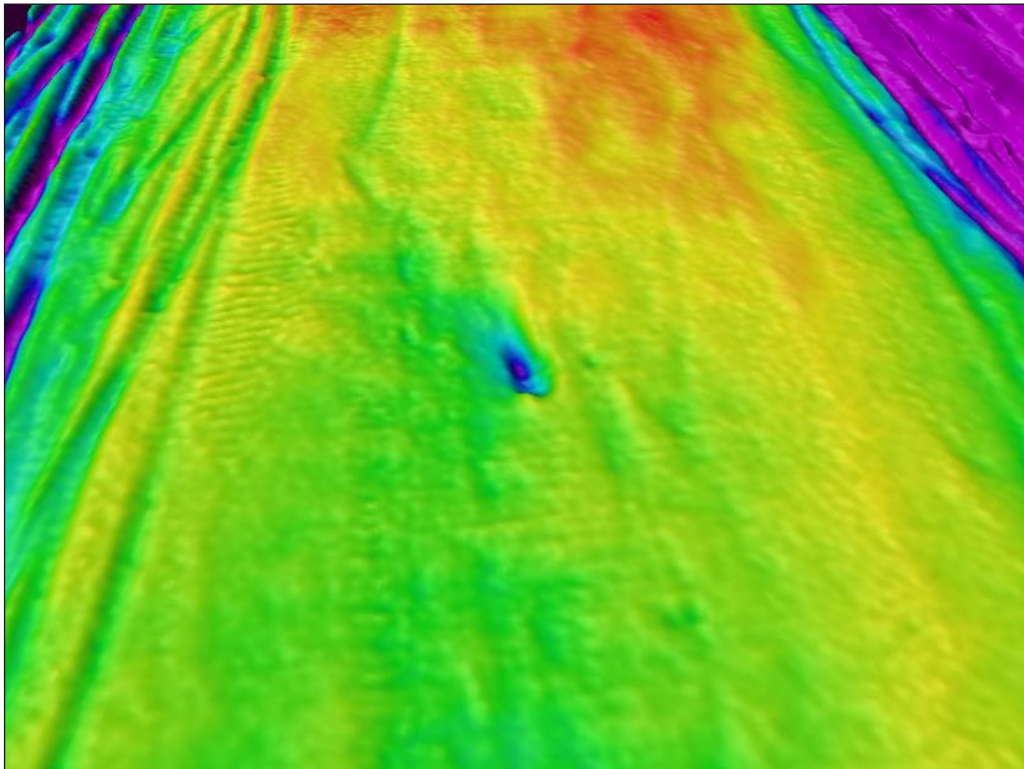




Aggregate Area 458

Archaeological Assessment of 2018 Geophysical Data
Archaeological Monitoring Report



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Summary

Wessex Archaeology was commissioned by CEMEX UK Marine Limited and Tarmac Marine Ltd to undertake an archaeological assessment of 2018 geophysical survey data as part of the heritage annual monitoring process for aggregate extraction Area 458. The data comprised sidescan sonar and multibeam echosounder data acquired by EGS (International) Ltd.

The study area comprises the Active Dredge Zone plus a 50 m buffer to the south, west and north sides and a 1 km buffer to the east.

The aim of this report is to provide an archaeological review of the effects of dredging on known archaeological sites, previously identified geophysical anomalies of possible archaeological interest and to assess the most recent geophysical data for any new anomalies that may be of potential archaeological interest.

Eight anomalies of archaeological potential have been identified within the study area. All of these have been classified as A2 – Uncertain origin of possible archaeological interest.

Three of the anomalies are located within the Active Dredge Zone (**7001**, **7009** and **7012**). A current 50 m Archaeological Exclusion Zone is already in place around the location of **7001** and it is recommended that this is maintained in accordance with the current licence.

Dark reflectors **7009** and **7012** were not identified in any of the previous monitoring assessments, **7012** is located in an area that has been dredged and may have been exposed during the process. Dark reflector **7009** may have become exposed during dredging activities or natural sand movement. No new Archaeological Exclusion Zones are recommended for these features, however heightened vigilance should be implemented at their locations and any material recovered reported using the established Marine Aggregate Industry *Protocol for reporting finds of archaeological interest* (BMAPA and English Heritage 2005)

The remaining five anomalies (**7002**, **7010**, **7011**, **7013** and **7014**) are located outside of the Active Dredge Zone and therefore no further Archaeological Exclusion Zones are recommended at this time as they are unlikely to be impacted. However, if this were to change, avoidance would be recommended.

It is recommended that if any objects of possible archaeological interest are recovered during dredging operations from Area 458 that they should be reported using the established Marine Aggregate Industry *Protocol for Reporting Finds of Archaeological Interest* (BMAPA and English Heritage 2005).



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The geophysical data were provided by EGS (International) Ltd.



Aggregate Area 458

Archaeological assessment of 2018 geophysical data Archaeological monitoring report

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by CEMEX UK Marine Limited and Tarmac Marine Ltd to undertake an archaeological assessment of 2018 geophysical survey data acquired by EGS (International) Ltd (EGSi) as part of the heritage impact annual monitoring process implemented for aggregate extraction in Area 458. The aggregate area is located in the eastern English Channel, approximately 39 km southeast of Beachy Head, East Sussex (Figure 1).

1.1.2 The report consists of an assessment of geophysical survey data comprising sidescan sonar (SSS) and multibeam echosounder (MBES) data sets. The data was acquired by EGSi between 2 and 3 September 2018. The survey was conducted over the Active Dredge Zone (ADZ) within Area 458, the study area comprises the ADZ plus a 50 m buffer on the south, west and north sides, and a 1 km buffer on the east side.

1.1.3 The study area for the Licence Area is defined by the following coordinates and includes the ADZ (Table 1):

Table 1 Delimiting coordinates for Area 458 study area

Easting	Northing
332252	5595657
331955	5596877
334501	5597469
337747	5597292
337789	5597134

1.1.4 Although the geophysical survey extents are larger than the study area, only geophysical anomalies identified within the study area are included within this report.

1.1.5 As required by the licence conditions for the dredging area, geophysical monitoring surveys are undertaken in order to ascertain any changes to the archaeological baseline. This report presents the archaeological assessment of the most recently acquired geophysical survey data for the area (year 11).

1.2 Previous work

1.2.1 In 2000 Wessex Archaeology undertook an environmental desk-based assessment (DBA) in support of a licence application for Areas 458 and 464. The DBA included an assessment of known, suspected and potential archaeological sites.

1.2.2 The DBA (Wessex Archaeology 2000) 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, obstructions and casualties (documented losses) from the National Monuments Record (NMR);
- the Receiver of Wreck at the Marine and Coastguard agency was approached with regards to reports of historic wrecks;
- records of wrecks and obstructions collated by the UK Hydrographic Office (UKHO);
- records of Palaeolithic and Mesolithic finds from the East Sussex Sites and Monuments Record (ESSMR);
- the Ministry of Defence (Naval staff Directorate) were consulted with regard to the existence of war graves within the study area;
- marine geophysical and geotechnical data provided by the client;
- 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.

- 1.2.3 In 2007 a pre-dredge archaeological assessment of geophysical data was undertaken by Wessex Archaeology in preparation for aggregate extraction within Areas 458 and 464 (Wessex Archaeology 2007). Geophysical datasets assessed for this report consisted of SSS, MBES and sub-bottom profiler (SBP) data, provided by United Marine Aggregates Ltd. The archaeological assessment 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 A Year 1 archaeological assessment of geophysical survey data acquired in 2008 was undertaken by Wessex Archaeology (Wessex Archaeology 2009). One site was identified to be of possible archaeological interest in this study and an exclusion zone was recommended (Figure 2).
- 1.2.5 Subsequently Year 2 (EMU 2010) archaeological monitoring was undertaken by EMU Limited for geophysical data acquired in 2009. A total of 14 contacts were identified in the geophysical survey data and five of these are located within the current study area (Figure 2).
- 1.2.6 The Year 3 (EMU 2011) archaeological monitoring was undertaken by EMU Limited for geophysical data acquired in 2010. A total of 12 contacts were identified in the geophysical survey data and four of these are located within the current study area (Figure 2).
- 1.2.7 The Year 4 (EMU 2012) archaeological monitoring was undertaken by EMU Limited for geophysical data acquired in 2011. A total of five contacts were identified in the geophysical survey data and three of these are located within the current study area (Figure 2).
- 1.2.8 The Year 5 (Wessex Archaeology 2013) archaeological monitoring was undertaken by Wessex Archaeology for geophysical (SSS and MBES) data acquired by Fugro in 2012. A total of four anomalies were identified in the geophysical survey data, all of which are located within the current study area (Figure 2).
- 1.2.9 The Year 7 (Wessex Archaeology 2015) archaeological monitoring was undertaken by Wessex Archaeology for geophysical (SSS and MBES) data acquired by Fugro in 2014. A



total of three anomalies were identified in the geophysical survey data, all of which are located within the current study area (Figure 2).

- 1.2.10 The Year 8 (Wessex Archaeology 2016) archaeological monitoring was undertaken by Wessex Archaeology for geophysical (SSS and MBES) data acquired by Fugro in 2015. A total of three anomalies were identified in the geophysical survey data, all of which are located within the current study area (Figure 2).
- 1.2.11 The Year 9 (Wessex Archaeology 2017) archaeological monitoring was undertaken by Wessex Archaeology for geophysical (SSS and MBES) data acquired by Fugro in 2016. A total of four anomalies were identified in the geophysical survey data, all of which are located within the current study area (Figure 2).
- 1.2.12 Most recently, the Year 10 (Wessex Archaeology 2018) archaeological monitoring was undertaken by Wessex Archaeology for geophysical (SSS and MBES) data acquired by EGS (International) Limited (EGSi) in 2017. A total of four anomalies were identified in the geophysical survey data, all of which are located within the current study area (Figure 2).
- 1.2.13 There are 17 reported British Marine Aggregate Producers Association (BMAPA) *Protocol for Reporting Finds of Archaeological Interest* records within Area 458 indicating evidence of maritime and aviation activity within the study area, all reported since its inception in 2005 (Table 2).

Table 2 Marine Aggregate Protocol finds associated with Area 458

Report ID	Find ID	Description	Date	Material	Licence Area	Wharf/Vessel	Year
UMD_0259	5323	Brass spoon engraved 'MAPPIN'	Post Medieval (1774 – mid 19th century)	Metal; Domestic	458 / 430 (centre point)	Erith	4 (2008-2009)
UMD_0264	5326	Half a cannonball for an 18 pounder sea service gun	Post Medieval	Metal; Cannonball	458 (centre point)	Ridham	4 (2008-2009)
UMD_0264	5327	Small cannonball for a 3 pounder gun	Post Medieval	Metal; Cannonball	458 (centre point)	Ridham	4 (2008-2009)
UMD_0264	5328	Half a small cannonball for a 3 pounder gun	Post Medieval	Metal; Cannonball	458 (centre point)	Ridham	4 (2008-2009)
Tarmac_0387	1308	Fuel cap	Modern	Metal	458 (centre point)	Greenwich	7 (2011-2012)
Tarmac_0401	1314	Spoon	-	Metal: Silver	458 (centre point)	Greenwich	7 (2011-2012)
Tarmac_0437	1354	Animal bone	Unknown	Bone	458 (north-west)	Erith Wharf	8 (2012-2013)
CEMEX_0551	1440	Possible aircraft debris	Modern	Metal	458 (north-west)	Erith Wharf	9 (2013-2014)
LTM_0540	1431	Torpedo component	Modern	Metal	458 / 464 / 430 (wharf)	Greenwich	9 (2013-2014)



Report ID	Find ID	Description	Date	Material	Licence Area	Wharf/Vessel	Year
LTM_0603	-	Large metal object	-	Metal	458 or 460 (Mixed cargo)	Greenwich	10 (2014-2015)
LTM_0619	-	Metal object, possibly aircraft	-	Metal	458 (centre point)	Greenwich	10 (2014-2015)
Tarmac_0667	5702	Metal, brass Wooden mooring roller	-	Metal, brass, wood	458 (centre point)	Greenwich (Charlemagne)	11 (2015-2016)
Tarmac_0705	5738	Timber	-	Wood	458	Erith (City of Westminster)	11 (2015-2016)
Tarmac_0706	5739	Metal Spike	-	Metal	458	Erith (City of Westminster)	11 (2015-2016)
CEMEX_0853	-	Aircraft fragment	Modern	Metal	458 (centre point)	Angerstein	13 (2017-2018)
Tarmac_0875	-	Rigging screw	Modern	Metal	458 (centre point)	Erith (City of Westminster)	13 (2017-2018)
CEMEX_0883	-	Carriage wheel	Medieval	Wood	458 (centre point)	Sand Fulmar	13 (2017-2018)

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 of the Middle Eocene Barton formation (Hamblin et al. 1992), which is overlain by a sedimentary unit of gravels, sandy gravels and muddy sandy gravels (British Geological Survey 1989). 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 (Wessex Archaeology 2009).

1.3.2 The seabed geology was relatively consistent across the site, pre-dredging works, 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). The overall nature of the seabed was relatively flat with no significant bathymetric expressions, although dredging scars are now clearly visible within the geophysical data.

1.4 Aims and objectives

1.4.1 The aims and objectives of this assessment are:

- confirm the presence of known or previously located marine sites of archaeological potential and to comment on their apparent character;
- identify, locate and characterise hitherto unrecorded marine sites of archaeological potential;
- comment on the effects of dredging/development on known archaeological sites; and
- provide recommendations for archaeological mitigation.



1.5 Co-ordinate system

1.5.1 The survey data was acquired in WGS84 UTM31N and the results are presented in the same co-ordinate system. Vertical levels are presented relative to Chart Datum (CD) at Eastbourne (EGS (International) Ltd 2018).

2 METHODOLOGY

2.1 Introduction

2.1.1 The methodology adopted for this assessment conforms to the Standard and Guidance for Archaeological Desk-Based Assessment published by the Chartered Institute for Archaeologists (CIfA 2014) and the BMAPA and English Heritage (2003) Marine Aggregate Dredging and the Historic Environment guidance note.

2.2 Data sources

2.2.1 A number of data sources were consulted during this assessment, including:

- Geophysical survey datasets acquired by EGSi;
- Recorded wreck and obstruction data acquired via the United Kingdom Hydrographic Office (UKHO);
- Past reports (EMU 2010; 2011; 2012; Wessex Archaeology 2000; 2007; 2009; 2013; 2015; 2016; 2017; 2018);
- Client supplied survey reports (EGS (International) Ltd 2018)

2.3 Geophysical data – technical specifications

2.3.1 Geophysical data were acquired by EGSi on the 2 and 3 September 2018 onboard survey vessel EGS *Pioneer*. The survey line spacing was undertaken at 90 m intervals and orientated at 75°/255°. Four cross lines were surveyed in the MBES data only for quality control purposes (EGS (International) Ltd 2018). Further details on the equipment used is detailed in Table 3.

Table 3 Summary of survey equipment

Survey Company	Survey Vessel	Data Type	Equipment	Data Format
EGS (International) Ltd	EGS <i>Pioneer</i>	MBES	Kongsberg EM2040D dual head hull mounted	.xyz
		SSS	2 x Klein 3000 series SSS Dual Frequency 100/500 kHz towfish and 100 m range	.xtf
		Positioning	V5 Applanix POS MV 320	N/A

2.4 Geophysical data – processing

2.4.1 All of the SSS and MBES data were assessed over the study area, each dataset was processed separately using the following software (Table 4).

Table 4 Software used for geophysical assessment

Dataset	Processing Software	Interpretation and rationalisation
MBES	QPS Fledermaus v7.7.5	ArcMap v10.5
SSS	CodaOctopus Survey Engine v7.5	

- 2.4.2 The MBES data were analysed to identify any unusual seabed structures that could be shipwrecks or other anthropogenic debris. The data were gridded at 0.5 m and analysed using QPS Fledermaus software, which enables a 3D visualisation of the acquired data and geo-picking of seabed anomalies.
- 2.4.3 The high frequency .*xtf* SSS data files were converted to .*cod* format using CodaOctopus File Utilities and then processed using CodaOctopus Survey Engine Sidescan+ 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.
- 2.4.4 A mosaic of the SSS is produced during this process to assess the quality of the sonar towfish positioning. This process allows the position of anomalies to be checked between different survey lines and for the positioning to be further refined if necessary.
- 2.4.5 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.

2.5 Geophysical data – data quality

- 2.5.1 Once processed, the geophysical data sets were individually assessed for quality and their suitability for archaeological purposes, and rated using the following criteria (Table 5).

Table 5 Criteria for assigning data quality rating

Data quality	Description
Good	Data which are clear and unaffected or only slightly affected by weather conditions, sea state, background noise or data artefacts. Seabed datasets are suitable for the interpretation of upstanding and partially buried wrecks, debris fields, and small individual anomalies. The structure of wrecks is clear, allowing assessments on wreck condition to be made. These data provide the highest probability that anomalies of archaeological potential will be identified.
Average	Data which are moderately affected by weather conditions, sea state and noise. Seabed datasets are suitable for the identification of upstanding and partially buried wrecks, the larger elements of debris fields and dispersed sites, and larger individual anomalies. Dispersed and/or partially buried wrecks may be difficult to identify. These data are not considered to be detrimentally affected to a significant degree.
Below Average	Data which are affected by weather conditions, sea state and noise to a significant degree. Seabed datasets are suitable for the identification of relatively intact, upstanding wrecks and large individual anomalies. Dispersed and/or partially buried wrecks, or small isolated anomalies may not be clearly resolved.
Variable	This category contains datasets where the individual lines range in quality. Confidence of interpretation is subsequently likely to vary within the study area.



2.5.2 The MBES data were rated as 'Good' using the above criteria. The data quality and resolution of 0.5 m was found to be of a good standard and suitable for archaeological assessment of objects and debris over 0.5 m in size.

2.5.3 The SSS data have been rated as 'Average' using the above criteria table. A number of files were subject to some weather interference, such as cable snatching, which has affected the data quality. Overall the SSS data are considered as suitable for archaeological assessment.

2.6 Geophysical data – anomaly grouping and discrimination

2.6.1 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 exploration area.

2.6.2 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 and multiple SSS anomalies.

2.6.3 All geophysical anomalies that have been identified within previous monitoring reports have also been grouped at this stage and compared with the results of the most recent 2018 geophysical dataset.

2.6.4 All previously identified geophysical anomalies that have not been observed within the most recent 2018 dataset have been removed from the gazetteer but are still presented in Figure 2.

2.6.5 Anomalies that have been previously identified by Wessex Archaeology (2013; 2015; 2016; 2017; 2018) have retained their original identification number. Newly identified anomalies have been issued a new number starting with **7009**.

2.6.6 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. For anomalies located on the seabed, these flags are ascribed as follows (Table 6).

Table 6 Criteria discriminating relevance of identified features to proposed scheme

Overview classification	Discrimination	Criteria	Data type
Archaeological	A1	Anthropogenic origin of archaeological interest	MBES, SSS
Archaeological	A2	Uncertain origin of possible archaeological interest	MBES, SSS
Archaeological	A3	Historic record of possible archaeological interest with no corresponding geophysical anomaly	MBES, SSS

2.6.7 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 SEABED FEATURES ASSESSMENT

3.1 Introduction

3.1.1 The geophysical data were assessed to identify features of archaeological potential relating to maritime and aviation activity.

3.2 Seabed features assessment results

3.2.1 The results of this assessment are collated in gazetteer format detailed in Appendix 1 and illustrated in Figures 2 – 5.

3.2.2 Eight features have been identified as being of possible archaeological potential within the study area and are discriminated as shown in Table 7. No recorded wrecks and obstructions were identified within the study area.

Table 7 Anomalies of archaeological potential within the study area

Archaeological discrimination	Quantity		Interpretation
	Active Dredge Zone	Outside Active Dredge Zone	
A1	0	0	Anthropogenic origin of archaeological interest
A2	3	5	Uncertain origin of possible archaeological interest
A3	0	0	Historic record of possible archaeological interest with no corresponding geophysical anomaly
Total	3	5	

3.2.3 Furthermore, these anomalies can be classified by probable type, which can further aid in assigning archaeological potential and importance (Table 8).

Table 8 Types of anomaly identified

Anomaly classification	Definition	Number of anomalies		
		Active Dredge Zone	Outside Active Dredge Zone	Type total
Debris	Distinct objects on the seabed, generally exhibiting height or with evidence of structure, that are potentially anthropogenic in origin	1	1	2
Dark reflector	Individual objects or areas of high reflectivity, displaying some anthropogenic characteristics. Precise nature is uncertain	2	3	5
Mound	A mounded feature with height not considered to be natural. Mounds may form over wreck sites or other debris.	0	1	1
Total		3	5	8

3.2.4 In previous monitoring assessments (Wessex Archaeology 2009; 2013; 2015; 2016; 2017; 2018; EMU 2010; 2011; 2012) 29 geophysical anomalies representing 15 features of possible archaeological potential were identified within the study area. Fifteen of these previous anomalies were grouped with two features identified in the current dataset by Wessex Archaeology. The remaining 14 previously identified anomalies were not observed in the most recent dataset by Wessex Archaeology and have either been interpreted within



the most recent dataset as being natural features, or may have since been buried within the seabed sediment. All previous anomalies are presented in Figure 2.

3.3 Within Active Dredge Zone

- 3.3.1 Three anomalies have been identified within the ADZ, one of which (**7001**) has been identified in all previous monitoring assessments. All of these anomalies have been discriminated as A2 – Uncertain origin of possible archaeological interest.
- 3.3.2 Debris **7001** was observed in the previous 2017 dataset as a sub-angular object measuring 4.4 x 1.7 x 0.9 m on the edge of a large depression measuring 14.0 x 9.0 x -0.6 m directly to the northeast. To the east of the object and depression a mound was observed in the MBES data, measuring 14.0 x 5.0 x 0.1 m, and aligned east northeast to west southwest. The anomaly was interpreted as possible partially buried debris.
- 3.3.3 In the 2018 data this feature was observed in the SSS data as a slightly elongated or pointed dark reflector with a bright and tapered shadow and significant height off the seabed. The object has dimensions of 3.1 x 1.7 x 1 m and is situated in a slight depression, with scouring orientated northeast and measuring up to 50 m. In the MBES data this is visible as a large, elongated depression measuring 23 x 7 m situated on an area of flat seabed between two areas that have been disturbed by dredging (Figure 3).
- 3.3.4 A current 50 m Archaeological Exclusion Zone (AEZ) exists around the extents of this feature (Figures 2 and 3) and from the MBES data a single dredge track is observed within the AEZ in the north which has occurred within the past year (Figure 3). Dredging has affected the upper 14 cm of sediment to within 14 m of the AEZ. This disturbance does not appear to have had any adverse impact on the archaeology within the AEZ.
- 3.3.5 Two dark reflector objects have been observed in the 2018 data that have not been identified in previous monitoring assessments. Anomaly **7009** is a small and indistinct dark reflector object with a very long, bright and distinct shadow. The anomaly has dimensions of 1.8 x 0.3 x 1.1 m and is situated within an area of disturbed seabed or scour measuring 14.6 x 5.5 m. This anomaly is faintly visible in the MBES data as a slight depression, this could be a natural feature or an item of debris (Figure 4). Dark reflector **7012** is a straight edged object that may be partially broken up or buried by sands. The feature has a bright shadow and dimensions of 6.3 x 1.8 x 0.1 m, it is situated in an area that has been disturbed by dredging activities. This could be a natural feature or an item of debris (Figure 4).

3.4 Outside Active Dredge Zone

- 3.4.1 Five anomalies have been identified outside the ADZ, one of which (**7002**) has been identified in all the previous monitoring assessments (Figure 2). All of these anomalies have been discriminated as A2 – Uncertain origin of possible archaeological interest.
- 3.4.2 Mound (**7002**) was observed in the previous 2017 SSS data as a discrete elongate mound measuring 23.2 x 5.9 x 0.7 m and recorded in the MBES data as measuring 33.0 x 11.0 x 0.9 m. In the most recent 2018 data the mound has been observed in the SSS data as a large oval shaped feature with significant height off the seabed and situated in a slight depression. The mound is orientated east-northeast to west-southwest with dimensions of 26.3 x 14.0 x 0.8 and is isolated on a sandy area of the seabed. In the MBES data this is visible as a large elongate mound situated in an area undisturbed by dredging activities with a slight depression or scour visible on its northeast side (Figure 4).



- 3.4.3 Debris **7010** is a distinct and isolated elongated dark reflector with a long, bright shadow and significant height off the seabed. The object has dimensions of 3.3 x 3.0 x 1.2 m and has an almost halo shaped bright reflector object attached to its northern side measuring 6.0 x 3.0 m. In the MBES data this is visible as a small rounded mound with a slightly flattened peak situated in an un-dredged area of the seabed. This feature has not been identified in previous monitoring assessments and could be an item of modern debris or older debris that has recently become exposed (Figure 5).
- 3.4.4 Three dark reflector objects have been identified outside the ADZ (**7011**, **7013** and **7014**). None of these features have been identified in any of the previous monitoring assessments and are all interpreted to be either natural features or items of debris. Anomaly **7011** is an elongated dark reflector measuring 7.3 x 2.7 x 1.1 m with a bright, large and tapered shadow. This feature is visible in the MBES data as a slight oval depression with some scouring orientated northeast and measuring 30 m (Figure 5).
- 3.4.5 Dark reflector **7013** is a distinct object measuring 3.3 x 3.3 x 1.4 m with a long, bright and tapered shadow. This feature is situated within a depression and has a large amount of scouring orientated northeast and measuring up to 100 m in the SSS data. In the MBES data this is visible as a small, rounded mound with a peak situated within a depression, this depression or scour measures 16.0 x 5.5 m (Figure 5).
- 3.4.6 Dark reflector **7014** is an elongated object with a large, bright shadow and significant height off the seabed. This feature has dimensions of 3.4 x 2.3 x 0.9 m with some slight scour to the northeast and measuring 18 m. This object is visible in the MBES data as a small, rounded mound in a depression.

4 CONCLUSIONS AND RECOMMENDATIONS

- 4.1.1 The assessment of the geophysical data within the study area resulted in a total of eight anomalies identified as being of possible archaeological interest (A2 archaeological rating).
- 4.1.2 Three anomalies are located within the ADZ (**7001**, **7009** and **7012**). A current 50 m AEZ is already in place around the location of **7001** and it is recommended that this is maintained in accordance with the current licence. The MBES data indicates that there has been some dredging activity within the northern section of the AEZ in the past year. Dredging has affected the upper 14 cm of sediment to within 14 m of the AEZ extents, although this does not appear to have had any adverse impact on the archaeology within the AEZ.
- 4.1.3 Dark reflectors **7009** and **7012** were not identified in any of the previous monitoring assessments, **7012** is located in an area that has been dredged and it may have been exposed during the process. Dark reflector **7009** may have become exposed during dredging activities or natural sand movement. No new AEZs are recommended for these features, however heightened vigilance should be implemented at their locations and any material recovered reported using the established Marine Aggregate Industry *Protocol for reporting finds of archaeological interest* (BMAPA and English Heritage 2005). Further details on the AEZ are outlined in the table below (Table 9).



Table 9 Recommended AEZ within the study area

ID Number	Classification	Original Assessment	Position (WGS84 UTM31N)		Status	Exclusion Zone
			Easting	Northing		
7001	Debris	88980	333745	5596420	Reviewed - retained unchanged	50 m buffer around existing point location

- 4.1.4 The remaining five anomalies (**7002**, **7010**, **7011**, **7013** and **7014**) are located outside the ADZ and, therefore, no AEZs are recommended at this time as they are unlikely to be impacted. However, if this were to change, avoidance would be recommended where feasible.
- 4.1.5 In the previous monitoring assessment (Wessex Archaeology 2018) two dark reflector objects (**7007** and **7008**) were identified outside the ADZ. Anomaly **7007** has not been identified in the most recent 2018 dataset. The MBES data indicates that no recent dredging activity has taken place over this location suggesting possible burial of the feature. Therefore, operational vigilance is to be undertaken if activity takes place in the vicinity of this anomaly. Anomaly **7008** has been deemed to be a natural feature and removed from the most recent gazetteer.
- 4.1.6 For features assigned A2 archaeological discrimination rating, no AEZs are recommended at this time. However, avoidance of these features by micro-siting is recommended if they are proposed to be directly impacted by development in the future.
- 4.1.7 It is recommended that if any objects of possible archaeological interest are recovered during dredging operations from Area 458, that they should be reported using the established Marine Aggregate Industry *Protocol for reporting finds of archaeological interest* (BMAPA and English Heritage 2005).



5 REFERENCES

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Wessex Archaeology 2018 *Aggregate Area 458: Archaeological Assessment of 2017 Geophysical Data; Archaeological Monitoring Report*. Unpubl rep ref: 88984.01.



APPENDICES

Appendix 1 Seabed features of archaeological potential

ID Number	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Description	External references	Area
7001	Debris	333745	5596420	A2	3.1	1.7	1.0	A slightly elongated or pointed dark reflector object with a bright and tapered shadow and significant height off the seabed, this object is situated in a slight depression and has scouring orientated northeast and measuring 50 m. In the MBES data this is visible as a large elongate depression measuring 23 x 7 m. This feature is situated on an area of flat seabed between two areas that have been disturbed by dredging. This feature has been identified in all previous monitoring assessments and has a 50 m AEZ assigned to it	A458_SC_0007	Inside
7002	Mound	336381	5597263	A2	26.3	14.0	0.8	A large oval shaped mound feature with significant height off the seabed and in a slight depression. This feature is isolated on a sandy area of the seabed. In the MBES data this is visible as a large elongate mound isolated in an area undisturbed by dredging with a slight depression or scour to the northeast. This feature has been identified in all previous monitoring assessments	A458_SC_0008	Outside
7009	Dark reflector	336726	5596922	A2	1.8	0.3	1.1	A small and indistinct dark reflector object with a very long, bright and distinct shadow with significant height off the seabed. This object is situated within an area of disturbed seabed or scour measuring 14.6 x 5.5 m. This anomaly is faintly visible in the MBES data as a slight depression. This feature has not been identified in previous monitoring assessments and could be a natural feature or an item of debris	A458_SC_0002	Inside
7010	Debris	336712	5597060	A2	3.3	3.0	1.2	A distinct and isolated elongated dark reflector object with a long, bright shadow and significant height off the seabed. There is an almost halo shaped bright reflector object attached to it measuring 6 x 3 m. In the MBES data	A458_SC_0001	Outside

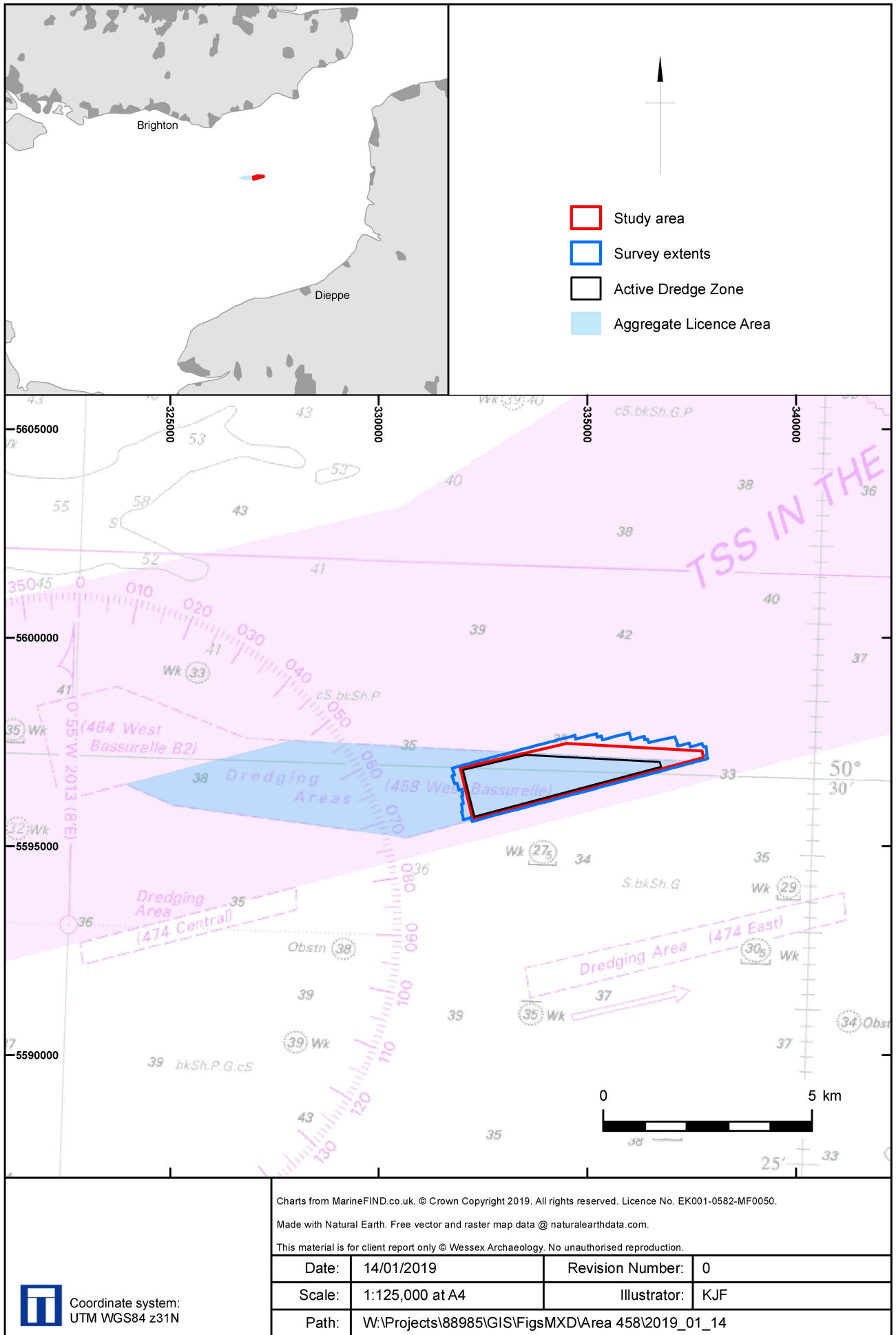


ID Number	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Description	External references	Area
								this is visible as a small rounded mound with a slightly flattened peak situated in an un-dredged area of the seabed, this feature has a slightly circular object (or circular area of disturbed seabed) attached to its northern side. This feature has not been identified in previous monitoring assessments and could be an item of debris		
7011	Dark reflector	337034	5597292	A2	7.3	2.7	1.1	An elongated dark reflector object with a bright, large and tapered shadow with significant height off the seabed. This feature is visible in the MBES data as a slight oval depression with some scouring orientated northeast and measuring 30 m. This feature has not been identified in previous monitoring assessments and could be a natural feature or an item of debris	A458_SC_0005	Outside
7012	Dark reflector	335183	5596898	A2	6.3	1.8	0.1	A straight edged object that may be partially broken up or buried by sands, the feature has a bright shadow and is situated in an area that has been disturbed by dredging activities. This feature has not been identified in previous monitoring assessments and could be a natural feature or an item of debris	-	Inside
7013	Dark reflector	336847	5597230	A2	3.3	3.3	1.4	A distinct dark reflector object with a long, bright and tapered shadow and significant height off the seabed. This feature is situated within a depression and has a large amount of scouring orientated northeast and measuring up to 100 m. In the MBES data this is visible as a small, rounded mound with a peak situated within a depression, the depression or scour measures 16 x 5.5 m. This feature has not been identified in previous monitoring assessments and could be a natural feature or an item of debris	A458_SC_0009	Outside
7014	Dark reflector	335303	5597294	A2	3.4	2.3	0.9	An elongated dark reflector object with a large, bright shadow and significant height off the seabed. This feature has a slight scour to the northeast measuring 18 m and is visible in the MBES data as a small, rounded mound. This feature has not been identified in previous monitoring	A458_SC_0010	Outside



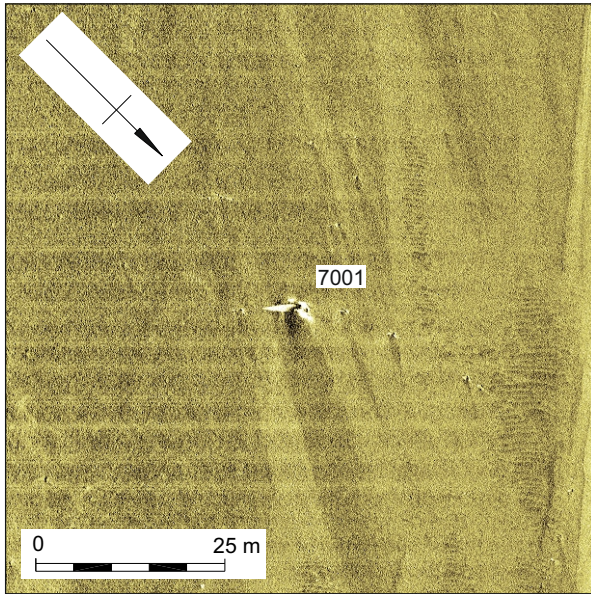
ID Number	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Description	External references	Area
								assessments and could be a natural feature or an item of debris		

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

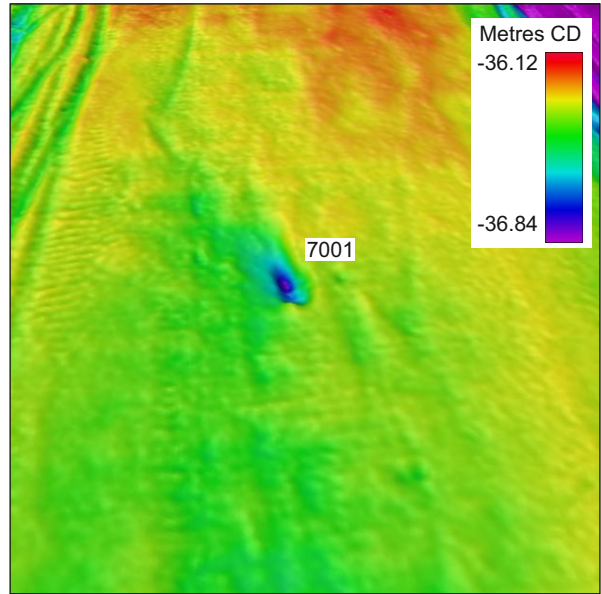


Location map

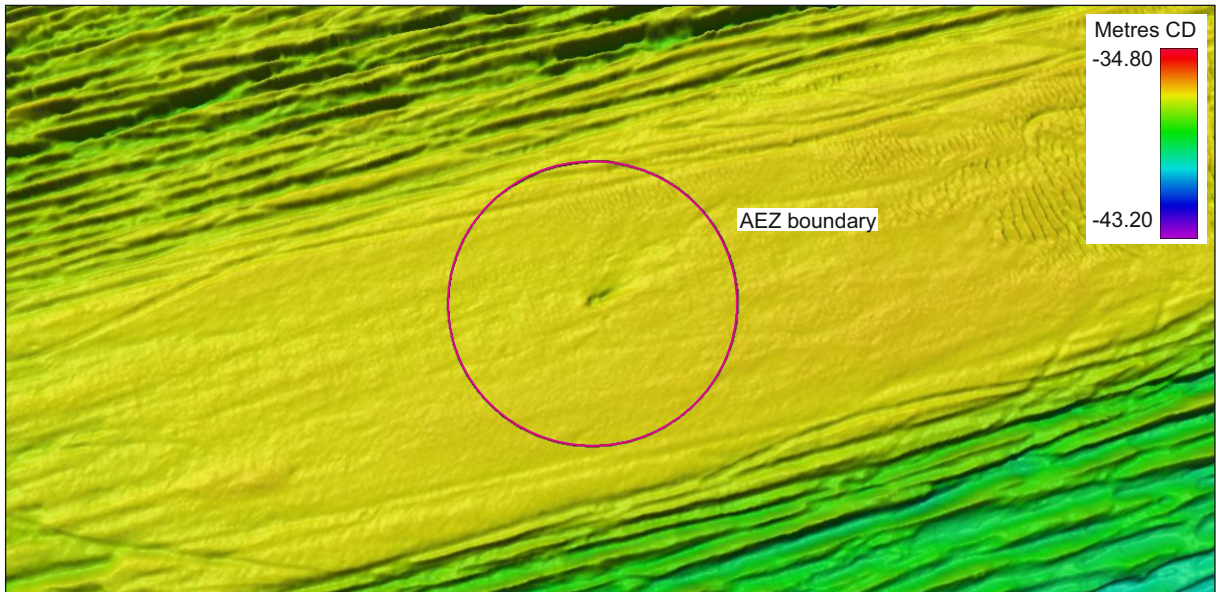
Figure 1



SSS waterfall image of debris 7001, 3.1 x 1.7 x 1 m



MBES image of debris 7001 (x4 vertical exaggeration) facing east

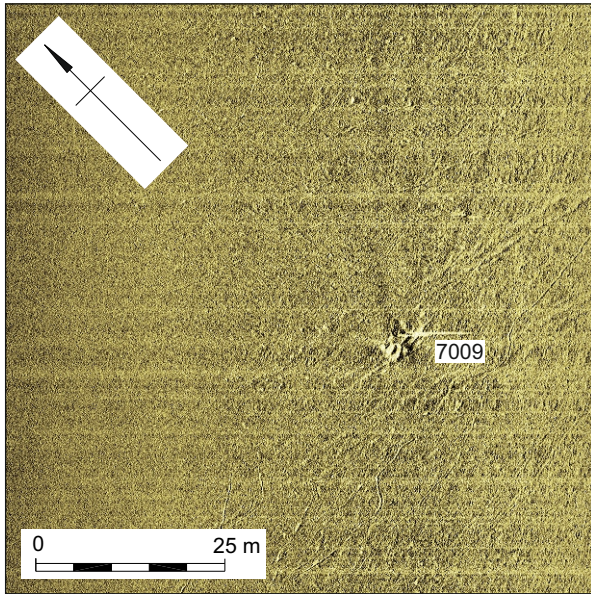


Debris 7001 50 m Archaeological Exclusion Zone

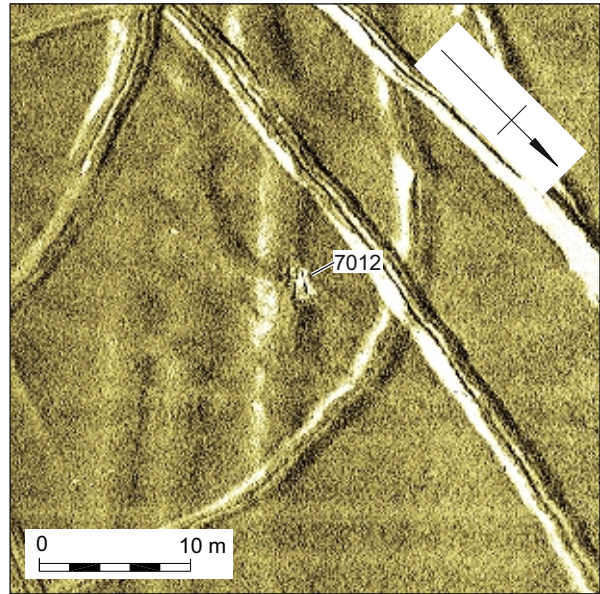
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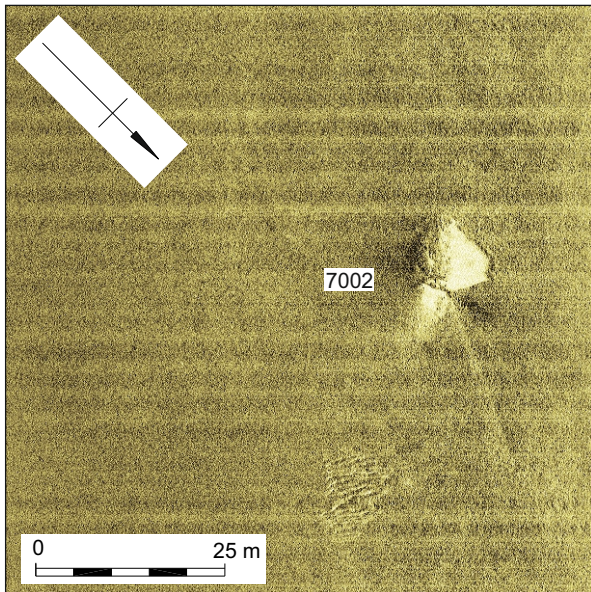
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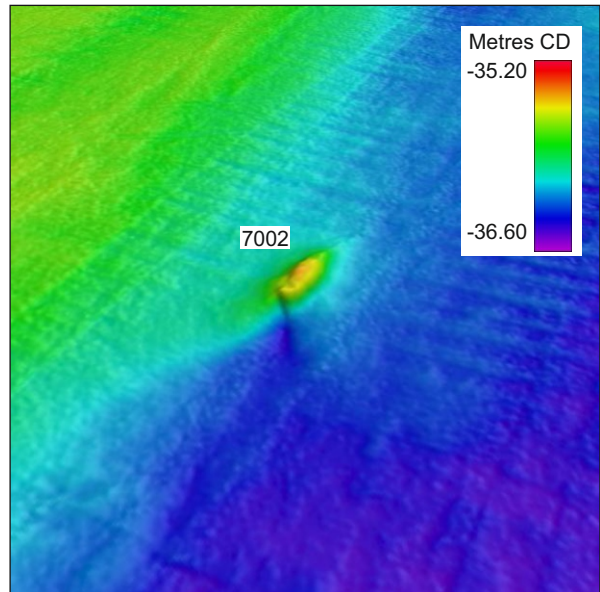
SSS waterfall image of dark reflector 7009, 1.8 x 0.3 x 1.1 m



SSS waterfall image of dark reflector 7012, 6.3 x 1.8 x 0.1 m



SSS waterfall image of mound 7002, 26.3 x 14 x 0.8 m



MBES image of mound 7002 (x4 vertical exaggeration) facing southwest



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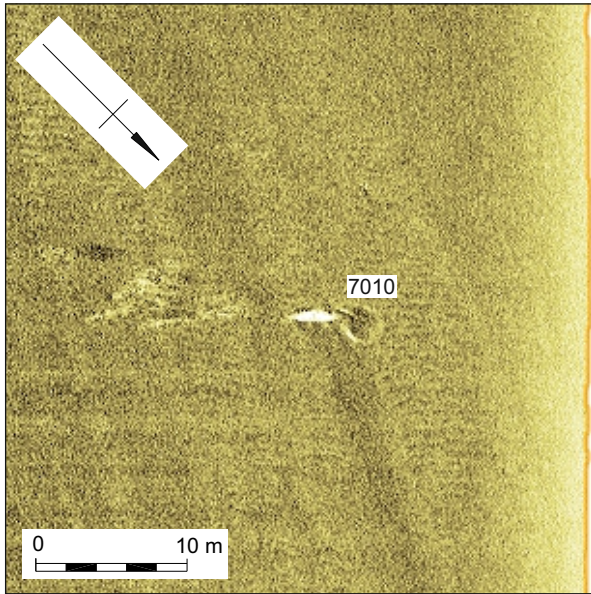
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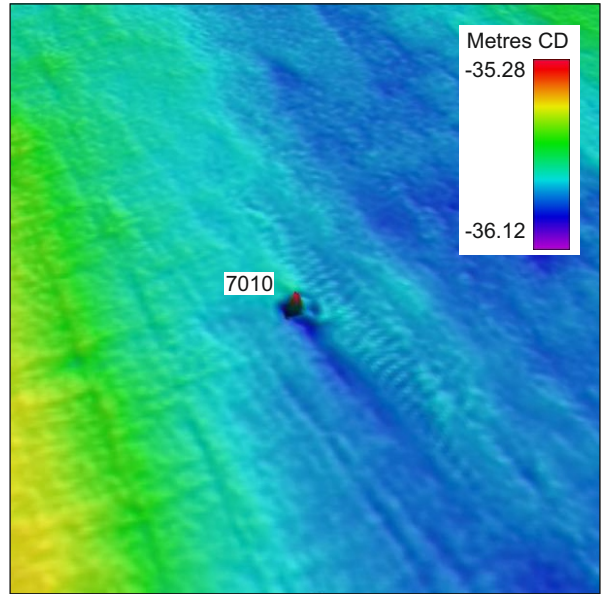
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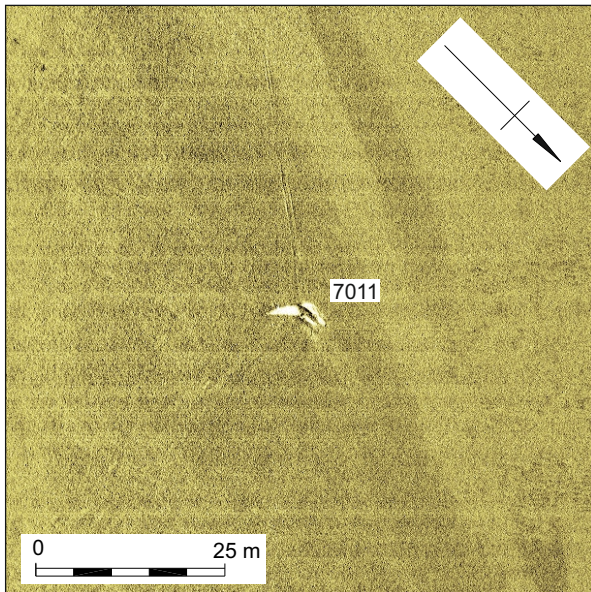
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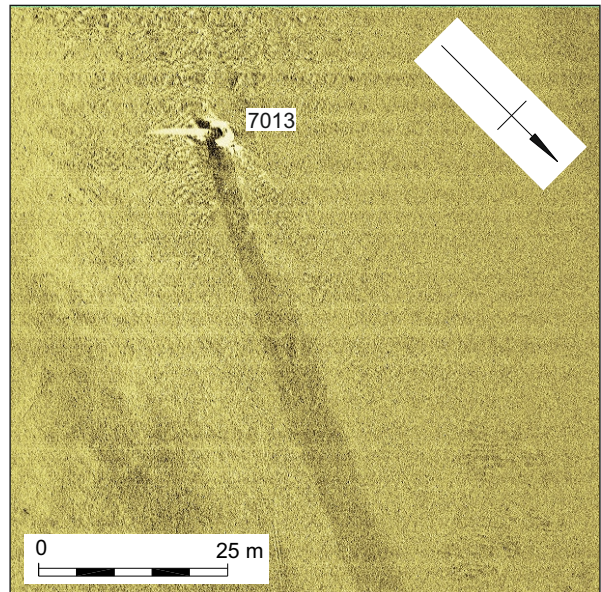
SSS waterfall image of debris 7010, 3.3 x 3 x 1.2 m



MBES image of debris 7010 (x4 vertical exaggeration) facing west



SSS waterfall image of dark reflector 7011, 7.3 x 2.7 x 1.1 m



SSS waterfall image of dark reflector 7013, 3.3 x 3.3 x 1.4 m

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