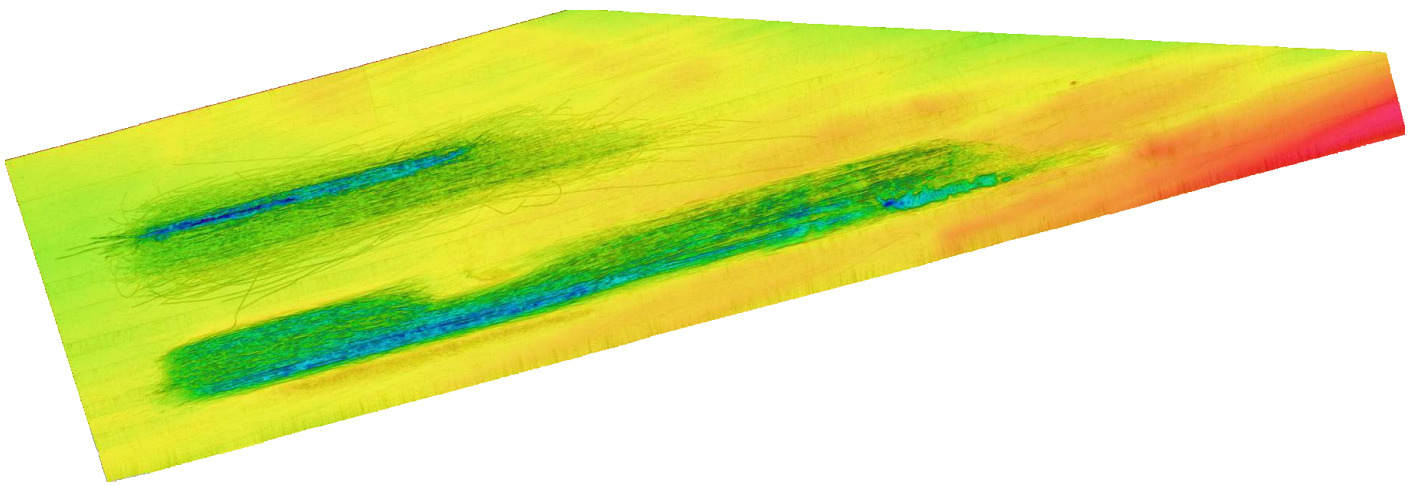




making sense of heritage

# Area 458 Marine Aggregate Extraction

Archaeological Assessment of 2014 Geophysical Data  
Archaeological Monitoring Report



Ref: 88981.01  
June 2015



**Area 458  
Marine Aggregate Extraction**

**Archaeological Assessment of 2014 Geophysical Data  
Archaeological Monitoring Report**

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**June 2015**

**Report Ref 88981.01**



## Quality Assurance

<b>Project Code</b>	88981	<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	Abby Mynett	Louise Tizzard		11/05/2015
File:	88981_Geophysical_Assess_Area_458_201500511.pdf				
V02	F	Abby Mynett	Louise Tizzard		09/06/2015
File:	88981_Geophysical_Assess_Area_458_201500609.pdf				
File:					
File:					
File:					

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

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# Area 458 Marine Aggregate Extraction

## Archaeological Assessment of 2014 Geophysical Data Archaeological Monitoring Report

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## Area 458 Marine Aggregate Extraction

### Archaeological Assessment of 2014 Geophysical Data Archaeological Monitoring Report

#### Summary

Wessex Archaeology was commissioned by CEMEX UK Marine Ltd and Lafarge Tarmac Marine Ltd to undertake an archaeological assessment of geophysical survey data as part of the heritage impact monitoring process implemented for aggregate extraction Area 458. The data consisted of sidescan sonar and multibeam bathymetry acquired in 2014 by Fugro EMU Limited. The review includes an assessment of the current data in addition to the results of the previous archaeological monitoring assessments undertaken by Wessex Archaeology and EMU Limited.

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

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

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

Anomaly **7004** is a newly identified feature situated on the western edge of the Study Area. This feature is located outside of the Active Dredge Zone but within the Licence Area, therefore, no exclusion zone is recommended at this time. However, its position should be noted for any future dredging activity or monitoring.

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



## **Area 458 Marine Aggregate Extraction**

### **Archaeological Assessment of 2014 Geophysical Data Archaeological Monitoring Report**

#### **Acknowledgements**

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

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



## Area 458 Marine Aggregate Extraction

### Archaeological Assessment of 2014 Geophysical Data Archaeological Monitoring Report

#### 1 INTRODUCTION

##### 1.1 Project Background

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

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

**Table 1: Delimiting co-ordinates of Area 458**

- 1.1.3 The Study Area was defined by a buffer, 50 m to the north, west and south and 1 km to the east of the Active Dredge Zone, as specified in the marine licence (**Figure 1**).
- 1.1.4 The assessment consists of a review of sidescan sonar and multibeam bathymetry data acquired by Fugro EMU Limited in 2014 (Year 7).
- 1.1.5 As part of the Marine Licence Conditions for Area 458, annual geophysical monitoring surveys should be reviewed in order to identify any changes to the archaeological



baseline. This report details the most recent archaeological baseline investigations using geophysical survey data acquired by Fugro EMU in 2014 (Fugro EMU 2015). Similar investigations have been undertaken yearly between 2009 and 2013 (Wessex 2009, 2013; EMU Limited 2010, 2011, 2012). As the baseline archaeological assessment for Area 458 did not identify any UKHO wrecks or obstructions within the area, no new data searches (UKHO, NMR, etc.) were undertaken as part of this assessment.

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

## 1.2 Previous Work

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

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

- 1.2.2 A total of seven finds have been reported through the Marine Aggregate Industry *Protocol for Reporting Finds of Archaeological Interest* within Licence Area 458 between 2007 and 2014 (**Table 2**). These finds are largely reflected in the National Record for the Historic Environment (NRHE) record with some additional finds.





Report ID	Description	Date	Material	Licence Area	Wharf/Vessel	Year
UMD_0259	Brass spoon engraved 'MAPPIN'	Post Medieval	Metal; Domestic	430	Erith	4 (2008 - 2009)
UMD_0264	Half a cannonball for an 18 pounder sea service gun	Post Medieval	Metal; Cannonball	458	Ridham	4 (2008 - 2009)
UMD_0264	Small cannonball for a 3 pounder gun	Post Medieval	Metal; Cannonball	458	Ridham	4 (2008 - 2009)
UMD_0264	Half a small cannonball for a 3 pounder gun	Post Medieval	Metal; Cannonball	458	Ridham	4 (2008 - 2009)
Tarmac_0387	Fuel cap	Modern	Metal	458	Greenwich	7 (2011 - 2012)
Tarmac_0401	Spoon		Metal: Silver	458	Greenwich	7 (2011 - 2012)
Tarmac_0437	Animal bone	Unknown	Bone	458	Erith Wharf	8 (2012-2013)

**Table 2: Marine Aggregate Protocol finds associated with Area 458**

### 1.3 Seabed Geology

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

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

### 1.4 Aims

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

## 2 METHODOLOGY

### 2.1 Data Sources

2.1.1 The geophysical data assessed for this report were acquired and provided by Fugro EMU Ltd; the survey was undertaken in October 2014 on board survey vessel *RV Discovery*. Further background information was obtained from the geophysical monitoring survey report and previous monitoring surveys, as detailed in **Section 1.2** (Fugro EMU 2015).



- 2.1.2 The geophysical survey data comprised sidescan sonar and multibeam bathymetry datasets. Each of these were assessed for their quality and rated using the following criteria.

Data Quality	Description
Good	Data which are clear and unaffected by weather conditions or sea state. The dataset is suitable for the interpretation of standing and partially buried metal wrecks and their character and associated debris field. These data also provide the highest chance of identifying wooden wrecks and debris.
Average	Data which are affected by weather conditions and sea state to a slight or moderate degree. The dataset is suitable for the identification and partial interpretation of standing and partially buried metal wrecks, and the larger elements of their debris fields. Wooden wrecks may be visible in the data, but their identification as such is likely to be difficult.
Variable	This category contains datasets with the quality of individual lines ranging from good to average to below average. The dataset is suitable for the identification of standing and some partially buried metal wrecks. Detailed interpretation of the wrecks and debris field is likely to be problematic. Wooden wrecks are unlikely to be identified.

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

- 2.1.3 The sidescan sonar data have been rated as 'Good' using the above criteria table, although a very small number of files displayed a minimal amount of noise interference. Overall the data quality and positioning was found to be of a high standard for archaeological assessment.
- 2.1.4 The multibeam bathymetry data have been rated as 'Good' using the above criteria. The data quality and resolution of 1m was found to be of a high standard and suitable for the archaeological assessment of seabed objects and debris.
- 2.1.5 For this survey all positions were recorded and expressed in WGS 1984, UTM Zone 31N.

## 2.2 Geophysical Data – Technical Specifications

- 2.2.1 The geophysical data were acquired by Fugro EMU on board survey vessel RV *Discovery* between 1<sup>st</sup> and 4<sup>th</sup> October 2014.
- 2.2.2 The sidescan sonar deployed for the survey was an Edgetech 4200 dual frequency sidescan sonar towfish operating at high (400 kHz) and low (100 kHz) frequencies with a 150 m range. Towfish laybacks were between 75 m and 110 m. The sidescan sonar data were digitally logged and provided to WA as high and low frequency .*xtf* files and .*jsf* files.
- 2.2.3 A USBL system was used on board to track the position of the sidescan sonar towfish. The coordinate system used for the survey was WGS84 UTM31N.
- 2.2.4 Multibeam bathymetry data were acquired using a Kongsberg 2040 400 kHz system. The bathymetry data were digitally logged and provided to WA as a single processed XYZ .*txt* and .*asc* file, gridded at 1m.

## 2.3 Geophysical Data – Processing

- 2.3.1 The high frequency .*xtf* sidescan sonar data files were processed by WA using Coda Geosurvey software. This allowed the data to be replayed with various gain settings in order to optimise the quality of the images. The data were initially scanned to give an understanding of the geological nature of the site and were then interpreted for any

objects of possible anthropogenic origin. This involves creating a database of anomalies within Coda by tagging individual features of possible archaeological potential, recording their positions and dimensions and acquiring an image of each anomaly for future reference.

- 2.3.2 A mosaic of the sidescan sonar data is produced during this process to assess the quality of the sonar towfish positioning. The survey lines are smoothed, and the navigation corrected. This process allows the position of anomalies to be checked between different survey lines and for the layback values to be further refined if necessary.
- 2.3.3 The form, size and/or extent of an anomaly is a guide to its potential to be an anthropogenic feature and therefore of archaeological interest. A single small but prominent anomaly may be part of a much more extensive feature that is largely buried. Similarly, a scatter of minor anomalies may define the edges of a buried but intact feature, or it may be all that remains as a result of past impacts from, for example, dredging or fishing.
- 2.3.4 The multibeam bathymetry data were analysed to identify any unusual seabed structures that could be shipwrecks or other anthropogenic debris. The data were gridded at 1 m and analysed using Fledermaus software, which enables a 3-D visualisation of the acquired data and geo-picking of seabed anomalies.

**2.4 Geophysical Data – Anomaly Grouping and Discrimination**

- 2.4.1 The previous section describes the initial interpretation of all available geophysical datasets which were conducted independently of one another. This inevitably leads to the possibility of any one object being the cause of numerous anomalies in different datasets and apparently overstating the number of archaeological features in the Study Area.
- 2.4.2 To address this fact, the anomalies were grouped together along with the results of the DBA and previous monitoring reports. This allows one ID number to be assigned to a single object for which there may be, for example, a UKHO record and multiple sidescan sonar anomalies.
- 2.4.3 Once all the geophysical anomalies and desk-based information have been grouped, a discrimination flag is added to the record in order to discriminate against those which are not thought to be of an archaeological concern. These flags are ascribed as follows:

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

**Table 4: Criteria discriminating relevance of seabed feature to proposed scheme**

- 2.4.4 All the archaeological sites that have been identified within the Study Area are presented in **Figure 1, Appendix I** and discussed below. Those anomalies previously identified have retained their identification number; newly observed anomalies have been given a new, unique number.
- 2.4.5 The grouping and discrimination of information at this stage is based on all available information and is not definitive. It allows for all features of potential archaeological

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

### 3 RESULTS

3.1.1 The results of this assessment are collated in gazetteer format and detailed in **Appendix I**. Below is a summary of the number and types of features identified in the Study Area for Area 458. The anomalies have then been divided into their classifications and described accordingly.

3.1.2 The archaeological assessment of geophysical data identified a total of three anomalies of possible archaeological potential, one of which is located within the current Active Dredge Zone (**Figure 1**). All of the anomalies (**7001**, **7002** and **7004**) have been rated as being A2 (uncertain origin of possible archaeological interest).

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

**Table 5: Anomalies of archaeological potential within the Study Area**

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

Anomaly Classification	Number of Anomalies
Debris	2
Mound	1
<b>Total</b>	<b>3</b>

**Table 6: Types of anomaly identified**

3.1.4 **7001** has been classified as possible debris remains, and has been identified in all previous archaeological monitoring reports (EMU Limited 2010; 2011; 2012; Wessex Archaeology 2013) and is subject to an Archaeological Exclusion Zone (AEZ). The debris is located near the centre of the active dredge zone and appears in the sidescan sonar data as a hard edged and very distinctive thick, curvilinear dark reflector with a very large and bright shadow and dimensions of 3 m x 3 m x 0.1 m height. (**Figure 2**). The debris is discernible in the bathymetry data small mound lying in depression, which may be a possible scour, of approximately 15 x 6 x -0.4m and orientated southwest to north. The possible debris feature is situated in an area of small sand waves that may be covering the full extent of the anomaly. The debris is exposed to a similar degree as the previous monitoring survey (Wessex Archaeology 2013) which recorded dimensions of 6.6 m x 1.6 m x 0.4 m, though the scouring appeared very discreet. Based on the similar nature of the debris remains in the previous monitoring surveys it can be concluded that the exclusion zone has been effective in mitigating the impacts on this feature.

3.1.5 **7002** is interpreted to be a mound feature located on a flat and sandy area of the seabed in the eastern area of the Study Area. This has been identified during previous monitoring reports (EMU Limited 2010; 2011, 2012; Wessex Archaeology 2013). The feature is very distinctive in the sidescan sonar data and anomalous to the surrounding seabed (**Figure**

3). It is visible as both a hard edged and diffuse rectangular shaped dark reflector with a very large and bright shadow. The mound has dimensions of 32 m x 11 m x 1 m and is clearly identified in the bathymetry data, visible as an elongate mound on flat area of the seabed and aligned approximately west-southwest to east-northeast with a possible indistinct and shallow scour to the northeast. The mound is larger than the most recent previous monitoring survey (Wessex Archaeology 2013) which recorded dimensions of 18 m x 6 m x 0.6 m. This is either due to increased exposure of the feature or a build-up of sediment increasing the length of the feature.

- 3.1.6 **7004** is a newly recorded anomaly that has not been identified in any of the previous monitoring surveys. The possible debris appears as a long and thick curvilinear shaped hard edged dark reflector with no visible shadow in the sidescan sonar data. The feature has dimensions of 6.9 m x 0.7 m and is situated in a large depression on a sandy and even area of the seabed (**Figure 4**). This feature is not visible in the bathymetry data.

## 4 MITIGATION

- 4.1.1 With regards to mitigation of archaeology, the marine planning authority, working with the relevant regulator and advisors, takes account of the desirability of sustaining and enhancing the significance of heritage assets and adopts a general presumption in favour of the conservation of designated heritage assets within an appropriate setting (HM Government 2011; DCALG 2012).
- 4.1.2 Anomaly **7001** has been observed in all previous monitoring surveys and was previously assigned an Archaeological Exclusion Zone. It is merited to keep this 50m buffer in place (**Figure 5**).
- 4.1.3 Anomaly **7002** is located outside of the active dredging zone in previous monitoring assessments. Although of potential archaeological interest, this feature is situated outside the active dredging zone no exclusion zone is recommended, in line with the findings of the 2013 monitoring report (Wessex Archaeology 2013).
- 4.1.4 Anomaly **7004** is a newly identified feature located on the western edge of the Study Area. This feature is located outside of the Active Dredge Zone but within the Licence Area, therefore no exclusion zone is recommended at this time. However, its position should be noted for any future dredging activity or monitoring.
- 4.1.5 It is recommended that if any objects of possible archaeological interest are recovered during dredging operations from Area 458, that they should continue to be reported using the established Marine Aggregate Industry *Protocol For Reporting Finds of Archaeological Interest* (BMAPA and English Heritage 2005).

## 5 REFERENCES

BMAPA and English Heritage 2003. Marine Aggregate Dredging and the Historic Environment Guidance Note (prepared by Wessex Archaeology).

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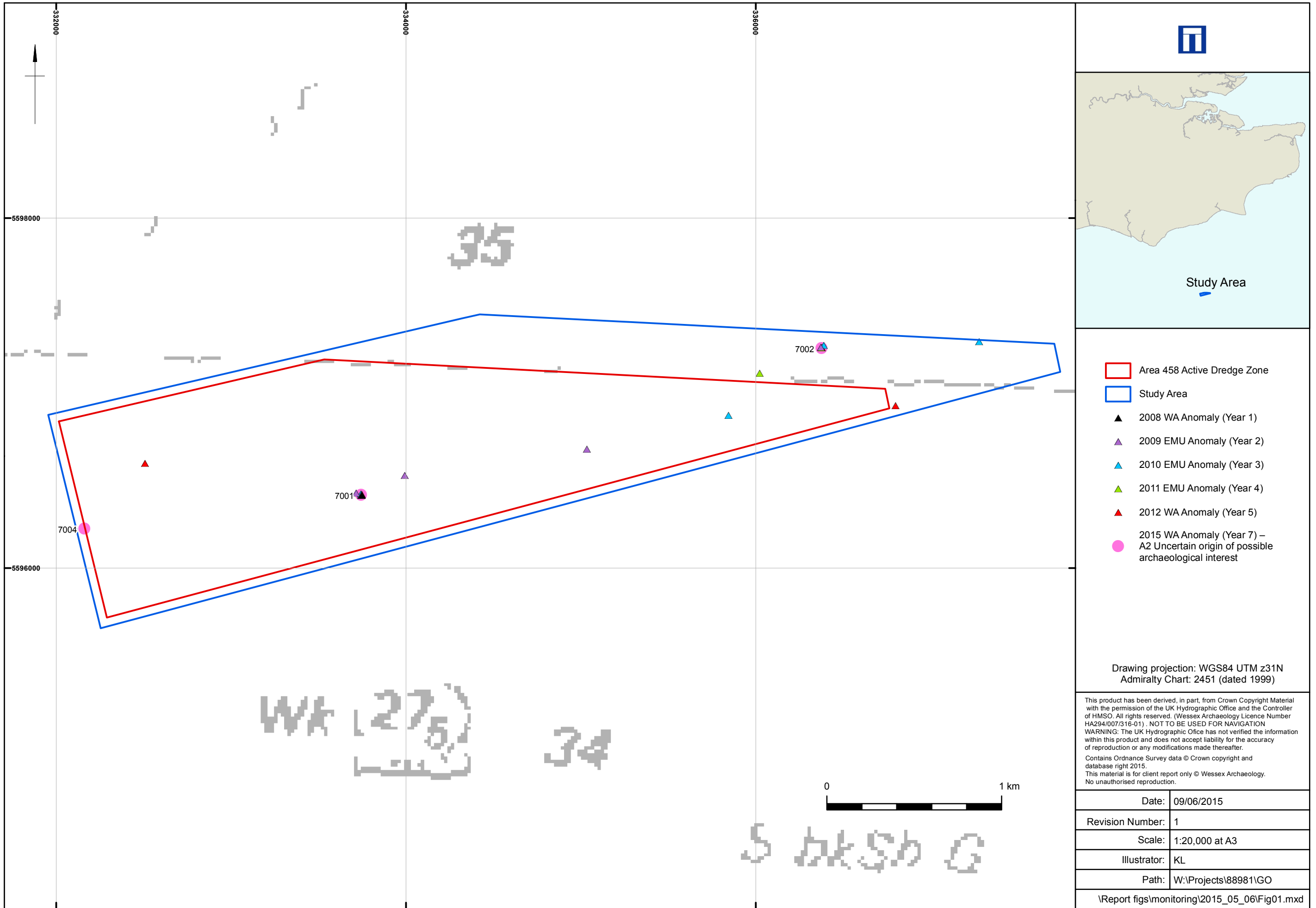
Wessex Archaeology 2013. Area 458: Marine Aggregate Extraction. Archaeological Assessment of 2012 Geophysical Data. Archaeological monitoring report. Unpublished report reference no. 71360.02.



## APPENDIX I – SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL

WA ID	Classification	Archaeological Potential	Easting	Northing	Length (m)	Width (m)	Height (m)	Notes	Active Dredge Zone	External References
7001	Debris	A2	333743	5596418	3.0	3.0	0.1	Hard edged and very distinctive possible debris remains, anomaly looks broken up or partially buried by small sandwaves anomalous to the immediate surrounding seabed. In the bathymetry this is visible as a small mound lying in depression, which may be a possible scour, of approximately 15 x 6 x -0.4m. This depression is oriented SW to N	Inside	EMU 2011, 0001; EMU2010, 0007; EMU 2009, 0009
7002	Mound	A2	336376	5597258	32.0	11.0	1.0	Very large mound feature, made up of a very faint and diffuse dark reflector, almost rectangular shaped but has an irregular profile; anomaly has a very large and bright shadow, highly distinctive on a flat and even area of the seabed. Visible in the bathymetry as an elongate mound on flat seabed. Aligned approximately WSW to ENE. Possible indistinct and shallow scour to the NE.	Outside	EMU 2011, 002; EMU 2010, 0011; EMU 2009, 0008
7004	Debris	A2	332160	5596225	6.9	0.7	0.0	Long and thick linear dark reflector with no shadow and in a slight depression, hard edged anomaly that is very distinctive and isolated on a sandy and even area of the seabed	Outside	-

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



- Area 458 Active Dredge Zone
- Study Area
- ▲ 2008 WA Anomaly (Year 1)
- ▲ 2009 EMU Anomaly (Year 2)
- ▲ 2010 EMU Anomaly (Year 3)
- ▲ 2011 EMU Anomaly (Year 4)
- ▲ 2012 WA Anomaly (Year 5)
- 2015 WA Anomaly (Year 7) – A2 Uncertain origin of possible archaeological interest

Drawing projection: WGS84 UTM z31N  
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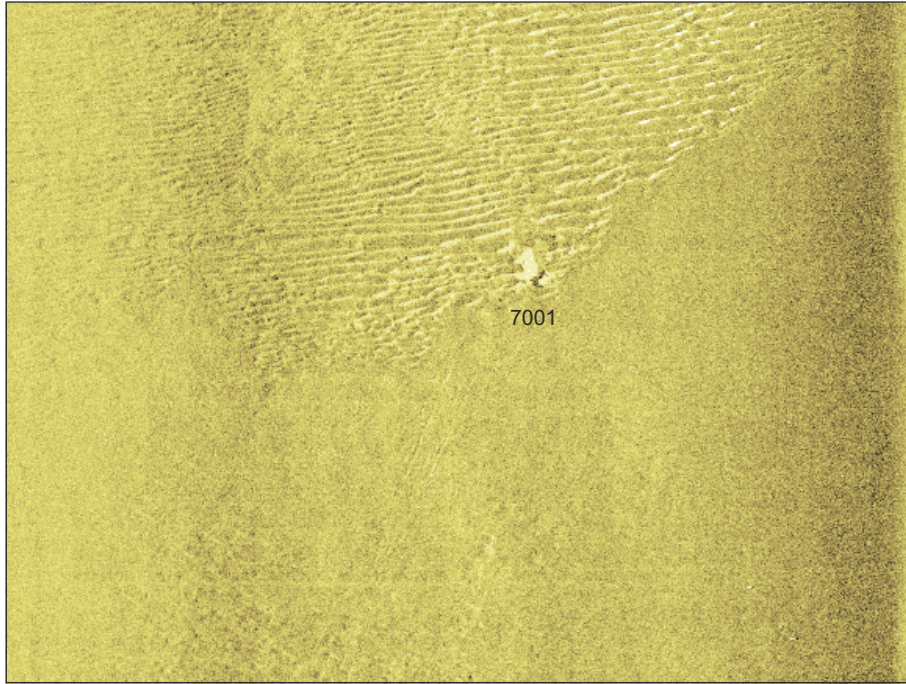
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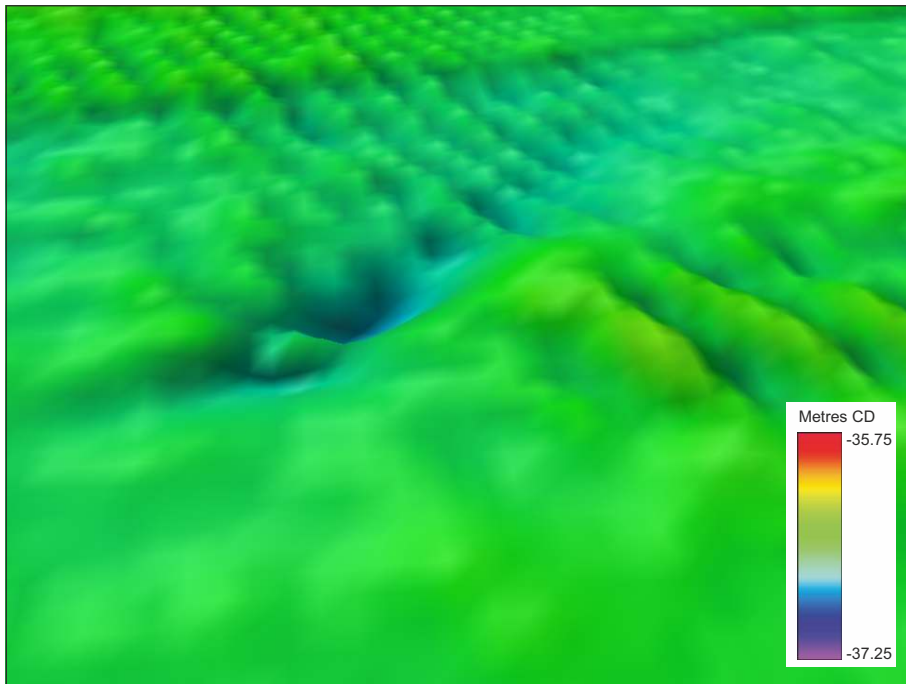
Study Area Location and Geophysical Anomalies

Figure 1





A. Sidescan sonar waterfall image of debris 7001, 3m x 3m x 0.1m



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

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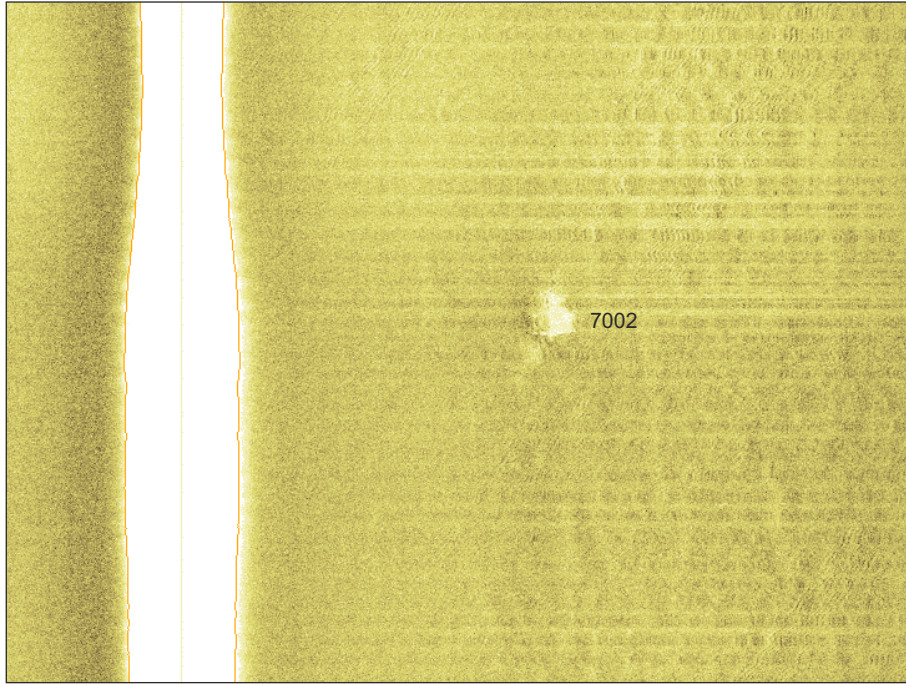
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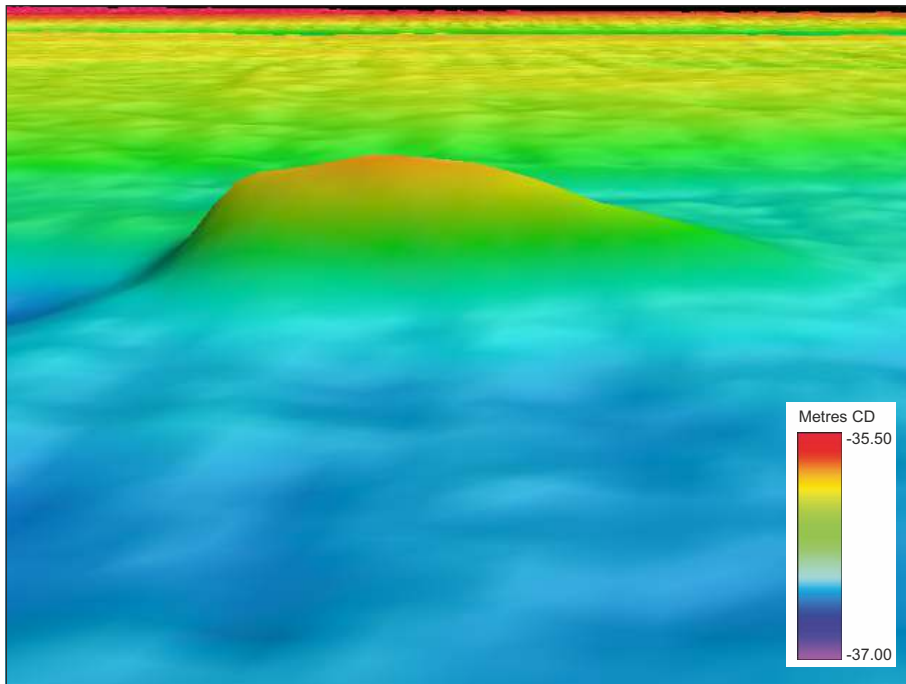
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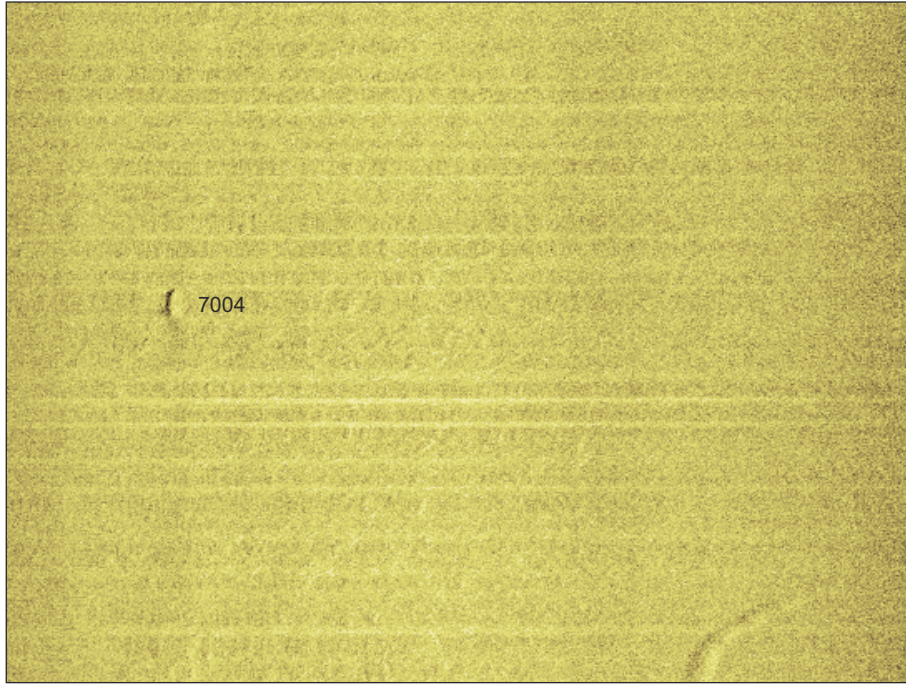


A. Sidescan sonar waterfall image of mound 7002, 32m x 11m x 1m



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

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Sidescan sonar waterfall image of debris 7004, 6.9m x 0.7m

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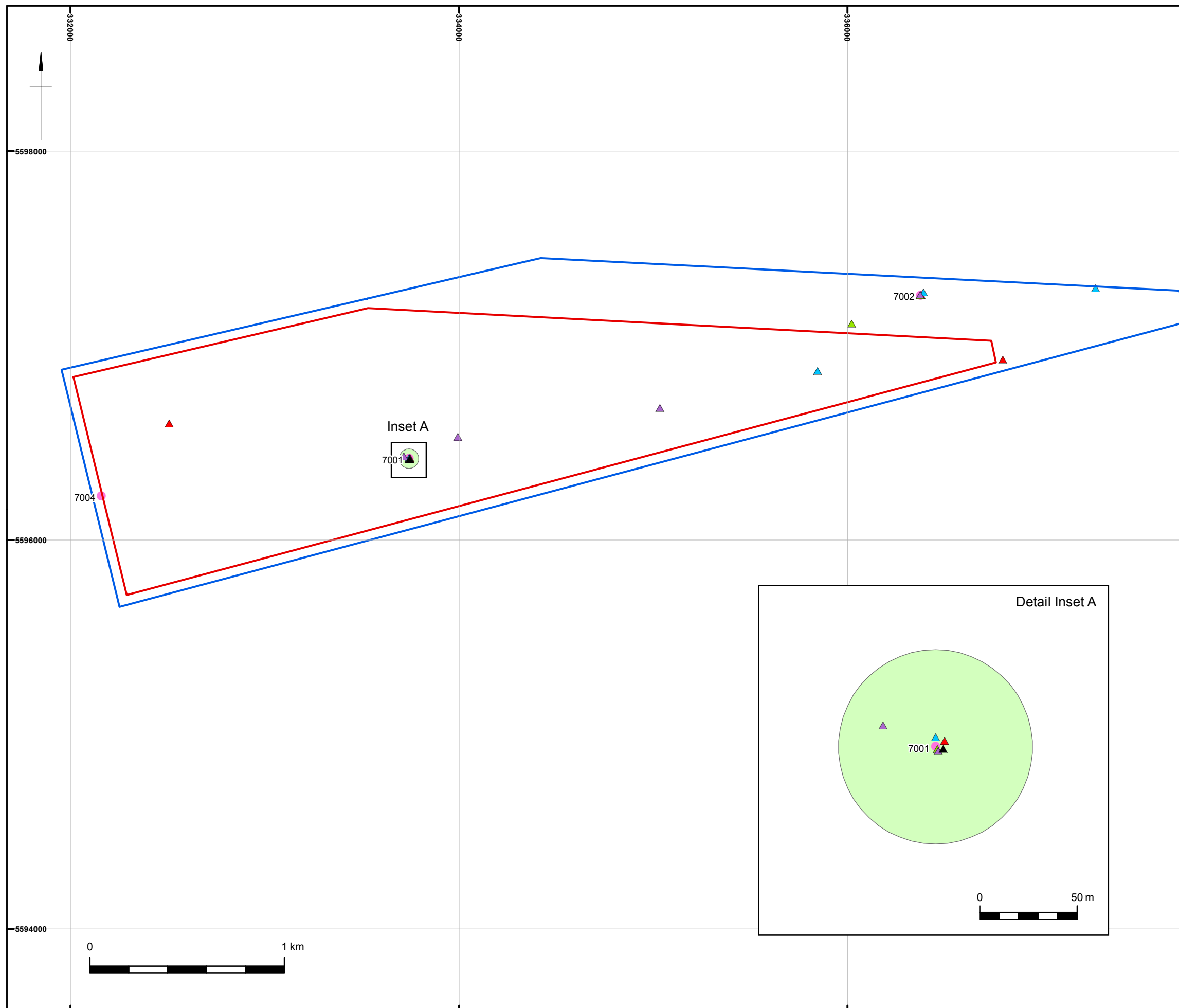
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- Area 458 Active Dredge Zone
- Study Area
- ▲ 2008 WA Anomaly (Year 1)
- ▲ 2009 EMU Anomaly (Year 2)
- ▲ 2010 EMU Anomaly (Year 3)
- ▲ 2011 EMU Anomaly (Year 4)
- ▲ 2012 WA Anomaly (Year 5)
- 2015 WA Anomaly (Year 7) – A2 Uncertain origin of possible archaeological interest
- 50m Archaeological Exclusion Zone



Drawing projection: WGS84 UTM z31N

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