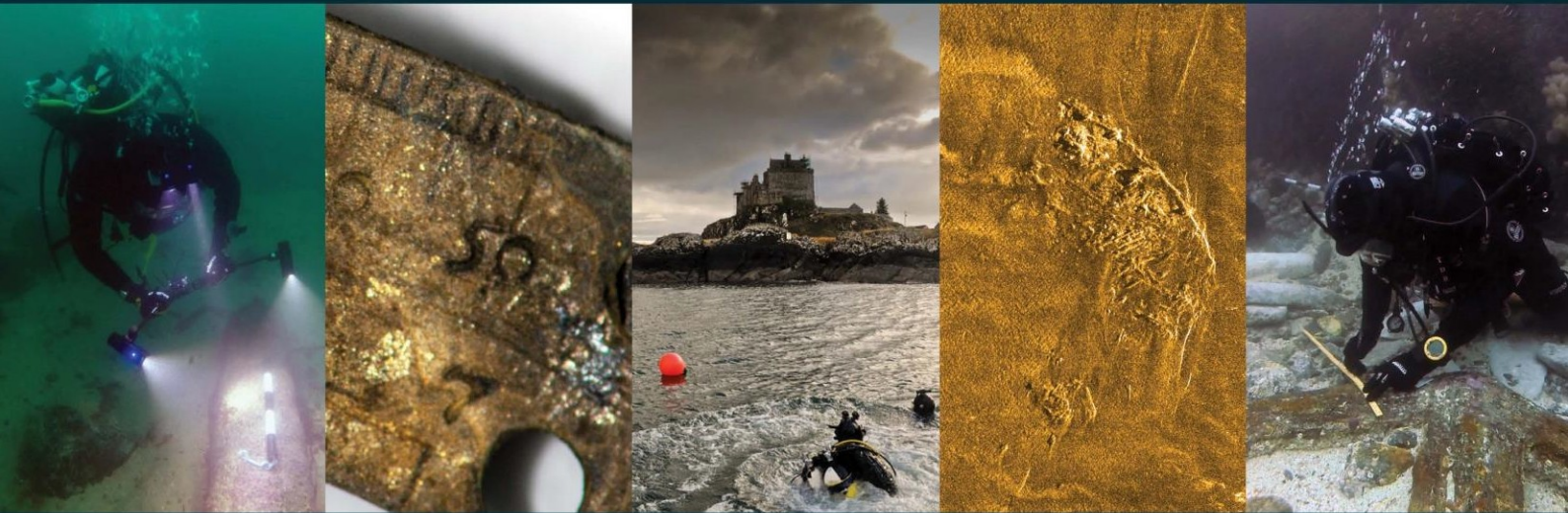


Brighton Marina designated area

Marine assessment for possible de-designation



for

Historic England

CA Project: 770340

CA Report: 16395

November 2016



Brighton Marina designated area
Marine assessment for possible de-designation
Historic England project number: 7375
CA project: 770340
CA report: 16395

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SUMMARY

Project name: Brighton Marina: Marine assessment for possible de-designation.

Cotswold Archaeology was commissioned in February 2016 by Historic England to undertake a marine assessment for possible de-designation of the Brighton Marina designated area. The wreck is believed to be the remains of a 16th century vessel, possibly built in continental Europe, and was designated to ensure high standards of archaeological recording and ensure that those carrying out the work had the necessary resources to do so. This assessment will be based on desk-based research, geophysical survey and diver survey; this report presents the results of the desk-based research and geophysical survey.

The wreck site has been subject to local interest since 1963. Investigations have included the survey of over 3000m² of seabed both visually and with metal detectors by the Black Cat group. Additionally, between 1984 and 1989 pre-disturbance survey, excavation, site stabilisation and site monitoring were carried out on the site by the Hampshire and Wight Trust for Maritime Archaeology (HWTMA).

Geophysical survey including sub-bottom and magnetometer surveys were also undertaken in 2004/5 and the site has also formed the focus for a NAS Part II project conducted by Keith Clark (Clark, 2005).

The early removal of wreck material from the seabed and changes in the depositional environment of the site suggest that there is little left to investigate. The current licensee for the wreck, Terence Newman, has continued research on the site but his diving operations have focused on locating anchors beyond the designated area which may be part of the wider debris field associated with the wreck.

1. INTRODUCTION

Outline

- 1.1. Cotswold Archaeology (CA) was appointed by Historic England (HE) to carry out an assessment of the Brighton Marina designated area (List Entry Number 1000047) with the aim of reassessing the designation status of the site. This assessment comprises desk-based research and geophysical survey; ground-truthing diver surveys were also planned in the event that the geophysical surveys identified targets that warranted further investigation.
- 1.2. The Brighton Marina designated area is one of three sites identified by Historic England as requiring additional investigation to inform discussions on possible de-designation (Historic England, 2015):

The three sites identified in this brief have not had contract or Licensee visits for many years. Historic England believes that there may be little, or indeed no, archaeological remains left on the sites, however, without site visits it is impossible to conclude this with any certainty. Specific archaeological assessment of the three sites will assist in their future management, whilst potential de-designation will enable Historic England to better prioritise resources.
- 1.3. The site lies off the western arm of the breakwater wall surrounding Brighton Marina and is believed to represent the remains of an unidentified armed vessel, probably dating to the sixteenth century (Historic England, 2015). Bronze and iron ordnance, as well as other associated material, were recovered without survey or archaeological control before the site was designated in 1983. The Black Cat group worked regularly on the site until 1987 when the slowly encroaching sand, discouraged them from further work.
- 1.4. The Brighton Marina designated area came into force on 18 October 1983 following and application by the Basildon-based Black Cat Sub-Aqua Club (henceforth referred to as the 'Black Cat group') and the recommendation of the East Sussex archaeological adviser, Dr A. G. Woodcock (Woodcock, 1983).
- 1.5. East Sussex County Council's arguments for the protection of the Brighton Marina wreck site are presented in three parts (Woodcock, 1983):

- *‘that the wreck and its contents are of such importance that any work on the site must abide by the highest standards of archaeological investigation;*
- *that the need for a detailed survey and assessment is urgent since, with the building of the Marina, new currents appear to have speeded up the erosion of the site; and*
- *the resources and equipment required to undertake such work are not at present within the reach of Black Cat Sub-Aqua Club’.*

Co-ordinate systems and GIS

1.6. The current project ArcGIS workspace was set up in WGS1984, using the UTM Zone 30N projection. Existing site plans were georeferenced to modern charts in this projection.

Location

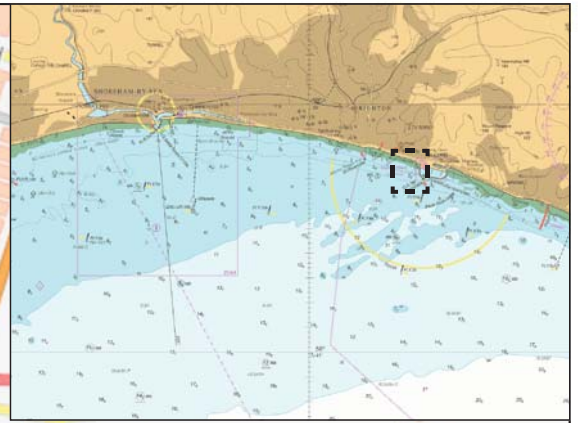
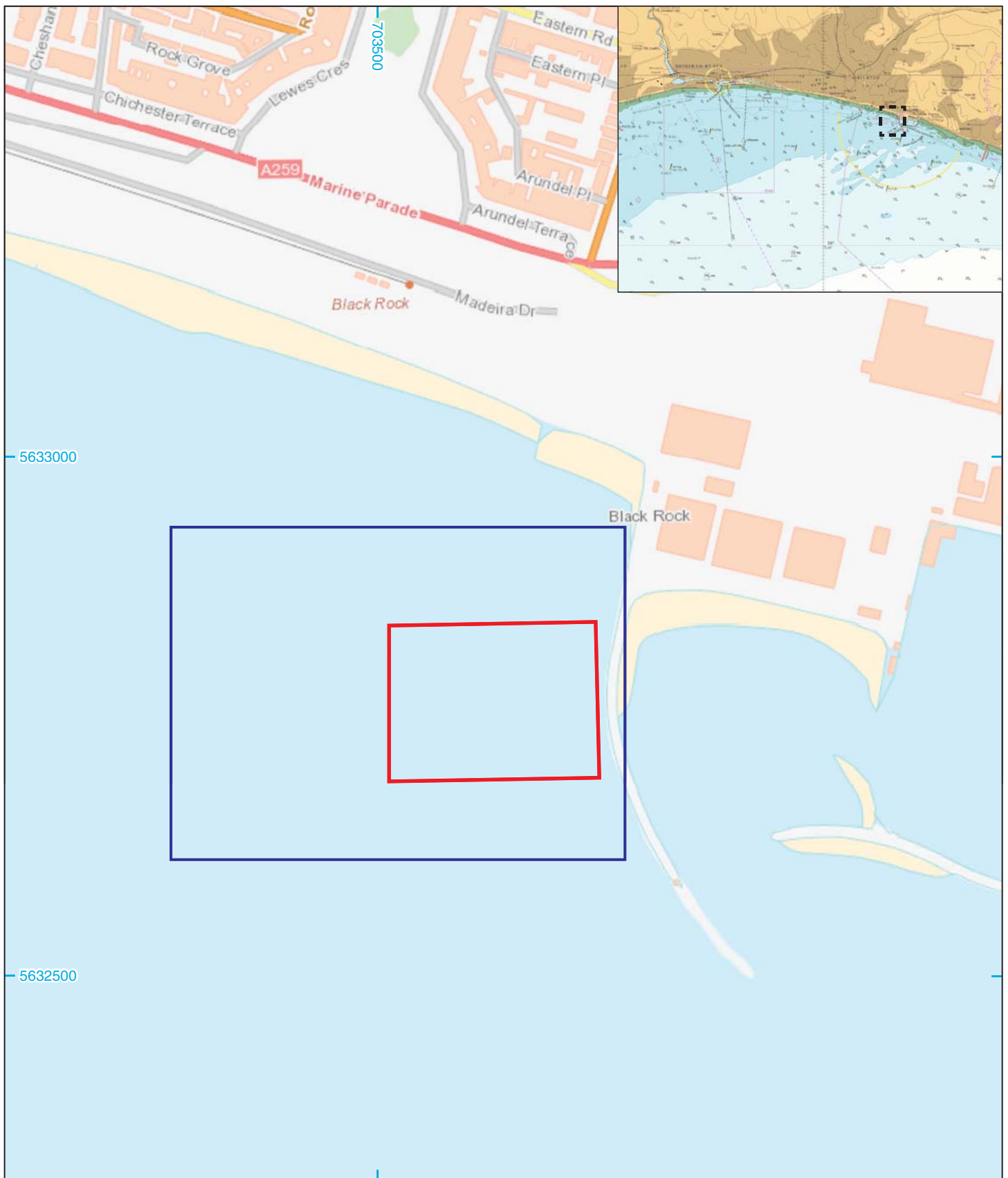
1.7. The designated area is located immediately west of the western arm of the breakwater of Brighton Marina (Figure 1). The site is reported to lie in an area of sandy seabed with chalk outcroppings, ranging in depth from 5 m to 10 m below chart datum (CD). There are shallow gullies to the north and east of the designated area which are partially filled with sand (Clark, 2005). This is confirmed by the British Geological Survey (BGS) which indicates that the bedrock geology of the coast is composed of the Newhaven Chalk Formation (BGS, 2016). The multibeam bathymetry survey carried out by MSDS Marine (Appendix A) supports this, showing a rocky seabed with gullies on an approximate southwest by northeast alignment in the eastern half of the designated area up to the breakwater. The designated area is defined by straight lines between the points listed in Table 1.

| Corner | Easting | Northing |
|---------------|----------------|-----------------|
| Northwest | 703512 | 5632838 |
| Northeast | 703712 | 5632841 |
| Southwest | 703518 | 5632689 |
| Southeast | 703718 | 5632693 |

Table 1 Coordinates of Brighton Marina designated area (WGS84 UTM Z30N).

Scope and aims

1.8. The assessment focuses upon the known and potential archaeological remains associated with a possible 16th century wreck within the Brighton Marina



- Brighton Marina designated area
- Geophysical Survey area

Coordinate System: WGS 1984 UTM Zone 30N



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, ©OpenStreetMap contributors, and the GIS User Community



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PROJECT TITLE

Brighton Marina designated area

FIGURE TITLE

Site location plan

| | | | | |
|-------------|-----|-------------|------------|------------|
| DRAWN BY | LJH | PROJECT NO. | 770340 | FIGURE NO. |
| CHECKED BY | RP | DATE | 22-07-2016 | |
| APPROVED BY | MW | SCALE @A4 | 1:5,000 | 1 |

designated area, as well as a 440 m by 550 m 'buffer' around the designated area covered by the marine geophysical survey (Appendix A).

1.9. As stated by Historic England (2015) the aims of the project are to:

- allow Historic England to update/enhance the quality of the NHLE;
- undertake site risk assessments to inform Heritage at Risk;
- allow better understanding of the sites and how they had been identified for designation previously, thereby helping improve Historic England's future assessment approach to candidate sites;
- identify the probability of the presence / absence of archaeological remains; and
- potentially save resources in terms of Historic England officer time and money and allow this to be redirected to other designated and significant sites.

2. METHODOLOGY

2.1. This assessment focuses on the Brighton Marina designated area (Fig. 1) but also, where informative, historic environment evidence and heritage assets in the wider environs. This study area has ensured that data sources provided sufficient contextual information about the wreck site

Data acquisition

2.2. A geophysical survey of the designated area and its immediate environs was undertaken by MSDS Marine on 19 April 2016 to support the desk-based research on the wreck site and inform possible future diver survey. The survey utilised sidescan sonar, multibeam echo sounder and magnetometer systems to identify anomalies which may be of archaeological interest for ground-truthing during diver operations (Appendix A).

2.3. The multibeam echo sounder data were collected using an R2Sonic 2022 with Ultra High Resolution (UHR) mode. Data were primarily collected in an east-west orientation and working from deep to shallow. Where required lines were run in other orientations such as along the marina wall.

- 2.4. Sidescan sonar data were collected using a Klein 3900 dual frequency (455/900 kHz) system, with the 900 kHz data used for archaeological interpretation. Data were primarily collected in a north-south orientation.
- 2.5. Magnetometer data were collected using a Geometrics G-882. Survey lines were run in a primarily north-south orientation; however allowances were made for topography and physical obstacles. The magnetometer data were processed by a third party unexploded ordnance (UXO) company and focused on anomalies with an amplitude greater than 5nT.
- 2.6. Owing to technical difficulties no sub-bottom data were collected in the designated area.

3. THE WRECK SITE

- 3.1. The Brighton Marina wreck is thought to represent the remains of a 16th-century vessel. Remains of this wreck were first recorded in 1963, prior to the construction of Brighton Marina, when a 16th-century bronze minion was recovered, along with two other guns, from the area to the east of Brighton, off Black Rocks which formed the focal point for subsequent work and designation (Fenwick and Gale 1998; WA 2004).
- 3.2. Following the discovery of 'ship's structure' in 1973 during construction work on Brighton Marina, which does not appear to have been subject to archaeological monitoring, the Black Cat group dived the site in 1974. Bronze and iron ordnance, as well as other associated material, were recovered before the site was designated in 1983. The Black Cat group also reported a framework of timbers which extended from the seabed and may have represented the ship's ribs. Other reported remains included a 15th-century bronze hackbut, a demi-culverin cannon, a breech loading swivel cannon, a calivar barrel, breech chambers, iron and lead shot, a stone cannon ball, an anchor, rope and the remains of a gun carriage (Woodcock, 1983). Later analysis suggests that the bronze hackbut dated from 1450-1500 and the iron-built stave guns thought to date from 1500-1530, thereby suggesting an early 16th century date for the wreck (Environ UK Ltd., 2004). The Black Cat group worked regularly on the site until 1987. In 1989 they decided to

formally end their work on the site owing to slowly encroaching sand covering the site.

3.3. Following their diver survey, the Black Cat group estimated that wreckage may have been spread over an area of up to 800 m in a south-west/north-east direction, although remains have been recorded as having come primarily from an area within c. 400 m of the marina wall. A chalk outcropping which lies to the south, is thought to define the southern extent of the site. Although ship's timbers were reported during the early stages of the Black Cat group's work on the site, these appear to have been removed or possibly destroyed early on in the investigations, possibly as a result of the construction of the breakwater. Consequently, later work on the site has focused on the debris field associated with the wreck, and this appears to be spread over a poorly defined area. The problem of defining the wreck site is further compounded by varying degrees of accuracy in mapping the area over the years, leading to a wider area being designated than might usually be expected. Even with this approach, the designated area only covers an area measuring 150 m by 200 m to the west of the western arm of the Brighton Marina.

4. PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS

Pre-designation

1963

4.1. Three cannon were reportedly removed from the seabed by the Black Cat group (Environ UK Ltd., 2004). One of these, a bronze minion thought to date to the 16th century, was acquired by the Royal Armouries whilst the others are believed to have been sold for scrap (Environ UK Ltd., 2004). The bronze cannon is on display at the Royal Armouries at Fort Nelson in Portsmouth (catalogue number XIX.6) and is accessible for study (Environ UK Ltd., 2004).

1974-1983

4.2. The Black Cat group's investigations of the site became more formalised in 1974 when the group discovered a wrought iron stave-built cannon (Clark, 2005). The cannon was identified by Margaret Rule (Mary Rose Trust) and Adrian Barak and thought to date to c. 1545, although later analysis suggests it could date to as early as 1500 (Environ UK Ltd., 2004). Subsequent finds from diving in 1977 included

various swivel guns, a bronze hackbut thought to date to c. 1475 and, what is described as, 'a framework of heavy timbers' were noted on the seabed.

- 4.3. It is unclear what additional work was carried out by the Black Cat group, although they did receive additional funding for metal detector equipment in 1979 and a barrel was raised and conserved in 1982. A licensee report from 1985 indicates that a systematic approach to diver survey was being employed with the use of fixed moorings and a rope grid (Merralls, 1985).

Post-designation

1984

- 4.4. The Black Cat group conducted 102 hours of underwater investigations during the 1984 season, carrying out visual and metal detector surveys of the site. Two breech chambers were located during these surveys, one of which was concreted to the chalk strata. Both of these artefacts were raised and conserved and are now on display at the Shipwreck Heritage Centre, Hastings (Plate 1).



Plate 1 Breech blocks on display at the Shipwreck Heritage Centre, Hastings

1985

4.5. The Black Cat group carried out dives over six days with nine divers. During this season the group re-located an iron and wooden anchor beyond the designated area. This anchor had been reported in previous years by the group. A concreted cannon ball was also found and raised. Timbers were also reported within the designated area during this season, although they do not appear to have been recorded and the licensee report suggests they were partially buried in the chalk strata (Merralls, 1985).

1986

4.6. The Archaeological Diving Unit (ADU) visited the site in 1986 and carried out a diver survey. An undated licensee report, possibly from 1986, also includes a site plan showing the distribution of cannon and an anchor within the designated area (Stan, n.d.) and is reproduced below (Plate 2).

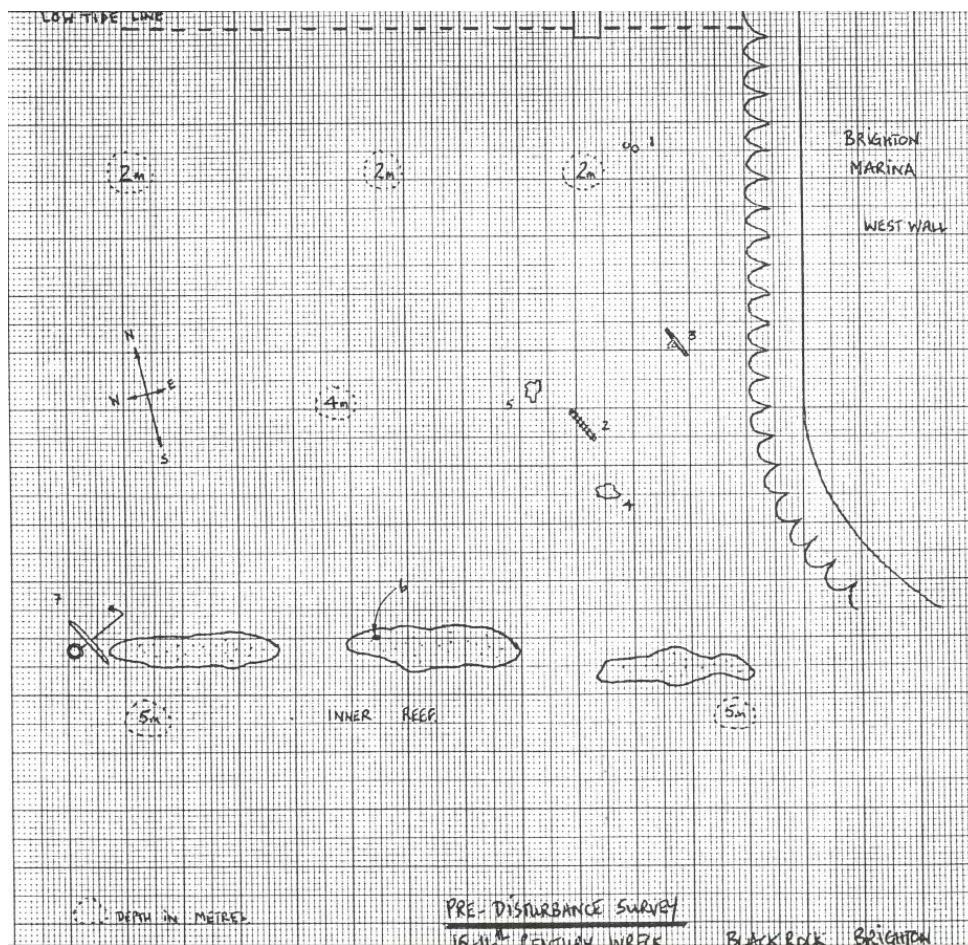


Plate 2 Undated Black Cat group plan of the Brighton Marina protected area.

1989

4.7. The ADU visited the site again in August 1989 and noted that sand cover had increased compared with levels observed during previous surveys (ADU, 1989). No archaeological remains were observed at the time of their visit. This increase in sand levels was particularly noticeable against the marina wall and may have obscured remains of the wreck (ADU, 1989).

1990

4.8. Work carried out by the licensees included dives undertaken by six divers over three days, and comprised visual assessment, re-location of existing buoys and sinkers, and removal of modern debris ahead of proposed metal detector searches. High sand levels were recorded by the divers over the western part of the site, while the eastern area had areas of clean chalk and sand-filled gullies. Modern debris was concentrated in the eastern area. No archaeological deposits or remains were observed.

1995

4.9. The ADU dived on the site in June 1995. No archaeological material was observed and it was thought that sand covered any remains of the wreck.

1999

4.10. The ADU visited the site in August 1999, following reports from commercial divers that parts of the ship's structure were protruding from under the marina breakwater (ADU, 1999). The ADU noted that the section of seabed at the base of the wall, where elements identified as potential parts of the wreck's structure had been twice reported, lay mainly outside the designated area, except for one short section where the north-south boundary just touches the curve of the breakwater. One dive was conducted, lasting 63 minutes, but no archaeological material was encountered despite focusing on the base of the wall outside the designated area where potential structure had previously been reported (ADU, 1999).

2001

4.11. The ADU assessed the site in 2001, using the non-statutory criteria for assessing the importance of wrecks (see Appendix B for extract). The ADU visited the site, following invitation to comment on proposals to extract shingle from a stretch of nearby coast as part of the tidal defence strategy plan proposed by

Halcrow Maritime, of Halcrow Group Ltd. (ADU, 2001). The ADU noted that this removal had the potential to alter sand levels within the designated area, potentially exposing the protected remains to harm, although no remains were observed on the site. They concluded that the 'site does not appear to be a strong candidate for designation but, until its full potential has been assessed by an extended period of investigation, it would not be sensible to de-designate'; this extended period of investigation has now been completed.

2003

- 4.12. By 2003 the licence for the Brighton Marina designated area had been transferred to Dave Parham, of Bournemouth University who produced a licensee report for this year (Parham, 2003). No archaeological fieldwork was undertaken, and the report focuses on efforts to locate and collate the existing, dispersed, archive from earlier investigations including work by the Black Cat group and the ADU. The latter included a site report and plans from work undertaken in 1986. Artefactual material was also located at the Royal Armouries, Fort Nelson. The Shipwreck Heritage Centre, Hastings (two breach chambers) and the Shipwreck and Heritage Centre, Charlestown, including one cannon and possible smaller finds.

2004

- 4.13. A licensee report for 2004 was produced by Dave Parham. A sub-bottom survey using a boomer and a magnetometer survey were conducted in this year and the licensee report indicates that results would be available the following year. Further archival research was also undertaken. The finds located at different repositories were recorded, with a research grant from the Pilgrim Trust. Additionally, the original site archive was copied from the previous licensee Stan Merralls of the Black Cat group, and a site plan produced. The licensee report also notes that, on the basis of the evidence recorded in the site archive:

the archaeological material is spread over a considerable area of seabed. Work conducted in the 1970s and 1980s recorded material that spread from the breakwater to a position 500 m to the east, with the north/south dimensions covering a similar distance. Whilst most of the archaeological material located during this period was recovered some of it was not and we

know at this present time that archaeological material lies outside the current protected area (Parham, 2004).

- 4.14. Wessex Archaeology also appears to have worked on the site in this year. Site plans reproduced by Keith Clark (2005) are attributed to a Wessex Archaeology report from 2004. Clark (2005: 8) indicates that these site plans were based on the original work by Stan Merralls, and were produced with funding from the Pilgrim Trust.
- 4.15. Clark (2005) carried out a marine geophysical survey in October 2004 with on-board support and supervision by Dave Parham. The survey was intended to cover the restricted area and collect sidescan sonar, sub-bottom and magnetometer data. The extent and efficacy of the survey is unclear but five magnetic anomalies were identified, of which three were considered viable targets.

2005

- 4.16. A licensee report was produced by Dave Parham describing diving operations carried out during 2005. These focused on investigating anomalies recorded by the magnetometer survey carried out in 2004 by Clark (2005). All anomalies investigated were found to comprise modern debris (Parham, 2005).
- 4.17. Following on from the geophysical survey, Clark (2005) also produced a report for the Brighton Marina Protected Wreck Project (2004-2005), undertaken as part of the NAS Part II Certificate. The diving program included a general swim over the restricted area, investigation of nearby gullies, and targeted dives at the recorded positions of previous finds, and ground-truthing of geophysical anomalies. The survey identified two modern concrete blocks and a coil of steel cable but no wreck material was identified. Clark (2005) notes that the steel cable did not coincide with the location of a magnetic anomaly identified by the geophysical survey. He also notes that no ferrous material was identified at the anomaly locations and suggests any ferrous material may have been buried under the sand. This report includes site plans from previous investigations and indicates that archival material, accessed as part of the production of the report, was deposited with the National Monuments Record (NMR) at Swindon.

2013

- 4.18. A licensee report produced by Terence Newman indicates no diving was undertaken on the site in 2013. The report noted, however, that an anchor had been raised, recorded and returned to the seabed from the vicinity of the Protected Wreck in this year. The connection with the wreck is uncertain.

2014

- 4.19. A licensee report produced by Terence Newman indicates no diving was undertaken on the site in 2014. Another anchor was recorded although the connection with the site is unclear. No finds or archaeological material relating to the wreck were encountered during a foreshore survey undertaken by Mr Newman following winter storms.

5. RESULTS OF GEOPHYSICAL SURVEY

- 5.1. A full description and assessment of the results of the geophysical survey are available in the geophysical survey report prepared by MSDS Marine (Appendix A).
- 5.2. A total of nineteen anomalies were identified by the survey of the Brighton Marina protected wreck. These included sixteen magnetic anomalies, two sidescan sonar anomalies and one multibeam bathymetry anomaly. Of these anomalies, both sidescan sonar anomalies have been interpreted as modern debris (Appendix A).
- 5.3. Anomaly MB001 is a linear feature approximately 8 m in length, with an approximate east to west orientation. The anomaly is adjacent to an area of outcrop however the form is dissimilar and potentially indicative of anthropogenic debris.
- 5.4. Magnetic anomaly MG005 is located in an area of rocky outcropping and coincides with the position of magnetic anomaly 1 identified by Keith Clark in 2004 (Clark, 2005). This anomaly is thought to be a mooring block (Appendix A).
- 5.5. Magnetic anomalies MG004, MG008, MG009, MG011, MG012 and MG013 are all within the bathymetry and sidescan sonar data coverage but with no identifiable features on the seabed. The positions of some of these anomalies, within areas of outcrop, implies that material may be present but obscured. It is worth noting, however, that the rocky areas have been previously subject to fairly extensive diver searches resulting in the location of modern debris.

6. OVERVIEW OF THE CURRENT WRECK SITE

6.1. The following assessment of the Brighton Marina designated area is based on the non-statutory criteria set out by Historic England for choosing which wrecks to designate (English Heritage, 2010).

Period

6.2. The site lies off the western arm of the breakwater wall surrounding Brighton Marina in 5-10m of water and is believed to represent an unidentified armed vessel, probably dating to the early 16th and possibly originating from continental Europe.

6.3. Analysis of the stone cannon balls suggested that they were from a quarry in Spain and the designation application notes that ship's timbers built from cypress had been found suggesting a 'continental origin' (Woodcock, 1983). It is unclear from the archival material, however, when the timber samples were taken and who identified the tree species. Stan Merralls has suggested that the wreck is that of a French vessel carrying out a raid on the south coast of England (Stan, n.d.).

Rarity

6.4. Very little is known about the construction of the vessel, although its possible dating to the early 16th century would make it rare. As noted by the ADU, all other vessels from this period are designated under the Protection of Wrecks Act (1973) (Appendix B).

Documentation

6.5. No documentary evidence has been discovered to connect this wreck to a particular event or person. The Black Cat group has suggested a link to a French fleet which sacked Brighton in 1527, but no evidence beyond the 16th century dating of the armaments supports this claim (Woodcock, 1983).

Group value

6.6. As with the previous ADU assessment of the designated area (Appendix B), there is still insufficient information to associate the wreck with a wider group.

Survival/condition

6.7. The ordnance known to have been recovered from the site includes:

- two 16th-century wrought iron-built stave guns thought to date from 1500-1530 (Environ UK Ltd., 2004), one with a stone cannon ball still in the barrel;
- a rare bronze hackbut dating from 1450-1500 (Environ UK Ltd., 2004); and
- two breech chambers.

6.8. Timbers have also been recorded in the area, although these may have been removed or overlain by the western breakwater. A gun carriage has also been recovered from the site. The remains reportedly lay along an east-west line, and may have extended to within the marina (Fenwick & Gale, 1998, p. 60). It is not clear at present whether further evidence survives on the site.

Fragility/vulnerability

6.9. The seabed is flat chalk with shallow gullies filled in with fine sand. A number of pieces of ordnance are known to have been recovered from this site over the period from 1974 to 1985. These were revealed only occasionally with sand movement. The distribution of these artefacts seems to lie in a line from south-west to north-east leading towards the marina wall. Although some of the ordnance recovered from the site underwent conservation, other pieces appear to have been sold for scrap and their current location and status is unknown (Environ UK Ltd., 2004).

6.10. The desk-based research and geophysical survey (Appendix A) carried out during this assessment suggest that there is little or no archaeological material associated with a wreck remaining on the seabed. The designated area is therefore no longer vulnerable to divers or to the possible extraction of shingle as detailed by the ADU (Appendix B).

Diversity

6.11. One of the wrought iron guns recovered from the wreck site was still attached to its wooden carriage with a twist of hemp in its touch hole and a stone cannon ball in its barrel. As well as both bronze and iron guns, the material associated with the wreck includes stone and iron shot, breech chambers and concretions.

6.12. No additional archaeological material appears to remain on the seabed. Further investigation of the site is therefore unlikely to uncover additional artefacts which would add to the diversity of the known assemblage.

Potential

6.13. The geophysical survey (Appendix A) supported by archival research suggests that there is very little if any wreck material remaining on the seabed. Any structural remains appear to have been removed or destroyed during the construction of the breakwater in 1972 (Environ UK Ltd., 2004) and the geophysical survey indicates (Appendix A) that the potential for smaller objects to be found in the chalk gullies is negligible.

7. CONCLUSION

7.1. Previous work carried out on the site suggests that much of the wreck material that may have derived from a 16th century wreck had been removed previously from the seabed. This early removal of artefacts without archaeological recording was cited as one of the original reasons for designation (Woodcock, 1983). This may have been further compounded by difficulty in recording the positions of artefacts accurately. It has also been suggested a number of ship's timbers were encountered and removed during the construction of the western arm of the Brighton Marina breakwater in 1972 (Environ UK Ltd., 2004).

7.2. Diver surveys after 1989 suggest that there is very little, if any, archaeological material remaining exposed on the seabed. It is possible, however, that there may be wreck material buried under the sand, and as early as 1989 the Black Cat group cited an encroaching blanket of sand as a reason not to continue their work on the site (Clark, 2005).

7.3. Geophysical surveys conducted by Keith Clark in 2004 (Clark, 2005) and by MSDS Marine in support of this assessment (Appendix A) also suggest that there is no cohesive wreck structure visible on the seabed. An elongated anomaly MB001 was identified at the southern limit of the designated area and may be associated with magnetic anomaly MG010 (Appendix A). This target is due to be investigated further by divers in the near future. The geophysical survey carried out in support of this report identified a total of 15 anomalies, six of which within the designated area may represent buried wreck debris (Appendix A). At present it is unclear what these anomalies are although Clark's report of ferrous objects, such as coils of cable, identified during his diver survey suggests that they may be modern debris (Clark, 2005).

7.4. The description of ship's timbers encountered during the construction of the breakwater in 1972 (Environ UK Ltd., 2004) suggest that the focus of the wreck site is likely to be at the eastern limit of the designated area. Although previous reports have described sand encroaching over this part of the site (Clark, 2005; ADU, 1989; ADU, 1995; ADU, 1999) recent geophysical survey (Appendix A) shows this area to be exposed rock. As such it is possible to say with a fairly high degree of confidence that no structural remains have survived in this area. The information reviewed, from both archival sources and the geophysical survey, suggests that there is little to no wreck material remaining on the seabed to protect.

Recommendations

- 7.5. The Brighton Marina wreck was originally designated to ensure that high standards of archaeological recording were used when investigating the site (Woodcock, 1983). This goal has largely been achieved, with the possible exception of the removal of structural material outside the designated area during the construction of the breakwater (ADU, 1999). Since there now appears to be no archaeological material relating to the wreck within the designated area it is arguable that the primary reason for designating the site is no longer valid.
- 7.6. Given the history of the site and investigations over many years including the recent geophysical surveys conducted for this assignment it seems fair to conclude that no significant artefactual or wreck material remains within the designated area or its immediate environs. It therefore seems logical that the designated status can be removed.

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APPENDIX A: GEOPHYSICAL SURVEY REPORT

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1.0 Introduction

1.0.1 MSDS Marine Ltd (MSDS) was contracted by Cotswold Archaeology (CA) to undertake a geophysical and hydrographic survey of the Brighton Marina protected wreck. The wreck lies immediately to the west of Brighton Marina.

1.0.2 The survey was undertaken to establish the current status of the site to enable Historic England (HE) to re-assess the site’s designation. The results of the survey will be analysed to identify any potential targets for ground-truthing and to inform the designation re-assessment.

1.0.3 The survey comprised multibeam echo sounder (MBES), sidescan sonar (SSS), sub-bottom profiling (SBP) and magnetometer (MAG). The data were processed and an archaeological review undertaken.

1.0.4 Survey operations were undertaken on 19th April 2016 using the Brighton based vessel *Channel Diver*, skippered by Steve Johnson. The vessel was chosen due to proximity to the survey area and the local knowledge of the skipper.

1.0.5 The following personnel were on board during the survey operation

| Name | Organisation | Role |
|-----------------|----------------------|-----------------------|
| Steve Johnson | Channel Diver | Skipper |
| Mark James | MSDS Marine Ltd | Surveyor |
| Matt King | Swathe Services | Surveyor |
| Daniel White | Swathe Services | Surveyor |
| Mike McClean | CM Sourcing | Surveyor |
| Sally Evans | Cotswold Archaeology | Client Representative |
| Terrance Newman | Independent | Site Licensee |
| Jezz Davies | Independent | Volunteer |

Table 2: Personnel on site

2.0 Project location

2.0.1 The Brighton Marina protected wreck site lies immediately to the west of Brighton Marina and is bounded by a designated area based on the following co-ordinates, taken from Statutory Instrument 1983/1400 (Figure 1):

| OSGB36 | |
|--------|--------|
| EAST | NORTH |
| 533370 | 103025 |
| 533370 | 102875 |
| 533170 | 102875 |
| 533170 | 103025 |

Table 3: Brighton Marina wreck designated area

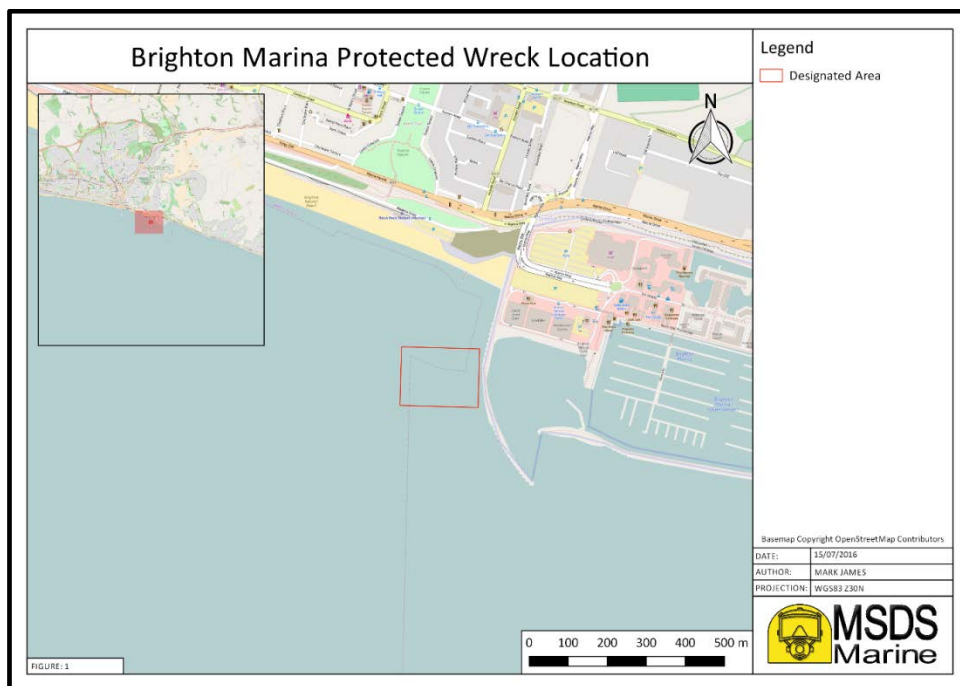


Figure 1 Brighton Marina protected wreck location – see Figure 1 (p8 main report)

2.0.2 All data was positioned in WGS84 Z30N and all outputs are in this format. All depths were reduced to Chart Datum (CD) Newhaven, Newhaven is 3.52m below Ordnance Datum (OD).

2.0.3 The minimum specification for coverage was the designated area. Previous investigations identified the locations of potential anomalies beyond this area, however, so a wider area was surveyed to incorporate these additional anomalies (Fig 2).

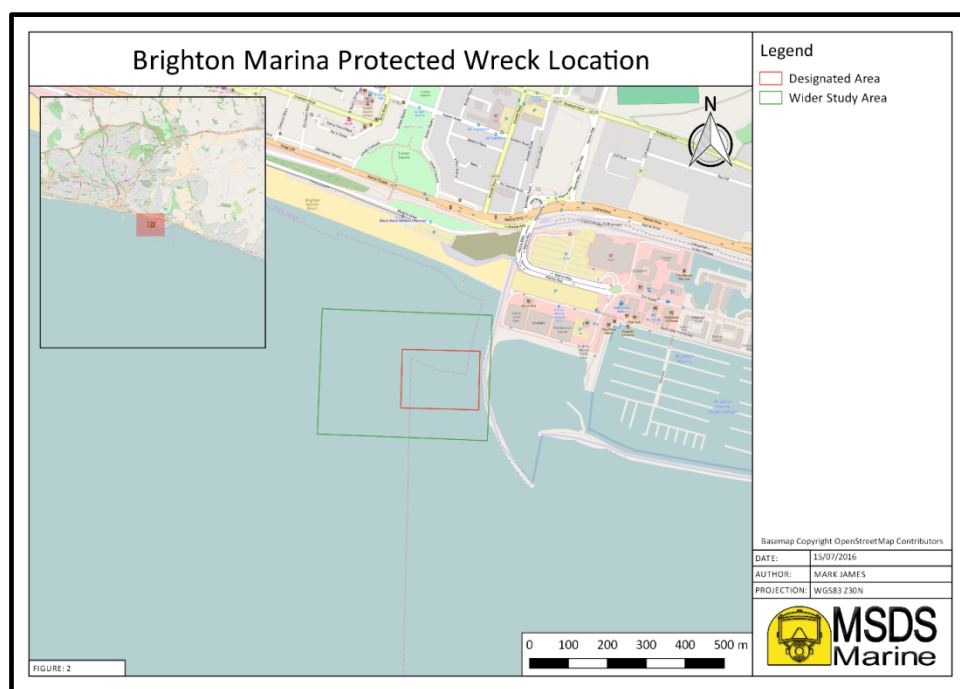


Figure 2: Brighton Marina wider study area – See Plate 1 (p.12)

2.0.3 The site lies in around 5-10 meters of water. The northward limits of the survey were largely dictated by the depth of water and the tide.

3.0 Technical specifications and methodology

3.0.1 The equipment chosen for the survey was based on a requirement for high resolution data that could be interpreted archaeologically and the ability to mobilise onto a vessel of opportunity

3.1 Vessel

3.1.1 The survey vessel, *Channel Diver*, was mobilised and operated out of Brighton Marina. *Channel Diver* is a 36ft South Boats catamaran primarily used for diving charters. The vessel has ample deck space and cabin space and provided a stable platform for survey operations.



Figure 3: Survey support vessel Channel Diver

3.2 Positioning and motion

3.2.1 Positioning and motion for the multibeam echo sounder survey was controlled using an Applanix POS MV WaveMaster with real time 3G real time kinematic (RTK) corrections. The Applanix system with RTK corrections can produce positional accuracy of $>0.1\text{m}$, roll and pitch to 0.02° , heading to 0.03° and heave to 2cm or 2%.

3.2.2 A position string was exported from the Applanix system to provide positional data for the sidescan sonar, the sub-bottom profiler and the magnetometer.

3.2.3 Where required the raw GPS data were post-processed in POSpac to improve absolute accuracy. POSpac uses reference station data, alongside the logged GPS and motion data from the survey to produce a more accurate position solution.

3.3 Multibeam echo sounder

3.3.1 An R2Sonic 2022 with Ultra High Resolution (UHR) mode multibeam echo sounder was used for the collection of multibeam bathymetry data; the 2022 offers an excellent combination of resolution, ease of use and size and weight making it the idea system for short, high resolution surveys undertaken on vessels of opportunity.

3.3.2 At 400 kHz the 2022 has a beam width of $1.0^{\circ} \times 1.0^{\circ}$ reducing to $0.6^{\circ} \times 0.6^{\circ}$ when in 700 kHz UHR mode. The 2022 has a real time user selectable swath sector of 10° to 160° and a range resolution of up to 1.25cm. These features ensure high resolution, high density data collection the parameters of which can be adjusted in real time to ensure optimum ensonification of the seabed and any features of potential archaeological interest.

3.3.3 The multibeam echo sounder was mobilised onto the vessel with the use of rigid metal frame incorporating the inertial measurement unit (IMU) and the antennas. By mounting the multibeam echo sounder, the IMU and the antennas on the same rigid frame common errors associated with vessels of opportunity such as offset errors and hull flex are reduced to a minimum.

3.3.4 Prior to data collection a patch test was undertaken to determine any offsets between the MBES, the IMU and heading sensor. Offset corrections are then applied to the dataset to ensure minimal errors in the positioning and overlap of the data.

3.3.5 The bathymetric data were collected by running predetermined lines based on the depth of water to achieve a data overlap of 50%. The deeper the water the wider the coverage at a fixed swath sector, however beam footprint will increase and data density will decrease. The data recorded are displayed in real time; which allows online QC to take place and lines re-run or filled in where required.

3.3.6 The bathymetry data were primarily collected in an east-west orientation, and working from deep to shallow. Running along the shoreline and from deep to shallow allows the surveyor to visualise the depth and any obstructions on the next line which allows for additional safety when working in shallow waters. Where required, additional infill lines were run in other orientations such as along the marina wall.



Figure 4: Preparing to take a sound velocity profile

3.3.7 Sound velocity was recorded continuously at the multibeam echo sounder head with a Valeport Mini Sound Velocity Sensor (SVS) and at intervals through the water column with a Valeport Sound Velocity Profiler (SVP). Sound velocity measurements are required, and applied to the bathymetry data, in order to correct errors that may be created due to variations in the speed of sound through the water column.

3.3.8 All line planning and multibeam echo sounder data collection were undertaken in HyPack HySweep.

3.3.9 Following data collection, patch test and tide corrections are applied within HyPack HySweep and the data exported as individual lines in XYZ format. The lines of data are then cleaned in various programs including, HySweep, Fledermaus and Cloud Compare to remove noise, data artefact and unwanted features such as fish.

3.3.10 Once the data has been cleaned the lines are imported into software including Fledermaus and Cloud Compare where the data can be visualised and effects such as shading applied to help highlight potential anthropogenic features. Interpretation is undertaken using the complete point cloud, however for the purposes of visualisation in this report the data have been gridded at 0.1m to produce a surface model.

3.3.11 A georeferenced bathymetric image was produced along with the positions and images of potential anthropogenic anomalies.

3.4 Sub-bottom profiler

3.4.1 An EdgeTech 3100P Sub-bottom Profiler with a SB-216S towfish was used for the survey. The 3100P system uses full spectrum CHIRP technology and with the SB-216S towfish there is a good combination of penetration and resolution for the seabed type in the survey area.



Figure 5: EdgeTech SB-216S towfish

3.4.2 The sub-bottom profiler towfish was towed from a bollard on the starboard side of the stern, the length of cable is adjusted to fly the towfish deeper or shallower as required to maintain a set altitude range above the seabed.

3.4.3 The position of the towfish is calculated by applying the offset of the bollard from the GPS antenna and calculating the layback. Layback is calculated using the amount of cable out and the depth of the fish.

3.4.4 Data are collected following a pre-determined line plan dependent on the coverage and line density required. Unlike multibeam echo sounders and sidescan sonars, sub-bottom profilers only collect data directly below the towfish meaning buried material must be directly under the path to be ensonified. A line plan with 5m spacing was considered optimal for the survey taking into consideration the objectives, the survey area and time available.

3.4.5 Data were recorded in SEG-Y format using EdgeTech's Discover software.

3.4.6 Following collection, the data are imported into CODA SurveyEngine Seismic+ where gains are adjusted to optimise visualisation and the seabed tracked. The data are then viewed and interpreted to identify the geological makeup of the area and any buried material.

3.5 Sidescan sonar

3.5.1 The sidescan sonar used for the survey was a Klein 3900 dual frequency (455/900 kHz) system. The frequencies of 455 and 900 kHz are an effective combination for range and resolution where the objective is the ensonification of small features. Interpretation was undertaken using the 900 kHz data.



Figure 6: Klein 3900 sidescan sonar

3.5.2 The sidescan sonar towfish was towed from a cleat in the centre of the stern, the length of cable was adjusted to fly the towfish deeper or shallower as required to maintain a set altitude above the seabed, typically 10% of the range. For the ensonification of small features of potential archaeological interest it is preferable to fly the sidescan sonar towfish close to the seabed, often at between 2-3m dependent on the seabed topography.

3.5.3 The position of the sidescan sonar towfish is calculated by applying the offset of the bollard from the GPS antenna and calculating the layback. Layback is calculated using the amount of cable out and the depth of the fish.

3.5.4 Data are collected following a pre-determined line plan dependent on the frequency, and thus range, the desired height of the towfish and the required overlap. The ideal data coverage is 200% as this compensates for the data blank in the water column and enables each anomaly to be ensonified from two angles, for this survey a 30m line spacing was appropriate.

3.5.5 The sidescan sonar data were primarily collected in a north-south orientation. Usually with towed equipment the best approach is to work with the topography and along contours as it is easier to maintain the towfish height. For this survey the eastern edge of the survey area was bounded by a marina wall so turning the vessel at this point with towed equipment would have been problematic. To address this, survey lines were run north-south.

3.5.6 Data were recorded in XTF format using Klein's SonarPro software.

3.5.7 All processing of sidescan sonar data was undertaken in CODA SurveyEngine Sidescan+. Where applicable navigation and layback offsets were applied and gains adjusted to optimise visualisation. Data were reviewed on a line by line basis and anomalies of potential archaeological interest tagged, measured and imaged. A mosaic of the sidescan sonar data was produced to provide an overview of the nature of the seabed within the survey area.

3.6 Magnetometer

3.6.1 The magnetometer used for the survey was a Geometrics G-882. The G-882 is a cesium-vapour magnetometer commonly used within the survey industry and in particular for the detection of unexploded ordnance (UXO). The G-882 is suited to the detection of ferrous materials of potential archaeological interest, and is supplied with a built in altimeter to enable it to be flown a set distance from the seabed.

3.6.2 The magnetometer was towed from a bollard on the port side of the stern, the length of cable is adjusted to fly the towfish deeper or shallower as required to maintain a set altitude above the seabed, typically the closer to the seabed the better the detection capabilities.

3.6.3 The position of the magnetometer is calculated by applying the offset of the bollard from the GPS antenna and calculating the layback. Layback is calculated based on the amount of cable out and the depth of the fish.

3.6.4 Data are collected following a pre-determined line plan based on the required detection parameters and the height at which the magnetometer could be towed safely above the seabed. The G-882 has a detection slant range of 6m for 4.5kg of iron, using a towed height of 3m this equates to c.5.2m on the seabed. Therefore a magnetometer tow height of 3m and 10m line spacing was considered appropriate for the detection of 4.5kg of iron on the surface. It should be noted that for

buried material the detection properties will be less, however potentially *in situ* material is likely to consist of larger iron artefacts such as anchors and cannon.

3.6.5 The magnetometer data were primarily collected in a north-south orientation to reduce interference caused by the Earth's magnetic fields.

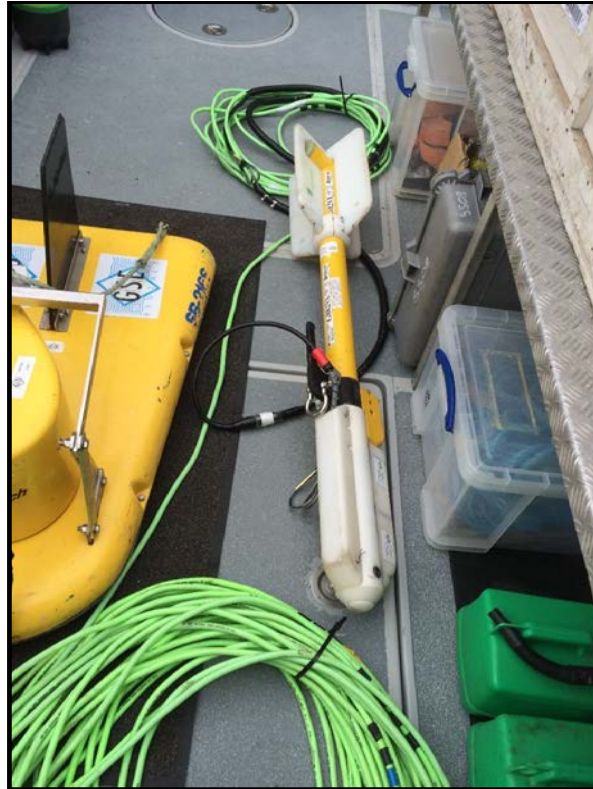


Figure 72: Geometrics G-882 magnetometer

3.6.6 Data were collected using Geometrics MagLog software and processed using Geometrics MagPick where it is viewed to remove any data spikes to build a clean total field. A background magnetic field is created and subtracted from the clean total field to produce a residual magnetic field from which magnetic anomalies over 5nT are identified. The position and intensity of identified magnetic anomalies are viewed alongside the sidescan sonar and bathymetry data in order to identify modern objects which can be discounted from the assessment.

4.0 Results

4.1 Multibeam

4.1.1 The majority of the designated area and the wider study area were successfully surveyed. A small area to the northeast of both areas was not covered due to the depth of water, the seabed topography and a rapidly falling tide.

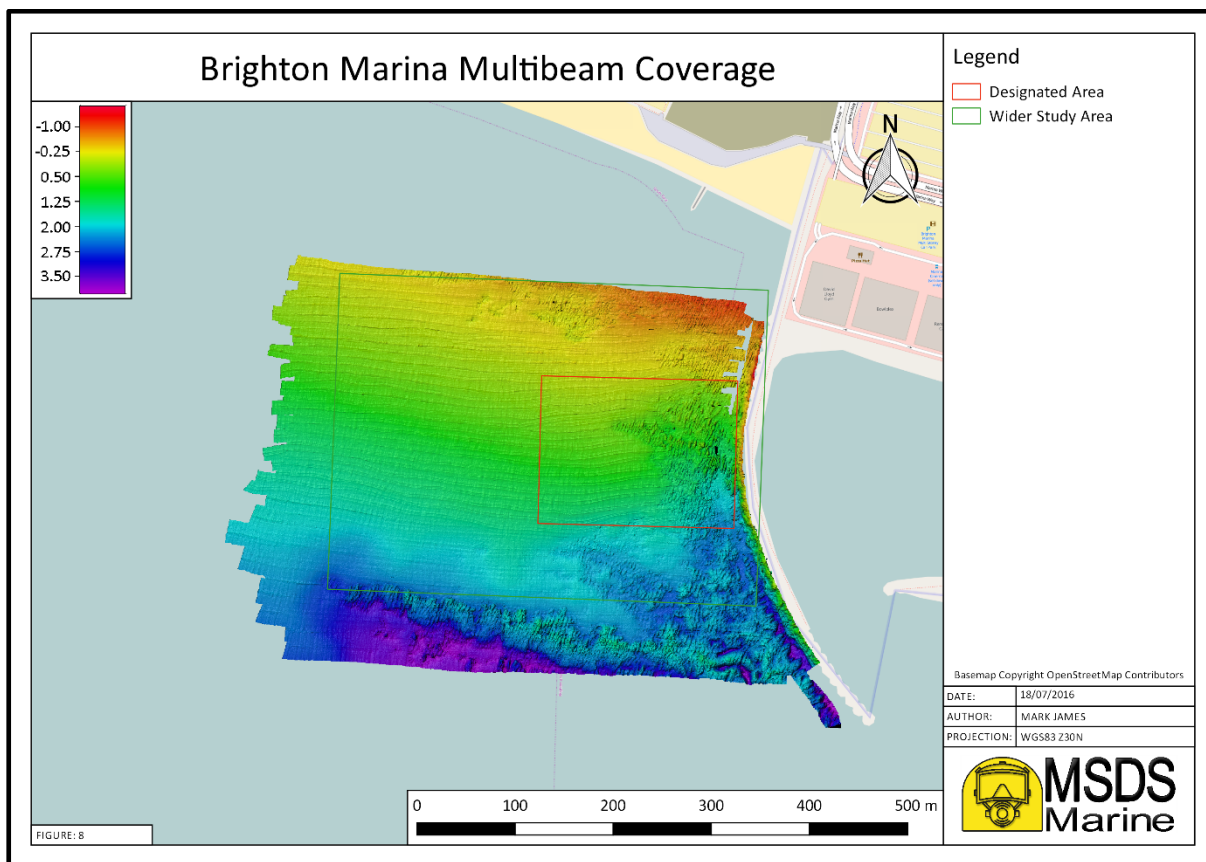


Figure 8: Brighton Marina multibeam coverage

4.1.2 One anomaly of potential archaeological interest was identified in the bathymetry data, the anomaly is a linear feature c.8m in length and the form indicates anthropogenic origin. The anomaly lies just inside the southern boundary of the designated area.

| Multibeam Anomalies | | | | |
|---------------------|-------|------------|-------------|--|
| ID | Image | East | North | Description |
| MB0001 | | 703615.253 | 5632696.991 | Anomaly MB001 is a linear feature approximately 8m in length. The anomaly is alongside an area of outcrop however the form is dissimilar and potentially indicative of anthropogenic debris. |

Table 4: Multibeam anomalies

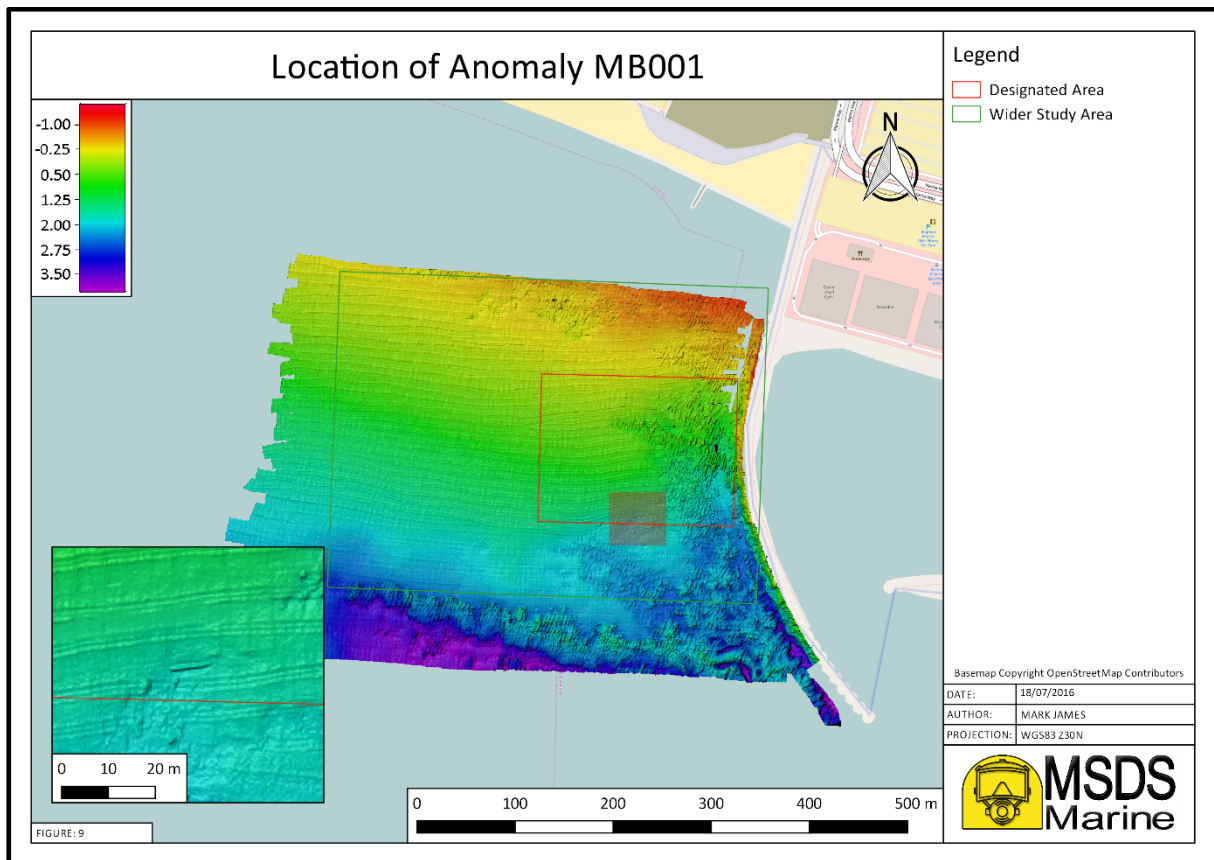


Figure 9: Location of anomaly MB001

4.1.4 The multibeam bathymetry survey was undertaken on its own to make best use of the tides. The turning circle of the vessel with towed equipment is significantly increased and it was decided that the best way to maximise output was to take this approach.

4.2 Sub-bottom profiler

4.2.1 The multibeam bathymetry survey ended on a low tide and upon launching of the sub-bottom profiler it became apparent that it would not be possible to maintain a consistent height or stop the fish rolling in the depth of water available across the wider survey area.

4.2.2 To ensure the completion of the other survey objectives the decision was taken between MSDS and CA to forgo the SBP and concentrate on the sidescan sonar and magnetometer.

4.3 Sidescan sonar

4.3.1 Full coverage of the designated area and c.85% coverage of the wider study area was achieved. Surveying continued until two hours after light was lost and the decision was made to stop operations due to the proximity to known obstructions close to shore that were not visible in the dark. Although not within the survey area they would have impacted turning the vessel with towed equipment.

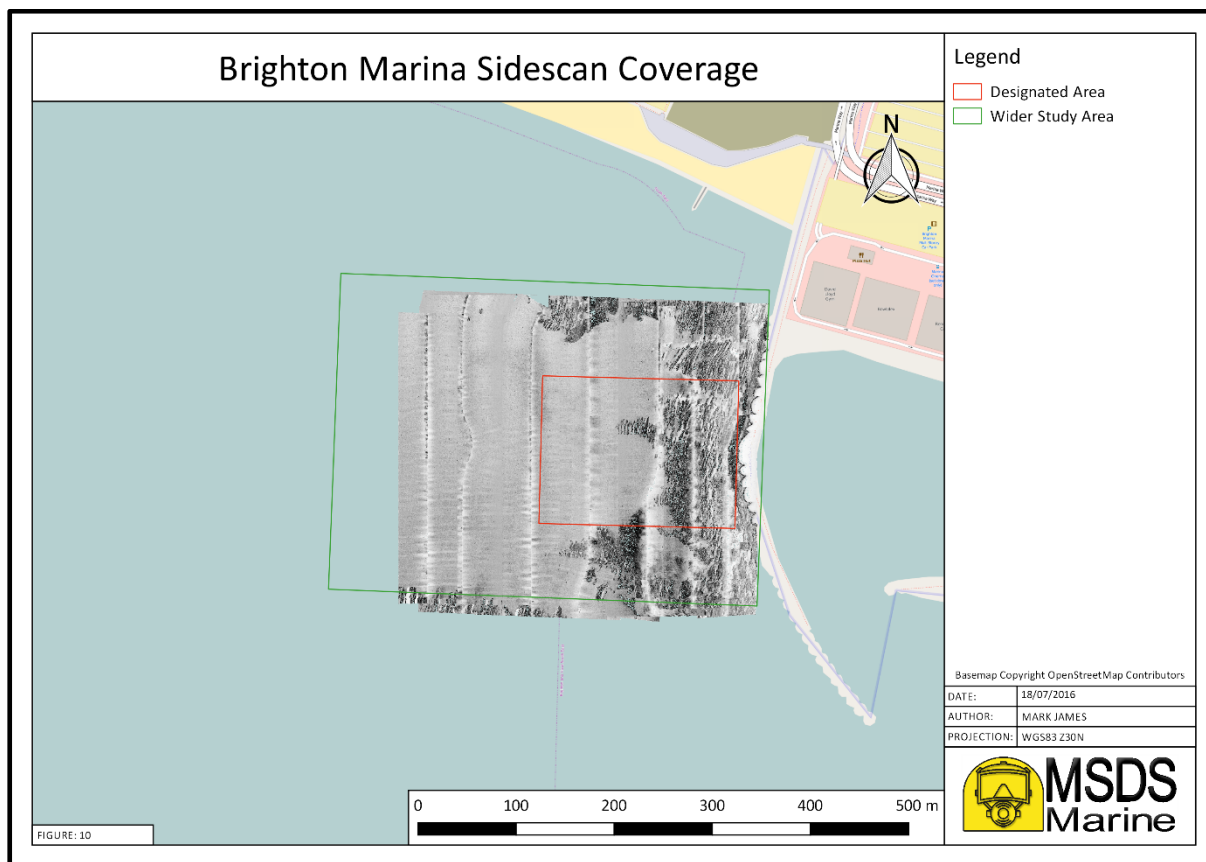


Figure 3: Brighton Marina sidescan coverage

4.3.2 The sidescan sonar data were of good quality and suitable for the identification of potentially anthropogenic anomalies, there is a clear definition between the areas of sand and the rocky/chalky outcrops.

4.3.3 Two anomalies of potential anthropogenic origin and of potential archaeological interest were identified in the sidescan sonar data.

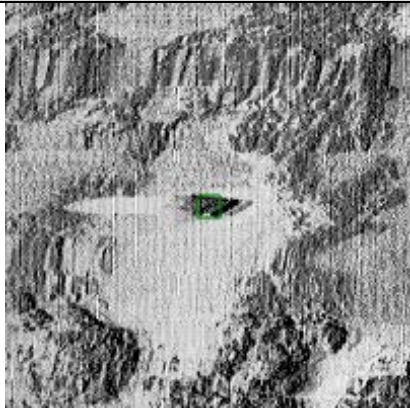
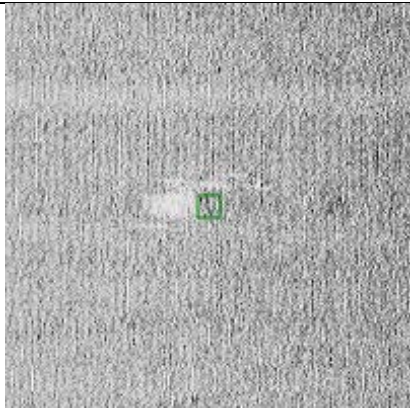
| Sidescan Sonar Anomalies | | | | |
|--------------------------|--|------------|-------------|--|
| ID | Image | East | North | Description |
| SS001 |  | 703642.083 | 5632789.495 | Anomaly SS001 is an angular feature 1.4m x 1.6m and 0.5m tall. The angular form of the feature indicates anthropogenic origin, however the anomaly is likely modern. |
| SS002 |  | 703455.533 | 5632794.639 | Anomaly SS002 is a thin, irregular, linear feature in an area of otherwise featureless seabed. The feature measures 2.3m x 0.2m and is indicative of anthropogenic debris, although likely moderns such as discarded cable, etc. |

Table 5: Sidescan sonar anomalies

4.3.4 It is believed that both anomalies SS001 and SS002 represent modern material. Following discussions with CA it is noted the position of SS001 is very close to that of a concrete mooring block used during previous works on the site, the angular form corroborates this. SS002 is an amorphous anomaly with a linear element, the form is not dissimilar to discarded cable, rope or fishing gear and is likely modern in origin.

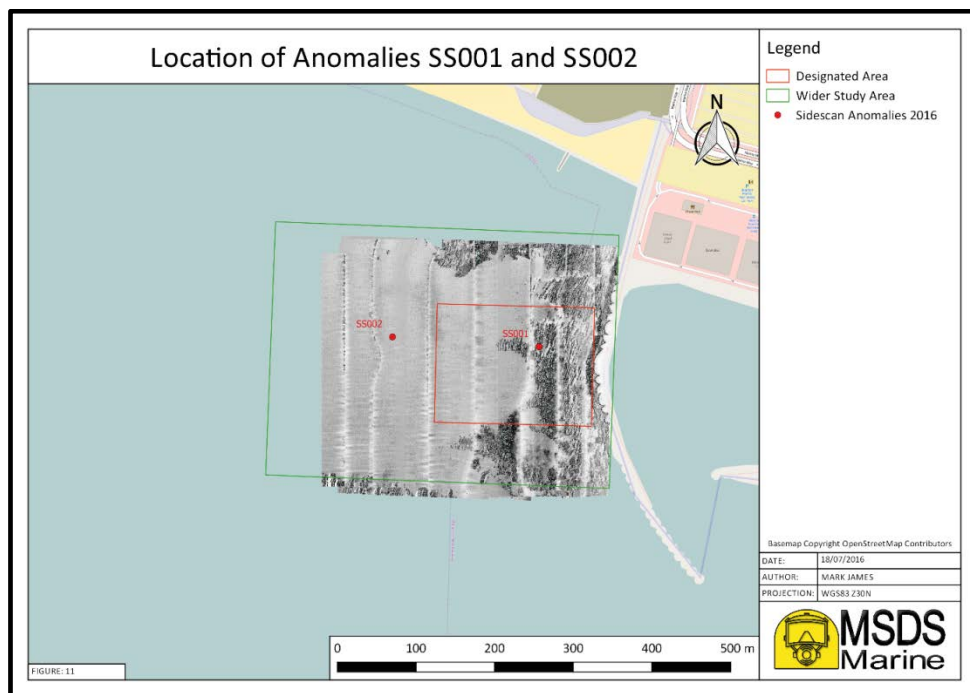


Figure 4: Location of anomalies SS001 and SS002

4.4 Magnetometer

4.4.1 Magnetometer coverage was the same as for the sidescan sonar but with an additional line to the west of the wider survey area. As with the sidescan sonar surveying continued until two hours after light was lost and the decision was made to stop operations due to the proximity to known obstructions close to shore that were not visible in the dark.

4.4.2 A total of fifteen magnetic anomalies were identified during the survey.

| Magnetic Anomalies | | | |
|--------------------|----------------|----------|---------|
| ID | Amplitude (nT) | East | North |
| MG001 | 116.62 | 703555.4 | 5632988 |
| MG002 | 20.19 | 703314.9 | 5632930 |
| MG003 | 23.62 | 703328.4 | 5632889 |
| MG004 | 9.43 | 703666.9 | 5632847 |
| MG005 | 13.87 | 703630.8 | 5632788 |
| MG006 | 310.12 | 703706.7 | 5632778 |
| MG007 | 165.81 | 703703.9 | 5632736 |
| MG008 | 7.97 | 703627.3 | 5632735 |
| MG009 | 15.06 | 703552.3 | 5632694 |
| MG010 | 24.91 | 703624.5 | 5632694 |
| MG011 | 8.83 | 703553.6 | 5632661 |
| MG012 | 5.13 | 703632 | 5632617 |
| MG013 | 5.62 | 703438 | 5632610 |
| MG014 | 171.23 | 703332.4 | 5632589 |
| MG015 | 9.96 | 703516.4 | 5632448 |

Table 6: Magnetic anomalies

4.4.3 Of the fifteen anomalies identified six were within the designated area, five within the wider study area and the remaining four outside both areas.

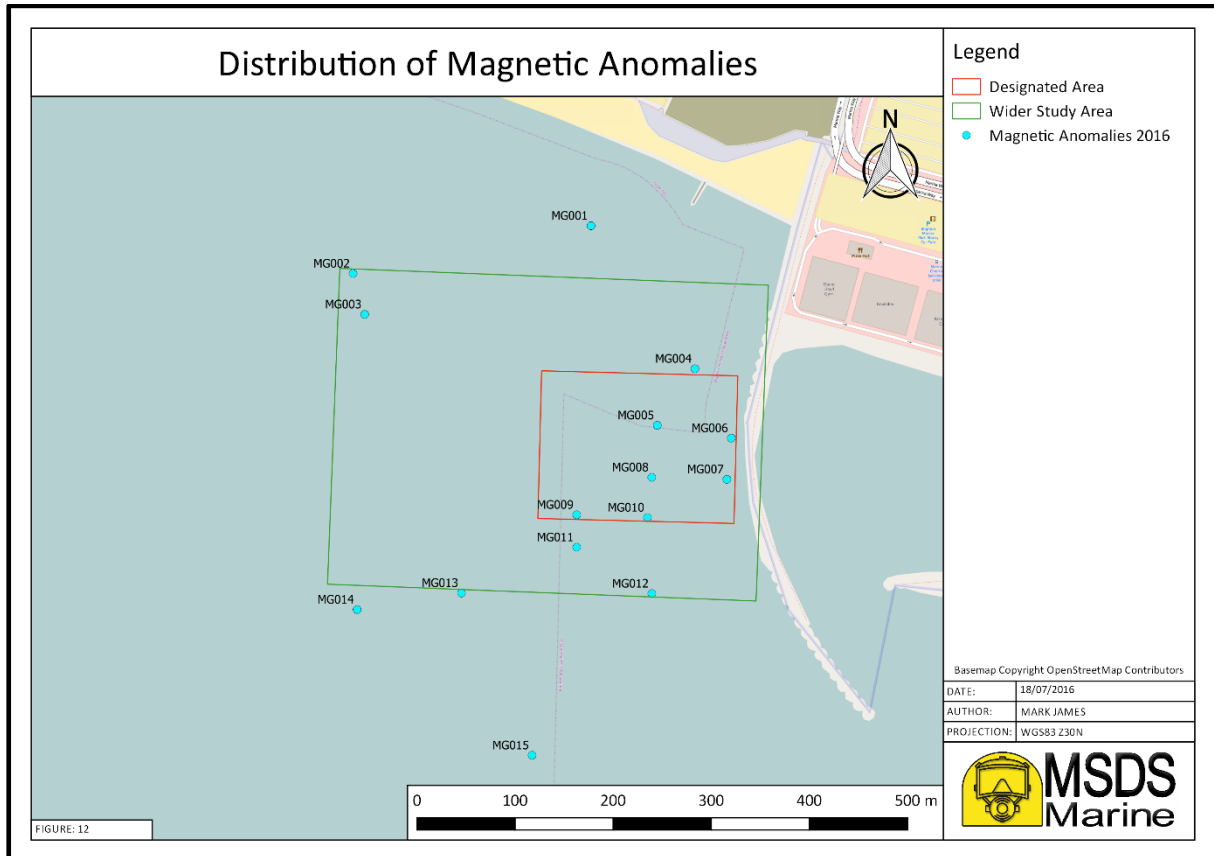


Figure 5: Distribution of magnetic anomalies

4.4.4 Magnetic data does not provide a 'visual' image of the anomaly, only an amplitude, as such it is not possible to identify anomalies only to ascertain that ferrous material may exist on, or below, the seabed.

5.0 Discussion of identified anomalies

5.0.1 Nineteen anomalies in total were identified during the Brighton Marina protected wreck survey. These are comprised of sixteen magnetic anomalies, two sidescan sonar anomalies and one multibeam anomaly.

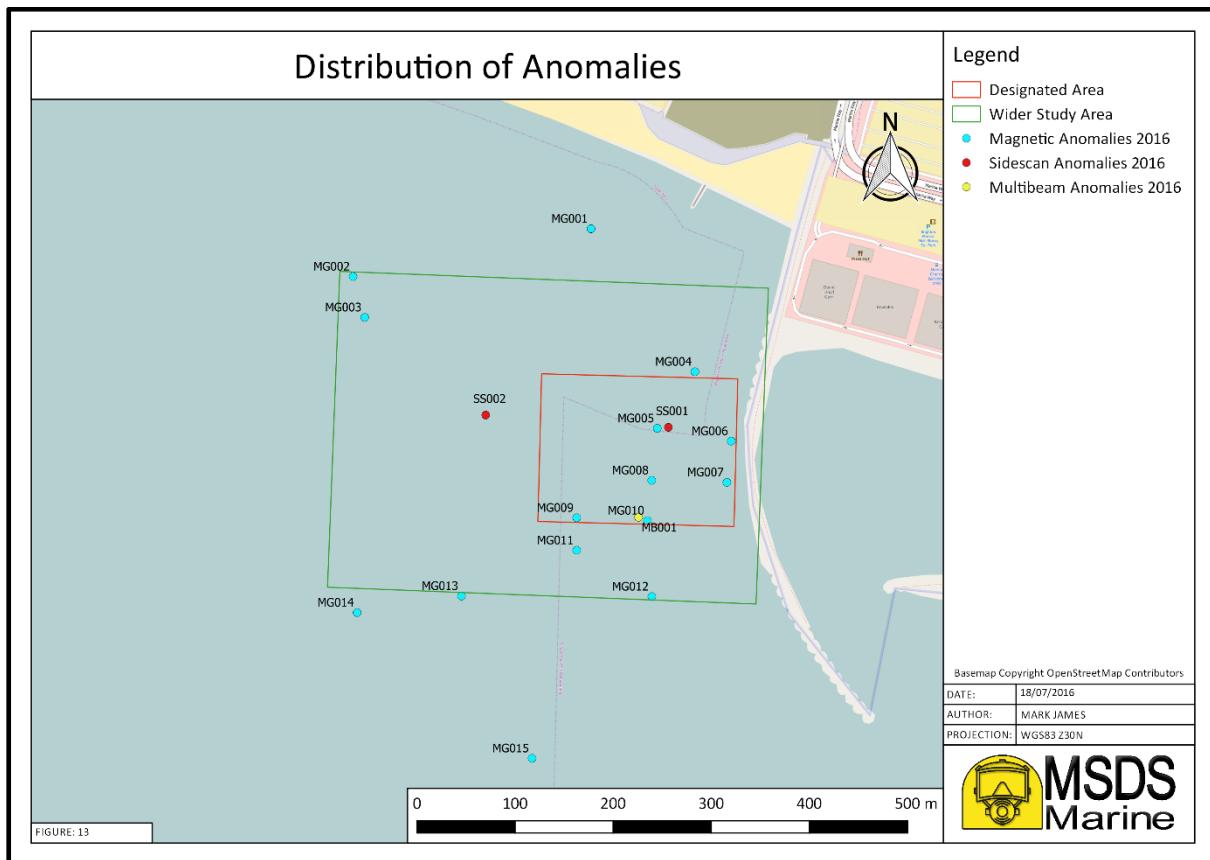


Figure 6: Distribution of anomalies

5.0.2 For the purposes of the comparison of anomalies, those within 10m each of each other have been assessed. This is due to the inherent inaccuracies whilst using towed equipment, particularly in very shallow water and also the magnetometer line spacing.

5.0.3 Two magnetic anomalies have corresponding surface expressions on the seabed. MG005 which corresponds to SS001 and MG010 which corresponds to MB001.

5.0.4 MG005 has an amplitude of 13.87nT and lies c.10m to the west of SS001. SS001 has been identified as a concrete mooring block, the low magnetic anomaly would be consistent with iron reinforcing and/or the tethering ring which would likely be made of iron.

5.0.5 MG010 has an amplitude of 24.91nT and lies c.9m to the east of MB001. MB001 is not identifiable, however the linear form and close by magnetic anomaly would indicate anthropogenic origin. MB001 does not appear in the sidescan sonar data, there could be a number of reasons for this including the position of the contact on the seabed, the geological makeup of the seabed or the angle at which the contact lies in relation to the sidescan sonar.

5.0.6 MG006 and MG007 have amplitudes of 310.12nT and 165.81nT respectively with no obvious anomalies on the seabed. The intensity, the distance to the marina wall and records from previous works would suggest modern origin as a result of construction.

5.0.7 MG001 and MG015 lie outside the coverage of the bathymetry and sidescan sonar data.

5.0.8 MG002, MG003 and MG014 lie outside the sidescan sonar data and have no visible anomalies within the bathymetry data.

5.0.9 MG004, MG008, MG009, MG011, MG012 and MG013 are all within bathymetry and sidescan sonar data coverage but with no identifiable features on the seabed. Due to the positions of some of the anomalies within areas of outcrop it is possible that material may be present but obscured. It is worth noting that the rocky areas have previously been subject to fairly extensive diver searches with the location of modern debris.

| Identified Anomalies | | | | | |
|----------------------|----------------|----------|---------|---------|--|
| ID | Amplitude (nT) | East | North | Related | Notes |
| MG001 | 116.62 | 703555.4 | 5632988 | | Outside MBES and SSS |
| MG002 | 20.19 | 703314.9 | 5632930 | | Outside SSS, nothing visible in MBES |
| MG003 | 23.62 | 703328.4 | 5632889 | | Outside SSS, nothing visible in MBES |
| MG004 | 9.43 | 703666.9 | 5632847 | | Small magnetic anomaly, nothing visible in MBES or SSS |
| MG005 | 13.87 | 703630.8 | 5632788 | SS001 | See SS001 |
| MG006 | 310.12 | 703706.7 | 5632778 | | Potential construction debris or material |
| MG007 | 165.81 | 703703.9 | 5632736 | | Potential construction debris or material |
| MG008 | 7.97 | 703627.3 | 5632735 | | Small magnetic anomaly, nothing visible in MBES or SSS |
| MG009 | 15.06 | 703552.3 | 5632694 | | Small magnetic anomaly, nothing visible in MBES or SSS |
| MG010 | 24.91 | 703624.5 | 5632694 | MB001 | See MB001 |
| MG011 | 8.83 | 703553.6 | 5632661 | | Small magnetic anomaly, nothing visible in MBES or SSS |
| MG012 | 5.13 | 703632 | 5632617 | | Small magnetic anomaly, nothing visible in MBES or SSS |
| MG013 | 5.62 | 703438 | 5632610 | | Small magnetic anomaly, nothing visible in MBES or SSS |
| MG014 | 171.23 | 703332.4 | 5632589 | | Significant magnetic anomaly with no visible anomaly in MBES |
| MG015 | 9.96 | 703516.4 | 5632448 | | Outside MBES and SSS |
| SS001 | | 703642.1 | 5632789 | MG005 | Likely concrete mooring block |
| SS002 | | 703455.5 | 5632794 | | Likely modern debris, no magnetic anomaly |
| MB001 | | 703615.3 | 5632697 | MG010 | Unknown linear feature |

Table 7: Identified anomalies

6.0 Recommendations for ground-truthing

6.0.1 The majority of anomalies identified during the course of the survey come from the magnetic data, only two of these anomalies correspond to other datasets. MG005/SS001 and MG010/MB001. It is highly likely that SS001 is a modern mooring block and as such requires no further investigation.

6.0.2 MB001 is an unknown elongated feature the form of which indicates anthropogenic origin, the size and location of the feature likely indicates modern origin although the anomaly has not been described previously. Visual confirmation would confirm the origin and archaeological significance, if any.

6.0.3 MG014 is a large magnetic anomaly that would be worthy of further investigation, however there is no anomaly visible in the other datasets and therefore it is likely that to establish the origin would require invasive investigation.

6.0.4 The remaining anomalies have been interpreted to be of likely modern origin or have no visible feature on the seabed. Many lie in areas previously investigated by divers or in areas where intrusive investigation would be required. As such, it is not considered that investigation of these anomalies would be productive to the further understanding of the site.

APPENDIX B: EXTRACT FROM THE ADU 2001 ASSESSMENT AGAINST DESIGNATION CRITERIA

Period

The archaeological evidence, although not seen in-situ by the ADU, points strongly to this being a wreck of the first half of the 16th century. There is little evidence to identify what type of vessel it was other than it carried a mixture of armament, including stave-built cannons and a bronze hackbut.

Rarity

Vessels of this period are rare and all ten that have been positively located in UK waters have been designated under the 1973 Act.

Documentation

Attempts have been made to link this site with the sacking of Brighton in 1527 but, so far, no documentary evidence has been discovered which would connect the wreck with this or any other event.

Group Value

There is insufficient data to associate the site with any other wreck or with any known shore installation, such as a harbour.

Survival/condition

From what the ADU has seen in the past, this site has not survived well and is in poor condition compared to the other known 16th century sites. However the consistent reports of ship structure under the harbour wall indicates that at least some of the wreck may have been outside the original designated area.

Fragility/vulnerability

This site is an area popular as a shore dive and it was thought that any exposed material would be vulnerable to random removal by divers. Now that the adjacent public car park has disappeared and the sand levels have remained high for more than a decade, this threat has been reduced. However we are concerned that the sand level may be reduced by the extraction of beach shingle.

Diversity

The site once contained a small but interesting collection of guns, but these were removed before designation. No identifiable technological or other features that might provide useful information about the nature of the ship before it sank have so far been found on the site.

However when conditions allow -the area close to the harbour wall to be studied, our understanding of the site and our perception of its importance could change.

Potential

It is difficult to estimate the potential of this site as a covering of sand hampers visual investigation and geophysical survey is hampered by the site's location in a corner at the junction of the harbour wall to the beach. Remote surveys are also problematic because fishermen have dumped modern material such as chains and steel cables in the area.

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