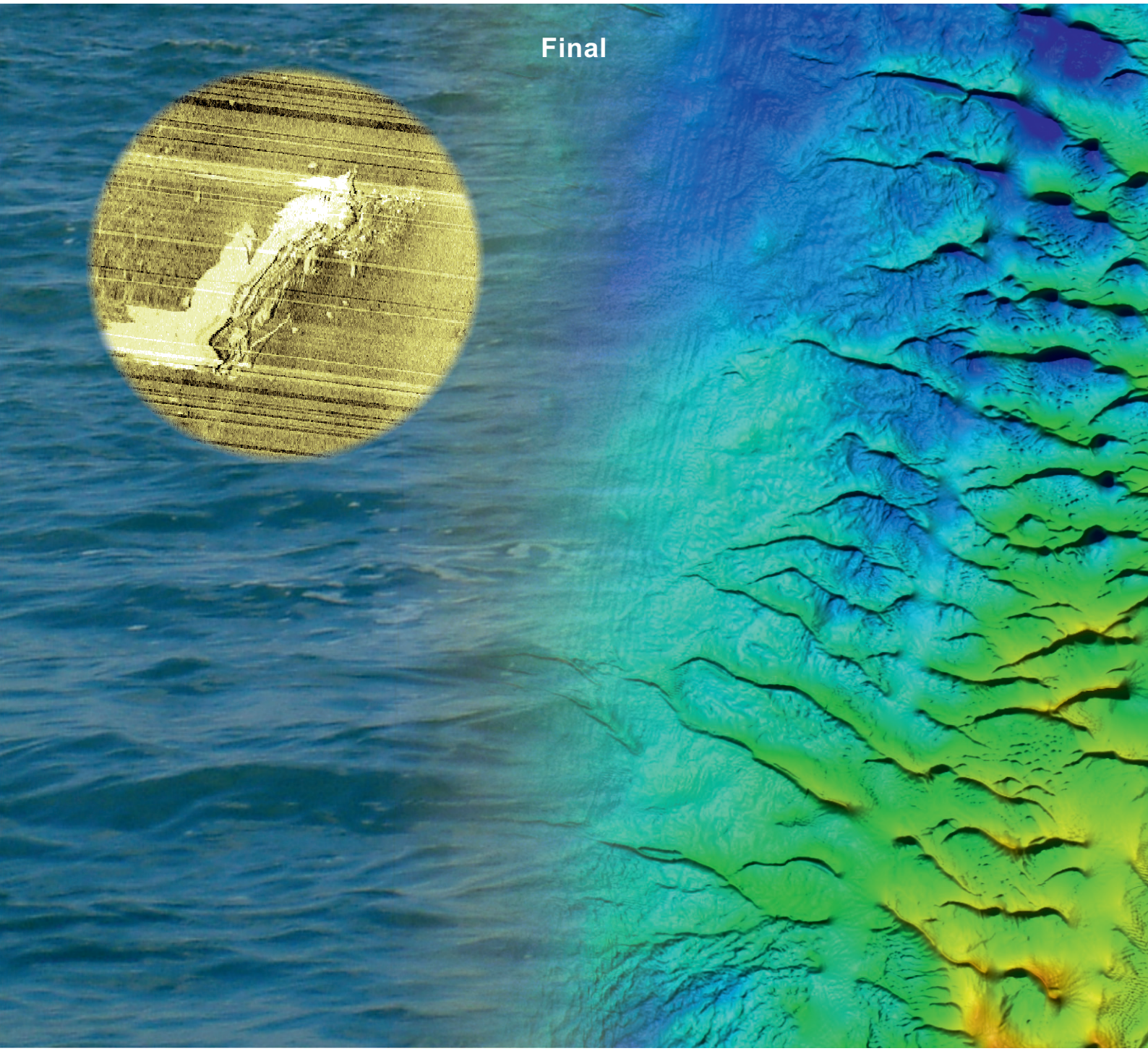
Wessex Archaeology

# Area 481
# Marine Aggregate Extraction

## Archaeological Assessment of Geophysical Data
## Archaeological Monitoring Report

**Final**



Ref: 64692.03

April 2012

# AREA 481

# MARINE AGGREGATE EXTRACTION

## Archaeological Assessment of Geophysical Data

## Archaeological Monitoring Report

Final

Prepared by:

**Wessex Archaeology**
Portway House
Old Sarum Park
Salisbury
Wiltshire
SP4 6EB

Prepared for:

Tarmac Marine Dredging/ Van Oord UK Ltd.
UMA House
Shopwyke Road
Chichester
West Sussex
PO20 2AD

**April 2012**

**Report Ref: 64692.03**

# AREA 481
# MARINE AGGREGATE EXTRACTION

## Archaeological Assessment of Geophysical Data
## Archaeological Monitoring Report

**Ref: 64692.03**

| | |
|---|---|
| Title: | Area 481 Marine Aggregate Extraction: Archaeological Monitoring Report |
| Principal Author(s): | Hanna Steyne |
| Managed by: | Paul Baggaley |
| Origination date: | December 2011 |
| Date of last revision: | April 2012 |
| Version: | 64692.03 |
| Wessex Archaeology QA: | Steve Webster |
| Status: | Final Report |
| Summary of changes: | Incorporation of comments from MMO |
| Associated reports: | 64690.02, 64691.02 |
| Client Approval: | Dr Andrew Bellamy |

# AREA 481
# MARINE AGGREGATE EXTRACTION

## Archaeological Assessment of Geophysical Data
## Archaeological Monitoring Report

**Ref: 64692.03**

### Summary

Wessex Archaeology was commissioned by Tarmac Marine Dredging & Van Oord UK Ltd to undertake an archaeological assessment of geophysical survey data as part of the heritage impact monitoring process implemented for aggregate extraction Area 481. The data consisted of sidescan sonar and multibeam data acquired by Gardline Ltd in April and May 2011 (Gardline 2011). The review was to include an assessment of these data in conjunction with the results of the previous desk-based assessment (WA 2007) and monitoring report (WA 2009).

The overall aim of this report is to provide an archaeological review of the effects of dredging upon known archaeological sites and previously identified geophysical anomalies that may potentially be of archaeological interest; and to assess the areas for new sites and anomalies of potential archaeological interest.

In total 10 geophysical anomalies were identified within dredging Area 481, and a further 19 geophysical anomalies were identified within the 500m buffer zone. Three shipwrecks were identified (**7001, 7002** and **7003**), all of which had been previously recorded (WA 2007 and WA2009). One of the shipwrecks (**7002**) is located within Area 481 East and the other two (**7001** and **7003**) are located in the buffer zone around Area 481 West. The two wrecks within the buffer zone correspond to the charted wreck sites of the *Freidig* (**7001**) and *Heimland* (**7003**). Site **7002** is an unidentified shipwreck. The three wrecks were all identified during previous archaeological analysis of geophysical data, and as a result are already subject to exclusion zones (WA 2007 and 2009).

No new mitigation strategies have been recommended for the area, though it is recommended that the present Archaeological Exclusion Zones remain in place, and that any artefacts recovered during dredging activities are reported using the established BMAPA Protocol for Reporting Finds of Archaeological Interest (BMAPA & English Heritage 2003).

# AREA 481
# MARINE AGGREGATE EXTRACTION

## Archaeological Assessment of Geophysical Data
## Archaeological Monitoring Report

**Ref: 64692.03**


### Acknowledgements

This investigation was commissioned by Tarmac Marine Dredging & Van Oord Ltd. The data were provided by Gardline Ltd, and their assistance is acknowledged in this respect.

Genevieve Shaw carried out the assessment and Hanna Steyne compiled the report, with quality control provided by Steve Webster. Kitty Brandon prepared the illustrations and the project was managed for Wessex Archaeology by Dr Paul Baggaley.


### Data Licences

# AREA 481
# MARINE AGGREGATE EXTRACTION

## Archaeological Assessment of Geophysical Data
## Archaeological Monitoring Report

**Ref: 64692.03**

## *Contents*



### Figures:



### Tables:

# AREA 481
# MARINE AGGREGATE EXTRACTION

## Archaeological Assessment of Geophysical Data
## Archaeological Monitoring Report

**Ref: 64692.03**

## 1. INTRODUCTION

### 1.1 PROJECT BACKGROUND

1.1.1 Wessex Archaeology (WA) was commissioned by Tarmac Marine Dredging & Van Oord UK Ltd. to undertake an archaeological assessment of geophysical survey data as part of the heritage impact monitoring process implemented for aggregate extraction Area 481, situated off the Lincolnshire coast (**Figure 1**).

1.1.2 Area 481 is located just east of the Inner Dowsing sandbank and north of the Docking Shoal. The area is divided into two areas, Area 481 West (approximately 6km²) and Area 481 East (approximately 2km²) (**Figure 1**).

1.1.3 The licenced area is delimited by the following co-ordinates (WGS 84, UTM Zone 31N):

| Easting | Northing |
|---|---|
| 344281 | 5908669 |
| 345273 | 5908646 |
| 345120 | 5908161 |
| 343482 | 5907062 |
| 342184 | 5902745 |
| 341355 | 5902781 |
| 342290 | 5906809 |

**Table 1: Delimiting co-ordinates Area 481 West**

| Easting | Northing |
|---|---|
| 346277 | 5905574 |
| 346080 | 5902599 |
| 345084 | 5902638 |
| 345587 | 5903574 |
| 345424 | 5904906 |

**Table 2: Delimiting co-ordinates Area 481 East**

1.1.4 This assessment consists of a review of sidescan sonar and multibeam data acquired by Gardline in May 2011 (Gardline 2011).

1.1.5 As part of the Marine License conditions for the dredging area, geophysical monitoring surveys should be reviewed for changes to the archaeological baseline. This report details the most recent archaeological baseline investigation using geophysical data, a similar investigation having been undertaken for the current Study Area in 2009 (WA 2009).

1.1.6 The survey coverage for the data used in this report has been dictated by Section 12.6(i) of the schedule of conditions for this extraction area which states "*A full coverage Swathe bathymetric survey of the active dredge areas plus a 500m strip*

*around them shall be undertaken by the Operator every second year of the licence term. The extent of the survey shall be determined with reference to EMS track plot data for the previous 2 years*."

1.1.7 In addition to this, for the 2011 survey, the survey coverage was also extended further north from Area 481 East in order to cover an area of possible mussel beds that were encountered by grab samples collected in 2009 by MES. However, the data which were acquired specifically to cover the mussel beds were not assessed for archaeology.

## 1.2 PREVIOUS WORK

1.2.1 In 2007 WA undertook a desk-based assessment (DBA) in support of a licence application for Area 481 (WA 2007). The DBA included an assessment of known, suspected and potential archaeological sites within the Study Area and the assessment of marine geophysical data for sites of archaeological interest.

1.2.2 The DBA (WA 2007) compiled and reviewed documentary records of known archaeological sites and assessed the potential for new sites to be discovered. The reviewed material consisted of:

- Records of wrecks and obstructions collated by the UK Hydrographic Office (UKHO).
- Records of known wrecks and recorded losses held in the maritime section of the National Record of the Historic Environment (NRHE).
- Various secondary sources relating to the palaeoenvironment and to the Palaeolithic and Mesolithic archaeology of Northern Europe
- Secondary sources relating to known and potential wreck sites and casualties.
- The MoD (Naval Staff Directorate) was approached with respect to the Protection of Military Remains Act (1986).
- The Receiver of Wreck at the Marine and Coastguard agency was approached with regards to reports of historic wrecks.
- The database of the BMAPA Protocol for reporting finds of archaeological interest was consulted with respect to archaeological finds reported by wharfs or dredgers.
- Marine geophysical and geotechnical data provided by the client.

1.2.3 The geophysical datasets assessed for the DBA consisted of sidescan sonar and sub-bottom profiler data acquired in 1999 and 2000. The archaeological interpretation of geophysical data aimed to locate, assess and report on the position, character and nature of known and newly discovered archaeological sites.

1.2.4 The archaeological assessment of sidescan sonar data for the DBA identified two anomalies in the southern part of Area 481 East (**6000, 6001**) and one anomaly in the centre of Area 481 West, (**6003**) all of which were thought to be isolated debris. The presence of one charted wreck in the buffer zone around Area 481 West was confirmed (**6002**) (WA 2007) (**Figure 2**). The shipwreck correlated with UKHO and NRHE positions for a shipwreck tentatively identified as the *Freidig*, a Norwegian steamer lost in 1918.

1.2.5 An archaeological assessment of sidescan sonar and multibeam data were undertaken in 2009 by Wessex Archaeology (WA 2009) using data acquired by Gardline in December 2008 and March 2009, as part of the heritage impact monitoring process. The monitoring report confirmed the presence of the shipwreck tentatively identified as the *Freidig* in the far eastern part of the buffer around Area

481 West (**7100**). In addition a second shipwreck was identified in the western part of the buffer around Area 481 West (**7102**), which corresponded with UKHO and NRHE reports for the *Heimland*; also a Norwegian steamer lost in 1917. A third shipwreck was identified in the centre of Area 481 East (**7101**) (**Figure 2**). This wreck was previously uncharted, was not identified in the DBA and did not correspond with any UKHO or NRHE records of shipping losses. It was postulated that the site had become exposed in the movement of sand waves since previous surveys.

1.2.6 Only two other anomalies were identified within the licensed dredging areas; **7103** in Area 481 West and **7109** in Area 481 East. These two anomalies have been identified as a small dark reflector and possible piece of debris respectively. An additional 10 anomalies were identified within the buffers around the licence areas (**Figure 2**).

1.2.7 The features identified within the licenced dredging areas during the DBA were not identified during the 2009 monitoring assessment (**Figure 2**).

### 1.3 SEABED GEOLOGY

1.3.1 The DBA (WA 2007) describes the seabed sediments of Area 481 are composed of slightly shelly, slightly silty, slightly too very gravelly sand (Andrews 2001). The general thickness of this layer in the Study Areas ranges from 0.5m to 1m (*ibid*). The geotechnical vibrocore assessment indicates that these sediments are probably marine in origin and were deposited during the Holocene transgression. Gardline describe the seabed sediments as gravely sands, with sand swept into sand waves in both active areas of licenced area 481 (**Figure 3**) (Gardline 2011)

### 1.4 AIM

1.4.1 The aim of this report is to provide Tarmac Marine Dredging & Van Oord UK Ltd with an archaeological review of the effects of dredging on known archaeological sites and previously identified geophysical anomalies that may be of potential archaeological interest; and to assess the areas for new sites of potential archaeological interest.

## 2. METHODOLOGY

### 2.1 DATA SOURCES

2.1.1 The sidescan sonar data for this report were provided by Gardline Ltd, and was collected in May 2011. Further background information was obtained from previous archaeological work at the site (WA 2007, 2009).

2.1.2 The geophysical data used for this report were assessed for quality and their suitability for archaeological purposes, and rated 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 3: Criteria for assigning data quality rating**

2.1.3 The sidescan sonar data have been rated as “Good” using the above criteria.

## 2.2 GEOPHYSICAL DATA - TECHNICAL SPECIFICATIONS

2.2.1 The data assessed were obtained by Gardline Ltd during April and May 2011 on the MV Ivero and Titan Endeavour. The dataset consisted of sidescan sonar data.

2.2.2 Gardline used an Edgetech 4200 dual frequency sidescan sonar system, operated at both frequencies (100/420kHz) simultaneously and a range of 100m or 150m. The data were recorded digitally using and provided to WA as both .jsf and .xtf files.

2.2.3 For this survey all positions were recorded and expressed in WGS 1984, UTM Zone 31°N.

## 2.3 GEOPHYSICAL DATA - PROCESSING

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. 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.

2.3.2 A mosaic of the sidescan sonar data is produced during this process to assess the quality of the sonar towfish positioning. The survey lines are smoothed, and the navigation corrected either with .cnv files provided by the survey company who acquired the data or individual fixed laybacks as recorded in the survey logs. This allows the position of anomalies to be checked between different survey lines and for the layback values to be further refined if necessary.

2.3.3 The form, size, and/or extent of an anomaly is a guide to its potential to be an anthropogenic feature, and therefore of its potential 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 of a feature as a result of past impacts from, for example, dredging or fishing.

2.3.4 The multibeam bathymetry data were analysed to identify any unusual seabed structure that could be shipwrecks or other anthropogenic debris and correlated with the sidescan sonar interpretation. The data were gridded and analysed using Fledermaus software, which enables 3-D visualisation of the acquired data and geo-picking of seabed anomalies.

### 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 along with the results of the DBA and previous monitoring report. This allows one ID number to be assigned to a single object for which there may be, for example, a UKHO record and multiple sidescan sonar anomalies.

2.4.3 Once all the geophysical anomalies and desk-based information have been grouped, a discrimination flag is added to the record in order to discriminate against those which are not thought to be of an archaeological concern. These flags are 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.

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 of potential archaeological interest to be highlighted, while retaining all the information produced during the course of the geophysical interpretation and desk-based assessment for further evaluation should more information become available.

## 3. RESULTS

3.1.1 Interpretation of the geophysical data identified a total of 29 sidescan sonar anomalies of possible archaeological potential within the Study Area (**Figure 2**, **Appendix I**). Three of the anomalies (**7001**, **7002** and **7003**) were classified as A1 and identified as shipwreck sites and the other 26 were classified as A2; as per the discrimination scheme outlined in **Table 3**.

3.1.2 Of the 29 anomalies, 10 lie within licenced dredging Area 481 with the remaining 19 anomalies within the 500m buffer zone.

3.1.3 Eight anomalies lie within the Western part of Area 481 and a further 14 within its buffer. Two anomalies lie within the Eastern part of Area 481 and a further five within its buffer.

3.1.4 Of the three shipwrecks, two lie within the buffer zone of Area 481 Western Area (**7001** and **7003**) and the third lies within the central region of Area 481 Eastern Area (**7002**).

3.1.5 **7001** corresponds with UKHO and NRHE reports of a shipwreck tentatively identified as the *Freidig*. *Freidig* was a Norwegian registered steamer lost in October 1918 after a collision with the *Ariadne Alexandra* of London. The vessels were in a convoy en route from Middlesbrough for Rouen. The *Freidig* was carrying a cargo of iron ingots. She was built in 1882 as the *Lahneck* in Elbing but changed hands a number of times and was owned by A/S Motorseil (Gustav Pedersen & Son), Lillesand at the time of her loss. **7001** lies in the eastern part of the buffer around Area 481 West. The site measures approximately 54.5m x 13.6m x 8m and is orientated NE-SW. The sonar image indicates the broken up structure of a ship with debris around the wreck within a discrete area (**Figure 4**).

3.1.6 **7002** is an uncharted wreck located near the centre of Area 481 East. The anomaly measures approximately 22.4m x 11.3m x 2.7m. The site is oriented NE-SW and lies within an area of sand ripples. The wreck is badly broken up but is upstanding to a height of 2.5m. There is at least one piece of debris lying away from the main area (**Figure 5**).

3.1.7 **7003** corresponds with UKHO and NRHE reports of a shipwreck tentatively identified as the *Heimland*, a Norwegian steel hulled steamer built in 1913 and lost in January 1917 after hitting a mine laid by the German submarine UC-26. The ship was registered and owned in Norway when lost and was en route from Newcastle to St. Nazaire with a cargo of coal. The site measures approximately 49m x 39.5m x 4.5m and is broken up with at least one piece of debris lying away from the main site (**Figure 6**).

3.1.8 For all three wreck sites described above, no changes were identified to either the structure of the wrecks, any associated debris or surrounding seafloor.

3.1.9 A total of eight dark reflectors are located within the dredge area. Five of the dark reflectors are located in the central part of Area 481 West (**7004**, **7006**, **7018**-**7020**). These anomalies range in size from 2m x 0.5m x 0.8m (**7018**) to 4.4m x 0.6m x 0.2m (**7019**). An additional dark reflector is located in the south of Area 481 West (**7009**) and measures 2.9m x 0.6m x 0.5m (**Figure 7**).

3.1.10 One dark reflector is located in the far north of Area 481 East (**7026**). **7026** is a small circular anomaly with a bright shadow and measures 1.8m x 1.2m x 1m (**Figure 7**).

3.1.11 Two sites identified as debris lie within Area 481, both are within Area 481 West (**7016** and **7017**). Both these sites are composed of two distinct small objects 65m and 73m apart respectively (**Figure 7**).

3.1.12 With the exception of wreck **7001** (WA 2007 **6002**) none of the anomalies seen during the DBA (WA 2007) were identified during this assessment.

3.1.13 Wrecks **7001, 7002** and **7003** were identified in the monitoring survey in 2009 (WA 2009 **7100, 7101** and **7102**). Dark reflector **7026** is 13m to the northwest of object (WA 2009 **7109**) which was identified as debris in the 2009 monitoring survey. Two lines of data from 2009 show the object; however it appears quite different on each pass. However, one of the images is very similar to that from this recent survey indicating that the objects are likely to be the same. No other features identified during the 2009 survey were identified during this assessment.

3.1.14 In total 29 geophysical anomalies of possible archaeological potential have been identified within the Study Area. Ten of these are located within the Area 481 licenced dredging areas. The three shipwrecks and feature **7026** were identified in

previous surveys, and it is likely that the other 25 anomalies within this data set have been produced by dredging and sand movement altering the superficial sand distribution across the site.

3.1.15 Similarly, it is likely this re-distribution of sediment across the site has prevented those sites of possible archaeological interest identified in previous data sets being identified using the recent geophysical assessment.

## 4. MITIGATION

4.1.1 According to heritage agencies and the principles outlined in Marine Aggregate Dredging and the Historic Environment, the preferred approach to the presence of potential archaeological sites is 'to preserve *in situ*' or 'preservation by record' (BMAPA and English Heritage 2003). The mitigation suggested for marine aggregate extraction is avoidance, reduction, or remedying and offsetting, and monitoring.

4.1.2 Exclusions zones are already in place around the three shipwrecks (**7001**, **7002** and **7003**) (Figure 2) and it is suggested that these are maintained.

4.1.3 No additional geophysical anomalies of high possible archaeological potential were identified during this assessment, therefore no new exclusion zones are considered necessary at this point

4.1.4 It is recommended that if any objects of possible archaeological interest are recovered during dredging operations from Area 481, that they should be reported using the established BMAPA Protocol for reporting finds of archaeological interest.

## 5. REFERENCES

BMAPA and English Heritage, 2003, Marine Aggregate Dredging and the Historic Environment, English Heritage.

Gardline, 2011, Licence Area 481: Monitoring Survey, Unpublished technical report 8762/Geo(00)

Wessex Archaeology, 2007, 'Area 481 Aggregate Dredging Licence Application Archaeological Assessment', Unpublished technical report 64690.02.

Wessex Archaeology, 2009, 'Area 481 Archaeological Assessment of Geophysical Data: Archaeological Monitoring Report', Unpublished technical report 64691.02.

# 6. APPENDIX I: ANOMALIES OF POSSIBLE ARCHAEOLOGICAL POTENTIAL

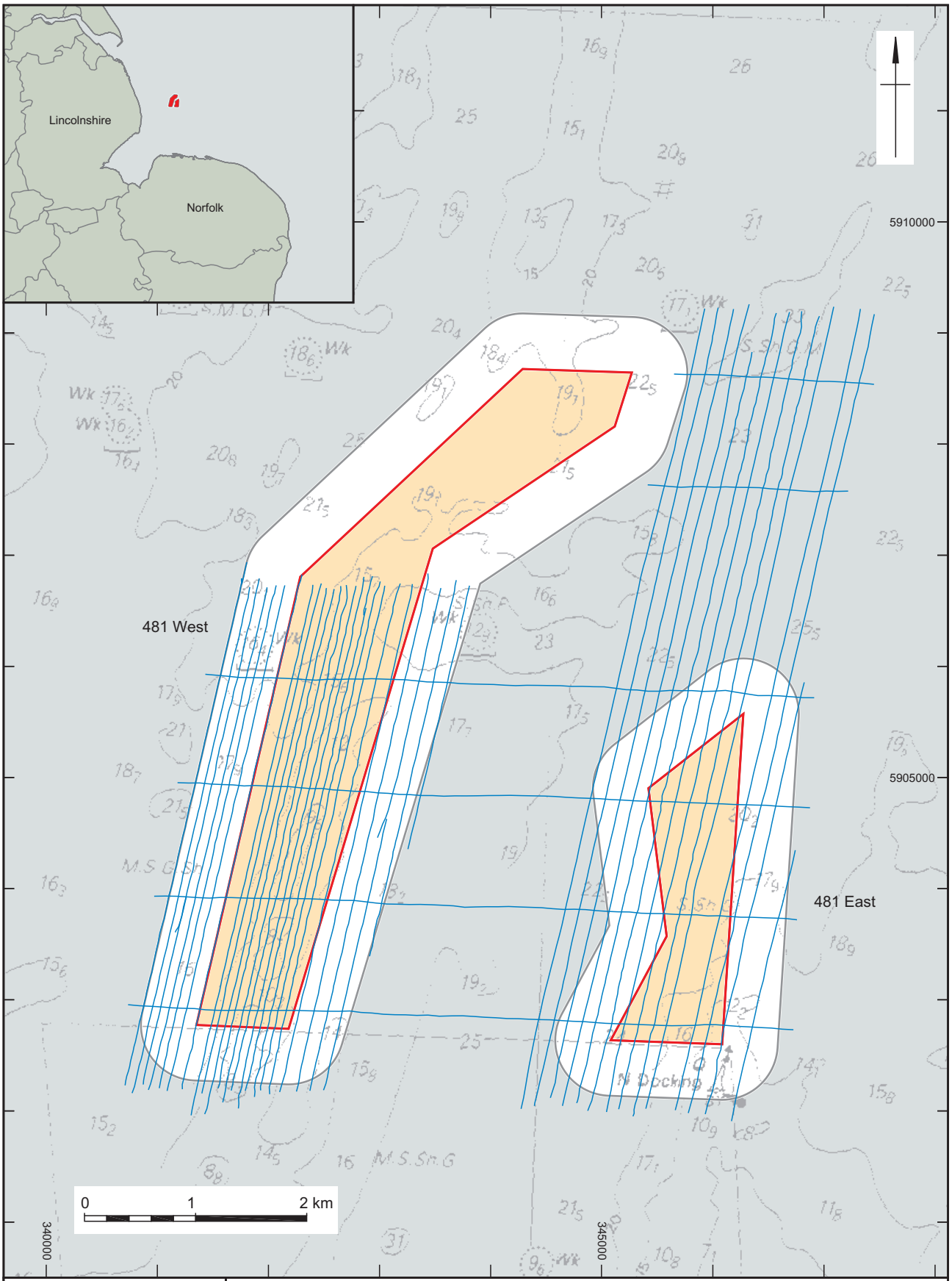
| WA ID | Name/ Classification | Easting | Northing | Archaeological Discrimination | Length (m) | Width (m) | Height (m) | Description | Internal references | External references |
|---|---|---|---|---|---|---|---|---|---|---|
| 7001 | Wreck<br>(Possibly *Freidig*) | 343751 | 5906352 | A1 | 54.5 | 13.6 | 8 | *Freidig* was built 1882 at Elbing, originally named *Lahneck*. Owned and registered in Norway at time of loss. Lost after collision whilst in convoy in 1918. Carrying a cargo of iron ingots en route for Rouen from Middlesbrough.<br><br>Area oriented NE-SW of curvilinear dark reflectors, approx 4 -5 major ones which indicates broken up structure of a ship. Large pointed shadows Can't tell if it's upright etc. Looks damaged but debris around wreck and not scattered. | 6024 | UKHO 8623, NRHE 913205 |
| 7002 | Wreck | 345882 | 5904256 | A1 | 22.4 | 11.3 | 2.7 | Unknown, uncharted wreck.<br><br>Area containing several curvilinear dark reflectors indicating structure. Wreck oriented NE-SW, badly broken up stands to height of 2.5m and with at least one piece of debris lying away from the main area. In area of sand ripples/shallow sandbanks. | 6031, 6035 | n/a |

| WA ID | Name/ Classification | Easting | Northing | Archaeological Discrimination | Length (m) | Width (m) | Height (m) | Description | Internal references | External references |
|---|---|---|---|---|---|---|---|---|---|---|
| 7003 | Wreck<br>(Possibly *Heimland*) | 341747 | 5906217 | A1 | 49 | 39.5 | 4.5 | Built 1913 in Fredrikstad, Norway. Owned and registered in Norway at the time of loss. Lost after striking a mine laid by the German submarine UC-26, whilst en route from Newcastle to St. Nazaire with a cargo of coal.<br><br>Orientated NE-SW. Discrete area with multiple large curvilinear dark reflectors and smaller weaker curvilinear dark reflectors. Structure of a wreck visible, rib-like area in the middle, broken up with at least 1 piece of debris away from main area. Debris lying around, bow end more damaged than stern. Scour mark off the side. Lots of geological debris surrounding it | 6040 | UKHO 8622, NRHE 913204 and 1459768 |
| 7004 | Dark reflector | 342176 | 5905040 | A2 | 4.2 | 0.7 | 0 | Sub-rectangular anomaly, data quality variable so difficult to interpret | 6000 | n/a |
| 7005 | Dark reflector | 341738 | 5902375 | A2 | 4.8 | 0.6 | 0 | Oblong weak anomaly, lying in area of sand ripples | 6001 | n/a |
| 7006 | Dark reflector | 342382 | 5904774 | A2 | 2.4 | 0.8 | 0 | Square anomaly in area of bright reflection. | 6003 | n/a |
| 7007 | Dark reflector | 342064 | 5902503 | A2 | 5.7 | 1 | 0.4 | Distinct elongated anomaly with large shadow, possibly debris. | 6005 | n/a |
| 7008 | Bright reflector | 341983 | 5902392 | A2 | 2.4 | 0.8 | 0 | Hemispherical anomaly, possibly the shadow of an object but no dark reflector distinguished. | 6006 | n/a |
| 7009 | Dark reflector | 342142 | 5902991 | A2 | 2.9 | 0.6 | 0.5 | Weak linear anomaly with bright shadow. | 6004, 6007 | n/a |
| 7010 | Dark reflector | 342105 | 5902447 | A2 | 1.6 | 0.3 | 0.3 | Short, thick linear anomaly with shadow. | 6008 | n/a |
| 7011 | Dark reflector | 342383 | 5902843 | A2 | 4 | 0.2 | 1.5 | Thin linear anomaly with narrow long shadow. | 6009 | n/a |
| 7012 | Dark reflector | 342057 | 5906534 | A2 | 1.3 | 0.4 | 0.4 | Small approx circular anomaly with shadow, appears isolated. | 6010 | n/a |
| 7013 | Debris | 341163 | 5903027 | A2 | 2.4 | 0.3 | 0.4 | Thin linear anomaly with shadow, probably debris. | 6011 | n/a |

| WA ID | Name/ Classification | Easting | Northing | Archaeological Discrimination | Length (m) | Width (m) | Height (m) | Description | Internal references | External references |
|---|---|---|---|---|---|---|---|---|---|---|
| 7014 | Dark reflector | 341420 | 5903291 | A2 | 3.1 | 0.4 | 0.5 | Amorphous shaped anomaly with shadow, surrounding seabed featureless, isolated. | 6012 | n/a |
| 7015 | Dark reflector | 342233 | 5906810 | A2 | 2.4 | 0.1 | 0.3 | Narrow curvilinear anomaly with rounded shadow. | 6013 | n/a |
| 7016 | Debris | 341518 | 5902800 | A2 | 65 | 2 | 0.2 | Two distinct features approximately 65m apart, with no features in between. Ring-shaped bright reflector 1.7 x 1.3m, probably modern debris such as a tyre. Nearby is a short linear dark reflector 1.9 x 0.2 x 0.2m, with straight edged shadow. | 6014 | n/a |
| 7017 | Debris | 341945 | 5905064 | A2 | 73 | 4 | 0.3 | Two distinct features approximately 73m apart, with no features in between. Diffuse linear anomaly 4.1 x 0.3 x 0.3m with uneven shadow. A small roughly circular anomaly 0.9 x 0.3 x 0.4m with shadow is nearby. | 6015 | n/a |
| 7018 | Dark reflector | 342074 | 5905261 | A2 | 2 | 0.5 | 0.8 | Weak curvilinear with bright rounded shadow. | 6016 | n/a |
| 7019 | Dark reflector | 342236 | 5905618 | A2 | 4.4 | 0.6 | 0.2 | Approx rectangular anomaly with uneven shadow, near edge of range. | 6017 | n/a |
| 7020 | Dark reflector | 342075 | 5905725 | A2 | 2.9 | 0.3 | 0.1 | Narrow linear with weak shadow. | 6018 | n/a |
| 7021 | Dark reflector | 343139 | 5905278 | A2 | 20 | 14 | 0.4 | Group of three dark reflectors. Thick linear with large shadow 4.2 x 0.5 x 0.4m. Amorphous shaped anomaly with weak shadow 5.2 x 1 x 0.1m and a narrow linear with shadow 4.3 x 0.6 x 0.2m. | 6019 | n/a |
| 7022 | Seafloor disturbance | 343538 | 5906369 | A2 | 8.9 | 14.8 | 0.5 | Area containing several small circular dark reflectors with linear narrow shadows. Possible area of debris | 6020, 6022 | n/a |
| 7023 | Dark reflector | 343672 | 5906552 | A2 | 2.1 | 0.5 | 0.5 | Curvilinear anomaly with shadow. | 6012 | n/a |
| 7024 | Dark reflector | 344925 | 5903364 | A2 | 5.7 | 0.2 | 0.2 | Narrow curvilinear anomaly with slight shadow. | 6025 | n/a |

| WA ID | Name/ Classification | Easting | Northing | Archaeological Discrimination | Length (m) | Width (m) | Height (m) | Description | Internal references | External references |
|---|---|---|---|---|---|---|---|---|---|---|
| 7025 | Seafloor disturbance | 345190 | 5903470 | A2 | 24.1 | 28.9 | 0 | Area containing alternating weak dark and bright reflectors indicating raised areas, possibly partially buried feature, possibly natural feature. | 6026 | n/a |
| 7026 | Dark reflector | 345649 | 5905029 | A2 | 1.8 | 1.2 | 1 | Small circular anomaly with large bright shadow. | 6028 | n/a |
| 7027 | Dark reflector | 345506 | 5903490 | A2 | 2.9 | 0.6 | 0.9 | Weak linear with shadow. | 6029 | n/a |
| 7028 | Debris | 346535 | 5905533 | A2 | 43 | 20 | 0 | Group of four dark reflectors. Two triangular shaped anomalies 2.3 x 4.1m and 1.5 x 2.5m. A weak curvilinear 3.7 x 0.4m and a linear weak anomaly 4.9 x 1.2m. | 6037 | n/a |
| 7029 | Debris | 346002 | 5902226 | A2 | 65 | 45 | 2 | Long coiled curvilinear dark reflector 18.7 x 2.8 x 0.2m with a ring shaped dark reflector at one end. Further two pieces of debris nearby. Short linear dark reflector 0.5 x 0.4 x 0.6m with shadow and a curvilinear dark reflector3.2 x 0.9 x 2m with ring shaped shadow and scour mark. | 6038 | n/a |

1. *Co-ordinates are in WGS84 UTM31N*
2. *Positional accuracy estimated ±10m*




Survey Area
500m buffer
Active dredge areas
Geophysical survey lines

Drawing projection: UTM WGS84 z31. Admiralty chart 108 (dated 2000)

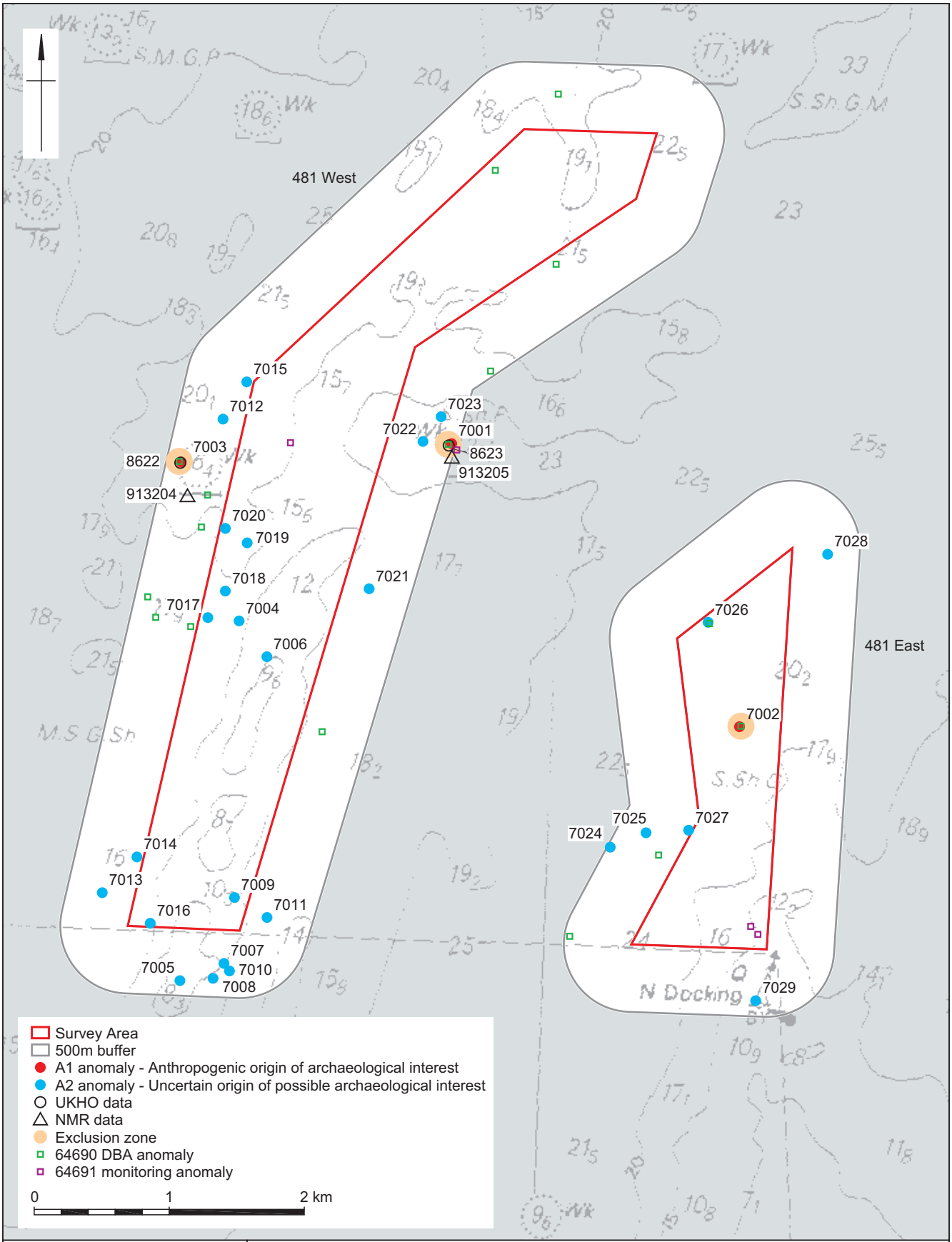


Wessex Archaeology

| | | | |
|---|---|---|---|
| Date: | 13/02/12 | Revision Number: | 0 |
| Scale: | 1:50,000 @A4 | Illustrator: | KJF |
| Path: | W:\Projects\64692\Drawing Office\Report figs\Monitoring\12_02_13 | | |

Site location

Figure 1




Drawing projection: UTM WGS84 z31. Admiralty chart 108 (dated 2000)

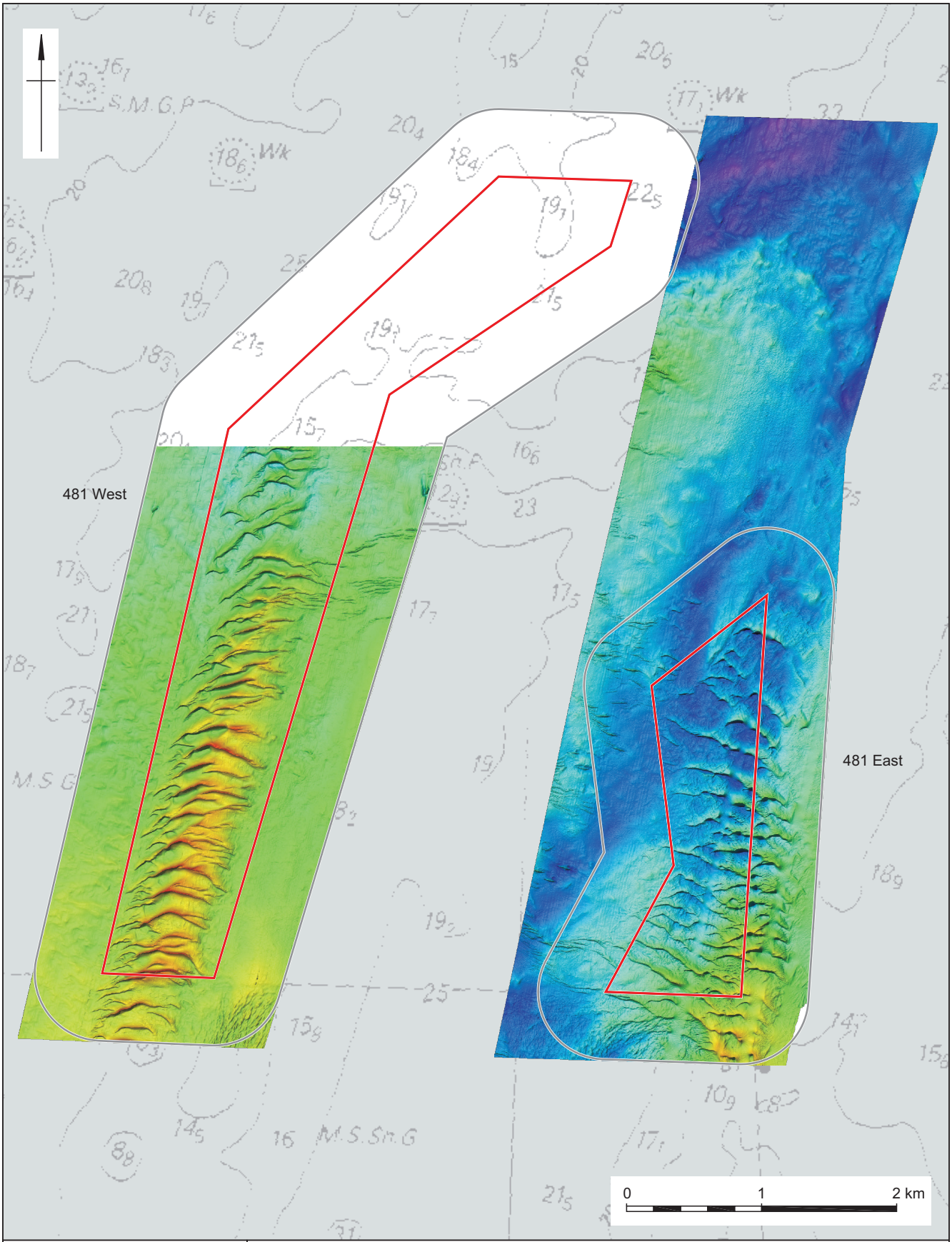


| | | | |
|---|---|---|---|
| Date: | 13/02/12 | Revision Number: | 0 |
| Scale: | 1:40,000 @A4 | Illustrator: | KJF |
| Path: | W:\Projects\64692\Drawing Office\Report figs\Monitoring\12_02_13 | | |

Wessex Archaeology

Known archaeology and sidescan sonar anomalies

Figure 2




Survey Area
500m buffer

Drawing projection: UTM WGS84 z31. Admiralty chart 108 (dated 2000)



| | | | |
|---|---|---|---|
| Date: | 13/02/12 | Revision Number: | 0 |
| Scale: | 1:40,000 @A4 | Illustrator: | KJF |
| Path: | W:\Projects\64692\Drawing Office\Report figs\Monitoring\12_02_13 | | |

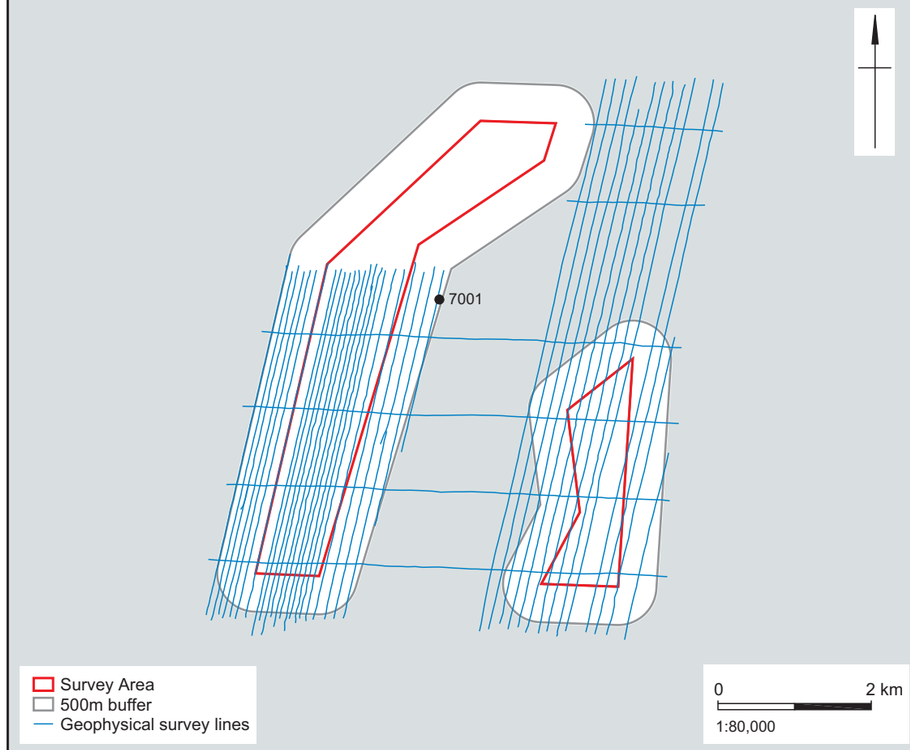
Wessex Archaeology

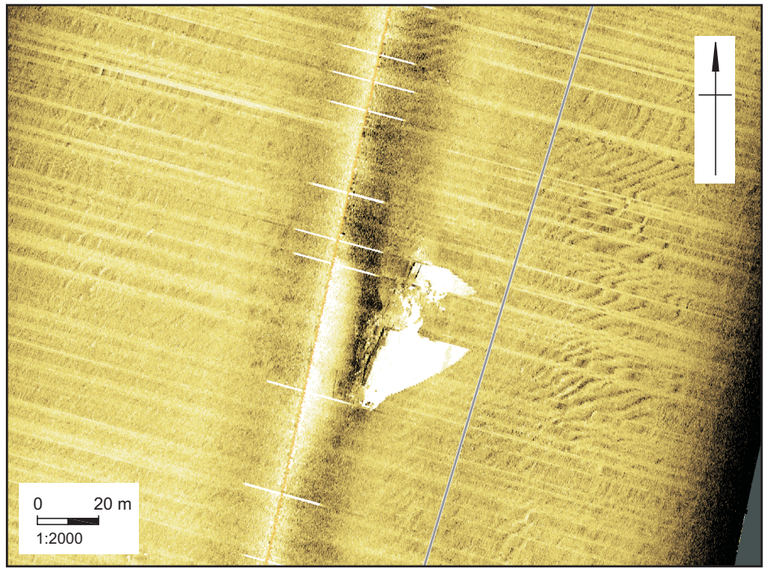
Multibeam bathymetry

Figure 3

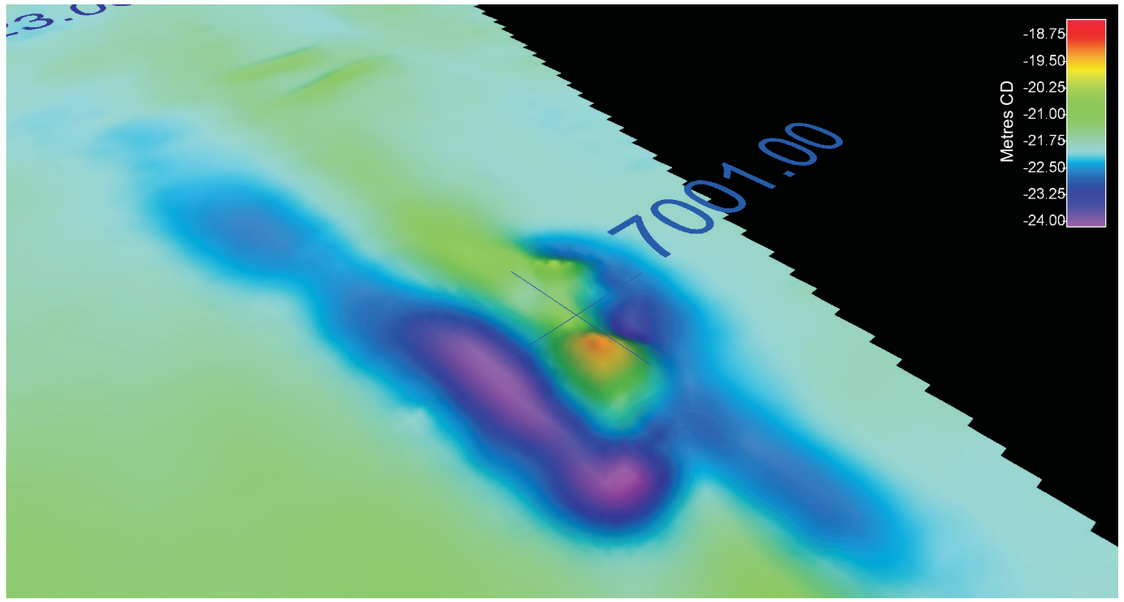
# WAID 7001. *Freidig* (1918). UKHO 8623, NMR 913205 and 943141

| | | | | |
|---|---|---|---|---|
| **Location** | | 343750, 5906352 (UTM WGS84 z31N) | **Region** | Area 481 W buffer |
| **Geophysical survey dimensions and notes** | | Shipwreck tentatively identified as the *Freidig* UKHO 8623, NMR 913205 and 943141.<br><br>Dimensions: 54.5m x 13.6m x 8m.<br><br>The site is orientated NE-SW. Approximately 4-5 large curvilinear dark reflectors indicating broken up structure of a ship. Large pointed shadows. Not possible to identify whether upright. Looks damaged with debris around the wreck, but not scattered. | | |
| **Build** | **Type** | Screw propelled steamer with single boiler. Initially fitted with 2-cylinder compound engine but possible later fitted with a triple expansion engine. Bridge deck 50ft, forecastle 26ft, 1 deck. | | |
| | **Construction** | Built 1882 in Elbing for J Salvesens Rederi Akties as Lahneck. | | |
| | **Dimensions** | 59.3m x 9.2m x 3.9m. 726 tons gross. | | |
| | **Shipyard** | Hull and machinery built by F. Schichau at Elbing. | | |
| **Loss** | **Cause** | Collision with London registered SS *Ariadne Alexandra* whilst in convoy. | | |
| **Extent of Survival** | | Geophsyical data indicates a relatively intact but broken up wreck. | | |
| **Sediment Characterisation** | | Gravely sands. | | |




7001: Sidescan sonar mosaic




7001: Multibeam bathymetry (looking NE)

Wessex Archaeology

Drawing projection: UTM WGS84 z31N

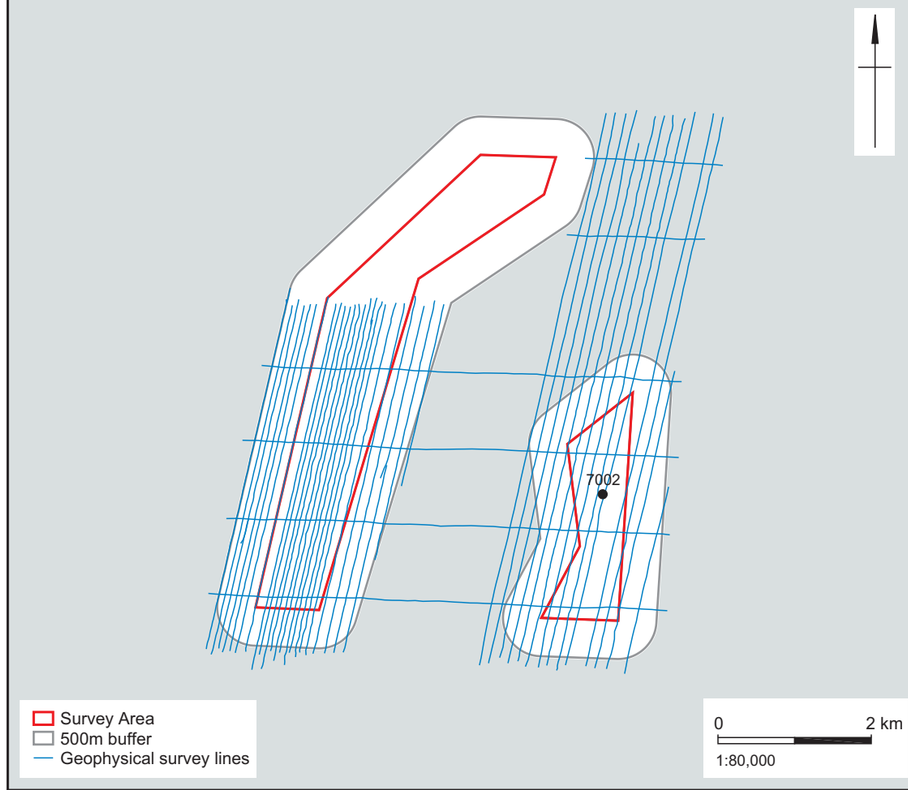


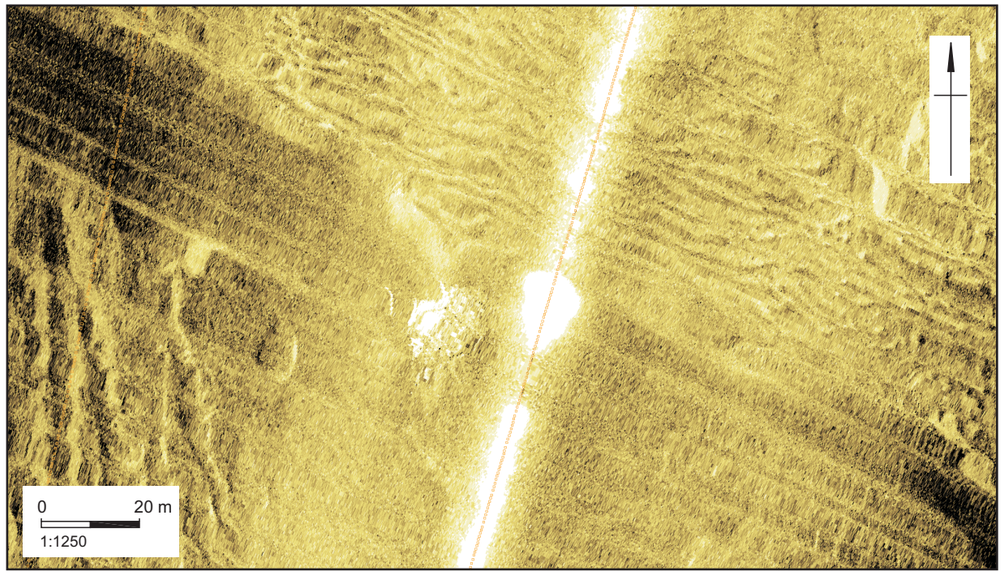
| | | | | | |
|---|---|---|---|---|---|
| Date: | 15/02/12 | Revision Number: | 0 | Illustrator: | KJF |
| Path: | W:\Projects\64692\Drawing Office\Report figs\Monitoring\12_02_13 | | | | |

Figure 4

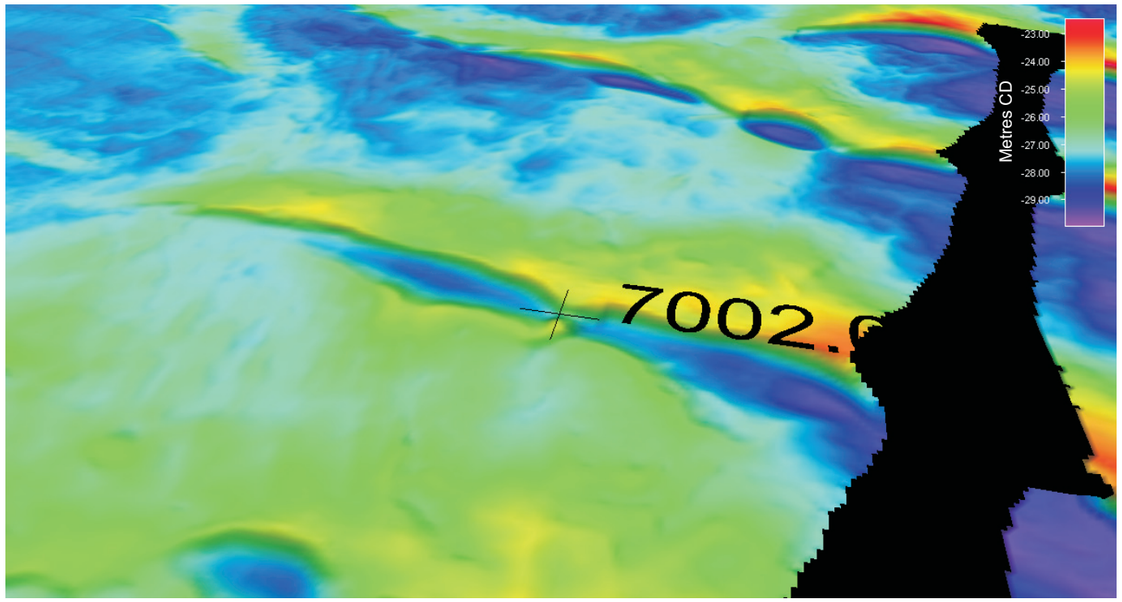
# WAID 7002. Unidentified wreck

| | | | | |
|---|---|---|---|---|
| **Location** | | 345882, 5904256 (UTM WGS84 z31N) | **Region** | Area 481 E |
| **Geophysical survey dimensions and notes** | | Unknown, uncharted wreck.<br><br>Dimensions: 22.4m x 11.3m x 2.7m<br><br>The site is orientated. NE-SW. Several curvilinear dark reflectors indicate badly broken up structure upstanding to height of 2.5m. At least one piece of debris lying away from the main area. In area of sand ripples/shallow sandbanks | | |
| **Build** | **Type** | Unknown | | |
| | **Construction** | Unknown | | |
| | **Dimensions** | Unknown | | |
| | **Shipyard** | Unknown | | |
| **Loss** | **Cause** | Unknown | | |
| **Extent of Survival** | | Geophsyical data indicates a relatively coherent but broken up wreck. | | |
| **Sediment Characterisation** | | Gravely sands, sand ripples. | | |




7002: Sidescan sonar mosaic




7002: Multibeam bathymetry (looking N)

Wessex Archaeology

Drawing projection: UTM WGS84 z31N

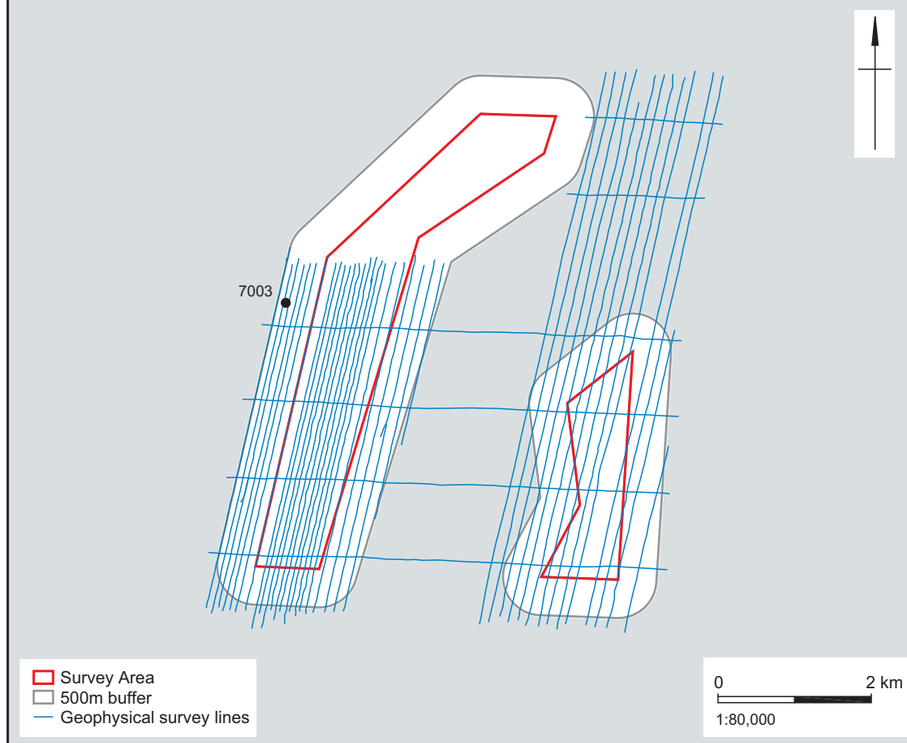


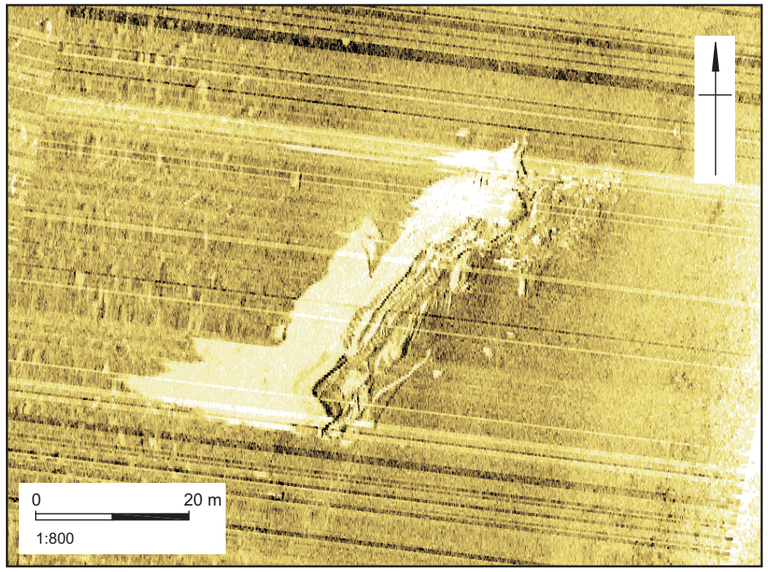
| | | | | | |
|---|---|---|---|---|---|
| Date: | 15/02/12 | Revision Number: | 0 | Illustrator: | KJF |
| Path: | W:\Projects\64692\Drawing Office\Report figs\Monitoring\12_02_13 | | | | |

Figure 5

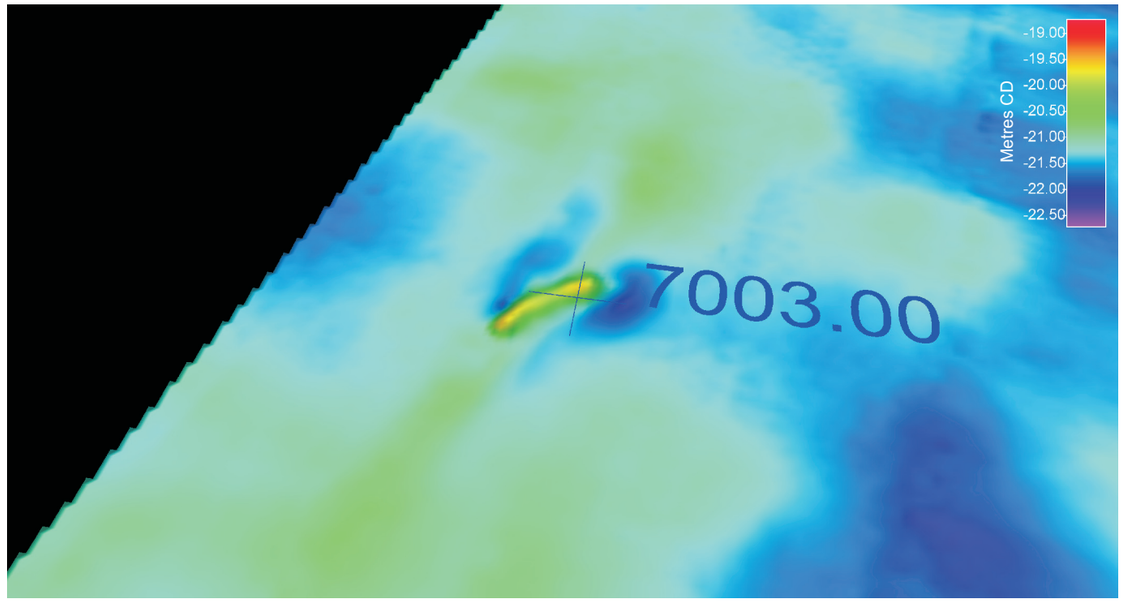
# WAID 7003. *Heimland* (1917) UKHO 8622, NMR 913204 and 1459768

| | | | | |
|---|---|---|---|---|
| **Location** | | 341747, 5906217 (UTM WGS84 z31N) | **Region** | Area 481 W buffer |
| **Geophysical survey dimensions and notes** | | Shipwreck tentatively identified as the *Heimland* UKHO 8622 NMR 913204 and 1459768.<br><br>Dimensions: 49m x 39.5m x 4.5m<br><br>The wreck is orientated NE-SW and consists of a discrete area with multiple large curvilinear dark reflectors and smaller weaker curvilinear dark reflectors. Structure of a shipwreck visible, rib-like area in the middle, broken up with at least 1 piece of debris away from main area. Debris lying around, bow end more damaged than stern. Scour mark off the side. Lots of geological debris surrounding it. | | |
| **Build** | **Type** | Steel built screw-driven steamer fitted with triple expansion steam engine. | | |
| | **Construction** | Built in 1913, by Fredrikstad mek. Vaerksted. | | |
| | **Dimensions** | Unknown | | |
| | **Shipyard** | Fredrikstad, Norway | | |
| **Loss** | **Cause** | Mined en route from Newcastle-upon-Tyne to St. Nazaire with coal. Mine laid by German submarine UC-26 the previous day. | | |
| **Extent of Survival** | | Geophsyical data indicates a relatively coherent but broken up wreck. | | |
| **Sediment Characterisation** | | Gravely sands, sand ripples. | | |




7003: Sidescan sonar mosaic




7003: Multibeam bathymetry (looking N)

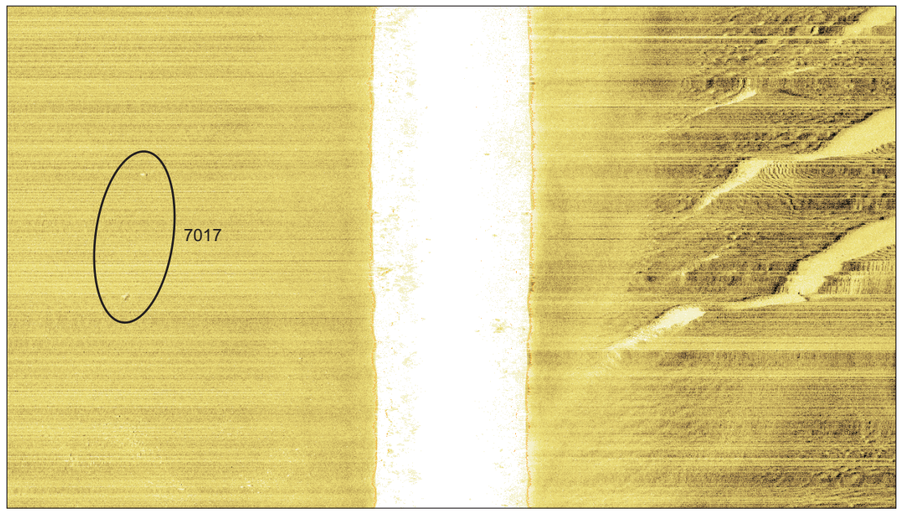
Wessex Archaeology

Drawing projection: UTM WGS84 z31N

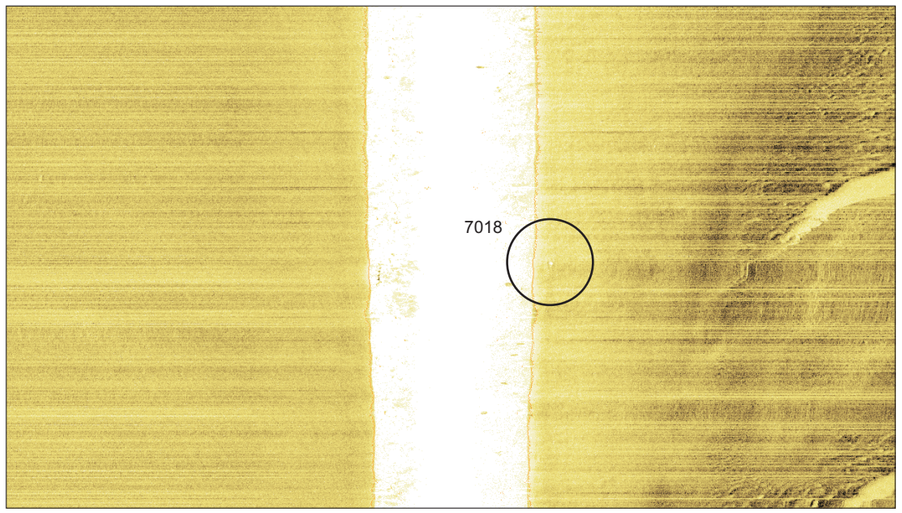


| | | | | | |
|---|---|---|---|---|---|
| Date: | 15/02/12 | Revision Number: | 0 | Illustrator: | KJF |
| Path: | W:\Projects\64692\Drawing Office\Report figs\Monitoring\12_02_13 | | | | |

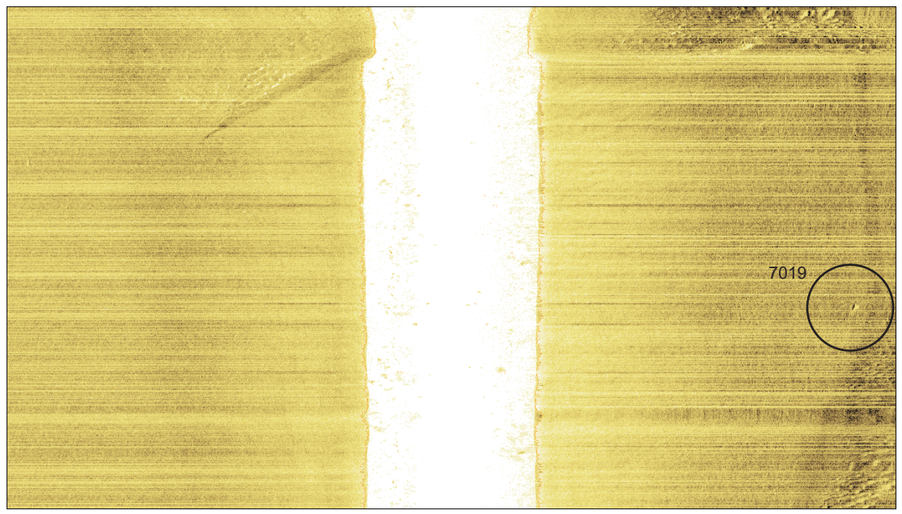
Figure 6



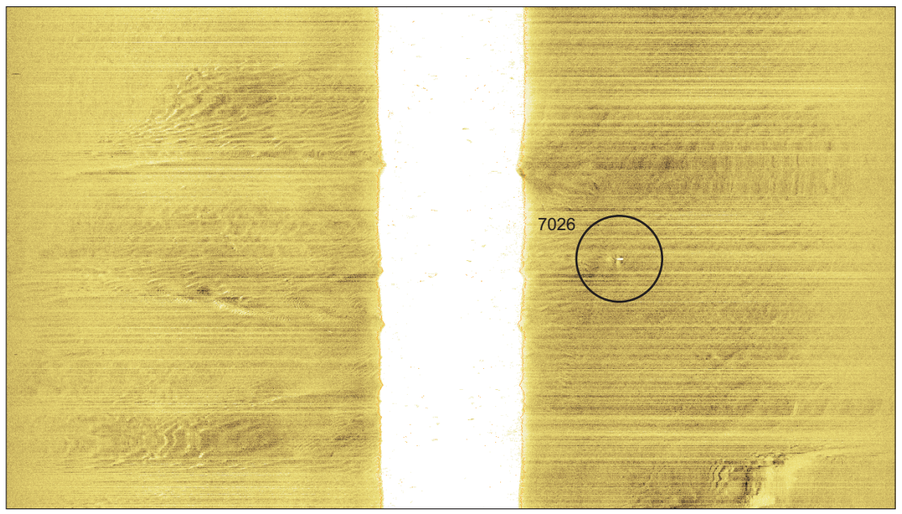

7017. Debris. Two objects 73m apart measuring 4.1m x 0.3m x 0.3m and 0.9m x 0.3m x 0.4m




7018. Dark reflector. 2m x 0.5m x 0.8m

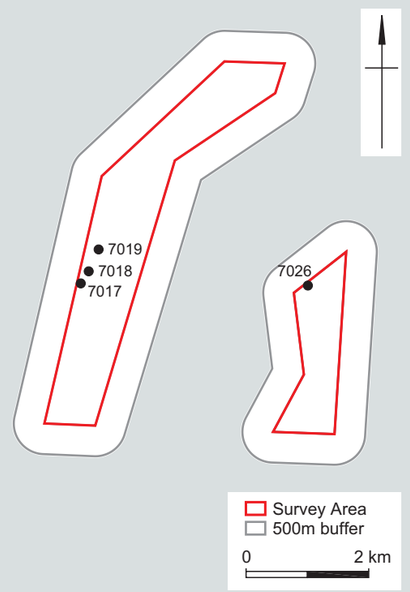



7019. Dark reflector. 4.4m x 0.6m x 0.2m




7026. Dark reflector. 1.8m x 1.2m x 1m

Wessex Archaeology



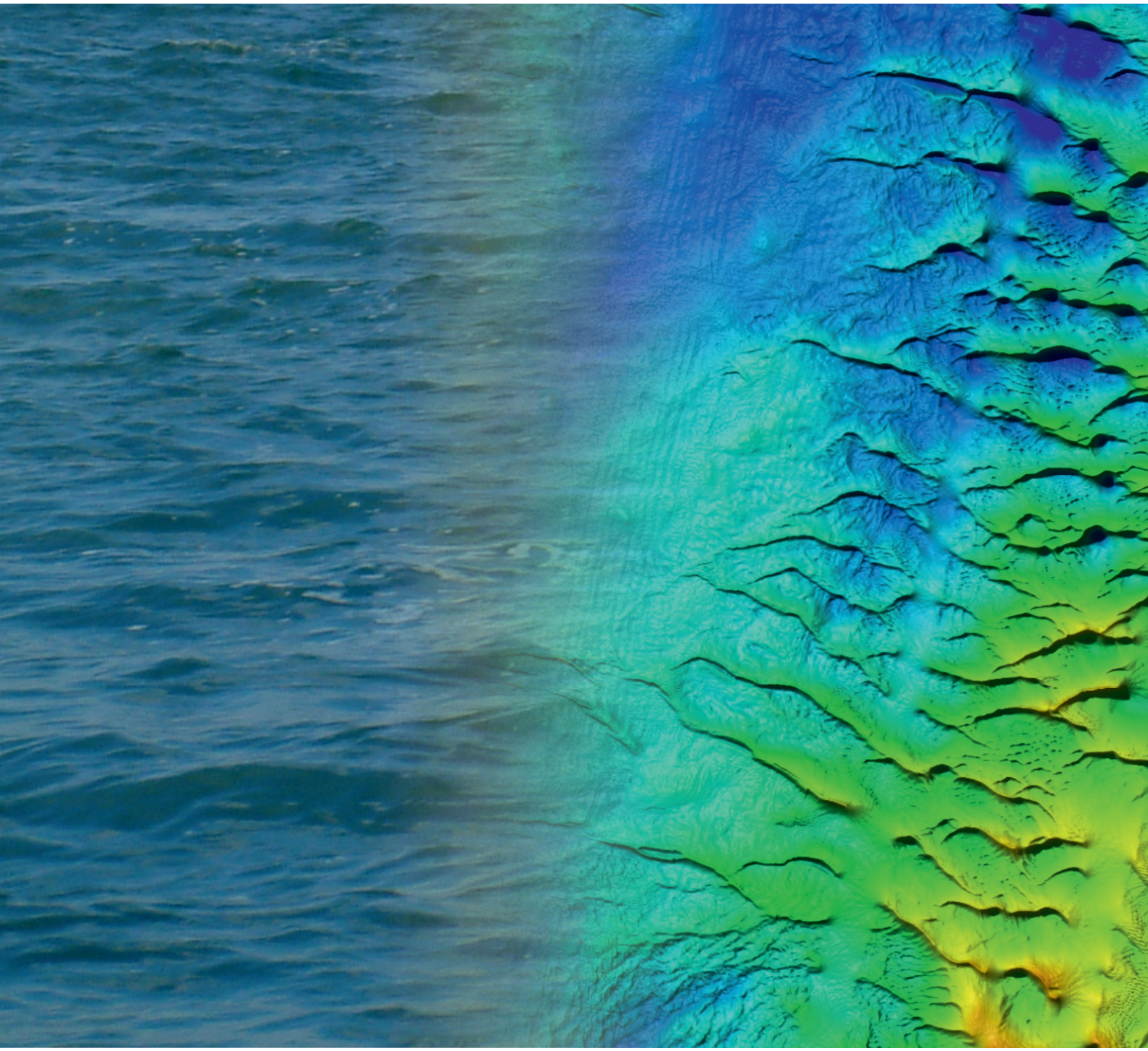

Drawing projection: UTM WGS84 z31.



| | |
|---|---|
| Revision Number: | 0 |
| Illustrator: | KJF |
| Date: | 15/02/12 |
| Scale: | NTS (inset 1:100,000 @A3) |
| Path: | W:\Projects\64692\Drawing Office\ |
| Report figs\Monitoring\12_02_13 | |

Sidescan sonar anomalies of archaeological potential

Figure 7



**WESSEX ARCHAEOLOGY LIMITED.**
**Registered Head Office**: Portway House, Old Sarum Park, Salisbury, Wiltshire SP4 6EB.
Tel: 01722 326867 Fax: 01722 337562 info@wessexarch.co.uk
Regional offices in **Edinburgh**, **Rochester** and **Sheffield**
For more information visit **www.wessexarch.co.uk**