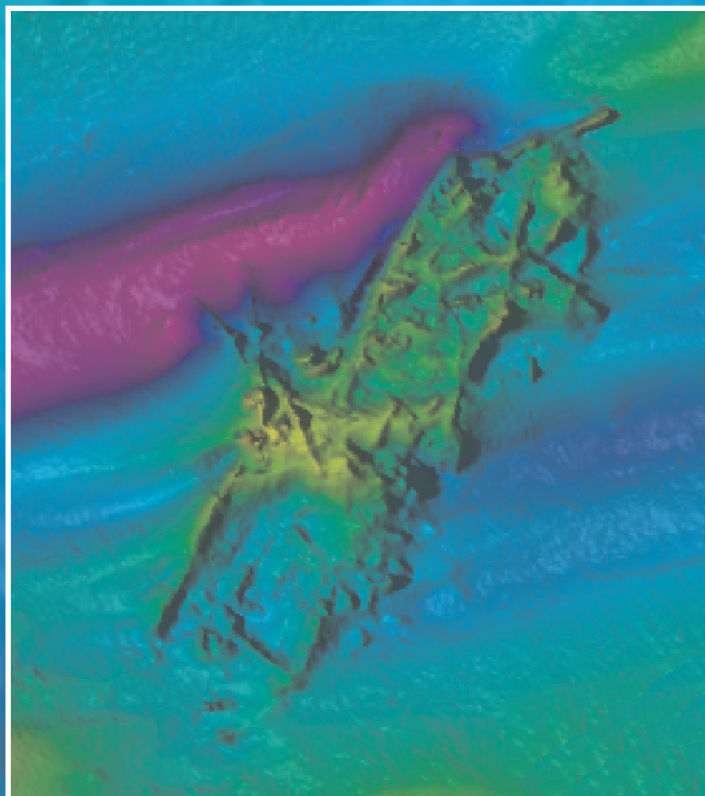




# London Gateway Project River Thames

Archaeological Diving Investigation

Technical Report



**LONDON GATEWAY PROJECT  
RIVER THAMES**

**ARCHAEOLOGICAL DIVING INVESTIGATION**

**Technical Report**

**Prepared for:**

**Port of London Authority**

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**Ref: 61205.01**

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# LONDON GATEWAY PROJECT RIVER THAMES

## ARCHAEOLOGICAL DIVING INVESTIGATION

### Technical Report

**Ref: 61205.01**

### Summary

Wessex Archaeology was commissioned by the Port of London Authority to carry out a preliminary archaeological diving investigation of five wreck sites in the Thames Estuary. Previous work had been carried out on these sites by Wessex Archaeology, working on behalf of the PLA. This work comprised geophysical survey and desk based research. The sites have also previously been dived by the PLA dive team. All the work has been conducted as part of the archaeological investigations for the London Gateway port development.

This project follows on from an Archaeological Awareness Day held on 19 July 2006. The Port of London Authority commissioned Wessex Archaeology to make presentations to PLA staff on the overall context for archaeological investigations within the Thames Estuary and outlined archaeological methods for wreck investigations. As a result of this it was decided to integrate Wessex Archaeology personnel with the Port of London Authority dive team to demonstrate archaeological recording methods for wreck investigation. This would have the added benefit of gathering data on the five wrecks in question in advance of further work being undertaken for the London Gateway project.

The sites that were selected to be investigated were the *Dovenby* (WA 5010/5012), the *Letchworth* (WA 5005), the *Pottery Wreck* (WA 5204) and the *German Aircraft* (WA 7543). The sites were dived between 14 August 2006 and 18 August 2006.

Two Wessex Archaeology divers were integrated into the Port of London Authority dive team. A Sonardyne SCOUT acoustic tracking system and the Wessex Archaeology in house recording system was installed on the diving vessel.

Underwater visibility on all sites was zero. A total of 299 minutes were spent underwater over a period of four days.

The main objective of diving the *Dovenby* North site was to establish whether it was the same vessel as the *Dovenby* South site. It was established that the *Dovenby* North site is of metal construction. However, no diagnostic features were identified to meet the objective. Further time would be required on this site to establish whether it is the part of the *Dovenby*.

The *Letchworth* is a dispersed site. The key objective of diving this site was to establish whether it is likely that any human remains are present from the time of the sinking. Considering the poor state of the wreck, the survival of human remains on the seabed seems highly unlikely. Further archaeological diving investigation of this

wreck is unlikely to be cost effective in adding to the information available through documentary research.

Archaeological material was identified from the Pottery Wreck, including ships structure and associated anthropogenic material. Further work is required on this site to establish the type, character date/period, identity, importance and extents of this wreck.

A small metal tube and some pipe was observed on the German Aircraft site but no other substantial structural material was located. Further diving work is unlikely to be productive on this site prior to clearance. However, it should be noted that the type and identification of the aircraft has not been established, or whether there was any loss of life. It should also be noted that any clearance work may require a licence under the Protection of Military Remains Act 1986.

# **LONDON GATEWAY PROJECT RIVER THAMES**

## **ARCHAEOLOGICAL DIVING INVESTIGATION**

### **Technical Report**

**Ref: 61205.01**

### **Acknowledgements**

This project was commissioned by the Port of London Authority. Wessex Archaeology would like to thank Nicola Clay and the PLA Marine Services division, especially Captain Peter Steen, Marine Services Manager and Kevin Leadbetter, Marine Services Diving Supervisor, and the members of his dive team.

We would also like to acknowledge the Port of London Authority Hydrographic division for the provision of multibeam bathymetric data and for their help and advice in many aspects of this project.

The diving fieldwork was carried out by Jens Auer and Niall Callan of Wessex Archaeology. Diving support, including the provision and operation of the diving vessel, were provided by the PLA Marine Services dive team. Kevin Leadbetter acted as Diving Supervisor.

This report was compiled by Jens Auer. The illustrations were produced by Kitty Brandon. The project was managed for Wessex Archaeology by Stuart Leather. Quality assurance was provided by Dr. Antony Firth, Head of Coastal and Marine Projects.

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# LONDON GATEWAY PROJECT RIVER THAMES

## ARCHAEOLOGICAL DIVING INVESTIGATION

### Technical Report

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# LONDON GATEWAY PROJECT RIVER THAMES

## ARCHAEOLOGICAL DIVING INVESTIGATION

### Technical Report

**Ref: 61205.01**

## 1. INTRODUCTION

- 1.1. Wessex Archaeology (WA) was commissioned by the Port of London Authority (PLA) to carry out a preliminary archaeological diving investigation of five wreck sites in the Thames Estuary (**Figure 1**).

| WA ID       | Name                   | Position (NGR)             | Date of loss                |
|-------------|------------------------|----------------------------|-----------------------------|
| <b>5010</b> | <i>Dovenby</i> (south) | 597743.31 E<br>180665.16 N | 06.11.1914                  |
| <b>5012</b> | <i>Dovenby</i> (north) | 597650.64 E<br>180790.71 N | 06.11.1914                  |
| <b>5005</b> | <i>SS Letchworth</i>   | 604812.29 E<br>180182.23 N | 01.11.1940                  |
| <b>5204</b> | Pottery Wreck          | 593859.16 E<br>180120.23 N | c. 19 <sup>th</sup> century |
| <b>7543</b> | German Bomber          | 592868.88 E<br>180150.22 N | 1939-1945                   |

- 1.2. Previous work had been carried out on these sites by Wessex Archaeology, working on behalf of the PLA. This work comprised geophysical survey and desk based research. The sites have also previously been dived by the PLA dive team. All the work has been conducted as part of the archaeological investigations for the London Gateway port development.
- 1.3. This project follows on from the Archaeological Awareness Day held on 19 July 2006. The PLA commissioned WA to make presentations to PLA staff on the overall context for archaeological investigations within the Thames Estuary, and outline archaeological methods for wreck investigations. As a result of this it was decided to integrate two WA divers within the PLA team to demonstrate archaeological recording methods for wreck investigation. This would have the added benefit of gathering data on the five wrecks in question in advance of further work being undertaken for the London Gateway project.
- 1.4. The sites were dived between 14 August 2006 and 18 August 2006.

## 2. AIMS AND OBJECTIVES

- 2.1. The aim of the diving investigation was to demonstrate practical aspects of archaeological recording underwater using an acoustic diver tracking system to the Port of London Authority (PLA) dive team, and to collect additional

data on a number of sites implicated by the London Gateway development, in order to inform further mitigation strategies.

2.2. The project objectives were:

- to demonstrate the principles and benefits of an acoustic diver tracking system for archaeological recording in a low-visibility environment;
- to demonstrate the principles and benefits of an integrated approach to archaeological recording underwater using the diver recording system DIVA and Arc GIS in conjunction with acoustic diver tracking;
- to assess the chosen study sites as part of the Stage 1 Mitigation diving investigation (Stage 1, Mitigation 1B) in terms of their archaeological potential.

### 3. METHODOLOGY

#### 3.1. DIVING

- 3.1.1. All diving operations were conducted from the PLA Marine Services diving vessel *PLA Diver*, using Surface Supplied Diving Equipment (SSDE).
- 3.1.2. The dive team comprised five members with the following roles: one skipper and diving supervisor (PLA), one archaeological supervisor (WA), one standby diver (PLA), one tender (PLA) and one diver (WA).
- 3.1.3. The diver used a KMB 27B diving helmet. This enabled communication with the supervisors on the surface, for safety and for archaeological recording.
- 3.1.4. The PLA diving supervisor was in charge of pre-dive checks, descent and ascent. During the dive the archaeological supervisor controlled the diver communication unit and the acoustic tracking and recording system.
- 3.1.5. A table listing all dives undertaken can be found in **Appendix I**.
- 3.1.6. All diving was conducted according to the PLA code of practice for diving operations, which accords with the Diving at Work Regulations 1997.

#### 3.2. ACOUSTIC TRACKING SYSTEM

- 3.2.1. An Ultra Short Baseline (USBL) acoustic tracking system manufactured by Sonardyne, and known as SCOUT, was used to track the divers.
- 3.2.2. The SCOUT system consists of three main components: the vessel-mounted acoustic transceiver, one or more ROV or diver-mounted transponders, and the surface command module, running the control software.



- 3.2.3. The system calculates position by measuring range and bearing from the vessel-mounted transceiver to the submerged transponder. The vessel-mounted transceiver interrogates the submerged transponder, and the submerged transponder replies to the interrogation signal. The range is calculated from the time it takes the interrogation procedure to be completed.
- 3.2.4. The transceiver comprises an array of transducers, and the bearing is calculated from the pattern (signal phase) of return energy that is received by this array. The term ultra short baseline refers to the length of the transducer array within the receiver unit.
- 3.2.5. The waterproof and portable surface command module running the SCOUT USBL software was installed in the wheelhouse (**Figure 2, Plate 1**). The SCOUT USBL Transceiver was mounted on a pole over the side of *PLA Diver* (**Figure 2, Plate 2**).
- 3.2.6. To track the diver the submerged transponder was attached to the diver's umbilical (**Figure 2, Plate 3**).
- 3.2.7. The transponder works on frequencies between 35 and 55kHz. The stated operating range for the system is 500 metres and the acoustic coverage is +/- 90 degrees below the transceiver.
- 3.2.8. All positions are calculated relative to the vessel-mounted transceiver. The movement of the vessel on any axis introduces errors into the calculated position. Therefore the movement of the transceiver had to be measured for accurate position calculation. There are two options for measuring these parameters: either by using internal sensors in the transceiver; or by integrating external sensors into the system. External sensors increase the overall position accuracy from  $\pm 2.75\%$  of the slant range to  $\pm 0.50\%$  of the slant range, and therefore external sensors were used for this operation.
- 3.2.9. A Motion Reference Unit (MRU) was used to measure heave, pitch, and roll, and a gyro compass was used to measure the vessel's changing heading (yaw). A Global Positioning System (GPS) receiver was used to measure the vessel's position in real world coordinates.
- 3.2.10. The external sensors comprised:
- A TSS HRP-10 MRU was fitted in the wheelhouse, on the same side as the vessel-mounted transceiver.
  - A S G Brown Meridian Surveyor gyrocompass was also installed in the wheelhouse and positioned exactly parallel to the centre line of the vessel.
  - A Leica 1200 RTK GPS system, which provided real world positioning information in x, y, z.
- 3.2.11. All the external sensors were interfaced with the SCOUT surface command module. The position offsets of all the external sensors and the vessel-

mounted transceiver were measured and the values entered into the SCOUT software. The SCOUT surface command module uses this data to generate a real world position for the transceiver (i.e. the diver) in real time, which can be output to the archaeological recording system.

### 3.3. RECORDING METHODS

- 3.3.1. Archaeological recording was undertaken using WA's 'in-house' recording system known as 'DIVA'. This system comprises a Microsoft Access database integrated with ESRI ArcGIS 9.0 (**Figure 3**). The position from the acoustic tracking system is interfaced into the GIS.
- 3.3.2. Georeferenced geophysical images and background mapping can be displayed in the GIS and therefore the diver's position in relation to these images can be tracked. The diver's track can be saved and logged separately.
- 3.3.3. Multibeam bathymetric imagery was used as the back drop for diver tracking during the diving operation as this provides a scaled image from which to identify the salient features. Sidescan sonar imagery was used at the pre-dive briefing stage to assist the diver in understanding the form and orientation of the sites.
- 3.3.4. Specific positions, known as Observation Points (**Obs**) can also be logged. When created observation points automatically open a structured data base form in which archaeological information including descriptions, measurements, photographic and video references can be recorded. Observations points are entered into the system by the archaeological supervisor during the dive.
- 3.3.5. Observations can be taken as quick, but less accurate, spot fixes, or as average fixes. Average fixes obtain a number of positions over a short period of time and calculate an average position for the diver or tracked vehicle using a software application developed by WA and known as Accu-fix. The more accurate average fixes are generally used for recording datum points and important features on sites.
- 3.3.6. Diver observations can be displayed as different layers in ArcGIS, grouped for example by mapping labels, and observation type.
- 3.3.7. To allow seamless integration with the geophysical survey data, British National Grid (BNG) co-ordinates, based on the OSGB 36 datum were used for displaying and recording data.
- 3.3.8. A summary form, generated in DIVA, allows the archaeological supervisor to summarise individual dives, whole events and monuments. The diver can also enter archaeological, environmental and operational summaries. Paper records such as drawings can be referenced to individual diver observations.
- 3.3.9. A general log allows the archaeological supervisor to keep track of daily events, working hours, weather forecast and tidal predictions.

## 4. RESULTS

### 4.1. SITES 5010/5012: *DOVENBY*

- 4.1.1. The *Dovenby* was a steel bark that was lost in the Thames in 1914. She was near the end of her voyage destined for London with a cargo of Guano from Peru. The *Dovenby* is regarded as comprising two sites; to the north site **5012** and to the south site **5010**. A number of smaller anomalies have been detected between and around these two main areas of wreckage.
- 4.1.2. The multibeam data for the two sites show that site **5010** and site **5012** are lying *c.* 100m apart and that both anomalies are ship-shaped. Site **5010** measures 75m x 16m; these dimensions are approximately consistent with the known dimensions of the *Dovenby*. Site **5012** measures 55m x 14.5m.
- 4.1.3. Since the 1960's it has been assumed that the two sites are different sections of the wreck of the *Dovenby*. However, the proximity of the dimensions of site **5010** to those of the original vessel cast some doubt on this previously held assumption. The dimensions of site **5012** might suggest that it is a separate vessel.
- 4.1.4. One of the objectives of the diving inspection was thus to clarify whether both anomalies are part of the same wreck, or whether they are the remains of two different vessels.
- 4.1.5. The multibeam imagery and diver tracks are illustrated in **Figure 4**.

#### Site 5012

- 4.1.6. Three dives were conducted on this site. There was no underwater visibility for any of the dives. The first dive (**WA1001**) was located *c.* 100 metres to the south east of the site. This was because of a positioning error within the GIS. No wreckage was encountered.
- 4.1.7. The position error was not resolved for the second dive (**WA1002**) and the vessel was relocated over the wreck site using the PLA navigation system. Because of the position error the diver could not be effectively tracked over the site. However, descriptions of features observed by the diver were recorded, and related to the vessel's GPS position. The depth of water at this location was *c.* 14 metres. Debris including distorted metal plate was encountered (**Obs 101**) and followed in a north westerly direction. The plate was upstanding by *c.* 2 metres (**Obs 102**). This is most likely to be the hull of the vessel.
- 4.1.8. The positioning issues were resolved for the third dive (**WA 1003**). The diver made bottom to the east of the wreckage and made his way to the eastern side of the wreck. Again, there was no underwater visibility. The general water depth during the dive was 20 metres. The diver proceeded along the eastern side of the wreck northeast towards the area of the presumed stern, but the

lack of visibility and the upstanding debris on the seabed made the progress very slow.

- 4.1.9. It was noted that the wreckage was more upstanding in the north of the site. Steel plates in the centre of the wreck were standing 1.5 metres proud of the seabed (**Obs 105**), while the hull plating in the north-east was found to stand up to 3 metres proud of the seabed (**Obs 106**).
- 4.1.10. The lack of underwater visibility, the size of anomaly **5012** and the dispersed/ broken up nature of the wreckage would make archaeological recording of this site a very time consuming task. No diagnostic elements that would differentiate the two site were encountered during dives **WA1002** and **WA1003** on anomaly **5012**. It was decided to conduct a single dive on the southern anomaly (**5010**), to be able to compare both anomalies in terms of construction and possibly determine whether they constitute part of the same wreck or whether they are the remains of two different ships.

#### **Site 5010**

- 4.1.11. The diver made bottom in the south-western part of the site and reported that there was no underwater visibility (**WA1005**). The general water depth during the dive was 21 metres which, in accordance with the decompression tables, limited the bottom time to 40 minutes. The diver was directed to the western edge of the wreck, to identify features on the geophysical image within the GIS. A ship's bollard was identified (**Obs 119**). Moving south from this point the diver noted steel plates, possibly the outer hull plating of the vessel, which stood approximately one metre proud of the seabed (**Obs 120**).
- 4.1.12. To the south the diver observed a substantial number of long, cylindrical iron or steel objects, c. 10cm in diameter, some of which were bent into circular shapes (**Obs 121**). The diver described these objects as "iron bars". It could not be established whether they were structural remains of the vessel or part of the cargo or ship's ballast.
- 4.1.13. Further progress to the south was prevented by the length of the diver's umbilical. When the diver was returning to the shot a long cylindrical object c. 75cm in diameter, possibly the remains of a steel mast, was identified.
- 4.1.14. It was not possible to obtain a detailed description of constructional features on site **5010** in the limited bottom time available, and it was not possible to determine whether sites **5010** and **5012** are part of the same wreck or constitute two different wrecks. However, both anomalies are composed of similar structural steel elements.

#### **4.2. SITE 5005: LETCHWORTH**

- 4.2.1. A single dive (**WA1004**) was conducted on the site of the *Letchworth*, a steam collier sunk by German aircraft on 1 November 1940 with the known loss of one life, the Chief Engineer George M. McColl Smith. There were

seventeen survivors rescued from the vessel. However it is not known whether there was any further loss of life.

- 4.2.2. The diver made bottom in the southern part of the site. The general water depth during the dive was 18 metres, and there was no underwater visibility.
- 4.2.3. The diver proceeded along the western edge of the site towards a large upstanding object visible in the multibeam data (**Figure 5**). Travelling northwards, metal structure, consisting of bent plates upstanding by 0.5 metre, was noted on the seabed (**Obs 107**). The structure became progressively less apparent, until it was almost flush with the seabed (**Obs 108**). The large object visible on the geophysical image was found to be a circular steel structure, approximately three metres in diameter (**Obs 109**), and was interpreted as a boiler. It was heavily damaged, probably by explosives.
- 4.2.4. Further steel plates were observed north of the boiler (**Obs 111, 112**). The diver then proceeded to the south-western edge of the site (**Obs 113**) and reached a relatively intact section of outer hull structure, standing up to three metres proud of the seabed in the south of the site (**Obs 114, 115, 116**).
- 4.2.5. Another circular steel section was found to the east of the outer hull structure (**Obs 117, 118**). This section was about 2.5 metres long and stood about two metres proud of the seabed. It could not be interpreted.
- 4.2.6. The SCOUT tracking system worked well, but kept dropping out whenever the diver entered the acoustic shadow of upstanding structures on the seabed.
- 4.2.7. Although a number of high sections remain on the seabed, the wreck of the *Letchworth* seems to be very broken up. Sharp edges and bent or buckled steel plates and frames indicate explosion damage, caused either by the bomb that sank the vessel or by clearance attempts.

### **4.3. SITE 5204: THE POTTERY WRECK**

- 4.3.1. According to reports from previous work carried out on the site by the PLA and Nigel Nayling, from the University of Lampeter (Nayling 2005), the 'Pottery Wreck' site comprises a central 7 metre long timber, possibly a keel, protruding from a mound, with clinker frames and planks. A sample of clinker frames and planks have been recovered from the site. The wreck was named after pottery samples that were recovered from the site by Nigel Nayling. The samples were identified as parts of late slipped white bowls dating to the 19<sup>th</sup> or early 20<sup>th</sup> century.
- 4.3.2. The site was dived on a single occasion (**WA 1006**). The diver tracks, observation points and geophysical image are illustrated in **Figure 6**. The diver made bottom in the north-east of the central wreck mound and proceeded westwards towards the wreck. The general depth on site was 12 metres and there was no underwater visibility. Before reaching the main part of the site the diver reported half buried planking (**Obs 123**). The diver noted

a large central timber protruding from the seabed in a scoured area of riverbed (**Obs 124**). The timber was c. 50-60cm wide with rabbets on both sides and was interpreted as a section of keel.

- 4.3.3. In the north, a fresh break in the keel was noted. This could have been caused by a large object (anchor or trawl) being pulled through the site. On either side of the keel broken up smaller timbers, possibly planks, were noted (**Obs 126**). The diver followed the length of the keel for c. 5m (**Obs 127**), at which point fresh damage to the timber was noted. It could not be determined whether the keel continued into the seabed in this area.
- 4.3.4. Proceeding southwards onto flat seabed, a number of metal concretions were observed on the seabed (**Obs 128**). In the south of the site, a circular, hollow object made from soft metal (copper or brass) was noted. The object was c. 40cm in diameter and associated with either rope or wire on one side (**Obs 129**).
- 4.3.5. Turning north towards the mound again, a large, heavily concreted metal object was encountered (**Obs 130**). Just to the east of this object the clay riverbed could be felt in deeply scoured channels (**Obs 131**). Intact pottery, and broken up timber was observed in the scours. Further north, a broken large rectangular timber was noted lying at a right angle to the keel (**Obs 132-137**). The timber had an old, fairly eroded break on one side and a scarf joint at the other end.
- 4.3.6. A rolled up lead sheet was found further north in the scour hole (**Obs 138**). Crossing an area of broken up timbers, probably planks (**Obs 139**), more lead was found at the northern edge of the central mound (**Obs 140, 141**). When crossing the mound the diver could feel a number of clay pipes in the sediment. Just south of the mound he discovered fabric in the soft sediment (**Obs 142**). Further east again, more lead was lying on the riverbed.
- 4.3.7. Even though the 'Pottery Wreck' appears to be fairly broken up the site contains structural elements and a range of artefact types.

#### **4.4. SITE 7543: GERMAN AIRCRAFT**

- 4.4.1. Site **7543** was identified as the remains of a German aircraft from the recovery of a JUMO aircraft engine from the site by the PLA. JUMO engines were installed in a number of different German aircraft in World War II.
- 4.4.2. The site was dived on one occasion (**Dive 1007**). The diver tracks, observation points and geophysical image can be seen in **Figure 7**. The diver made bottom close to the original location of the aircraft engine and started a 20 metre circular search. The water depth on site during the dive was 16 metres and there was no underwater visibility.
- 4.4.3. The diver found a small metal tube 12 metres west of the engine location. The tube measured 18cm long and 30cm in diameter with a wall thickness of 1cm (**Obs 146**). Three metres to the north-west of the tube a section of metal

pipe was identified, with dimensions 70cm long and 10cm in diameter that protruded from the seabed (**Obs 147**). No further features could be found in a 10 metre radius of the aircraft engine location.

## **5. CONCLUSIONS**

### **5.1. METHODOLOGY**

- 5.1.1. The underwater visibility for all the diving operations was nil. However, information on all the sites was gathered and has been used to interpret the sites further and inform recommendations for further work.
- 5.1.2. The acoustic tracking system and archaeological recording system enabled information to be logged and interpreted. Initial problems with the tracking system, encountered on the first two dives were corrected, enabling the diver to be guided and georeferenced observations to be made.
- 5.1.3. The investigation demonstrated that despite nil visibility, productive observations could be made on the form, layout, and archaeological character of the sites. However, the low visibility, upstanding complex structure, and overall extent of the metal wrecks mean that progress is slow.

### **5.2. SITES 5010/5012: DOVENBY**

- 5.2.1. A total of 79 minutes was spent underwater on the *Dovenby* North (**5012**) site. The wreck was of steel construction but no specific diagnostic features were identified. The dives did serve as an orientation dive and establish that more time would be required on the site to confirm the identity of the vessel.
- 5.2.2. A total of 38 minutes underwater was spent on the *Dovenby* South (**5010**) site to try to identify specific constructional detail that could be compared to features on the *Dovenby* North. The wreck was also of steel construction. A bollard was found indicating the remains of deck structure.
- 5.2.3. Although the diving on **5010** and **5012** raised no doubts as to the identification of 5010 as being the *Dovenby*, the case for 5012 to also be a part of the *Dovenby* remains unproven.

### **5.3. SITE 5005: LETCHWORTH**

- 5.3.1. A total of 38 minute was spent underwater on the *Letchworth* (**5005**). The site comprised generally dispersed steel structure. There was evidence of the catastrophic destruction of the site either by the events of the sinking or by the subsequent clearance operations.
- 5.3.2. Considering the poor state of the wreck, the survival of human remains on the seabed seems highly unlikely. Further archaeological diving investigation of this wreck is unlikely to be cost effective in adding to the information available through documentary research.

#### **5.4. SITE 5204: THE POTTERY WRECK**

- 5.4.1. A total of 82 minutes was spent on the Pottery Wreck (**5204**). The operation confirmed the initial interpretation of the site, and demonstrated the presence of ship's structure and associated artefactual material. The keel section was traced for five metres and other structural components were observed, though not identified. Other material including lead, clay pipes, textile and soft metal objects were identified.
- 5.4.2. Further work is required on this site to establish the type, character date/period, identity, importance and extents of this wreck.

#### **5.5. SITE 7543: GERMAN AIRCRAFT**

- 5.5.1. A total of 62 minutes was spent underwater on the German Aircraft (**7543**). A small metal tube and some pipe were observed but no other substantial structural material was located. Further diving work is unlikely to be productive on this site prior to clearance. However, it should be noted that the type and identification of the aircraft has not been established or whether there was any loss of life. It should also be noted that any clearance work may require a licence under the Protection of Military Remains Act 1986.

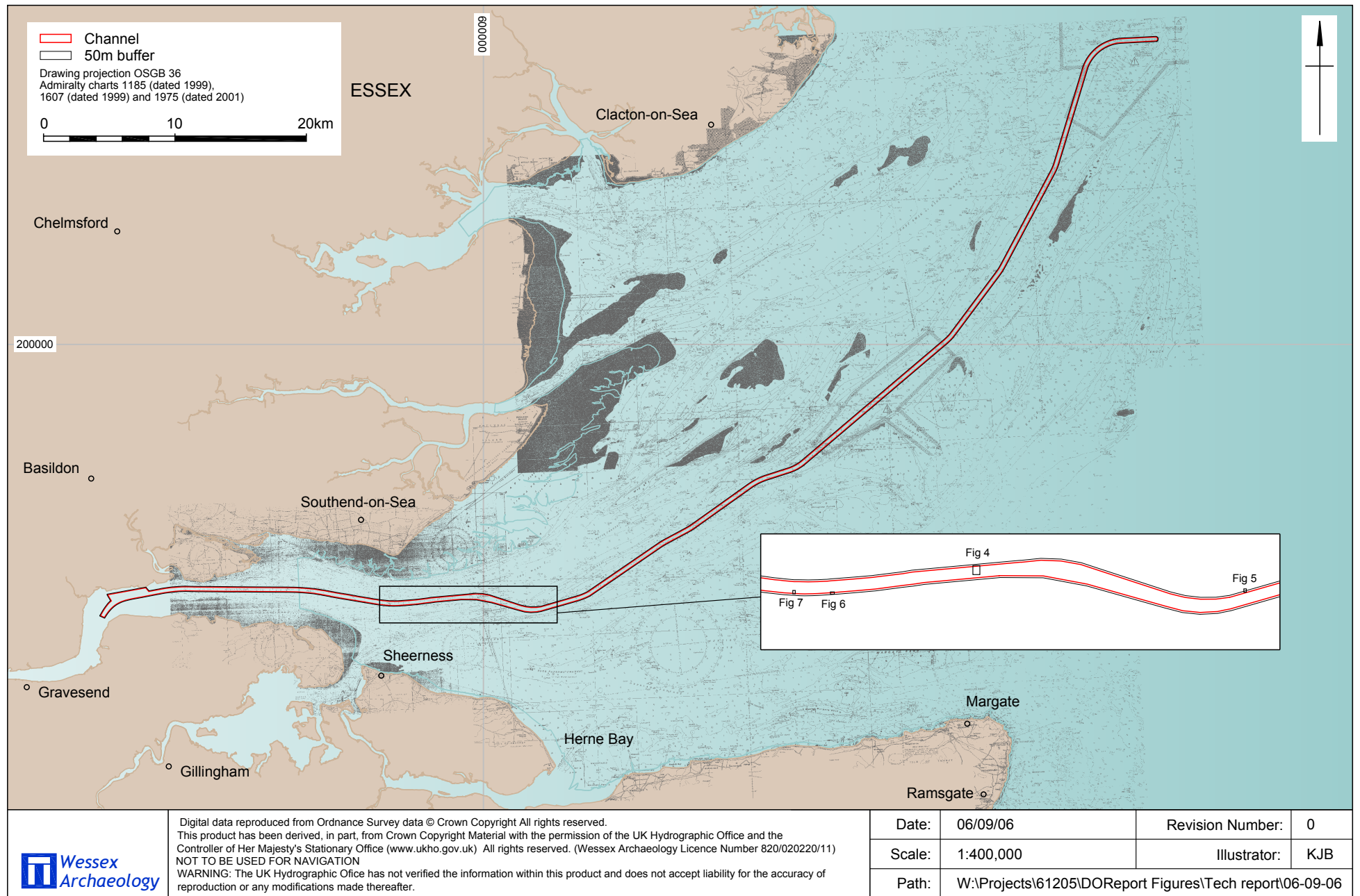
### **6. REFERENCES**

- Nayling, N., 2205, *London Gateway Project: Diving Inspection Report 2*, Unpublished Report University of Wales, Lampeter



**APPENDIX A: SUMMARY TABLE OF DIVES**

| <b>Dive No.</b> | <b>Site no.</b> | <b>Site name</b>       | <b>Diver</b> | <b>Left surface</b> | <b>Arrived surface</b> | <b>Duration (min)</b> | <b>Depth (m)</b> | <b>Visibility</b> | <b>Date</b> |
|-----------------|-----------------|------------------------|--------------|---------------------|------------------------|-----------------------|------------------|-------------------|-------------|
| 1001            | <b>5012</b>     | <i>Dovenby (north)</i> | Auer         | 11:14               | 11:24                  | 10                    | 14               | None              | 15.08.06    |
| 1002            | <b>5012</b>     | <i>Dovenby (north)</i> | Auer         | 11:40               | 12:11                  | 31                    | 14               | None              | 15.08.06    |
| 1003            | <b>5012</b>     | <i>Dovenby (north)</i> | Callan       | 17:10               | 17:48                  | 38                    | 20               | None              | 15.08.06    |
| 1004            | <b>5005</b>     | <i>Letchworth</i>      | Auer         | 12:02               | 12:40                  | 38                    | 18               | None              | 16.08.06    |
| 1005            | <b>5010</b>     | <i>Dovenby (south)</i> | Callan       | 17:55               | 18:33                  | 38                    | 21               | None              | 16.08.06    |
| 1006            | <b>5204</b>     | Pottery wreck          | Auer         | 12:39               | 14:01                  | 82                    | 12               | None              | 17.08.06    |
| 1007            | <b>7543</b>     | German Bomber          | Callan       | 07:26               | 08:28                  | 62                    | 16               | None              | 18.08.06    |



Site location

Figure 1



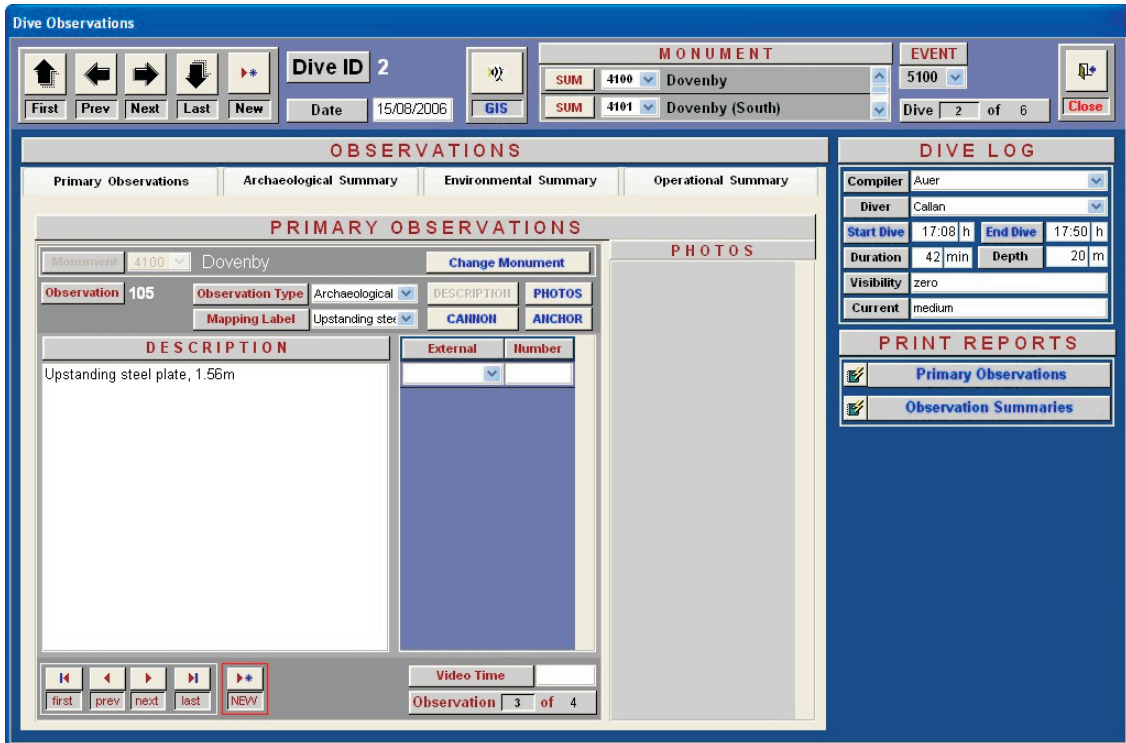
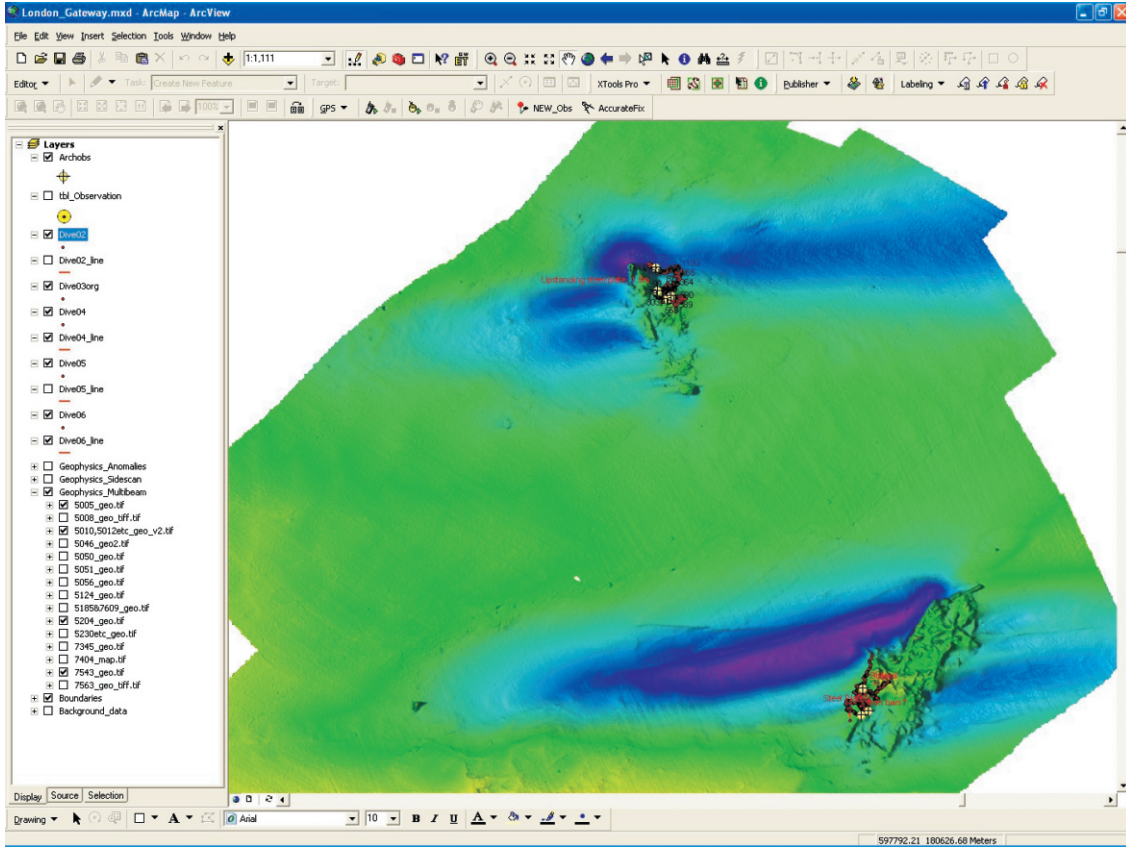
Plate 1: SCOUT surface command module

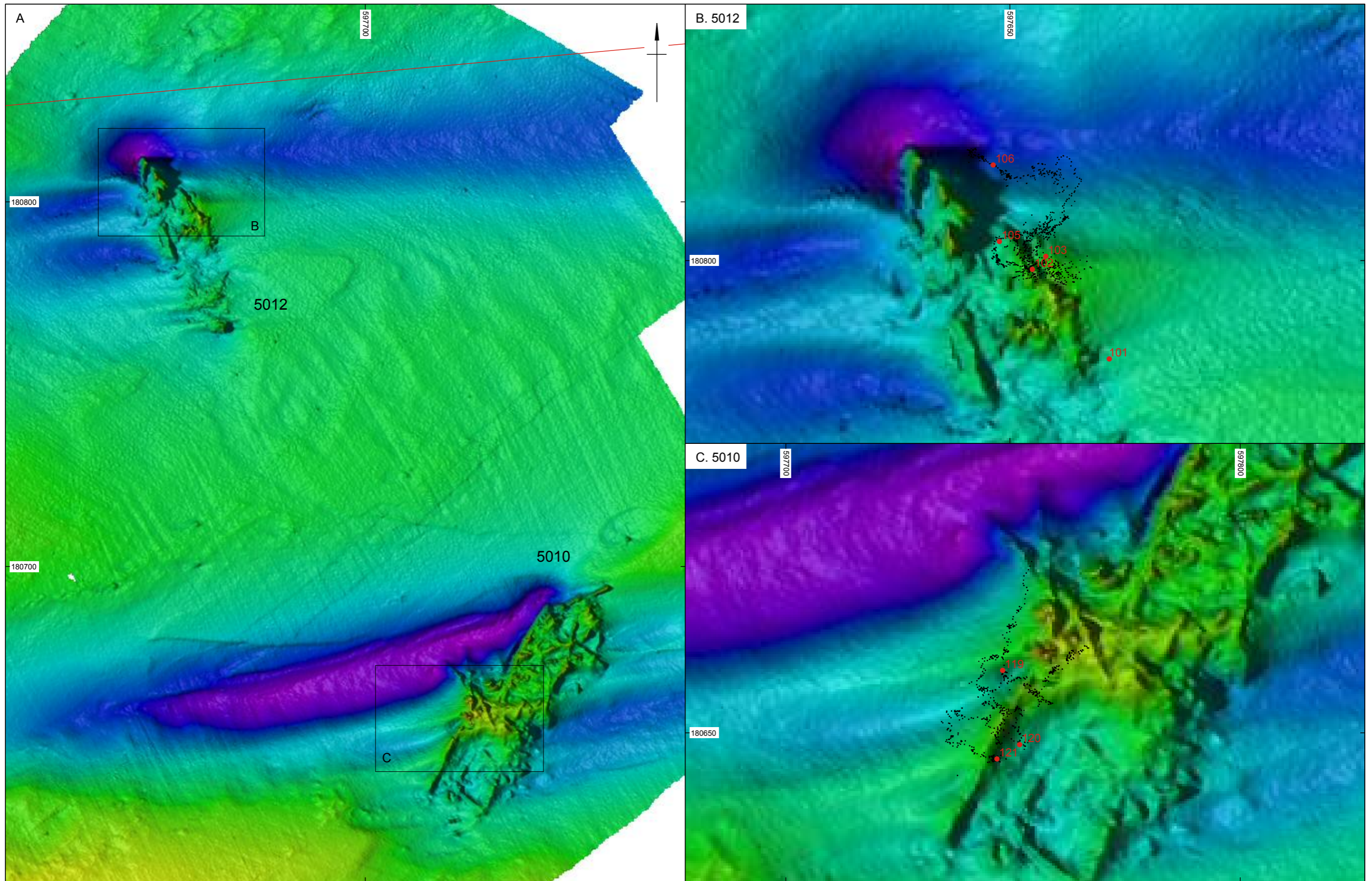


Plate 2: SCOUT transceiver



Plate 3: SCOUT beacon on umbilical

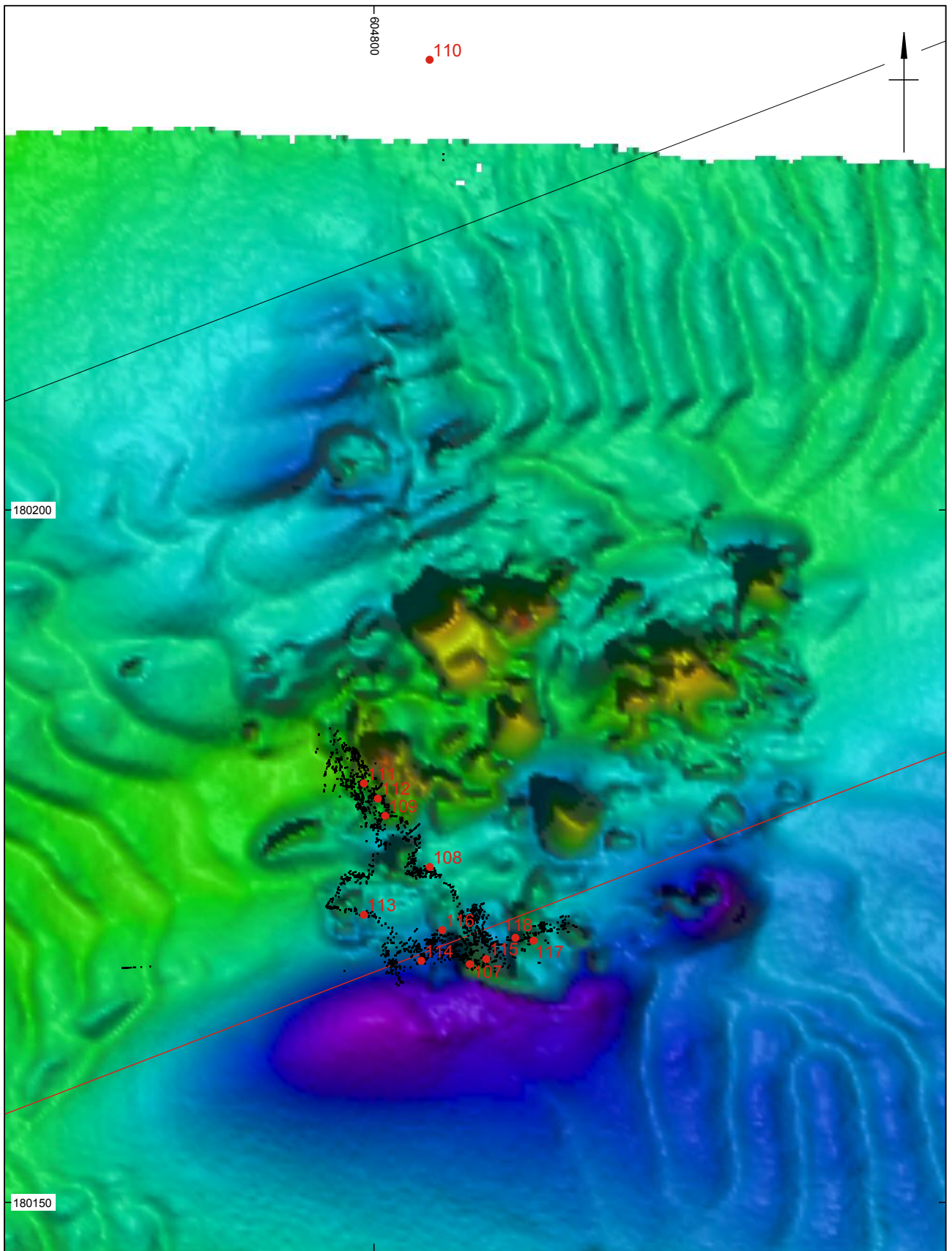




|  |   |      |   |        |  |                  |     |
|--|---|------|---|--------|--|------------------|-----|
|  | Channel (northern edge inset A)                                 | <br> | This material is for client report only © Wessex Archaeology. No unauthorised reproduction. | Date:  | 06/09/06   | Revision Number: | 0   |
|  | Diver track   |      |   | Scale: | 1:1000 & 1:400   | Illustrator:     | KJB |
|  | Diver observations<br><small>Drawing projection OSGB 36</small> |      |   | Path:  | W:\Projects\61205\DO\Report Figures\Tech report\06-09-06 |                  |     |

Diver track and observations superimposed on multibeam image on site 5010 (Dovenby South)/5012 (Dovenby North)

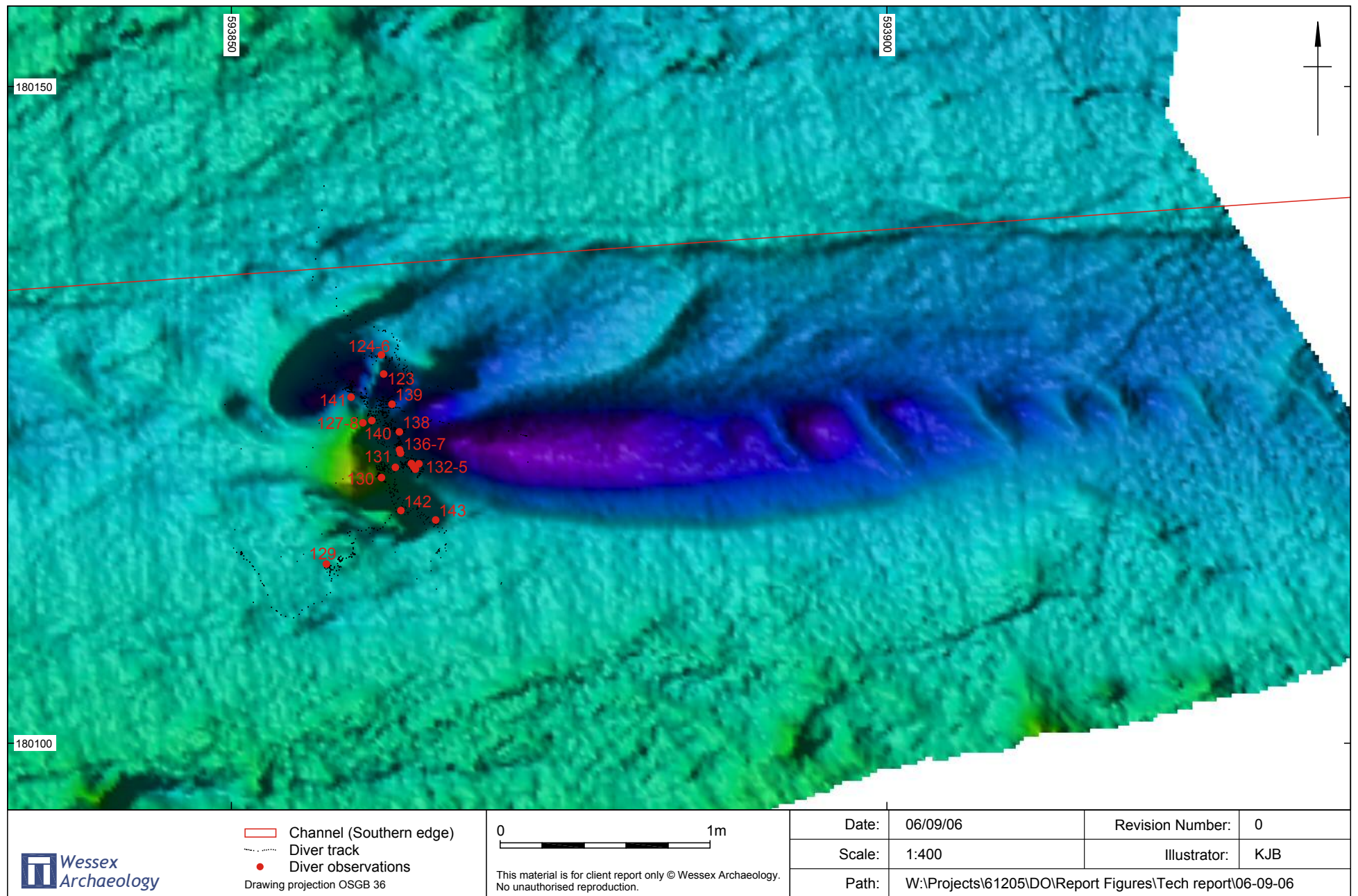
Figure 4



|   |  |  |                  |     |
|---|--|--|------------------|-----|
| <ul style="list-style-type: none"> <li> 50m buffer (Northern edge of channel)</li> <li> Diver track</li> <li> Diver observations</li> </ul> <p>Drawing projection OSGB 36</p> | <p>0 <span style="margin-left: 100px;">1m</span></p>   |  |                  |     |
|   | <p>This material is for client report only © Wessex Archaeology. No unauthorised reproduction.</p> |  |                  |     |
|   | Date:  | 06/09/06   | Revision Number: | 0   |
|   | Scale:   | 1:400  | Illustrator:     | KJB |
|   | Path:  | W:\Projects\61205\DO\Report Figures\Tech report\06-09-06 |                  |     |

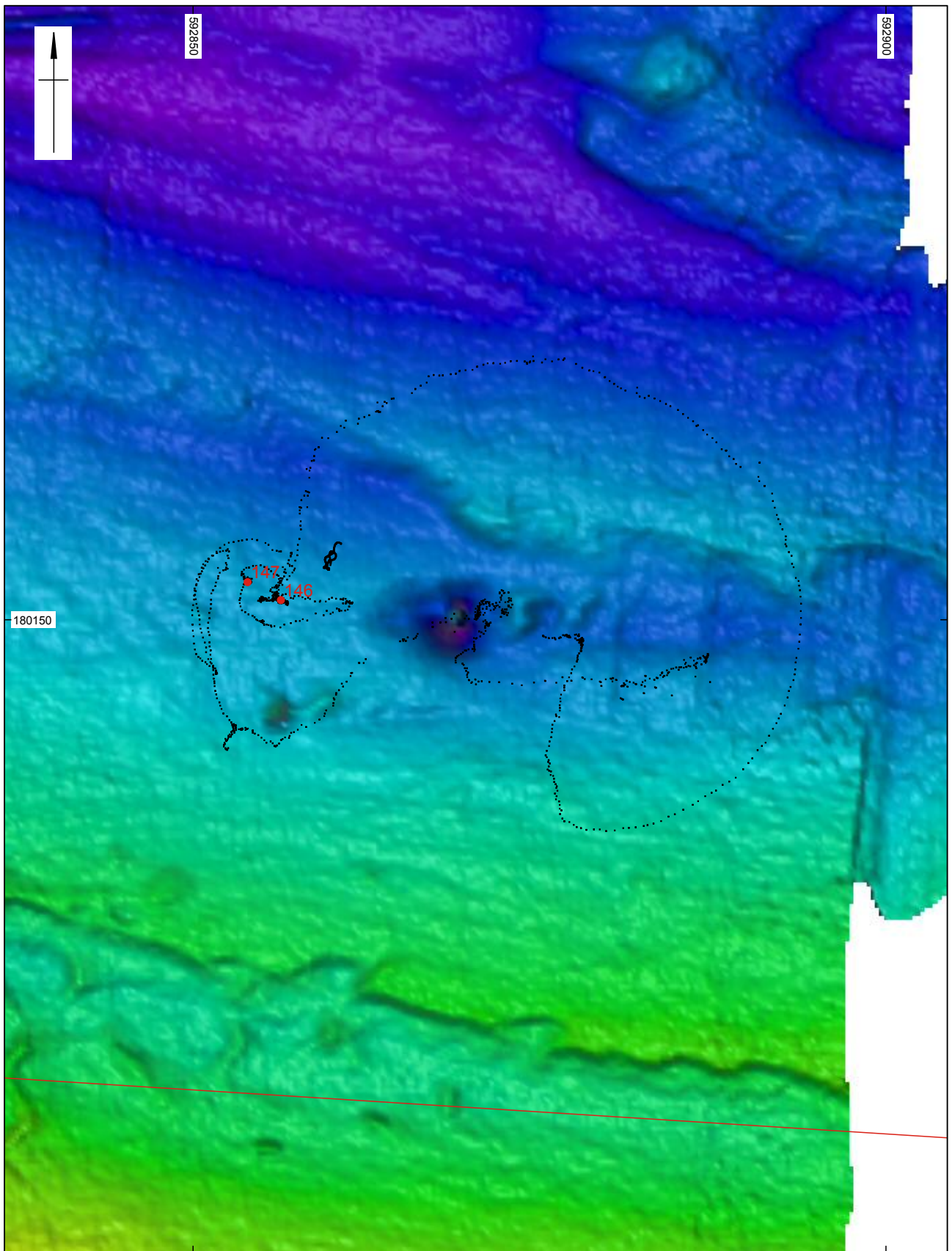
Diver track and observations superimposed on multibeam image on site 5005 (Letchworth)

Figure 5



Diver track and observations superimposed on multibeam image on site 5204 (Pottery Wreck)

Figure 6

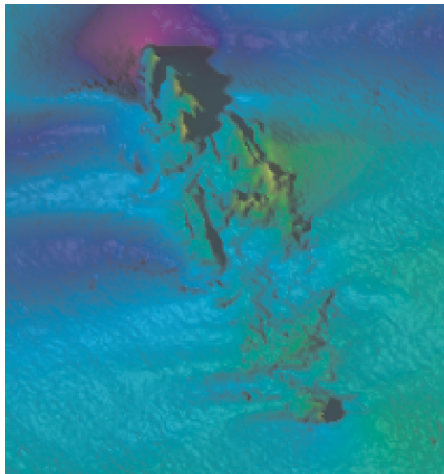


|   |   |                    |
|---|---|--------------------|
| <ul style="list-style-type: none"> <li><span style="border: 1px solid red; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Channel (Southern edge)</li> <li><span style="border-bottom: 1px dotted black; display: inline-block; width: 15px; margin-right: 5px;"></span> Diver track</li> <li><span style="color: red; font-size: 10px; margin-right: 5px;">•</span> Diver observations</li> </ul> <p>Drawing projection OSGB 36</p> | <p>0 <span style="margin-left: 100px;">1m</span></p>  |                    |
|   | <p><small>This material is for client report only © Wessex Archaeology. No unauthorised reproduction.</small></p> |                    |
| <p><b>Wessex</b><br/>Archaeology</p>  | Date: 06/09/06  | Revision Number: 0 |
|   | Scale: 1:400  | Illustrator: KJB   |
|   | Path: W:\Projects\61205\DO\Report Figures\Tech report\06-09-06  |                    |

Diver track and observations superimposed on multibeam image on site 7543 (German Aircraft)

Figure 7





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