



NEMO Link

Temporary Exclusion Zone
Archaeological Investigation of Ferrous Debris



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November 2017



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DATA LICENCES

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Summary

Wessex Archaeology was commissioned by J-Power Systems Corporation to undertake an archaeological assessment of geophysical survey data over a section of the NEMO Link route where an item of debris was identified by a team of divers clearing the proposed route of unexploded ordnance.

The geophysical data consisted of sidescan sonar, magnetometer and multibeam bathymetry acquired in 2016 by Gardline. The review included an assessment of the current data in addition to the target investigation reports and the results of the previous archaeological assessments undertaken by Wessex Archaeology and Sea Change Heritage Consultants.

The geophysical data (Gardline 2016a) was assessed within a 50 m radius of the as found location of the ferrous debris. Three anomalies were identified in the 2016 magnetometer data, all have been assessed as an A2 object (Uncertain origin of possible archaeological interest); no surface representation indicates that these items are buried.

As part of a UXO survey, an item of ferrous debris with archaeological values and some recent debris (steel wire) were recovered. The anomalies identified may relate to the debris items recovered; both 7432 and 7433 are close to the as found location of the debris with potential archaeological interest. However, there is no further information available to confirm the position and extent of this and so association cannot be confirmed. To confirm that all items have been removed further details of the area cleared or further investigation and geophysical data would be required.

There are a number of anomalies surrounding the 50 m buffer, however none to indicate a substantial wreck or debris field.

The recovered metal debris has been assessed to determine its nature, condition, typological characterisation, possible date, potential archaeological interest and the need for further assessment or conservation. After evaluating the debris, it has been identified as a metal band that serves to structurally reinforce the hull of a wooden vessel. The object may belong to a small merchant ship dating to the early twentieth century. The debris is considered to be of low archaeological value.



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Acknowledgements

This assessment was commissioned by J-Power Systems Corporation. The information was provided by Nigel Brazier, UK Nearshore pUXO Works Project Manager for NEMO Link from Dynasafe Bactec Limited, whose assistance is acknowledged in this respect.

Sam Strutton carried out the geophysical assessment and compiled the report, Joaquin Callejo Gomez assessed and recorded the ferrous debris with quality control provided by Dr Louise Tizzard and Euan McNeill. Will Foster prepared the illustrations and the project was managed for Wessex Archaeology by Euan McNeill.



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1 INTRODUCTION

1.1 Project Background

- 1.1.1 Wessex Archaeology was commissioned by J-Power Systems Corporation to undertake an archaeological review of potential archaeological material and geophysical data acquired during an unexploded ordnance (UXO) survey of the NEMO Link route (Figure 1).
- 1.1.2 As part of ongoing works any items of archaeological interest found during UXO clearance works are reported to Wessex Archaeology. This approach enables a representative sample of archaeological anomalies identified as part of the archaeological assessment of geophysical survey data to be subject to ground-truthing exercises. The aim of this assessment was to contribute towards a greater understanding of the nature, character and extent of the marine archaeological environment to inform appropriate mitigation strategies adopted for the scheme. This assessment of data is currently ongoing; however, this report covers a specific reported target and the surrounding area.
- 1.1.3 On the 20 July 2017, an area of magnetic anomalies, previously identified by Gardline Geosurvey Ltd (Gardline), were investigated by Dynasafe BACTEC Limited (Dynasafe BACTEC) and Bluestream using a dive team. One metallic object of archaeological interest was identified and brought to the surface. As it was of archaeological interest a survey report of the object was sent to Wessex Archaeology for review. A temporary exclusion zone (TEZ) of 50 m around the original location of the object was put in place.
- 1.1.4 Whilst reviewing the area some ferrous debris (reported to be steel wire) was discovered and removed. An area of 50 m by 20 m was cleared, the exact location of this area has not been provided, so is unable to be used to inform interpretations.
- 1.1.5 Dynasafe BACTEC and Bluestream carried out the survey and recovery of the objects, their current findings have been reported on in the form listed below (Appendix 1).
- *Preliminary Record Pro-forma Sheet (Dynasafe BACTEC and Bluestream 2017).*
- 1.1.6 The metallic object was recovered on 20 July 2017 and was found to comprise a compound object formed of a length of banding with metal pins attached. The object was cut up post-recovery into three sections to facilitate transport and storage, and was transferred to Wessex Archaeology, Salisbury for recording and identification.
- 1.1.7 A review of the 2016 geophysical survey data over a section of the NEMO Link route where the anomaly of archaeological interest was identified was undertaken and forms the basis of this report. The 2016 geophysical data were acquired by Gardline.



1.2 Aim

- 1.2.1 The aim of this document is to describe the location and archaeological nature of any targets which may be subject to impact as a result of the development in the surrounding area of the as found debris.

2 METHODOLOGY

2.1 Data sources

- 2.1.1 A number of data sources and additional information were utilised during this assessment. These included:

- *geophysical data acquired during geophysical and UXO survey operations by Gardline in 2016, with associated reports (Gardline 2016a; 2016b);*
- *the results of previous geophysical interpretations undertaken by Wessex Archaeology (Environmental Impact Assessment (EIA) / Desk-Based Assessment (DBA); Wessex Archaeology 2016);*
- *the Written Scheme of Investigation (WSI) for the NEMO Link project 'NEMO-TUVSUD-CB-PRO-1000 WSI Rev2' (Sea Change 2016); and*
- *Preliminary Record Pro-forma Sheet (Dynasafe and Bluestream 2017).*

- 2.1.2 The focus of the geophysical assessment is within 50 m of the as found position of the item of debris (Table 1).

Table 1: Debris locations

	Easting (WGS84 UTM 31 N)	Northing (WGS84 UTM 31 N)	Description
Debris			
Survey position	unknown	unknown	Metal with concretions
As found position	388404	5686278	
New position	Recovered		

2.2 Geophysical Data Assessment Methodology

Geophysical Data – Technical Specifications

- 2.2.1 Geophysical data were acquired by Gardline during 2016, data acquisition was split into two surveys undertaken by two separate vessels. The geophysical survey was completed by MV *Meriel D*, which comprised the collection of sidescan sonar (SSS), multibeam echosounder (MBES) and sub-bottom profiler (SBP) datasets, between 16 May and 18 June 2016. The UXO survey was undertaken by MV *Titan Discovery* between 15 April and 26 September 2016, and comprised marine magnetometer datasets. The SBP data were not used in this review as were deemed outside of the investigations requirements for this investigation.

- 2.2.2 The following information has been taken from the Gardline Operations and Interpretive reports (Gardline 2016a; 2016b). It is understood that variable line spacing was planned across the different sensors for the nearshore surveys, with the sidescan sonar at a maximum of 40 m and the magnetometer array at 6 m line spacing. Infill was undertaken were deemed required along the route (Gardline 2016a).

2.2.3 The SSS data were acquired utilising an Edgetech 4200-FS 300/600 kHz system at a range of 50 m per channel, and were provided to Wessex Archaeology as .xtf files. The magnetic data were acquired in a towed array of three Geometrics G-882 magnetometers spaced 3.4 m or 2.3 m apart, depending on the bathymetry (flat or with bedforms, respectively). The data were provided as .csv files in nanotesla (nT). The MBES data were acquired utilising a Reson SeaBat 7125 SV2 system, processed data were provided as 0.5 m gridded .xyz files reduced to lowest astronomical tide (LAT).

2.2.4 All positions were recorded and expressed in WGS 1984 UTM Zone 31N coordinates.

Geophysical Data – Processing

2.2.5 Three different datasets were used to assess the study area: SSS, magnetometer and MBES (Gardline 2016a) data. Each dataset was processed separately using the following software (Table 2).

Table 2: Software used for geophysical assessment

Dataset	Processing Software	Interpretation and rationalisation
SSS	CODA Survey Engine v5.5	ArcMap v10.5.0.6491
Magnetometer	MagPick v3.25	
MBES	Fledermaus v7.7.4	

2.2.6 The SSS data files were processed by Wessex Archaeology using Coda Survey Engine software. This allowed the data to be replayed with various gain settings in order to optimise the quality of the images. The data were interpreted for any objects of possible anthropogenic origin. This involves creating a database of anomalies within Coda by tagging individual features of possible archaeological potential, recording their positions and dimensions, and acquiring an image of each anomaly for future reference.

2.2.7 A mosaic of the SSS data is created during this process to assess the quality of the sonar towfish positioning and coverage of the area. This process allows the position of anomalies to be checked between different survey lines and for the positioning to be further refined if necessary.

2.2.8 The form, size and/or extent of an anomaly is a guide to its potential to be an anthropogenic feature and therefore of 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.

2.2.9 The magnetometer data were processed by Wessex Archaeology using Geometrics MagPick software in order to identify any discreet magnetic contacts which could represent buried metallic debris or structures such as wrecks.

2.2.10 The software enables both the visualisation of individual lines of data and gridding of data to produce a magnetic anomaly map. The data were first manually smoothed to try and eliminate any spiking. A trend was then fitted to the resulting data, and the trend values subtracted from the smoothed values. This was carried out in an attempt to remove natural variations in the data (such as diurnal variation in magnetic field strength and changes in geology). The processed data were then gridded to produce a map of magnetic anomalies,

and individual anomalies tagged and images taken in a similar process to that undertaken for the SSS data.

- 2.2.11 The MBES data were analysed to identify any unusual seabed structures that could be shipwrecks or other anthropogenic debris. The data were viewed and analysed using Fledermaus software, which enables 3-D visualisation of the acquired data and geo-picking of seabed anomalies.

Geophysical Data – Anomaly Grouping and Discrimination

- 2.2.12 The previous section describes the initial interpretation of all available geophysical datasets 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 datasets and apparently overstating the number of archaeological features in the study areas.
- 2.2.13 To address this fact, the anomalies were grouped together, allowing 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 SSS anomalies. At this stage, gazetteers of anomalies created during previous phases of work undertaken by NEMO Link site were reviewed and if present were grouped with the data interpretation.
- 2.2.14 Once all the geophysical anomalies and desk-based information have been grouped, a discrimination flag is added to each record in order to discriminate against those not thought to be of archaeological potential. These flags are ascribed as follows (Table 3):

Table 3: Criteria discriminating relevance of anomalies to the proposed scheme

Non-archaeological	U1	Not of anthropogenic origin
	U2	Known non-archaeological feature / Feature of non-archaeological interest
	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

- 2.2.15 The grouping and discrimination of information is based on all available information and is not definitive. It allows for all features of potential archaeological interest to be highlighted, while retaining all the information produced during the course of the geophysical interpretation and desk-based assessment, enabling further evaluation should more information become available.
- 2.2.16 Any sites located outside of the defined study areas, either previously recorded in known databases (e.g. UKHO) or identified during this geophysical assessment, are deemed beyond the scope of the current project and are subsequently not included in this report.
- 2.2.17 During grouping of the interpretation results with the results of previous phases of work, any identified anomaly that matches a previously identified feature retains the original anomaly number assigned for previous Wessex Archaeology reports. However, positions and dimensions are updated to reflect the more recent data.



- 2.2.18 For the final results, the non-archaeological anomalies are removed from the gazetteer. The results from the assessment of the study area have been provided as a gazetteer in Appendix 2, are discussed in this report and illustrated in Figures 2 and 3. Recommendations have been made for mitigation measures should the anomalies be directly impacted by the proposed scheme.

3 THE SITE

3.1 Surficial Geology

- 3.1.1 The study area lies approximately 2 km south-west of Ramsgate Harbour on the edge of the Ramsgate Channel, north-west of Cross Ledge, at the entrance to Pegwell Bay, in the southern North Sea.
- 3.1.2 The broad geological sequence across the route, between the UK and Belgium, are summarised in Table 4, taken from the archaeological EIA (Wessex Archaeology 2016).

Table 4: General geological sequence for the NEMO Link route (Wessex Archaeology 2016)

Unit	Description
1	Recent (Holocene) seabed sediments, gravelly shelly sand
2	Post-Devensian terrestrial (UK sector) and estuarine (Belgian sector) clay, silt and fine sand with organic inclusions and peat layers
3	Eocene clay (London Clay Formation)
4	Palaeocene sand and sandy clay (Thanet Formation)
5	Campanian (Upper Cretaceous) chalk

- 3.1.3 Within the study area, the surficial sediment mainly comprises shelly gravelly sands and sandy gravels, with the presence of silt and clay; identified as recent (Holocene) seabed sediments.
- 3.1.4 Underlying the surficial sediments, the geology for the study area is the Thanet Formation comprising sand and sandy clay (Palaeocene; Thanetian). The various units of clay noted in Table 5 (Unit 2, 3 and 5) do not appear in the geology in this section of the route. This is confirmed by the British Geological Survey (BGS) Solid Geology charts of the area (BGS 1989).
- 3.1.5 The geophysical data indicates that with the surficial sediments there are mobile bedforms around the study area, which highlights the possibility of possible buried debris.

3.2 Results

Geophysical Assessment Results

- 3.2.1 The study area, 50 m radius from the as found location of the debris (MAG_X), was assessed using the data from the 2016 UXO survey (Gardline 2016) for the potential for further debris items.
- 3.2.2 A total of three anomalies were identified within the study area; all anomalies were identified as magnetic with no surficial representation. Table 6 summarises the anomaly classes. Further information has been provided in the gazetteer (Appendix 2) and Figure 2.

Table 5: Classification of anomalies of archaeological potential from the geophysical data acquired in 2016 (Gardline 2016)

Criteria classes	Interpretation	Total
A1	Anthropogenic origin of archaeological interest	0
A2	Uncertain origin of possible archaeological interest	3
A3	Historic record of possible archaeological interest with no corresponding geophysical anomaly	0
Total		3

- 3.2.3 The three magnetic anomalies (**7432**; **7433**; **7434**) were identified near the as found location of the item of debris found by the Dynasafe Bactec dive team. Some magnetic variance in the area appears to link the anomalies.
- 3.2.4 Magnetic anomaly **7432** was identified approximately 15 m south-west of the as found location of the debris that was recovered (Dynasafe BACTEC and Bluestream 2017). The magnetic anomaly was a large size with an amplitude of 385 nT recorded, indicating ferrous material. No surface representation of the magnetic anomaly was observed in the geophysical data, signifying that the object is buried. The object appears to be very close to an area of magnetic variance and is likely either linked or positioned close to a number of buried ferrous objects. Mobile bedforms were visible in the SSS and MBES data to the west of the object, indicating that recent surficial sediments cover the area.
- 3.2.5 Magnetic anomaly **7433** was identified approximately 12 m south-east of the as found location of the debris that was recovered (Dynasafe BACTEC and Bluestream 2017). The magnetic anomaly was a large size with an amplitude of 277 nT recorded, indicating ferrous material. No surface representation of the magnetic anomaly was observed in the geophysical data, signifying that the object is buried. The magnetic data displayed a number of peaks indicating that there may be a number of objects clustered closely together. There also appears to be an area of magnetic variance, possibly linking the surrounding objects together (**7432**; **7434**). This indicates that there may be a linear object with either the changes in direction displaying as anomalies or additional objects. Mobile bedforms were visible in the SSS and MBES data to the west of the object, indicating that recent surficial sediments cover the area.
- 3.2.6 Magnetic anomaly **7434** was identified approximately 39 m east of the as found location of the debris that was recovered (Dynasafe BACTEC and Bluestream 2017). The magnetic anomaly was a large size with an amplitude of 84 nT recorded, indicating ferrous material. No surface representation of the magnetic anomaly was observed in the geophysical data, signifying that the object was buried. The magnetic data an area of magnetic variance, possibly linking the surrounding objects together (**7432**; **7433**). This indicates that there may be a linear object with either the changes in direction displaying as anomalies or additional objects. Mobile bedforms were visible in the SSS and MBES data to the west of the object, indicating that recent surficial sediments cover the area.
- 3.2.7 The Dynasafe BACTEC dive team reviewed an area where there was indication of ferrous debris for potential UXO; an item of ferrous debris, of possible archaeological interest, was located, along with further debris reported as steel wire (pers. comm. Euan McNeill). An area of approximately 50 m by 20 m was reviewed and cleared of all objects of ferrous origin. The area was checked by the dive team with hand held devises (pers. comm. Euan



McNeill). The items recovered may relate to one or more of the magnetic anomalies identified in this report, however, due to the unknown location of the clearance area with regards to the geophysical anomalies, at this time Wessex Archaeology is unable to reduce or remove the A2 items.

- 3.2.8 There are a number of anomalies surrounding the 50 m buffer, however none to indicate a substantial wreck or debris field.

Archaeological Assessment of Ferrous Debris

- 3.2.9 The ferrous debris comprised an iron band measuring 6.03 m long, 70 mm wide and 20 mm thick. The band has two different faces; a slightly curved one that would be the outer face and a flat face from which metallic nails would serve to fix it to the hull, which is thought to have been wooden. The nails, which are made of iron, are placed every 180 mm along its length and measure 70 mm long and 10 mm wide. The debris was cut up post-recovery into three sections to facilitate transport and storage and one section of the debris is shown in Plate 1.
- 3.2.10 The item has an inverse curvature which would have been present when the banding was in its original position attached to the vessel. It is unknown whether this change in curvature occurred before or after its disposal, or during the recovery works.
- 3.2.11 The metallic item has been assessed as being from a vessel of the late 19th or early 20th century. The item would most likely be a metal reinforcement and protective element that would be attached to the hull of a small merchant ship (Cooper 1955, 39). It is particularly similar to the longitudinal iron reinforcements used on Thames Sailing Barges (Plate 2). It is not associated with any further remains from a wreck and appears to be a stray item, possibly lost or discarded from a relatively modern vessel. The metal debris is considered to be of low archaeological interest.

4 CONCLUSION

- 4.1.1 Using the geophysical data (Gardline 2016a), no areas were identified within the 50 m radius of the as found location of the item of debris as being of high archaeological potential based on their geophysical response.
- 4.1.2 Three anomalies were identified in the 2016 magnetometer data, all have been assessed as an A2 object (Uncertain origin of possible archaeological interest); no surface representation indicates that these items are buried.
- 4.1.3 As part of a UXO survey, an item of ferrous debris with archaeological potential and some recent debris (steel wire) were recovered. The debris has been identified as metal banding that is likely to have been attached to the wooden hull of a small merchant ship, possibly a Thames Sailing Barge. There are a number of anomalies surrounding the 50 m buffer, however none indicate a substantial wreck or debris field. The debris has therefore most likely been lost from or discarded from a vessel, and as such is considered to be of low archaeological interest.
- 4.1.4 The anomalies identified in the 2016 magnetometer data may relate to the debris items recovered; both **7432** and **7433** are close to the as found location of the debris with potential archaeological interest. However, there is no further information available to confirm the position and extent of this and so association cannot be confirmed. To confirm that all items have been removed further details of the area cleared or further investigation and geophysical data would be required.



- 4.1.5 Based on the assessment of both the geophysical data and recovered material, it is recommended that the TEZ be removed.

5 REFERENCES

British Geological Survey (BGS) 1989 Solid Geology 1:250000 Series

Cooper, F. S. 1955 *A Handbook of Sailing Barges: Evolution and Details of Hull and Rigging*. Southampton, Adlard Coles Ltd.

Dynasafe BACTEC Limited and Bluestream 2017 Preliminary Record Pro-forma Sheet; Written 20/07/2017 at 23:00Gardline Geoservices Limited (Gardline) 2016a FIELD/OPERATIONS REPORT for New Subsea Cable Survey: - Nemo Link Pre-Engineering and UXO Survey. Report Reference: 2016 14-233-SUB-REP-008

Gardline Geoservices Limited (Gardline) 2016b FINAL INTEGRATED INTERPRETATIVE REPORT for New Subsea Cable Survey: - Nemo Link Pre-Engineering and UXO Survey. Report Reference: J14-233-SUB-REP-012

Sea Change Heritage Consultants (Sea Change) 2017 Archaeological Written Scheme of Investigation. Rev 2. Document Reference: NEMO-TUVSUD-CB-PRO-1000 WSI Rev2

Wessex Archaeology 2016 Project Nemo UK-Belgium Electrical Interconnector Richborough to West Zeebrugge Archaeological Environmental Impact Assessment Volume I: Report; Report reference: 73390.03




APPENDIX 1: PRELIMINARY RECORD PRO-FORMA SHEET

Appendix 5. Preliminary Record Pro-forma Sheet

Discoveries on Board / on the Seabed / in the inter-tidal zone	
Company Name:	BLUESTREAM + DYNASAFE BACTEC LTD
Vessel/Team Name:	MVD SCHELDDEOORD
Site/Sea Area Name	RAMSGATE - NEMO LINK PROJECT
Date:	201717
Time of compiling information:	2300
Name of compiler (Site Champion):	ANDREW LONSDALE UXO SUPERVISOR
Name of finder (If different from above):	P. REGTEREN UXO DIVER
Time at which discovery was encountered:	2145
Vessel position at time when anomaly was encountered:	
a) Latitude	388410.10
b) Longitude	5686253.40
c) Datum (if different from WGS84)	UTM 31
Original position of the anomaly on the seabed, if known:	
EASTING : 388404.30 NORTHING : 5686278.30	
Notes on likely accuracy of original position stated above:	
NO DISCREPANCIES IN ACCURACY	
a) How accurate is the position?	ACCURATE - "ANOMALY DE" ON NAVSCREEN
Is the position the original position or has the material been moved by operations?	ITEM RECOVERED TO DECK BEFORE IT COULD BE FULLY INSPECTED.
Details of circumstances and activity that lead to the discovery	CLEARING CORRIDOR FOR CABLE - NEMO LINK PROJECT.

Discoveries on Board / on the Seabed / in the inter-tidal zone	
Description of the find/anomaly: BAND OF METAL - HEAVILY ENCRUSTED. CURVED WITH SQUARE SHANK NAILS 8M LONG APPROX X 50CM DEEP X 1CM THICK.	
Apparent size/extent of the anomaly: 8M LONG X 50CM WIDE X 1CM THICK	
Details of any find(s) recovered: NO OTHER FINDS LOCATED.	
Details of photographs, drawings or other records made of the find(s) (e.g. location figure): SEVERAL PHOTOS TAKEN - SENT SEPARATELY	
Details of treatment or storage of find(s): WRAPPED IN PLASTIC AND TAKEN TO SHORE	
Date and time Nominated Contact informed:	22.12
General notes: METAL CONTACT DETECTED. AREA HAD BEEN LITTERED WITH SWIL SO ITEM WAS RECOVERED AS BELIEVED TO BE ASSOCIATED WITH CONTAMINATED AREA	

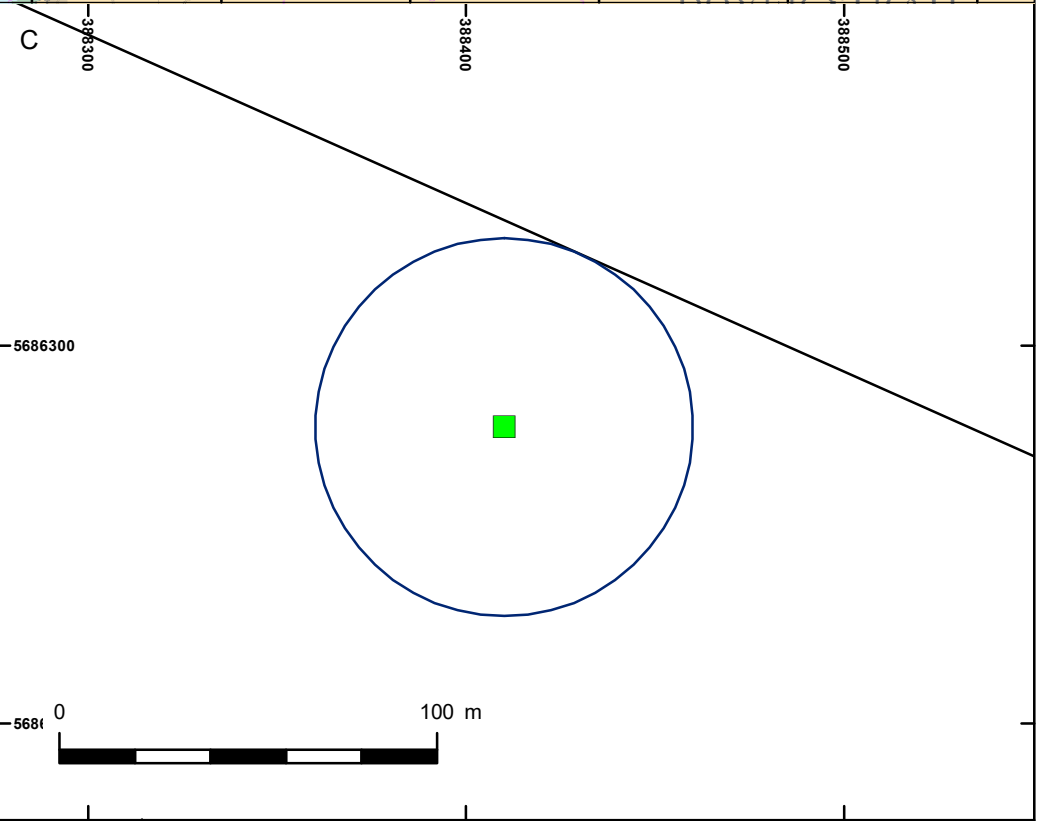
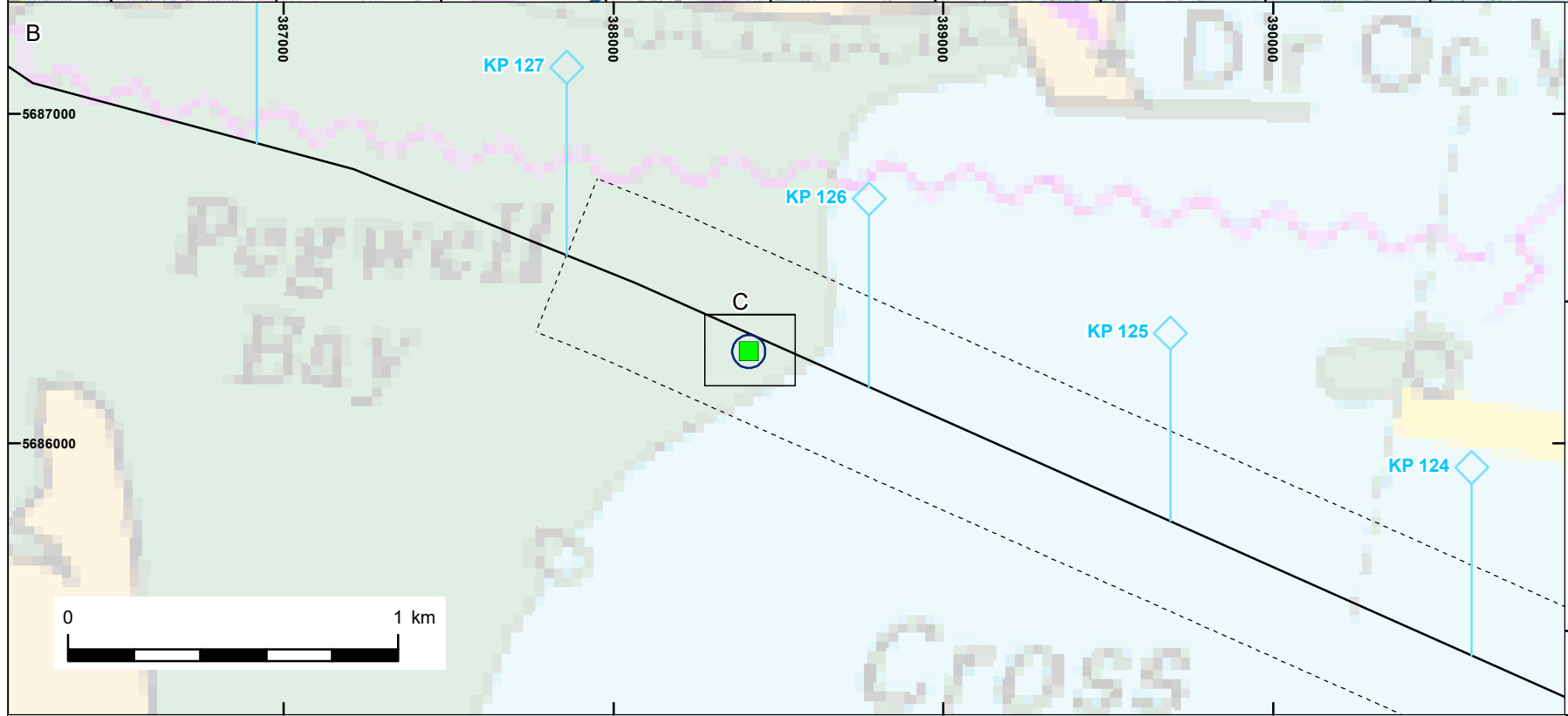
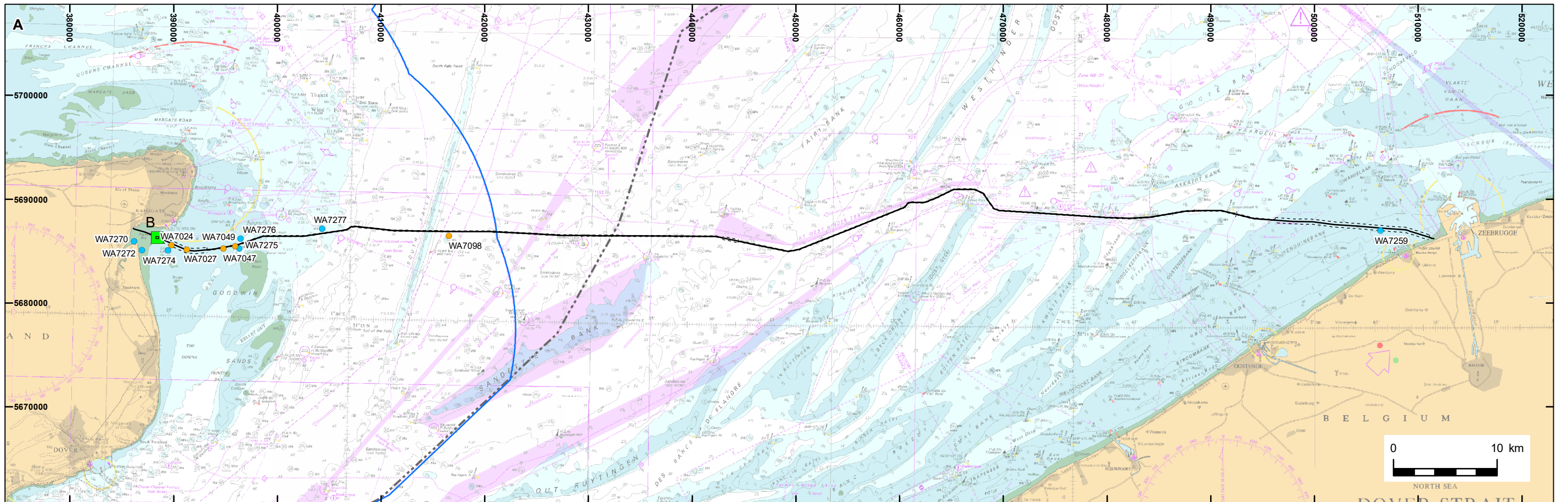
Discoveries on Board / on the Seabed / in the inter-tidal zone	
If discovered on the seabed:	
a) Derived from: e.g. Obstacle Avoidance Sonar, Cable Tensionometer?	ORIGINAL SONAR DATA
Apparent size/extent of anomaly (length, width, height above seabed)	BURIED UP TO 1.8M.
Extent of deviation/route development	N/A
Signed: 	Date: 20/07/17



APPENDIX 2: GEOPHYSICAL GAZETTEER

WA ID	Class	Easting (UTM31N)	Northing (UTM31N)	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Magnetic Amplitude (nT)	Description	External Reference
7432	Magnetic	388395	5686276	A2	-	-	-	385	Large asymmetric dipole seen in the magnetic data amongst an area of magnetic variance that appears to join between identified magnetic targets, indicating a linear object. Not seen in the SSS or MBES data, indicating buried ferrous debris. Located approximately 15 m from the as found location of the item of debris found by the dive team (Bactec Dynasafe 2017 (21/07/2017)).	-
7433	Magnetic	388421	5686272	A2	-	-	-	277	Large asymmetric dipole with a number of peaks and troughs seen in the magnetic data amongst an area of magnetic variance, possibly joined to nearby anomalies indicating a linear object. Not seen in the SSS or MBES data, indicating buried ferrous debris. The signal indicates that there may be a number of buried ferrous objects clustered together. Located approximately 12 m from the as found location of the item of debris found by the dive team (Bactec Dynasafe 2017 (21/07/2017)).	-
7434	Magnetic	388449	5686276	A2	-	-	-	84	Medium asymmetric dipole seen in the magnetic data amongst an area of magnetic variance, possibly joined to nearby anomalies indicating a linear object. Not seen in the SSS or MBES data, indicating buried ferrous debris.	-

1. Co-ordinates are in WGS84 UTM 31 N
2. Positional accuracy is estimated at ± 10



NEMOLink Route	Regional boundaries	UK Written Scheme of Investigation Exclusion Zones (EZ)	Archaeological Investigation Study Area
— RPL	— UK 12 NM limit (territorial waters)	● Archaeological EZ Locations	■ Ferrous Debris As Found Location
- - - Route corridor	- - - Mid-way boundary between UK and Europe	● UKHO EZ Locations	□ 50 m Study Area
— KPs			

Geophysical data acquired by Gardline Geosurvey Ltd in 2016.
 Charts from MarineFIND.co.uk. © Crown Copyright 2017. All rights reserved. Licence No. EK001-0582-MF0050.
 Contains Ordnance Survey data © Crown copyright and database right 2017.

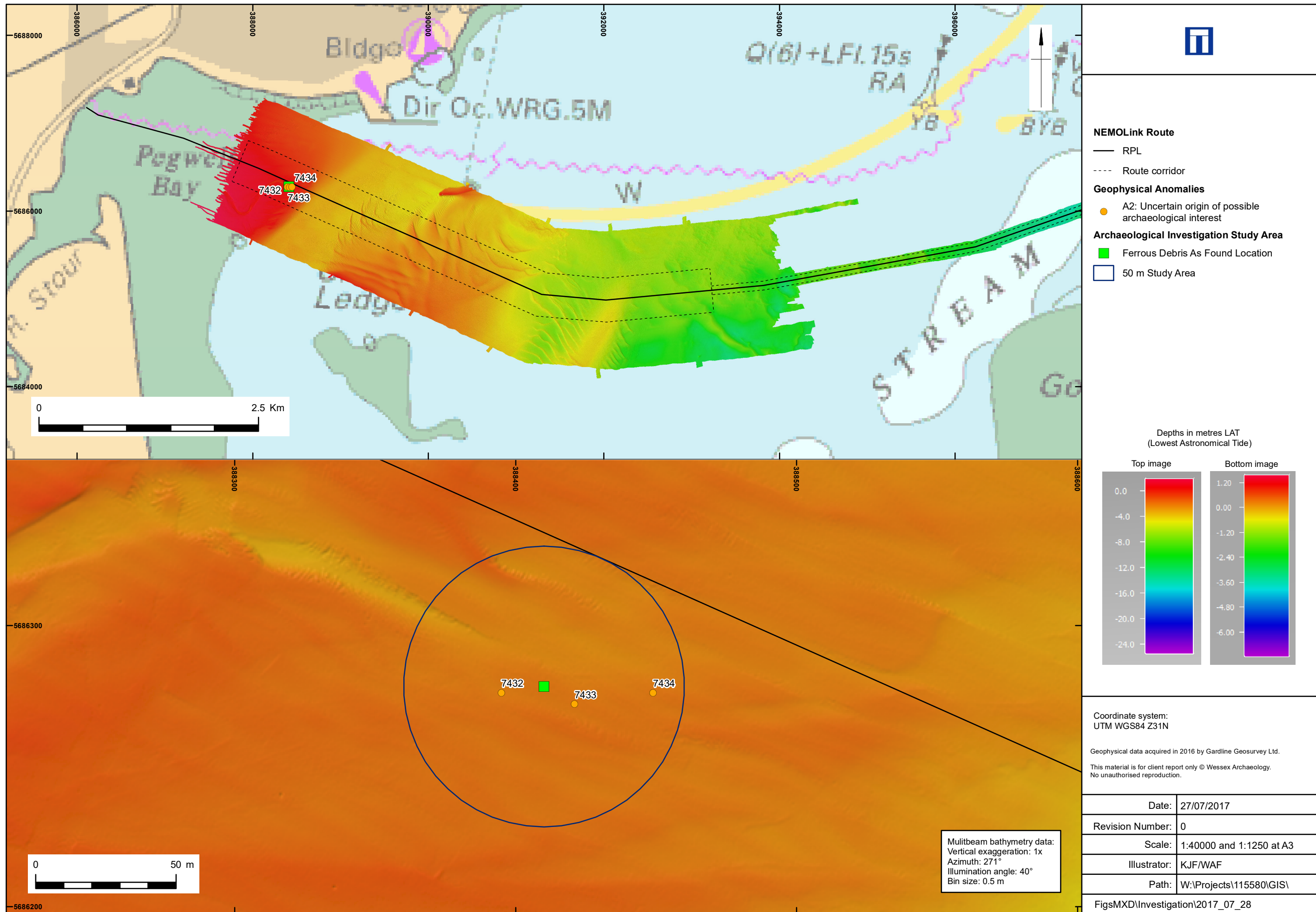
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Coordinate system:
 UTM WGS84 Z31N

Date:	07/04/2017	Revision Number:	0
Scale:	A 1:400,000 B 1:20,000 C 1:800 at A3	Illustrator:	KJF/ND/WAF
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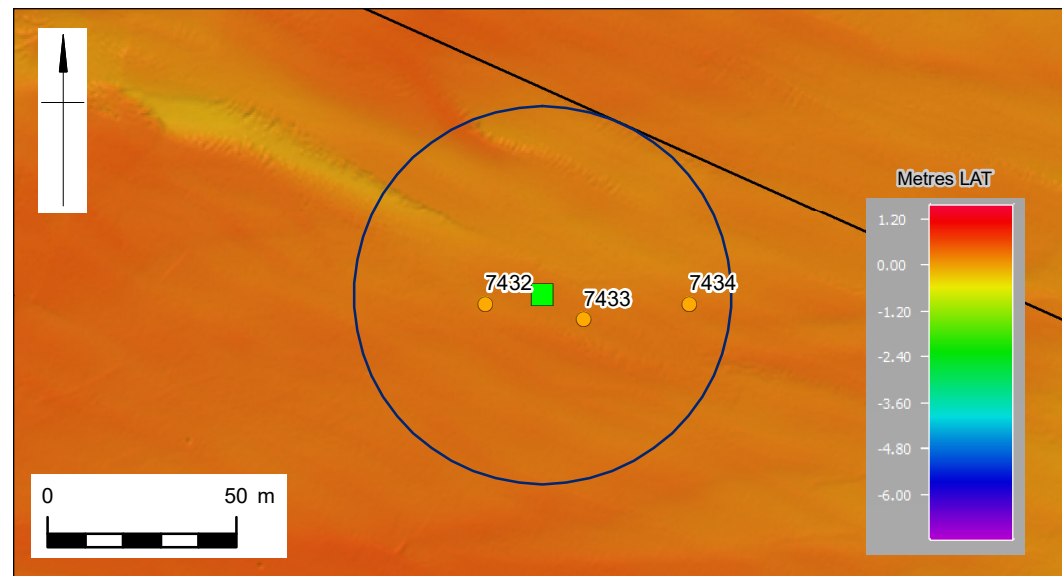
Location map

Figure 1

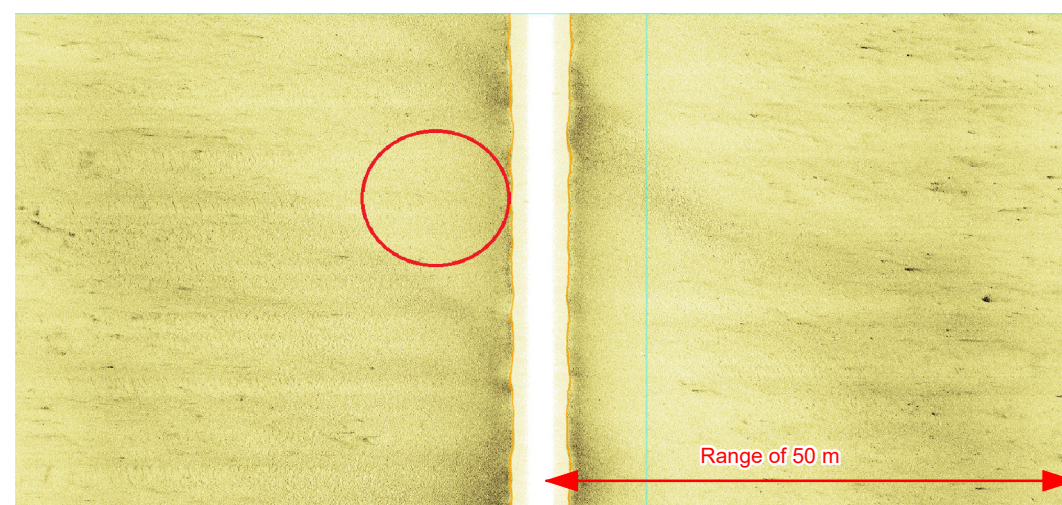


Anomalies of archaeological potential identified in 2016 geophysical data

Figure 2



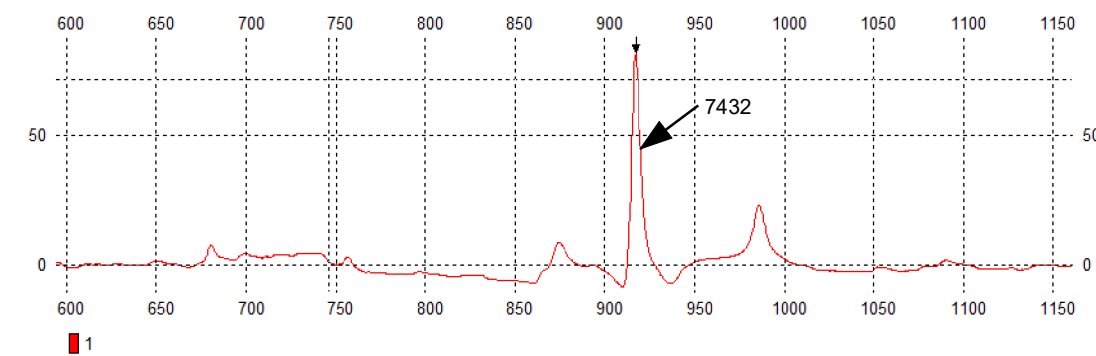
Multibeam bathymetry image of the location buried ferrous debris before recovery with locations of 7432, 7433 and 7434



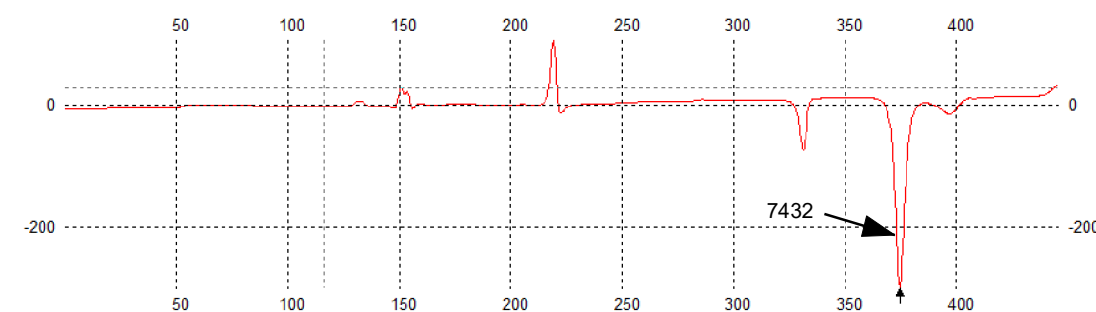
Sidescan sonar image of the location of buried ferrous debris before recovery



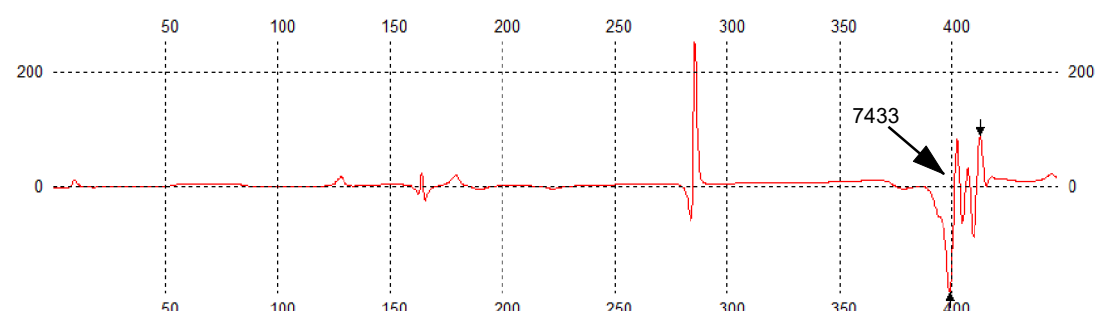
Images of the recovered metal debris



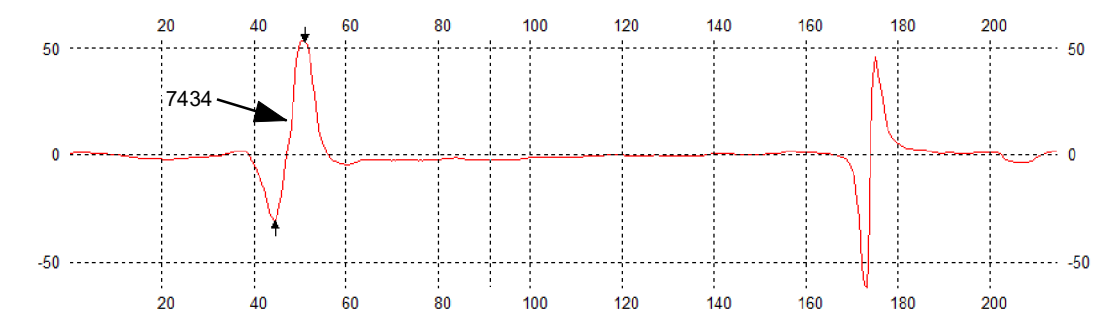
Magnetometer profile (positive peak) of 7432 measuring 385 nT in total



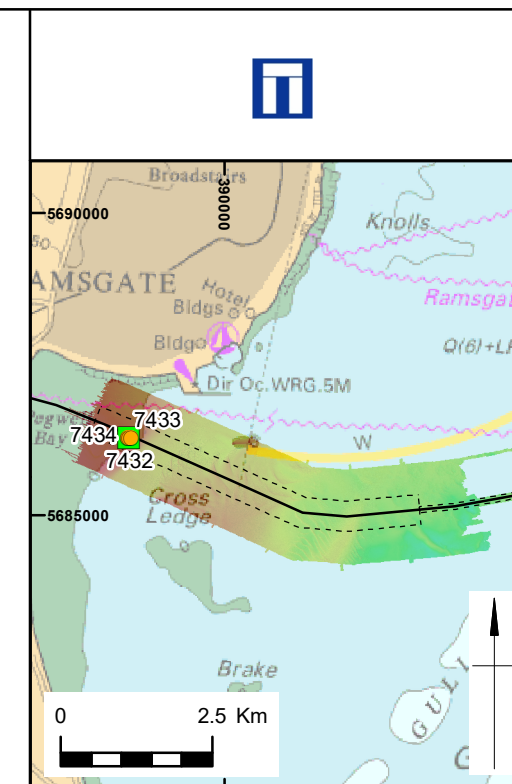
Magnetometer profile (negative peak) of 7432 measuring 385 nT in total



Magnetometer profile (positive and negative peak) of 7433 measuring 277 nT in total



Magnetometer profile (positive and negative peak) of 7434 measuring 84 nT in total



NEMOLink Route

- RPL
- - - Route corridor

Geophysical Anomalies

- A2: Uncertain origin of possible archaeological interest

Archaeological Investigation Study Area

- Ferrous Debris As Found Location
- 50 m Study Area

Coordinate system:
UTM WGS84 Z31N

Geophysical data acquired in 2016 by Gardline Geosurvey Ltd.
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Date:	28/07/2017
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Path:	W:\Projects\115580\GIS\FigsMXD\Investigation\2017_07_28



Plate 1: One section of the ferrous debris



Plate 2: Metal banding on a restored Thames Sailing Barge, *Pudge*.
Photo courtesy of the Thames Sailing Barge Trust.

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