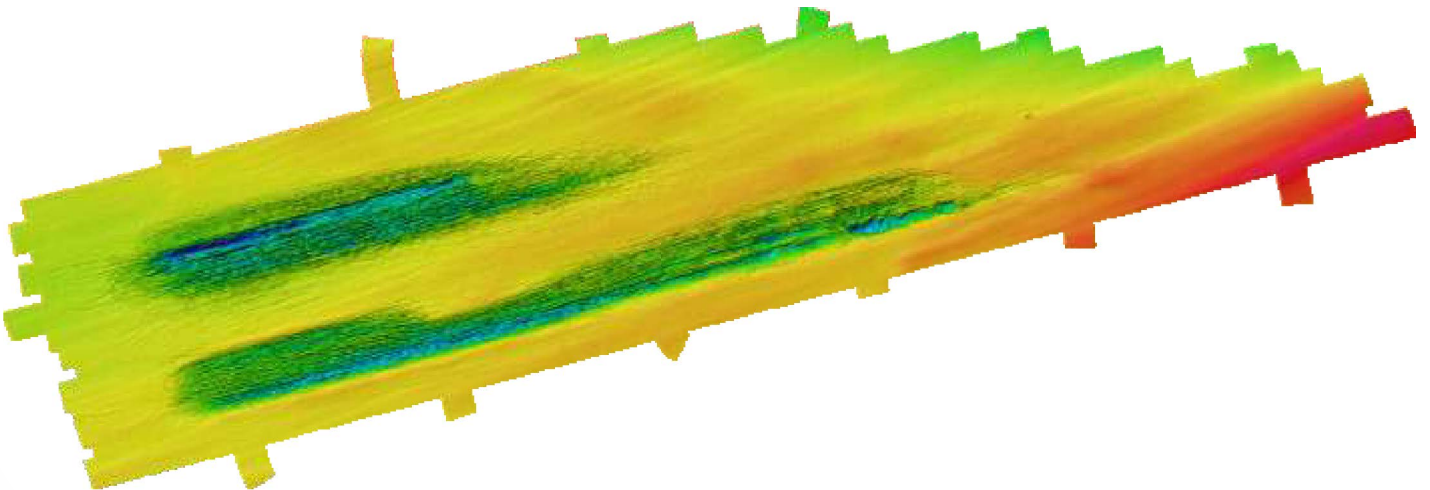




# Aggregate Area 458

Archaeological Assessment of 2016 Geophysical Data  
Archaeological Monitoring Report



Ref: 88983.01  
March 2017



## **Aggregate Area 458**

### **Archaeological Assessment of 2016 Geophysical Data Archaeological Monitoring Report**

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**March 2017**

**Report Ref.: 88983.01**



## Quality Assurance

<b>Project Code</b>	88983	<b>Accession Code</b>	-	<b>Client Ref.</b>	-
<b>Planning Application Ref.</b>	-	<b>Ordnance Survey (OS) national grid reference (NGR)</b>	-		

Version	Status*	Prepared by	Checked and Approved By	Approver's Signature	Date
V01	E	L. Andrews	L Tizzard		20/02/17
File:	88983_Area458_Geophysics_Report_V01_20170217.pdf				
V02	E	L. Andrews	L Tizzard		06/03/17
File:	88983_Area458_Geophysics_Report_V02_20170306.pdf				
V03					
File:					
V04					
File:					
File:					

\* I = Internal Draft; E = External Draft; F = Final

### DATA LICENCES

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## Aggregate Area 458

### Archaeological Assessment of 2016 Geophysical Data Archaeological Monitoring Report

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## Aggregate Area 458

### Archaeological Assessment of 2016 Geophysical Data Archaeological Monitoring Report

#### Summary

Wessex Archaeology was commissioned by CEMEX UK Marine Limited and Tarmac Marine Limited to undertake an archaeological assessment of geophysical survey data as part of the heritage annual monitoring process for aggregate extraction Area 458. The data comprised sidescan sonar and multibeam bathymetry data acquired by Fugro EMU Limited during November and December 2016.

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 any new anomalies that may be of potential archaeological interest.

Four anomalies of archaeological potential have been identified within the Study Area. All of the anomalies identified (**7001**, **7002**, **7005** and **7006**) have been classified as A2 - Uncertain origin of possible archaeological interest.

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

The remaining three anomalies (**7002**, **7005** and **7006**) are located outside the Active Dredge Zone and, therefore, no Archaeological Exclusion Zones are recommended for these anomalies at this time as they are unlikely to be impacted. However, if this were to change, avoidance would be recommended where feasible.

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).



## **Aggregate Area 458**

### **Archaeological Assessment of 2016 Geophysical Data Archaeological Monitoring Report**

#### **Acknowledgements**

This assessment was commissioned by CEMEX UK Marine Limited and Tarmac Marine Limited and the assistance of Samantha Bevan of CEMEX, and Simon Lockett of Tarmac, is acknowledged in this respect. The geophysical data were provided by Ben Rainbow of Fugro EMU Limited.

Laura Andrews carried out the 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.



## Aggregate Area 458

### Archaeological Assessment of 2016 Geophysical Data Archaeological Monitoring Report

#### 1 INTRODUCTION

##### 1.1 Project background

- 1.1.1 Wessex Archaeology (WA) was commissioned by CEMEX UK Marine Limited and Tarmac Marine Limited to undertake an archaeological assessment of geophysical survey data provided by Fugro EMU Limited (Fugro) 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 south-east of Beachy Head, East Sussex (**Figure 1**).
- 1.1.2 The Study Area for the Licence Area, as provided by Fugro, is delimited by the following coordinates (WGS 84 UTM Zone 31N):

**Table 1** Delimiting coordinates for Area 458

<b>Easting</b>	<b>Northing</b>
332254	5595656
331955	5596876
334421	5597449
337707	5597282
337742	5597121

- 1.1.3 The data comprised sidescan sonar (SSS) and multibeam echosounder (MBES) data acquired by Fugro on 30 November and 2 December November 2016. The geophysical survey data assessed for this report covers the Study Area for Area 458 (**Figure 1**). The Study Area was defined by a buffer, 50 m to the north, west and south and 1 km to the east of the active dredge zone, as specified in the marine licence.
- 1.1.4 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 areas (year 9).
- ##### 1.2 Previous work
- 1.2.1 In 2000 WA 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 (WA 2000) compiled and reviewed documentary records of known archaeological sites and assesses 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 WA in preparation for aggregate extraction within Areas 458 and 464 (WA 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 WA (WA 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 5 contacts were identified in the geophysical survey data and 3 of these are located within the current Study Area (**Figure 2**).
- 1.2.8 The Year 5 (WA 2013) archaeological monitoring was undertaken by WA for geophysical (SSS and MBES) data acquired by Fugro in 2012. A total of 4 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 (WA 2015) archaeological monitoring was undertaken by WA for geophysical (SSS and MBES) data acquired by Fugro in 2014. A total of 3 anomalies were identified in



the geophysical survey data, all of which are located within the current Study Area (**Figure 2**).

- 1.2.10 Most recently, the Year 8 (WA 2016) archaeological monitoring was undertaken by WA for geophysical (SSS and MBES) data acquired by Fugro in 2015. A total of 3 anomalies were identified in the geophysical survey data, all of which are located within the current Study Area (**Figure 2**).
- 1.2.11 There are nine 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	Unknown	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	Unknown	Metal	458 (north-west)	Erith Wharf	9 (2013 - 2014)
LTM_0540	1431	Torpedo component	Modern	Metal	458 / 464 / 430	Greenwich	9 (2013 - 2014)

### 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 (WA 2009).

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 (WA2009). The overall nature of the seabed was relatively flat with no significant bathymetric expressions.

## **1.4 Aim**

1.4.1 The aim of this report is to:

- 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 on known archaeological sites; and
- Provide recommendations for archaeological mitigation.

## **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 The primary data set was the geophysical data acquired by Fugro. The data comprised SSS and MBES data acquired by Fugro between 30 November and 2 December 2016 at 90 m line spacing with cross lines every 1 km.

2.2.2 The SSS data were provided as high and low frequencies in *.xtf* format and the MBES data were provided as a single *.txt* file. Only the high frequency SSS data were assessed by WA.

2.2.3 Further background information was obtained from previous archaeological investigations as detailed in Section 1.2.

2.2.4 A United Kingdom Hydrographic Office (UKHO) search for wrecks and obstructions was also undertaken as part of this assessment.

### **2.3 Technical specifications**

2.3.1 The geophysical data were acquired by Fugro between 30 November and 2 December 2016. The data were acquired with a line spacing of 90 m with cross lines spaced every 1 km.



- 2.3.2 The SSS data were acquired using an Edgetech 4200 dual frequency sidescan sonar towfish and transceiver, operated at both high (600 kHz) and low (300 kHz) frequencies simultaneously, at a range of 114 m. The SSS data were provided as high and low frequencies in .xtf format.
- 2.3.3 The MBES data were acquired using a Kongsberg EM 2040 MBES system operated at 400 kHz. The data were processed in QINSy and reduced to Chart Datum (CD), Eastbourne. The data were digitally recorded, gridded to 1 m cell size and provided to WA in a single .txt file.
- 2.3.4 A Fugro Starfix system with G2+/HP/XP corrections was used to provide primary positioning for the survey. The secondary positioning system used was an Applanix POS MV DGNS.
- 2.3.5 For this survey all positions were recorded and expressed in WGS 1984, UTM Zone 31N.

## 2.4 Data quality

- 2.4.1 The geophysical data used for this report were assessed for quality and their suitability for archaeological purposes, and rated using the following criteria.

**Table 3** Criteria for assigning data quality rating

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

- 2.4.2 The high frequency SSS data have been rated as 'Average' using the above criteria. The data were acquired at a range of 114 m and was subject to some weather interference. The positioning of some lines has also been affected. Visibility did not extend to the end of the 114 m range. Large and upstanding objects were visible however smaller objects were difficult to identify. Overall the data were considered suitable for archaeological interpretation.
- 2.4.3 The MBES data were rated as "Good" using the above criteria. The 1 m gridding ensured relatively small features were visible, and relatively few weather and tidal artefacts were present within the data. The dataset was considered suitable for archaeological interpretation.

## 2.5 Processing

- 2.5.1 The high frequency SSS 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.

- 2.5.2 A mosaic of the SSS 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.
- 2.5.3 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.
- 2.5.4 The MBES data were analysed to identify any unusual seabed structures that could be shipwrecks or other anthropogenic debris. The results were correlated with the SSS data interpretation. The data were analysed using Fledermaus software, which enables 3-D visualisation of the acquired data and geo-picking of seabed anomalies.

## 2.6 Anomaly grouping and discrimination

- 2.6.1 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.
- 2.6.2 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, multiple SSS anomalies and a MBES anomaly.
- 2.6.3 All geophysical anomalies that were identified in previous monitoring reports have also been grouped at this stage and the results compared with the results of the most recent 2016 dataset.
- 2.6.4 Anomalies that have been previously identified by WA have retained their original identification number.
- 2.6.5 Once all the geophysical anomalies 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:

**Table 4** Criteria for discriminating archaeological importance of features

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

- 2.6.6 Anomalies that were identified within the geophysical data but located outside the Study Area as provided by Fugro are considered outside the limits of this assessment and have been removed from the final gazetteer.



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 RESULTS

3.1.1 The results of this assessment are collated in gazetteer format and detailed in **Appendix I** and are illustrated in **Figure 2**. Where anomalies have been identified within the previous WA monitoring reports (WA 2013; 2015; 2016) their previous number has been retained. Newly identified anomalies have been issued a new number starting with 7005.

3.1.2 Four anomalies of archaeological potential have been interpreted within this area (**Figure 2**). These anomalies are discriminated as follows:

**Table 5** Anomalies of archaeological potential in Area 458

Archaeological Discrimination	Number of anomalies	Interpretation
A1	0	Anthropogenic origin of archaeological interest
A2	4	Uncertain origin of possible archaeological interest
<b>Total</b>	<b>4</b>	

3.1.3 These anomalies of potential archaeological interest have been classified by probable type, which can further aid in assigning archaeological potential and importance:

**Table 6** Types of anomalies identified in Area 458

Anomaly Classification	Number of Anomalies Inside Active Dredge Zone	Number of Anomalies outside Active Dredge Zone	Total Number of Anomalies
Debris	1	0	1
Mound	0	1	1
Dark Reflector	0	2	2
<b>Total</b>	<b>1</b>	<b>3</b>	<b>4</b>

3.1.4 In previous monitoring assessments (WA 2016; WA 2015; WA 2013; EMU 2012; EMU 2011; EMU 2010) 23 geophysical anomalies representing 11 features of possible archaeological potential were identified within the Study Area. Thirteen of these previous anomalies were grouped with two features identified in the current dataset by WA. The remaining ten previously identified anomalies were not observed in the most recent dataset by WA and have been interpreted as natural features, or may be buried within the seabed sediment. All previous anomalies are presented in **Figure 2**.

### 3.2 Within Active Dredge Zone

3.2.1 One anomaly (**7001**) has been located within the Active Dredge Zone (ADZ) and has been discriminated as A2 – Uncertain origin of possible archaeological interest.

3.2.2 Anomaly **7001** has been classified as an individual piece of possible debris and was observed in both the SSS and MBES datasets. The feature has been identified in all previous monitoring assessments (WA 2016, WA 2015, WA 2013; 7001, WA 2009; 7000, EMU 2012; 0001, EMU 2011; 0007, EMU 2010; 0009).



- 3.2.3 From the most recent dataset anomaly **7001** has been observed in the SSS data as a sub-angular object within a slight scour and possible surrounding smaller objects measuring 4.8 x 1.7 x 0.9 m (**Figure 3**).
- 3.2.4 This anomaly was observed in the previous 2015 dataset as an object within a depression measuring 4 x 3.2 x 0.3 m. The difference in size could be due to changing sediment dynamics within the area.
- 3.2.5 A current 50 m Archaeological Exclusion Zone (AEZ) exists around the extents of this object (**Figure 2**) and there is no evidence of any dredging within the AEZ over the past year.

### 3.3 Outside Active Dredge Zone

- 3.3.1 Three anomalies (**7002**, **7005** and **7006**) have been identified outside the ADZ and have been discriminated as A2 – Uncertain origin of possible archaeological interest.
- 3.3.2 One anomaly identified outside the ADZ (**7002**) has been identified within both the SSS and MBES data and classified as a mound; a significant isolated area with recorded height. This anomaly has been previously identified within all previous monitoring reports (WA 2016, WA 2015, WA 2013; 7002, EMU 2012; 0002, EMU 2011; 0011, EMU 2010; 0008) (**Figure 2**).
- 3.3.3 Anomaly **7002** was identified within the most recent SSS data as a discrete elongate mound measuring 22.2 x 6.2 x 0.6 m, which may represent the peak of a larger overall mound feature observed in the MBES data as 32 x 15 x 0.7 m, aligned ENE to WSW with some slight scour and disturbance at the ENE end (**Figure 4**).
- 3.3.4 This mound was observed in the previous 2015 data with SSS measurements of 21.8 x 5.2 x 0.8 m within overall MBES measurements of 30 x 8.5 x 0.7 m. The increase in dimensions and slight decrease in height may suggest that the mound is being enlarged by sediment accretion surrounding the mound due to seabed processes.
- 3.3.5 The 2 remaining anomalies (**7005** and **7006**) were both classified as dark reflectors; objects of uncertain origin, and neither of these anomalies have been previously identified.
- 3.3.6 Anomaly **7005** was observed as a thin sub-angular object with slight bright shadow measuring 3.5 x 0.6 x 0.2 m. This anomaly has been interpreted as a piece of possible debris or a natural feature.
- 3.3.7 Anomaly **7006** was observed as an object with tall sub-angular bright shadow, measuring 5.6 x 0.7 x 1.3 m, and a slight surrounding seabed disturbance. This anomaly has been interpreted as a piece of possible debris or a natural feature.

## 4 MITIGATION

- 4.1.1 With regards to mitigation of archaeology the marine planning authority, working with the relevant regulator and advisors, take account of the desirability of sustaining and enhancing the significance of heritage assets and adopt a general presumption in favour of the conservation of designated heritage assets within an appropriate setting (HM Government 2011; DCALG 2012).
- 4.1.2 A total of 4 anomalies of archaeological potential have been identified across the Study Area for Aggregate Area 458. All of the anomalies identified (**7001**, **7002**, **7005** and **7006**) have been classified as A2 - Uncertain origin of possible archaeological interest.



- 4.1.3 One of the anomalies (**7001**) is located within the ADZ. A current 50 m AEZ is already in place around the location of this anomaly and it is recommended that this is maintained in accordance with the current licence.
- 4.1.4 The remaining three anomalies (**7002**, **7005** and **7006**) are located outside the ADZ and, therefore, no AEZs are recommended for these anomalies 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 (WA 2016) anomaly **7004** was identified just outside the ADZ on the western edge of the Study Area. This anomaly has not been identified in the recent 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 be undertaken if activity takes place in the vicinity of this anomaly.
- 4.1.6 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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**APPENDIX I: ANOMALIES OF POSSIBLE ARCHAEOLOGICAL POTENTIAL – AREA 458**

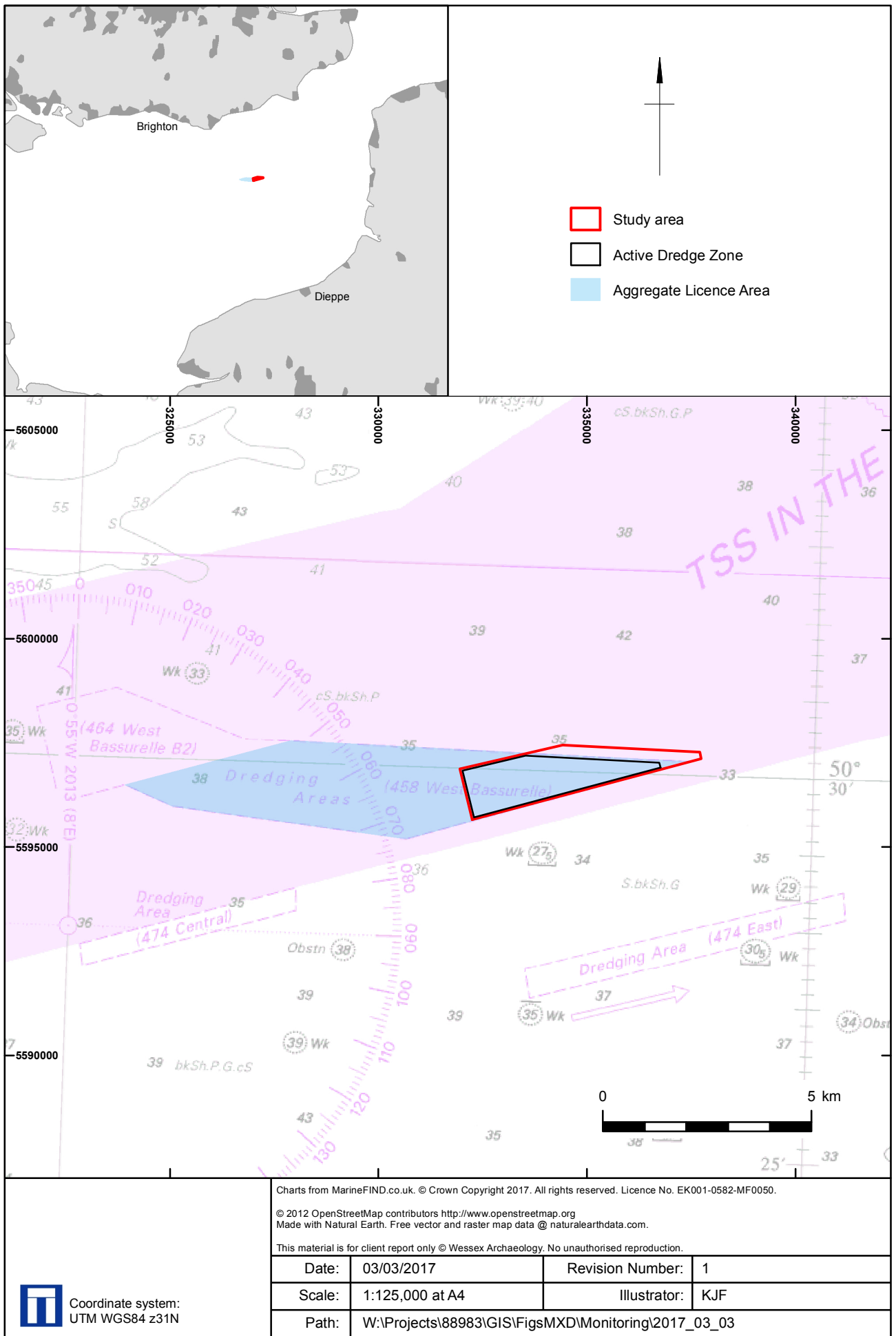
WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Description	Active Dredge Zone (ADZ)	External References
7001	Debris	333742	5596419	A2	4.8	1.7	0.9	Object within slight scour and possible surrounding objects. Looks to be on the edge of a small hump in the seabed. Observed as an object within a depression (36.67 m below CD) and a relatively significant disturbance within the seabed in the MBES data. Build-up to south-west. Position taken from MBES data. Previously observed as an object within a seafloor disturbance measuring 4 x 3.2 x 0.3 m	Inside	WA 2013; WA 2015; WA 2016 (7001), WA 2009 (7000), EMU 2010 (0009), EMU 2011 (0007), EMU 2012 (0001)
7002	Mound	336379	5597260	A2	22.2	6.2	0.6	Discrete sub rounded elongate mound of sediment with slight irregular height shadow. Observed as an elongate mound with a sloped height and measuring 32 x 15 x 0.7 m at (35.58 m below CD) in the MBES data. Dimensions taken from SSS data and position from MBES data. Previously observed as a mound measuring 30 x 8.5 x 0.7 m.	Outside	WA 2013; WA 2015; WA 2016 (7002), EMU 2010 (0008), EMU 2011 (0011), EMU 2012 (0002)
7005	Dark reflector	333801	5597191	A2	3.5	0.6	0.2	Thin edge of an object with slight bright shadow. May be stretched but could be possible debris. Not previously observed.	Outside	-



WA ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Description	Active Dredge Zone (ADZ)	External References
7006	Dark reflector	334933	5597213	A2	5.6	0.7	1.3	Edge of an object with bright angular shadow and slight surrounding disturbance. Not previously observed.	Outside	-

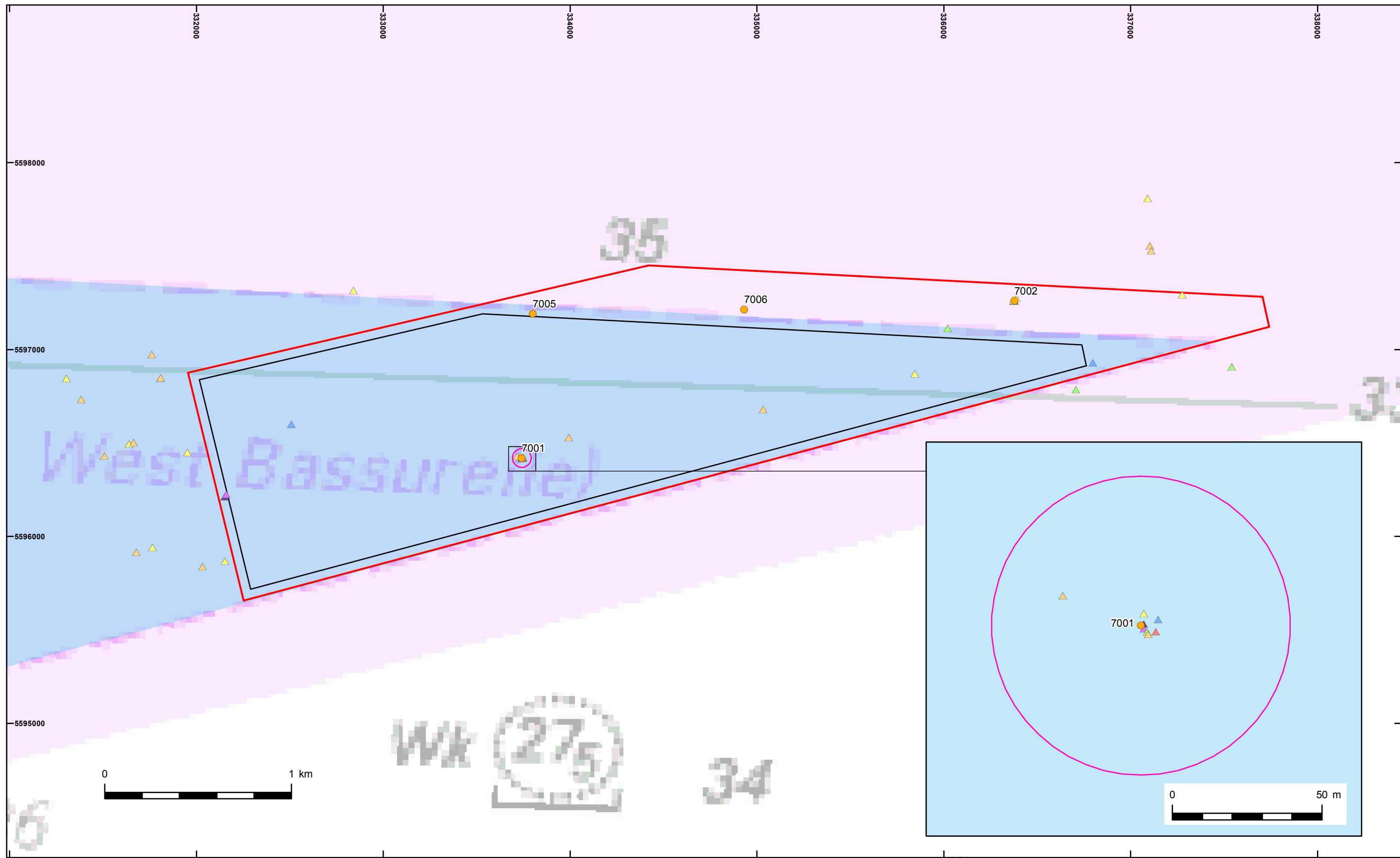
Notes:

1. All coordinates are in WGS84 UTM Zone 31N
2. Positions are considered accurate to within approximately  $\pm 10$  m



Location map

Figure 1



- Study area
- Active Dredge Zone
- Aggregate Licence Area
- Archaeological Exclusion Zone (50 m)
- **2017 WA Anomaly (Year 9)**
- A2 - Uncertain origin of possible archaeological interest
- ▲ 2009 WA Anomaly (Year 1)
- ▲ 2010 EMU Anomaly (Year 2)
- ▲ 2011 EMU Anomaly (Year 3)
- ▲ 2012 EMU Anomaly (Year 4)
- ▲ 2013 WA Anomaly (Year 5)
- ▲ 2015 WA Anomaly (Year 7)
- ▲ 2016 WA Anomaly (Year 8)

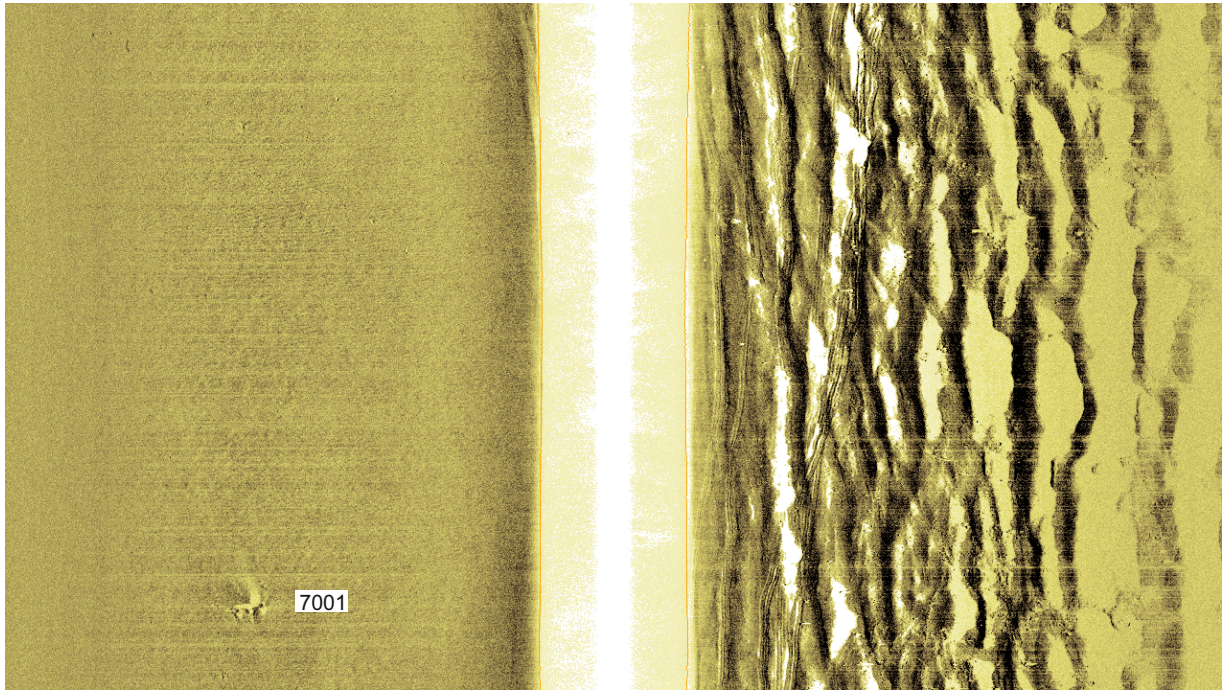
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Date:	03/03/2017	Revision Number:	1
Scale:	1:20,000 & 1:1250 at A3	Illustrator:	KJF
Path:	W:\Projects\88983\GIS\FigsMXD\Monitoring\2017_03_03		

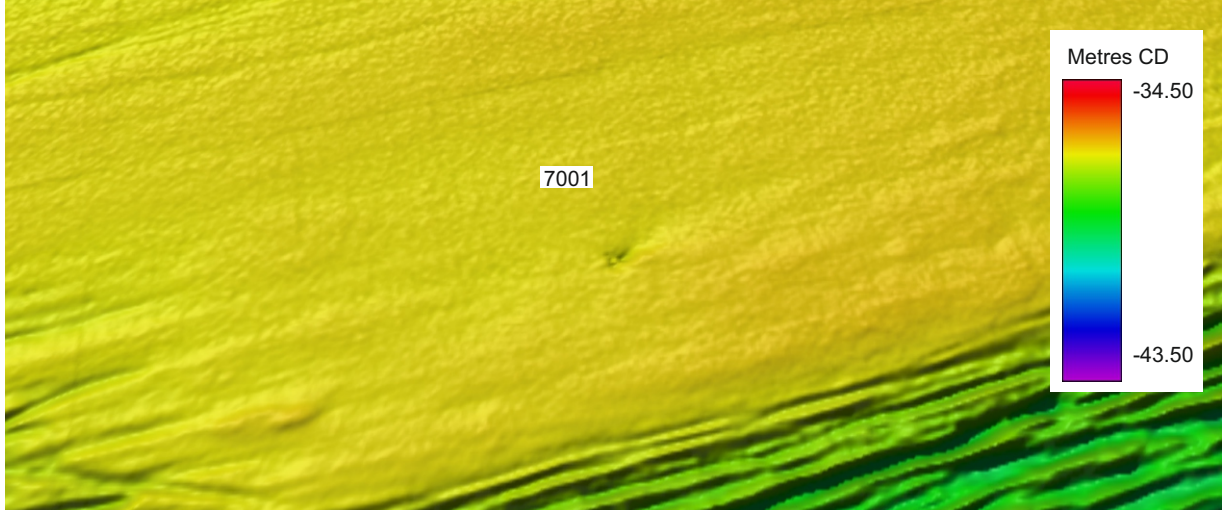
Coordinate system:  
UTM WGS84 z31N

Anomalies of archaeological potential and Archaeological Exclusion Zone


Figure 2

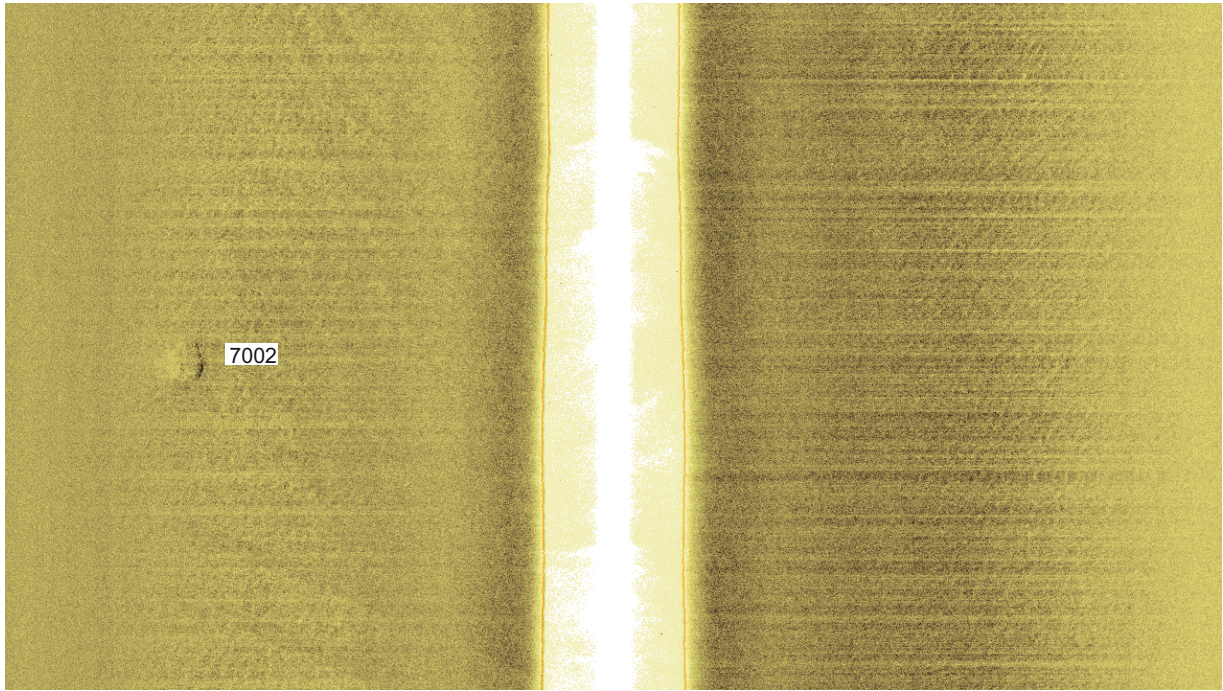


A. Sidescan sonar waterfall image of debris 7001, facing north-east, 4.8 x 1.7 x 0.9 m

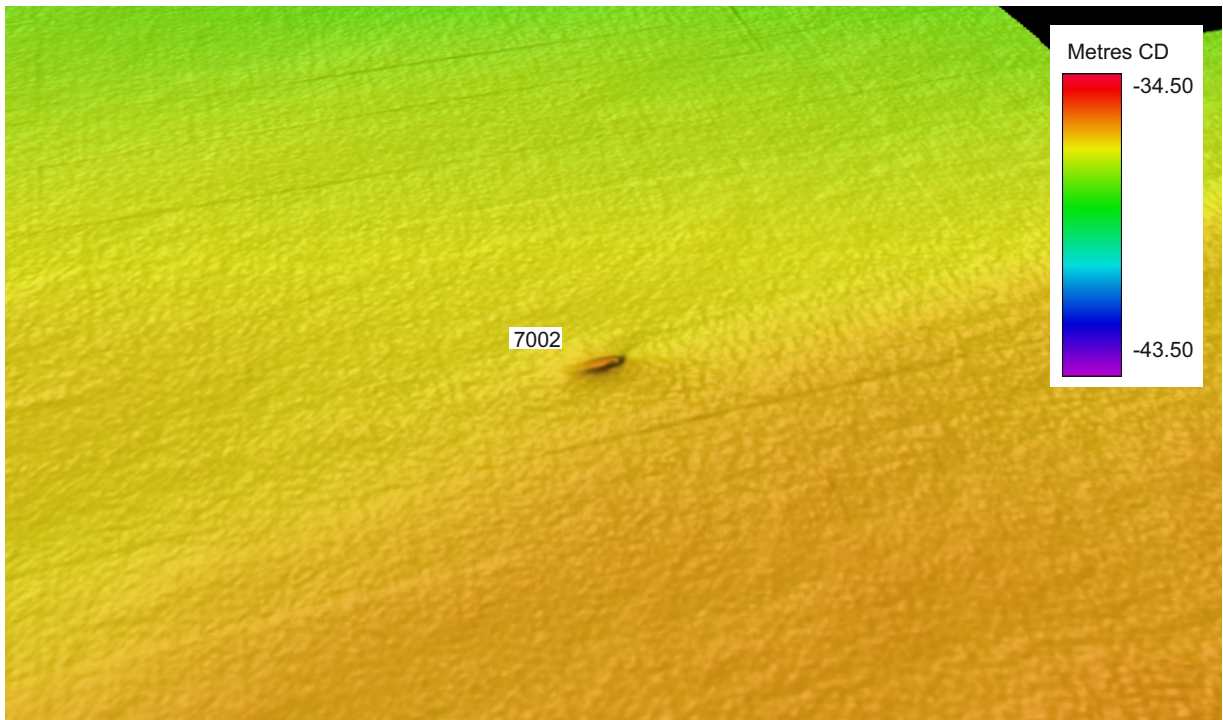


B. Multibeam echosounder image of debris 7001 (x1 vertical exaggeration), facing north


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	Date:	16/02/2017	Revision Number:	0
	Scale:	NTS at A4	Illustrator:	KJF
	Path:	W:\Projects\88983\Graphics_Office\Rep figs\Monitoring\2017_02_16		



A. Sidescan sonar waterfall image of mound 7002, facing south-west, 22.2 x 6.2 x 0.6 m



B. Multibeam echosounder image of mound 7002 (x1 vertical exaggeration), facing north

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