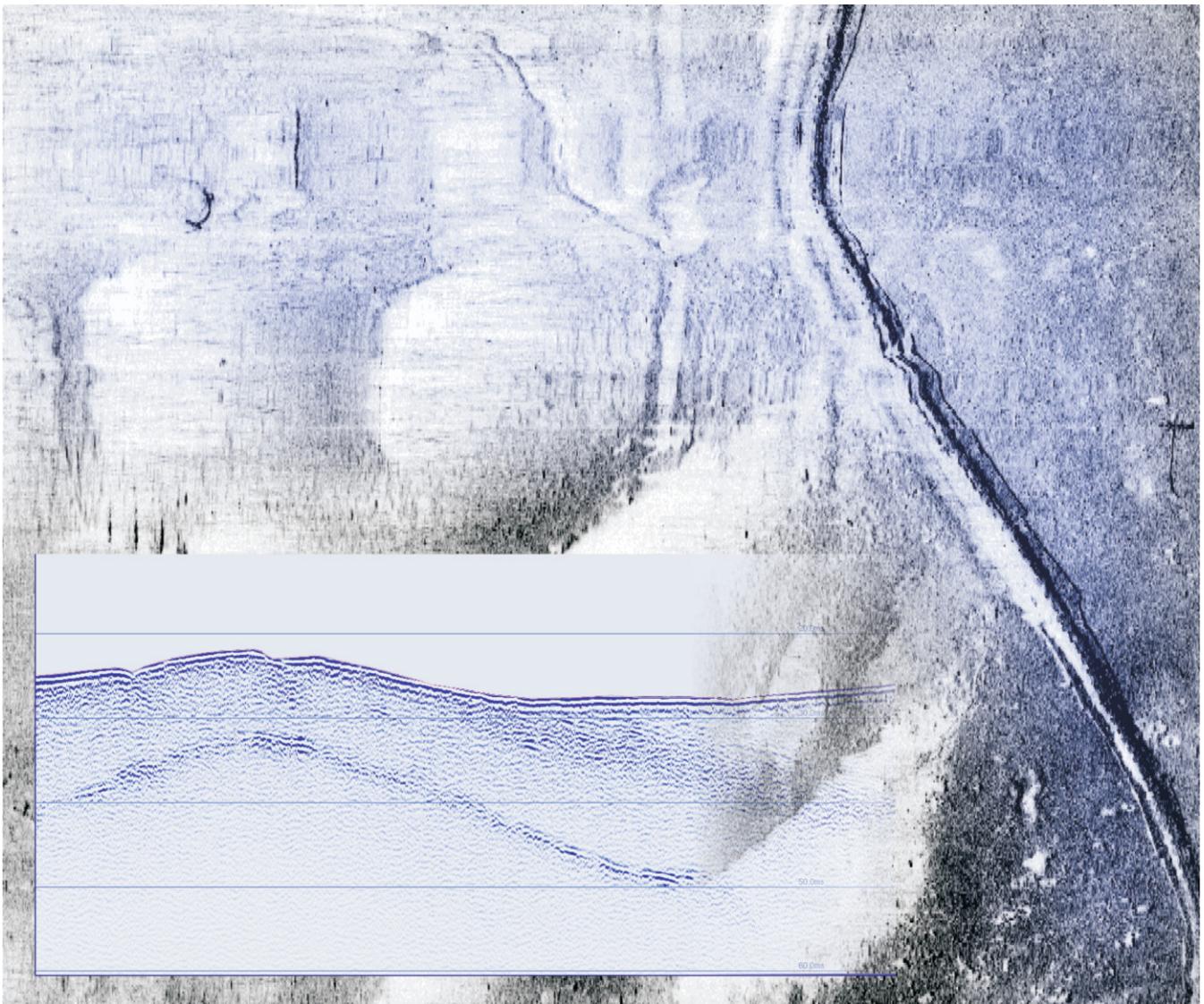




## Tobermory Galleon, Tobermory Bay, Sound of Mull

Undesignated Site Assessment



**ARCHAEOLOGICAL SERVICES IN RELATION TO THE PROTECTION OF WRECKS  
ACT (1973)**

**TOBERMORY GALLEON, TOBERMORY BAY, SOUND OF MULL**

**UNDESIGNATED SITE ASSESSMENT**

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**October 2006**

**Ref: 53111.02q-3**

# TOBERMORY GALLEON, TOBERMORY BAY, SOUND OF MULL

## UNDESIGNATED SITE ASSESSMENT

Ref: 53111.02q-3

### Summary

‘Oh Where O Where Has My Little Boat Gone  
Oh Where Oh Where Can She Be Stop’

Telegram 11<sup>th</sup> Duke of Argyll to Lt Commander Parkinson, commander of the RN search for the Tobermory Galleon, 1950.

Wessex Archaeology was commissioned by Historic Scotland to undertake an Undesignated Site Assessment of the site known as the Tobermory Galleon in Tobermory Bay, Mull. The work was undertaken as part of the Contract for Archaeological Services in Relation to the Protection of Wrecks Act (1973). The assessment has been carried out in advance of possible further commercial salvage work on the site.

The archaeological material recovered from the site since the 1700s, and the available documentary evidence concerning its salvage, are consistent with the presence in Tobermory Bay of the wreck of an Spanish Armada ship lost in 1588. Although WA has not undertaken an analysis of original source material, sufficient evidence appears to be available in secondary sources to positively identify the ship as being a Ragusan vessel that the Spanish called *San Juan de Sicilia*. The evidence supporting the alternative theory that the wreck was a vessel called the *Florencia* appears to be weak and does not stand close scrutiny.

It is unlikely that the Tobermory Galleon was a galleon at all. She is more likely to have been an argosy, a Mediterranean carrack. Documentary research indicates that the vessel appears to have been heavily damaged during the Armada campaign and sought refuge in Tobermory Bay to effect repairs whilst undertaking the ‘north around’ route back to Spain. However, whilst she was in the Bay she exploded, caught fire and then sank. It seems likely that most of the vessel above the waterline and forward of the mizzen mast was destroyed before the ship sank and debris was probably scattered over a wide area. The wreck was not immediately buried and remained largely exposed until the 1700s.

Rumours of a fabulous treasure being carried on board the ship started to spread soon after the sinking. The wreck was heavily salvaged between 1645 and 1740, latterly by Jacob Rowe and his innovative ‘diving engine’. Detailed descriptions of the condition of the wreck at this time exist in contemporary records and the salvage appears to have reduced it from a structure that stood up to nine metres clear of the seabed at the stern to the level of the floor timbers. These records also provide us with our best indication of the position of the wreck, probably close to the shore on the northern or north-western side of Tobermory Bay and in a contemporary water depth of 14-18 metres to the seabed.

The wreck ceased to be visible from the surface in about 1740 and the presumption has been that it has since been buried. However, it is by no means certain that this is the case and the wreck may have ceased to exist as a coherent structure at this time.

Since the apparently very thorough salvage carried out by Rowe and his predecessors, considerable uncertainty over the position of the wreck and the weakness of the arguments in favour of their being a very large quantity of specie onboard the ship have not discouraged subsequent salvors. As a result abortive and loss-making attempts to relocate the wreck and recover treasure have been made by several colourful characters ever since. Whilst little of commercial value has been found, a steady stream of artefacts from the wreck have been recovered. Unfortunately these have rarely been recorded and have largely been dispersed by private sale. The methods used by these salvors have been highly destructive and it is likely that the site has been largely, if not totally destroyed.

Wessex Archaeology understands that the Poop Company Ltd has planned for another salvage attempt. The prospective salvors have undertaken a geophysical survey and, using additional information provided by a former salvor, claim to have located the stern of the wreck in which they believe a large quantity of specie still lies. The data upon which this claim is based has not been shared with Historic Scotland and it has not therefore been possible to assess it.

The archaeological component of the proposed salvage work is unclear. This is an area of concern because if significant archaeological deposits are discovered, then there is a risk of considerable adverse publicity if they are not dealt with in a manner consistent with normal archaeological and heritage management practice.

It is possible that part of the wreck and debris fields from both the sinking and subsequent salvage still exist. It is the opinion of Wessex Archaeology that any surviving hull structure is likely to be limited to keel and floor timbers, although it is possible that small sections of other ship structure survive detached from this. The survival of a coherent stern as envisaged by the current salvage concern appears highly unlikely, although it cannot be totally discounted. The surviving archaeological deposits may have been reworked by 19<sup>th</sup> and 20<sup>th</sup> century salvage efforts, which have recovered a limited number of finds. The current depth of burial remains uncertain.

A geophysical survey followed by diver ground-truthing of anomalies was carried out by Wessex Archaeology in August 2006. Within the survey areas the seabed consists largely of a fine-grained sediment unit, probably of silt and/or clay, which overlies a coarse-grained compacted sediment unit that is possibly comprised of sands or gravels. Below this is a probable basement bedrock unit, probably consisting of tertiary lavas. The thickness of these units is variable, with the bedrock unit observed to vary between 5-20m below the seabed. The compacted sediment unit varies between 1-11 metres sub-seabed. Isolated boulders were observed in the survey areas.

A number of anomalies were identified. Several were discounted owing to distance from the shore and depth of burial. An area of deep depressions was however identified in what is believed to be the target area identified by the prospective salvors and one depression was examined. The depressions are believed to be the remains of previous salvage trenches. No archaeological material consistent with the site was observed and probing of the depression floor failed to detect the presence of archaeological deposits immediately below. In addition an anomaly identified as a probable mooring was ground-truthed in order to enable similar features to be discounted. One small anomaly was detected in a position that is compatible with documentary evidence for the site position but could not be ground-truthed because it was too deeply buried.

The wreck clearly meets and exceeds some of the criteria for designation under the Protection of Wrecks Act (1973). Nevertheless Wessex Archaeology does not recommend designation at the present time because the continued existence of archaeological deposits associated with the wreck is unproven and because the position of such deposits, in particular any surviving coherent ship structure, is not known with sufficient certainty. Furthermore any attempt to impose a wide area designation to take into account such uncertainty may impact upon the recreational and commercial use of the harbour.

However, Wessex Archaeology strongly recommends that the site should be designated if the continued existence of significant archaeological deposits is proven. In those circumstances the designated area should be kept as small as possible in order to minimise any impact upon the normal activities of the harbour. In the meantime alternative means should be considered to ensure that the site is adequately managed and, if the proposed salvage proceeds, that there is an adequate archaeological component.

# **TOBERMORY GALLEON, TOBERMORY BAY, SOUND OF MULL**

## **UNDESIGNATED SITE ASSESSMENT**

**Ref: 53111.02q-3**

### **Acknowledgements**

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- Local divers Steve Barlow and Robin Turner, for information received;
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The diving was carried out by Graham Scott, Hanna Steyne, Dietlind Paddenberg and Labhaoise McKenna, and the geophysical survey was carried out by Louise Tizzard, with the assistance of vessel master David Burden. Graham Scott supervised the fieldwork and the diving. The report was compiled by Graham Scott, with a contribution from Louise Tizzard, and was edited by Steve Webster. Kitty Brandon prepared the illustrations. The project was managed for Wessex Archaeology by Steve Webster.

### **Data Licences**

The material derived from the UKHO is subject to licence 820/020220/11 and the conditions on End-Users and Third Parties contained therein. The following charts and wreck requests have been added to Schedule 1 Annex A:

- Digital use of Chart 2474 (dated 1992)

A copy of the report will be sent to UKHO.

# TOBERMORY GALLEON, TOBERMORY BAY, SOUND OF MULL

## UNDESIGNATED SITE ASSESSMENT

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### **Front Cover**

Sidescan and seismic traces

### **Back Cover**

Seismic profile across Area 2

# TOBERMORY GALLEON, TOBERMORY BAY, SOUND OF MULL

## UNDESIGNATED SITE ASSESSMENT

Ref: 53111.02q-3

### 1. INTRODUCTION

#### 1.1. PROJECT BACKGROUND

1.1.1. This document constitutes an Undesignated Site Assessment undertaken as part of the Contract for Archaeological Services in Relation to the Protection of Wrecks Act (1973). The document has been prepared by Wessex Archaeology (WA) for Historic Scotland (HS). It constitutes an Undesignated Site Assessment of the wreck of a Spanish 1588 Armada vessel located in Tobermory Bay, Mull and popularly known as the Tobermory Galleon (**Figure 1**).

1.1.2. The work was conducted in accordance with a written brief produced by HS. The site was investigated in August 2006.

#### 1.2. DEFINITIONS

1.2.1. Reference in this report to ‘the wreck’ means the coherent or semi-coherent remains of the sunken Spanish vessel and its *in situ* contents on the seabed. Reference to ‘the site’ or ‘the wreck site’ means the wreck itself, together with any debris fields surrounding or associated with it (including debris fields caused by the explosion and sinking, by the natural deterioration of the wreck or by subsequent salvage).

1.2.2. All positions in this report are given in WGS 84, UTM zone 29N.

1.2.3. In 1588 Spanish records used the new (Gregorian) calendar. However, English sources were still using the old (Julian) calendar, and dates in these sources therefore fall ten days earlier than those quoted in contemporary Spanish sources. The dates quoted from sources have not been corrected.

#### 1.3. BACKGROUND

1.3.1. The Tobermory Galleon is the name popularly given to the wreck of a vessel of the ill-fated 1588 Spanish Armada that sought refuge in Tobermory Bay to effect repairs. The ship is believed to have been lost there as a result of an explosion and fire, possibly deliberate, on 5<sup>th</sup> November 1588 (26<sup>th</sup> October in the Julian Calendar).

1.3.2. Rumours of a very large treasure aboard the vessel arose shortly after the sinking. As a result the site has been heavily and destructively salvaged since the mid-17<sup>th</sup> century. However, although a considerable number of guns and other artefacts have been recovered, significant quantities of specie or other bullion have not. The search for treasure has attracted colourful characters such as the naval diver Buster Crabbe and has a degree of significance in the development of early diving technology.

1.3.3. Since the site ceased to be visible in about 1740, its whereabouts has remained in doubt. Although artefacts have been recovered in some quantity, the ship itself has

remained elusive and it now appears to be universally assumed that, if it still exists, it must be buried under many metres of sediment. The last salvor to claim that he had found the wreck was John Grattan in 1975.

- 1.3.4. The site has not been archaeologically recorded to any significant degree, although a considerable amount of historical research has been undertaken into both the salvage efforts and the ship itself. This culminated in Alison McLeay's book 'The Tobermory Treasure' (1986). Almost all of the salvaged material has been dispersed commercially or privately and the collection held by the Isle of Mull Museum is very small.
- 1.3.5. The identity of the ship has been the subject of a long-running dispute between those who believe that the wreck is that of the Ragusan argosy *San Juan de Sicilia* and those who believe it to be a vessel called *Florencia*. This debate is clearly influenced by the hunt for treasure, as there appears very little chance that the *San Juan* carried a large quantity of specie or bullion.
- 1.3.6. WA understands that the 13<sup>th</sup> Duke of Argyll claims sole ownership of the wreck and its contents, his family having been involved in efforts to salvage the wreck since shortly after it sank. Further commercial salvage work has been planned by the Poop Company Limited, using the coastal marine services company Fathoms Ltd. John Grattan is involved in the proposed operation. The operation was due to have begun in September 2006 but is now delayed.
- 1.3.7. Preliminary geophysical survey work has been undertaken and the salvors claim to have pinpointed the position of the wreck using a combination of sub-bottom profiling and information provided by Mr. Grattan. Although the general area of seabed that the consortium is interested in has been disclosed to HS, survey data and other detailed information upon which this claim is based has not.
- 1.3.8. The NMRS number for the site is NM55NW 8013. It is not currently protected by legislation and the site is believed to lie within the collecting area of the MLA accredited Isle of Mull Museum.

## 2. AIMS AND OBJECTIVES

- 2.1.1. The principle aim was to conduct an Undesignated Site Assessment in order to assist HS with decisions concerning designation. This involves recording to Level 2a, defined as follows:

Level	Type	Objective	Sub-level	Character	Scope
2	Evaluation	A record that provides sufficient data to establish the extent, character, date and importance of the site.	2a	Non-intrusive	A limited record based on investigations that might include light cleaning, probing and spot sampling, but without bulk removal of plant growth, soil, debris etc.

- 2.1.2. This was further defined in the brief, specifying the following objectives (HS 2006):

- Undertake a review of the available documentary evidence on the site. As a starting point, refer to Mcleay (1986).
- Contact the following stakeholders (see section 7 for details):
  - Morag Brown (Tobermory Harbour Association) to inform THA of WA's visit, to ask on local opinion relating to the position of the vessel, and to smoothe local logistics.
  - Port Manager of Caledonian MacBrayne at Craignure to ensure that works will not disrupt ferry operations.
  - Simon Wall (Scottish Water Solutions) to inform SWS of WA's visit and to ensure that the works won't interfere with SWS effluent outfall developments.
- Carry out a geophysical survey using CHIRP sonar, echosounder and sidescan to produce a 3d model of the topography of the seabed and a record of buried deposits as per your estimate (reference T10468). Should the hire of geophysical equipment exceed 3 days, prior authorisation to utilise the standby rate must be obtained from Historic Scotland in advance.
- Confirm the position, extent, stability and character of any significant archaeological deposits on the surface of the seabed and buried within the seabed sediments. Sediment depths in excess of 10mtrs may be expected.
- Carry out a dive and produce a structured record of field observations in any area where geophysical investigations suggest presence of buried archaeological deposits.
- Locate and accurately position using tracked diver survey moorings on the seabed, in the vicinity.
- Locate and accurately position using tracked diver survey an effluent outfall recently constructed by Scottish Water Solutions on the seabed surface, in the vicinity.
- Identify whether possible locations for the wreck are covered by local harbour legislation. If such legislation is in place, identify what organisation administers local byelaws?
- Assess the site against the non-statutory criteria for Designation under the Protection of Wrecks Act 1973.
- Report on the results of work in an Undesignated Site Report, incorporating geophysical results as a technical appendix.
- No material is to be recovered from the site, nor is the site to be interfered with in any way.

### **3. METHODOLOGY**

#### **3.1. GEOPHYSICAL SURVEY**

3.1.1. The geophysical survey methodology is detailed in **Appendix IV**.

### 3.2. DIVING

- 3.2.1. Digital still photographs were taken using a housed Canon G2 digital camera with a 0.56 wide-angle adapter. Video images were taken using a hat-mounted single chip Colourwatch Digital Inspection Camera, recording onto miniDV tape.
- 3.2.2. All data acquired during diving operations, other than images, was recorded in real time within an MS Access database. WA proforma record sheets were used for context recording.
- 3.2.3. Fuller details, including acoustic tracking information is detailed in **Appendix VI**.

### 3.3. DATA AVAILABILITY

- 3.3.1. The following documentary data was obtained by WA prior to the commencement of fieldwork:
  - HS Brief;
  - NMRS records for the site;
  - UKHO chart 2394.
- 3.3.2. Additional sources used during the compilation of this report are listed in Section 11.

## 4. FIELDWORK RESULTS

### 4.1. PROGRESS AGAINST OBJECTIVES

- 4.1.1. *Undertake a review of the available documentary evidence on the site.* Achieved, through secondary sources.
- 4.1.2. *Contact the following stakeholders: Morag Brown, Tobermory Harbour Association (THA); Port Manager, Caledonian MacBrayne, Craignure; Simon Wall, Scottish Water Solutions (SWS).* Achieved, by the Project Manager and (on site) by the Project Officer. In addition the Project Officer contacted the Isle of Mull Museum and also established a co-operative dialogue with SWS contractor staff, including the diving supervisor. As a result a degree of co-operation was achieved, which facilitated some diving (although the contractors were constrained in this respect by their timetable). WA also liaised with local divers Steve Barlow and Robin Turner and obtained information from them relating to the position of seabed features within the harbour.
- 4.1.3. *Carry out a geophysical survey using chirp sonar, echosounder and sidescan to produce a 3D model of the topography of the seabed and a record of buried deposits as per your estimate (reference T10468).* Achieved, although limited by the presence of SWS diving contractors and other obstructions. See **Appendix VI**.
- 4.1.4. *Confirm the position, extent, stability and character of any significant archaeological deposits on the surface of the seabed and buried within the seabed sediments. Sediment depths in excess of 10mtrs may be expected.* Partially achieved,

although again limited by the presence of SWS diving contractors and other obstructions.

- 4.1.5. *Carry out a dive and produce a structured record of field observations in any area where geophysical investigations suggest presence of buried archaeological deposits.* Partially achieved, although similarly limited by the presence of SWS diving contractors and other obstructions.
- 4.1.6. *Locate and accurately position using tracked diver survey an effluent outfall recently constructed by SWS on the seabed surface, in the vicinity.* Achieved, using geophysical survey results and positional information provided by the contractor.
- 4.1.7. *Identify whether possible locations for the wreck are covered by local harbour legislation. If such legislation is in place, identify what organisation administers local bylaws.* Achieved.
- 4.1.8. *Assess the site against the non-statutory criteria for Designation under the Protection of Wrecks Act 1973.* Achieved.
- 4.1.9. *Report on the results of work in an Undesignated Site Report, incorporating geophysical results as a technical appendix.* Achieved.

## **4.2. GEOPHYSICAL INVESTIGATIONS**

- 4.2.1. The geophysical survey undertaken by WA is fully described in **Appendix VI**. Sidescan, chirp sub-bottom profiling and single beam bathymetric data sets were acquired for the survey areas shown in **Figure 2**. The survey was restricted by the presence of a large number of moorings (**Plate 1**) and a diving barge involved in operations on the construction of a new outfall.
- 4.2.2. The sub-bottom data has allowed sedimentary sections of the seabed to be generated. These are shown in **Figure 4**. Within the survey areas it may generally be stated that the seabed consists largely of a fine-grained sediment unit, probably of silt and/or clay, which overlies a coarse-grained compacted sediment unit that is possibly comprised of sands or gravels. Below this is a probable basement bedrock unit, probably consisting of tertiary lavas. The thickness of these units is variable, with the bedrock unit observed to vary between 5-20m sub-seabed, and deepening beyond detectable range to the south of the study area. The compacted sediment unit varies between 1-11 metres sub-seabed. Isolated boulders were observed within the survey areas.
- 4.2.3. In the north of Area 3, a possible anticlinal axis was observed at about 5m sub-seabed. The depth of the bedrock appears to increase to both the north and south of this axis. To the north significant reflectors are absent and it is possible that the boundary between the two sedimentary units has been rendered invisible by reworking associated with excavation.
- 4.2.4. A total of six anomalies were identified and considered unsuitable for ground-truthing. Of these, four (**5001** and **5003-5**) were considered to be too deeply buried for diver ground-truthing and to be in a position that meant that association with the site was unlikely. One that is unlikely to have been visible but may have been detected by probing (**5002**) was not ground-truthed because WA was under strict

instructions from HS not to excavate, and because its position was thought to make association with the site unlikely. Another anomaly (**5006**) was considered to be in a promising position but was too deeply buried for ground-truthing.

- 4.2.5. Two anomalies were considered suitable for ground-truthing. The first, **5007**, was identified as a possible modern mooring and was ground-truthed in order to test this theory and thereby exclude other similar features from consideration. The second, **5008**, was identified by sidescan survey as being an area of deep seabed depressions, possibly the salvage trenches dug by salvors in the 1970s and 1980s. The path of the new outfall pipes curves around this area to the west and north.
- 4.2.6. The positions of all anomalies are shown plotted in **Figure 2** and are listed in **Appendix IV**. The positions of the ground-truthed anomalies are as follows (the position of **5008** is representative, the approximate extent of the area of holes is shown in **Figures 2** and **3**):

Anomaly No.	Lat.	Long.
<b>5007</b>	56° 37.30636' N	06° 3.77163' W
<b>5008</b>	56° 37.33356' N	06° 3.83596' W

- 4.2.7. Although too deeply buried for ground-truthing, **5006** could be part of the wreck or a large artefact within the debris field such as a gun. It lies within the part of Tobermory Bay where the wreck is believed to have been. However, due to its small contact size it is thought unlikely that it could be a very large fragment of hull. The depth of burial is 12.1m. The position of **5006** is as follows:

Anomaly No.	Lat.	Long.
<b>5006</b>	56° 37.36438' N	06° 3.71625' W

### 4.3. GROUND-TRUTHING

- 4.3.1. The methodology for anomaly **5007** consisted of a diver circular search from a shot positioned by surface dGPS, general visual inspection of seabed features and limited depth survey (**Appendix VI**). The methodology for anomaly **5008** consisted of a swim line search from the dive vessel anchor, which was dropped on the anomaly position, with general visual inspection, depth survey and hand-probing using a 1.5m probe. Ground-truthing constituted a Level 1b assessment (**Appendix V**). Log details of the dives are given in **Appendix VII**.
- 4.3.2. Anomaly **5007** (**Figure 2**) was identified following preliminary analysis of the sidescan sonar data, within which it appeared as a small depression-like feature. It was ground-truthed on 25<sup>th</sup> August 2006. Prior to the dive a mooring buoy was noted to be in close proximity and it was therefore suspected that the anomaly was related to this mooring, which is used by one of the charter vessels based out of Tobermory during the tourist season. The lower part of this mooring (context **3003**) was found in the vicinity of the anomaly position. This consisted of two large modern concrete sinkers connected by ground chain and shackle to the riser chain of the mooring. Additionally three small and steep-sided depressions were observed (contexts **3001-**

**3004**). One was estimated to be approximately 2m deep. Interpretation of these features is uncertain but no artefacts (including modern debris) or archaeological deposits were observed.

- 4.3.3. Anomaly **5008 (Figure 2)** was also identified following preliminary analysis of the sidescan sonar data, within which it appeared as a large depression-like feature. It was ground-truthed on 26<sup>th</sup> August 2006 over the course of two dives. A large steep-sided linear depression (context **3005**) was found, orientated approximately north-west to south-east. The trench was up to 4.25 metres deep and was approximately 18m wide. Length was not established, although the diver located the north-west end of the depression. Probing of the base of the depression produced, for the most part, no resistance at 1.5 metres (the length of the probe) though with occasional hard base (probably stone) at various levels.
- 4.3.4. Although some modern debris typical of harbour locations was found both in and around this feature, no pre-modern artefacts or archaeological deposits were identified. A number of boulders were observed but these did not appear to constitute either a cluster or a coherent layer.
- 4.3.5. Approximately 7.5m north-northeast of the depression, the new outfall pipe (context **3006**) was observed to cross the search area from west to east. The pipe bundle was observed to be reinforced by stone bags and covered with flexible concrete matting. Although the pipe bundle appears to have been laid on the seabed rather than being trenched, WA understands it is anticipated that it will quickly become buried below the current seabed due to the weight of the matting (Bob Forrest of Atlas Marine pers. comm.).

## 5. REVIEW OF DOCUMENTARY EVIDENCE

### 5.1. THE WRECKING EVENT

- 5.1.1. This is the first documentary reference to the ship that was to become known as the Tobermory Galleon. On 30<sup>th</sup> October 1588 William Asheby, a member of the English Embassy to the Scottish Court, added the following postscript to his regular report to London (McLeay 1986:31):

‘As I had writ this letter Sir William Kith send me wourd that Mack Cleiden an Irishe Lord in the isles wrot to the K. that on Fridai the 13 of September there arrived a greate ship of Spaigne of 1400 tons, having 800 soldiours and there commanders; at an Iland caulled Ila (Islay) on the west part of Scotland; thether driven by weather, thei thinke that thei rest of the Fleat is driven on the north part of Ireland; I will make further inquirie and presentlie certifie your honour with sped: thei report this ship to be furnished with 80 brass peces, She beaten with shote and wether.’

- 5.1.2. Later that year, in early November, Asheby reported the arrival of the ship at Mull (Martin 1998: 12):

‘This six weeks... (there has been) a greate ship of Spaigne about the Ile of Mula in MacLanes countrie, which thei here report cannot go from thence; those irishe (Gaelic Scots) people releave them with victell, but are not able to possess her, for

she is well furnished both with shott and men; if there be anie shipes of war in Ireland thei might have a great praie (prize) of this ship for she is thought to be verie riche.’

- 5.1.3. What appears to have happened is that a large Spanish carrack, heavily damaged during the Armada campaign, arrived off Islay on 23<sup>rd</sup> September 1588. It had survived the ferocious storm of the 20<sup>th</sup> September that claimed many of the retreating Armada vessels on the Irish coast, and had presumably been pushed north by the south-westerly winds. The Spanish vessel that then arrived in what is now known as Tobermory Bay was probably the same vessel. The reason that she moved north again from Islay is unclear, but it is probably because of promises made to the crew of a safe haven and the possibility of supplies by kinsmen of the chief of the Clan Maclean, Lachlan Maclean.
- 5.1.4. By this time Tobermory Bay had probably been long known as an excellent anchorage. However, the first mention of it was in 1549 when it was described as ‘a sufficient raid (roadstead or anchoring place) for schippis’ (THA website).
- 5.1.5. In return for supplies and materials to repair the damaged ship, or at least the promise of them (as contemporary Spanish accounts make plain), Lachlan obtained the services of a force of soldiers and guns from the ship. He used these with great effect to lay waste the lands of rival clans. Lachlan was charged with rebellion the following year and the arraignment stated that his force included ‘ane hundredth Spanyeartis’ (Martin 1998: 12).
- 5.1.6. Two days after reporting the arrival of the ship in Mull, Asheby wrote again with sensational news (Martin 1998: 13):
- ‘The Spannishe shipe...is burnt, as is reported here by the treacherie of the Irishe; and almost all the men within is consumed with fire; it is thought to be on(e) of the principalle shippes, and some on(e) of great accompt within; for he was always, as thai saie, served in sylver.’
- 5.1.7. The cause of the loss is not known with certainty. All accounts appear to indicate that there was an explosion and fire, and the evidence of early salvors supports this. The cause of the explosion is more uncertain and a number of explanations have been put forward, ranging from the plausible to the fantastical. The latter involving either fairy cats or the Blue-eyed Witch of Lochaber depending, perhaps, on the storyteller’s fancy.
- 5.1.8. More realistically the suspects are an accident, treachery by Lachlan Maclean or the actions of an English agent. Perhaps the least likely is treachery, because Maclean would have had little to gain from blowing up the vessel, although the explosion may have accidentally resulted from an attempt to capture the vessel. Indeed contemporary English and Spanish writers both speak of the ‘treacherie of the Irishe’. Perhaps the simplest and therefore plausible is the accidental ignition of gunpowder, which had either been spread out upon the deck to dry or was in the process of being taken off the ship for the same purpose. This explanation was accepted by the official Spanish enquiry (into the loss of the *San Juan de Sicilia* – see below) five years later (Martin 1998: 13).

- 5.1.9. However, it has also been suggested that an English agent was responsible and there is some contemporary evidence to support this. Writing on 26<sup>th</sup> November to Elizabeth I's spymaster, Sir Francis Walsingham, Asheby says: 'the partie that laid the traine (fuse)...the man knowen to your honour and called Smallet' (Martin 1998: 14). Smallet or Smollet was a Dumbarton merchant from whom the Spanish had been buying provisions. As such he may have had both the confidence of the Spanish and sufficient opportunity, and, coming from Dunbarton, he may have been regarded as 'Irishe' by both English and Spanish alike.
- 5.1.10. Following the sinking, the few survivors reputedly took immediate shelter in a cave close to the current RNLI station. A contemporary account suggests that all those actually onboard at the time were lost (McLeay 1986: 155). This cave was not located during fieldwork.

## 5.2. VESSEL IDENTITY

- 5.2.1. Controversy has always dogged the identification of the Spanish vessel. The name is not given in any contemporary account. As a result there are two camps, those who identify it as a vessel called the *Florenzia* and those who identify it as the *San Juan de Sicilia*. The latter identification was originally put forward by Andrew Lang in an article published in Blackwood's Magazine in 1912 (Lang 1912).
- 5.2.2. In a book published in 1655 but written in 1635, Archbishop Spottiswoode described 'A ship of Florence... driven upon the west coast of Scotland... spoiled and set on fire by certain highlanders' (McLeay 1986: 149-150). In 1677 the 9<sup>th</sup> Earl of Argyll wrote of the wreck that 'It is reported to have been the *Admiral of Florence*... a ship of 56 guns'. This subsequently appears to have become the *Florence of Spain*, the *Florida* and the *Florenzia* (McLeay 1986: 150; Martin 1998: 14).
- 5.2.3. No ship of the above names is found in the meticulous Armada lists and therefore none is likely to be the Spanish name of the vessel. However, *Florenzia* means 'of Florence' and there was a vessel that sailed with the Armada that could be described as being 'of Florence', the *San Francisco*. She was a modern galleon belonging to the Grand Duke of Tuscany and she had been requisitioned at Lisbon to take part in the campaign (Martin 1998: 14). This vessel, described in the Armada lists as the *San Francisco*, is also described in one primary source as 'Galeon de Florenzia' (McLeay 1986: 151).
- 5.2.4. It was suggested in the 17<sup>th</sup> century that this vessel was the 'Vice Admirall of the Spanish Fleet'. However, this was incorrect, the 'Vice Admirall' was in fact the *San Juan* of Juan Martinez de Recalde (McLeay 1986: 151). Furthermore the reliable Armada records confirm that the *San Francisco* returned to Spain and the other Armada vessel called *San Francisco*, the 900 ton almiranta of the Squadron of Andalusia, is also recorded as having returned to Spain (McLeay 1986: 151).
- 5.2.5. Proponents of the theory that the *Florenzia* or *San Francisco* was lost at Tobermory have suggested that the ship was recorded as having returned to Spain, to mislead Spain's opponents and to disguise the loss of a substantial amount of 'treasure' with the ship. However, this argument does not appear to stand up to close scrutiny. The meticulous records kept by the Spanish authorities were for the use of the King and his councillors and were never intended for publication. Secondly, a letter from

Medina Sidonia to the King's Secretary in September 1588 reports that 'the galleon of the Duke of Florence' had returned to Santander. Thirdly, the Venetian Ambassador in correspondence linked to the fate of three missing Venetian ships, recorded that the 'well known galleon' of the Grand Duke of Tuscany had returned (McLeay 1986: 153). Fourthly, the ship continued to draw her pay until 1590 when it left Spain after being reconditioned (McLeay 1986:153).

- 5.2.6. On 17<sup>th</sup> December 1588, Marolin de Juan, the Armada's Pilot-General, wrote a letter to Bernardino de Mendoza, the Spanish Ambassador to France (McLeay 1986:155), in which he said the following:

'The ship San Juan Bautista, of Ragusa, 800 tons, was burnt in a Scottish port, with Don Diego Manrique on board. They say that the only persons who escaped it were 15 who were on shore at the time.'

- 5.2.7. It appears likely that the Pilot-General obtained this information from soldier survivors from the *Trinidad Valencera*. They in turn probably heard it from other Armada survivors whilst they were in Edinburgh (McLeay 1986: 155).

- 5.2.8. Armada records list three *San Juan Bautistas*. One sailed with the Castile Squadron but returned safely to Spain. The second, also of the Castile Squadron, was scuttled off south-west Ireland. It is therefore the third that is of interest, the *Santa Maria De Gracia Y San Juan Bautista*. It is listed by Armada records as being attached to the Levant Squadron and as being of 800 tons (McLeay 1986:156). It was commanded by another Don Diego, Don Diego Tellez Enriquez.

- 5.2.9. There are three strong arguments for this third *San Juan*, usually referred to in the Armada records as *San Juan de Sicilia* (it having been commandeered in Sicily), being the vessel referred to by Marolin de Juan. First, her commander's name was Diego Enriquez (it appears to be commonly accepted by both identification camps that reference to the name Manrique was a cipher clerk's mistake). Secondly, she is not recorded as having returned to Spain. Thirdly, and most importantly, she was the only *San Juan* in the fleet from Ragusa (modern Dubrovnik).

- 5.2.10. Ragusan survivors of the loss of the *San Juan* subsequently described the location where the ship had been lost (Kostic 1979; McLeay 1986: 160):

'It pleased God that the ship put into a port on the Scottish coast, where we took shelter and anchored at an island called Largona (possibly Firth of Lorn), whose Lord is Maelan (probably Maclean). There we stayed the whole month of September, repairing the ship as best we could, with much toil and in great danger of our lives.'

- 5.2.11. As a result of research by Geoffrey Parker in the Armada archives in Simancas, the following account comes from an official document filed after the official Spanish enquiry into the loss of the *San Juan de Sicilia* (McLeay 1986: 163-4):

'Having been asked, on behalf of Vicenio de Pdero (Vice Petrov Jug), a Ragusan, Captain (owner) of the vessel named San Juan de Sicilia, lost on expedition against England... on the 5<sup>th</sup> of November (1588)... An official enquiry was issued at Valladolid on the 12<sup>th</sup> of August last year, '92.... In spite of exhaustive enquiries he (General Marcos de Aramburu) was forced to the conclusion that it was wrecked one

day in that same month of November '88 on the Island of Mull, according to the story of two men who say they are from the ship itself... Given in Madrid, 7<sup>th</sup> September 1593.'

5.2.12. The document goes on to describe how the loss occurred:

'the ship San Juan de Sicilia put into port at the aforementioned island called Mull for lack of sails, which the enemy had reduced to tatters. They were kept at the island with false promises; it was claimed that sails would be found for them, and other items they needed. And so they loaned some men in order to mount an attack on another hostile island, and gave them about a hundred men with which they caused destruction and razed property to the ground. In the meantime they worked to improve the ship as best they could. One day, whilst taking off the powder to dry, they were engulfed by an explosion which knocked down all the men on the forward deck, and most of them died. The ship caught fire and sank. And it appears that the time the vessel in question reached the island was the end of September, or a few days into October, and it was there for another thirty or forty days before it burnt.'

### 5.3. SAN JUAN DE SICILIA

5.3.1. The following account of the vessel is based upon the work of McLeay (1986) and Martin (1998), which combines their researches and those of Professor Geoffrey Parker with those of earlier writers such as Lang (1912), Hardie (1912) and Kostic (1979).

5.3.2. The *San Juan de Sicilia* was an 800-ton merchant vessel from the Adriatic port of Ragusa (modern Dubrovnik and an important trading state in the 16<sup>th</sup> century). Before her involvement with the Armada, she was known as *Brod Martolosi* (Martolosi's Ship) after one of her owners, Jaketa Martolisić (known to the Spanish as Vicencio de Pedro Martolosi), the other being Vice Petrov Jug. In 1586 she put into a Sicilian port, one of the Phillip II's dominions, and was embargoed by Spanish officials. Three hundred men of the crack Sicilian Tercio (Regiment) were then put on board her and she sailed to Lisbon to assemble with the Levant Squadron of the Armada. The cost to the Spanish government of this forced hiring was 1000 Sicilian escudos per month (McLeay 1986: 179).

5.3.3. Although contemporary records do not record exactly what type of ship the *San Juan de Sicilia* was, the fact that it was from Ragusa means that it was almost certainly an 'argosy'. Although the exact meaning of the term 'argosy' appears to be contentious, it can probably be said in this context that it refers to a large sea or ocean-going three-masted carrack-like vessel typical of the Mediterranean, and in particular Adriatic ports such as Ragusa and Venice. Hull construction would have been carvel, with a mix of square and lateen sails.

5.3.4. The term 'argosy' appears to have had a wide circulation in the 16<sup>th</sup> century. Coming from rich trading cities, they became associated in the popular imagination with wealth and are frequently mentioned in popular contemporary writings. In Shakespeare's 'Merchant of Venice' (c.1600: Act 1, Scene 1) Salarino says to his friend the merchant Antonio:

'Your mind is tossing on the ocean;

There, where your argosies with portly sail,  
Like signiors and rich burghers of the flood,  
Do overpower your petty traffickers.’

- 5.3.5. Alastair Garvie, Curator of the Isle of Mull Museum has calculated that the vessel may have had the following approximate dimensions: maximum length – 98 feet (29.87m), breadth – 33 feet (10.06m) (Brown and Whittaker 2000: 1). WA has undertaken no calculations, but Mr Garvie’s figures may be a little conservative.
- 5.3.6. WA understands that all of the Armada ships were officially measured by the Spanish authorities before the campaign started. These records were not accessed as part of this assessment..
- 5.3.7. The master of the vessel was Luka Ivanov Kinkovic, known to the Spanish as Lucas de Juan (McLeay 1986: 158). The ship was however commanded by the senior Spanish aristocrat on board, Don Diego, who was son of the commander of the Knights of Alcantara, one of Spain’s foremost military orders (Martin 1998:16; McLeay 1986: 175). With Don Diego were four other Spanish notables, including his brother, Don Pedro (McLeay 1986: 157).
- 5.3.8. The complement of the ship was 342. This included 279 soldiers of various tercios. They appear to have been a mixture of mainly pikemen and arquebusiers. Most are likely to have been seasoned professionals.
- 5.3.9. The Armada muster records list the armament of the ship as being 26 guns. However, there is a discrepancy between the number of guns that have probably been salvaged from the site and this number, with 23-24 bronze guns and 5-10 iron guns being recorded as having been recovered since the sinking (McLeay 1986: 177). This discrepancy may not be significant because we know from contemporary correspondence that at least half of the guns of the *Casa de Paz* were transferred to the *San Juan de Sicilia* after the muster was made.
- 5.3.10. Two of the guns deserve special mention. A certified list prepared by Baltasar de Navarete of the guns that he had put on board (as opposed to those that were already onboard) shows two huge siege guns cast in Augsburg by Emperor Charles V’s master-founder, Gregorio Loeffler. These guns, probably weighing two and a half tons each and firing shot of 40 pound weight, would almost certainly have been carried disassembled with their field carriages and limbers in the hold (Martin 1998: 14). It is highly unlikely that they were intended to be used at sea and would have been quite impracticable, if not dangerous, if they had. One of the guns is drawn to scale in a Spanish manuscript dated 1587, now at Simancas (Martin 1988: 62). Three similar pieces were recovered from the *La Trinidad Valencera* site (Parker and Martin 1988: 41-2; Martin 1988: 57-73).
- 5.3.11. It appears likely that 1588 was not the vessel’s first visit to the British Isles. In 1586 she probably visited an English port to pick up a cargo, possibly textiles, for the Eastern Mediterranean. It was on her way home that she called into Sicily, where she was arrested (McLeay 1986: 158).
- 5.3.12. The vessel appears to have been heavily engaged during the campaign, particularly at Gravelines, and suffered very heavy battle damage together, presumably, with much

loss of life. Contemporary records indicate that she was probably short of usable sails as a result. Paymaster Pedro Coco Calderon, who sailed on another ship that had been keeping company with the *San Juan de Sicilia* as the Armada retreated around the north of Scotland, later recorded that:

‘We looked anxiously for the San Juan de Sicilia, on board which was Don Diego Tellez Enriquez... who had fought so bravely. She had been so much damaged that not a span of her sails was serviceable; and as we could not find her, it is feared she may be lost.’

- 5.3.13. Calderon’s account is corroborated by the testimony of a survivor from the San Juan, Ivan Mihov, a Ragusan caulker:

‘...the ship sailed as best she could with her sails in tatters, her rigging torn and her masts broken.’

- 5.3.14. Inevitably the vessel appears to have lagged behind and lost contact. As noted above, this may well have saved her from the storm that beset the faster vessels off the coast of Ireland.

#### **5.4. POST WRECKING EVENT SITE FORMATION PROCESSES – HUMAN INTERVENTION**

- 5.4.1. The following analysis focuses on the various salvage attempts made since 1588, as they represent the only available evidence with regard to the dramatic changes that have occurred to the condition of the wreck since that date. The analysis is based entirely upon secondary sources.

##### **1588**

- 5.4.2. It is highly likely that the first salvage attempts were made in the immediate aftermath of the sinking. The explosion was sufficiently powerful for it to be subsequently recollected that part of the forecastle had landed on the shore, although it is uncertain how reliable this report is, as it appears much later in a rather colourful account. However, wreckage is likely to have been scattered over a fairly wide area. Much that floated will have come ashore, from where it will have been collected by local clansmen an/or the survivors.

- 5.4.3. Due to the depth of water, the wrecked hull is likely to have been completely underwater. There is no evidence to suggest that underwater salvage was attempted at this time, although it is conceivable that an attempt to drag the wreck may have been made and it is also conceivable that breath-holding swimmers could have reached the site from the surface.

##### **1645-1677**

- 5.4.4. Salvage during this period was accomplished by breath-holding divers. Due to the depth of water, a primitive form of diving bell was also used. Six iron guns were recovered in about 1645 by these means (Brown and Whittaker 2000: 20; McLeay 1986: 39; Martin 1998: 19). Details of the recovered ordnance, including type and size, are unknown.

- 5.4.5. The 9<sup>th</sup> Earl of Argyll, writing in 1677, recorded that ‘two brass cannon of large calibre, but very badly fortified, and a great iron gun’ were recovered by James

Mauld in 1665 (Brown and Whittaker 2000: 20; McLeay 1986:40; Martin 1998: 19). Details of these guns are again unknown, although the limited descriptions indicate that they were not small anti-personnel weapons such as swivel guns.

5.4.6. Following the departure of Mauld, the Earl of Argyll recovered a further six guns (Brown and Whittaker 2000: 20; McLeay 1986:40). Martin (1998: 19) states that these were bronze pieces. No further details of these guns are available, although the fact that one is recorded as weighing nearly six-hundredweight suggests that the others were smaller. At some point between 1665 and 1675, an unnamed German salvor recovered an anchor (Brown and Whittaker 2000: 20; McLeay 1986: 40; Martin 1998: 19-20).

5.4.7. In a memorandum associated with the salvage contract awarded to Treilaben and Smith in 1676, the Earl of Argyll described the site as follows, presumably from the accounts given to him by previous salvors and their divers (Martin 1998: 20-21):

‘It lies in a very good road land lok’d betwixt a litle iland and a bay in the Ile of Mull, a place quhair vessels doe ordinarily anchor, free of any violent tyde, hardly any stream at all, a clean heard channel with a little sand on the top, and little or no mudd in most places about, upon ten fathom at highe-water, and about eight at ground-ebb, so calm that the Earle of Argyll caused dive at all tymes of the tyde in seasonable weather, and even when it was whyt water within lesse than a mile of the place.

‘The fore part of the ship that was above water is quyt burnt, so that from the mizzen mast to the foreship there is no deck left, but the hull full of sand, which the Earl of Argyll caused search a litle but found nothing but a great deal of cannon-ball about the main-mast, and some kettles, and tankers of copper and such like in other places. ‘Over the hindship, wher the cabin was, ther is a heap of great timber, which will be a great task to remove, but under thes is the main expectation (of treasure), and it is thought the deck under the cabine is still entire. The great timber lay in great confusion, and in the midle there is a voyd place, which the Earl durst not try with the bell and the workmen did not give a perfect accompt of it. Thes great timber lyes so high ebb-water they can be touched, at five and six fathom water.

‘Ther is a harder and softer sand in places neir about the ship. Ther was cannon found on clean sand, quhair a six pence might be known from a shilling. Some cannon wer half covered with sand, and on(e) cannon fullie covered was gotten up, so farr does the art of the bell go. The cannon generally lay at some yards distance from the ship from tuo to twentie and some not recovered lay crosse tuo or three together.’

5.4.8. In 1683 Archibald Miller of Greenock wrote a letter to James, Duke of York in an unsuccessful attempt to win a contract to salvage the wreck (Brown and Whittaker 2000: 20-21; McLeay 1986: 40; Martin 1998: 21-22). Miller had been one of Mauld’s divers in 1665 and he recollected the wreck as follows. Modern equivalent words are given in brackets:

‘The Ship lyes Sunck off the Shore, about one-finger stone-cast, her Sterne lyes into the Shore Norwest...There is no Deck upon her Except in ye Hinder part, there is one great heap of Timber wch I take to be the Cabbin, I did see one doore there wch I

take to be the Steerage doore, and within that doore I did see a number of Dishes both great and small of a White blewish Colour, but whether they are pewter plate I know not.

‘Neer this place I did see one great Gun and her Mussle upright on end, as big or bigger than the Gun I lifted wch would carry a 48 lb. ball, there is a great heap of Cannon shot about Midship, and upon the Shot lyes three Iron Gunns.

‘In the fore part of the Ship lyes many great Ballast stones and some shot amongst them, and there wee found one Silver bell about 4 li weight, wee got within the Ship at a pretty distance the said great Gun wth other two (all Brass Gunns) the great Gun is eleaven feet length, and seaven inches and one fourth part of measure in bore, th’other two were Minions, wee also got two Demy Culverins, two Falcons, two Slings all Brass.

‘We lifted three Anchors whereof one was eighteen feet of length, th’ other was fifteen and the third was ten, I got two brass sheeves [pulley wheels/sheeve blocks] weighing Sixty pounds, I lifted also the Rother [rudder] and took eight iron pykes [hinges] off it, It was twenty eight foot of Length, but there is no peece broken of the same.

‘I lifted the Kemp stone [capstan] of Curious worke, pauled with a Spring at every inches end, I cannot tell ye bigness, the thing I found would have been two foot in the Diameter. I saw something like a Coat of Armes but could not reach it being entangled, I saw Guild [gilding] upon severall standing peeces of the Ship. I found something like Mettle betwixt the Ship and shore in soft Osie ground in severall places and thinck they were Gunns.’

- 5.4.9. The dimensions given by Miller for the large gun recovered whilst he was working on the site indicate that it was a large siege piece. This was almost certainly one of the Loeffler guns and was probably seen near to where it had been stored in the hold.
- 5.4.10. Whilst recent commentators seem to regard Miller as being a reasonably credible witness, it is acknowledged that he appears to have been prone to ‘spicing’ his account. This was presumably intended to whet the appetites of potential sponsors. For example he stated that on his last dive he had: ‘found a Crowne or Diadem and had hooked the same, but being chained it fell amongst the Timbers’.
- 5.4.11. More significantly (at least in terms of the site’s future reputation) he also described seeing a paper document as follows: ‘paper of Lattin Extracted out of the Spanish Records that there was thirty millions of Cash on board the said Ship, and it tells it lay under ye Sell of the Gunroome’.
- 5.4.12. No documentary record for such a treasure appears to have been found in the meticulous records kept in respect of the 1588 Armada (Martin 1998: 22). Furthermore there is little reason to suppose, had the document existed, that it would have been specific as to exactly where within the ship the treasure was, unless of course it was to convince his potential sponsors that it was there and easily reached. However, it is conceivable that it may have been an original or copy document removed from the Armada records and in the possession of the Earl of Argyll (see below).

- 5.4.13. Between 1686 and 1689, 12 bronze guns were recovered from the site by a consortium (Brown and Whittaker 2000: 20; McLeay 1986: 47; Martin 1998: 22-23). Other artefacts were recovered but were described as being of ‘no great value’. In 1688, or possibly 1698 (McLeay 1986: 47), William Sacheverell’s divers were lowered ‘threescore Foot under Water’ to reach the site. Sacheverell was vague as to what was recovered but mentions ‘Plate or Money’. Whilst it has been suggested that Sacheverell, the Governor of the Isle of Man (Macnab 1970, quoted by NMRS) recovered ‘much of the lost bullion’, the reference for this appears to be unreliable. It is certainly possible that Sacheverell recovered a quantity of money and plate, but WA has seen no evidence to suggest that it was a very large quantity. Brown and Whittaker (2000: 20) state that he also recovered a gun and copper kettles.
- 5.4.14. Subsequently there appear to have been two further attempts to salvage the site in 1691 and 1693 by a man called Wharton (Brown and Whittaker 2000: 20), but it is not known whether artefacts were recovered.
- 5.4.15. From the accounts given by the 8<sup>th</sup> Earl of Argyll and Archibald Miller it is possible to reconstruct the condition of the wreck in 1665 in some detail. It appears to have been partially intact and possibly little changed since it sank in 1588. It appears to have been sitting on a hard seabed, comprised of a thin layer of sand with little mud over a firmer substrate, with the stern to the north-west (and bow presumably to the south-east).
- 5.4.16. It also appears that the hull above the water line forward of the mizzen mast was largely destroyed and that the lower hull in this part of the ship was filled with sand. What the divers were looking at appears to have been the hold. The Earl’s account confirms that the decks had not survived in this area. This is probably because they had been consumed in the fire that followed the explosion.
- 5.4.17. A considerable amount of debris was preserved in this area, either buried close to the surface or exposed. This included part of the mainmast, various iron and brass guns including a large siege piece, the capstan (possibly recovered from outboard), iron shot and a silver bell. A number of large ballast stones were also seen forward of midships.
- 5.4.18. Aft of the mizzen the wreck appears to have been damaged but well preserved. The Earl recorded that ‘the deck below the cabine is still entire’. Miller also talks about a ‘Cabbin’. Assuming that they are referring to the ‘great [captain/commander’s] cabin’, this implies that the hull from the upper deck down was preserved in this area of the ship. Both accounts seem to indicate that there was considerable debris lying on the deck and Miller’s account suggests that this area of the wreck may have been as much as nine metres above the surrounding seabed. This is likely to have come from the upper works of the stern and from the great cabin itself.
- 5.4.19. Miller describes seeing a number of what may have been pewter dishes. He also records recovering the rudder but does not say whether it was still attached. Miller’s account also makes it clear that the gilding decoration of some of the timbers still survived.

**1729-32**

- 5.4.20. Salvage during this period was undertaken using a ‘diving engine’; a type of armoured diving dress invented by Captain Jacob Rowe. In October 1729 Rowe wrote the following account of his salvage work on the site to one of his financial backers, Robert Graham (McLeay 1986: 57):

‘Under ye Ballast of ye Wreck we have discovered a Large Platform Covered with Boards Under which we Discovered a Great Number of Casks and Chists but they being semented hard together we have not as yet Able to take up a Specimen to prove whether ye Same be Treasures.’

- 5.4.21. Then, in November 1729, Rowe wrote the following account to his business associate Alexander Mackenzie (Martin 1998: 25):

‘we have been making as large a progress by way of Dragging or Clearing the Wreck as if it had been Summer Season, so that in the Spring Season when the Water is most clear and Fittest for Diving we shall have nothing more to do than clearing of wood and taking up Guns and Treasure.

The Draggs under the Platform... hath broken off considerable quantities of semented Cakes of Ballast, the under part of which bears the lively impression of Iron hoops of Casks and Chists, which I really judge to be Treasure, but by the hardness and smoothness thereof we have not been able to penetrate the same so far as to take up a Specimen, but I am continually endeavouring to undermine it with our Dragg, which I hope to accomplish, but if I fail in the attempt, I have prepared a Machine that will break it all to pieces.’

- 5.4.22. In November 1730, Rowe wrote to the Lord Advocate in the following terms (McLeay, 1986: 59-60):

‘But after breaking a very hard semented crust of Ballast (by means of a loaded dart and lifting the floor timber of the Wreck) we found what lay under the same to be nothing but shot, which caused me to pursue my searching and clear the Wreck further on towards the head thereof, which I effectually performed by the middle of September so that all the Divers could give me full assurance that there Did nothing remain on the Bottom but the floor Timbers which did all appear as if they had been clean swept...’

- 5.4.23. Having failed to find anything of great value within the hull of the vessel itself, Rowe turned his attention to the seabed around, having noted that many of the guns had previously been salvaged from a distance of 20 feet from the wreck:

‘Meeting with disappointment I made further Dilligent Search upon the outsides of the Wreck, being the more Induced so to doe by the Quantities of Crushed Matters taken up by the Drydges, which did plainly appear to have been broken off from Casks and Chests, and in Searching on the Said Sides of the Wreck, the Divers have discovered severall Banks of hard semented matters that hath been blowen out of the Wreck, wherein on the East Side of the Wreck (on which is the deepest Water) we have lately broken off some crusted matter bearing the impression of hoops from an Iron-bound Chest, as also the Impressions from a fine-wrought Cabinet, also a Buro, and likewise the divers have seen the Shape of appearance of Severall Guns...’

- 5.4.24. It would appear from the above descriptions that the salvage undertaken by Rowe on the wreck itself was very thorough, using a variety of techniques including explosives. The description given to him by his divers suggests that the inside of the hull had been completely cleared of its contents, including ballast. The description also suggests that the surviving hull structure above the floor timbers had been dismantled. It would be reasonable to conclude from his account that by 1732 the remaining vessel structure had largely been dismantled, leaving only the very bottom of the hull, and that the contents of the hull had largely been removed. According to McLeay (1986: 184) Rowe had been able to examine boards around the keel, demonstrating just how thorough his dismantling was.
- 5.4.25. Rowe's account is also interesting because it indicates that outside the hull on the eastern side were 'severall Banks of hard semented matters'. This suggests that there were several mounds of concretion outside of the wreck on this side. Rowe felt that they were material that had been blown out of the ship.
- 5.4.26. It is not clear where the removed material went, but it can probably be assumed that much of it was dumped in the immediate or near vicinity of the wreck, from where some of it will have spread out, probably over a wide area. As McLeay has pointed out (1986: 65), this may well have confused later salvors.

#### **1740**

- 5.4.27. Rowe subsequently returned in 1740, when a number of guns were recovered. One of these guns is believed to be at Inverary Castle. It has a length of 112.5", a shot weight of 23lb (iron) and a weight of 3253lb by mark (Martin and Parker 1988: 217). It bears the monogram and attributes of Francis I of France (salamander badge, fleurs de lys and the initial 'F'). Probably classified as a medio canon by the Spanish, Martin has suggested, speculatively but plausibly, that it may have been captured at the Battle of Pavia in 1525, before being pressed into Armada service (Martin 1998: 22).
- 5.4.28. It has also been suggested that the letter 'B' around the touch hole stands for 'Benvenuto' and that the gun was therefore cast by Benvenuto Cellini (1500-1571) (Campbell 1899). However, this attribution is now regarded as being unlikely (Dr Colin Martin pers. comm.). Although this gun is traditionally believed to have been recovered from the site, it is not clear whether there is any documentary evidence to corroborate this. McLeay has suggested (1986: 176-7) that it may have come from another site altogether.
- 5.4.29. 1740 is significant for one other landmark in the history of the site. According to Brown and Whittaker (2000: 21) and McLeay (1986: 96 and 184), the last recorded sighting of the wreck by fishermen was in this year 'before the ship disappeared under silt'. What remained after Rowe's salvage could apparently still be seen as a dark shape from the surface on occasion, even though it must have been in a minimum of 14 metres of water.

#### **1740-1814**

- 5.4.30. Sporadic salvage operations are recorded by Brown and Whittaker (2000: 21) as having occurred during this period. In 1752 'some cannon, several iron balls and other things' were reported as having been recovered.

- 5.4.31. It seems that a craft tradition grew up using wood recovered from the site. The traveller Edward Daniel Clarke visited Tobermory in 1797 and recorded that (Brown and Whittaker 2000: 25):

‘A part of the stern served for many years as a stair-case at the landing place before the present quay was built. A part of it lay neglected upon the shore when we arrived, which was somewhat diminished before our departure, from the desire we all felt to possess a relic of so curious a piece of antiquity... the master of a herring buss... assured us, he was present when it was raised from the bottom of the harbour.’

- 5.4.32. Clarke asked the Controller of Customs to take the remainder into safe custody. It seems that he did, because Archie Campbell, a subsequent Controller and a protégé of Sir Walter Scott, appears to have sent Sir Walter a writing box carved out of this wood. This case is now on display at Abbotsford House, Melrose.
- 5.4.33. Scott himself visited Tobermory in 1814. Although there is no record of him having collected any artefacts or wood at this time, Scott and others presented gifts carved out of wood supposed to be from the site to George IV when he visited Edinburgh in 1822. At least one of these gifts, a snuff box, is still in the Royal Collection (Brown and Whittaker 2000: 25).

### 1873

- 5.4.34. A Norwegian barque brought up a gold coin with her anchor (Brown and Whittaker 2000: 21). Alternatively this may have happened at the turn of the century to a yacht owner (McLeay 1986: 96). The type and date of the coin is not known, but it is assumed that it had a demonstrable connection with the wreck as it appears to have excited renewed interest in it.

### 1903-9

- 5.4.35. In 1903 a group of Glasgow businessmen (the ‘West of Scotland Syndicate’) used the steam dredgers *Sealight* and *Beamer* to search for the site (Brown and Whittaker, 2000: 21-22; McLeay 1986: 96-98; Martin 1998: 25). Over the course of several seasons work a large area of seabed must have been extensively reworked. A number of artefacts were found, including a broken sword blade and leather scabbard, iron shot, a gold ring in the form of a coiled two-headed serpent, brass dividers, a few coins, porcelain and human bones. Most of these artefacts were disposed of at auction in London in 1904. A total of 74 lots were offered, with 58 described as ‘part of ship’s treasure’, 5 as part of the ‘ship’s outfit’ and 11 as part of the ship’s armament (Brown and Whittaker 2000: 22).
- 5.4.36. A low mound was found roughly where the wreck was believed to be. It is conceivable that this may have been one of the ‘sented banks’ discovered by Rowe. When explored by divers a number of small arms and pikes were found, together with a silver two-piece candle-lamp (McLeay 1986: 97).
- 5.4.37. It is clear that the salvors became increasingly doubtful as to whether they were dredging in the correct place. Things became so desperate that they resorted to the services of a diviner, who was unsuccessful (McLeay 1986: 98).
- 5.4.38. One of the more famous artefacts recovered from the wreck in 1906 was the so-called ‘Pereira Plate’. This pewter plate was one of several found at the same time,

most of which appear to have been sold at auction (McLeay 1986: 174-5). It is approximately 280mm in diameter, with a flat rim approximately 38mm wide and a narrow ridge around the outside edge. The plate was originally described as bearing the arms of the Portuguese Pereira family. However, the mark has since been correctly identified as a touch mark and the plate was probably made in the Spanish Netherlands for export (McLeay 1986: 174-5; Brown and Whittaker 2000: 19).

- 5.4.39. A fine bronze breech-loading swivel gun, 1.38m in length, was also found (Martin 1998: 26). This is believed to be in the ownership of Charterhouse School, Surrey. Two mortars and a pestle are in the collection of the National Maritime Museum at Greenwich (Brown and Whittaker 2000: 21).

### **1910-28**

- 5.4.40. From 1910 until 1928 Lt. Col. Kenneth MacKenzie Foss made several salvage attempts on the site. Foss, a consummate salesperson, appears to have become obsessed with the galleon and it is difficult to know what credence to place in his accounts. What is certain is that he spent several years undertaking a systematic excavation of what he believed to be likely sites for the wreck, without ever finding a substantial part of the ship itself. He did claim to have found the remaining hull with a probe, buried under 6.5 feet of soft clay, but does not appear to have actually dug down to it.
- 5.4.41. Foss did however recover a large number of artefacts, many of which are likely to have come from the wreck. These included part of an inlaid silver bowl, silver coins, a bronze breech block, the handle of a silver flagon, an item identified as a pewter rose water dish, a pewter pilgrim's bottle, glass bottles, mortars, pewter plates, shot, broken pottery, a fragment of wooden beam, musket barrels and another gold ring. A temporary exhibition was held at the Mishnish Hotel in 1910, when sufficient artefacts to fill several glass cases and cover the smoking room floor were put on display. Many were subsequently sold by auction (**Appendix II**). It should be noted that Foss was accused of 'salting' the seabed with artefacts, although this allegation remained unproven.
- 5.4.42. Foss's excavation methods were apparently exceedingly brutal. For much of his time on the site he employed a 'Sykes digger', a large mechanical grab. From the descriptions of the artefacts he did recover, it appears likely that many of these had been severely damaged by the grab (McLeay 1986: 106).
- 5.4.43. The information from Foss's work says little about the condition of the site in the early years of the 20<sup>th</sup> century, other than that nothing was visible on the seabed surface. His search does appear to have been fairly comprehensive and, unless he was looking in entirely the wrong place or simply not deep enough (neither of which seem entirely plausible), it also suggests that the hull as a coherent unit no longer existed. This possibility is corroborated by the failure of the West of Scotland Syndicate to find it.
- 5.4.44. However, the fact that he found artefacts and debris from the wreck still surviving in soft sediments indicates that he was working within a debris field related to the site. Whether this was a debris field from the explosion, the wreck or the subsequent salvage is not known.

- 5.4.45. It should be noted that Foss is supposed to have had a copy of a map in the Duke of Argyll's possession which showed the location of the site marked as 'Spanish Wrack' at the mid-point of a line joining two promontories in the harbour. This map was said to have been drawn up in about 1730, perhaps by Jacob Rowe. Previous salvors do not appear to have been aware of its significance (McLeay 1986: 99-100). The map does not appear to have survived, although WA has not made enquiries of the Duke of Argyll and cannot specifically confirm this.
- 5.4.46. Later accounts (McLeay 1986: 116) suggest that a map was drawn up in 1932, plotting various points in Tobermory Bay where artefacts had been found and searches carried out. It is not known whether this map still exists.

#### **1950-4**

- 5.4.47. In 1950 the Royal Navy were paid by the 11<sup>th</sup> Duke of Argyll to locate the wreck. They recovered a concreted leather dagger sheath and timber fragments. McLeay (1986:120) states that a sample of the wood was sent off for analysis and proved to be oak of perhaps North African origin.
- 5.4.48. In 1954 further work was carried out. The area pinpointed as being the likely position of the wreck was airlifted and timber fragments were found. However, the salvage team were not convinced that they had located the wreck and searched elsewhere. At one location, a layer of large boulders was found after digging a deep hole through 'silt' and it was concluded that the wreck was under this. However, at the time a means to remove the boulders was not available.
- 5.4.49. The 1954 salvage attempt moved an estimated 800 tons of silt and recovered a large number of timber fragments, heavily concreted shot, lead sheeting, an iron gun, pieces of pewter plate (McLeay 1986: 127) and a candlestick (contemporary British Pathé newsreel). Additionally a number of scatters of human bone and bone fragments were found, including a skull that was eventually dumped in the Sound of Mull in 1984 (McLeay 1986: 127). No coherent wooden structure was found.

#### **1975-6**

- 5.4.50. A further attempt at salvage was made in 1975-6 using water jetting equipment. The leader of the salvage team, Commander John Grattan, claimed to have discovered the exact position of the wreck on 29<sup>th</sup> August. Grattan stated that 'we pin-pointed the deck area, and dug a fairly small hole down to it' (McLeay 1986: 130). Grattan claimed to have found the poop deck.
- 5.4.51. The 12<sup>th</sup> Duke of Argyll gave the following account of diving on the salvage site (McLeay 1986: 131):
- 'I know I went down 80 feet [24m] because I was wearing a depth gauge. I felt the deck as I was told I would, at two levels, with a long steel probe, one at 18 feet [5.49m] and another at 12 feet [3.66m]. This was within one of many trenches that my father had dug.'
- 5.4.52. The Duke's statement indicates that he did not touch what he was told was deck, but felt it using a very long steel probe. This is somewhat at odds with Grattan's apparent claim to have 'put his [the Duke's] own hand on his own galleon' (McLeay 1986: 130).

- 5.4.53. It is difficult to know what to make of Grattan's findings as they do not appear to have been published. It is not known where exactly he located what he believes to have been deck. His theory that he found the poop deck appears to be at odds with the salvage accounts from the 17<sup>th</sup> and 18<sup>th</sup> centuries which appear to imply that this did not survive, at least not *in situ*. Furthermore his claims with regard to the extent of the survival of the stern appear to be contradicted by the contemporary accounts of the salvage work undertaken by Rowe.
- 5.4.54. However, Grattan is claimed to have recovered a small core from the deck which was then identified as 'Saharan oak planted in the 11<sup>th</sup> Century' (Quickberry website 2006). The analysis was apparently carried out by a laboratory at Harwell and the date was obtained by means of C14 dating. WA does not have access to the results of this analysis and therefore cannot comment on either the dating or the identification of the sample.
- 5.4.55. Brown and Whittaker (2000: 21) record that Grattan's team found a number of artefacts. These included pewter candlesticks, iron shot and lead sheathing.
- 5.4.56. Grattan has apparently described the seabed as consisting of a layer of silt over a thick layer of clay (Poop Company Ltd. undated: 10). It appears that the deck he claims to have found was in this layer or immediately below it.

## 1982

- 5.4.57. In 1982 Wharton Williams Taylor (more commonly known as '2W') and Stewart Marine undertook further salvage work. They were led by Mike Stewart, who had visited Grattan's operations.
- 5.4.58. The first salvage concern to declare itself more interested in archaeology than specie (McLeay 1982: 132), this salvage team first undertook a sub-bottom profiling survey (probably boomer), before driving one or three trenches inshore (McLeay 1986: 133 and Steve Barlow pers. comm. respectively). Very few artefacts seem to have been recovered. Brown and Whittaker (2000: 21), these include iron shot, bone, leather and 'shards' of pottery.
- 5.4.59. The exact position of the trenches dug by 2W is not known. However, analysis of the geophysical results obtained by WA and a photograph showing the location of the 2W barge in relation to the MacBrayne/Mishnish pier and the Western Isles Hotel (McLeay 1986: 88-89) suggest that at least one trench may have been in the location shown in **Figure 2**.
- 5.4.60. Stewart made the following interesting comment concerning the deck that Grattan states that he located (McLeay 1986: 133):

'I had already visited the Tobermory site when John Grattan and the McCormacks were working there. They always claimed to have located the deck, and certainly we found a very hard layer under the surface, but when we dug down to it, it turned out to be what the geologists call 'mud rock' and not wood. I wonder if John Grattan really found the wreck?'

## 5.5. POST WRECKING EVENT SITE FORMATION PROCESSES – NATURAL ENVIRONMENT

### **Tobermory Bay**

- 5.5.1. Tobermory Bay, also known and charted as Tobermory Harbour, is a sheltered environment that is rarely subject to large waves or swell. Although subject to a maximum tidal range of about 3.3m, the tidal stream through or around the western side of the Bay is not strong. The dominant flow is on the flood, when the stream moves into the south of the Bay and then flows to the north and then east in a clockwise ‘swirling’ motion (Alasdair MacLean pers. comm.).
- 5.5.2. The seabed shelves gradually from the shore to the east (except along the north shoreline near the ferry slipway where it slopes steeply) and attains depths of over 50m in the eastern part of the Bay. The seabed in the western half of the Bay appears from the WA chirp survey (**Figure 4**) to comprise a silt and/or clay unit, over a relatively thicker uncharacterised coarser sediment unit, above a bedrock unit probably comprised of tertiary lavas.
- 5.5.3. The WA survey noted a large number of seabed depressions, many of which are likely to result from the placement of moorings or of 20<sup>th</sup> century salvage of the site. The fact that these have not in-filled suggests that the seabed is stable.
- 5.5.4. Tobermory (St Mary’s Well) was built as a planned fishing station in 1788 on the north-west shore of the Bay. A quayside and road were built along the shore. In 1814 the first pier was built. The extent to which the shoreline moved seaward at this time is unclear. However, it appears possible that the shoreline ran along or just behind the buildings currently fronting Main Street (Alasdair MacLean pers. comm.). The small Tobermory River empties into the Bay just to the south of this. There is a second and smaller stream that empties into the Bay just to the north of the Fishermens Pier. This stream is culverted. There is no obvious submerged channel for either watercourse.
- 5.5.5. This study did not identify any readily available information concerning either the sedimentary or hydrodynamic regimes of the Bay, and it is not clear to what extent (if at all) they have been scientifically studied. The sheltered environment and the lack of strong tidal flows provide additional evidence that the general sedimentary environment is fairly stable, at least in the short and medium terms. Data concerning the amount of sediment moved in or out of the Bay by tidal streams does not appear to be available.
- 5.5.6. In the vicinity of the site the shoreline has been effectively protected from erosion as a result of the building of the town. The extent to which this has affected the general morphology of the seabed in the Bay is not known.
- 5.5.7. The Bay, particularly from its western edge out to as far east as the edge of the current moorings area, is known to be subject to silting, although it has never needed to be dredged (Alasdair MacLean pers. comm.). The Tobermory River appears to be a significant factor in this. It has a large catchment area and is believed to carry significant quantities of sediment when in spate, particularly after ploughing or after forest planting (such as has occurred in the late 20<sup>th</sup> century) or deforestation (as has occurred generally on Mull in the last few hundred years). It is also possible that the

fresh water flowing into the Bay from the river has a limited dilution effect upon water salinity in the vicinity of the river mouth.

- 5.5.8. To the north and south of the town the shore is not defended and is comprised of discontinuous low cliffs of tertiary lavas. There is no indication that rapid erosion of these cliffs is being experienced. The land climbs steeply above these cliffs and there may be some run-off of soil, but the amount is unlikely to be significant.

#### **The Seabed in the Vicinity of the Site**

- 5.5.9. We know from the late 17<sup>th</sup> century accounts of the 9<sup>th</sup> Earl of Argyll and Archibald Miller that the ship was found in 14m-18m of water (depending upon the state of the tide). Although it is not explicitly stated in their accounts, they clearly imply that the wreck was upright or nearly upright. The Earl of Argyll states that the seabed around the vessel was ‘a clean hard [hard] channel with a little sand on top and little or no mudd in most places about’. He also states that the hull forward of the mizzen mast was full of sand but does not state how deep the sand was. Miller refers to ‘soft Osie [mud?] ground’ between the wreck and the shore, which he describes as being ‘about one-finger stone-cast’ away.
- 5.5.10. It should be noted that as late as the 1730s, when Jacob Rowe was examining the seabed around the site, a number of guns were observed by his divers. Given that over 140 years had elapsed since the vessel sank, the fact that these guns were still visible suggests that they were lying directly on a firm or hard seabed.
- 5.5.11. In 1730 Rowe described the seabed on the eastern side of the wreck (the port side, given that Miller stated that the stern lay towards the north-west). We may conclude from this that by 1730 the wreck probably lay on a shallow slope that was either natural or created by scour or salvage.
- 5.5.12. The extent to which the wreck has interacted with the seabed and has influenced sedimentation both locally and within the Bay as a whole is unknown. The effect does not appear to have been overly dramatic because the wreck remained largely exposed when seen in the 1660s and was still visible until 1740 (152 years after the sinking).
- #### **Hydrodynamic Factors**
- 5.5.13. As noted above, Tobermory Bay is a relatively benign marine environment. Indeed it is so benign that the 9<sup>th</sup> Earl of Argyll commented that his workers could ‘dive at all tymes of the tyde in seasonable weather, and even when it was whyt water within lesse than a mile of the place’. It seems unlikely therefore that the wreck will have been significantly affected by wave action, except perhaps during exceptional storm conditions. Even then the effect is likely to have been minimised by the depth of water.
- 5.5.14. The limited tidal flow means that erosion to artefact surfaces caused by particulate matter carried in the flow of water in and around the wreck is likely to have been minimal. It also means that the stress caused to the structure of the wreck by the flow of water itself is also likely to have been minimal. Some scouring is likely to have occurred and this may have worked with gravity to partially bury the hull, although it appears clear from the eyewitness accounts that this process, if it was occurring at all, was very slow.

- 5.5.15. The extent to which the exposed wreck influenced sedimentation within the Bay by interrupting the tidal flow of water is unclear. As noted above, contemporary accounts suggest that the exposed hold of the vessel had partially in-filled with sand by the mid-1600s. This indicates that it was attracting some deposition of water-borne sediments. The account given by Rowe of a deeper seabed on the eastern side of the wreck is perhaps consistent with the tidal flow within the Bay described by Alisdair Maclean (see above), with sediment accumulating on the western side and scour on the eastern.
- 5.5.16. Map regression using historic maps available through the Canmore and THA websites suggests that the Tobermory River has emptied to the south of the possible positions of the site since at least the 19<sup>th</sup> century. However, prior to the reclamation of land for the seafront car park constructed in the 1990s, the river mouth was further east and the flow emerged south of the harbour. Run-off sediments of peat would then have been deposited east of the mouth and south of the harbour itself, from where they would then have been re-circulated to the north by the dominant tidal flow. This is believed to have resulted in a general accumulation of sediment from the Fishermens Pier to the east of the Mishnish Pier, including the moorings area (**Figure 2** and **Plate 1**) (Alasdair MacLean pers. comm.).
- 5.5.17. The extent to which the smaller stream has affected sedimentation within the Bay and therefore around the wreck is uncertain. It has been observed to transport some run-off sediment and although this appears to accumulate close to its outfall, it is believed to be redistributed further out into the Bay during south-easterly gales (Alasdair MacLean pers. comm.).
- 5.5.18. Since the construction of the car park, the mouth of the river has moved west and this has affected the direction of its outflow. As a result a bar is forming between the mouth of the river and the Fishermens Pier (Morag Brown pers. comm.).
- 5.5.19. It seems unlikely that the flow of water from the mouth of the Tobermory River had any direct effect upon the exposed wreck, unless it is much further south than is currently believed. However, the run-off from this river may have been moved in sufficient quantities to have contributed to the long-term burial of the site.

### **Biological Factors**

- 5.5.20. Contemporary accounts from the 1740s suggest that considerable marine growth could be seen on the site (McLeay 1986: 96, 184). This marine growth will have been mixed and will have included brown algae such as kelp. Such fouling is likely to have had a number of effects, possibly seasonal, such as reducing erosion to artefact surfaces caused by sea-borne particulate matter and reducing the transfer of chemical species between the wreck and open sea water (Jones et al. 2003: 16). Salvors such as Rowe and Miller do not appear to mention fouling but it seems extremely unlikely that the site was not heavily fouled within a short period after the wrecking event.

## **5.6. FINDS**

- 5.6.1. Details of what can be discerned from the secondary sources examined, concerning the finds recovered from the site by the various salvage attempts, are given above (an additional list of items auctioned in 1910 is given in **Appendix II**). This listing is

undoubtedly far from complete and, as the recoveries were made using salvage and not archaeological methods, very little contextual information can be gleaned from them.

- 5.6.2. It cannot be assumed that all of the finds recovered by the salvors are from the site. For example a photograph of finds recovered by salvors in the early 20<sup>th</sup> century that is on display in the Isle of Mull Museum appears to show a Bartmann type jug that looks later in form than 1588. By the time that the *San Juan de Sicilia* sank there, Tobermory Bay was well known as a good anchorage (see above). Recorded and probably unrecorded losses have occurred there and it is also reasonable to assume that a significant quantity of material has been dumped or lost from anchored vessels. Therefore it is highly unlikely that all of the recovered finds originate from the same vessel.
- 5.6.3. A detailed manifest exists for the ship in the Armada archives at Simancas. This would have been assembled from chits and receipts signed by the vessel's master and other officials. This manifest has not been examined for the purposes of this report. It is part reproduced in photographs accompanying McLeay's book (1986:90-91). The manifest is partially listed in **Appendix III**, insofar as it can be discerned from McLeay (1986: 167-187) and Martin (1998: 14-16). In addition the various aristocrats aboard the vessel are likely to have been carrying some personal possessions with them that would not have been recorded in the manifest.
- 5.6.4. There is some indication from historic accounts that a quantity of precious metal coinage and other items was onboard. Given that there is no surviving evidence for any significant quantity of specie or bullion being carried onboard the *San Juan de Sicilia* officially, the items were probably personal possessions of the more important individuals. It might be expected that aristocrats such as Don Diego would have had with them a modest quantity of coinage and jewellery and other items intended for prestigious display, such as plate. The commander and his aristocratic companions were reported at the time to have been 'always served in silver' (McLeay, 1986: 187). However, notwithstanding the initial confidence of the Spanish, these individuals are unlikely to have carried a very significant proportion of their personal wealth with them on such a risky venture.
- 5.6.5. In addition the master of the ship is known to have received payments from the Spanish authorities before the Armada sailed. McLeay's research (1986: 179-180) suggests that these payments totalled 10,480 escudos and 4 reals. Assuming that the crew was actually paid, McLeay concludes that a substantial part of this sum would have been paid out in wages and perhaps then spent before the ship sailed. The money paid to the master for the hire of the vessel may also have been sent back to the owners rather than kept onboard (supplies subsequently obtained by the master in Corunna were purchased on credit). Nevertheless it is possible that some of this money remained onboard when the vessel sank.
- 5.6.6. It is beyond the scope of this report to assess the various claims that have been made for the presence of a large quantity of specie on the site. Rumours appear to have arisen shortly after the loss of the vessel and it may well be that the 7<sup>th</sup> Earl of Argyll was told that a large sum of money had been carried onboard. It has also been suggested that whilst in Spain he may have been given a document that either had or was purported to have been taken from official Armada records and which recorded

a large sum of money onboard. This document may have been the ‘paper of Lattin’ that Miller claimed to have seen, although his description of it and the exact location of the money given suggests that Miller’s account may have been a fabrication designed to induce sponsorship (see above).

- 5.6.7. No hard evidence for this ‘treasure’ ever appears to have been produced and the surviving Armada records entirely fail to record or to imply its presence on board the vessel (the same records list large sums of money onboard other vessels). Whilst it is conceivable that there is no record because a document listing it as being onboard was removed from the official records (McLeay 1986: 36), it is likely that it would have been mentioned in other records as either onboard or missing if the sum involved was large. Furthermore if it had been onboard at the start of the campaign it seems unlikely that it would have been left on a ship that was noted to be struggling to keep up with the fleet as it retreated.
- 5.6.8. Given the apparent thoroughness of Jacob Rowe’s divers in dismantling the wreck, it seems improbable that his divers would have failed to find ‘thirty million in money’ had it been there. The only reasonable conclusion that can be drawn from this appears to be that it very probably never was.

## 5.7. SITE POSITION

- 5.7.1. As noted above, it would appear that the wreck ceased to be visible on the seabed by about 1740. Since then it is clear that successive salvage attempts have had great difficulty in locating the wreck - and it is certainly arguable that they did not.
- 5.7.2. It is assumed that the vessel was anchored somewhere in Tobermory Bay before the explosion. There do not appear to be any documentary sources that describe where exactly she was anchored or where she sank.
- 5.7.3. A significant part of the forecastle reputedly landed on the shore following the explosion (Brown and Whittaker 2000: 17). If this is to be believed (the quote is from a colourful and quite possibly fictional account of 1830), this suggests that the vessel was fairly close inshore when the explosion occurred.
- 5.7.4. In 1677 the 9<sup>th</sup> Earl of Argyll, who appears to have closely supervised bell diving operations, described the wreck as lying between a small island (assumed to be Calve, see **Figure 1**) and a bay (assumed to be Tobermory Bay). He stated that it lay in eight and ten fathoms (approximately 14m-18m) at low and high water respectively, which indicates that it lay in the inner part of the Bay. **Figure 1** shows the approximate line of the 10 and 15 metre contours, although intervening sedimentation may have reduced their significance as an indicator of the position of the wreck.
- 5.7.5. In 1683 Archibald Miller stated that the wreck lay ‘one finger stone-cast’ from the shore and was orientated with its stern to the north-west. It is not known how far ‘one finger stone-cast’ was, although it appears very doubtful that it was a distance exceeding 50 metres. Miller also stated that the stern of the vessel ‘lyes into the shore’, which suggests that she was closer to the north side of the Bay than to the south (**Figure 1**).

- 5.7.6. It is not known where exactly the 17<sup>th</sup> century shoreline was. An extensive quayside and settlement was built in 1788 and there do not appear to be any reliable or detailed maps available for the period prior to this. However, there appears to be some topographical and building evidence to suggest that it ran along or just behind the buildings fronting Main Street (see above) and that the shoreline has therefore moved a significant distance seaward since the 17<sup>th</sup> century.
- 5.7.7. A map, possibly created by Jacob Rowe, showing the position of the wreck is reported to have existed (see above). However, WA has not seen this map and, as it now appears to be lost, its existence must be open to considerable doubt.
- 5.7.8. The last visual sighting of the wreck itself appears to have been in about 1740. Thereafter it is not clear whether any of the subsequent salvors actually relocated the original site of the wreck or, if they did, whether they realised that they had. Many artefacts were recovered but this material could have come from a debris field associated with either the explosion and sinking or the subsequent salvage (in particular Rowe's apparently thorough demolition).
- 5.7.9. Many of the subsequent salvors appear to have searched wide areas of the seabed and the exact position of their excavations is largely unknown. Although a map may have existed in the possession of the 12<sup>th</sup> Duke of Argyll, its current whereabouts do not appear to be known (Quickberry website 04/09/06, quoting an e-mail received from Mathew French and John Grattan). A number of depressions in the seabed certainly do exist, but it is highly unlikely that excavations preceding those of John Grattan in the 1970s can be positively identified amongst them.
- 5.7.10. A photograph taken from the 2W barge in 1982 shows the barge to be directly off and just to the east of the current Caledonian MacBrayne office on the Mishnish Pier. It is believed that John Grattan's excavation was to the west of this position (**Figure 2**). The WA geophysical results indicate that extensive and steep sided depressions exist in the seabed there and this has been confirmed by WA ground-truthing. WA understands that this is the area that the prospective salvors (with the assistance of John Grattan) have identified as being the current position of the wreck.
- 5.7.11. The significance of this identification depends upon the strength of the evidence available to the salvors. Fathoms have undertaken some form of sub-bottom profiling survey, which may have been by either boomer or chirp. John Grattan presumably has an exact position for the deck that he believes he found. Unfortunately WA understands that this evidence has not been made available to HS and it is therefore difficult to assess. What can however be said is that some doubt appears to have been cast upon what Grattan did find in 1975-6 and it appears unlikely (but not impossible) that the sub-bottom survey would have detected the type of remnant structure that Rowe describes as having been left by his operations. These doubts are such that it must remain open to doubt as to whether the current salvage concern has correctly identified the site of the wreck.
- 5.7.12. A tradition exists locally that the wreck is located close to the current lifeboat mooring (**Figure 2**). This tradition is reflected in the display on the wreck at the Isle of Mull Museum, where the approximate location is circled on an aerial photograph of the harbour. The Archaeology Notes section of the NMRS record for the site (NM55NW 8013), quoting Macnab (1970), describes the position of the ship when it

sank as being ‘300 yards off what is now the New Pier’ (the Caledonian MacBrayne pier). Given that the wreck ceased to be visible in about 1740, this tradition may be based more upon the position of 20<sup>th</sup> century salvage barges rather than any firm evidence for wreck structure. This position is certainly not within the ‘one-finger stone-cast’ of Archibald Miller. Furthermore no evidence of buried structure was observed in the chirp data and no relevant anomalies were detected in the sidescan data in the vicinity of the lifeboat mooring.

- 5.7.13. A local diver, Steve Barlow, has observed exposed timber structure close to the north-east edge of the current local moorings area (**Figure 2**) (Steve Barlow pers. comm.). Mr. Barlow expressed the view that this structure, which he estimated to have been about 20 square feet in area, could have been from one of a number of losses in the area. Unfortunately this information was not received in time to facilitate a seabed search of the area. However, the reported position of the remains seen by Mr. Barlow appears to be both too far east and too deep to be the wreck and no anomaly fitting the description was observed in the sidescan data.
- 5.7.14. It is therefore possible that our only reliable guides to the position of the wreck are the comments of the 9<sup>th</sup> Earl and Archibald Miller. The Earl’s description places the wreck in the inner (western) part of Tobermory Bay. Miller places it in the northern part of the inner bay, within perhaps 50m of the shore (**Figure 2**). Given uncertainties concerning the position of the 17<sup>th</sup> century shoreline, this distance measurement is not as helpful as it might be.
- 5.7.15. Some doubt must also attach itself to the comments made by Miller with regard to distance from the shore because of the time that elapsed between his work on site and the date of his account. Although the ship was being provided with supplies by the Macleans, the crew would undoubtedly have wished to guard against an attempt to seize. Therefore unlikely that they would have anchored so close inshore, within both bow and musket shot and from where it could easily have been rushed by a force in small boats. It is also highly unlikely that a large sailing vessel would have been anchored within 50m of the shore because of the danger of dragging anchors and running aground in any gale from the east (this is the only direction from which the inner bay is not sheltered). It is however possible that either the explosion or the subsequent fire parted the cables, allowing the vessel to drift inshore before sinking.
- 5.7.16. It is possible that **5006** may be part of the wreck or a large artefact associated with the debris fields. However, until it is ground-truthed, this identification must remain a matter of speculation.
- 5.7.17. The February 2006 issue of ‘Lorn Life’ carried an article on the site. The article stated that a former resident of Oban, Mike Thomas Monroe (described as ‘an authentic treasure hunter’), claimed to have located the site. The article stated that Mr. Monroe had ‘dived in Tobermory Harbour in the 1970s when the expedition [Grattan’s?] was abandoned due to sand at dangerous depths [?]’. Mr. Monroe claimed to have found a map (in a Chinese carved ivory case) made by a man called Raymond Hawke on which the location of the wreck was marked. The article quotes Mr. Monroe as saying that he ‘trawled the Bay’ using a ‘crane ship’ and ‘all the treasure came up’. The article states that Mr. Monroe has written a book on the site called ‘Too Long in Vera Cruz’ and that the ‘pieces of eight, gold doubloons, crucifixes, pottery and iron nails’ recovered by him are being ‘authenticated’ at the

Smithsonian Institute. WA has not examined either the book or Mr. Monroe's claims.

## 6. ARCHAEOLOGICAL CONCLUSIONS

### 6.1. TYPE OF SITE AND INITIAL SITE FORMATION PROCESS

- 6.1.1. The archaeological material recovered from the site since the 1700s and the available documentary evidence concerning its salvage are consistent with the presence in Tobermory Bay of the wreck of the 1588 Armada ship referred to in contemporary accounts. Although WA has not undertaken an analysis of original source material, sufficient evidence appears to be available in secondary sources to positively identify the ship as being the *San Juan de Sicilia*, a Ragusan argosy (carrack). The evidence supporting the alternative theory that the vessel is the *Florencia* conversely appears to be weak and does not stand close scrutiny. Despite being popularly known as a Spanish galleon, the ship was neither Spanish nor a galleon.
- 6.1.2. The *San Juan de Sicilia* appears to have been heavily damaged during the Armada campaign. Whilst undertaking the 'north around' route back to Spain, she appears to have fallen behind the fleet. Having been further held up by bad weather, a decision appears to have been taken to seek refuge in Tobermory Bay in order to effect repairs. However, whilst she was in the Bay she exploded, caught fire and then sank. The explosion was probably caused either by an English agent or by an accident whilst drying gunpowder, although it remains possible that it was caused by the actions of the local clan chief, Lachlan MacLean. It seems likely that most of the vessel above the waterline and forward of the mizzen mast was destroyed before the ship sank and debris was probably scattered over a wide area.
- 6.1.3. After it sank, the vessel appears to have come to rest, hull completely submerged, in 14m-18m of water. Part of the stern survived to a height of at least 9m above the seabed. Subsequent seabed descriptions from the mid-1600s suggest that the vessel settled onto a firm compacted seabed covered by a thin layer of sand. The extent to which the lower hull became immediately buried is uncertain, but the height of the wreck above the seabed and the description of a firm seabed suggest that it did not bury to any significant extent.
- 6.1.4. The fact that the vessel exploded suggests that a significant debris field is likely to exist from the sinking. This is supported by the fact that 19<sup>th</sup> and 20<sup>th</sup> century salvors have recovered artefacts believed to be from the ship from different parts of the Bay. A number of guns and possibly other wreck material including concretions were observed by early salvors to be scattered around the hull, approximately 20 yards away. The fact that these appear to have been located a small but noticeable distance away suggests that they may have been blown out of the ship and that it therefore sank where it was anchored and without drifting. No evidence of a debris trail that might indicate that the vessel moved either before or after sinking appears to have been found, although that is not to say that it does not exist.

## 6.2. SUBSEQUENT SITE FORMATION PROCESSES

### 1588-1740

- 6.2.1. The wreck did not break up as a result of environmental processes and probably survived until the mid-16<sup>th</sup> century in a broadly similar condition to when it sank. The descriptions given suggest that some re-deposition of sand occurred within the hull but that otherwise the wreck remained largely unburied.
- 6.2.2. In the intervening period, the exposed wreck is likely to have been covered with seasonal marine growth that may have had some protective value but which may also have caused some drag and additional stress to the vessel structure. Marine bacteria and fungi are likely to have colonised the site, and organic artefacts including the wooden structure of the vessel will have started to decay slowly. Marine borers, probably led by *Limnoria* and followed by *Chelura terebrans* would have colonised the wreck and attacked the exposed structure. Most metal artefacts would have begun to corrode, with iron artefacts most rapidly affected. Concretion will have begun to form on these.
- 6.2.3. From the mid-16<sup>th</sup> century until about 1740 the site was subject to very extensive salvage. Modern salvors tend to underestimate the capabilities of their early predecessors, perhaps because it is sometimes in their interests to do so, and some doubt has been cast upon how thorough this phase of salvage was (French 2006). However, the contemporary accounts of the salvors of this period do suggest that the salvage was indeed thorough, and that by 1740 most of the wreck had been dismantled and cleared. The account given by Jacob Rowe makes it clear that ballast was removed and that only a section of floor timbers (of unknown area) survived this period of salvage. There do not appear to be any convincing reasons why the accounts of this period should not be regarded as being credible or why any section of the stern of the vessel should have been spared and therefore it seems likely that they are correct.
- 6.2.4. It appears likely that a secondary debris field, consisting of artefacts and other material, including ballast, gradually developed over the initial debris field during this period of salvage. The growth of this debris field is likely to have been fairly intense during Rowe's operations, when material excavated from within the hull was presumably dumped away from the wreck. There is a strong probability that the boundary between the two debris fields became blurred, particularly when Rowe turned his attention to the seabed outside the hull.
- 6.2.5. It would appear that 1740 marked the last date that the remaining part of the wreck was visible (Note: this means visible from the surface as a shape on the seabed, there is no suggestion that structural elements in any way broke the surface of the water at this time). It seems generally assumed that this is because the remaining part of the wreck finally sank under its own weight and became buried. There are two possible mechanisms for this. Firstly, a combination of gravity acting upon the remaining hull structure to sink it within existing soft sediments, together with a gradual deposition of fine grained sediments, at least partly from the Tobermory River. Secondly, gravity may have had no significant effect and the depth of burial is therefore likely to have been relatively shallow. Of these two mechanisms, it is perhaps the latter that is more likely because the contemporary accounts suggest that the seabed was firm or hard and that the ballast was largely if not entirely removed.

6.2.6. However, it is also possible that the remaining section of floor timbers simply disintegrated. If this has occurred, then the mechanism is likely to have been environmental factors acting upon a structure already severely stressed by the recent salvage. Despite the weight of tradition behind the burial theory, the disintegration explanation is not easily dismissed, because of the firm seabed and the likelihood that the ship structure that survived the salvage lacked a protective covering of ballast and concretion.

#### **1741-2006**

- 6.2.7. Assessing the subsequent history of the site is not easy because the mechanism for its disappearance in 1740 is uncertain, and because no one has either relocated it or has published sufficient information to enable a claim that it has been relocated to be assessed.
- 6.2.8. Assuming that the remaining wreck structure was buried in or about 1740 as a result of gravity and sedimentation, it is reasonable to assume that the wreck continued to sink as a result. It will then have either come to rest on bedrock or a resistant layer of sediment that was either already compacted or had compacted as a result of the weight of the wreck. Debris fields are unlikely to have had a similar concentrated mass and are therefore likely to have behaved differently and they may be expected to be less deeply buried, except possibly for very heavy individual objects such as large guns.
- 6.2.9. Assuming that the wreck has not subsequently been completely destroyed by salvage, the current depth of burial is likely to be the distance between the 1740 seabed and the current position of the wreck plus the depth of sedimentation since. Unfortunately there simply is not enough reliable data to make this calculation possible.
- 6.2.10. Assuming that gravity was not involved, the wreck is likely to be buried by only the depth of sediment that has accumulated since 1740. Again this calculation is impossible due to lack of data. In this scenario, a significant vertical distribution of artefacts between debris field and wreck is unlikely.
- 6.2.11. It is certainly possible that any remaining wreck structure could have been destroyed by the subsequent salvage attempts in the 19<sup>th</sup> and 20<sup>th</sup> centuries. Some fairly brutal methods appear to have been used that resulted in considerable damage to the few artefacts recovered. Nevertheless fragments of wood were discovered. Quite how much wood was recovered is however unknown and it may be that it was isolated pieces recovered from a buried debris field as opposed to being broken from a structure.
- 6.2.12. The condition of any wreck structure that has survived the salvage efforts is likely to depend upon environmental factors, principally the depth of burial. Anecdotal evidence suggests that the type and depth of burial sediments may have promoted an anoxic burial environment that is conducive to the survival of wood and other organic materials and it may be that attack by marine bacteria and fungi and wood boring organisms has been slowed or halted.
- 6.2.13. The fate of the two debris fields that are likely to have existed is also unknown. The fact that 19<sup>th</sup> and 20<sup>th</sup> century salvors have recovered artefacts associated with the

site demonstrates that they have encountered surviving debris fields and reworking and further dispersal will therefore have occurred. The continued survival of these deposits is demonstrated by the recovery of material during the last salvage work in 1982.

- 6.2.14. Unfortunately it is difficult to know how deeply deposits associated with them are buried because this information does not appear to have been either recorded or published by the salvors. Similar information about their horizontal disposition is also lacking. It is impossible to determine how extensive they are and to what extent they can be differentiated. The condition of artefacts within the debris fields is also likely to have been affected by environmental factors in the same way that any surviving ship structure will have been. The apparent recovery of leather in 1982 (Brown and Whittaker 2000: 21) suggests a burial environment conducive to the survival of organic remains, although an association with the site may not have been proven.

### 6.3. OVERALL CHARACTERISATION

- 6.3.1. The overall character of the site can be summarised as follows:

Area and distribution of surviving ship structure:	Unknown. Salvage of the site has not been subject to archaeological methods or control and very little data appears to be available in publicly accessible sources or at all. The wreck was last visible in about 1740 and the position of any surviving ship structure is highly uncertain. John Grattan claims to have found the stern of the vessel in 1975, but insufficient evidence is available to assess this claim and it must therefore be treated with considerable caution. Contemporary salvage accounts suggest that Jacob Rowe's divers dismantled the wreck and that only a section of floor timbers (and presumably the keel) remained. The size of this remaining coherent section of hull is unknown – it may have been the entire length of the keel or just a part of it. It is not known whether any significant section of the ships structure has survived environmental forces and subsequent salvage.
Description of seabed environment	Sub-bottom profiling using a chirp system suggests that the western part of the Tobermory Bay seabed consists largely of a fine-grained sediment unit, probably of silt and/or clay, which overlies a coarse-grained compacted sediment unit that is possibly comprised of sands or gravels. Below this is a probable basement bedrock unit, probably consisting of tertiary lavas. The thickness of these units is variable, with the bedrock unit observed to vary between 5-20m sub-seabed. The compacted sediment unit varies between 1-11m sub-seabed. Towards the northern edge of the geophysical study area (believed to be the site of the most recent salvage attempts), significant reflectors are absent and it is possible that the boundary between the two sedimentary units has been rendered invisible by reworking associated with excavation.
Character of ship structure:	Uncertain. The ship was almost certainly a Ragusan argosy. It was probably carvel-built and in the region of 30m long by 10m breadth. Probably of Mediterranean carrack-type with high stern and forecastles, it had at least three masts.
Depth and character of stratigraphy:	Unknown. Deposits related to the possible surviving ship structure and to debris fields resulting from the sinking and the subsequent salvage may exist, although these may have been substantially reworked by 19 <sup>th</sup> and 20 <sup>th</sup> century salvage. The possibility of a substantial overburden of soft sediments exists, which tradition suggests may be several metres deep. However the possibility that the site has never been deeply buried cannot be discounted.

Volume and quality of artefactual and environmental evidence, including cargo, ordnance, domestic assemblage, etc.:	Uncertain. The limited records that exist concerning artefacts recovered during salvage suggest an assemblage typical of that which might be expected of an Armada transport/warship. A substantial number of guns have been recovered, including two large siege pieces almost certainly carried as cargo. A substantial domestic assemblage, war stores and ships supplies have also been recovered. In addition a limited quantity of coins and precious metal tableware is recorded. Very few of the recovered artefacts are traceable, published or currently accessible to the public.
Site formation and transformation processes	<p>The vessel sank in 14m-18m of water in the western part of Tobermory Bay, with its stern to the north-west and towards the shore. The vessel appears to have largely burnt to the waterline before it sank.</p> <p>The wreck appears to have survived exposed in the general condition that it sank in until the mid-1600s, when salvage work prompted by rumours of treasure began. When seen by divers in the 1660s the decks forward of the mizzen mast were noted to be absent with what appears to have been the hold exposed. However a section of the stern survived at least to the upper deck, with debris from the great cabin and possibly from the poop deck above that to a height of 9m above the seabed. The wreck appears to have been largely exposed.</p> <p>Between 1645 and 1740 the wreck appears to have been very thoroughly salvaged and the coherent structure of the ship reduced to the level of the floor timbers. The wreck was last seen exposed in about 1740, when it either ceased to exist as a coherent structure or was buried by sedimentation.</p> <p>Subsequently the position of the wreck was lost and large areas of seabed have been reworked by 19<sup>th</sup> and 20<sup>th</sup> century salvors. Although artefacts have been recovered during these salvage operations, they have been poorly recorded, with the result that the position of excavations or of recovered finds is either unknown or only generally known.</p> <p>This salvage has been large-scale and has involved the use of grabs and cutting machines. It is possible that surviving archaeological deposits associated with the site, including any surviving ship structure, have been destroyed or severely damaged as a result. Sedimentation is known to occur in Tobermory Bay, albeit generally slowly, but the depth of burial of any surviving archaeological deposits is uncertain.</p>
Apparent date of ship's construction and/or loss:	The wreck has been positively identified as being that of the <i>San Juan de Sicilia</i> , lost in 1588, probably on 5 <sup>th</sup> November as a result of an explosion and subsequent fire. WA has been unable to establish a date for the construction of the ship, but it is possible that a further study of primary or secondary sources may provide this.
Apparent function:	Merchant vessel commandeered as a fighting ship and war transport by the Spanish.
Apparent origin:	Ragusa (modern Dubrovnik)

## 7. HERITAGE MANAGEMENT CONCLUSIONS

### 7.1. SITE POSITION

- 7.1.1. The evidence suggests that the ship is likely to have sunk fairly close inshore in the north-west part of the Bay, within the area shown in **Figure 2**. Despite extensive salvage efforts from the 17<sup>th</sup> to the 20<sup>th</sup> centuries, the positions of both site and wreck are uncertain, with the best positional information coming from accounts written in the 1700s.

- 7.1.2. WA does not have sufficient information to assess the claims made by John Grattan and the Poop Company Limited to have found the stern of the vessel. However, it should be noted that the WA geophysical survey found no trace of it in the area that the consortium claims to have located it and contemporary accounts suggest that this part of the ship is likely to have been destroyed by previous salvors.

## **7.2. ENVIRONMENTAL IMPACTS**

- 7.2.1. Given that the position of the site is uncertain, it is not possible to determine whether natural environmental processes are likely to have an impact upon it. Tobermory Bay appears to be a fairly benign and stable environment, at least in the short term, and significant damage to archaeological deposits is not expected to occur through natural processes. However, it is not inconceivable that the changes in the outflow of the Tobermory River, that appear to have resulted in the formation of a bar between the river mouth and the Fishermens Pier, could have had an effect upon the burial depth of the site.

## **7.3. HUMAN INTERVENTION**

### **Outfall Scheme**

- 7.3.1. Given that the position of the site is not known, it is not possible to determine whether the outfall scheme has had an impact upon it. Theoretically if the pipes have been laid above a seabed containing artefacts or ship structure that is not deeply buried, then the pipes may impact upon these deposits as they sink into the seabed under the weight of the concrete matting.
- 7.3.2. It would appear that some mitigation may have already occurred in that the route of the pipes appears to have been chosen to avoid passing over an area of deep depressions that are likely to be remnant salvage trenches. Further mitigation is not recommended.

### **Moorings**

- 7.3.3. For the same reason, it is not possible to determine whether the ground tackle of modern moorings is likely to have an impact upon the site. However, it would appear that most of the moorings are of the gravity type, using a combination of chain and small-medium concrete blocks (Jim Traynor pers. comm.). These are only likely to impact upon shallow archaeological deposits.

### **Controls**

- 7.3.4. Enquiries made of Tobermory Harbour Association (THA) suggest that no local bylaws apply to the seabed. However, THA has the lease of the seabed from Crown Estates and is apparently consulted with regard to all applications for licences by Crown Estates. THA has not been consulted by either the Poop Company Limited or Fathoms with regard to the proposed operations (Morag Brown pers. comm.).

### **Proposed Salvage Operation**

- 7.3.5. The Poop Company has issued a briefing document (undated) for investors. This document gives brief details of the proposed salvage operation.
- 7.3.6. This indicates that the salvors intend to excavate overburden from their target area using either an air lift or a specialised jetting tool. It appears that the sediments

removed will be screened for small artefacts before being dumped at some distance from the excavation. Valuable artefacts will be removed from any wreck structure before it is subject to examination. They appear to expect the structure to be in a sufficiently good condition for it then to be recovered whole to the surface.

- 7.3.7. The briefing paper refers to the salvage operation having a ‘scientific approach’. It is assumed that a limited form of archaeological component is anticipated as they propose to hire a single archaeologist. It is not known what the archaeological component will be, although the wording of the briefing document suggests that it may not be prominent. It should be noted in this context that although the document states that an environmental impact assessment will be carried out, ‘an archaeological survey of the site is meaningless’. Furthermore the funding arrangements described in the report make no provision for post-excavation work.
- 7.3.8. The document is also silent as to how the bulk of the finds will be handled and their ultimate fate. In calculating the funding no provision appears to have been made for conservation or study, and no mention is made with regard to their curation. The briefing document does not state how any intact hull structure will be dealt with once it has been recovered.
- 7.3.9. Complete excavation, i.e. destruction of the target area, is anticipated by the briefing document. It is possible that further documentation may exist detailing a more adequate approach to the archaeological component of the proposed work. However, if it is to be judged solely from the briefing paper, it appears likely to fall far short of the standard of work that the public now expect to be carried out on important archaeological sites.

## **8. ASSESSMENT AGAINST STATUTORY CRITERIA**

### **8.1. ASSESSMENT SCALE**

- 8.1.1. For each criterion, one of the following draft grades has been selected. This has been done to help assess the relative importance of the criteria as they apply to the sites. The categories are ‘scored’ in accordance with the following scale:
- Uncertain - Insufficient evidence to comment;
  - Not valuable - This category does not give the site any special importance;
  - Moderately valuable - This category makes the site more important than the average wreck site, but not exceptional;
  - Highly valuable - This category gives the site a high degree of importance. A site that is designated is likely to have at least two criteria graded as highly valuable;
  - Extremely valuable - This category makes the site exceptionally important. The site could be designated on the grounds of this category alone.

## 8.2. ASSESSMENT

- 8.2.1. The site is a wreck site and can therefore be designated under the Protection of Wrecks Act (1973).

### **Period**

- 8.2.2. Extremely valuable. The site is directly associated with and therefore illuminates one of the seminal events in the history of the British Isles, the defeat of the 1588 Spanish Armada. Only one other Armada wreck is currently protected in UK waters, that of the *Girona* in Northern Ireland. Given that the *Girona* was a galleass, an oared warship, the *San Juan de Sicilia* would represent the only protected example of the merchant carracks that made up the bulk of the Armada. WA is aware of no other Ragusan argosies that are known to survive and the site therefore has an international significance beyond the UK and Spain.

### **Rarity**

- 8.2.3. Highly valuable. Known 16<sup>th</sup> century wrecks are very rare. Therefore the loss of what may remain of this site to salvage would be significantly adverse.

### **Documentation**

- 8.2.4. Extremely valuable. Given its age, the site is very rare in terms of the quantity and diversity of its documentation. Regardless of period, it is extremely rare for a detailed manifest to survive and very unusual for such a detailed record of the vessel's movements and the circumstances of these movements to survive. The archive material is also very diverse, ranging from the manifest, to the accounts of Ragusan sailor survivors, to the possible machinations of Walsingham and his lieutenants.

### **Group Value**

- 8.2.5. Highly valuable. The site has considerable importance in terms of group value on a number of levels. Firstly it is one of a group of Armada vessels known to have been lost on the western seaboard of the British Isles and Ireland as a result of the retreat of the Spanish Armada. Secondly it is a not insignificant part of the historic maritime environment of the Sound of Mull (that includes three other designated wrecks). Thirdly it is directly associated with the terrestrial history of the region and with local ancient monuments such as Mingary Castle, which the vessel's soldiers briefly besieged whilst serving the MacLeans.

### **Survival / Condition**

- 8.2.6. Uncertain. The site has been so heavily salvaged that it is possible that the structure of the vessel may have ceased to exist in any cohesive sense and that all that remains is a scattered spread of debris and artefacts. The extent and density of such a debris field is highly uncertain.

### **Fragility / Vulnerability**

- 8.2.7. Uncertain. If no structure remains, then fragility and vulnerability will depend upon the extent and density of any debris field. If the current salvage consortium has correctly identified the position of the wreck, then its operations are likely to destroy the site. Uncertainty with regard to their methodology means that there is potential for the loss of both information and artefacts.

**Diversity**

- 8.2.8. Highly important. As a rare surviving example of a Ragusan argosy, the site is highly important in terms of the diversity of carrack design.

**Potential**

- 8.2.9. Uncertain. The potential will depend upon the extent of survival. Given the doubts with regard to this, the potential may actually be quite low.

**9. RECOMMENDATIONS****9.1. ARCHAEOLOGICAL**

- 9.1.1. It would aid the archaeological understanding of the site if HS were able to obtain and assess the following data:

- Sub-bottom profiling data acquired by the Poop Company Ltd;
- The position of the deck that John Grattan claims to have located in 1975-6;
- A copy of the analysis of the wood sample prepared by Harwell, the original wood sample recovered by Grattan and the documentation associated with it.

- 9.1.2. It would aid the archaeological understanding of the site if it were subject to a more detailed assessment of the available primary documentary and artefactual evidence than has been possible for this report. The aim of this should be to catalogue and collate an archive of original or copy documents concerning the *San Juan de Sicilia* and the history of the salvage of the site. This assessment should, if possible, include documentation held with the Armada records at Simancas and by the Duke of Argyll at Inverary, at least in terms of the type of evidence that is available (rather than a copy of every document). It is recommended that this archive should then be curated by and made publicly accessible at the Isle of Mull Museum, with a summary added to the RCAHMS records and distributed to existing stakeholders.

- 9.1.3. It is recommended that an assessment of the artefacts recovered from the site be undertaken. The aim of this study should be to collate a list, from all available sources, of artefacts recovered from the site and to fully record all that can be traced. The number and nature of the salvage operations mean that a full catalogue is not likely to be a viable option, but some work would aid with the understanding of the wreck.

- 9.1.4. The above recommendations would fall within the compass of an archaeological desk-based assessment. Further diving fieldwork by the archaeological contractor is not recommended unless the position of the site can be pinpointed with greater accuracy. Further ground-truthing of anomalies identified by sub-bottom profiling is unlikely to be productive unless invasive work is sanctioned and properly resourced. Coring would assist in determining the nature of the seabed deposits identified as a result of the WA chirp survey but the depth of sediment involved may make this an expensive study.

## 9.2. HERITAGE MANAGEMENT

- 9.2.1. The site appears to meet the criteria for designation with some ease. However, notwithstanding the fact that it is likely that some remains associated with the vessel survive on the seabed, WA does not recommend designation at this stage because the position and survival of the site is so uncertain. Tobermory Bay is a busy anchorage and harbour and designation is likely to impact upon the established activities of a number of recreational and commercial user groups. In addition there are other potential stakeholders whose interests may be affected, such as the proposed salvors, and in this respect there may be scope for dispute involving conflict of laws if designation is used to restrict their operations.
- 9.2.2. Instead WA recommends that the question of designation should be kept under review and that the possibility of future emergency designation should be considered if concrete evidence for the presence of further archaeological remains is obtained. Unless HS intends to fund excavations within the bay, the most likely source of artefactual and/or structural evidence is the proposed salvage works. Any finds recovered in this manner must be reported to the Receiver of Wreck (Maritime and Coastguard Agency) under the terms of the Merchant Shipping Act 1995. In view of the importance of the wreck the identification of 16<sup>th</sup> century hull remains and/or clusters of 16<sup>th</sup> century artefacts (as opposed to single isolated finds) should be reported to HS prior to recovery, and this should trigger consideration of a further assessment of the site by HS. In the meantime consideration should be given to mitigating the potential impact of proposed salvage operations through the licensing processes appropriate for seabed development within the area.
- 9.2.3. Whilst the wreck does appear to be that of the *San Juan de Sicilia*, it is recommended if the site is designated that a form of words is used that avoids naming the vessel. Recent experience with sites such as the Welsh site designated as the *Diamond* but no longer believed to be that vessel (WA 2004) has demonstrated that naming a wreck in a designation should be avoided if there is any doubt whatsoever about the identification. A form of words such as ‘the wreck known as the Tobermory Galleon’ may be appropriate instead.
- 9.2.4. It is recommended that more information be sought from the current salvage consortium with regard to the archaeological, conservation and curatorial components of its proposed operation. The historic importance of the site should be stressed as should be the potential for considerable negative publicity for all concerned if public expectations with regard to heritage management are not met. The Duke of Argyll in particular may have concerns in this respect.
- 9.2.5. A close dialogue between HS and THA would be beneficial. This is likely to assist in the management of the site, regardless of whether it is designated or not. For example, archaeologically sensitive changes in seabed morphology could be monitored through THA in a way that would not impose any financial or undue administrative burden upon them. Diving contractors, such as those employed by THA to inspect moorings, could be encouraged to report observations that may be archaeologically relevant to THA, who could then inform HS.
- 9.2.6. The site is well known locally and there is considerable potential for local stewardship. Promotion of the site in an archaeological context, possibly in

conjunction with THA, the Isle of Mull Museum and Argyll and Bute Council and involving local schools and media, should be considered as a medium and long-term priority.

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## 11. ARCHIVE

- 11.1.1. The project archive consisting of a WA Access database and other computer records, together with digital photographs, DV tapes, dive logs and miscellaneous hardcopy photographs are currently stored at WA under project code 53111.

**APPENDIX I: CONTEXT INDEX**

<b>Context No.</b>	<b>Outline Description</b>	<b>Stratigraphic Sequence</b>
<b>3001</b>	Seabed depression	Cuts 3007
<b>3002</b>	Seabed depression	Cuts 3007
<b>3003</b>	Mooring ground tackle	Above and cuts 3007
<b>3004</b>	Seabed depression	Cuts 3007
<b>3005</b>	Seabed depression	Cuts 3007
<b>3006</b>	New SWS outfall pipes	Above and cuts 3007
<b>3007</b>	Fine grained sediment, possibly silt or clay	Above 3008 and 3009
<b>3008</b>	Coarse grained compacted sediment, possibly sand and gravels	Below 3007, above 3009
<b>3009</b>	Bedrock	Below 3007 and 3008

## APPENDIX II: ARTEFACTS SOLD AT AUCTION IN 1910

The following artefacts, recovered from the site by Lt. Col. Foss, were auctioned in London in 1910 (Brown and Whittaker 2000: 22) (Note: 'Incrusted' probably means concreted).

- Incrustation of gun barrel
- Part of a chain, understood to be fetters of malefactors
- Part of a gunstock with ramrod inside
- Scabbard of lance, incrustated, showing leather in fairly good preservation
- Ramrod legavation wood, covered with lead for ramming home shot into gun
- Old wine bottle (broken)
- Head on an old iron bolt, incrustated
- Incrustation of gun barrel
- Gun breach wedge, incrustated
- Gun barrel, incrustated with form of gunstock
- Old hatchet, incrustated
- Piece of wood, incrustated with impression of old chain
- Piece of old earthenware from the Florencia
- Encrustated topmast fid
- Iron band for wooden stock
- Two-piece sheet lead, used for covering wood on exposed parts, tar still adhering to same
- Incrustation, showing where gun barrel has been
- Piece of broken explosive bomb
- Piece of wood from the Florencia
- Barrel of gun and small bone, incrustated
- Iron spike in wood, heavily incrustated
- Piece of wood from the Florencia
- Scoop, with piece of wood attached to the end
- Piece of incrustation with scabbards incrustated
- Incrustation showing scabbard
- Incrustation of gun barrel
- Two pieces of wood from the Florencia
- Soup plate, taken from the ship
- Two old broken bottles
- Sheet lead, taken from the ship
- Two old broken bottles
- Old gun barrel
- Jar, broken, taken from the ship

The catalogue also lists two 'Spanish Armada treasure chest(s) of wrought iron, 24.5 inches long, 14.5 inches high and 15 inches wide', one of which still had its key. It seems unlikely that these chests actually came from the site.

**APPENDIX III: THE MANIFEST OF THE *SAN JUAN DE SICILIA***

The following items are recorded in the manifest of the *San Juan de Sicilia*. The list is taken from a number of secondary sources and is far from complete, but does give an indication as to the wide range of items carried on board. The quantity, where given, is in brackets:

<p style="text-align: center;"><b>Food and drink</b></p> <p>Bacon  Fresh meat  Vinegar  Wine  Sardines  Codfish  Octopus  Salt  Olive oil  Rice  Cheese  Tuna  Beans  Chick-peas  Hard-tack  Olives</p>	<p style="text-align: center;"><b>Equipment for repairing the vessel</b></p> <p>Tallow  Hemp rope  Planks  Beams  ‘Bars’ of wood  Barrel hoops  Gun-port hinges  Nails  Nail punches</p>
<p style="text-align: center;"><b>Ordnance supplies</b></p> <p>Barrels of gunpowder (69)  40lb shot (400)  4-10lb iron shot (50)  4-12lb stone shot (100)  2lb iron shot (190+)  Chain shot (30)  Sledgehammers  Sheepskin plugs  Wooden aiming levers  Brass ladles  Iron rings (4)  Field carriages and limbers for the Loeffler  siege guns (4)  Tents  Prefabricated timbers for gun emplacements  Gabions  Sharpened stakes  Picks and shovels  Handcarts  Baskets  Tripod hoist  Field forge</p>	<p style="text-align: center;"><b>Small arms and weapons</b></p> <p>Arquebuses (100)  Muskets (20)  Shot moulds  Lead dippers  Ash pikes  Ball shot  Lead sheet  Grenades  Pikes  Morion helmets  Breastplates</p> <p style="text-align: center;"><b>Miscellaneous</b></p> <p>Wooden lanterns with linen wicks, some with  leather covers  Wooden plates (70)  Wooden bowls (38)  Steelyard  Flags of naval linen (3)</p>

## APPENDIX IV: GEOPHYSICAL SURVEY

### INTRODUCTION

#### Background

Wessex Archaeology (WA) was commissioned by Historic Scotland (HS) to conduct an Undesignated Site Assessment for a site known as the Tobermory Galleon, Sound of Mull. As part of the work a geophysical survey of the site was commissioned. Although the exact location of the wreck is unknown, it is understood that previous work by Fathoms Limited has identified two areas of what they term 'high potential'. The first is an area to the south of Mishnish Pier (Area 1). The second area (Area 2) has been classed by Fathoms Limited as a zone of high potential which includes a salvage hole from a previous salvage episode. A further site of interest, due to local opinion on where the wreck lies, is located around the present lifeboat mooring in the harbour (**Figure 2**). A survey area (Area 3) measuring approximately 300m x 190m was implemented during the geophysics survey. The lifeboat mooring is situated in the northern part of this area (**Figure 2**).

### GEOPHYSICAL SURVEY METHODOLOGIES

#### Survey Area

WA conducted a geophysical survey at sites within Tobermory Harbour on 23<sup>rd</sup> August 2006. The survey was conducted from the survey vessel *Xplorer*.

Initially a sidescan sonar survey was conducted over an area of the harbour to the east of the main mooring area. The survey consisted of thirteen lines, each approximately 750m long. The line spacing was provisionally 50m, however due to the number of moorings and moored vessels in the area (**Plate 1**), in-fill lines at 25m spacing were conducted to ensure full coverage of the seabed (**Figure 2**).

It was not possible to survey the entire harbour at one time because a working diving barge was situated over Areas 1 and 2. The east-west orientated buoyed channel (Areas 1 and 2) was surveyed later in the day, when three east-west orientated sidescan sonar lines were acquired: one along the northern and southern limit of the channel and one along the centre (**Figure 2**). The buoyed channel was approximately 40m wide and due to its narrowness and the presence of buoys it was not possible to acquire data along any cross-lines.

Investigation with the chirp data around the lifeboat mooring buoy (Area 3) comprised 10 north-west to south-east orientated lines, at approximately 10m line spacing wherever possible, and 10 east to west orientated lines. Due to the presence of vessels in the area there was no fixed line-spacing for the east to west lines, and data was acquired wherever possible; the spacing ranging from 10m to 40m (**Figure 2**).

#### Geophysical Technical Specifications

Throughout the survey all co-ordinates were expressed in WGS84, UTM zone 29N.

Onboard the *Xplorer* positioning was provided by a dGPS navigator system. The navigation data for this survey was recorded digitally using Ilex Harbourman software and a position was logged every second. The positioning system, echosounder and tow fish were all interfaced into this system, ensuring that the navigation parameters were consistent for all equipment throughout the survey.

Single beam bathymetric data were recorded throughout all stages of surveying and was acquired using a Knudsen 320M single beam echosounder. The echosounder transducer was mounted to the survey vessel, and the transducer draught was measured and entered into the echosounder to obtain depths relative to the sea-surface. A TSS DMS 2.05 motion sensor was rigidly mounted above the transducer to measure the vertical displacement (heave) and attitude (roll/pitch) of the vessel; this data was interfaced with the echosounder. The accuracy of the draught and velocity offsets were checked at the start of the survey using the bar check method.

The corrected bathymetric data were recorded digitally, interfaced with the navigation data, using Ilex Harbourman software and on the echosounder trace.

Sub-bottom profiler data were acquired using a chirp system. The chirp system used was the new EdgeTech 3100P portable sub-bottom profiling system using a SB-126S tow vehicle. The chirp is a high-resolution wide-band frequency modulated sub-bottom profiler. The system transmits a frequency-modulated pulse that is swept over a full spectrum frequency range (in this case 2-12 kHz). The acoustic return that is received at the hydrophones is passed through a pulse compensation filter. This results in high-resolution profiles of sub-bottom stratigraphy. The vertical resolution using 2-12 kHz frequency is 8cm and in an area of silts and clays, which is typical for the survey areas of concern, the typical sub-seabed penetration is expected to be in excess of 10m.

Chirp data were digitally recorded on an EdgeTech model 3100P topside processor and laptop. The data were recorded in SEG-Y format and were then converted to Coda format for processing and interpretation.

Sidescan sonar data were acquired using a Klein 3000 dual frequency towfish. This system collects data at 125kHz and 445kHz simultaneously. The Klein 3000 collects data at both high and low frequencies and therefore produces high quality images suitable for archaeological purposes.

The data was collected digitally on a workstation using Klein SonarPro software in xtf format and stored on hard disk as date/time-referenced files for post-processing and the production of sonar mosaics.

High and low frequency data were acquired at a range of 75m throughout the survey. Due to the number of moorings and moored vessels in the harbour (**Plate 1**) navigating along planned survey lines was not always possible. However, full coverage of sidescan sonar data was ensured by acquiring sidescan sonar data at a smaller line spacing and running in-fill lines where necessary.

### **Geophysical Data Processing**

The processing of the digital seismic data was undertaken using Coda Geosurvey software, which is a standard package for processing and interpreting single channel seismic data.

The seismic data was collected and interpreted with two-way travel time (TWTT) along the z-axis, not depth. Therefore, to convert the TWTT to the interpreted boundaries into depths the velocity of seismic waves through the geology must be known or estimated. For this project

the velocity of the seismic waves was estimated to be 1600 m/sec, which is a standard estimate for shallow, unconsolidated sediments of the type being studied in this survey.

Once the seismic data had been interpreted the position of the boundaries could be exported in the form of xyz text files where z was now the calculated depths not the TWTT. Any anomalies observed on the sub-bottom profiler data were assigned a number starting at **5001** for the purpose of the WA in-house database.

The sidescan sonar data were acquired and post-processed using Coda Geosurvey software and a sonar mosaic of the seafloor was produced.

### **Geophysical Data Quality**

Generally the quality of the data acquired was reasonable given the difficult surveying conditions. Navigation hazards included mooring buoys with long ropes attached, moored vessels, and vessels sailing and motoring in and out of the harbour. Also, a diving barge was positioned over Areas 1 and 2, hindering survey operations during much of the allocated survey time.

The quality of the data positioning was variable. During both the sidescan sonar and sub-bottom profiler acquisition the equipment was towed from the back of the vessel with as much as 50m of cable out. However, it was not possible to tow the equipment directly behind the vessel at all times, due to the restricted survey areas preventing sufficient lead in to the survey lines following line turns.

Within Area 3 the sidescan sonar data on the north-south orientated lines were generally of good quality and the fish was towed directly behind the vessel. Wherever possible, the data quality was optimised by adjusting the height of the fish by changing the length of cable paid out (between 10m and 50m) to account for changes in water depth and vessel speed. Sidescan sonar data were collected for Areas 1 and 2, however, the positioning is of poor quality. This was due to a combination of navigational input errors and the buoyed channel being such a small area that it was not possible to tow the fish directly behind the vessel during this part of the survey. As such, exact positioning of features for this part of the survey is not achievable.

During post-processing of the sidescan sonar data layback values were applied and positioning of the data was improved where the same feature was observed on more than one line of data. Due to the coverage of sidescan sonar data lines acquired in Area 3 the positioning is considered to be of good quality.

The positional accuracy of the chirp data throughout the survey was generally good. Although the equipment was observed directly behind the vessel on the north-south orientated lines of Area 3, the chirp towfish was not always directly behind the vessel on the cross lines in this area, due to the need to weave between moored vessels and the tight turning circles. However, correlation of the data was undertaken during post-processing of the data. During the survey of Areas 1 and 2 there was only 3m cable out due to the shallow waters and this resulted in the chirp being towed directly behind the vessel, therefore the positional accuracy is considered to be of good quality.

The quality of the sidescan sonar data itself was good, and was considered suitable for archaeological purposes.

The chirp data was generally of good quality given the survey conditions. The optimal towing position of the chirp data is 3m-5m above the seabed. Towing at this depth was not always possible during this survey. Due to the water depths (up to 40m) within the survey area the chirp would require in excess of 50m cable out. Due to the navigation hazards within the harbour it was considered unsafe to tow equipment at this distance in case of snagging and therefore the chirp fish was flown high. However, a maximum penetration of 20m was observed and the quality and penetration of the data in deep water, compared to where the chirp was towed at its optimal depth in Area 1, did not differ significantly. As such, it is considered that the chirp data were of good quality throughout the survey.

## RESULTS AND INTERPRETATION

### Sidescan Sonar Data

Throughout the three areas the seabed sediments are consistent, with no identifiable change. Based on the seismic nature, the sediments have been interpreted as fine-grained sediments such as silts and clays. This was subsequently confirmed by diver observations. In Area 3 numerous boulders were observed in the north-western corner of the site. Boulders were also observed within Areas 1 and 2.

Throughout the three areas numerous objects were observed on the sidescan sonar data, including mooring blocks, pipelines and their mattresses, and debris associated with a busy harbour such as Tobermory.

Within Area 2 a series of large holes/trenches were observed (**Figure 3**). These are thought to be those generated by previous salvage operations. A pipeline was observed to the north and west of the holes and numerous small depressions and objects were observed within the vicinity.

Although many anomalies were visible on the sidescan sonar data, no features were considered a likely location for the Tobermory Galleon. However, identification of the form and nature of every observed anomaly on the data is difficult; the form, size and/or extent may not enable easy discrimination. For example a single small but prominent anomaly may be part of a extensive feature that is largely buried and unless the sub-bottom profiler data is acquired directly over this anomaly the buried feature will not be identified.

Based upon preliminary results, two anomalies were identified for diver ground-truthing. The positions of these anomalies are as follows:

<b>Anomaly number</b>	<b>Lat.</b>	<b>Long.</b>
<b>5007</b>	56° 37.30636' N	06° 3.77163' W
<b>5008</b>	56° 37.33356' N	06° 3.83596' W

During the survey, the ends of two pipelines and the T-piece connector were observed on the sidescan sonar data within the harbour. The locations of these are as follows:

<b>Lat.</b>	<b>Long.</b>	<b>Description</b>
56° 37.27142' N	06° 3.47988' W	End of pipeline to the south
56° 37.39707' N	06° 3.66186' W	T-piece connector
56° 37.42072' N	06° 3.61305' W	End of pipeline to the north-east

### Sub-bottom Profiler Data

Generally two reflectors were observed throughout the harbour area. A deep reflector was locally observed within Area 3 (**Figures 2 and 5**). Where observed, this reflector is interpreted as representing the top of the bedrock layer. It is observed in the north of Area 3 at a minimum depth of approximately 5m sub-seabed and this depth may represent the axis of an anticline as the reflector to deepens north and south of this point.

Within 80m north of the anticlinal axis, the bedrock reflector disappears despite being less than 12m deep. This may be because the acoustic impedance between it and the material overlying it decreases due to a lateral change in the physical properties of one of these layers. Such a change may also explain why this bedrock reflector was not observed in Areas 1 and 2. To the south of the anticlinal axis, the bedrock reflector can be traced to a depth of approximately 20m below the seafloor before it becomes too deep to produce a reflection.

Overlying the bedrock is a unit comprising high amplitude chaotic reflectors possibly indicative of a coarse-grained, compacted sediment, possibly sands and gravels (**Figure 4**). The true nature of this sediment is unknown without ground-truthing. This unit is observed in all three areas. In Areas 1 and 2 the top of this unit is observed within 1m of the seabed. In Area 3 the reflector marking the top of this unit is observed close to the seabed and deepens to the south and south-east of the survey area. Within the survey area the maximum observed depth of this reflector is 11m sub-seabed.

Overlying this reflector is a unit of low amplitude with few weak reflections observed locally at the base of the unit indicating layered sediments (**Figure 4**). Where observed, this unit is interpreted as fine-grained sediment such as clay or silt. This was confirmed by the diver observations. This unit is observed on the data where the reflector marking the base of this unit is deeper than 1m sub-seabed. Although the unit is not clearly observed on the sub-bottom profiler data in Areas 1 and 2, it is considered that a thin layer (<1m) of silts overlies the coarser sand and gravel unit. This is confirmed on the sidescan sonar data, which indicates a fine-grained seabed sediment. To the north of Area 3 this unit is less than 1m thick and then thickens to a maximum observed 11m to the south of the area.

Six anomalies were visible in the sub-bottom profiler data: five within Area 3 (**5001–5005**) and one in Area 1 (**5006**) (**Figure 2**). Details of these anomalies are as follows:

Anomaly No.	Lat.	Long.	Depth sub-seabed	Description
<b>5001</b>	56° 37.17803' N	06° 3.63585' W	4.1m and 6.7m	Two closely-spaced (approximately 5m apart) bright reflectors are observed at this location.
<b>5002</b>	56° 37.20274' N	06° 3.63197' W	1.5m	A hyperbolic refraction is observed on the data just beneath the seabed in the silt unit.
<b>5003</b>	56° 37.19520' N	06° 3.58658' W	12.3m	Observed as a very bright reflector within the coarse sediment unit.
<b>5004</b>	56° 37.20783' N	06° 3.59635' W	9.8m	Observed as a bright reflector at the base of the silt unit.
<b>5005</b>	56° 37.25007' N	06° 3.62633' W	3.8m	Observed as a very bright reflector within the coarse sediment unit.
<b>5006</b>	56° 37.36438' N	06° 3.71625' W	12.1m	Anomalous bright reflector within the coarse sediment unit.

Although the anomalies **5001**, **5003**, **5004** and **5005** are interpreted as bright reflectors anomalous to the surrounding sediment, anomaly **5002** displays a hyperbolic refraction which could represent a small buried object or an object on the seabed such as a boulder or mooring block. Nothing was observed on the sidescan sonar data at this location so it is possible that this reflection indicates a buried object. Although **5006** is situated in what has previously been described as a zone of 'high potential', due to the small contact size and its relatively low reflectivity it is considered unlikely that this represents the hull of the Tobermory Galleon. However, this cannot be completely ruled out.

Locating a buried object such as the galleon is difficult using a sub-bottom profiler. Firstly, due to the small footprint of the sub-bottom profiler, the source needs to pass directly over the top of the buried object. Even if this occurs, the seismic response for the object may be small and differentiation between geology and man-made objects (whether made of wood or metal) cannot be accurately made.

The anomalies **5001** - **5005** are all situated in excess of 100m to the south of the lifeboat mooring and in excess of 150m from the shore. Given their location it is considered unlikely that they represent the Tobermory Galleon.

Buried wrecks such as this galleon are normally best located using a magnetic survey but this would not have been possible in Tobermory Harbour due to the density of vessels and moorings (**Plate 1**).

The holes in the seabed created by past salvage operations were identified on the sub-bottom profiler data in Area 2 (**Figure 2**) to a depth of in excess of 4m (**Figure 3**). In the vicinity, no anomalous reflectors indicating any buried objects were observed.

**APPENDIX V: WA RECORDING LEVELS**

Level	Type	Objective	Sub-level	Character	Scope	Notes
<b>1</b>	<b>Assessment</b>	A record sufficient to establish the presence, position and type of site.	<b>1a</b>	Indirect (desk-based)	A basic record based on documentary, cartographic or graphic sources, including photographic (incl. AP), geotechnical and geophysical surveys.	Preferably compiled at the start of work on a site, and updated as work progresses.
			<b>1b</b>	Direct (field)	A basic record based on field observation, walkover survey, diving inspection etc., including surveys.	Typically a one-dive visit to the site to assess a geophysical anomaly or report by the public.
<b>2</b>	<b>Evaluation</b>	A record that provides sufficient data to establish the extent, character, date and importance of the site.	<b>2a</b>	Non-intrusive	A limited record based on investigations that might include light cleaning, probing and spot sampling, but without bulk removal of plant growth, soil, debris etc.	A two to four-dive visit to assess the sites archaeological potential, backed up by an outline plan of the site.
			<b>2b</b>	Intrusive	A limited record based on investigations including vigorous cleaning, test pits and/or trenches. May also include recovery (following recording) of elements at immediate risk, or disturbed by investigation.	Either an assessment of the buried remains present on a site; the recovery of surface artefacts; or cleaning to inform for example a Level 2a investigation.
<b>3</b>	<b>In situ</b>	A record that enables an archaeologist who has not seen the site to comprehend its components, layout and sequences.	<b>3a</b>	Selective	A detailed record of selected elements of the site.	To include a full outline plan of the site and a database (or equivalent) entry for all surface artefacts.
			<b>3b</b>	Un-excavated	A detailed record of all elements of the site visible without excavation.	Full site plan (i.e. planning frame or equivalent accuracy) with individual object drawings, and full photo record (possibly including a mosaic
			<b>3c</b>	Excavated	A detailed record of all elements of the site exposed by open excavation of part or whole of the site.	Full or partial excavation of a site, documented by plans, sections and recording.

## **APPENDIX VI: TECHNICAL NOTES**

### **Diving Systems**

A four-person surface supplied diving team was deployed during fieldwork operations from the diving support vessel *Xplorer*, a 12m MCA Cat.2 work-boat. *Xplorer* operated out of Tobermory Harbour. All diving operations complied with the Diving at Work Regulations 1997 and the Inshore/Inland ACOP.

### **Sonardyne Prospector LBL Acoustic Tracking System**

The Prospector acoustic tracking system was not deployed upon the site because of the danger that the array would foul moorings.

However, dive vessel position was tracked using the Prospector system during diving operations. This enabled the diver to be directed to the anomaly positions with a high degree of confidence.

### **Video**

Full digital colour video footage of the diving operations was recorded using a diver hat-mounted Colourwatch 306 single-chip, digital inspection camera and umbilical, recording onto digital videotape. The image produced by this system was displayed in real time on a surface monitor for the use of the diving supervisor and database recorder. The entire length of each dive was recorded.

### **Depths**

Depths were recorded using a pneumo-fathometer with an in-date calibration to 0.25% accuracy. Depth measurements separated by more than 10 minutes were calibrated against a fixed reference point.

### **Recording**

Diver observations and hand measurements, together with details of still photographs taken, were entered in real time in DIVA, the WA proprietary MS Access database. DIVA is MIDAS compliant and it is intended that a copy of the database entries will be made available to the RCAHMS.

## APPENDIX VII: DIVE RECORDS AND FUTURE OPERATIONS PLANNING

### DIVE RECORDS

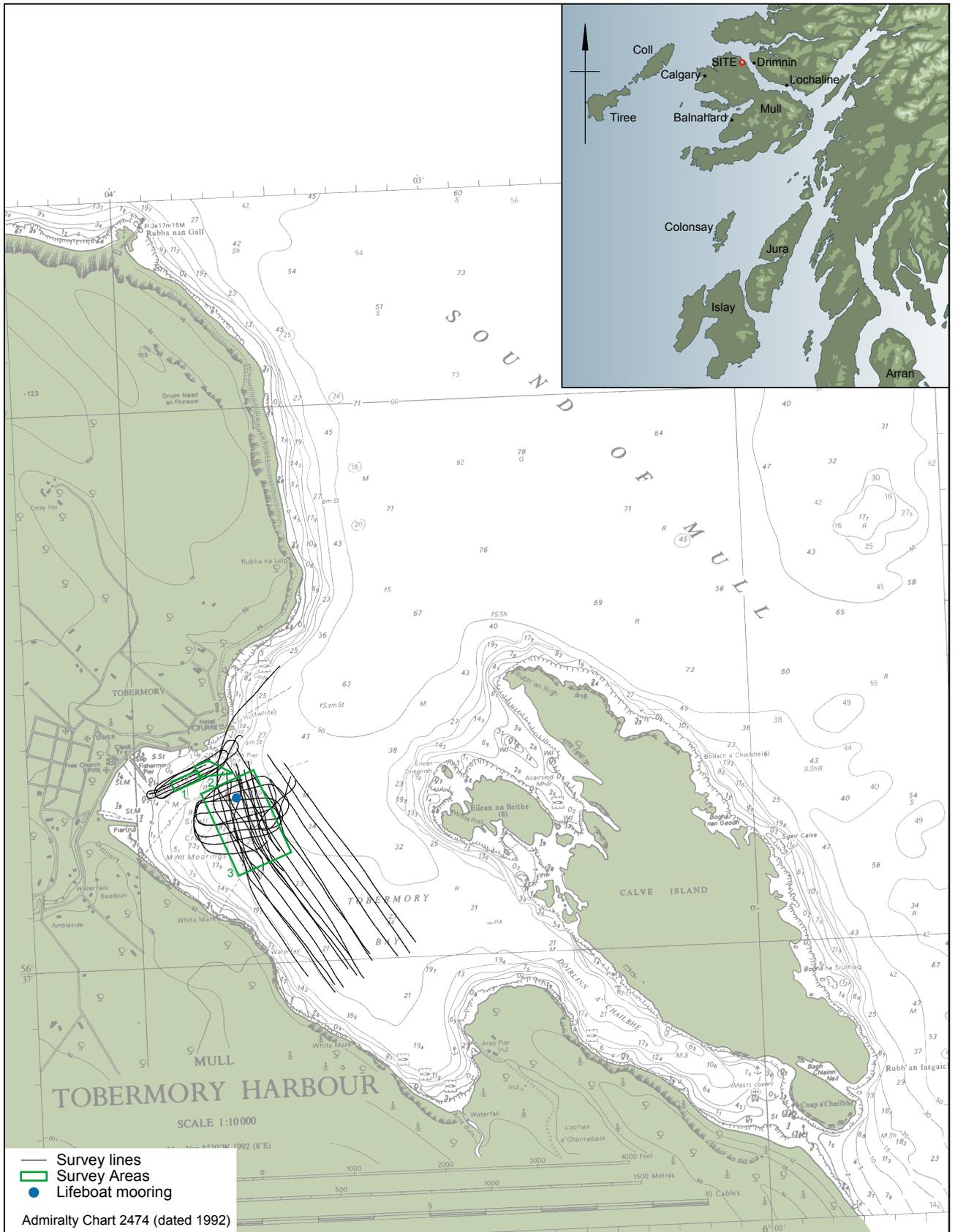
Dive	Date	Diver	Start time*	Max. Depth	Bottom Time	Estimated Visibility	HW Tobermory
1001	25/08/06	Steyne	15:15	21.5m	25 min	5m+	08:25
1002	26/08/06	McKenna	11:53	20.5m	37 min	'Poor'	08:52
1003	26/08/06	Paddenberg	13:45	19.0m	47 min	'Poor'	08:52

\*All times B.S.T.

### FUTURE OPERATIONS PLANNING

The following advice is based upon experience using SSDE techniques only. It is intended as a general guide only and no liability can be accepted for reliance upon it:

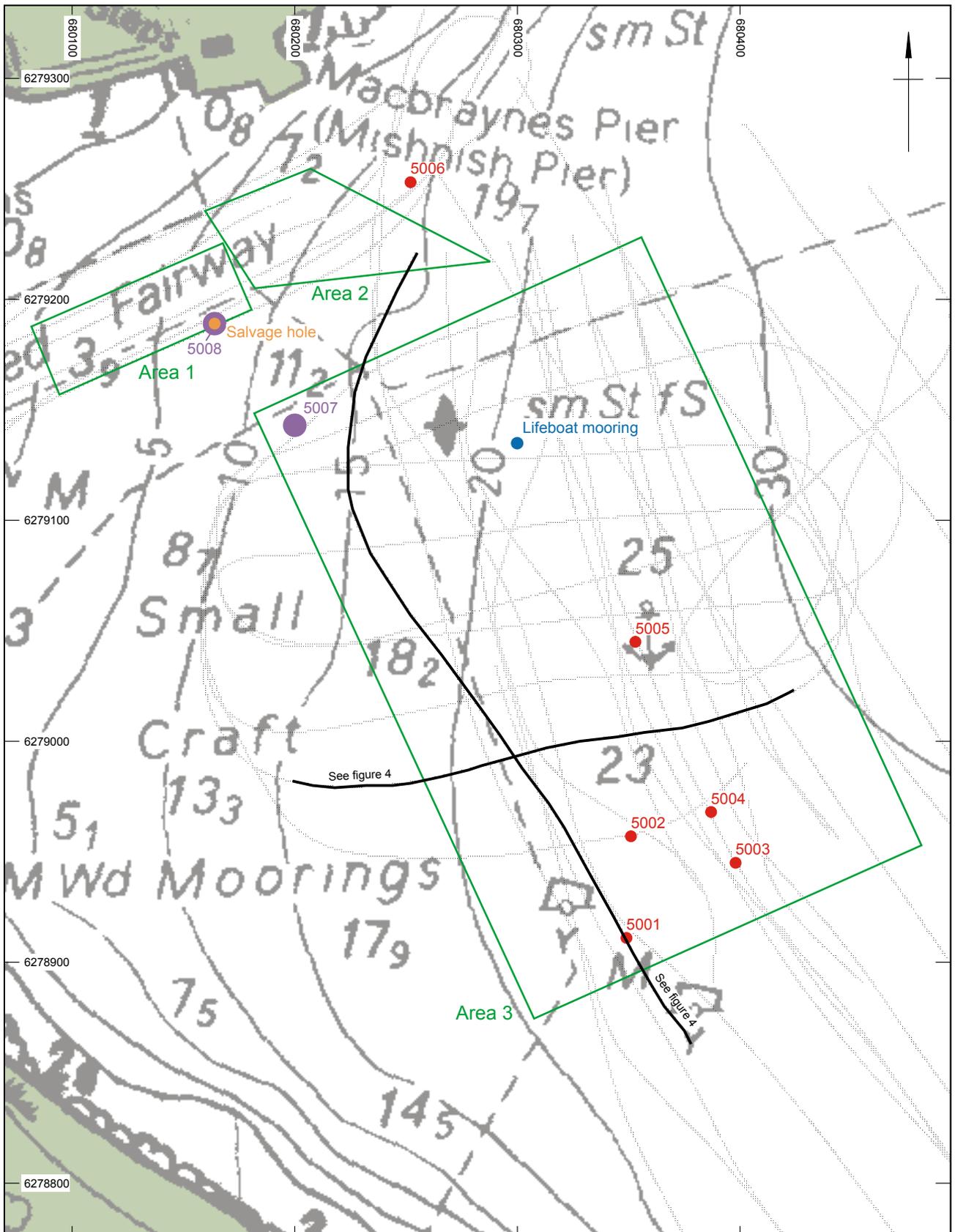
- Tobermory Harbour is sheltered from weather approaching from all directions except the north-east. Operations are therefore unlikely to suffer significant down time as a result of weather. Furthermore, although there is a maximum tidal range of 3.3m, the tidal streams experienced are very weak and unlikely to limit diving. Tobermory Harbour therefore represents an environmentally benign environment for marine operations.
- Although no permit to work system is in operation within the harbour (as of 26<sup>th</sup> August 2006) it is a busy marine environment with many vessel movements ranging from small powered craft to cruise ships. Moderately large ferries call regularly at the harbour. In addition it should be noted that the marked channel is not always followed. Diving operations should ensure that the Tobermory Harbour Association and Caledonian MacBrayne are informed in advance. Experience has demonstrated that not all recreational boat users are likely to pass wide and slow and consideration should be given to the use of a safety boat during the tourist season.
- The use of nitrox as a breathing mixture would be advantageous in extending bottom times, particularly if the dive team size is small.



<ul style="list-style-type: none"> <li>● Position for lifeboat mooring</li> <li>56° 37.2997 N 06° 03.6744 W</li> <li>WGS. 84 coordinates</li> </ul>	Digital Map Data © (2006) XYZ Digital Map Company This product has been derived, in part, from Crown Copyright Material with the permission of the UK Hydrographic Office and the Controller of Her Majesty's Stationary Office ( <a href="http://www.ukho.gov.uk">www.ukho.gov.uk</a> ) All rights reserved. (Wessex Archaeology Licence Number 820/020220/11) <b>NOT TO BE USED FOR NAVIGATION</b> WARNING: The UK Hydrographic Office has not verified the information within this product and does not accept liability for the accuracy of reproduction or any modifications made thereafter.	
	Date: 24/10/06	Revision Number: 0
	Scale: 1:100,000	Illustrator: KJB
	Path: London\U:\Projects\53111\Drawing Office\Report Figures\2006\z29_Tobermory	

Tobermory site location

Figure 1



- Survey lines
  - ▭ Survey Areas
  - Sites dived
  - Salvage hole
  - Sub-bottom profiler anomalies
  - Lifeboat mooring
- Admiralty Chart 2474 (dated 1992)  
UTM WGS.84 z29N

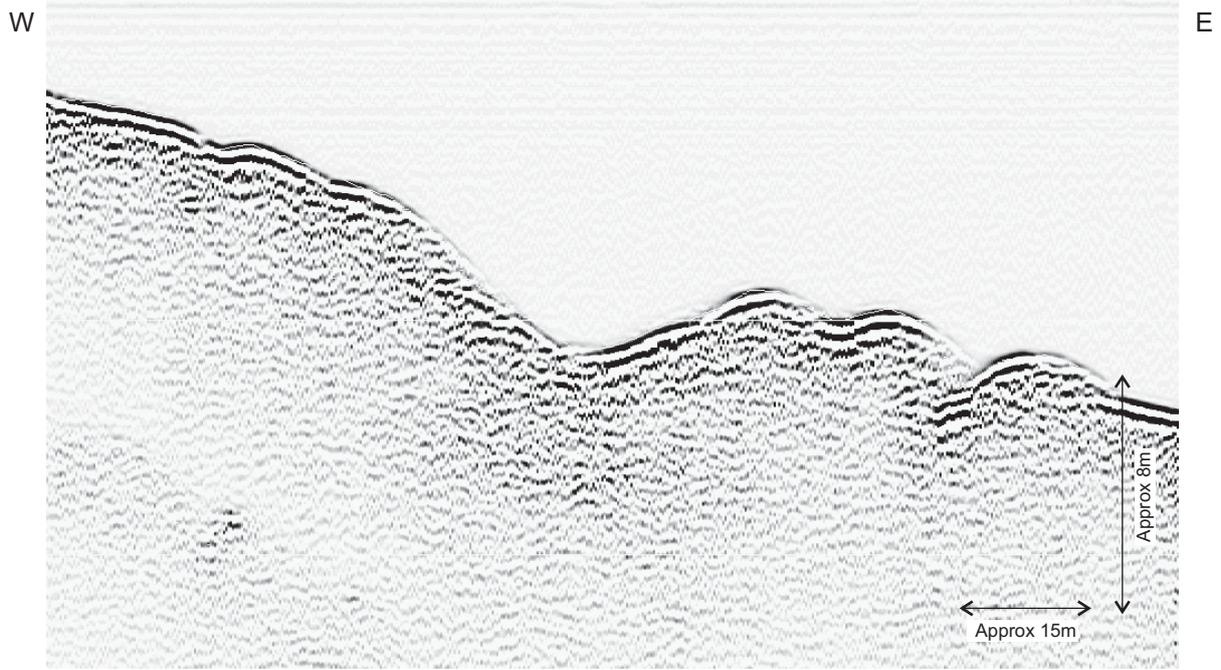
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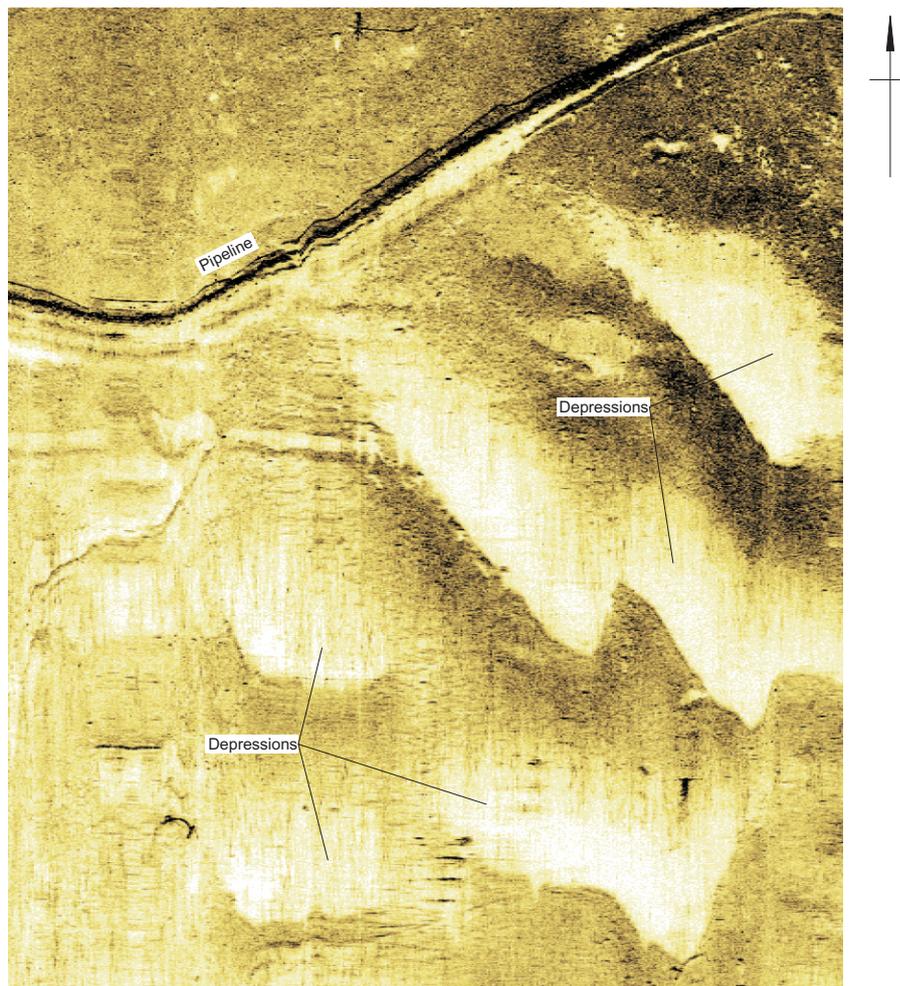
Site plan

Figure 2

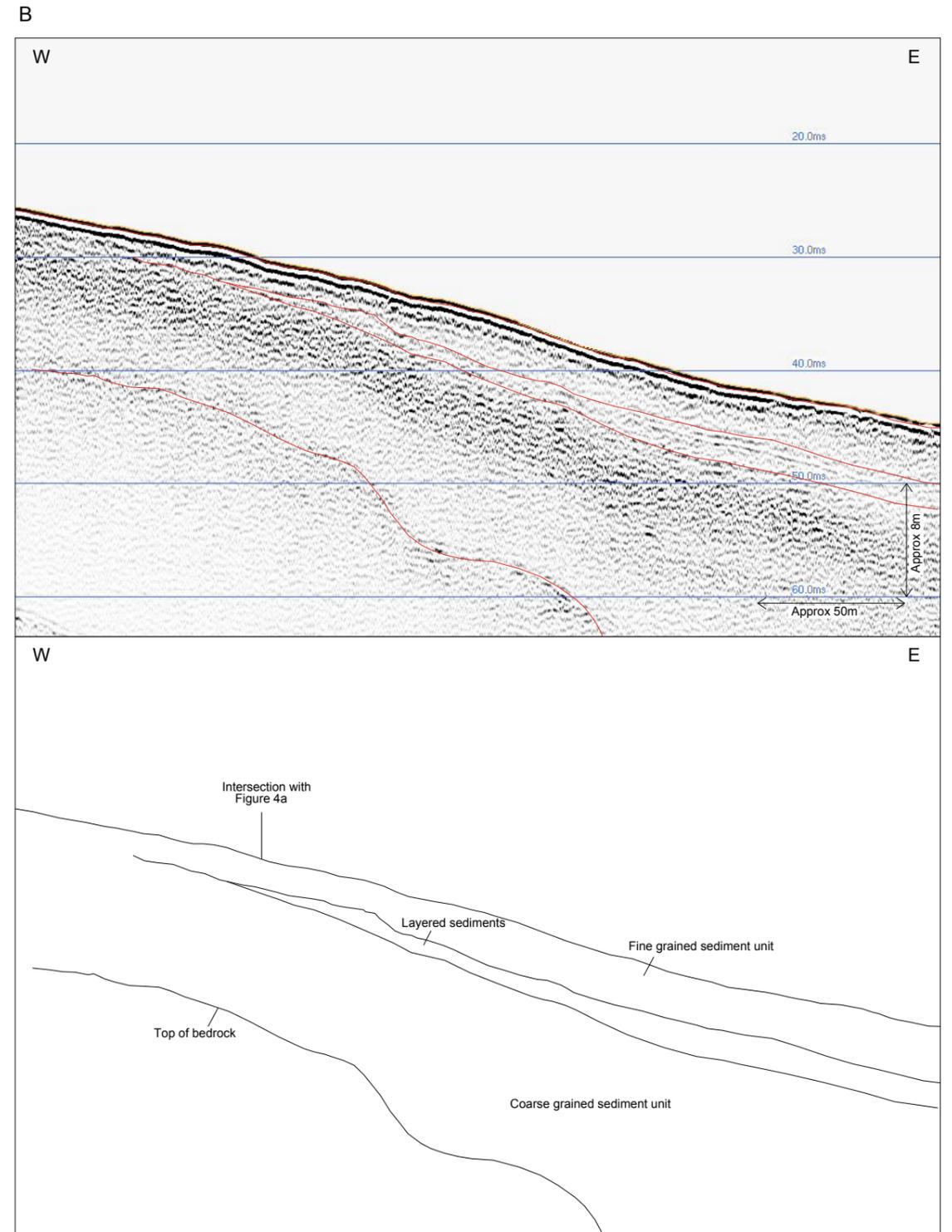
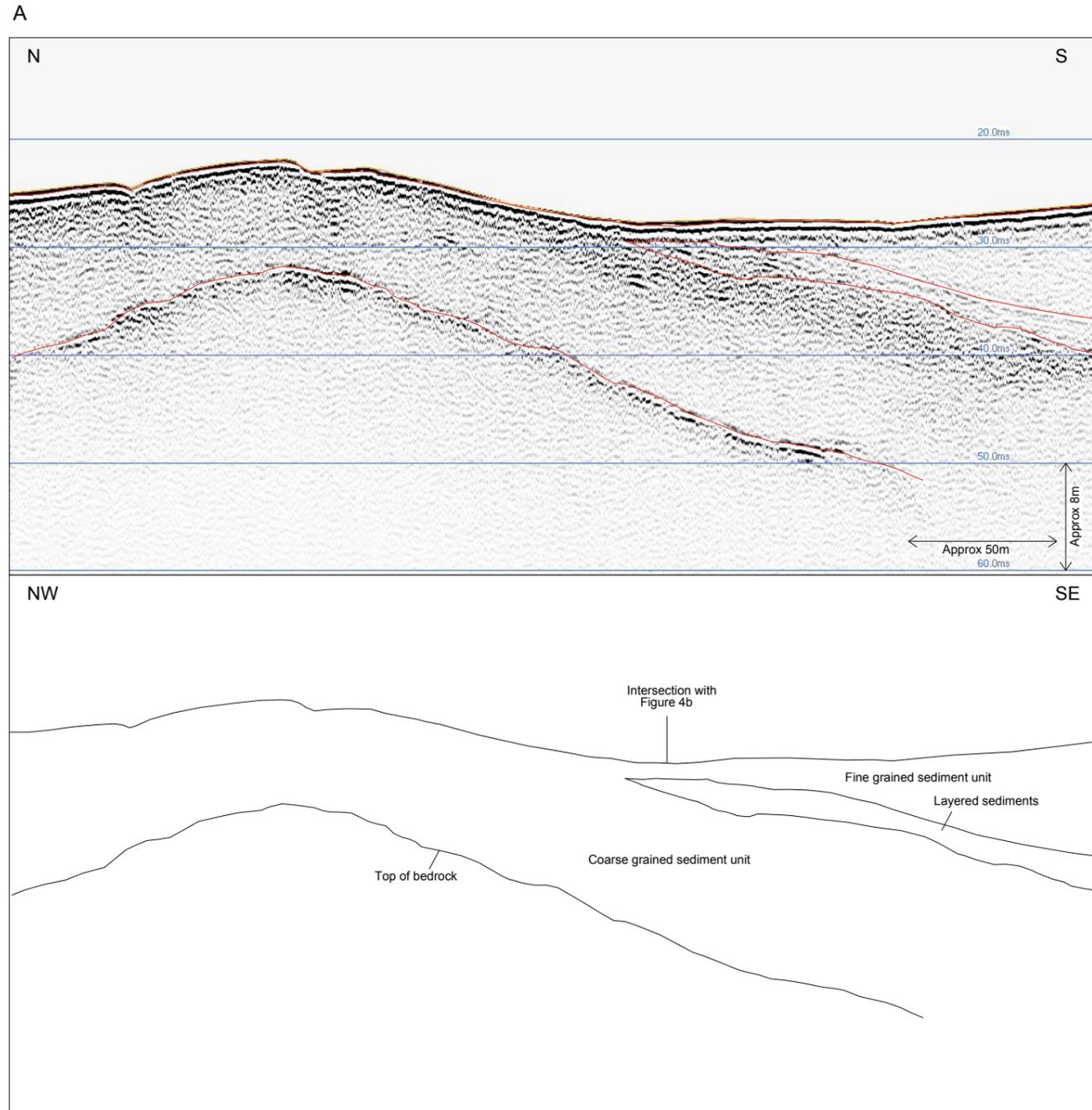




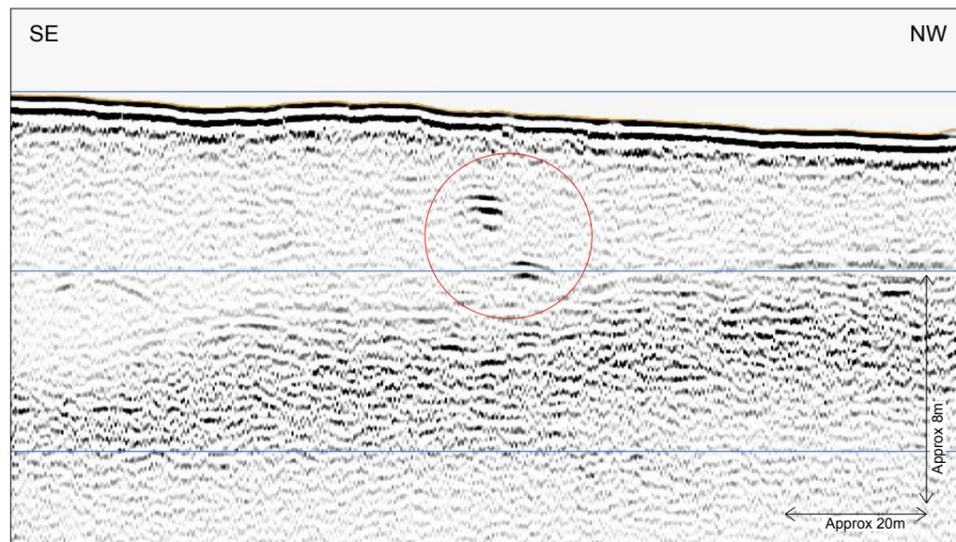
A. Sample profile across depressions



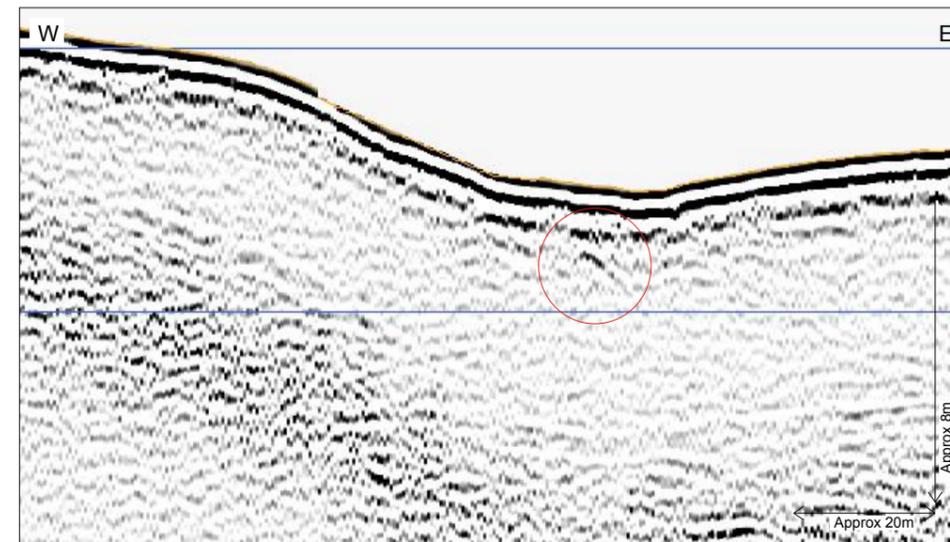
B. Sidescan sonar



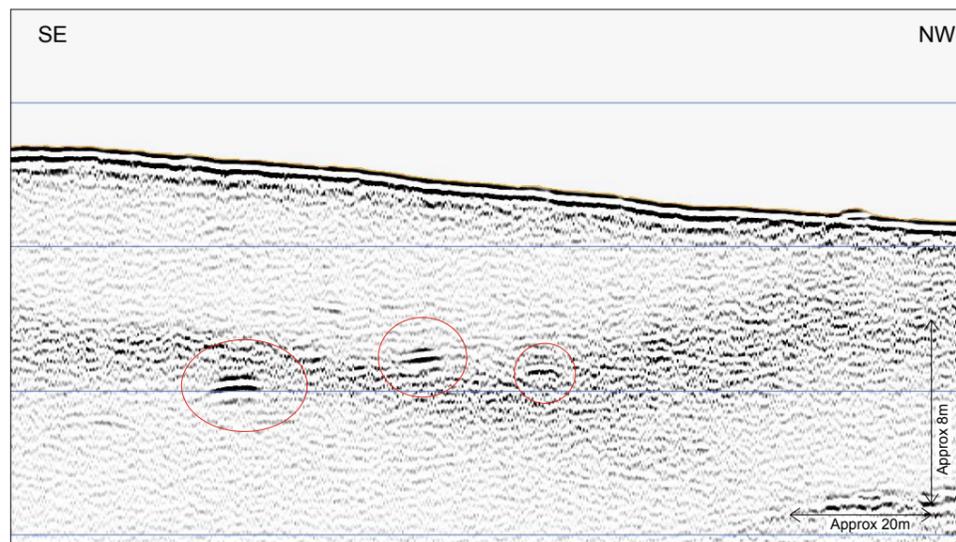
A. Anomaly 5001



B. Anomaly 5002



C. Anomalies 5003, 5004 and 5005



D. Anomaly 5006

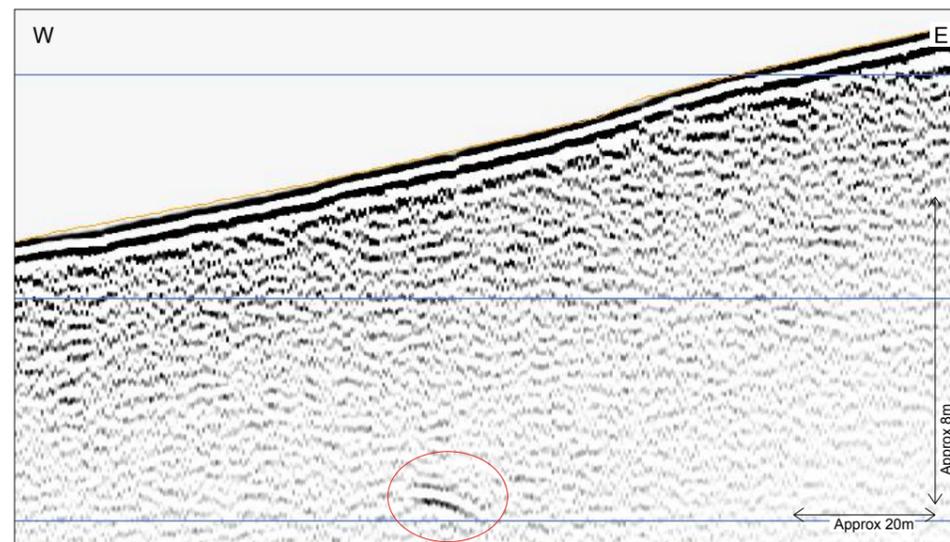
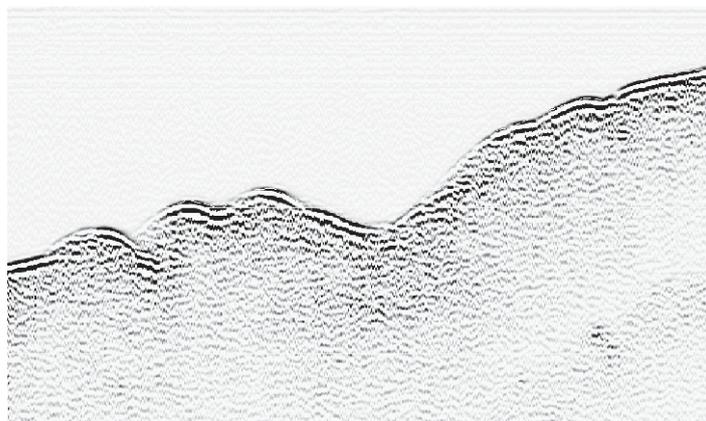




Plate 1: Areas 1 and 2



Plate 2: Geophysical survey



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