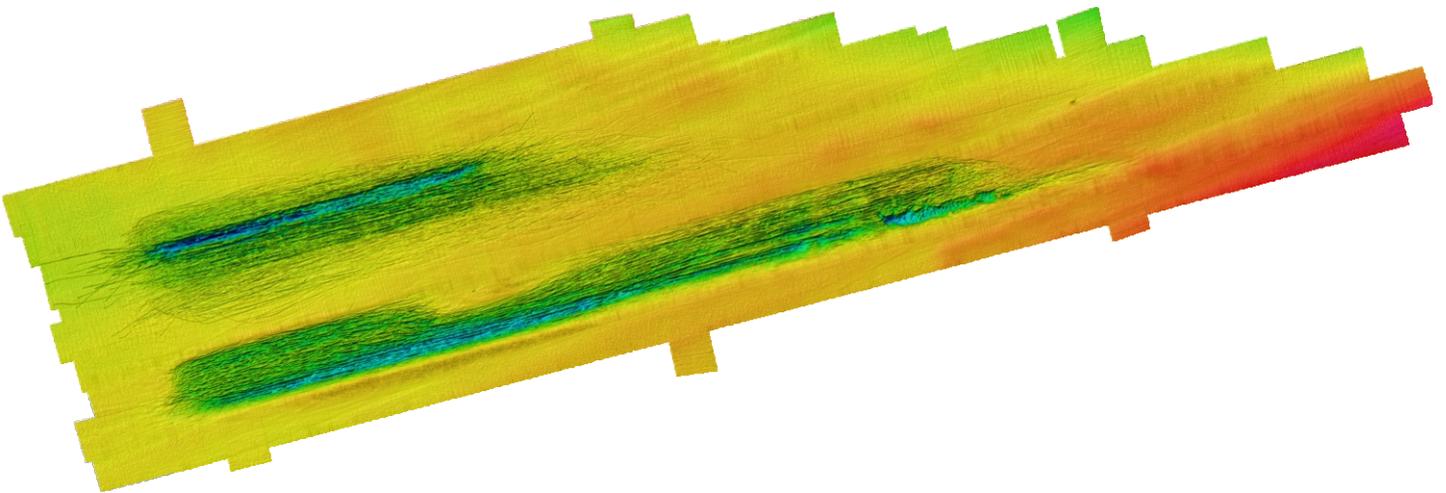




making sense of heritage

Area 458 Marine Aggregate Extraction

Archaeological Assessment of 2015 Geophysical Data
Archaeological Monitoring Report



Ref: 88982.01
March 2016



**Area 458
Marine Aggregate Extraction**

**Archaeological Assessment of 2015 Geophysical Data
Archaeological Monitoring Report**

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Area 458 Marine Aggregate Extraction

Archaeological Assessment of 2015 Geophysical Data Archaeological Monitoring Report

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Area 458 Marine Aggregate Extraction

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Summary

Wessex Archaeology was commissioned by CEMEX UK Marine Ltd and Tarmac Marine Ltd to undertake an archaeological assessment of geophysical survey data as part of the heritage impact monitoring process implemented for aggregate extraction Area 458. The data consisted of sidescan sonar and multibeam bathymetry acquired in 2015 by Fugro EMU Limited. The review includes an assessment of the current data in addition to the results of the previous archaeological monitoring assessments undertaken by Wessex Archaeology and EMU Limited.

The principal aim of this report is to provide an archaeological monitoring assessment of known archaeological sites and to assess the area for any anomalies of potential archaeological interest within the Study Area.

Three features have been identified within the Study Area all of which corresponded to anomalies identified in previous monitoring reports. **7001** has been identified in all previous monitoring assessments and was previously assigned an Archaeological Exclusion Zone. It is merited to keep this 50 m buffer in place.

Anomaly **7002** has been identified in all previous monitoring surveys, however it is located outside the limit of the dredging area and as such no new mitigation measures are merited.

Anomaly **7004** was identified for the first time in the 2015 monitoring report, located on the western edge of the Study Area. This feature is located outside of the active dredge zone and as such no Archaeological Exclusion Zone was recommended in the Year 7 monitoring report. However, it is noted in the 2015 sidescan sonar data that a single dredge track is observed less than 2 m from the updated position of **7004**. It is highly recommended that this position is avoided and the anomaly should be monitored in future. If this feature cannot be avoided then further mitigation may be required, such as implementation of an Archaeological Exclusion Zone.

It is recommended that any artefacts recovered during dredging activities continue to be reported using the established Marine Aggregate Industry *Protocol for Reporting Finds of Archaeological Interest* (BMAPA and English Heritage 2005).



Area 458 Marine Aggregate Extraction

Archaeological Assessment of 2015 Geophysical Data Archaeological Monitoring Report

Acknowledgements

This assessment was commissioned by CEMEX UK Marine Ltd and Tarmac Marine Ltd. The data were provided by Fugro EMU Limited, and Samantha Drawbridge's assistance is acknowledged in this respect.

Abby Mynett carried out the geophysical assessment and compiled the report, with quality control provided by Dr Louise Tizzard. Kitty Foster prepared the illustrations and the project was managed for Wessex Archaeology by Dr Louise Tizzard.



Area 458 MARINE AGGREGATE EXTRACTION

Archaeological Assessment of 2015 Geophysical Data Archaeological Monitoring Report

1 INTRODUCTION

1.1 Project Background

- 1.1.1 Wessex Archaeology (WA) was commissioned by CEMEX UK Marine Ltd and Tarmac Marine Ltd to undertake an archaeological assessment of geophysical survey data as part of the heritage impact monitoring assessment implemented for aggregate extraction in Area 458, located in the eastern English Channel, 30 km south of Beachy Head, East Sussex.
- 1.1.2 The Study Area is delimited by the following co-ordinates (WGS84 UTM31N) and includes the active dredge zone (**Table 1**).

UTM 31 Easting	UTM 31 Northing
333528	5597241
334324	5597427
334421	5597449
335222	5597408
335292	5597405
335455	5597397
335840	5597377
337707	5597282
337742	5597121
336823	5596876
332253	5595656
332241	5595705
331955	5596876

Table 1: Delimiting co-ordinates of Area 458

- 1.1.3 The Study Area was defined by a buffer, 50 m to the north, west and south and 1km to the east of the active dredge zone, as specified in the marine licence (**Figure 1**).
- 1.1.4 The assessment consists of a review of sidescan sonar and multibeam bathymetry data acquired by Fugro EMU Limited (Fugro EMU) in August 2015 (Year 8).
- 1.1.5 As part of the Marine Licence Conditions for Area 458, annual geophysical monitoring surveys should be reviewed in order to identify any changes to the archaeological

baseline. This report details the most recent archaeological baseline investigations using geophysical survey data acquired by Fugro EMU in 2015. Similar investigations have been undertaken yearly between 2009 and 2015 (Wessex 2009, 2013, 2015; EMU Limited 2010, 2011, 2012). As the baseline archaeological assessment for Area 458 did not identify any UKHO wrecks or obstructions within the area, no new data searches (UKHO, NMR etc.) were undertaken as part of this assessment.

- 1.1.6 The survey coverage for the data used in this report has been dictated by condition of the current Area 458 Marine Licence for this extraction area and following the Guidance Note “Marine Aggregate Dredging and the Historic Environment” (BMAPA and English Heritage 2003).

1.2 Previous Work

- 1.2.1 There have been eight archaeological assessments addressing the maritime cultural heritage of Licence Area 458. These are:

- the archaeological technical report produced by WA (Wessex Archaeology 2000) in support of the aggregate licence application for Areas 458 and 464.
- the pre-dredge archaeological monitoring report produced by WA in 2007 (Wessex Archaeology 2007) as part of the licence conditions outlined by the Marine Licence;
- the Year 1 archaeological monitoring assessment (since the commencement of dredging operations) produced by WA in 2009 (Wessex Archaeology 2009); the Year 1 assessment reviewed geophysical survey data acquired in 2008. One site was identified to be of possible archaeological interest in this study and an exclusion zone was recommended. This feature has also been identified in the 2013 data;
- the Year 2 archaeological monitoring assessment was produced by EMU Limited in 2010; the Year 2 assessment reviewed geophysical survey data acquired in 2009 (EMU Limited 2010). A total of 14 contacts were identified in the geophysical survey data and five of these are within the current Study Area under review;
- the Year 3 archaeological monitoring assessment was produced by EMU Limited in 2011; the Year 3 assessment reviewed geophysical survey data acquired in 2010 (EMU Limited 2011). The report identified twelve geophysical contacts and four of these are within the current Study Area;
- the Year 4 archaeological monitoring assessment was produced by EMU Limited in 2012; the Year 4 assessment reviewed geophysical survey data acquired in 2011 (EMU Limited 2012). The assessment identified five geophysical targets of which three are located within the current Study Area;
- the Year 5 archaeological monitoring assessment produced by WA in 2013 (Wessex Archaeology 2013); the Year 5 assessment reviewed geophysical survey data acquired in 2012. The assessment identified four geophysical targets;
- the Year 7 archaeological monitoring assessment produced by WA in 2015 (Wessex Archaeology 2015); the Year 7 assessment reviewed geophysical survey data acquired in 2014. The assessment identified three geophysical targets.

- 1.2.2 A total of seven finds have been reported through the Marine Aggregates Industry *Protocol for Reporting Finds of Archaeological Interest* within the Licence Area 458 between 2007 and 2015 (**Table 2**). These finds are largely reflected in the National Record for the Historic Environment (NRHE) record with some additional finds.



Report ID	Description	Date	Material	Licence Area	Wharf/Vessel	Year
UMD_0259	Brass spoon engraved 'MAPPIN'	Post Medieval	Metal; Domestic	458	Erith	4 (2008 - 2009)
UMD_0264	Half a cannonball for an 18 pounder sea service gun	Post Medieval	Metal; Cannonball	458	Ridham	4 (2008 - 2009)
UMD_0264	Small cannonball for a 3 pounder gun	Post Medieval	Metal; Cannonball	458	Ridham	4 (2008 - 2009)
UMD_0264	Half a small cannonball for a 3 pounder gun	Post Medieval	Metal; Cannonball	458	Ridham	4 (2008 - 2009)
Tarmac_0387	Fuel cap	Modern	Metal	458	Greenwich	7 (2011 - 2012)
Tarmac_0401	Spoon		Metal: Silver	458	Greenwich	7 (2011 - 2012)
Tarmac_0437	Animal bone	Unknown	Bone	458	Erith Wharf	8 (2012-2013)

Table 2: Marine Aggregate Protocol finds associated with Area 458

1.3 Seabed Geology

1.3.1 The Study Area lies within the Hampshire-Dieppe Basin. Three main stratigraphic units have been identified for Area 458 in previous investigations; the deepest sediment unit has been identified as Tertiary bedrock, which is overlain by a sedimentary unit of gravel and sandy gravels. In turn, this unit is overlain by marine shelly and sandy gravel unit of Holocene age and around 1 m maximum depth across the site.

1.3.2 The seabed geology is relatively consistent across the site, with the eastern extents having slightly less frequent boulders present on the seabed than the western areas. The site is extensively gravelly with some mobile sandy sediment visible throughout (Wessex Archaeology 2009).

1.4 Aims

1.4.1 The aim of this study is to provide the licensees with an archaeological review of the effects of dredging on known archaeological sites and previously identified geophysical anomalies in Area 458. The report also aims to identify any new sites of potential archaeological interest that may have been previously covered and subsequently exposed from dredging works and associated activities.

2 METHODOLOGY

2.1 Data Sources

2.1.1 The geophysical data assessed for this report were acquired and provided by Fugro EMU; the survey was undertaken in August 2015 on board survey vessel *RV Discovery*. Further background information was obtained from the geophysical monitoring survey report and previous monitoring surveys, as detailed in **Section 1.2**, the technical information was provided with the data by Fugro EMU.



2.1.2 The geophysical survey data comprised sidescan sonar and multibeam bathymetry datasets. Each of these were assessed for their quality 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 table. Overall the data quality and positioning was found to be of a high standard for archaeological assessment.

2.1.4 The multibeam bathymetry data have been rated as 'Good' using the above criteria. The data quality and resolution of 1 m was found to be of a high standard and suitable for the archaeological assessment of seabed objects and debris over 1 m.

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

2.2 Geophysical Data – Technical Specifications

2.2.1 The geophysical data were acquired by Fugro EMU on board survey vessel RV *Discovery* on the 10th August 2015.

2.2.2 The sidescan sonar deployed for the survey was an Edgetech 4200 dual frequency sidescan sonar towfish and transceiver operating at high (400 kHz) and low (100 kHz) frequencies with a 160m range. The sidescan sonar data were digitally logged using discovery acquisition software and provided to WA as high frequency .*xtf* files.

2.2.3 The multibeam bathymetry data were acquired using a Kongsberg EM 2040 multibeam bathymetry system. The bathymetry data were digitally logged and provided to WA as an ungridded .*pts* file referenced to Chart Datum (CD).

2.2.4 Positioning was provided by a Fugro StarPack GNSS receiver with StarFix HP differential corrections and the coordinate system used for the survey was WGS84 UTM31N.

2.3 Geophysical Data – Processing

2.3.1 The high frequency .*xtf* 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 site 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. This process 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 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.
- 2.3.4 The multibeam bathymetry data were analysed to identify any unusual seabed structures that could be shipwrecks or other anthropogenic debris. The data were gridded at 1 m and analysed using Fledermaus software, which enables a 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 datasets which were conducted independently of one another. 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 Area.
- 2.4.2 To address this fact, the anomalies were grouped together along with the results of the DBA and previous monitoring reports that fall within the current Study Area. 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 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 archaeological concern. These flags are 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 discriminating relevance of seabed features to proposed scheme

- 2.4.4 The results of the 2015 data were compared and added to the results of the previous geophysical assessments that fall within the Study Area as described above. These results are presented in **Figure 1, Appendix I** and are discussed below. Those anomalies previously identified have retained their original identification number.
- 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 The results of this assessment are collated in gazetteer format and detailed in **Appendix I**. Below is a summary of the number and types of features identified in the Study Area for Area 458. The anomalies have then been divided into their classifications and described accordingly.

3.1.2 The archaeological assessment of geophysical data identified a total of three anomalies of archaeological potential, one of which is located within the current active dredge zone (**Figure 1**). All of the anomalies (**7001**, **7002** and **7004**) have been given an archaeological potential rating of A2 (**Table 5**).

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

Table 5: Anomalies of archaeological potential within the Study Area

3.1.3 Furthermore, these anomalies can be classified by probable type, which can further aid in assigning archaeological potential and importance.

Anomaly Classification	Number of Anomalies
Debris	2
Mound	1
Total	3

Table 6: Types of anomaly identified

3.1.4 Debris feature **7001** has been identified in all previous archaeological monitoring surveys (Wessex Archaeology 2009, 2013, 2015; EMU Limited 2010; 2011; 2012) and has previously been assigned a 50 m Archaeological Exclusion Zone. This feature is the only anomaly located within the active dredge zone in the centre of Study Area. In the most recent sidescan sonar data the debris is visible as a distinctive dark reflector with a curvilinear shape. The debris has a bright shadow and possible area of bright reflector attached to it (measuring 9.5 m x 5.9 m collectively) and appears to be situated in a depression (**Figure 2**). In the bathymetry data the debris has dimensions of 4 m x 3.2 m x 0.25 m and is visible as a small mound situated in a depression or scour measuring approximately 10.5 m x 4.2 m x -0.35 m. This depression is oriented southwest to northeast and is located on the edge of an area of small sand waves. The sand waves appear to have shifted further away from **7001** since the previous monitoring report (Wessex Archaeology 2015) and may have exposed more of the debris given the slightly larger dimensions recorded in the 2015 data.

3.1.5 Mound feature **7002** has been identified in previous monitoring reports (EMU Limited 2010; 2011, 2012; Wessex Archaeology 2013, 2015) and is located outside of the active dredge zone in the eastern area of the Study Area. The mound is very distinctive in the multibeam bathymetry data as an elongate mound on a flat and featureless area of the

seabed aligned approximately west-south-west to east-north-east. In the sidescan sonar data the feature appears as a long, distinct and thin curvilinear dark reflector with a dull but large shadow, isolated on a sandy and even area of the seabed. The mound has similar dimensions to the previous monitoring report, measuring 30 m x 8.5 m x 0.7 m and has a possible indistinct and very shallow scour coming from it orientated to the northeast (**Figure 3**).

- 3.1.6 Debris **7004** is located outside of the active dredge zone but within the Study Area. This feature was identified in the 2015 monitoring report for the first time (Wessex Archaeology 2015). The difference in positioning between last years and this year's monitoring report (16 m) is likely due to a positioning discrepancy rather than being a different anomaly. The debris has been identified in the sidescan sonar data only and is distinguishable as a small and distinct dark reflector on the edge of a seabed scar with dimensions of 3.3 m x 0.7 m x 0.4 m (**Figure 4**). The possible debris is a long linear shape with a dull shadow and is in a very slight depression. The nearby seabed scar was not visible in last year's data and the smaller recorded dimensions in this year's data suggest part of the debris may have been covered by sediments.

4 MITIGATION

- 4.1.1 With regards to mitigation of archaeology, the marine planning authority, working with the relevant regulator and advisors, takes account of the desirability of sustaining and enhancing the significance of heritage assets and adopts a general presumption in favour of the conservation of designated heritage assets within an appropriate setting (HM Government 2011; DCALG 2012).
- 4.1.2 Anomaly **7001** has been observed in all previous monitoring reports and was previously assigned an Archaeological Exclusion Zone. It is merited to maintain this 50 m buffer (**Figure 5**).
- 4.1.3 Anomaly **7002** is located outside of the active dredge zone and although of potential archaeological interest no exclusion zone is recommended for this feature at this point in time. This is in line with the previous monitoring report findings (Wessex Archaeology 2013, 2015).
- 4.1.4 Anomaly **7004** is located outside of the active dredge zone on the western edge of the Study Area but within the Licence Area. Due to its location outside of the active dredging area no Archaeological Exclusion Zone was recommended in the Year 7 monitoring report. However, it is noted in the sidescan sonar data that a single dredge track is observed less than 2 m from the updated position of **7004**. It is highly recommended that this position is avoided and the anomaly should be monitored in future. If this feature cannot be avoided then further mitigation may be required, such as implementation of an Archaeological Exclusion Zone.
- 4.1.5 It is recommended that if any objects of possible archaeological interest are recorded during dredging operations from Area 458 that they should continue to be reported using the established Marine Aggregate Industry *Protocol For Reporting Finds of Archaeological Interest* (BMAPA and English Heritage 2005).



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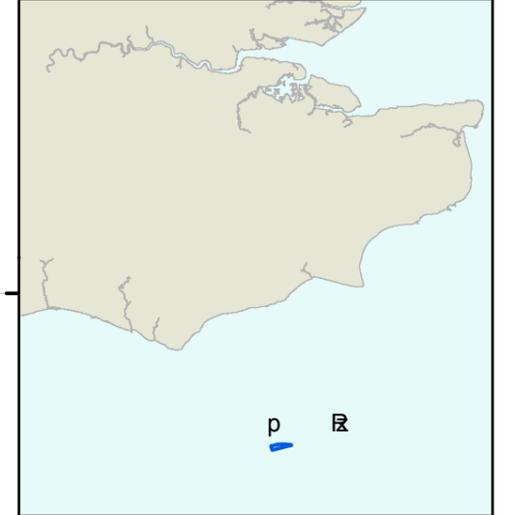
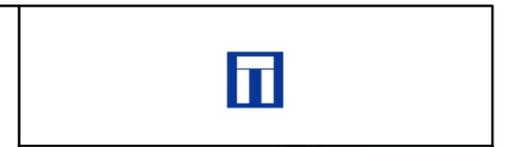
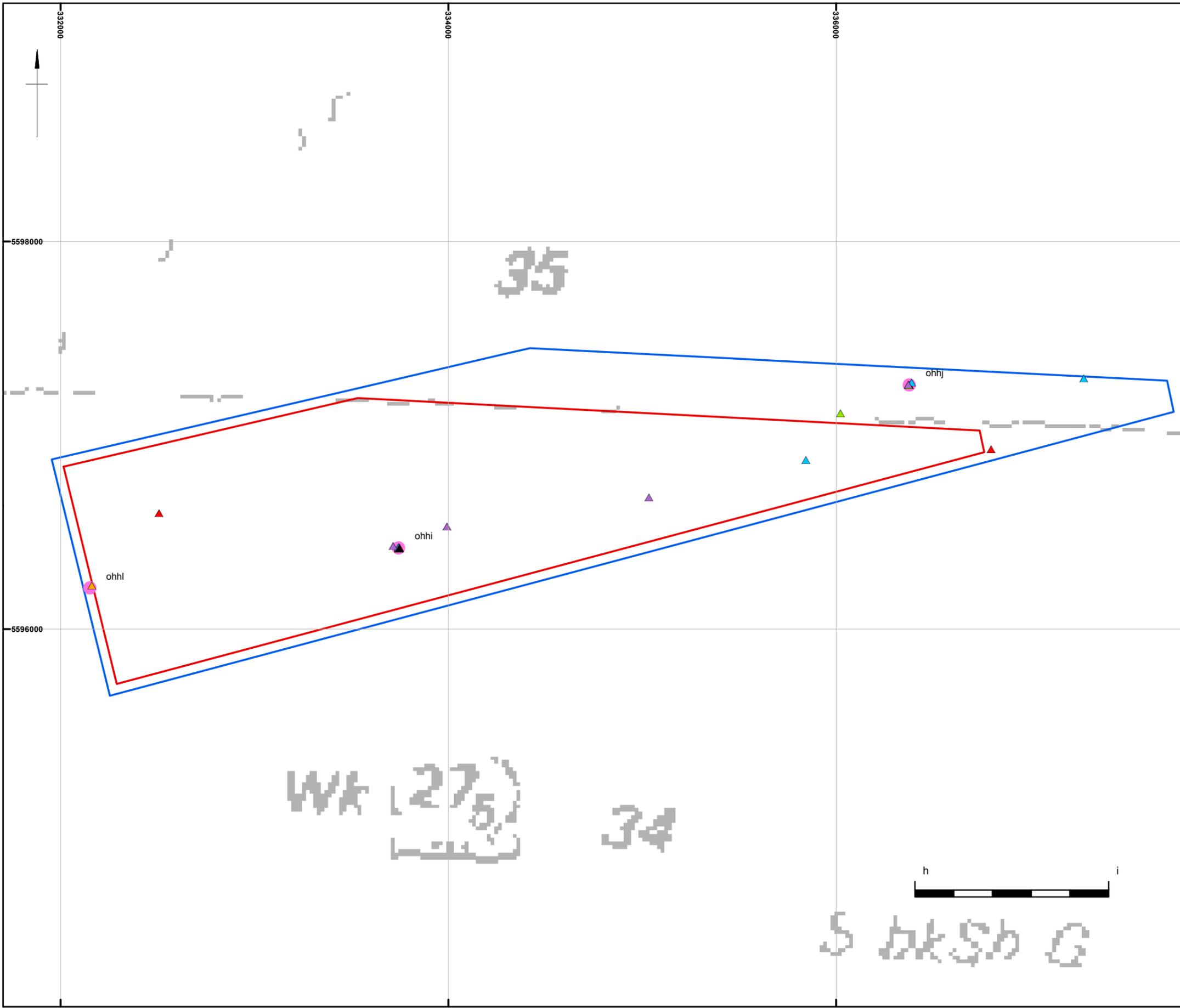
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APPENDIX I – SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL

WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Notes	Active Dredge Zone	External References
7001	Debris	333743	5596420	A2	4.0	3.2	0.3	Distinct medium sized possible debris feature isolated on a sandy area of the seabed. The dark reflector has a curvilinear shape with a bright shadow and possible area of bright reflector attached to it (measuring 9.5 x 5.9m) situated in a depression. In the bathymetry data the feature appears as a small mound in a depression or scour of approximately 10.5 x 4.2 x -0.35m. This depression is oriented SW to NE. The mound is located on the edge of an area of small sand waves	Inside	EMU 2011, 0001; EMU2010, 0007; EMU 2009, 0009, G2890_Area458_SSS_0004; 7001
7002	Mound	336378	5597260	A2	30.0	8.5	0.7	Distinct elongate mound on a flat seabed aligned approximately WSW to ENE. In the sidescan data the feature appears as a long and distinct curvilinear dark reflector with a dull but large shadow	Outside	EMU 2011, 002; EMU 2010, 0011; EMU 2009, 0008, G2890_Area458_SSS_0001; 7002
7004	Debris	332151	5596211	A2	3.3	0.7	0.4	Small and distinct dark reflector on the edge of a scar, long linear possible debris with a dull shadow and in a slight depression	Outside	7004

1. Co-ordinates are in WGS84 UTM31N
2. Positional accuracy estimated $\pm 10\text{m}$



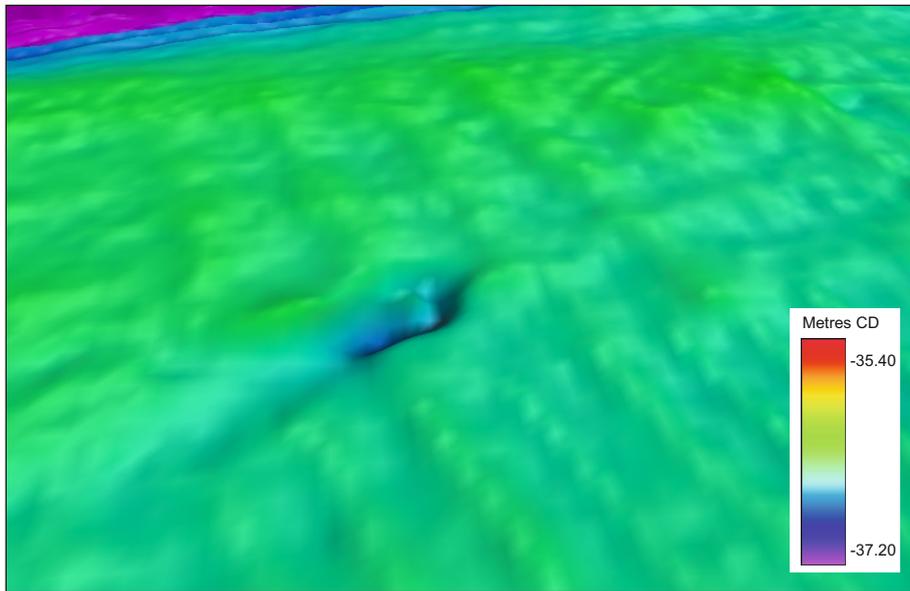
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yo R y	y hi n hi j o



A. Sidescan sonar waterfall image of debris 7001, 4.0m x 3.2m x 0.3m



B. Multibeam bathymetry image of debris 7001 (x6 vertical exaggeration), looking south

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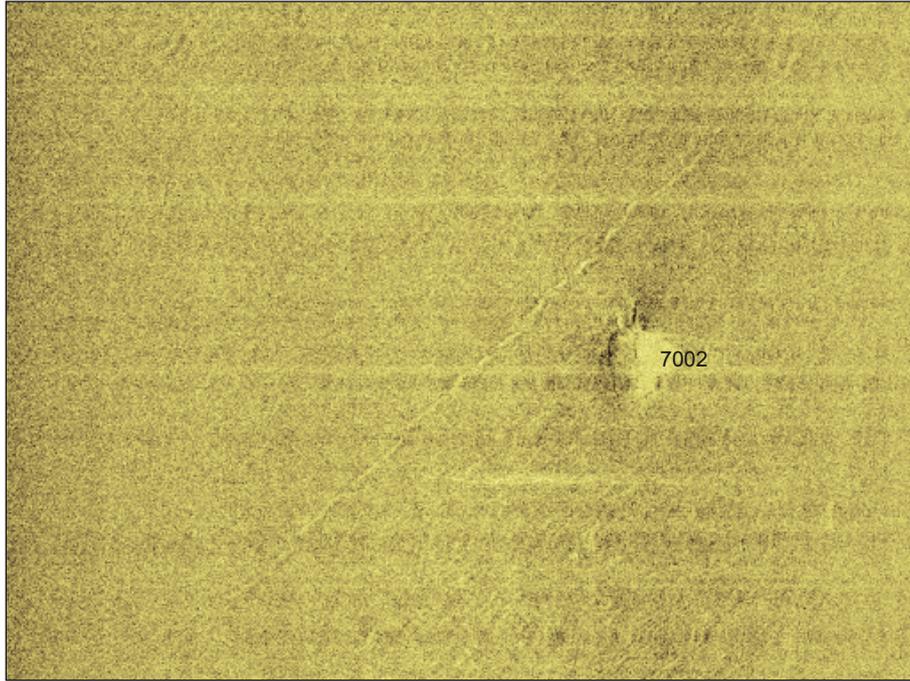
Date: 27/01/2016

Revision Number: 0

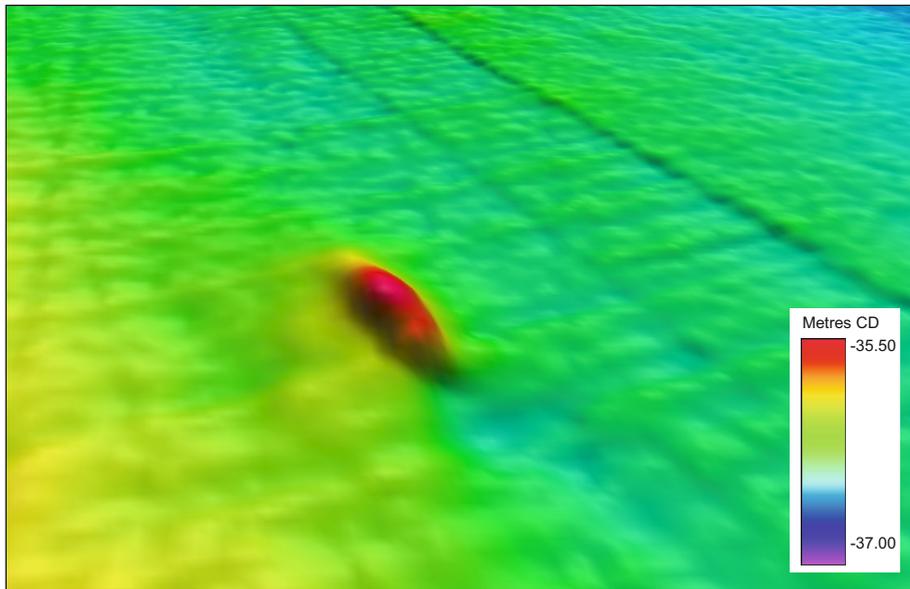
Scale: n/a

Layout: KJF

Path: W:\Projects\88982\GraphicsOffice\Report figs\monitoring\2016_01_27



A. Sidescan sonar image of mound 7002, 30.0m x 8.5m x 0.7m

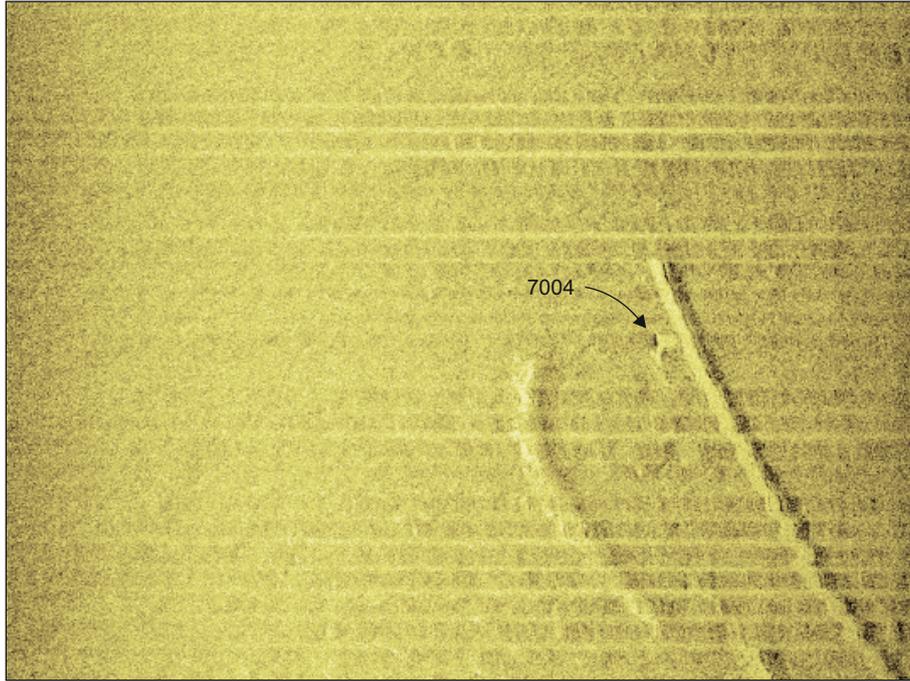


B. Multibeam bathymetry image of mound 7002 (x6 vertical exaggeration), looking west

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A. Sidescan sonar image of debris 7004, 3.3m x 0.7m x 0.4m

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