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TEST EXCAVATION OF *S.S. DICKY*

17th APRIL 2015



S.S. Dicky

26° 41' 51.37", 153° 08' 21.65" (WGS 84)

Dicky Beach

Caloundra

QLD

April 2015

Test Excavation of S.S. *Dicky*
17th April 2015

Prepared for:

Sunshine Coast Council

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EXECUTIVE SUMMARY

The Sunshine Coast Council (SCC) is proposing to preserve key heritage elements and remove hazardous elements from the remains of the S.S. (Screw Steamer) *Dicky* due to concerns for public safety in light of recent increased deterioration. A permit is required from the Department of Environment and Heritage Protection under section 91 of the *Queensland Heritage Act 1992* to disturb the site. The awarding of a permit would be conditional, in part, on acceptable archaeological mitigation being implemented before, during and after the removal of hazardous elements from the wreck.

So as to better inform and plan for the cutting of the wreck and to finalise a Conservation Management Plan (CMP) for the wreck, a test excavation was planned to investigate a number of unknown aspects and test cutting equipment to inform the CMP methodology. A permit application for this investigation was approved by the Department of Environment and Heritage Protection under section 91 of the *Queensland Heritage Act 1992* (approval letter dated 16th April, 2015). The test excavation was conducted on the 17th of April, 2015. The key objectives of this test excavation were as follows:

- To test the cutting equipment and methodology both above water and underwater;
- To expose the top of an isolated position of the port side hull at midships and determine cutting depth;
- To inspect the structural integrity of the stanchion; and,
- To test the complete archaeological strategy proposed in the draft CMP.

The test excavation encountered a considerably higher sand level than previously experienced which hindered progress in exposing and cutting frames. However, the test excavation was able to successfully test a thermal lance underwater and a hand held circular saw above water. The thermal lance took approximately 20 minutes to cut through a relatively small frame underwater, while cutting with the saw above water took approximately 6 minutes to cut through a frame almost three times the size. It was also found that most of the port side hull from stern to past midships will require cutting underwater regardless of the tide level.

The test excavation was not able to reveal the edge of the hull on the port side, except right at the bow, demonstrating that the sand level is a major factor when considering access to the desired frames to be removed and indicating that there should be some reconsideration as to what is considered to be a hazardous element of the wreck.

2.13 m of the length of the stanchion was exposed, however, a cause for its instability was not located. Despite this, the stanchion was relatively stable at this level of exposure which indicated that the weakness is much deeper and that the stanchion should remain quite stable without reinforcement.

A number of issues were identified as part of the CMP methodology including the difficulty of recording with only two archaeologists and the unnecessary complexity of the recording process. It was also found that baseline offset measurements hindered the progress of excavation and would be of limited accuracy. The amount of access to the site by archaeologists was limited by travel times and the objectives and timings of the test excavation could have been better communicated between SCC and the archaeologists.

From the findings of the test excavation, the following recommendations have been made:

- A hydraulic powered circular hand saw would be useful for underwater and above water cutting of the wreck. A diamond saw blade needs to be used and would need to be a minimum size of 10 inches. Underwater cutting will require a commercial dive team to complete the cuts;
- Re-evaluate what is considered unacceptably hazardous elements of the wreck in order to inform the location of cutting. This is to include consideration of depth of burial and infrequent exposure of the port side hull;

- The stanchion should remain *in situ* in the beach with no additional supports or reinforcements until it becomes too unstable to remain in this position. The CMP should be amended likewise;
- The labelling and recording methodology in the CMP should be reviewed by the archaeologists in order to simplify the process;
- Three archaeologists would be required during the main cutting works in order to fulfil the tasks required in an efficient and timely manner;
- DPGS positioning is preferred as the method of positioning of frames during the cutting works;
- Storage and initial conservation measures of the artefacts should be monitored by an archaeologist. The artefacts should also be recorded at the storage facility, rather than on-site, in order to obtain a higher standard of recording;
- The amount of sand cover appears to be more effective at prohibiting access to the wreck than tide levels and so should be given a higher consideration when determining the timings of the excavation;
- Archaeologist(s) will need to stay in Caloundra the night prior to works commencing in order to undertake preparatory work before the excavation as well as allowing works to commence early in the morning; and,
- Adequate briefings should be undertaken for all personnel involved in the excavation so that the objectives are clear. This will include a summary of objectives and other key points supplied to Council by the archaeologists, as well as an itinerary, timings and equipment/stores required.

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Abbreviations

AHD	Australian Height Datum
CMP	Conservation Management Plan
DEHP	Department of Environment and Heritage Protection (QLD)
DGPS	Digital Global Positioning System
GPS	Global Positioning System
HIA	Heritage Impact Assessment
PDS	Professional Diving Services
QLD	Queensland
SCC	Sunshine Coast Council
S.S.	Screw Steamer
WIP	Wreck Interpretation Plan

1 INTRODUCTION

The Sunshine Coast Council (SCC) is proposing to preserve key heritage elements and remove hazardous elements from the remains of the S.S. (Screw Steamer) *Dicky*. The wreck is located in the intertidal zone on Dicky Beach, Caloundra. The SCC cites concerns for public safety, especially in light of recent increased deterioration of the wreck as the reason why wreck should be removed from its current location.

A permit is required from the Department of Environment and Heritage Protection under section 91 of the *Queensland Heritage Act 1992* to disturb the site. The awarding of a permit would be conditional, in part, on acceptable archaeological mitigation being implemented before, during and after the removal of hazardous elements from the wreck.

So as to better inform and plan for the cutting of the wreck and to finalise a Conservation Management Plan (CMP) for the wreck, a test excavation was planned to investigate a number of unknown aspects and test cutting equipment to inform the CMP methodology. A permit application for such an investigation was approved by the Department of Environment and Heritage Protection under section 91 of the *Queensland Heritage Act 1992* (approval letter dated 16th April, 2015, Annex A). The conduct and findings of the investigation are the subject of this report.

1.1 Background

The historical information in this document is duplicated from a previous test excavation report by Cosmos Archaeology¹ and has been obtained from *S.S. Dicky Management Plan* by Cosmos Archaeology in 2008² and *S.S. Dicky Inspection Report: 20 and 31 May 2013* by the Heritage Division (then the Heritage Branch).³

The wreck of the S.S. *Dicky* is situated within the intertidal zone of a sandy surf beach located 100 metres to the north of Bunbybah Creek and 2.5 kilometres north of Caloundra City Centre. The vessel lies on an approximate south-west to north-east axis, perpendicular to the shoreline with the bow facing inland, and has been in this location for over 120 years. The wreck is a well-known feature of the area; the beach where it is located is named after it.

The iron hulled 225 ton (gross) steamship was wrecked in a severe storm in early February 1893 whilst en route from Fitzroy River to Brisbane carrying sand and water ballast. No lives were lost. The S.S. *Dicky* was initially only grounded by the stern at high tide, however, four attempts to re-float the vessel failed. Following the last attempt in late February 1894, the vessel was run ashore bow first and officially salvaged.

In the years that followed the effects of wave action, corrosion and scavenging have seen the progressive alteration and deterioration of the S.S. *Dicky* wreck. Substantial collapse events occurred in the mid-1920s and mid-1930s due to heavy seas arising from cyclones. In 1963, the propeller was removed and mounted on a specially erected stone cairn near the site. During the late 1960s, a broad section of the upper parts of the hull at midships was removed; possibly to allow the passage of 4WD vehicles along the beach. The passages of two cyclones in 1974 scoured out the sand around the wreck to such an extent that timber beams and floorboards were reportedly exposed. However, no significant loss or collapse appears to have occurred at that time. In 2005, the wreck was again exposed when then Caloundra City Council applied fish oil as a means of slowing down corrosion. It does not appear that the interior of the wreck was uncovered down to the bilge.

The pattern of deterioration during cyclonic seas has most recently culminated in the collapse of the mid-section of rib framing following Cyclone Oswald (January 2013). This

¹ **Cosmos Archaeology 2014** *Preliminary Archaeological Investigation of the Wreck of S.S Dicky*, report for Sunshine Coast Council.

² **Cosmos Archaeology 2008** *SS Dicky Management Plan*, report for Caloundra City Council.

³ **Waterson, P.A. 2013** *S.S. Dicky Inspection Report: 20 and 31 May 2013*, Heritage Branch, Environmental Policy and Planning Division, Department of Environment and Heritage Protection, Queensland Government.

event has been the catalyst for the Sunshine Coast Council to take a pro-active stance for the long term management of the wreck.

1.2 Rationale for Investigation

The issue of long-term management of the wreck of the S.S. *Dicky* has been debated since the 1980s. There has been competing concerns regarding the potentially hazardous nature of the wreck to swimmers and beach goers versus the landmark value and tourist attraction of the wreck site as well as the cultural heritage significance of the wreck itself. In 2013, an inspection report prepared by the Queensland Heritage Branch determined that the S.S. *Dicky* has suffered advanced degradation since Cyclone Oswald in January that year. This weather event resulted in structural damage and loss of fabric, dramatically affecting the wreck's appearance and heightening safety concerns. The report concluded that the vessel has passed a catastrophic level of deterioration and key "tipping point" whereby nothing can be done to preserve *in situ* the upper portions of the ship in the medium to long-term.

SCC engaged Cosmos Archaeology to undertake a test excavation in April 2014 in order to investigate the integrity and condition of the wreck, particularly structural stability in the keel area. The results of this test excavation led to the formulation of the current proposed works which include removing hazardous elements above the floor frames of the wreck and leaving the remainder *in situ*, with removed elements potentially to be incorporated into an interpretive display. This plan reduces safety concerns while preserving the remaining structure. It is currently proposed that the wreck elements should be cut down in June 2015.

SCC require a permit under section 91 of the *Queensland Heritage Act 1992* to undertake the proposed works. A series of planning documentation is under preparation in order to obtain this permit. The documentation includes a Heritage Impact Assessment (HIA), a CMP and a Wreck Interpretation Plan (WIP).

A number of pivotal questions were raised during the production of the draft HIA and CMP. This test excavation was proposed in order to answer these questions and finalise the reports.

1.2.1 Cutting of Frames and Rudder Post

The main question was in relation to proposed cutting equipment. Above water cuts could be made safely with hand held power tools such as a right angle grinder or reciprocating saw. However, the majority of cutting will need to be undertaken underwater, that is below Lowest Astronomical Tide (LAT), in very limited visibility and without the construction of any form of safety barriers against wave action. Hand held tools in this environment poses serious safety concerns to personnel. It was proposed that an excavator-mounted hydraulic circular cut-off saw be used instead for the underwater components. This type of saw is used for cutting steel and reinforced concrete with either friction (abrasive) or diamond blades. The saw would be mounted onto the end of the excavator boom and would require pre-setting and adjusting of the blade angle for the required cut. The reach of the excavator boom would allow operations into locations subject to incidental wave immersion. A limitation of this saw is that an extremely proficient machine operator would need to be used. Availability and access to this type of saw may also pose difficulties.

It was desirable that this saw be tested before finalising the CMP as an inability to access or use this saw efficiently for cutting underwater would necessitate a reassessment of the cutting methodology and/or reducing the amount of wreck (frames) that will be removed. Other cutting equipment would then need to be considered. Another option is to use an underwater exothermic cutting system (referred to in the remainder of this report as a thermal lance) for cutting underwater, or use hand held power tools and cut the wreck only above the water line or under the water line given that the environment is made safe. In the circumstance of cutting above the water line, the water level will need to be reduced as much as possible. If cutting below LAT, the operator may need to be protected by temporary sand bunds which would minimise water movement and wash that may unbalance the operator.

1.2.2 Depth of Port Side

Previous test excavations and exposure of the wreck have not been able to accurately record the depth of the surviving port side hull at midships. Due to the heel of the wreck this is potentially the lowest point that requires cutting and hence the deepest underwater and most difficult to access. Although the draft CMP intended to cut the hull down to the floor frames on both the port and starboard sides, depth and limited access to the port side may require a revised location of cutting.

One objective of the test excavation was to locate the top of the port side hull at midships and expose as much of its vertical side as possible. This was only required in one isolated place. From this, the depth of remains and the condition of the remaining elements may be determined. If it was not considered likely that the port side hull can be exposed down to the floor frames for cutting then it may be possible to identify another structural feature, such as a stringer, to use as an indicator or guide for cutting instead. If no structural features could be used, then an arbitrary depth may suffice.

1.2.3 Stanchion

The CMP intended to leave the currently exposed stanchion *in situ* as the only element permanently visible to act as a wreck marker. However, the stanchion was known to move when exposed to over one metre and should be stabilised to extend its presence on site. The structural integrity of the stanchion has previously not been investigated and the reason for its movement was unknown. In order to form a strategy for reinforcing and stabilising the stanchion, the cause of its instability must be understood.

1.2.4 Methodology

This test excavation will involve removal of elements from the wreck. As such, the full archaeological strategy proposed in the draft CMP was also to be tested during this excavation. This included recording and photography throughout the process, artefact labelling and storage, the metal detector survey and processing of data and artefacts. This would allow for any oversights in the methodology to be corrected before the final CMP. Of particular interest was testing the use of trilateration as a method of positioning instead of DGPS. Trilateration would provide sufficient accuracy for this project but may interfere with other operations more than DGPS.

1.3 Objectives

The key objectives of the test excavation of the S.S. *Dicky* wreck were as follows:

- To test the cutting equipment and methodology both above water and underwater;
- To expose the top of an isolated position of the port side hull at midships and determine cutting depth;
- To inspect the structural integrity of the stanchion; and,
- To test the complete archaeological strategy proposed in the draft CMP.

2 CONDUCT OF INVESTIGATION

2.1 Timings

The test excavation of the wreck of the S.S. *Dicky* was conducted on the 17th of April, 2015. Work was carried out from mid-morning to late-afternoon as the tide allowed.

2.2 Personnel

Cosmos Coroneos (Director, Cosmos Archaeology) was the project manager for the preliminary archaeological investigation. Cos managed excavation process, directed the mechanical excavation and was the liaison with other personnel on site including members of SCC, the dive team and Paddy Waterson (Principle Heritage Officer [Maritime Archaeology], Heritage Division, QLD Department of the Environment and Heritage Protection). Dani Wilkinson (Archaeologist, Cosmos Archaeology) undertook the initial metal detector survey, recorded the conduct of the excavation throughout the day as well as creating a site mud map and recording artefacts.

Non-maritime archaeological personnel included SCC staff who undertook the excavating as well as SCC dive contractors who operated the thermal lance.

2.3 Environmental Conditions

The test excavation was undertaken on Friday 17th April as it coincided with the Spring low tide and provided minimum inundation of the wreck. The excavation was timed to begin with surveying and recording a couple of hours before digging began. Digging occurred near low tide, with the lowest tide at 1:00 pm, and continued as long as possible with infilling as the tide rose (Table 1). As a result, the investigation began at approximately 11:00 with mechanical excavation being carried out between approximately 12:40 am and 4:00 pm and recording continuing until approximately 5:00.

Upon arriving on site in the morning conditions were sunny and still. There was a significant amount of sand accretion on site, amounting to approximately 1 m additional depth of sand surrounding the stanchion to previous observations in mid-March 2015. As a result of the increased sand level, the water line was already beyond the stern section of the wreck enabling immediate access for surveying (Figure 1). There was no rainfall on the day of excavation and only light winds from the east to south-east (

Table 2). The water level appeared to be approximately 1 m below sand level due to the accumulation of sand and rose throughout the excavation.

Table 1. Times and heights of high and low waters for Caloundra. Note: These times are adjusted for Caloundra as the source provides tide data for Mooloolaba and these occur 3 minutes after the Caloundra. Blue is for high tide and red is for low tide.⁴

Friday 17 th April	0030	0640	1300	1911
	0.29	1.89	0.14	1.91

⁴ Bureau of Meteorology, 'Mooloolaba Times and Heights of High and Low Waters April 2015', available http://www.bom.gov.au/cgi-bin/oceanography/tides/tide_predictions.cgi, accessed 19th March 2015.



Figure 1. View of S.S. *Dicky* upon arriving on site, showing the water level. (Cosmos Archaeology, 17th April, 2015).

Table 2. Daily rainfall at Caloundra with wind information from Maroochydore.⁵

Date	Rain	Wind 0900 (kts)	Wind 1500 (kts)
Tuesday 14 th April	0 mm	S 19	SE 15
Wednesday 15 th April	0 mm	S 15	SE 17
Thursday 16 th April	1.2 mm	SSE 17	ESE 17
Friday 17 th April	0 mm	SE 13	E 17

2.4 Metal Detector Survey Process

Upon arriving at the site a metal detector survey was undertaken to delineate the extent of wreck remains on the exterior of the port side. This was to reduce the risk of the machine excavator crushing and damaging buried wreck remains. A baseline was established from the exposed stern section of the wreck to the exposed stanchion and beyond, with transects spaced at approximately 4 m perpendicular to the wreck and 10 m long (Figure 2). Five transects were conducted between 9 m and 24.4 m along the baseline, with four additional transects infilling the centre between the original transects. Two Minelab Electronics Pty Ltd metal detectors were used including SD 2000 Super Detector and an Excalibur II. The survey transects were conducted from south to north and flags were placed where noise would start, with the noise increasing in volume towards the wreck. Any noticeable increases in noise were also flagged. Once the area was flagged, the excavator was able to approach and begin digging.

⁵ Bureau of Meteorology, 'Daily rainfall – Caloundra Airport', available http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=136&p_display_type=dailyDataFile&p_startYear=2015&p_c=-336185666&p_stn_num=040998, accessed 21st April 2015; Bureau of Meteorology, 'Maroochydore Queensland April 2014 Daily Weather Observations', available <http://www.bom.gov.au/climate/dwo/IDCJDW4081.latest.shtml>, accessed 21st April 2015.



Figure 2. Conducting a metal detector transect, facing N. Note that this detector is re-inspecting the transect and that the transects were first surveyed in the opposite direction. (Cosmos Archaeology 17th April, 2015).

2.5 Excavation Process

Mechanical excavation was undertaken by an experienced excavator under the direction of Cos Coroneos. Three test pits were excavated in total during this test excavation, each at different points on the port side of the wreck. The test pits were excavated by first digging on the southern extremity of the intended location and working northwards towards the wreck in order to encroach on any remains as opposed to digging vertically downwards and damaging the remains. No manual excavation was required during this test excavation as the excavation methodology and water level caused the sand surrounding wreck elements to become unstable and fall away with limited assistance.

2.6 Cutting Process

Two different tools for cutting were tested during this test excavation, including a thermal lance and hand held circular saw. Unfortunately the excavator-mounted hydraulic circular cut-off saw was unable to be obtained for this test. The thermal lance was operated by experienced commercial divers, while the hand held circular saw was operated by an experienced SCC worker. All cutting was guided by Cos.

2.7 Recording Process

Surveying of the shipwreck and was undertaken with offset measurements by Dani and Cos. A baseline was originally established from the stern section running past the stanchion and offsets were taken from this line to record the metal detector results and the location of all wreck material exposed during the excavation. These were all noted by Dani onto a site plan from the previous field investigation, with all exposed elements given a unique label, and were later digitised into the site plan (Annex B).

A brief written record of general observations and a timeline of events made by Dani during the conduct of the excavation. Photography and videoing was also undertaken by Dani with the assistance of Cos including general photographs of the site and excavation as well as videos of the tested cutting equipment and exposed wreck material (Annex C).

Only three artefacts were removed by cutting from the wreck during the excavation. The artefact recording procedure was undertaken by Dani which included photography and recording the artefacts onto prepared *pro forma*. The artefact was numbered, tagged and stored for inspection at a later part of the process. The records were then added to a FileMaker Pro artefact database (Annex D).

3 FINDINGS

3.1 Metal Detector Survey

The metal detector survey was conducted between approximately 11:00 am and 12:30 pm. The results are presented in Figure 3. Transects identified a general pattern of signals beginning approximately 4 to 6 m to the south of the baseline and increasing in volume as the transect progressed to the north and closer to the wreck. The only exceptions to this were the western two transects, closest to the bow, in which no noise was heard until about 2 m from the baseline. On the other transects, the volume of noise increased dramatically from about 2 m from the baseline. It was concluded that the noise at 4 to 6 m indicated fallen remains on the exterior port side of the wreck and the noise at 2 m indicated the port side hull. One exception was on the eastern most transect in which a relatively loud isolated signal was detected between 5.95 and 6.9 m from the baseline before silence and then the recommencement of the signal increasing closer to the wreck. This anomaly was interpreted to be a piece of isolated wreckage on the exterior port side of the hull that was relatively close to the surface. Because of the relatively deep sand cover over the site it cannot be stated with certainty that all substantial loose wreckage beyond the remaining intact section of wreck was detected.

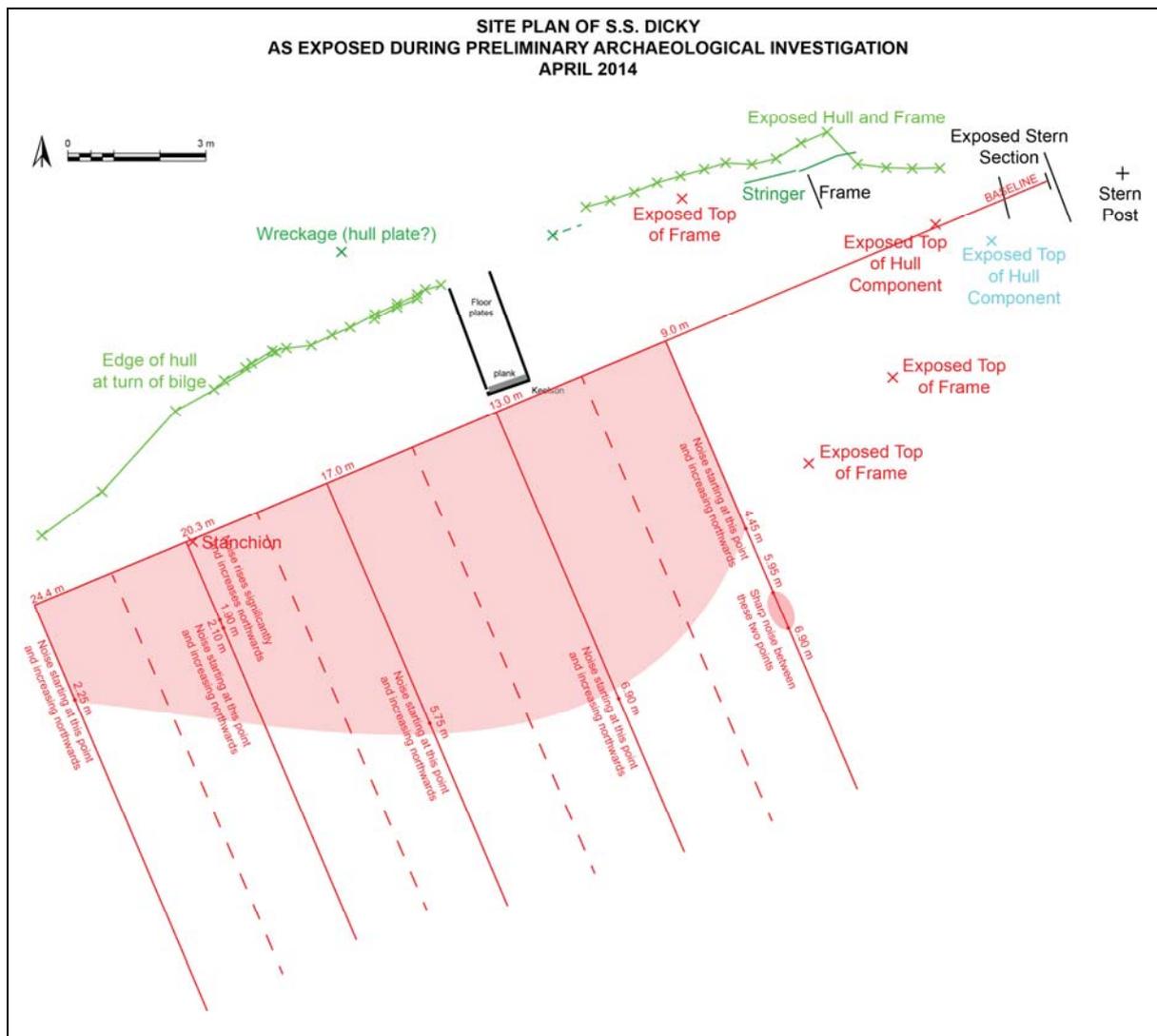


Figure 3. Site plan of the S.S. Dicky with metal detector transects and results.

The outer extent of the signal was flagged and the mechanical excavator was restricted from entering this area. The flags also provided an indication of where to excavate in order to intersect with possible port side hull remains.

3.2 Test Pit One

The first test pit was mechanically excavated on the exterior of the port side just toward the stern side of midships, starting approximately 8 m from the baseline and working inward towards the wreck (northward). The intent of this test pit was to uncover wreck remains on the port side to gauge a depth and any limitations to access. Excavation began at approximately 12:40 and identified wreck remains approximately 0.6 m below sand level (Figure 4). As these remains were two intact hull frames and a detached section of frame and hull plating – fulfilling the objective of exposing intact remains below LAT, no further searching for the wreck was conducted. In addition access to the wreck itself was considered too difficult in the present conditions considering the largely increased sand level so it was deemed appropriate to test the cutting methodology on these remains instead attempting to uncover more frames on the port side of the midships area. As a consequence these remains were further exposed to maximise access in order to test cutting with a thermal lance below the water line.



Figure 4. Test pit one, facing SE. (Cosmos Archaeology, 17th April, 2015).

Before cutting began, the exposed frames were recorded by scaled photography and positions were recorded through baseline offset to the highest point. Two separate frames were identified, labelled as FR001 and FR002.

FR001 was the larger and most exposed frame (Figure 5 to Figure 7). It measured approximately 250 mm in length and 200 mm in width with a depth larger than 500 mm in maximum dimensions. It appeared to consist of two attached components including an upright angle iron frame, with a larger angle frame attached to plating immediately adjacent to the east. This frame appears to have been bent over to the port side, with the frame and hull plating now facing outwards and angled downwards.

Frame FR003 is an angle frame but was completely submerged at the time of recording and limited visibility prevented further recording or measurements (Figure 8). Despite this, it appears consistent in size with other angle frames recovered from the wreck. Both FR001 and FR003 protruded from the sand at approximately the same angle and are aligned, indicating that they are likely to be *in situ*, that is attached to the main body of the wreck (see Annex B – Figure 22).



Figure 5. FR001, facing N. Shows intact angle frame to left and bent over section of hull plating and attached frame to the right. (Cosmos Archaeology, 17th April, 2015).



Figure 6. FR001, facing W. Cosmos Archaeology, 17th April, 2015).



Figure 7. FR001, plan view. Shows intact angle frame to left and bent over section of hull plating and attached frame to the right. (Cosmos Archaeology, 17th April, 2015).



Figure 8. FR003, plan view. (Cosmos Archaeology, 17th April, 2015).

Cutting with the thermal lance was undertaken by experienced commercial divers contracted by SCC (Figure 9 and Figure 10). It was initially attempted on FR001 on the section of hull plating, however, it was quickly observed that the cutting procedure would take a considerable amount of time. After approximately 10 minutes only about 50 mm of the length of the plating had been cut through. It was decided that this process would take too long to cut the entire plate which was approximately 250 mm wide. Instead, this cut was abandoned and the cutting process was instead begun on the intact angle frame. The same problems were encountered and it took at least 20 minutes to successfully cut through and remove the top of this frame. The removed section is artefact FR001-001.



Figure 9. Lighting the thermal lance in preparation for cutting, facing S. (Cosmos Archaeology. 17th April, 2015).



Figure 10. Diver undertaking the cutting, facing E. (Cosmos Archaeology, 17th April, 2015).

After the completion of cutting, the water level had risen to completely cover the frames. The cutting procedure also changed the colour of the water to a much darker hue (Figure 11). Together these changes completely prevented any form of recording of the remaining frames after cutting.



Figure 11. Test Pit One after the cutting procedure, facing E. (Cosmos Archaeology, 17th April, 2015).

3.3 Test Pit Two

The second test pit began adjacent to the stanchion in approximately the location of the port side of the wreck. Excavation continued downwards but no remains were encountered. The test pit also encroached on the stanchion and there was first mechanical and manual excavation around it in order to attempt to uncover the source of the instability of the stanchion. 2.13 m of the stanchion was exposed (1.25 m of which was exposed above the water at 3:20 pm) without reaching the attachment point and as a result the reason for its apparent instability was not located (Figure 12 and Figure 13). Gravels and cobbles, of various types including quartz, up to 100 mm across, were encountered towards the base of the stanchion. It is believed that these rocks have accumulated within the hull since the

wrecking event, having worked down through the sands, rather than being associated with ballast.



Figure 12. Exposure of the stanchion in Test Pit Two, facing SE.
(Cosmos Archaeology, 17th April, 2015).



Figure 13. Exposure of stanchion with rising water level, facing E.
(Cosmos Archaeology, 17th April, 2015).

3.4 Cutting of Exposed Frame

It was intended to test above water cutting equipment on the port side but, because no suitable wreck element was exposed in Test Pit Two, an exposed frame on the starboard side was used for testing instead. A hand held circular saw with a diamond blade was used and this was tested on frame FR002 on the starboard side (Figure 14). The initial cut with the circular saw took approximately two minutes and made significant progress through the western edge of the frame. The internal remains of the frame could be seen through this cut and it was obvious that a significant portion of metal remained, with a large amount of rust and concretion encasing it (Figure 15).



Figure 14. Cutting FR002 on the starboard side with hand held circular saw, facing NW. (Cosmos Archaeology, 17th April, 2015).



Figure 15. First cut with the circular saw, with the shiny surfaces in the interior indicating metal, facing N. (Cosmos Archaeology, 17th April, 2015).

It took approximately another four minutes to cut through the remainder of the frame (Figure 16). The piece of frame that was removed is artefact FR002-001. The cross section of the frame as seen at the top of the remaining frame and base of the artefact clearly shows the frame structure and the amount of metal that survives within the concretion (Figure 17). The frame is shaped as a 'T' with two angle frames back to back and a spacer between as well as hull plating across the top of the 'T'. The thickest part of the surviving metal occurs at the inside corners of the angle frames and the centre of the hull plating, both being approximately 10 mm thick. The surviving metal then tapers down to points towards the edges of the frame.



Figure 16. Cutting through the remainder of frame FR002, facing SE.
(Cosmos Archaeology, 17th April, 2015).



Figure 17. Cross section of the remaining frame FR002 showing the internal metal and outer concretion and rust product, profile view.
(Cosmos Archaeology, 17th April, 2014).

3.5 Test Pit Three

The third test pit was excavated further west, almost adjoining Test Pit Two, and was intended to expose a portion of the bow end of the wreck (Figure 18). This was successful, revealing plating and the remains of the stem post at the end limit of the bow (Figure 19 and Figure 20). The plating on the port side was in good condition, while that on the starboard side had been ripped and twisted to the side. There was relatively little concretion product visible, although this may have recently exfoliated and come off. A number of bolts were still visible. The western end of the bow is positioned 7.86 m from the top of the stanchion at a bearing of 235° (Annex B – Figure 22). The bow in plan appears to be off the centre alignment of the wreck. This could be because the measurement was taken off the top of the stanchion which is leaning and therefore is also off the centreline. It is also possible that the surrounding iron was sufficient to interfere with the compass.

The bow was exposed at between 2 to 3 hours after spring low tide (1:00 pm) and was almost underwater. The water level was unexpected. It was anticipated that the bow area would be mostly 'dry' even on a rising tide, as can be seen in numerous photographs of the site available on the internet. It is speculated that increased sand levels over the bow leads to the retention of fresh water which is run-off from the dune system. This water remains

perched somewhat slightly higher than the tide level at the time because it is unable to drain vertically due to the clay substrate upon which the wreck rests.



Figure 18. Test Pit Three at the bow, only marginally separated from Test Pit Two. Note the depth of sand over the bow. Apparently the bow was exposed in early April 2015. (Cosmos Archaeology, 17th April, 2015).



Figure 19. End of the bow in Test Pit Three above the water line, facing SSW. (Cosmos Archaeology, 17th April, 2015).



Figure 20. Profile view of the remains of the bow uncovered in Test Pit Three. (Cosmos Archaeology, 17th April, 2015).

The hand held circular saw was again tested in this Pit. The piece of hull plating that had twisted to the side was removed, becoming artefact BW001-001. This cutting took considerable less time than with frame FR002, most likely due to the much thinner thickness of surviving metal and lack of concretion. It took approximately two minutes to complete the cut.



Figure 21. Cutting of the bow section with hand held circular saw, facing S. (Cosmos Archaeology, 17th April, 2015).

3.6 Artefacts

Three artefacts were recovered during this test excavation from the cutting procedures detailed above. Two artefacts consisted of frames, FR001-001 being removed by thermal lance underwater and FR002-001 by hand held circular saw above water. BW001-001 is a piece of plating also removed by circular saw above water from the bow. These artefacts were recorded onto artefact pro forma recording sheets and photographed. This information was then entered into an artefact database, presented in Annex D. As a temporary measure of initial conservation, FR002-001 and BW001-001 have been stored in a tub of fresh water, with the water to be replaced every two weeks. They are currently stored at the Cosmos Archaeology premises in Murwillumbah.

4 DISCUSSION

4.1 *Observations of Cutting Equipment*

Two different methods of cutting were tested during this excavation, one under water and the other above water. The first was a thermal lance, operated by experienced commercial divers within Test Pit One. Although this was successful at cutting away a frame, it took approximately 20 minutes to complete and it involved only a single angle frame.

Approximately 20 lances were used to complete the task.

The thermal lances are usually used for cutting through steel, for which this tool is extremely effective. However, the wreck is made of iron and the material is now heavily encrusted with concretion, to which has incorporated into its matrix sand and shell grit. This may explain why the thermal lance has difficulty as there is a relatively large proportion of material to cut through for which the thermal lance is not designed.

The hand held circular saw was a much faster cutting tool, cutting through a heavy frame that consisted of up to three layers of iron in approximately six minutes. It also resulted in a relatively smooth and clean cut. However, use of this tool is restricted to above the water line.

It is now apparent that, even at low tides if there is considerable sand cover over the wreck, most of the port side hull from stern to past midships will require cutting underwater. The frames at the bow would only be above water at the bottom of a spring low tide. The underwater cutting rate of the thermal lance, based on the technique used is not feasible considering the extent of cutting that may be required. Another effective and cost-efficient cutting tool should be considered.

4.2 *Revision of Underwater Cutting Equipment*

A number of alternate underwater cutting solutions have been considered and are discussed below.

4.2.1 Thermal Lance

Advice was sought from Malcolm Venturoni, Professional Diving Services (PDS), who has experience with underwater cutting of concreted iron shipwrecks. In his experience the thermal lance should have been more effective during the test excavation. Mal explained possible reasons for the lance not working at an effective rate may be that genuine broco rods were not used or that the cutting technique could be adapted.

Mal has used a thermal lance to cut elements of the *Cerberus* shipwreck and his technique for cutting includes making a dent or mark in the concretion then using gas to crack the concretion off which leaves him with clean metal to cut along. This could be replicated for cutting through elements of the S.S. *Dicky* shipwreck.

4.2.2 Hydraulic Hand-Held Circular Saw

In the absence of an excavator-mounted hydraulic circular saw, a hand-held hydraulic circular saw could be used underwater instead provided that the environment is safe and stable enough for the operator. A closed circuit hydraulic saw would also cause minimal disturbance to the sediment underwater and enable more accurate recording of the remaining material after cutting. The hydraulic saw would require a hydraulic pump and the saw itself, although the pump is often used on construction projects and should be easily obtainable while the hand-held saw may be more easily obtained than an excavator-mounted saw.

The saw blade would need to be of a minimum size of 10 inches, providing a minimum three inch depth of cut which would lead to multiple cuts being required for thicker frames. A diamond blade is also required for this cutting. The saw would be operated by experienced commercial divers.

As seen in this test excavation, hand-held saws are effective for cutting through shipwreck frames above water. This has also been observed in cutting of the P.S. *Leo* shipwreck by Cosmos Archaeology in 2007. The P.S. *Leo* was located in an inter-tidal area but the site was effectively de-watered to assist with recording and cutting in a dry environment.

4.2.3 Air Powered Hand-Held Circular Saw

As an alternative to the hydraulic saw, the hand-held saw could also be air powered. An air powered saw would cut just as effectively, however, this saw would cause bubbling in the water and disturb sediments to reduce visibility for recording.

4.2.4 Large Capacity Air Powered Right Angle Grinder

A large capacity air powered right angle grinder could also be used for making cuts underwater. Use of this grinder would require a supply of flexible cutting disks and a diesel-powered air compressor. The grinder could also be used for dressing-off cuts made with other tools.

4.2.5 Air Powered Reciprocating Saw

A reciprocating saw, or power hacksaw, could also be used underwater and for dressing-off cuts. A diesel-powered air compressor would again be required on site to supply air to this tool.

4.2.6 Oxy-Acetylene Torch

An oxy-acetylene (here by referred to as 'oxy') torch was effectively used for above water cutting on the shipwreck P.S. *Leo*, as observed by Cosmos Archaeology in 2007. It was used to cut through thick iron elements such as the keel and localised areas where the saw could not reach. Photographs of the results are in Annex E.

4.3 Cutting Location

The test excavation revealed frames on the port side, however was not able to expose the edge of the hull, except at the bow. This demonstrated that sand level is a major factor when considering accessing the desired frames to be removed. This is not only indicated in the amount of time it would take to expose the frames but also there appears to be a very narrow window where frames on the port side may be sufficiently above water to allow cutting without the requirement for divers.

The depth of remains on this side, the level of water and the difficulty in cutting underwater given the conditions suggests that there could be a re-evaluation of the initial objective of cutting – which is to remove hazardous elements from the wreck. Reconsideration of what is considered unacceptably hazardous would be desirable before wreck elements can be identified and removed. It is possible that after re-evaluation, taking into account the depth of burial and infrequent exposure of the port side hull, fewer sections may be considered sufficiently hazardous to be removed.

Once a determination of what can be of hazardous elements is made, excavation can be conducted along the port side to locate elements that fit this description and then remove these elements by cutting. It would be preferable if the classification of hazardous elements included a maximum burial depth so that excavation can cease when it reaches that depth and continue in another point of the wreck.

This classification and methodology could also be replicated for the starboard side hull.

4.4 Stanchion

The test excavation was unsuccessful at identifying the cause of instability associated with the stanchion. It was suggested by Paddy Waterson that the weakness may be between the stanchion and the keelson, however, a repeat excavation would need to dig deeper in order to substantiate this claim. Despite not finding the source of the instability, it was observed

that the top 2.13 m of the stanchion was intact and well preserved and that the weakness was likely much further down. This indicates that the stanchion should remain quite stable with just the surrounding sand to support it. However, this is not a long term solution as the stanchion would be infrequently exposed and at these times the structural stability of the stanchion is vulnerable and at high risk of worsening.

4.5 Updates and Changes to CMP Methodology

The test excavation brought to light a number of issues as part of the methodology and processes in the CMP. The main issue is the limited amount of recording that could be undertaken during the test excavation due to only a small number of personnel and minimal access to wreckage between being exposed and cut. Also one of the two archaeologists was constantly monitoring the works, liaising with the various work crews, government representative, and client so as to be able to do very little recording. From this, it is advisable that a third archaeologist be added to the CMP in order to undertake additional recording and that the recording process be simplified and prioritised. For example, instead of photographing the cutting process of every single frame, general photography of the cutting process would be adequate. Also photographing of remaining frames after cutting should be dependent upon underwater visibility. A revision will also be made of the labelling system in order to simplify the process on site, even if the labels are then added to when processing the data.

It was found that baseline offset measurements as a form of positioning the remains worked effectively and was a quick process resulting in an acceptable accuracy of approximately +/- 100 mm. The only drawback was that the baseline was trampled by the large number of people on site so a better method of securing the baseline will be required. It is considered that DGPS positioning would be a preferred method of positioning as this would be more accurate than baseline offsets and less labour intensive. The time taken to access the point and take a position would be quicker with DGPS and hence cause less interruption to the excavation and cutting procedure. GPS was attempted during the excavation but the accuracy was only to 5 m and this is too inaccurate for recording the position of wreckage. The only exception would be if the metal detector survey located loose wreck remains beyond approximately 20 m from the shipwreck and then the accuracy of GPS would be appropriate for recording the location of the find along with a distance and bearing from the wreck.

Artefacts from the test excavation did not all end up being stored in the same location and the storage of one of the artefacts was not monitored by an archaeologist. A requirement for the archaeologist to supervise the transport and storage of artefacts should be added to the CMP in order to ensure that they are cared for correctly in addition to initial conservation measures being undertaken. It was also noted that recording the artefacts on site was made complicated by wind, sand and inconsistent light which hampered the taking of effective photographs for recording. It would be best to instead record the artefacts at the storage facility where they are to be kept.

In association with Section 4.4 above, the CMP should be amended to include no added support or reinforcement of the stanchion. Instead, the stanchion will remain unsupported as a wreck marker until it becomes too unstable to remain in this position. It will then be removed and recorded in the same way that the rest of the wreck remains have been recorded.

5 CONCLUSION

The test excavation was able to meet its primary objective, that of testing cutting techniques. The cutting of the frames above water proved successful, as was that underwater. However the time (approximately 20 min) it took to cut a frame underwater using a thermal lance requires a rethink with respect to change of technique, cutting equipment and approach to how much of the wreck along the port side can be feasibly removed while adequately reducing the risk to safety.

The feasibility of cutting away the frames on the port side is largely contingent on tide – as to how much gets cut above and below water – compounded by sand levels on the day of the nominated works. It may be that the time taken to cut frames underwater may be reduced, however deploying a dive team to undertake the cutting increases cost of the work. With the spring low tide it would appear that with sand cover, the bow area will be inundated within 2.5 hours on either side of the low water point. This provides a narrow window for part of the frame removal to be done in a dry environment. This window is further reduced if there is considerable sand cover over the wreck, as time will be lost while carefully excavating to expose the wreck. It is also believed that with more sand cover over the wreck, the ground water within the sand is perched slightly higher than the tide level.

The approach taken to date is that the works are to be done on the lowest spring tide irrespective of sand cover. For the reasons stated above this will increase the amount of time taken to remove the frames.

An alternative is to wait for times of less sand cover. This will reduce time lost in exposing the wreck, thereby increasing the window available for cutting the frames in a dry environment. It is understood that the wreck is more likely to be exposed in the later summer and early autumn months of the year. The downside to this approach is the relative uncertainty of when the wreck will be exposed thereby increasing the risk of a work team, including archaeologists, of not being available to undertake the work. It may also be that the wreck is exposed on the neap tides which would negate the advantages offered by working on spring low tides.

A decision should be made as whether the cutting the desired frames is to be carried out at a suitable tide or when there is less sand cover. It is possible of course to do both, by removing the upper frames of the starboard side and the rudder post during spring low tide, irrespective of sand cover, and then work on the port side when there is less sand cover.

On the day of the test excavation, mechanical excavation commenced close to the bottom of the low tide, after the archaeologists had completed their preparatory work. Ideally the excavation should have commenced at least two hours earlier. As it was the archaeologists could not have arrived on site earlier (due to airport arrivals and opening hours for the hiring of equipment) without having stayed in Caloundra overnight. In order to maximise the amount of excavation time on any given day it would be best to have the archaeologists stay the night in Caloundra and start their preparatory work first thing in the morning or ideally the day before.

On the day of the test excavation it was apparent when talking to Council personnel who were to undertake the cutting that there was not a clear understanding of the day's objectives or conditions of the permit awarded for the work. Without adequate briefing there could be delays in achieving the objectives due to the right equipment not being available or more rigorous supervision being required by the archaeologists. Prior to the commencement of the cutting works, the archaeologists will distribute to SCC a summary of the objectives along with other key points. This will also be accompanied by an itinerary of the day(s) works which include start and finish times, what the archaeologists need to do before any mechanical excavation can commence and a checklist of equipment/stores that would be needed on that day.

From the findings of the test excavation, the following recommendations have been made:

- A hydraulic powered circular hand saw should be acquired and used for underwater and above water cutting of the wreck. A diamond saw blade needs to be used and would need to be a minimum size of 10 inches. Underwater cutting will require a commercial dive team to complete the cuts;
- Re-evaluate what is considered unacceptably hazardous elements of the wreck in order to inform the location of cutting. This is to include consideration of depth of burial and infrequent exposure of the port side hull;
- The stanchion should remain *in situ* in the beach with no additional supports or reinforcements until it becomes too unstable to remain in this position. The CMP should be amended likewise;
- The labelling and recording methodology in the CMP should be reviewed by the archaeologists in order to simplify the process;
- Three archaeologists will be required during the main cutting works in order to undertake adequate recording simultaneously with the works;
- DPGS positioning is preferred as the method of positioning during the cutting works;
- Storage and initial conservation measures of the artefacts should be monitored by an archaeologist. The artefacts should also be recorded at the storage facility in order to obtain a higher standard of recording;
- Depth of sand cover should be a higher consideration than tide levels when determining the timings of the excavation as sand is more effective at prohibiting access to the wreck;
- The archaeologists will need to stay in Caloundra the night prior to works commencing in order to undertake preparatory work before the excavation; and,
- Adequate briefings should be undertaken for all personnel involved in the excavation so that the objectives are clear. This will include a summary of objectives and other key points supplied to Council by the archaeologists, as well as an itinerary, timings and equipment/stores required.

REFERENCES

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- Bureau of Meteorology, 'Maroochydore Queensland April 2014 Daily Weather Observations'**, available <http://www.bom.gov.au/climate/dwo/IDCJDW4081.latest.shtml>, accessed 21st April 2015.
- Bureau of Meteorology, 'Mooloolaba Times and Heights of High and Low Waters April 2015'**, available http://www.bom.gov.au/cgi-bin/oceanography/tides/tide_predictions.cgi, accessed 19th March 2015.
- Cosmos Archaeology 2008** *SS Dicky Management Plan*, report for Caloundra City Council.
- Cosmos Archaeology 2014** *Preliminary Archaeological Investigation of the Wreck of S.S Dicky*, report for Sunshine Coast Council.
- Waterson, P.A. 2013** *S.S. Dicky Inspection Report: 20 and 31 May 2013*, Heritage Branch, Environmental Policy and Planning Division, Department of Environment and Heritage Protection, Queensland Government.

ANNEX A – PERMIT



Department of
**Environment and
Heritage Protection**

Ref CTS 07263/15

16 APR 2015

Mr Michael Anderson
Coordinator Coastal and Planning
Sunshine Coast Regional Council
Locked Bag 72
SCMC QLD 4560

Dear Mr Anderson

Thank you for your letter and attachment dated 14 April 2015 seeking approval for a preliminary archaeological investigation of the wreck of the S.S. *Dicky*, scheduled for the 17 April 2015.

Your application is approved under section 91 of the *Queensland Heritage Act 1992* subject to compliance with the following conditions:

1. Works are carried out in accordance with your application *SS Dicky CMP Test Excavation Permit Application 150144 v3*, dated 14 April 2015.
2. A report on the investigation and its results must be submitted to the Department of Environment and Heritage Protection (EHP) no later than 30 June 2015.

The Department of Environment and Heritage will provide Principal Archaeologist Paddy Waterson to help monitor the proposed works, but SCRC and your consultant are responsible for planning and executing the investigations. Please contact Paddy directly on either telephone (07 3330 5848 or 0455 068 668 or e-mail <paddy.waterson@ehp.qld.gov.au> to finalise arrangements.

Yours sincerely

A handwritten signature in black ink that reads 'Fiona Gardiner'.

Fiona Gardiner
Director, Heritage

CC: Peter Todd, Cultural Heritage Coordinator (ESR), EHP.

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Page 1 of 1

ANNEX B – SITE PLAN

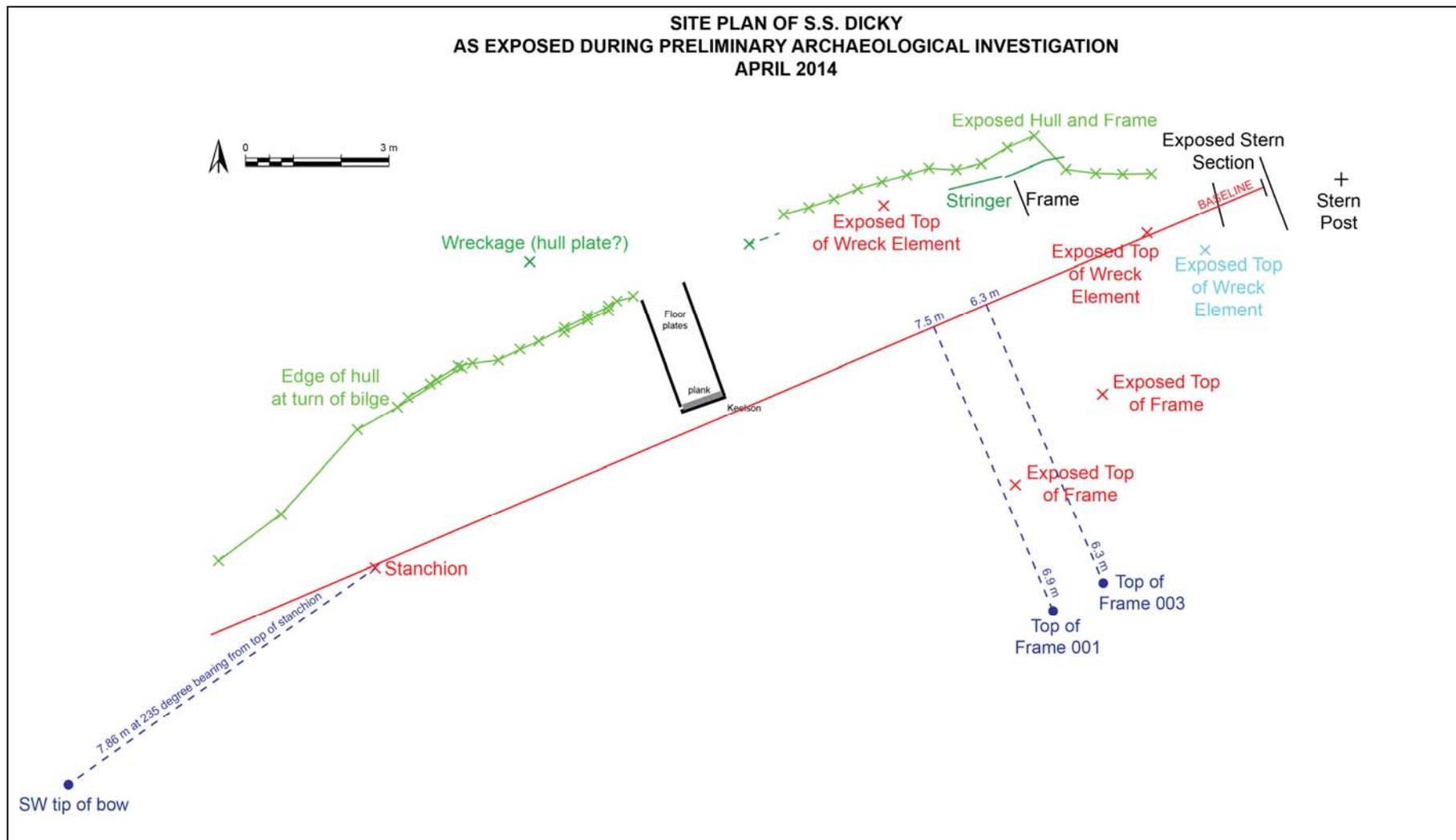


Figure 22. Site plan of S.S. Dicky updated with features from April 2015 test excavation (in dark blue).

ANNEX C – PHOTO AND VIDEO LOGS

Photo No.	Description	Orientation
SSDicky_150417_001	Metal detector survey	NE
SSDicky_150417_002	Metal detector survey	N
SSDicky_150417_003	Metal detector strikes	NE
SSDicky_150417_004	Position of baseline against stern section	ENE
SSDicky_150417_005	View of rough baseline position	SW
SSDicky_150417_006	Exposed starboard frames	NNW
SSDicky_150417_007	Exposed starboard frames and stern section	NE
SSDicky_150417_008	Exposure of stanchion 330 mm	ENE
SSDicky_150417_009	Excavation of Test Pit One	SE
SSDicky_150417_010	Excavation of Test Pit One	SE
SSDicky_150417_011	Excavation of Test Pit One	SW
SSDicky_150417_012	Excavation of Test Pit One	NW
SSDicky_150417_013	Excavation of Test Pit One	NW
SSDicky_150417_014	Exposure of frame in Test Pit One	NW
SSDicky_150417_015	Exposure of frame in Test Pit One	S
SSDicky_150417_016	FR001 and FR003	WNW
SSDicky_150417_017	FR001 and FR003	SSE
SSDicky_150417_018	FR001	N
SSDicky_150417_019	FR001	N
SSDicky_150417_020	FR001	N
SSDicky_150417_021	FR001	W
SSDicky_150417_022	FR001	W
SSDicky_150417_023	FR001	Plan view, top to N
SSDicky_150417_024	FR001	Plan view, top to N
SSDicky_150417_025	FR003	Plan view, top to N
SSDicky_150417_026	Cutting with thermal lance	S
SSDicky_150417_027	Cutting with thermal lance	S
SSDicky_150417_028	Cutting with thermal lance	S
SSDicky_150417_029	Cutting with thermal lance	S
SSDicky_150417_030	Excavation of Test Pit Two	SSW
SSDicky_150417_031	Cutting with thermal lance	S
SSDicky_150417_032	FR001	SE
SSDicky_150417_033	Cutting with thermal lance	SE
SSDicky_150417_034	Excavation of Test Pit Two	NW
SSDicky_150417_035	Test Pit One after cutting	ESE
SSDicky_150417_036	Exposure of stanchion in Test Pit Two	W
SSDicky_150417_037	Exposure of stanchion in Test Pit Two	SE
SSDicky_150417_038	Excavation of Test Pit Three	W
SSDicky_150417_039	Excavation of Test Pit Three	SE
SSDicky_150417_040	Excavation of Test Pit Three	ESE
SSDicky_150417_041	General site	E
SSDicky_150417_042	Initial cut of FR002 with saw	N

SSDicky_150417_043	Initial cut of FR002 with saw	N
SSDicky_150417_044	Initial cut of FR002 with saw	S
SSDicky_150417_045	Initial cut of FR002 with saw	N
SSDicky_150417_046	Exposure of bow in Test Pit Three	SW
SSDicky_150417_047	Exposure of bow in Test Pit Three	SW
SSDicky_150417_048	Exposure of bow in Test Pit Three	WSW
SSDicky_150417_049	Bow section	Plan view, top to NNW
SSDicky_150417_050	Bow section	N
SSDicky_150417_051	Bow section	E
SSDicky_150417_052	Bow section, detail of break	E
SSDicky_150417_053	Exposure of stanchion	E
SSDicky_150417_054	Cross section of FR002 after cutting with saw	W
SSDicky_150417_055	Cross section of FR002 after cutting with saw	W
SSDicky_150417_056	Cross section of FR002 after cutting with saw	W
SSDicky_150417_057	Cross section of FR002 after cutting with saw	N
SSDicky_150417_058	Exposure of bow section	SSE
SSDicky_150417_059	Test Pit Three	SE
SSDicky_150417_060	Bow section	SE
SSDicky_150417_061	GPS of bow section	N/A
SSDicky_150417_062	GPS of bow section	N/A
SSDicky_150417_063	GPS of bow section	N/A
SSDicky_150417_064	Detail of bow section	SE
SSDicky_150417_065	Detail of break in bow section	ENE
SSDicky_150417_066	Detail of break in bow section	E
SSDicky_150417_067	Detail of break in bow section	E
SSDicky_150417_068	Detail of break in bow section	SW
SSDicky_150417_069	Detail of bow after cutting	SW
SSDicky_150417_070	Detail of bow after cutting	SW
SSDicky_150417_071	Detail of bow after cutting	SW
SSDicky_150417_072	Detail of bow after cutting	SW
SSDicky_150417_073	FR001 and FR003 before cutting	S
SSDicky_150417_074	FR001 and FR003 before cutting	S
SSDicky_150417_075	FR001 and FR003 before cutting	S
SSDicky_150417_076	General view of site from beach entrance	NE
SSDicky_150417_077	General view of site from beach entrance	NE
SSDicky_150417_078	Recording offset measurements from survey	E
SSDicky_150417_079	Diver entering Test Pit One	NE
SSDicky_150417_080	Cutting with thermal lance	NE
SSDicky_150417_081	Recording offset measurements from survey	E

Video No.	Description	Length	File Size
SSDicky_150417_001	Recording FR003	00:16	32 MB
SSDicky_150417_002	Thermal lance cutting of FR001	20:14	2,429 MB
SSDicky_150417_003	Thermal lance cutting of FR001	04:50	695 MB
SSDicky_150417_004	Thermal lance cutting of FR001	13:24	1,744 MB
SSDicky_150417_005	Circular saw initial cut of FR002	01:50	243 MB
SSDicky_150417_006	Recording of bow section	00:34	81 MB
SSDicky_150417_007	Circular saw completing cut of FR002	01:57	204 MB
SSDicky_150417_008	Circular saw initial cut of BW001	00:43	75 MB
SSDicky_150417_009	Circular saw completing cut of BW001	01:05	148 MB

ANNEX D – ARTEFACT DATABASE

S.S. Dicky - Artefact Database

Artefact ID FR 001 001 **Date Removed** 17/04/2015

Recorded By D. Wilkinson **Date Recorded** 17/04/2015

Material Iron **No. of objects** 1

Short Description Frame from port side

Detailed Description

Frame removed by test cutting using thermal lance. 'Angle frame, 630 mm long, 230 mm wide and 80 mm deep on exterior. Heavy with a lot of metal intact (nearly 10 kg by estimate) but also heavily concreted with rust product. Original frame top is a rounded tapering point. Plating attached to widest edge of frame. Four bolts visible.

Frame dimensions are 630 mm surviving length, 90 mm width and 60 mm depth on interior with bolts approximately 30 mm wide and spaced approximately 130 mm apart between centre points. Frame thickness is approximately 20 mm.

Black, with fibrous and oyster shell marine growth. Surface is not smooth.

Condition

Very poor

Poor

Moderate

Good

Excellent

Indeterminate

Outcome

Undecided

Retain

Discard

CONSERVATION

Initial Yes No

Long term Yes No

Purpose

Interpretation Plan

Display

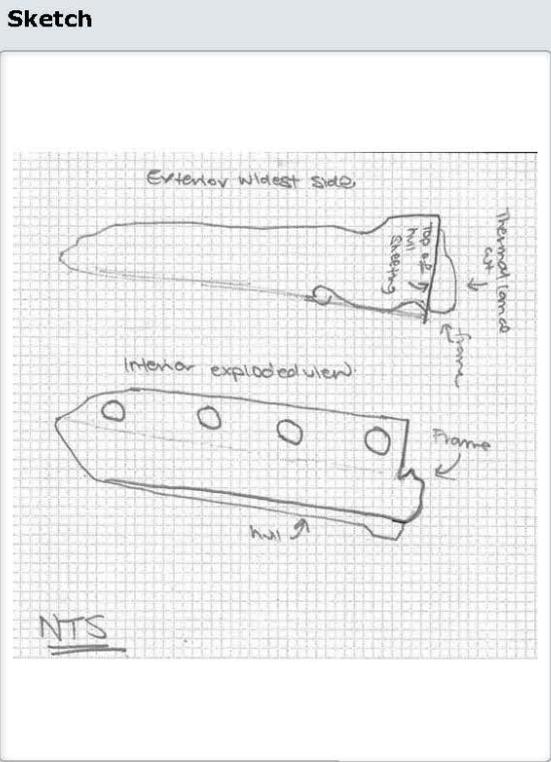
Storage

Conservation

Treatment

Burial

Conservation Description



S.S. *Dicky* - Artefact Database

Artefact ID

FR

001

001

Photos



S.S. Dicky - Artefact Database

Artefact ID	FR 002 001	Date Removed	17/04/2015
Recorded By	D. Wilkinson ▼	Date Recorded	17/04/2015
Material	Iron	No. of objects	1
Short Description	Frame from starboard		

Detailed Description

Frame from starboard consisting of two angle frames back to back with a spacer between and hull plating on the outside. Removed by saw.

Length is 460 mm, 260 mm deep and 232 mm wide along top of 'T'. Surviving metal inside has a maximum thickness of 10 mm and is very visible in the cross section. Heavily corroded around the outside with thick corrosion / rust product. A hole of 16 mm diameter is present in the worn end of the frame which consists only of the hull plating.

Condition

Very poor
 Poor
 Moderate
 Good
 Excellent
 Indeterminate

Outcome

Undecided
 Retain
 Discard

CONSERVATION

Initial Yes No

Long term Yes No

Purpose

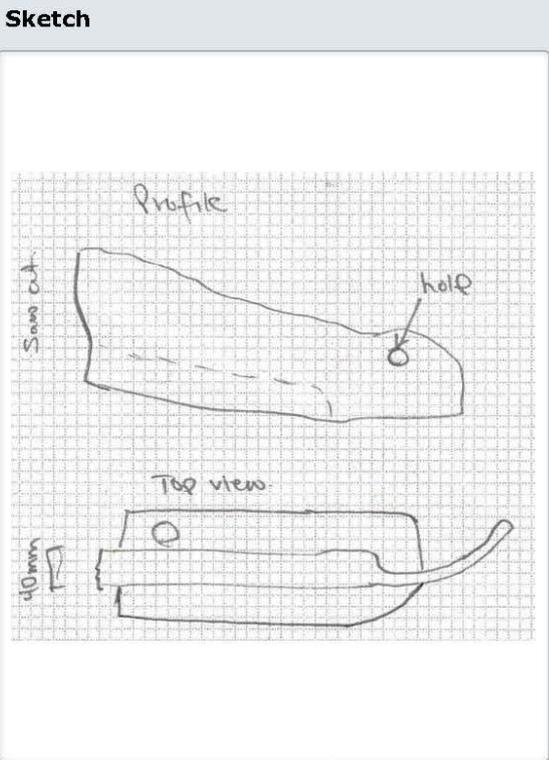
Interpretation Plan
 Display
 Storage

Conservation

Treatment
 Burial

Conservation Description

Initial conservation - After removal and recording the artefact was placed in a tub of fresh water. The water will be replaced every two weeks until all artefacts are assessed. The artefact is currently stored at the Cosmos Archaeology premises in Murwillumbah.



S.S. *Dicky* - Artefact Database

Artefact ID

FR

002

001

Photos



S.S. Dicky - Artefact Database

Artefact ID **BW 001 001**

Date Removed 17/04/2015

Recorded By D. Wilkinson

Date Recorded 17/04/2015

Material Iron

No. of objects 1

Short Description Bent piece of bow hull plating

Detailed Description

Piece of bow hull plating that had bent / warped to side and was tested by cutting with saw. Very little corrosion product and metal still in good condition. Artefact is roughly oval in shape with flat base where originally bent, with the bend at approximately a 90 degree angle and cut on the perpendicular edge.

The metal is 0.5 mm thick, with the short edge bolted to a fragment of hull 0.4 mm thick. Maximum dimensions are 210 mm long by 156 mm wide. Bolt diameter is 25 mm.

Condition

- Very poor
- Poor
- Moderate
- Good
- Excellent
- Indeterminate

Outcome

- Undecided
- Retain
- Discard

CONSERVATION

Initial Yes No

Long term Yes No

Purpose

- Interpretation Plan
- Display
- Storage

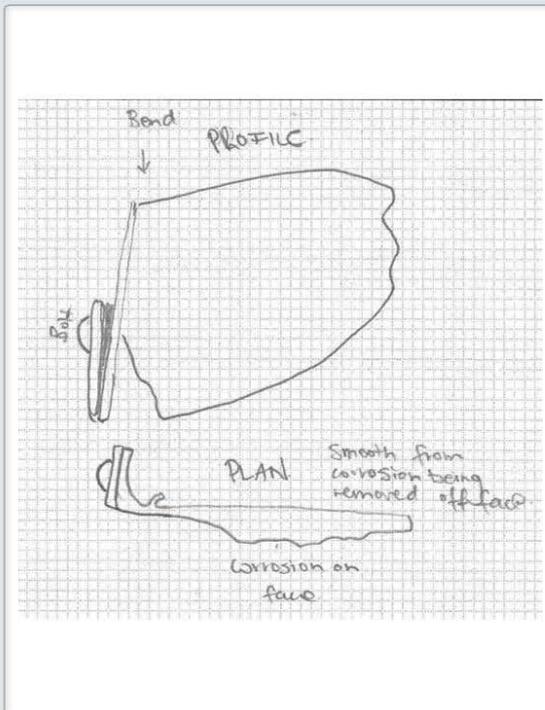
Conservation

- Treatment
- Burial

Conservation Description

Initial conservation - After removal and recording the artefact was placed in a tub of fresh water. The water will be replaced every two weeks until all artefacts are assessed. The artefact is currently stored at the Cosmos Archaeology premises in Murwillumbah.

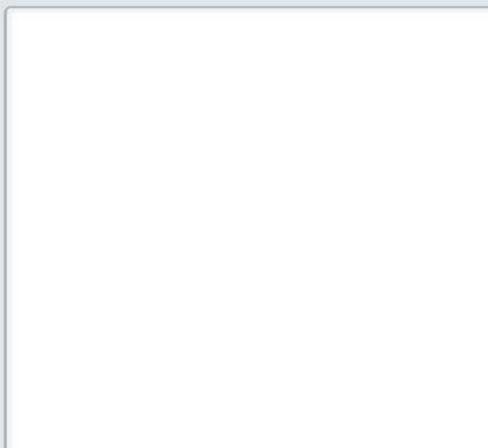
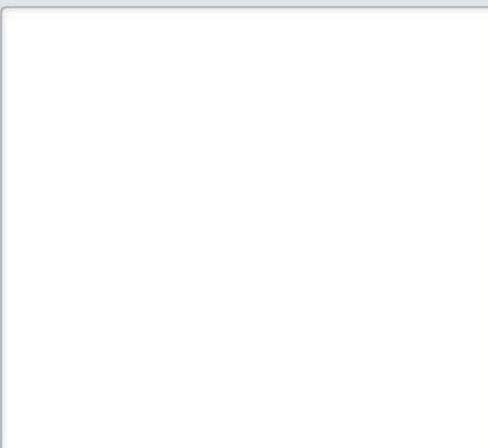
Sketch



S.S. Dicky - Artefact Database

Artefact ID **BW 001 001**

Photos



ANNEX E – CUTTING OF THE P.S. *LEO* SHIPWRECK

Images of the cutting process of the P.S. *Leo* Shipwreck, observed by Cosmos Archaeology in 2007.



The *Leo*. Iron hull. Was affected by tide but were able to de-water to record and do the cutting. Examples provided of cutting tools used – above water.



Forward part of the *Leo* after bow removed. All cutting done with circular saw and oxy torch.



Keelson cut with circular saw



Keel cut with oxy torch.
Thickest iron element on vessel. The iron connecting the rudder post to the stern on the *Dicky* maybe thicker.



Oxy cutter used to cut hull plate.



Oxy cutter used to cut keel