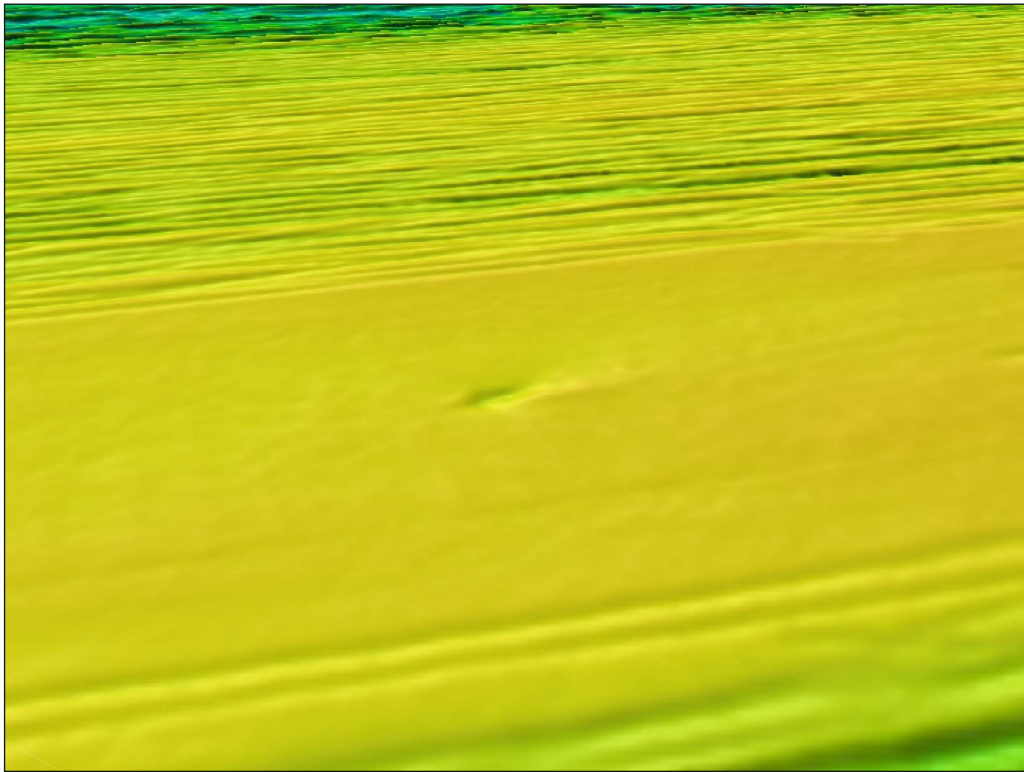




Aggregate Area 458

Archaeological Assessment of 2017 Geophysical Data
Archaeological Monitoring Report



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Summary

Wessex Archaeology was commissioned by CEMEX UK Marine Limited and Tarmac Marine Limited to undertake an archaeological assessment of 2017 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) Limited during August 2017.

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 area 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**, **7007** and **7008**) 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**, **7007** and **7008**) 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).



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The geophysical data were provided by Christopher Briggs and Mike Kingston of EGS (International) Limited.



Aggregate Area 458

Archaeological assessment of 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 Limited to undertake an archaeological assessment of geophysical survey data provided by EGS (International) Limited (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 south-east of Beachy Head, East Sussex (Figure 1).

1.1.2 The Study Area for the Licence Area, as provided by EGSi, is delimited by the following coordinates (WGS 84 UTM Zone 31N) and includes the Active Dredge Zone (Table 1):

Table 1 Delimiting coordinates for Area 458 Study Area

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

1.1.3 The data comprised sidescan sonar (SSS) and multibeam echosounder (MBES) data acquired by EGSi on 7 August 2017 and covered the Study Area for Area 458 (Figure 1). The Study Area is 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 Although the extents of the area covered by geophysical survey data is larger than the Study Area, only geophysical anomalies identified within the Study Area have been 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 10).

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 Most recently, 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 There are 14 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_03_87	1308	Fuel cap	Modern	Metal	458 (centre point)	Greenwich	7 (2011-2012)
Tarmac_04_01	1314	Spoon	-	Metal: Silver	458 (centre point)	Greenwich	7 (2011-2012)
Tarmac_04_37	1354	Animal bone	Unknown	Bone	458 (north-west)	Erith Wharf	8 (2012-2013)
CEMEX_05_51	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)
LTM_0603	-	Large metal object	-	Metal	458 or 460 (Mixed cargo)	Greenwich	10 (2014-2015)



Report ID	Find ID	Description	Date	Material	Licence Area	Wharf/ Vessel	Year
LTM_0619	-	Metal object, possibly aircraft	-	Metal	458 (centre point)	Greenwich	10 (2014-2015)
Tarmac_06_67	5702	Metal, brass Wooden mooring roller	-	Metal, brass, wood	458 (centre point)	Greenwich (Charlemagne)	11 (2015-2016)
Tarmac_07_05	5738	Timber	-	Wood	458	Erith (City of Westminster)	11 (2015-2016)
Tarmac_07_06	5739	Metal Spike	-	Metal	458	Erith (City of Westminster)	11 (2015-2016)

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 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/development on known archaeological sites; and
- provide recommendations for archaeological mitigation.

1.5 Co-ordinate system

1.5.1 The survey data were acquired in WGS84 UTM31N and the results have been presented using the same co-ordinate system.



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, comprising SSS and MBES data, acquired by EGSi.

2.2.2 The SSS data were provided as high and low frequencies files in *.xtf* format. Only the high frequency data were assessed by Wessex Archaeology.

2.2.3 The MBES data were reduced to Chart Datum (CD) Eastbourne, gridded to 1 m, and provided to Wessex Archaeology as a single *.xyz* file.

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

2.2.5 A UKHO search for wrecks and obstructions was also undertaken as part of this assessment.

2.3 Geophysical data – technical specifications

2.3.1 The geophysical data were acquired on board EGSi vessel *EGS Pioneer* on 7 August 2017 at approximately 90 m line spacing, aligned WSW – ENE, with no cross lines (EGSi 2017). Further details on the equipment used are outlined in Table 3.

Table 3 Summary of survey equipment

Survey Company	Survey Vessel	Data Type	Equipment	Data Format
EGSi	<i>EGS Pioneer</i>	SSS	Klein 3000 (132 / 445 kHz), 125 m range	<i>.xtf</i>
		MBES	Kongsberg EM2040D (400 kHz)	<i>.xyz</i>
		Positioning	V5 Applanix POS MV 320 C&C Technologies C-NAV 3050 GPS Sonardyne Scout Plus USBL	N/A

2.4 Geophysical data – processing

2.4.1 The SSS and MBES data were processed separately using the following software (Table 4).

Table 4 Software used for geophysical assessment

Dataset	Processing Software	Interpretation and rationalisation
SSS	CodaOctopus Survey Engine v5.5	ArcMap v10.5
MBES	QPS Fledermaus v7.7.5	

2.4.2 The high frequency *.xtf* SSS data files were 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.

- 2.4.3 A mosaic of the SSS data 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.
- 2.4.4 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.
- 2.4.5 The MBES data were analysed to identify any unusual seabed structures that could be shipwrecks or other anthropogenic debris. The data were gridded at 1 m, as provided, and analysed using QPS Fledermaus software, which enables a 3-D visualisation of the acquired data and geo-picking of seabed anomalies.

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 high frequency SSS data have been rated as 'Average' using the above criteria table. The data were acquired at a range of 125 m which makes identification of finer details and smaller objects more difficult. The majority of the data were subject to some weather interference, such as cable snatching, which has affected the data quality. Large and upstanding objects were visible. Overall the data were considered suitable for archaeological interpretation.



2.5.3 The MBES data were rated as 'Good' using the above criteria. The data quality and resolution of 1 m was found to be of a good standard and suitable for archaeological assessment of objects and debris over 1 m in size.

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 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 and multiple SSS anomalies and a MBES anomaly.

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 2017 dataset.

2.6.4 All previously identified geophysical anomalies that have not been observed within the most recent 2017 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) have retained their original identification number. Newly identified anomalies have been issued a new number starting with 7007.

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. These flags are ascribed as follows (Table 6).

Table 6 Criteria discriminating relevance of identified features within the Study Area

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

2.6.7 Anomalies that were identified within the 2017 geophysical data but located outside the Study Area as provided by EGSi, are considered outside the limits of this assessment and have been removed from the final gazetteer.

2.6.8 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 are illustrated in Figure 2.

3.2.2 Four anomalies 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 identified within the Study Area

Archaeological discrimination	Quantity		Interpretation
	Active Dredge Zone	Outside Active Dredge Zone	
A1	0	0	Anthropogenic origin of archaeological interest
A2	1	3	Uncertain origin of possible archaeological interest
A3	0	0	Historic record of possible archaeological interest with no corresponding geophysical anomaly
Total	1	3	

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 within the Study Area

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	0	1
Mound	A mounded feature with height not considered to be natural. Mounds may form over wreck sites or other debris.	0	1	1
Dark reflector	Individual objects or areas of high reflectivity, displaying some anthropogenic characteristics. Precise nature is uncertain	0	2	2
Total		1	3	4

3.2.4 In previous monitoring assessments (Wessex Archaeology 2009; 2013; 2015; 2016; 2017; EMU 2010; 2011; 2012) 27 geophysical anomalies representing 13 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 12 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 natural features, or may be buried within the seabed sediment. All previous anomalies are presented in Figure 2.

3.3 Within Active Dredge Zone

- 3.3.1 One anomaly (**7001**) has been located within the Active Dredge Zone and has been discriminated as A2 – Uncertain origin of possible archaeological interest.
- 3.3.2 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 (Wessex Archaeology 2009, 7000; Wessex Archaeology 2013; 2015; 2016; 2017, 7001; EMU 2010, 0009; EMU 2011, 0007; EMU 2012, 0001) as illustrated in Figure 2.
- 3.3.3 From the most recent dataset, anomaly **7001** has been observed in the SSS data 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 north-east. The depression is possibly scour caused by seabed processes. 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 ENE to WSW. This anomaly has been interpreted as possible partially buried debris (Figure 3).
- 3.3.4 This anomaly was observed in the previous 2016 dataset as a sub-angular object within a slight scour, measuring 4.8 x 3.2 x 0.3 m, with possible surrounding smaller objects and a slight mound to the east. The difference in size may be due to changing sediment dynamics within the area.
- 3.3.5 A current 50 m Archaeological Exclusion Zone (AEZ) exists around the extents of this object (Figure 2) and from the MBES data it has been observed that dredging along the NNW extents and the SSE extents has occurred within the past year (Figure 4). This small amount of impact does not appear to have had any adverse impact on the archaeology within the AEZ.

3.4 Outside Active Dredge Zone

- 3.4.1 Three anomalies (**7002**, **7007** and **7008**) have been identified outside the Active Dredge Zone and have been discriminated as A2 – Uncertain origin of possible archaeological interest.
- 3.4.2 One anomaly (**7002**) has been identified within both the SSS and MBES data and classified as a mound of uncertain origin. This anomaly has been previously identified within all previous monitoring reports (Wessex Archaeology 2013; 2015; 2016; 2017, 7002; EMU 2010, 0008; EMU 2011, 0011; EMU 2012, 0002) as illustrated in Figure 2.
- 3.4.3 Anomaly **7002** was identified within the most recent SSS data as a discrete elongate mound measuring 23.2 x 5.9 x 0.7 m, which may present the peak of an overall larger mound feature observed in the MBES data as 33.0 x 11.0 x 0.9 m. The mound is aligned ENE to WSW with some slight sediment build-up along the northern extents and some scouring visible at the eastern edge (Figure 5).
- 3.4.4 This mound was observed in the previous 2016 dataset with SSS measurements of 22.2 x 6.2 x 0.6 m, within overall MBES measurements of 32.0 x 15.0 x 0.7 m. The increase in length and slight decrease in width and height may suggest that the mound is being elongated by sediment accretion surrounding the mound due to seabed processes.
- 3.4.5 The two remaining anomalies (**7007** and **7008**) were both classified as dark reflectors and neither of these two anomalies have been previously identified.



- 3.4.6 Anomaly **7007** was identified as a straight-edged object, with a forked irregular shadow which suggests either two small objects directly adjacent or an irregular large object. This anomaly was observed with measurements of 3.9 x 1.4 x 0.8 m and has been interpreted as a piece of possible debris or a natural feature.
- 3.4.7 Anomaly **7008** was identified as an angular object with tall sub-angular bright shadow, measuring 3.1 x 0.6 x 0.6 m, and a slight surrounding seabed disturbance. This anomaly and has been interpreted as a piece of possible debris or a natural feature.

4 CONCLUSIONS AND RECOMMENDATIONS

- 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 four anomalies of archaeological potential have been identified across the Study Area for Aggregate Area 458. All of the anomalies identified (**7001**, **7002**, **7007** and **7008**) have been classified as A2 - Uncertain origin of possible archaeological interest.
- 4.1.3 One of the anomalies (**7001**) is located within the Active Dredge Zone. 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. 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	333748	5596421	Reviewed – maintain AEZ	50 m buffer around existing point location

- 4.1.4 The remaining three anomalies (**7002**, **7007** and **7008**) are located outside the Active Dredge Zone 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 previous monitoring assessments (Wessex Archaeology 2016; Wessex Archaeology 2015) debris anomaly **7004** was identified just outside the Active Dredge Zone 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 is to 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).



5 REFERENCES

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APPENDIX

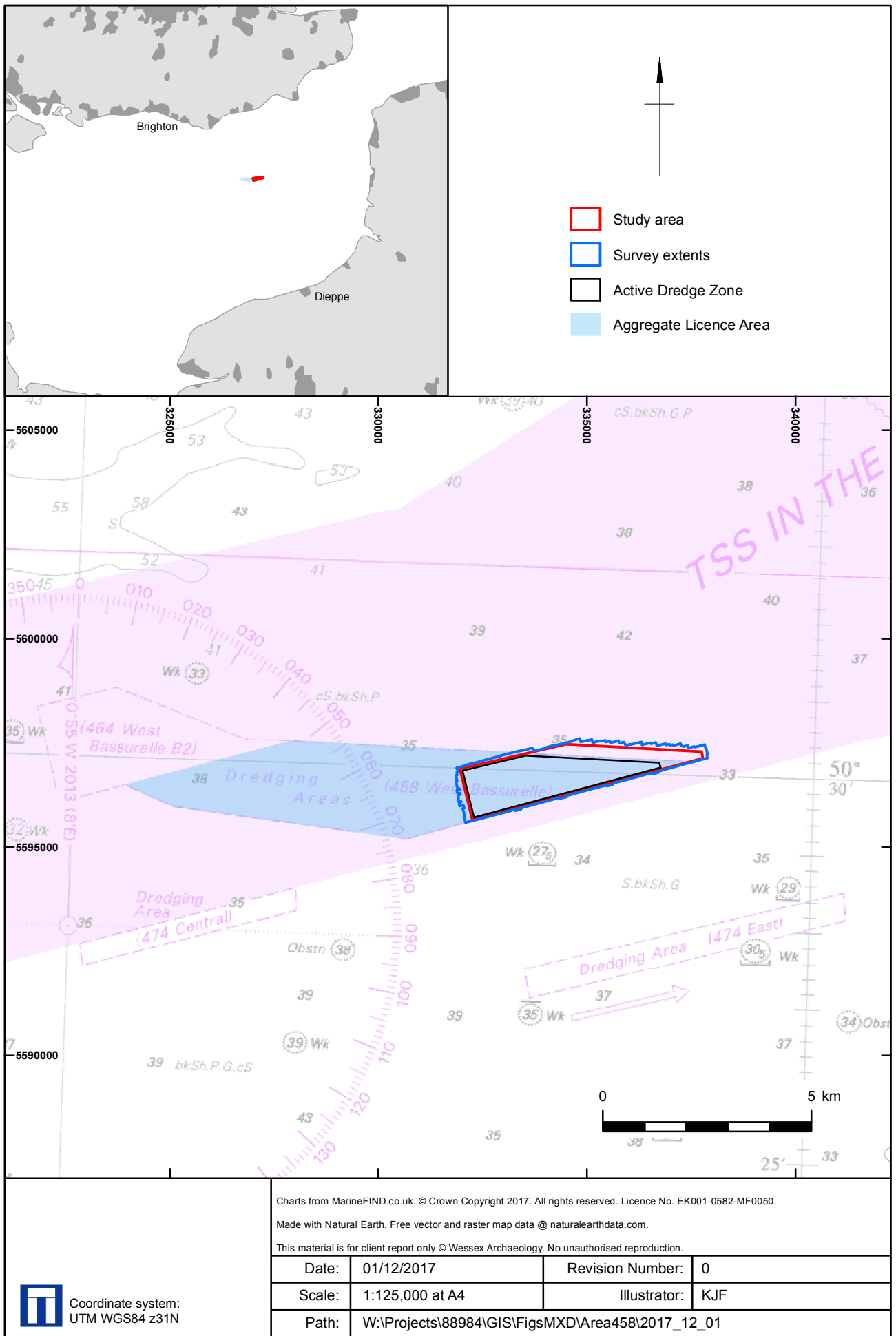
Seabed features of archaeological potential

ID	Classification	Easting	Northing	Archaeological Discrimination	Length (m)	Width (m)	Height (m)	Description	Active Dredge Zone (ADZ)	External References
7001	Debris	333745	5596420	A2	4.4	1.7	0.9	Solid object with slight scour and varied bright height shadow observed in SSS data. Located as a feature in the MBES data, appears as slight mound on the edge of a depression (14.0 x 9.0 x -0.6 m) with a larger mound directly adjacent to the SE extents (14 x 5.0 x 0.1 m, 36.9 m below CD) aligned ENE to WSW. Previously clearly observed as an object, measuring 4.8 x 1.7 x 0.9 m, within a depression and therefore possibly has become partially buried with some surrounding disturbance. Possible partially buried debris.	Inside	WA 2009 (7000), WA 2013; WA 2015; WA 2016; WA 2017 (7001), EMU 2010 (0009), EMU 2011 (0007), EMU 2012 (0001)
7002	Mound	336378	5597261	A2	23.2	5.9	0.7	Identified in the SSS as an elongate and irregular large object with irregular height shadow, aligned ENE to WSW. Observed in the MBES data as an elongate mound (33.0 x 11.0 x 0.9 m, 35.7 m below CD), isolated in an area undisturbed by dredging. Could be some build-up to the north and some scour to the east.	Outside	WA 2013; WA 2015; WA 2016; WA 2017 (7002), EMU 2010 (0008), EMU 2011 (0011), EMU 2012 (0002)



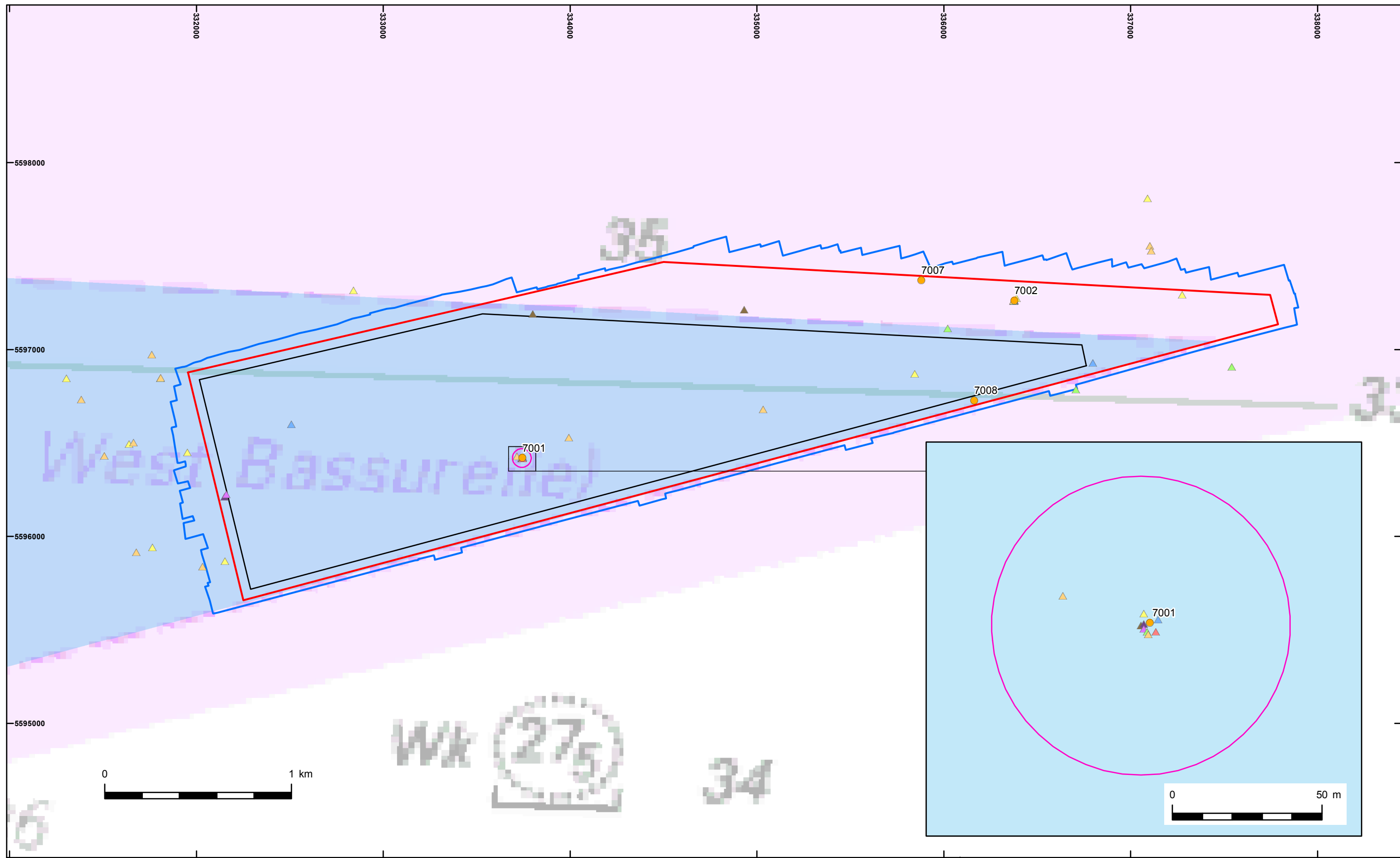
7007	Dark reflector	335880	5597370	A2	3.9	1.4	0.8	Dark straight edge of an object, forked shadow so could be two objects close together but could be adjoined. Some scour and seabed disturbance visible in the MBES data. Not previously observed.	Outside	-
7008	Dark reflector	336164	5596727	A2	3.1	0.6	0.6	Observed in SSS data as an angular object with corresponding angular bright shadow and some visible scour. Tentatively observed in the MBES data. Not previously observed.	Outside	-

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



Location map

Figure 1



- Study area
- Survey extents
- Active Dredge Zone
- Aggregate Licence Area
- Archaeological Exclusion Zone (50 m)
- 2017 WA Anomaly (Year 10)
- 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)
- ▲ 2017 WA Anomaly (Year 9)

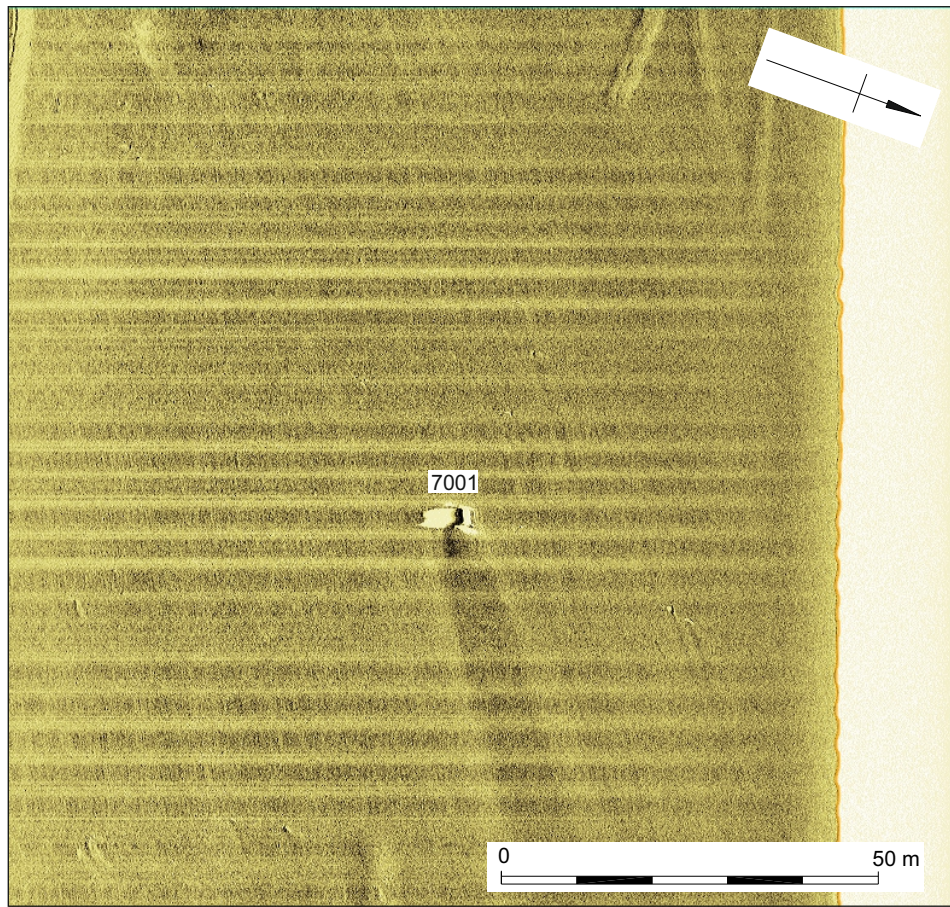
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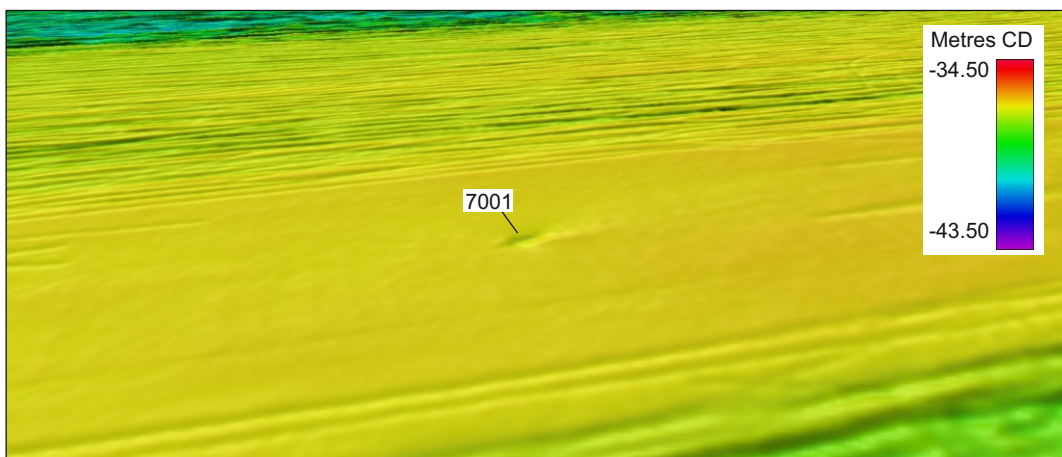
Coordinate system:
UTM WGS84 z31N

Anomalies of archaeological potential and exclusion zone

Figure 2



Sidescan sonar waterfall image of debris 7001, facing west-south-west, 4.4 x 1.7 x 0.9 m



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

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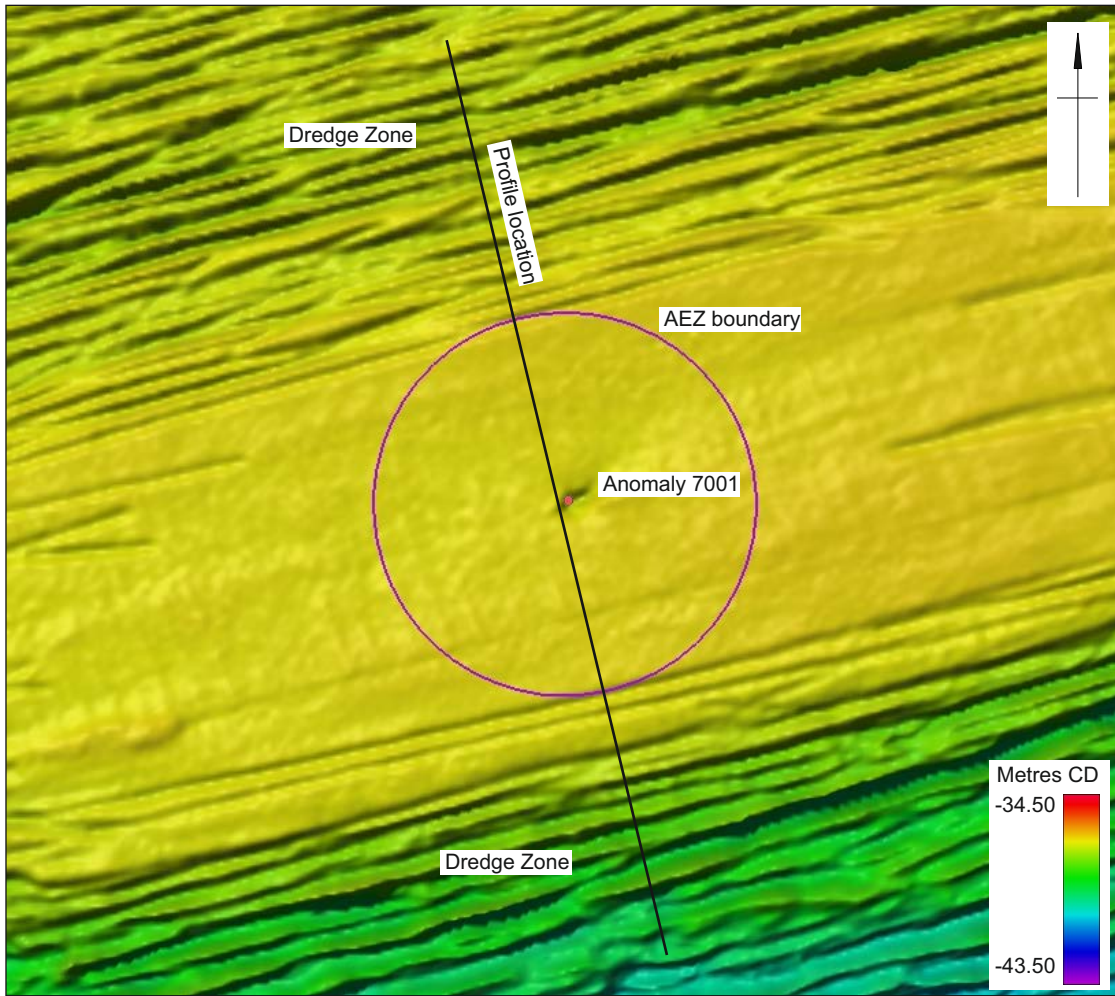
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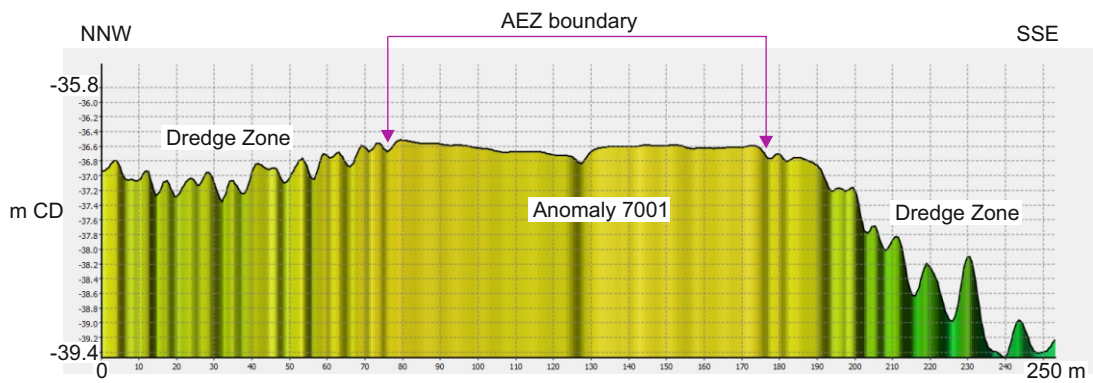
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Multibeam echosounder data showing extents of AEZ



Profile across AEZ in multibeam echosounder data

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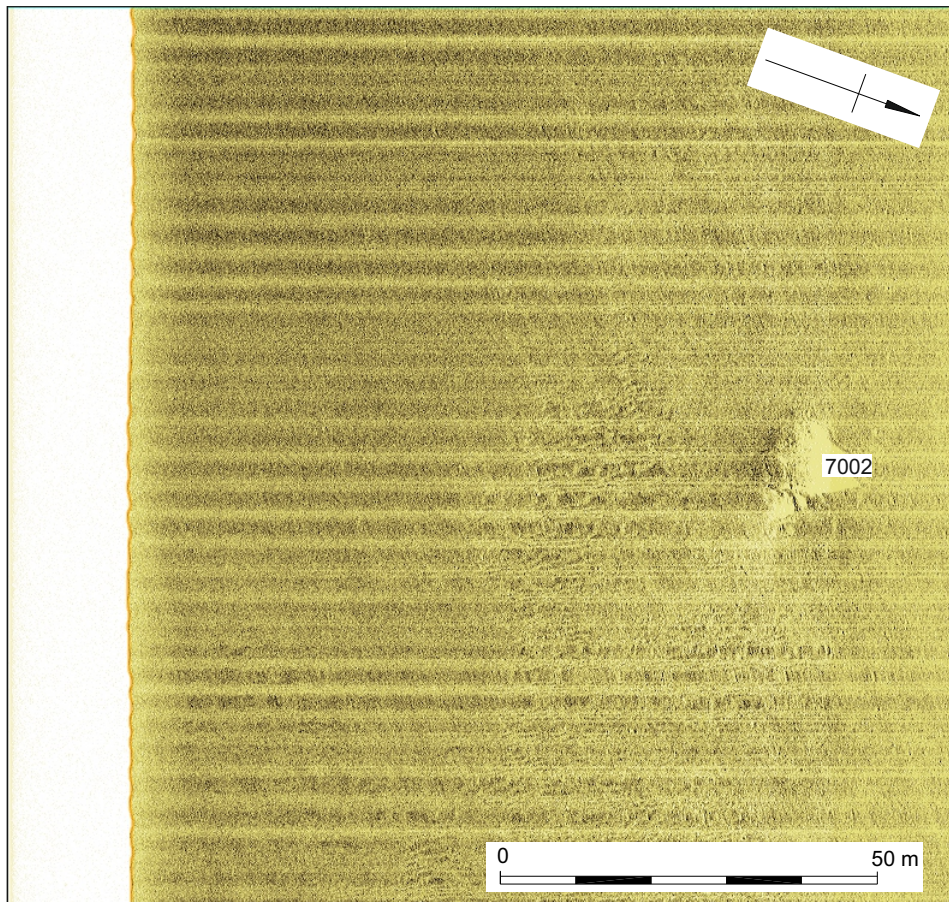
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Sidescan sonar waterfall image of mound 7002, facing west-south-west, 23.2 x 5.9 x 0.7 m



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

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