# Project Silent Anzac
# Maritime Archaeological Assessment 2014
# Interim Report

## Background

1. Project Silent Anzac is being undertaken by the AE2 Commemorative Foundation (AE2CF) Ltd, established by the Submarine Institute of Australia to protect, preserve and tell the story of the World War I Australian submarine, HMAS AE2.

2. Following an Assessment Phase completed in mid-2008, the AE2CF developed a Joint Proposal setting out a plan to implement the agreed measures including an Education Program for delivery in Australia. These proposals were accepted by the Australian and Turkish Governments and formally approved by a Ministry of Foreign Affairs note in February 2014. [1] Subsequently the Turkish Ministry of Culture and Tourism approved the AE2CF's Archaeological Permit Application in April 2014. [2]

3. The AE2CF assembled a team of volunteers with expertise in submarine engineering, afloat operations, maritime archaeology, naval history, conservation of steel shipwrecks, marine science and remotely operated underwater vehicles (ROV) from Australia, USA and Turkey.

4. The Project was largely funded by an Australian Government grant announced in the May 2013 Federal Budget as part of the Anzac Centenary Program 2014-2018, administered by the Department of Veterans' Affairs. The US ROV supplier, SeaBotix and the Defence Science and Technology Organisation (DSTO) also provided a significant amount of in-kind sponsorship and support.

## MAA Overview

### Contracting Phase

5. A decision was made to engage a Turkish company to provide all offshore services; three companies were approached and contributed to the development of a budget for the work and Request for Tender. Bids were sought and the company DEEP Offshore was selected. A contract was awarded on 12 February 2014.

### Mission Rehearsal and Training Exercise Phase 1&2

6. Operating cameras and instrumentation to record the conditions inside the submarine lying at 73m in the Sea of Marmara required development of specialised cameras, lighting, instrumentation and techniques. These

[1] Ministry of Foreign Affairs Third Party Note 2014/46373548-KUGY/4259662 dated 10 February 2014

2 Ministry of Culture and Tourism letter reference- 94949537-163.99 72221 dated 11 April 2014

developments were undertaken by a team from the DSTO laboratories at Fisherman's Bend in Melbourne, working in concert with the US ROV supplier SeaBotix and Turkish offshore specialists.

7. The equipments were prototyped by DSTO using a replica of the conning tower and a section of the control room, including some trials in the test tank at Fisherman's Bend. A Divers' Support Platform [DSP] to provide a safe and stable working area around the fin was also designed and manufactured in Melbourne.

8. The second phase of training and rehearsals were untaken in 12m of water in Corio Bay, Geelong using the RAN's Diving Team (ANRDT6) from Melbourne. DEEP and SeaBotix personnel attended to add their expertise to the further development of the arrangements for cameras, rigs for inserting them and mounting the cameras, instrumentation and ROVs. The Geelong replica is now to become an exhibit at the Holbrook Submarine Museum.


Figure 1 Replica and DSP at Corio Bay, Geelong

9. The lessons learnt from the Geelong MRTE were incorporated into the construction of modified DSP and replica in preparation for the third phase of MRTE to be held in Turkey in June.

10. Letters providing 15 days' notice of commencing the MAA were sent to the Ministries listed in the Ministry of Culture and Tourism's approval, Attachments 1-7 refer. Advice of the approval was also passed to the Coastguard (Attachment 9 refers).

Mobilisation

11. The AE2CF team started assembling at Tuzla, Turkey from the 29 May as required to undertake preparations. A list of team members is provided at Annex A.

12. The Diving Support Vessel [3] began a 4 day mobilisation period on 31 May 14, converting the large, empty deck space into an expedition site. The following containerized facilities were fitted:

[3] Kapitani Deriya-2, IMO number: 9503756, displacement 1,339 T

- Workshop/store,
- ROV and camera Operations Centre,
- An accommodation module,
- Diving Bell,
- Diving Operations control centre,
- Two double chamber Recompression Chambers,
- Compressor and electrical workshop, and
- Twenty quad packs of Gas mixture.

A temporary navigation buoy and the ground tackle [including a 9 tonne clump weight] to anchor the buoy was loaded as well as three 7 tonne anode pods for the Cathodic Protection System [CPS].

Figure 2 MV Kapitani Derya-2 Loading Temporary Buoy

Figure 3 Diving Bell Training and Deck Layout

13. The final two days of the mobilisation were very busy for the ship, DEEP Offshore and DSTO teams as equipment was unpacked and set to work. To facilitate safe operations video feeds from the ROV and diver's helmet cameras were available at both control sites.

Figure 4 Diving Control Centre and ROV Ops Room Preparations

Mission Rehearsal and Training Exercise Phase 3.

14. A three day rehearsal was undertaken to familiarize the Turkish diving team with all equipments and to practise inserting the equipment into the replica in 12m of water. This was very beneficial; the diving team became involved in optimizing the equipment and familiar with its function.

Figure 5 Briefing Divers on camera mounting arrangements

Figure 6 Replica and DSP MkII launch for MRTE Phase 3

15. The full AE2CF team for the MAA assembled at Sarkoy on Saturday, 7 Jun 14. The DSV had transited from Tuzla overnight. Plans to position the ship over AE2 and lay the buoys were delayed whilst the ship waited at Karabiga for a final clearance from the Harbour Master.

16. The ship was positioned early on Sunday and four mooring buoys were laid in a square around the site to enable the ship's position to be finely adjusted. This proved to be a very robust and practical arrangement. The moment critique arrived at 1400 when the first ROV serial entered the water and located AE2 as predicted. An attempt to position the DSP around the conning tower of AE2 failed, as the crane was unable to plumb the position sufficiently to enable the DSP to be lined up, despite deploying a diver to assist; the ship's position required further adjustment.

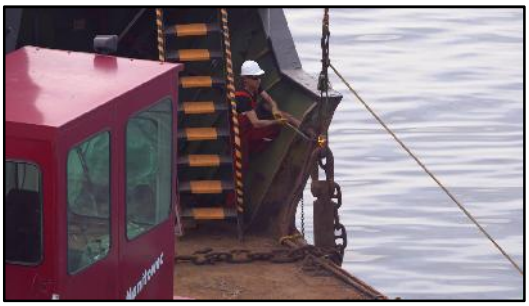


Figure 7 Laying the DSV moorings.

17. The MAA Diary and Photo Log at Annex B provides details of each day's activities; a short daily summary will be provided here for continuity.

18. Monday 09 Jun 14. The weather was too rough for crane operations, preventing a second attempt to install the DSP.

Figure 8 First view of AE2 fin

The ROV completed an external survey; good imagery was obtained and no major changes to AE2's appearance from the 2007 and 2013 surveys were noted. A diving medical emergency evacuation exercise was held, followed by a dive to clear away debris from around the hatch to avoid this entering the submarine during future serials.

Figure 9 Conning Tower Hatch on first approach and forward periscope pedestal

19. Tuesday, 10 Jun 14. The weather was perfect for the installation of the DSP, using an ROV to guide the crane operations and act as a tug to align the DSP in the final, delicate stages. During the first dive the upper conning tower hatch was inspected using the diver's helmet camera, three corrosion meter readings, a concretion sample and fluid sample from underneath the hatch were obtained. Cleaning around the hatch continued. An attempt to insert the drop camera during the second dive was unsuccessful, the opening was slightly too narrow, exacerbated by the camera assembly encountering a strengthening web not shown on the submarine construction plans and out of sight on the hatch. The two stirrups holding the hatch open as arranged by LCDR Stoker when abandoning the submarine were partially cut through before the diver ran out of time.

Figure 10 DSP in position. Taken on final flyover, shows CP connections in place with ROV grabber in foreground.

20. Wednesday 11 Jun 14. The stirrups were cut through and the hatch opened 3cm by hand, enabling the drop camera to be inserted during the second dive serial. Good images were recorded in the control room however visibility in the conning tower was poor due to the disturbance caused by the cutting and insertion. The drop camera was left inside the SM overnight in the hope of better visibility in the morning.

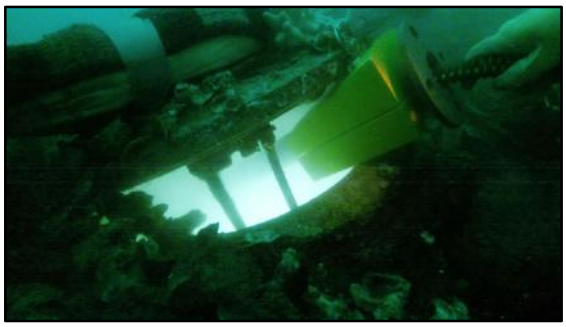


Figure 11 Drop camera illumination showing remaining hatch stirrup in place

21. Thursday, 12 Jun 14. Visibility in the control room was much improved, however the drop camera suffered a power failure due to flooding in one of the connectors and limited imagery was recorded – always a risk at 73m! The midships CPS pod was laid, using the ROV to position it 5m off the Port side of the SM, abeam the fin. The hatch was opened using a hand operated jack: much to the consternation of the resident conger eel, 'Bunts'.

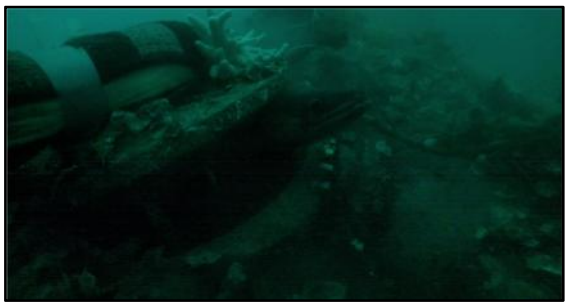


Figure 12 Bunts the conger eel emerges

During the final dive for the day the hatch was opened to the near upright angle of 85 degrees using a chain block and secured in this position. A build-up of silt, shells and concretion obstructed further movement. This opening proved adequate to insert the ROV, avoiding the need to cut the hatch away. It is a testament to the submarine's designers, the ship builders and the Engine Room Artificer responsible for the maintenance of equipment outside the pressure hull adherence to the maintenance routines that the hatch bearings operated correctly after 99 years on the seabed!

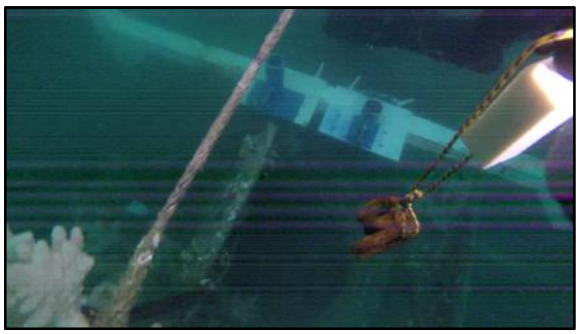


Figure 13 ROV being inserted into open hatch. Shows instrument mount in place and ROV weights

22. Friday, 13 Jun 14. Whilst the pole camera was being repaired following the earlier connector flooding, the opportunity was taken to position the ship and insert the after CPS pod 5m off the port after hydroplane, using the ROV's sonar to guide the crane. The ship then moved back to position the diving bell beside the DSP and the first diver cleared the area and set up the brackets to secure the pole camera with ROV observation to assist. A meeting with the Acting Director General Coastal Safety reached agreement regarding the Turkish ownership of the interim and final navigational buoys to be laid over AE2 (Attachment 10 refers).

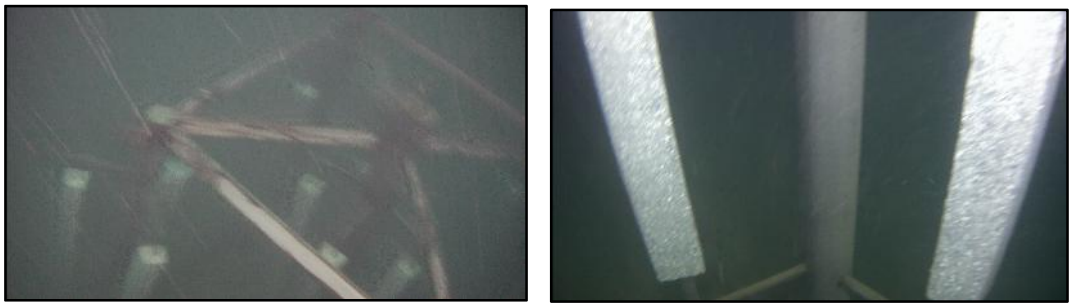


**Figure 14 Anode pod in position. Same pod after 48hour connection showing depletion initiation has taken place.**

23. Saturday, 14 Jun 14. In an effort to recover some lost time we proceeded with insertion of the modified SeaBotix vLBV ROV, in lieu of the pole camera. The ROV was a tight fit and required much manipulation to fit through the upper conning tower hatch. Visibility in the tower was poor because of the disturbed silt, however visibility rapidly improved and many details became evident as we waited for the next diver serial. Divers attempted to insert the ROV into the Control Room using a specially fitted aluminum pole, however the ROV became jammed due to a concretion build up that reduced the clearance and some unexpected lugs. Plans for a third dive serial were abandoned when a diver from the second serial suffered joint pains and underwent precautionary therapeutic treatment in the RCC.

**Figure 15 ROV and Aris sonar**

24. Sunday, 15 Jun 14. The planned rest day was abandoned to try and make up for lost time. Despite all efforts the ROV remained jammed in the lower conning tower hatch. The DEEP/DSTO team regrouped and provided the diver with an improvised boat hook fitted with camera and light to enable the diving supervisor to guide the diver's actions. After some practice on deck hooking the other modified ROV he descended into the depths and, working by feel, managed to dislodge ROV from lower conning tower hatch.

The ROV, now free to move around the conning tower, was able to conduct a detailed survey whilst waiting for extraction by the third dive serial. Once recovered normal pulse/breathing rates returned to the team above.

**Figure 16 Spare ROV being used by the diver to rehearse using the 'boat hook' to extract the stuck ROV**

25. Monday, 16 Jun 14. The ship was repositioned so that crane could lower the forward CPS pod to the bottom on the starboard side of the SM, adjacent to the windlass on the forward casing. Once again the ROV was essential in positioning the pod. The ship's position was then adjusted to position the diving bell for work on the forward CPS attachment points. Two dive serials were required to clean the attachment site and connect the CPS pod. The ROV provided invaluable assistance in guiding the divers between the pod and worksite during these serials. The ship moved back adjacent to conning tower, enabling the third dive serial to guide the DSTO ROV, which had been substantially modified overnight, fitted to the insertion pole, into the conning tower and thence into the control room. The VIP Sea Day was successfully completed during the day enabling nine invited visitors to view operations onboard the DSV and view some of the results obtained.

26. Tuesday, 17 Jun 14. This was a day of continuous ROV operation utilising the three ROV pilot working in shifts to complete seven hours surveying in challenging conditions.

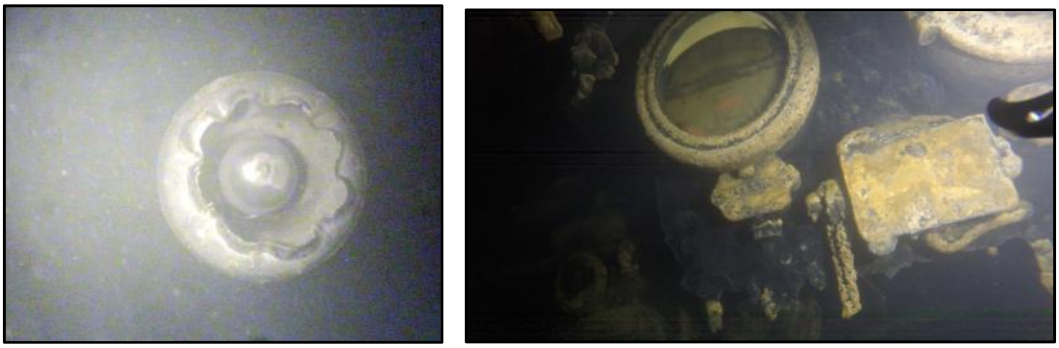


**Figure 17 Tuesday's shots of the day; Captain Stoker's desk light and the Control Room Log**

Images have been recorded from the Control Room through the wardroom, to the fore-ends and back taking in many equipments, artifacts and curiosities providing an unprecedented insight into early submarine construction and operation. Curiously only fragments of the spokes of the steering wheel, fore and after planes control wheels can be discerned, presumably these have

corroded away; providing a conundrum for our corrosion team. Among the many images, most memorable were the wooden wardroom furniture, the fluted light shade over the Captain's desk and the port decanter that sits intact on his desk.

Whilst this survey was occurring the ship was moved to the after CPS attachment point, sites cleaned and cables attached during two diving serials.

**Figure 18 After CP connection to port hydroplane. Midships CP connection to periscope pedestal**

27. Wednesday, 18 Jun 14. The ship was repositioned to the conning tower position, whilst ROV surveying of the amidships tube space continued in good visibility. The amidships CPS pod was attached during the first dive. During the second dive the ROV was extracted and preparations made for the crane insertion of the combined drop camera and Aris high definition sonar rig. This was successfully accomplished without using divers by the crane and an ROV to position the camera. The drop camera was extracted after conducting three sweeps of the control room with the assistance of the ROV to rotate the camera.

**Figure 19 Hatch closure (Top Hat) in place, DSP removed. Anode connection cable visible**

During the third dive serial the secure hatch was fitted and the DSP removed. An ROV survey of the site was then undertaken to ensure all expedition equipment was clear of the SM and the temporary navigation buoy was then laid. This marked the completion of afloat operations and several team members began the trip back to their homes.

28. Thursday, 19 Jun 14. During the day the AE2CF team cleaned and stowed equipment ready for re-export. A mast fitted with a yellow flashing light and radar reflector was fitted to the navigation buoy. A violent thunderstorm overnight forced the DSV to quit the moorings and seek shelter in Karabiga.

The completion of the afloat activity was reported to the Ministry of Culture and Tourism (Attachment 8) and arrangements made for a complete set of the original data gathered to be passed via the Australian Embassy, Ankara.

Figure 20 Temporary Navigation Buoy in position

29. Friday, 20 Jun 14. The remaining team began the process of returning to Australia. The ship completed the recovery of the moorings and steamed back to Tuzla for demobilization. This was completed on schedule the next day. The position of the navigational buoy was reported to the Department of Navy Hydrography and Oceanography (Attachment 11 refers).

## Conclusions

30. Objectives. All major objectives for the MAA were achieved, though not without overcoming a number of significant obstacles and setbacks. This success is a tribute to the technical capability, innovation and flexibility of the DSTO, SeaBotix and DEEP teams. Divers were a critical component for most activities and the tempo of 3 dives in a 12 hour working day, each dive providing 20 minutes work at 73m regulated progress. In addition to providing a unique capability to undertake the internal survey, ROVs allowed work to continue between dives and to maximize the effectiveness of each dive serial.

31. Data. A huge amount of data was collected, most of it in real time via umbilicals connecting to the various cameras and instruments in the water. Each record has been initially assessed and indexed. Full analysis will take many hours of painstaking work by knowledgeable researchers; results will be published in the final report. A set of selected interim images is attached at Annex F.

32. Navigation Buoy. Due to the late decision to fit a 3m buoy in lieu of a smaller buoy and production delays arising from the manufacture of the first buoy of this size in Turkey, the final buoy was not available in time for the MAA. The Directorate of Coastal Safety approved the fitting of a temporary, smaller buoy until the final buoy became available. Arrangements have been made to install the final buoy as soon as it is available which is anticipated will be no later than the end of August 2014. The final fitting will be reported the Navy Hydrograph and Oceanography Department.

33. Scientific Aspects. The scientific objectives for the Project, to undertake an external and internal examination of AE2 using specially developed and adapted instrumentation, high definition sonar and cameras were met. In doing so the DSTO team demonstrated great ingenuity to overcome a number of practical obstacles. A huge amount of data has been collected and a methodology set out for the detailed examination that will now follow. As a final product it is hoped to be able to populate a computer-generated model with the real images enabling us to visualize the interior of AE2. Further details are at Annex C.

34. Maritime Archaeological Aspects. The state of preservation of fittings and furniture is quite extraordinary; the internal examination has opened a time capsule. With the exception of the forward torpedo space, where decaying material severely restricted visibility, good quality images have been collected to enable the internal equipments to be identified and a start begun to better understand the operation of the vessel. The principle of minimum interference was followed throughout and we leave the wreck in a better state for the future, with a functioning cathodic protection system, secure hatch and navigational buoy in place. Further details are at Annex D.

35. Conservation Aspects. The readings taken over the course of the MAA indicate that the CPS is functioning correctly and as expected. It should be noted that this work represents the largest in-situ conservation project ever attempted on an historic iron shipwreck. As a result of this work the AE2 is now being actively preserved while remaining in-situ at the bottom of the Sea of Marmara. Not only will this cathodic protection system stop corrosion of AE2 it will actively remove chloride ions and so stabilise the vessel and preserve it for future generations. Further details are given at Annex E.

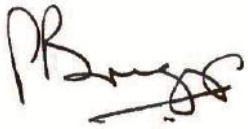
36. Security Aspects. Publication of the images and other information arising from the MAA has a potential downside, being; the attraction of trophy hunters who may attempt to enter the submarine to recover artefacts. While installation of the navigational buoy has reduced the risk of accidental damage it could facilitate undesired activity by indicating the wreck's location. The secure hatch closure provides some protection and the navigation buoy is located at an (albeit limited) distance from the wreck. Some additional protection will be provided by continuing to treat the coordinates of the wreck itself as confidential. However, security would be greatly boosted by activation of the 'no go' zone around the wreck which has been requested in earlier meetings with the Turkish Ministry of Transport, Maritime affairs and Communications and supervision of that zone by the appropriate authorities, including the Coastguard.

## Next Steps

37. Selected images will be provided for print and visual media to promote the story of AE2 and Sultanhisar in Australia and Turkey. These will also be incorporated into the Australian educational products such as the Study Guides, IBook and the AE2 graphic novel.

38. The expert members within the AE2CF's team will undertake further evaluation of the results in order to prepare the Final Report and to deliver papers at the Closing Conference to be held in Istanbul on 20 April 2015.

39. Discussions are underway with the Australian National Maritime Museum regarding the future management and detailed analysis of the data collected during the MAA – truly a joint success for Turkey and Australia.



P Briggs AO CSC
Rear Admiral RAN Rtd
Chairman AE2 Commemorative Foundation
10 July 2012

Annexes

A. MAA Team List
B. MAA Diary and Photo Log
C. Interim Scientific Report.
D. Maritime Archaeology Interim Report.
E. MAA Interim Conservation Report
F. Selected Images.

Attachments

1. AE2CF 14LET4301T 16May14 Ministry of Foreign Affairs
2. AE2CF 14LET4307T 16May14 Navy Hydrography and Oceanography
3. AE2CF 14LET4306T 16Mayis14 Ministry of Defence
4. AE2CF 14LET4305T 16May14 Ministry of Transport
5. AE2CF 14LET4304T 16May14 Ministry of the Interior
6. AE2CF 14LET4303T 16May14 Governor of Canakkale
7. AE2CF 14LET4302T 16May14 Gen Director of Cinema
8. AE2CF 14LET4327T To Ministry of Culture dated 20Jun14-1 Work Completed
9. AE2CF LET4300T 09May14 Coastguard
10. AE2CF LET4325 Acting DG Coastal Safety14Jun14
11. AE2CF LET4328T 25Jun14 Navy Hydrography & Oceanography