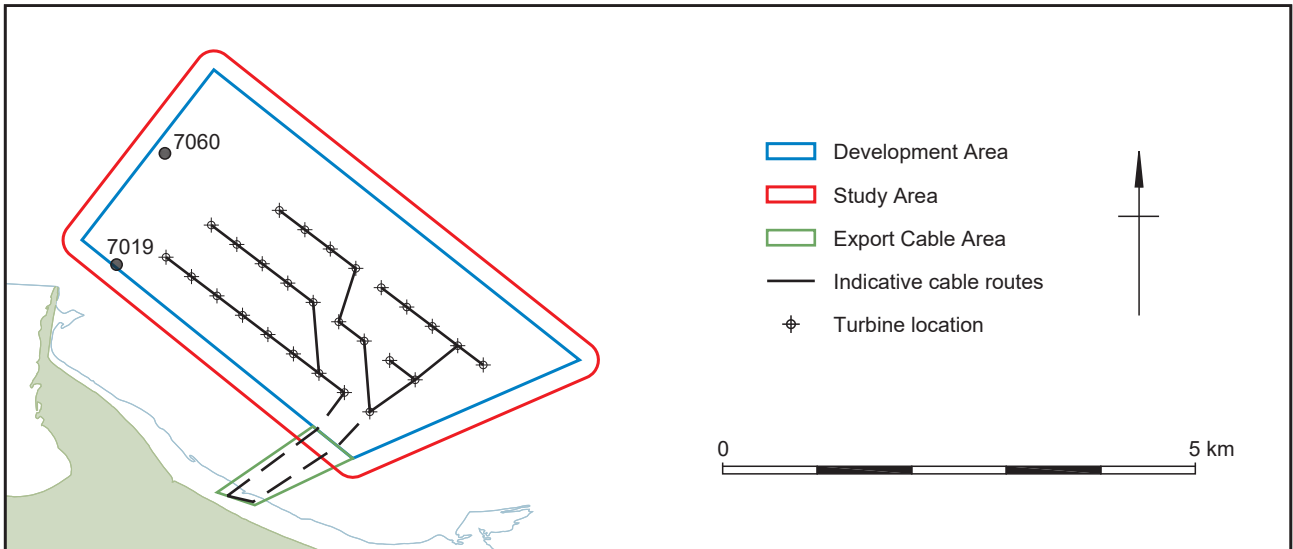
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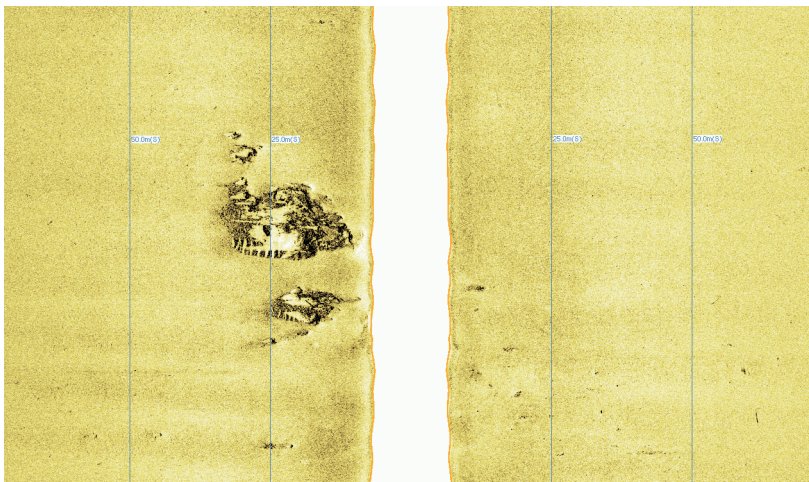
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Sidescan sonar contacts, magnetic anomalies and multibeam bathymetry anomalies identified within the survey area

Figure 2



A. Sidescan sonar image of the *Ida Duncan* wreck, site 7019



B. Sidescan sonar image of the *La Basiasse* wreck, site 7060

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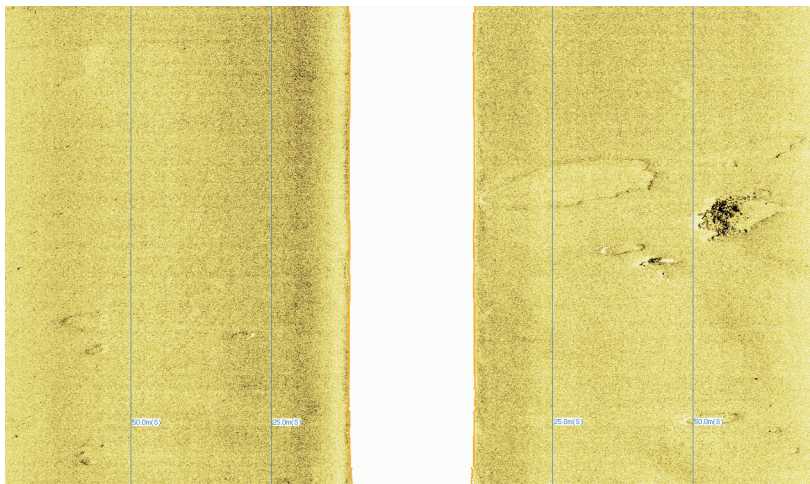
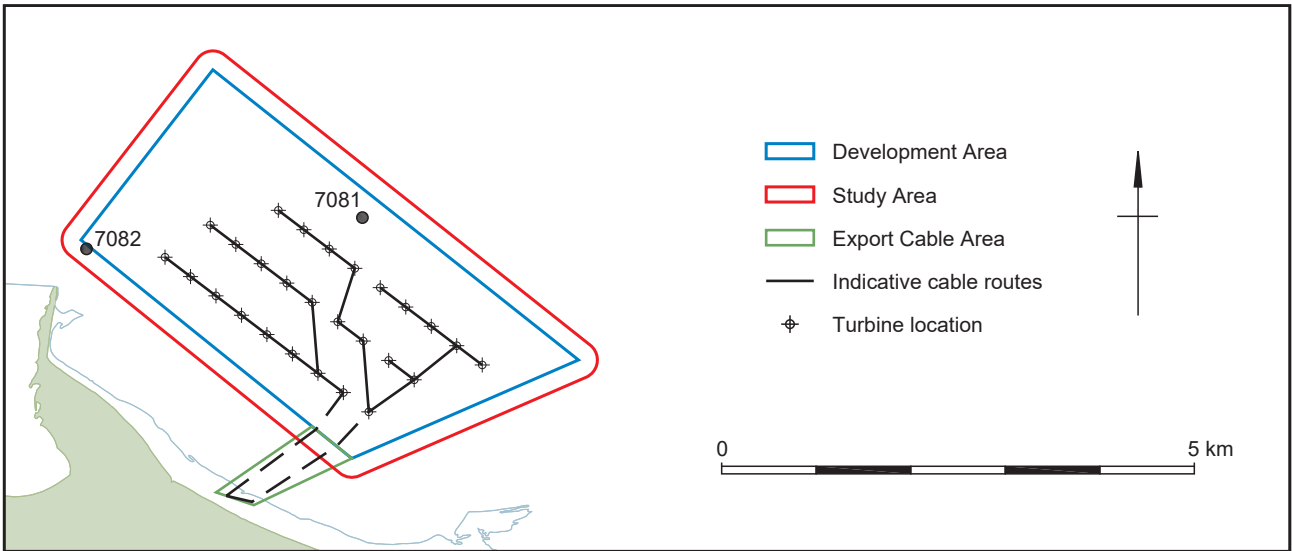
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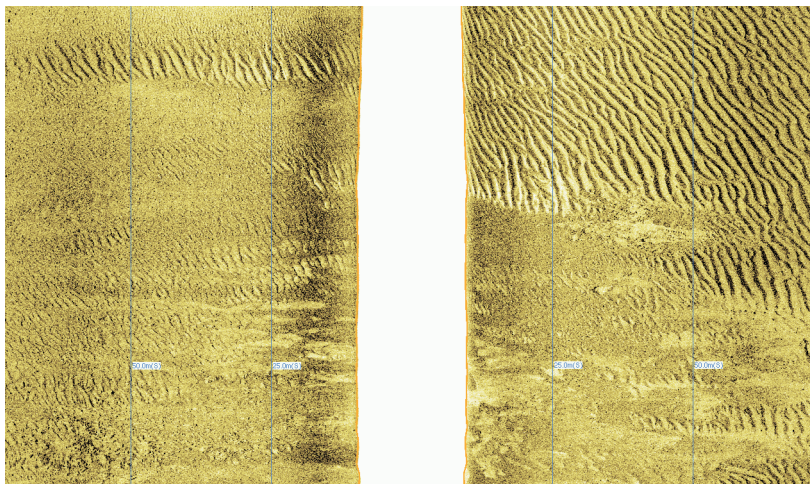
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A. Sidescan sonar image of the *SS Harraton* wreck, site 7081



B. Sidescan sonar image of the *Victory* wreck, site 7082

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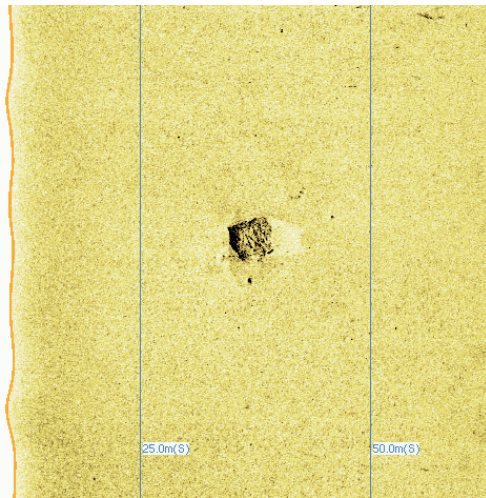
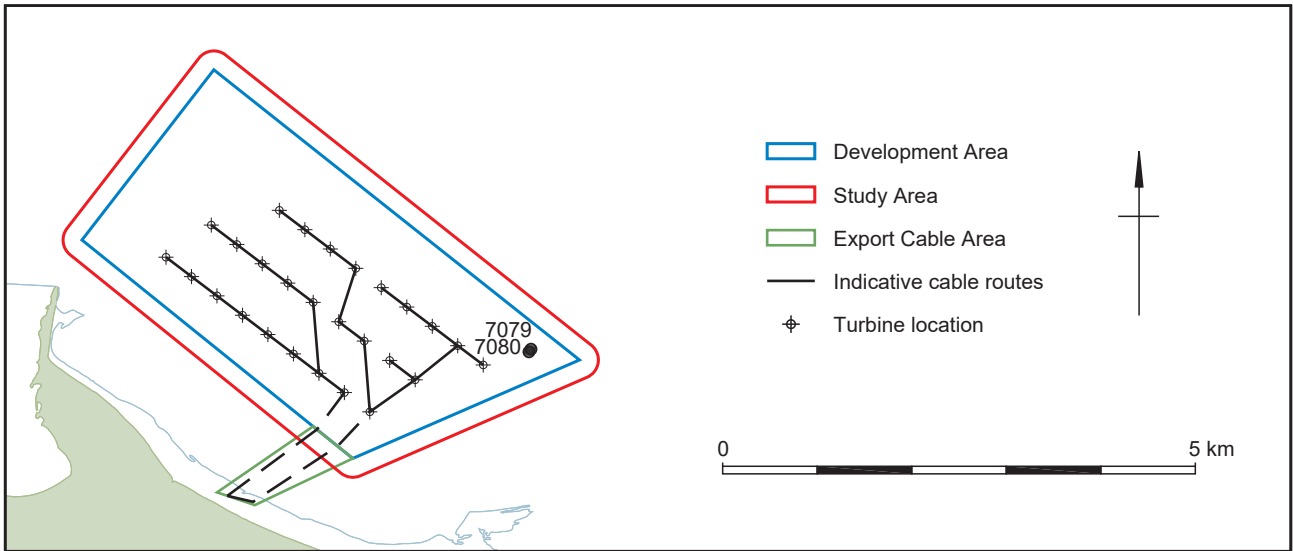
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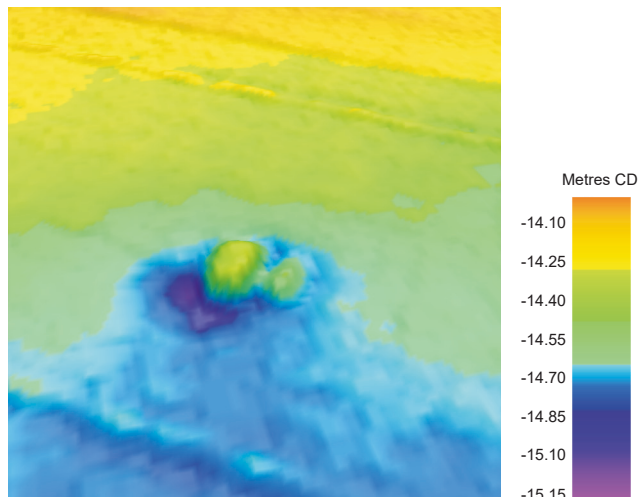
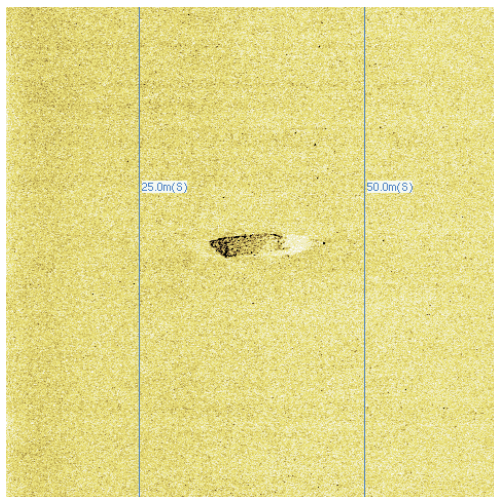
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A. Sidescan sonar image of an unidentified anthropogenic feature, site 7079



B. Sidescan sonar and multibeam bathymetry image of an unidentified anthropogenic feature, site 7080

Drawing Projection: OSGB National Grid

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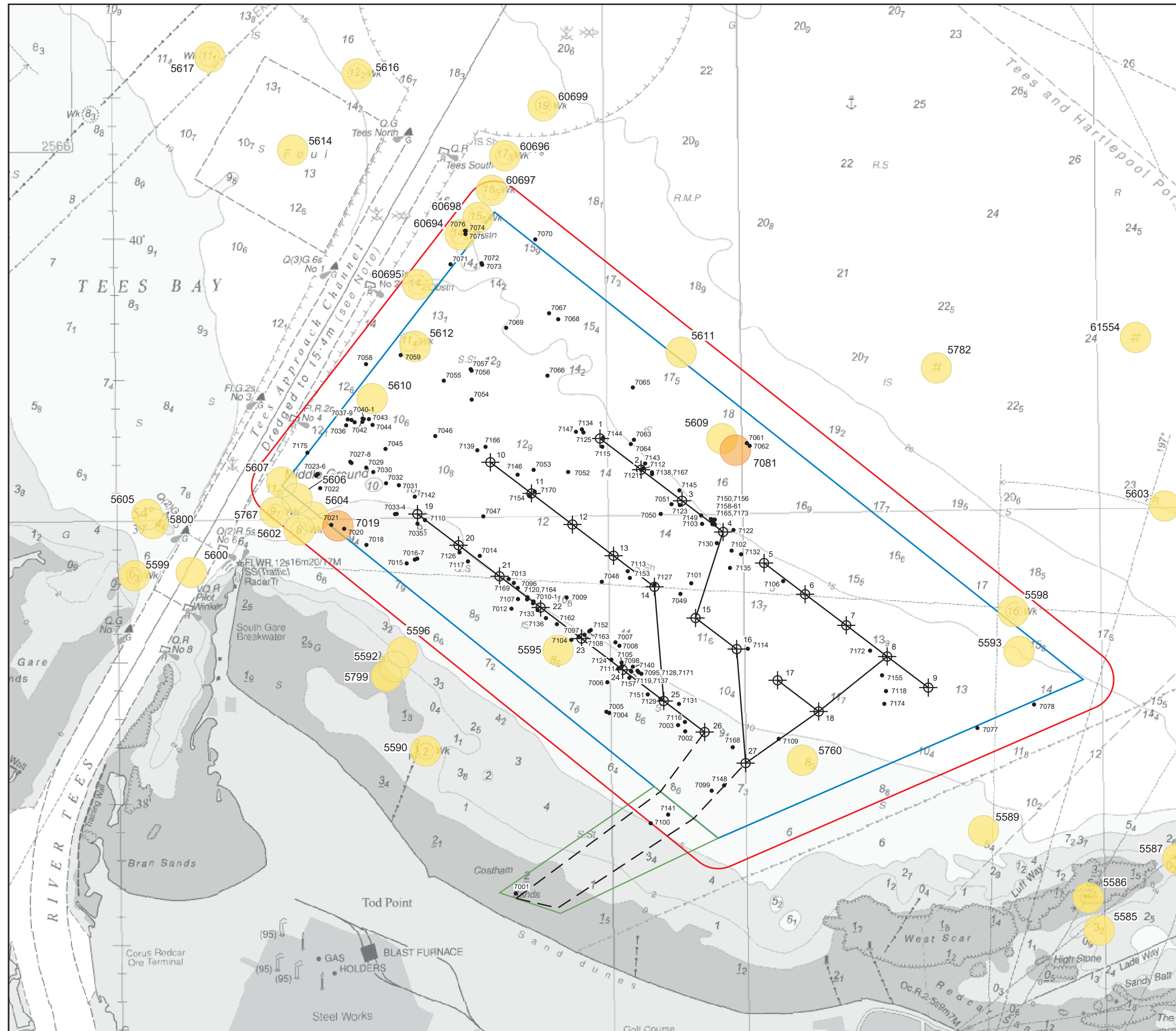
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- ▭ Development Area
- ▭ Study Area
- ▭ Export Cable Area
- Indicative cable routes
- ⊕ Turbine location
- Existing archaeological exclusion zones
- New archaeological exclusion zones
- A2 anomalies (sites of potential anthropogenic origin)



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Recommended exclusion zones

Figure 6



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