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

RILL COVE, THE LIZARD, CORNWALL

DESIGNATED SITE ASSESSMENT: FULL REPORT

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Summary

Wessex Archaeology was commissioned by English Heritage to undertake a designated site assessment of Rill Cove: a designated wreck site located at Rill Cove, the Lizard, Kerrier, Cornwall. The work was undertaken as part of the contract for Archaeological Services in Relation to the Protection of Wrecks Act (1973).

The wreck is that of an unknown (possibly Spanish) vessel that sank in the early 17th century. A substantial number of finds, mostly silver coins were recovered during excavations in the 1970s and 1980s. No ships structure and only two iron guns are known from the site.

The brief required Wessex Archaeology to relocate the site, establish whether archaeological material was present and geo-reference the site. The brief also required the survey of an anchor located off-site to the south.

Diving operations were conducted during August and September 2004. The cove was partially searched but it was not possible to locate the site, probably because a layer of mobile sand buried any surviving archaeological material. One loose surface find was observed, a small fragment of eroded wood, but no evidence of association with the site was found and it was probably modern debris. The area that is believed to contain the anchor was also searched but the anchor was not seen.

Following the fieldwork an archive assessment was conducted, which included an attempt to geo-reference those site plans that were available. This work suggests that the site lies to the east of the centre, and close to the edge of the designated area.

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Acknowledgements

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Wessex Archaeology would also like to thank the following people:

- Kevin Camidge, 2004 nominated archaeologist;
- Michael Hall and Kenneth J. Simpson, 2004 Licensee and former Licensee respectively;
- Steve Waring, NMR, Swindon;
- Sophia Exelby, HM Receiver of Wreck;
- Wrecks Office, UKHO.

The fieldwork was carried out by Graham Scott, Simon Adey-Davies, Jennifer Black, Steve Gaynor and David Burden. Graham Scott and Simon Adey-Davies supervised the diving and Graham Scott supervised the fieldwork. David Burden was the master of the dive vessel *Xplorer*. The report was compiled by Graham Scott with contributions from Jenny Black and edited by Steve Webster. Kitty Brandon prepared the illustrations. The project was managed for Wessex Archaeology by Steve Webster.

Data Licences

Details of wrecks and charts from the UK Hydrographic Office (UKHO) were obtained by Wessex Archaeology in digital format from Metoc Plc. The following notice applies:

Material derived from Seazone data provided by Metoc Plc. is subject to licence and conditions on end-users and third parties contained therein. Figure 1 contains Seazone data from Metoc Plc.

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1. BACKGROUND

1.1. INTRODUCTION

1.1.1. This document constitutes a Designated Site Assessment: Full Report for a programme of archaeological work 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 English Heritage (EH). It constitutes an assessment of a designated wreck site located at Rill Cove: a designated wreck site located at Rill Cove, Kerrier, Cornwall (**Figure 1**).

1.1.2. The work was conducted in accordance with a brief provided by EH. Fieldwork operations in the vicinity of the Lizard and the east of Mounts Bay took place during September and October 2004. Due to adverse weather and other priorities, diving operations were only possible on 28th and 30th August and 3rd and 26th September 2004. Surface supplied diving operations were undertaken from the dive vessel *Xplorer* by a team comprising Graham Scott, Simon Adey-Davies, Jennifer Black and Steve Gaynor, and vessel master David Burden.

1.2. DEFINITIONS

1.2.1. Main Site means the area shown in **Figures 2-5**, being the area in which the excavations were undertaken.

1.2.2. Anchor Site means the location of the anchor described in section 6.6 and shown in **Figure 1**.

2. OBJECTIVES

2.1.1. The overall objective for the site as defined in the WSI was for recording to Level 2a.

2.1.2. This was further defined, specifying the following tasks:

- Re-locate the areas of excavation indicated on the site plan, and establish whether any cultural material is present;
- Geo-reference the site plan and any material/features located;
- Geo-reference grid pins;
- Locate and geo-reference an anchor approximately 50 metres off site.

3. EXISTING SITE DATA

3.1. SITE POSITION

3.1.1. The position of the site as given in the brief was as follows:

677500	134500
OS Grid Reference (Sheet SW61 SE, 6" to 1 mile)	

3.1.2. This position is for the centre of the designated area and is the position given in the Statutory Instrument (SI). The SI number for the site is 1982 No. 47. The current Licensee is Mike Hall and the nominated archaeologist is Kevin Camidge. The designated area is a circle with a radius of 100 metres, the extent of which is shown in **Figure 1** and **Plate 2**.

3.2. AVAILABLE DATA

3.2.1. Documents referred to in the brief and available during fieldwork were as follows:

- 2004 Annual Licensee Report;
- 2003 Annual Licensee Report;
- 2002 Annual Licensee Report;
- 1998 Annual Licensee Report;
- 1996 Annual Licensee Report;
- 1995 Annual Licensee Report, 1:100 site plan and hard copy finds database;
- 1993 Annual Licensee Report, licence application and research design;
- 1992 Annual Licensee Report;
- 1991 Annual Licensee Report;
- 1990 Annual Licensee Report;
- 1987 Annual Licensee Report;
- 1983 Annual Licensee Report;
- 1989 ADU Report 054;
- 1990 ADU Report 059;
- 1992 ADU Report 92/08;
- 1993 ADU Report 93/02;
- 1995 ADU Report 95/16;
- 1998 ADU Report 98/04;
- 1976 Statutory Instrument.

3.2.2. Other documents available during fieldwork were as follows:

- UKHO wreck data for Wreck Number 22643;
- NMR Monument Report for Monument 1082103;
- Excavated site plan (sourced from Mr Camidge);
- Licensees' sketch plans and photographs (**Figures 2-5**) (partly sourced from Mr Camidge).

3.2.3. Documents sourced by WA and available following fieldwork were as follows:

- ADU paper archive;
- ADU diver hat camera video and audio tapes (non-digital, Hi8);
- Details of relevant droits received from the Receiver of Wreck;
- Various published and unpublished works detailed in the bibliography.

3.2.4. The ADU paper archive is very limited and chiefly comprises ADU and Licensee reports (not complete) with some dive logs. Diver hat camera footage exists for the ADU 1996 and 1998 visits. At the time of writing it is not clear whether the complete archive has been received.

3.3. OTHER DATA

3.3.1. The following sources are known to exist / have existed but have not been viewed by WA during the course of this assessment:

- ADU and Licensees magnetometer data (ADU, 1990);
- Licensees metal detector survey data (Hall, 1996);
- Excavation and site archive held by Mr Michael Hall and others.

4. METHODOLOGY

4.1.1. Fieldwork was undertaken using diver search (general search) and diver survey (video) techniques. Task-specific details are given as follows:

- The site was approximately located using advice received from Mr Camidge and sketch drawings and plans attached to the 1983 Annual Licensee Report (**Figures 2-5**). These were compared with the natural surface features in order to decide where to dive;
- Thereafter general visual inspections of the seabed were carried out by diver in order to find the natural features and the iron gun shown in **Figure 2**;
- The Anchor Site was very approximately located using an image from a Licensee's report and advice received from Mr Camidge;
- Thereafter the diver carried out general visual inspections of the seabed in order to find the anchor.

4.1.2. Due to uncertainties concerning the exact location of the Main Site, it had been intended to search the whole of Rill Cove. As a result a wide search area was established. However, bottom time was limited as a result of environmental factors (see **Appendix III**) and priority work on other sites in the area. Furthermore it did not prove possible to safely position the dive vessel so as to allow complete coverage of the search area using either surface supplied or tethered scuba equipment. As a result a more limited area was searched (see **Plates 1** and **2**).

4.1.3. The acoustic tracking system could not be used in tracking mode at this site due to the extremely confined and exposed location close to cliffs and other navigational hazards (in order to calibrate the array the dive vessel has to travel around the beacon array). As a result the searches were untracked. Due to the highly three-dimensional nature of the seabed and the presence of dense kelp over all solid surfaces, the use of

jackstay or circular search techniques proved to be impracticable and the searches were therefore 'free-swimming'.

4.1.4. During Dive 245 a single transponder beacon was attached to the diver umbilical within three metres of the diver. The range from the diver to the dive vessel was then obtained using the transducer and the bearing was calculated by reference to the position of the diver bubbles. This technique was used to obtain an approximate position for the loose find described Section 5 of this report.

4.1.5. Details of the methodologies used during the 2003 PWA survey are detailed in a separate document (WA 2003b).

5. RESULTS

5.1. SITE POSITION - MAIN SITE

5.1.1. The Main Site is situated in a small south-facing cove to the south-east of Rill Point, on the southern side of the Rill (**Figure 1** and **Plate 2**). The cove is backed by steep vegetated cliffs (**Plate 1**), under the water the seabed is a mixture of reefs, rocks and areas of sand.

5.1.2. Four of the Licensees' site plans have been reproduced as part of this report (**Figures 2-5**). During the post-excavation process an attempt was made to geo-reference these plans by matching them against the charted coastline. This was not wholly successful due to difficulties in effecting a match between plans drawn (at least partially) underwater and coarse bathymetry.

5.1.3. The plans used for this assessment are as follows:

- **Figure 2**: an undated plan that is believed to be one of the earlier illustrations of the site;
- **Figure 3**: a sketch showing the area excavated in 1983;
- **Figure 4**: a 'topographic' plan of the Main Site produced in 1987;
- **Figure 5**: an undated version of the 1987 plan (**Figure 4**) showing the areas excavated between 1976 and 1987.

5.1.4. **Figures 2** and **3** show the Main Site in relation to the surface topography of the cove as well as the seabed features. **Figures 4** and **5** show the position of the Main Site in relation to the features on the seabed, but are less easy to position relative to the dry-land topography. A key point used to link all of the plans is the cannon at the centre of the circle marked on **Figure 2** (labelled as Gun 1 for reference within this report).

5.1.5. The source illustration for **Figure 2** was received shortly after the fieldwork, therefore it could not be used to inform the 2004 diving. The surface topography shown in **Figure 3**, which was obviously copied from the undated plan shown in **Figure 2**, could not be easily reconciled with the surface features visible during WA fieldwork operations. This is possibly because of changes to the topography since **Figure 2** was drawn (possibly when the site was first investigated in the 1970s) but could also be due to subjective recording.

5.1.6. This initially caused considerable uncertainty as to where exactly the site was, despite telephone advice received from the nominated archaeologist. As a result it was decided to search a wide area within Rill Cove. The approximate boundaries of the search area are shown in **Plates 1** and **2**.

5.1.7. During the post-excavation period, when all the plans were available and with the experience of having seen the seabed, the positional data was re-considered. It has not been possible to reconcile the plans with the aerial photographs and the chart, but the 'best fits' are included as insets in **Figures 2-5**.

5.1.8. The approximate area searched by WA in 2004 is shown in **Plate 2**. Comparison with **Figures 2-5** suggests that the WA diver is most likely to have been swimming over a reef to the west of the Main Site. During Dive 253 the search was progressed some distance to the east of the area searched in Dive 248, suggesting that the Main Site was in fact at least in part swum over.

5.1.9. Prior to the commencement of fieldwork, WA had been informed that the only archaeological feature likely to be exposed was a heavily corroded and abraded iron gun (Artefact No. 3, 1995 Rill Cove Finds List; Gun 1 on **Figures 2-5**). It was reported that it was not *in situ*, and that it was currently situated on a reef that was not likely to be buried by sand (Camidge pers. comm.).

5.1.10. WA did not see this feature, though it may have been hidden by the dense cover of kelp and other algae on all exposed rock. Subsequently Mr Camidge commented that, during the single guided dive that he has made on the site, he was taken to the gun but did not recognise it until his hand was actually placed upon it (Camidge pers. comm.). This suggests that finding it is a matter of chance rather than judgement for those not thoroughly familiar with the site.

5.1.11. Only a partial recording of the ADU diving operation in 1998 was available to WA and there is no audio track to this. Other video footage that may have been shot by the ADU was not available and any transit marks acquired by the ADU in 1990 when they inspected the site do not appear to have been recorded or retained. However, the video that has been viewed suggests that the dive vessel used was anchored in a similar position to *Xplorer* during dives 245 and 248, and that a broadly similar area was searched. There is a note in the relevant dive log which states that the search was "in the correct area according to Kevin Camidge" (ADU 1998).

5.1.12. Comparison of **Plate 2** with **Figure 2** suggests that the WA searches may have been conducted largely to the west Main Site. Mr Hall has examined **Plate 1** and the area identified by him as containing the site is marked in that plate.

5.1.13. The following position for the Main Site has been derived by comparing the plans illustrated in **Figures 2-5** with the modern chart (see **Figure 1**) and the aerial photograph of the cove (see **Plate 2**). This appears to place Gun 1 (which is at the centre of the site) close to (approximately 25-30 metres) the edge of the designated area. The co-ordinates for this position are as follows:

Lat.	**49° 58.5483' N**
Long.	**05° 14.4462' W**
WGS 84	

5.2. SITE POSITION – ANCHOR SITE

5.2.1. The approximate location of the Anchor Site can be seen in **Figure 1**. A wide area around this position was searched during Dive 253. The area searched is shown in **Plates 1** and **2**. The anchor was not located during these searches.

5.2.2. This failure to find the Anchor Site could be due to the anchor being shown in the wrong position on the illustration in the site archive. This is considered unlikely as Mr Camidge has visited the Anchor Site in the company of Mr Hall and has confirmed that it lies at or close to the position shown (Camidge pers. comm.). Alternatively it could have been obscured by kelp and other algae, which is possible because the cover was dense and tall on most exposed hard surfaces.

5.2.3. However, the anchor is large (**Figure 6**), with a shank length of 3.47 metres, although experience has shown that even large objects can be missed in dense kelp. It could also be due to a navigational error by the diver, which may have resulted in incomplete coverage of the site. Alternatively the anchor may no longer be there, although this is thought to be unlikely as there have been no reports of interference by divers or other marine activities.

5.2.4. In the circumstances a combination of navigational error and kelp cover is the most likely explanation for the failure to locate the Anchor Site. Mr Camidge states that the anchor is in a crevice in the bedrock and very well camouflaged. Apparently it took Mr Hall, who is familiar with the site, 20 minutes of searching to relocate it (Camidge pers. comm.) and it is recorded that it took two days of searching in 1983 to find it (Simpson et al, 1983).

5.2.5. The following position for the Anchor Site has been derived by transferring the position given in the archive (a cross marked on a photocopy of the chart) onto Admiralty Chart 2345 (**Figure 1**). As a result this position should only be considered to be approximate, with an unknown degree of error, however it does appear to lie outside the designated area. The position is as follows:

Lat.	**49° 58.4806' N**
Long.	**05° 14.4891' W**
WGS 84	

5.3. DIVING CONDITIONS

5.3.1. Total bottom time of 217 minutes was achieved during the course of four dives, although Dive 260 had to be aborted after nine minutes due to swell.

5.3.2. Visibility was generally good, varying from five to ten metres, although in rough conditions visibility dropped to one to two metres (Dive 260). The diver's ability to

see the seabed in areas where the bedrock was exposed was severely limited by kelp and other algal growth.

5.3.3. Current varied from slack within the cove (Dive 245 and 248) to moderate to strong in the vicinity of the Anchor Site (Dive 253). Moderate swell resulted in Dive 260 being aborted because it rendered effective searching in the inshore area of the cove impracticable.

5.3.4. The dive vessel *Xplorer* was unable to deploy a multi-point anchor pattern safely and therefore some operational problems were experienced as the vessel swung on a single anchor in changing conditions of wind and tidal current. The vessel was anchored on the edge of or just outside the cove because of the presence of navigational hazards closer inshore, and was therefore subject to greater current.

5.4. GEOLOGY, TOPOGRAPHY AND FLORA

5.4.1. The underlying geology in the vicinity of Rill Cove consists of a recrystallized assemblage of serpentine (Edmonds et al 1975).

5.4.2. The Main Site is situated in a small south-facing cove to the south-east of Rill Point, and on the southern side of the Rill (**Figure 1**). The cove is backed by steep and vegetated cliffs (**Plate 1**). The cliffs are subject to active erosion and evidence of significant rock falls and landslides can be seen in **Plate 1** and **Figure 2**.

5.4.3. **Figure 4** shows a topographic plan of the seabed within the area of the Main Site prepared by the Licensee in 1987. Viewing it in conjunction with **Figure 5**, a plan of the excavated areas, shows the Main Site to be bounded by reefs to the west, north and east, but open to the south. In the approximate centre of the Main Site are two large reef outcrops, with areas of 'light sand', 'small boulders' and 'large boulders', the latter principally to the north-east (WA have seen no definition of these terms but take them at face value).

5.4.4. The 1993 Research Design (believed to be Hall and Camidge 1993) describes the usual stratigraphy encountered on the site. An upper layer of mobile sand has a thickness that varies over time and that is affected by erosion or deposition. Below this is a layer of 'pebbles and boulders' (the precise definition of these terms is not given, therefore the size range is uncertain). The thickness of this layer is not given. The Research Design implies that this layer is also affected by erosion.

5.4.5. Beneath pebbles and boulders there is a 'darker, more compact sand layer'. The depth of this layer is not given. The Research Design appears to imply that this layer is also subject to erosion. No indication is given as to what is below this, although it may be bedrock.

5.4.6. Discussions with Mr Hall have confirmed that the following stratigraphic sequence has been observed during excavations:

- Upper layer of loose sand, depth varies with time and location, very mobile and subject to rapid erosion and re-deposition;
- Layer(s) of loose sand and shingle, depth not recorded, mobile but subject to less rapid erosion;

- Hard packed sand, shingle and rock with a smooth surface, mobile and subject to some erosion;
- Natural hard packed sand and shingle, not apparently mobile but subject to erosion.

5.4.7. Natural bedrock has not apparently been reached during excavations. The stratigraphic sequence has not been subject to detailed recording and the depth of layers is unknown (reference is made in various reports to the depth of the upper layer alone).

5.4.8. The seabed within the designated area and in the vicinity of the site investigated in 2004 has been variously described in ADU reports as follows:

1989: The above-water topography continues down to the present sand level (at a depth of about six metres at the time of diving).

1990: The underwater topography is a continuation of the fissured bedrock, which constitutes the steep-sided cliffs on the shore. The lowering of sediment levels has revealed archaeological material in the rock gullies. These mobile sediments range in size from coarse gravel to sand. The designated area is free from significant weed cover (the inspection was carried out in May) and this indicates a dynamic underwater environment.

1993: The site appears to be well covered with sediment.

1998: The area of seabed covered by the wreck site contains several large upstanding outcrops of rock that reach to the surface, with some actually drying at low water. The upper parts of these are covered by dense kelp growth. These outcrops create a series of gullies and corridors of varying sizes, the bottoms of which are filled by sediments and aggregates in which the shipwreck material has been located during previous excavations. The abraded nature of the seabed material indicates an active and high-energy environment. Loose material lying in the gullies will usually be mobile during rough seas.

5.4.9. During Dive 248 the search area was bounded by the inshore edge of the cove consisting of the sea cliffs visible above water. Bedrock reef was visible across much of the search area, with steep-sided gullies filled with loose sand trending north-east to south-west. Further south the reef peters out into sand, with isolated areas of boulders.

5.4.10. Most of the area searched during Dive 253 consisted of bedrock with fissures and small gullies, sloping away to the south and west and becoming flat sand and cobble seabed with some outcropping. To the east an extension of the cliff bounding the western edge of the Dive 248 search area dropping down to flat sand gully was observed.

5.4.11. There is a note in the 1998 ADU dive log (ADU log 1998) that states that modern debris was seen in a gully recorded as being four metres deep (ADU 1998). No gullies of similar depth were observed by WA during 2004, and comparison of the video footage from 1998 and 2004 suggests that the depth of sand cover in the cove

was significantly greater in 2004 than in 1998. Fewer and less extensive expanses of sand in-fill can be seen in the gullies in the 1998 footage.

5.4.12. No systematic survey of the site flora could be undertaken because of limited bottom time. However, diver observations indicated that green and brown algae was growing on most hard stable surfaces, such as bedrock, with little or no cover in areas of mobile sediments. Kelp was the most prominent type and the cover was generally tall and dense.

5.5. HISTORY OF SITE INVESTIGATIONS

5.5.1. The following history has been compiled from limited archive material only. A copy has been sent to Mr Hall for comments and corrections and his response is currently being awaited.

5.5.2. **Pre-1976**: Michael Hall and Kenneth James Simpson discover the site whilst diving the wreck of a small trawler, the *Kerris Reed*, lost in Rill Cove in 1969. Site investigations are commenced by Hall, Simpson, Richard Larn and others (Fenwick and Gale 1998, and Larn 1996). There is some disagreement as to exactly when the site was discovered. Fenwick and Gale state 1975, whereas Simpson et al (1977) gives the date in 1977 as 'nine years ago' (i.e. 1968).

5.5.3. The Rill Cove Finds List submitted to ACHWS in October 1995 (also referred to as the Finds Database) records the recovery of finds including a large number of silver coins, and the location of an iron cannon on the site in 1974. Archaeological deposits were believed to have become exposed because of a movement of sand away from the site (implied by Simpson et al 1977). Following discussions with Mr Simpson, Mr Hall has confirmed to WA that the site was discovered in late 1974 (Hall pers. comm.). The site appears to have been covered by a layer of mobile sand in 1975 (Hall pers. comm.). As a result further investigations were delayed.

5.5.4. **1976**: Site designated under the Protection of Wrecks Act (1973). The SI came into operation on the 15th March 1976. The weather in 1976 is recorded as being 'exceptionally fine', thus allowing site investigations to continue. Survey work is recorded as being halted by April because of 'ground-seas', which caused the burial of the archaeological deposits by a layer of up to 3.6 metres of sediment (Simpson et al. 1977). However, a magnetometer search had been carried out by that stage, allowing the limits of the site to be established on three sides.

5.5.5. The remains of the trawler lay on the eastern side, although the site was in fact bounded by reef on this side (Michael Hall pers. comm.). The westward limit of the site was not established. Excavation work was undertaken and the area excavated is shown in a later site plan (**Figure 5**).

5.5.6. A desk-based assessment of archive material was undertaken at this time (Simpson et al. 1977). The 1983 Annual Licensee Report refers to "our 1976 report", indicating that an unpublished interim or Licensee report was produced for this year. This has not been seen by WA.

5.5.7. **1977**: A summary interim report published in this year (Simpson et al. 1977). This consisted of an outline history of site investigations and results. Otherwise the site

history is unknown for this year. No area is shown in **Figure 5** as having been excavated.

5.5.8. **1978**: Activity unknown. No area is shown in **Figure 5** as having been excavated this year. There is no reference to work being carried out in the available documents.

5.5.9. **1979**: Activity unknown. No area is shown in **Figure 5** as having been excavated this year. There is no reference to work being carried out in the available documents.

5.5.10. **1980**: This is described as the last successful season (Simpson et al. 1983). The 1983 report implies that some excavation was undertaken (Simpson et al. 1983). **Figure 3** appears to show this as being the largest area of the site excavated in a single year.

5.5.11. **1981**: Site investigations continued. Reported as one of two frustrating years on this site caused by excessive sand cover (Simpson et al. 1983). The 1983 report implies that some excavation was undertaken (Simpson et al. 1983) and a small area is marked in **Figure 5** as having been excavated in 1981.

5.5.12. **1982**: Site investigations continued in this year. Reported as one of two frustrating years on this site caused by excessive sand cover (Simpson et al. 1983).

5.5.13. **1983**: Site investigations recommenced in June, having been delayed by poor weather, and finished in August. The layer of mobile sand covering the site was observed as being about one to two feet higher than the last successful season in 1980 (Simpson et al. 1983). A non-local sports diver had reported what he thought to be an anchor lying off Rill headland, some distance from the site. The Licensee and his team conducted searches for this object before recommencing excavation.

5.5.14. The anchor was located and surveyed (**Figure 6**). The stock of the anchor was noted to be pointing towards the site. The 1983 Report hypothesised that this anchor was associated with the site and indicated a vessel of about 350 tons (Simpson et al. 1983).

5.5.15. Excavations continued on the Main Site (**Figure 5**). It appears that the layer of mobile sediment burying the archaeological deposits became progressively deeper during the work and excavation became difficult. The use of a dredge and air bags is recorded, as is the use of explosives to fragment large boulders (Simpson et al. 1983).

5.5.16. An Annual Licensee Report was produced for this year (Simpson et al. 1983). The Licensee was Simpson and other licensed team members are recorded in the report as being Hall, Anthony John Randall, Richard Larn, Roy Davis and Anthony John Crabtree. The report contained a text description of the methods and techniques used with partial results and interpretation incorporated within this, together with a list of artefacts recovered and photographs and/or scale drawings of a number of artefacts recovered that year. The recovery of fragments of ship timbers, a piece of lead sheathing and of an anchor fluke similar to those of the complete anchor is recorded, as well as a large number of coins.

5.5.17. **1984**: Activity unknown. No area is shown in **Figure 5** as having been excavated this year. There is no reference to work being carried out in the available documents.

5.5.18. **1985**: Activity unknown. No area is shown in **Figure 5** as having been excavated this year. There is no reference to work being carried out in the available documents.

5.5.19. **1986**: The area shown in **Figure 5** was excavated (Hall pers. comm.).

5.5.20. **1987**: An Annual Licensee Report was produced for this year (Camidge pers. comm.; copy in his possession). The Licensee stated that the site no longer required protection (Camidge pers. comm.). Further excavation was undertaken in four areas (**Figure 5**).

5.5.21. **The** ADU Report 059 (ADU, 1990) refers to various site plans being in existence, particularly in 1987.

5.5.22. **1988**: Activity unknown. No area is shown in **Figure 5** as having been excavated this year. There is no reference to work being carried out in the available documents.

5.5.23. **1989**: The ADU visited the site and reported that no archaeological remains were visible due to extensive sand cover (ADU, 1989). The ADU had difficulty in locating the site, commenting that "this may be due to rock falls and other natural changes". They reported that the team had abandoned plans for work on the site this year because of excessive sand cover (ADU, 1989).

5.5.24. **1990**: The ADU visited the site, possibly as a result of the Licensee reporting that general sand levels on the site had been lowered by winter storms. The ADU observed various organic and non-organic surface artefacts including "an eroded iron cannon" (ADU 1990). However, they were unable to reconcile the archaeological and natural features observed with the site plans in their possession (documents in the possession of the ADU are not generally listed in their reports and therefore the plans available at the time of their visit have not been identified with certainty). The ADU do not appear to have created a site plan or recorded their observations in a manner that could subsequently be reconstructed in a spatial way.

5.5.25. The ADU conducted a magnetometer survey, which detected "several consistent anomalies buried under sediment" (ADU 1990). No further details are given and the current whereabouts of the data was not available at the time of writing. The meaning of the term 'consistent' is not explained.

5.5.26. The ADU reported that 'a banded breech loading gun' (presumably a wrought iron swivel or tube gun) had been recovered from the site and was on display in the Charlestown Shipwreck Museum (now the Charlestown Shipwreck Heritage Centre). The ADU also reported the recovery of "over 300 16th century coins". A total of 4468 coins are listed in 1995 (see 5.5.37), it is not clear whether these were excavated between 1990 and 1995, or whether the ADU 1990 report was in error.

5.5.27. A brief Annual Licensee's Report was produced for this year in the form of a letter (Simpson 1991). The Licensee reported that no work was carried out "due to large quantities of sand which engulfed the whole area of the site". Mr Simpson announced his intention not to reapply for a licence due to lack of time and resources (although he remained as part of the licensed team) and proposed Mr Hall as a suitable alternative.

5.5.28. **1991**: An Annual Licensee Report was produced for this year (Hall and Camidge 1991). The report stated that "No excavation was possible this year due to the depth of sand lying over the site…the sand was found to be in the region of two metres deep over most of the site."

5.5.29. **1992**: The ADU visited the site and reported that they "saw no cultural material as the sand levels in and around the site were high" (ADU 1992). Illegal diving on designated sites in the area was reported to the ADU at some point but the reporter(s) are not identified.

5.5.30. An Annual Licensee Report was produced for this year (Hall 1993). The report stated that "Periodic inspection revealed that most of the site lay beneath a substantial layer of sand" and that no excavation took place.

5.5.31. **1993**: The 1993 research design submitted with the 1993 licence application (believed to be Hall and Camidge 1993) stated that "between 1976 and 1992 (16 years) seven seasons work were undertaken (totalling 826 man hours underwater) and resulting in 120 square metres being excavated. This suggests that the total area of the wreck is about 300 square metres. It states that about 100 square metres of this total have always been under a great depth of sand (minimum of three metres thick) and on this basis are unlikely to be excavated. A mean of 7.5 square metres was excavated per year over the whole 16 years. On this basis it would take approximately 11 years to complete excavation of the accessible parts of the site (80 square metres)."

5.5.32. The 1993 research design also stated the intention to extend the site grid by adding datum points (three 'permanent' grid points are marked on **Figure 5**). The existing grid points were inadequate for the whole site. The research design indicated that the normal method of excavation used a reaction dredge (a water dredge), followed by excavation by hand of the archaeological deposits. An area of 10 square metres is given as the typical trench size. No indication is given as to the depth of stratigraphy although three layers are described and stratigraphy is stated as being always recorded by sketch drawings. A proton magnetometer is listed amongst the equipment available but there is no clear indication as to where it was employed.

5.5.33. The ADU visited the site with the Licensee Mike Hall and 'Archaeological Director' Kevin Camidge and reported that "from the surface it was possible to confirm the Licensee's observation that the level of sand was high on the site", and that "The site appeared to be well covered with sediment" (ADU 1993). As a result no diving took place. However, the Licensee confirmed that where the ADU had dived in 1992 was the area where artefacts have been recovered in the past. Unfortunately the exact location of the ADU dives in 1992 does not appear to have been recorded.

5.5.34. **1994**: Activity unknown. There is no reference to work being carried out in the available documents.

5.5.35. **1995**: The ADU visited the site and reported that no archaeological remains were seen (ADU 1995). The Licensee had previously informed them that the sediment levels were relatively high.

5.5.36. An annual Licensee report was produced for this year. The Licensee stated that periodic inspection revealed that most of the site lay beneath a substantial layer of sand, and added that this problem had prevented them from working the site for a number of years (Hall 1995). The Licensee indicated an intention to work the western margin of the site: an area less deeply covered and not previously investigated, and to prepare a more detailed topographical plan of the area west of the 'present workings'.

5.5.37. The Report also included a hard copy and MS Access floppy disc copy (current whereabouts unknown) of a finds database, comprising a complete list of finds and a finds list excluding coins. A total of 4555 finds are listed as having been recovered, of which the vast majority (4468) are silver coins. A number of entries recorded as one find appear to be for example multiple pot sherds. One find, an iron cannon, is listed as remaining on the site, and is believed to be the feature marked as Gun 1 in **Figure 5** (Camidge pers. comm.).

5.5.38. The anchor located in 1983 is not listed and the ship timbers and lead sheathing recovered in the same year do not appear to be listed, although the latter may have been re-interpreted as unidentifiable. All of the finds are given a grid location, which has been plotted in coarse form in **Figure 5**. Of the coins, 4466 were listed as unknown and a proportion appear to have been sold prior to 1995. Mr Camidge believes that approximately 80% of the coins recovered from the site remain in the possession of Mr Hall (Camidge pers. comm.). None of the finds listed appear to have been recovered after 1987. Mr Hall stated that he intended to add further detail to the finds database (Hall 1995), suggesting that more detailed archive material does/did exist.

5.5.39. A supplementary annual Licensee report was produced for this year (Hall 1996). The Licensee reported that excavation was impracticable due to extensive sand cover (Hall 1996). However, a limited metal detector survey was carried out to the west of the excavated area. This located several metal finds, one of which was recovered (Hall 1996).

5.5.40. **1996**: Activity unknown. There is no reference to work being carried out in the available documents.

5.5.41. **1997**: Activity unknown. There is no reference to work being carried out in the available documents.

5.5.42. **1998**: The ADU visited the site and reported that no archaeological material was seen, probably because it was buried under sediment (ADU 1998). The report added that some intrusive modern steel debris was noted on the seabed. No further details were given. The ADU were still referring to the recovery of only "over 300" coins from the site, despite the apparent availability of a list detailing over 4000 of them.

5.5.43. An annual Licensee report was produced for this year (Hall and Camidge 1998). The Licensee reported that "the site was visited on a number of occasions…sand levels on the site were generally low; the iron cannon was completely exposed. No other material associated with the wreck was visible." There is no indication in the report that any excavation or survey work was undertaken.

5.5.44. **1999**: Activity unknown. There is no reference to work being carried out in the available documents.

5.5.45. **2000**: Activity unknown. There is no reference to work being carried out in the available documents.

5.5.46. **2001**: Activity unknown. There is no reference to work being carried out in the available documents.

5.5.47. **2002**: An annual Licensee report was produced for this year (Hall 2002). The Licensee reported that he and his team could not visit the site that year due to sickness. The report also stated that the long term storage conditions of recovered finds was intended to be improved, although it is not clear whether this has been achieved. This suggests that the existing conservation maintenance regime was considered to be an actual or a potential problem by Mr Hall. The extent and effectiveness of the conservation carried out on finds is unknown.

5.5.48. **2003**: An annual Licensee report was produced for this year (Hall and Camidge 2003). This stated that no work was undertaken on site due to considerable sand cover.

5.5.49. **2004**: An annual Licensee report was produced for this year (Hall and Camidge 2004). This stated that no work was undertaken on site due to considerable sand cover.

5.5.50. WA undertook fieldwork on the site.

5.6. ARCHAEOLOGICAL FEATURES – MAIN SITE

5.6.1. During Dive 245 one loose surface find was observed. This was described by the diver as a small piece of eroded wood. Given the high level of gully infill, it is thought likely that this object is most likely to have originated from outside the cove. Although it appeared to be man-altered, there is no evidence that it is contemporary with the finds from the Main Site and it is probably modern. An approximate position for this find is as follows:

Lat.	**49° 58.520' N**
Long.	**05° 14.493' W**
WGS 84 (converted from UTM using Geocalc version 2.4.1)	

5.6.2. The full extent of the site is currently unknown. Rough positional information given in the finds database has been used to map the distribution of finds. This appears to correspond reliably with the position of the excavated areas (**Figure 5**), and with a 1987 coin distribution plan in the possession of WA.

5.6.3. Most of the coins (and therefore most of the finds) have been recovered from the area between the two reef outcrops and the eastern edge of the site (principally to the east of these outcrops). Mr Hall has confirmed that the site appears to be very largely contained by the reef to the west and east and by the sea cliffs to the north and he

does not believe that the site is likely to extend much further (Hall pers. comm.). The total excavated area appears to be contained within an area of 28 metres west to east and 23 metres north to south.

5.6.4. However, this may not represent the whole of the site as a metal detector survey has been conducted to the west, with a number of anomalies detected and a single find recovered (Hall and Camidge 1996). Furthermore the ADU magnetometer survey of 1990 recorded a number of anomalies (ADU 1990). Unfortunately the extent of these surveys is unknown and WA are unable to determine how much of the cove has been searched. The research design (Hall and Camidge 1993) stated that the total area of the wreck was believed to be about 300 square metres and implies that 120 square metres had been excavated to date. This has been confirmed by Mr Hall, however WA has not seen supporting data for that calculation.

5.6.5. The archive material available to WA has produced a total of approximately 4557 finds (the number is approximate because some categories of finds are listed in the finds database collectively, e.g. “small ceramic fragments”). Of these, some 4555 appear to have come from the excavation areas shown in **Figure 5**.

5.6.6. The great majority of the finds are silver coins, listed in the finds database as being Spanish and of Philip II and Philip III. Simpson et al. (1977) stated that the coin finds were found loose in sand and consisted of “pieces of eight or cobs, as well as pieces of four and two, from the Potosi, Seville, Granada, Toledo and Mexico mints”. He dated them to the late 1500s and early 1600s. Intriguingly, he went on to suggest a tentative date of 1616 for the site but did not explain whether this is based upon the latest coin date or other evidence.

5.6.7. Fenwick and Gale (1998) refer to two dateable groups of 1555-98 and 1598-1603/5 but Mr Hall is not aware that two distinguishable groups exist, other than as coins minted under different monarchs (Hall pers. comm.). These coins, the majority of which are in the possession of Mr Hall, have not been examined for the purposes of this report and have not yet been published in any substantial way. Mr Hall describes most of them as being fairly heavily eroded and difficult to identify (Hall pers. comm.). He states that the latest examples appear to date from 1603 or 1605 and that one coin appears to predate Phillip II. Most have apparently been photographed.

5.6.8. Other recorded finds include an anchor fluke (apparently with the same dimensions as the complete anchor), pottery sherds, pewter dress buttons, lead and pewter bottle seals, brass dividers, a single copper ingot, a wooden pulley block, a sounding lead, lead shot for muskets or pistols and various unidentified iron, brass and copper artefacts. In addition evidence of an armed vessel has been found, in the form of a cast iron gun and a wrought iron swivel gun (Simpson et al 1977) and small iron shot. None of the finds appear to have been published to date.

5.6.9. Finds are recorded as coming from the upper mobile sand layer and this is plausibly interpreted as a secondary context, the original context being a lower, more stable layer. Reference to ‘underlying cultural remains’ indicates that finds have been found below the upper sand layer, although no details are given, although the 1983 annual Licensee report states that a number of non-coin finds were found in the ‘deepest levels of excavation’ (Simpson et al. 1983).

5.6.10. The 1983 annual Licensee report (Simpson et al. 1983) refers to the recovery of fragments of ship timbers and a piece of lead sheathing. However, these do not appear to be listed in the finds database and may have been re-interpreted as non-structural or of uncertain identity. Otherwise there is no other record of any of the structure of a vessel being found. The location is very exposed and it is likely that any vessel going ashore in or near the cove would break up rapidly, with little likelihood of any significant section of structure surviving. The hostile environment is also likely to be why very little organic material has been recovered, as the unstable seabed does not appear to be conducive to the presence of anaerobic conditions.

5.7. ARCHAEOLOGICAL FEATURES – ANCHOR SITE

5.7.1. This site appears to consist of a single find, a complete anchor lying in a crevice on bedrock. **Figure 6** is a scale drawing of this anchor, WA did not locate the anchor and cannot therefore confirm the accuracy of the drawing. However, Mr Hall has confirmed that he helped to take the measurements on which the drawing was based and has confirmed that it is an accurate representation (Hall pers. comm.). Apparently discovered by a non-local sports diver in 1983, it was relocated by the licensed team the same year (Simpson et al. 1983).

5.7.2. The anchor as drawn is of the straight-armed type. The angle of the arms is 75%. The arms are short and somewhat stubby, being less than twice the length of the flukes. The shank is notably long relative to the length of the arms. The means of securing the stock (which has not survived) is not clear as no nut/key or other modification can be seen on the shank. The ring is still attached and has a large diameter relative to the size of anchor. The anchor has the following basic dimensions, calculated using the scale bar shown:

- Length of anchor (crown to end shank) – 3.73m (12ft. 2.85in.);
- Length of shank (to throat) – 3.46m (11ft. 4.22in.);
- Width of shank - 0.19m (7.48in.) (the drawing does not show the section) ;
- Bill to bill (tip of fluke/palm) – 2.21m (7ft. 3.01in.);
- Length of arm (inner face, bill to throat) – 1.04m (3ft. 4.94in.);
- Length of fluke – 0.72m (2ft. 4.35in.);
- Width of fluke – 0.60m (1ft. 11.62in.);
- Internal diameter of ring – 0.57m (1ft. 10.44in.).

5.7.3. The anchor appears to have somewhat unusual dimensions and does not readily correspond with any known type. However, the straight arms and general form indicate that it is unlikely to predate 1540 or post-date the early nineteenth century and is unlikely to be of Spanish manufacture. Straight-armed anchors appear to have been more common on English vessels than continental ones. However, the angle of the arms is unusual and would be particularly unusual pre-1600 when 40-60 degrees was the norm (Curryer 1999). Experience suggests that mistakes are sometimes made in recording the angle of the arms when anchors on the seabed are recorded and it is possible that the angle of the arms has been incorrectly recorded in this case.

5.7.4. The shank is recorded as pointing towards the Main Site in the 1983 report (Simpson et al 1983) but Kevin Camidge recalls observing that the shank pointed towards a

position towards the west of the site on the single occasion that he has dived the Anchor Site (Camidge pers. comm.). It is not yet proved that the anchor is in fact associated with the Main Site. However, the possible date range for the anchor encompasses the date range for the coins found on the Main Site and an anchor fluke apparently of the same dimensions has been found on that site (Simpson et al 1983), therefore an association is possible.

5.7.5. The licensed team have speculated that the anchor dimensions indicate a vessel of about 350 tons, although they do not state their source for this calculation. Comparison of the dimensions with the table of dimensions given in Sutherland (Sutherland 1717) indicates a rough correspondence with anchor dimensions given for a vessel of '364 tuns'. However, this supposes that this anchor was a bower and not the stream or kedge anchors of a larger vessel. Whilst it is possible that the position of the anchor represents a last ditch attempt to save the vessel by the deployment of the sheet (largest) anchor, reconstruction of the vessel size from anchor dimensions appears to remain no more than speculation at the present time.

6. CONCLUSIONS

6.1. STATUS OF THE ARCHAEOLOGICAL RECORD

6.1.1. WA were unable to locate archaeological material during fieldwork in 2004, and are therefore unable to make direct observations concerning the archaeological status of the site, other than to say that any archaeological deposits that still exist appeared likely to be buried by mobile sand at the date of inspection. Nevertheless it is still possible to make limited comment upon the status of the archaeological record based upon the available archive material. However, it should be made clear that a significant caveat applies, in that work on the site has not yet been fully published. This assessment may therefore contain errors of fact and/or interpretation resulting from incomplete access to the results of the excavations.

6.1.2. The Main Site currently consists of an area within the cove and close to the cliffs that the Licensees have stated as measuring approximately 300 square metres. Metal detector and magnetometer surveys suggest that the site may in fact be significantly bigger, and therefore the boundaries of the site are not yet securely defined. The position of the site is not geo-referenced and it is difficult to relocate as there is only one archaeological feature that is usually exposed.

6.1.3. A post-fieldwork archive assessment by WA has suggested that the site lies towards the eastern end of the cove, probably within 25-30 metres of the edge of the designated area. This assessment needs to be supported by field observations backed up by dGPS positions for (at least) Gun 1 and any surviving datums before it can be confirmed.

6.1.4. Over 4500 finds have been recovered from the Main Site, largely during excavations that took place between 1976 and 1987 and led by Kenneth Simpson and Michael Hall. These excavations are not yet published and it is understood that post-excavation work is still ongoing (Camidge pers. comm.).

6.1.5. Excavation work has been hampered or rendered impracticable by a layer of mobile sand. This buries what are regarded as the archaeological deposits to a varying but usually substantial depth. The archaeological deposits appear to be only very rarely exposed.

6.1.6. The mobile sand layer is subject to a cycle of erosion and deposition which does not yet appear to be understood on anything other than an anecdotal basis. The licensed team has consistently made the case that material is being eroded from the archaeological deposits and is being recovered from both those deposits and the mobile layer above. WA are unable to assess this theory as insufficient data concerning the excavations has been published.

6.1.7. An association between the Anchor Site and the Main Site is probable but not yet proved. The anchor has been surveyed but WA are not in a position to comment upon the accuracy of the survey.

6.1.8. The overall character of the exposed material on the seabed can be summarised as follows (after Watson and Gale 1990):

Area and distribution of surviving ship structure:	None observed, survival of articulated structure or large sections of individual structural elements highly unlikely given the post-wreck event environmental conditions likely to have been experienced on the site. The archive records the recovery of small timber fragments.
Character of ship structure:	Unknown.
Depth and character of stratigraphy:	Archaeological deposits are contained within gully bottoms in layers including and below a layer of mobile sand.
Volume and quality of artefactual evidence:	Significant quantity has been recovered, particularly of Spanish 15th and 16th century coins. Organic material is poorly represented, probably as a result of post-wreck event environmental conditions.
Apparent date of ship's construction and/or loss:	Available data concerning the coin evidence indicates a date for the wrecking event not earlier than 1578 and probably not after 1627. Historical evidence indicates a possible link to a vessel lost in about 1619.
Apparent function:	Artefactual and historic evidence are inconclusive. The vessel was armed and the anchor located nearby if associated indicates that the vessel may have been in the order of 350 tons or more. Historical evidence indicates that the vessel may have been a merchant ship.
Apparent origin:	The vessel was carrying a very large quantity of Spanish coinage. Historical evidence suggests that this may be a vessel that sailed from St. Lucar in Spain.

6.2. SITE IDENTIFICATION

6.2.1. Detailed discussion of the identity of the excavated site is beyond both the scope of this report and the data currently available. Nevertheless a brief summary of the archive material is appropriate.

6.2.2. Simpson et al. (1977) gives a suggested date for the site of 1616. The evidential basis for this date is unknown. Coinage appears to be the only closely dateable class of find recovered from this site. The finds database refers only to coins of Philip II and III, therefore giving earliest and last possible dates for the minting of the coinage as

being 1556 and 1621 respectively. However, Mr Hall states that the assemblage contains one coin that possibly predates Philip II and that the latest reliably dateable coins (many coins are in a poor condition) are either 1603 or 1605 (Hall pers. comm.).

6.2.3. Therefore the wrecking event cannot have occurred earlier than 1578, the first year of the reign of Philip III. Had it occurred significantly later than 1605, then it is likely that coinage of a later date would be present in the assemblage. However, considerable caution must be exercised in pursuing this line of argument because many of the coins are in a poor condition and un-dateable. Allowing a very generous margin of error, 1640 is suggested as the last possible date for the wrecking event, although a date within six years of the last minted coin is more probable (Fenwick & Gale 1998, 53).

6.2.4. Larn (Larn and Larn 1997) records only one loss in the area during this period:

- Unidentified sailing vessel recorded thus: "about nine years ago, a ship from St. Lucar was wrecked at the Lizard, laden with bars and pieces of 8…", reported 1628, (CSP.Dom.Ch.I Vol.CXIII, p.258).

A letter from the Duchy of Cornwall dated 8th March 1618 apparently mentions "certain bars of silver taken up out of the sea at the Lizard". In the next ten years other papers from the Duchy refer to further salvage of silver from the Lizard. The nearby salvage of silver is also mentioned in papers relating to the construction of a lighthouse near Rill Cove by Sir John Killigrew in 1628. Furthermore in 1628 the diving pioneer Jacob Johnson sought permission to salvage material from a ship from "St Lucar", wrecked about nine years earlier at the Lizard when laden with silver bars and pieces of eight.

6.2.5. There is no conclusive evidence to link this loss with the Rill Cove wreck. Whilst it is a strong possibility, it must be remembered that consistent and reliable wreck recording did not exist in the 17th Century. Furthermore records of other losses may still exist undiscovered or have been destroyed in the intervening period. It is also the case that no silver bars have been recovered from the Main Site, but it is possible that these were either all contemporaneously salvaged or that some remain undiscovered, either on the Main Site or nearby. Also a vessel carrying that sort of cargo is likely to have been more heavily armed than the evidence from the Main Site suggests, although the armament may well have been salvaged shortly after the loss.

6.2.6. Mr Hall is currently researching the possibility that there is more than one 16-17th Century wreck on this site (Hall pers. comm.). However, he stresses that this is currently only a theory and is not yet supported by any documentary or artefactual evidence.

6.3. RECOMMENDATIONS

6.3.1. In the short term, further fieldwork is required in order to locate and geo-reference both the Main Site and the Anchor Site. In the medium term further fieldwork should concentrate on establishing the extent of the site by means of metal detector and possibly magnetometer surveys (although acquisition of the ADU data in this respect may be sufficient). This strategy may also require some limited evaluation trenches.

6.3.2. The collation, enhancement and publication to current standards of the work carried out by Mr Simpson, Mr Hall and others should be pursued. Experience has shown that significant delay in the publication of excavations can have a serious impact upon the quality of the final product and will increase the risk of a catastrophic failure to publish, through loss of interest and/or the eventual loss or dispersal of the archive and finds. Publication will enable the value of the excavations carried out by Mr Hall and others to enter the public domain and will ensure that they thereby receive appropriate credit for their efforts.

6.3.3. It is understood that Mr Camidge and Mr Hall are in the process of updating the finds database and that Mr Hall hopes to re-photograph all of the finds currently in his possession (Hall pers. comm.). However, there appear to be no firm plans for a full publication at the present time (Kevin Camidge pers. comm.).

6.3.4. The active co-operation of Mr Hall will be required in this respect because it appears that most of the site archive and finds are in his possession. Also experience with other sites suggests that he and other members of his team are likely to be able to add considerably to the existing written archive. Whilst Mr Hall and Mr Camidge should be able to complete this process themselves, they will nevertheless undoubtedly benefit from encouragement and technical, financial and other support from EH or other agencies.

6.3.5. Mr Hall should also be encouraged to liase with the NMR, local SMR and local registered museums with regard to the future of the excavation archive. Archives that remain in private hands in the very long term tend to be eventually lost or destroyed, regardless of the intentions of the original collator.

7. ARCHIVE

7.1.1. 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. The ADU archive is held at the NMR, Swindon.

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APPENDIX I: DIVE DETAILS

Dive	Date	Diver	Start time	Max. / Min. Depth (m)	Bottom Time (min.)	Estimated Visibility	LW (Lizard Point)	Current and Sea State
245	28/08/04	Scott	11:50	- / 12.0	73	5-10m variable	10:41	Slack / Slight
248	30/08/04	Gaynor	15:41	4.0/13.0	46	c.6m	12:18	Slack / Slight
253	03/09/04	Scott	13:33	4.5/12.25	89	Not Recorded	14:59	Moderate-Strong / Slight Swell
260	26/09/04	Scott	10:44	- / 7.0	9 (aborted due to swell)	1-2m	10:29	Slack / Moderate Swell

APPENDIX II: ARCHAEOLOGICAL OBSERVATIONS LOG

Dive No.	Obs. No.	Description (recorded in real time)	Diver Summary	Video Time
245	2224	Made bottom 9m. Visibility 5-10m. Diver swimming W towards cliff face, encounters gullies with kelp growing on rock surfaces. Seabed is sandy. Diver follows along the cliff line S towards the 'point' at end of the cliff line (W edge of cove) where the anchor is supposed to lie. Flat sandy seabed. At the point bedrock seabed covered in kelp, diver unable to see anything as a result. Diver makes his way back N along the cliff, reporting a slight current.(video time 00.12.38). Loose mobile sand well sorted with shell material. (00.19.57). Diver travels through gullies. Sand is piled up in gullies, more than 300mm deep (shallow probed) with sand ripples. Diver finds loose surface find - small piece of eroded wood, approximate distance 73m from DSV, bearing 330 degrees. Diver surface swims along to the north, passes in front of a large rock then drops down to explore gully. Diver possibly in the 1974 excavated area? (00.32.32). This gully has loose sand on top of rocks and boulders.	Archaeological - Nothing observed other than loose surface find that is of unknown age and significance. Likely to be modern debris, possibly washed into cove. Operational – Prospector attached to diver umbilical within 3m of diver, distance to beacon from *Xplorer* measured acoustically. Simultaneously bearing of diver exhaust bubbles recorded from *Xplorer*. Bearing and distance is approximate and of unknown accuracy.	See Description
	2225	Boat's final position when diver leaves bottom		
248	2238	Made bottom. Depth 10.75m. Diver heads towards shore, then into cove. Diver at end of umbilical (c.80-90m from *Xplorer*). Large reef area dropping down to sand, running NW to SE. Diver moving E. Another gully running NW to SE, diver moves 15 metres E, then returns W to beginning of search area. On surface 16:02hrs surface swim looking down to ascertain layout of gullies. Now swimming mid-water to get better view of gullies beneath going east to west. Video mosaic. End of line, moved 5 metres S, then travelled W to E. Travelled approx. 35 - 40m. End of line, 5m S then moved E to W back to cliff face. Moved as far N as possible into a gully then headed S.	Archaeological - Swam out to the length of umbilical into a cove and began a general visual inspection of the lay out of the seabed that contained gullies and reef's. After a swim around it was decided to swim transversely (west-east) across the gullies and reef mid-water to prepare a video mosaic. After swimming E to W, then S 5m then W to E 3 or 4 times. After that swam back to the W to the nearest gully to the cliff face and the followed it to the N where it starts at the N face of the cliff then S where it bears round to the E then it opens out to another gully travelling N to S . Began to follow that one to the S. To the E of that one a second gully joined this one. Left bottom.	

Dive No.	Obs. No.	Description (recorded in real time)	Diver Summary	Video Time
253	2243	Diver surface swimming to cliff. Diver searching for anchor off the point. Diver doing line searches in front of the cliff. Current strong. Visibility 2-3m. Depth by inlet of cove 4.5m. Diver searches through kelp, cutting as he goes. Diver follows contour of the bottom of the cliff, ends up near *Xplorer* and her bow anchor. Diver then heads back north towards the cliff. Diver explores area of outcrop which runs E. Travels NE.	Archaeological - Nothing observed. Seabed – Bedrock with fissures. Gradual slope away from Point to the S (one pinnacle which does not break surface), then flat sand and cobble seabed with some outcropping but to the E there is a cliff dropping down to flat sand gully. Marine Growth - Various types of kelp/algae - particularly high-energy varieties. Operational - No current experienced on seabed but very strong swell. Most of sloping bedrock searched but due to heavy kelp growth, anchor could easily have been missed. Cut sections of kelp as went to ensure relocation of areas already searched.	
260	2250	Surface swim to rock, left surface 10:44hrs. Visibility poor. Lots of suspended sand. Diver headed east to start pendulum search. Conditions not good for search. Dive abandoned 10:50hrs. Left bottom10:53hrs. Visibility 1-2m.	Archaeological - No observations. Operational – Visibility 1-2m due to sand in water column. Very strong surge from swell. Unable to visually search due to poor visibility and swell which diver unable to swim against.	

APPENDIX III: 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.

General

The location is exposed and can suffer from significant sea swell even in fine conditions. Experience suggests that significant time will be lost to adverse environmental conditions at all times of year and that future operations should be scheduled in July and August if possible. The western side of the cove is likely to be more sheltered than the eastern, which is more exposed to sea swell arriving from the south-west. The site is potentially hazardous in anything above Sea State 3. Any sustained prevailing wind of Force 4 or above from the south or south-west is likely to render conditions unsafe for diving.

The shallowness of much of the site means any significant sea swell or waves are likely to affect the efficiency of an SSDE diver and will adversely affect results, particularly photographic.

Insufficient bottom time was achieved to determine the best conditions for good visibility. However, poor visibility is likely to be experienced during sea swell conditions or in the aftermath of gale force conditions not originating from the north or east.

Heavy kelp growth was observed where the bedrock is exposed. This made visual search of exposed bedrock difficult and therefore slow and potentially unreliable without cutting. It is not known when the period of minimum kelp cover is likely to occur, but late winter is probable. Local advice should be sought if this is likely to be a significant factor in planning.

Approach

Approach to the edge of the cove is not problematic. However, a number of navigational hazards exist close to the shore and to the west and east and therefore caution should exercised if the dive vessel is required to approach close to the shore. Approach is likely to be safer at HW.

Anchoring

Anchoring is potentially problematic. The site lies close inshore and little time would be available to recover a diver in the event of an anchor dragging and the dive vessel losing position. Furthermore significant difficulty was experienced in positioning *Xplorer* on a single point anchor. Manoeuvring space for a vessel of any significant size or draft is highly restricted and considerable movement of the dive vessel was experienced during dives as a result of rapid changes in the effect of wind and tidal currents. Deployment and recovery of multi-point anchor patterns is also problematic because of navigational hazards and local advice should be used in this respect.

Dive Windows

Insufficient data is available to assess whether currents are likely to restrict diving operations. However, the limited experience gained during WA diving operations suggests that tidal current currents are only likely to be of significance to the west of the Anchor Site.