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Cosmos Archaeology Pty Ltd

Ex-HMAS *Adelaide* Artificial Reef Project

Submerged Cultural Heritage Impact Assessment:

Desktop Review

April 2009

Terrigal,

NSW

Ex-HMAS *Adelaide* Artificial Reef Project

Submerged Cultural Heritage Impact Assessment:

Desktop Review

Prepared for:

Worley Parsons Services Pty Ltd

By:

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April 2009

J08/13

Abbreviations

AHS	Australian Hydrographic Service
GPS	Global Positioning System
HA	(State) *Heritage Act 1976*
HIA	Heritage Impact Assessment
HMAS	Her (or His) Majesty's Australian Ship
HO	Heritage Office
HSA	(Commonwealth) *Historic Shipwrecks Act 1977*
Km	Kilometre
LAT	Lowest Astronomical Tide
M	Metre
nm	Nautical mile.

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Executive Summary

The Australian Government has gifted the HMAS *Adelaide* to the NSW Government for the creation of an artificial reef and recreational dive site in waters off NSW Central Coast near Terrigal. This report is a desktop or baseline review, which will form the basis of the Environmental Impact Assessment and Plan of Management.

A search of heritage and shipwreck registers has determined there are no known shipwrecks within the proposed scuttling area; however 18 shipwrecks lost in the vicinity of the Avoca/Terrigal area have yet to be located. It is possible that two of these shipwrecks, the *Maud Weston* and *The Union* may be located within the study area.

A review of the sidescan sonar data collected revelled only one anomaly of cultural heritage potential present within the study area. The anomaly is located close to the northeast corner of the study area.

Based on the research undertaken for this assessment and review of the sidescan data, the following recommendations have been made;

Recommendation 1

If the proposed final scuttling position of the ex-HMAS Adelaide *is within 100 m of identified anomaly* [33°27.7455S 151°27.2517E], *additional maritime archaeological works, including an underwater visual inspection, of the anomaly will be required prior to scuttling.*

The underwater visual inspection will determine if the anomaly is a cultural heritage site, such as a shipwreck or other material, and, if so, will define the nature or extent of the site. The field investigation should be co-ordinated by a maritime archaeologist, and the results of the field survey presented in a report. The results of the field inspection can recommend, but not be limited to, the following:

- No further Maritime archaeological work required;
- Recommend an assessment to be conducted into potential sedimentation pattern changes that may occur as a result of the scuttling works on the site;
- Archaeological monitoring of the site post scuttling to determine what changes, if any, occur to the site and recommend mitigation measures, such as sandbagging of the site.

Recommendation 2

If the proposed final scuttling position is a distance greater than 100 m from the identified anomaly [33°27.7455S 151°27.2517E], *no further maritime archaeological work is required.*

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1.0 INTRODUCTION

1.1 Background

The Australian Government has gifted the HMAS *Adelaide* to the NSW Government for the creation of an artificial reef and recreational dive site in waters off NSW Central Coast near Terrigal. Currently being project managed by the Department of Lands (NSW), an Environmental Impact Assessment and Management Plan is required for the proposed scuttling area to determine the impacts the scuttling and subsequent dive site will have on the immediate environment.

Cosmos Archaeology Pty Ltd has been commissioned by Worley Parsons Services Pty Ltd to undertake a maritime Heritage Impact Assessment (HIA) for the proposed scuttling area of the HMAS *Adelaide*. This report is a desktop or baseline review, which will form the basis of the Environmental Impact Assessment and Plan of Management.

1.2 Proposed Development

The project will involve the scuttling of the ex-HMAS *Adelaide* approximately 2 km offshore of Avoca Beach in 29 m to 34 m of water to create a recreational dive site. It is proposed to scuttle the vessel to allow it to rest upright on the seabed. Moorings will be installed on the final dive site, either attached or adjacent to the vessel. After the scuttling a navigation exclusion zone will be established around the site.[1]

1.3 The Study Area

The proposed location for the scuttling of the *HMAS Adelaide* is approximately 2 km offshore from Avoca Beach in water between 29 m and 34 m in depth[2]. The study area (also referred to as the 'scuttling area') for this investigation is a 750 m x 400 m section of the seabed where it is proposed the vessel be scuttled for the creation of the dive site (Figure 1). The current proposed location for the ex-HMAS *Adelaide* is near the middle of the study area.

1.4 Scope of Study

This study will assess the potential for the presence of submerged cultural heritage (namely shipwrecks, but also plane wrecks, dumped material etc.) within the study area.

The study does not assess:

- Aboriginal cultural heritage, or;
- Any cultural heritage sites outside of the 750 m x 400 m study area.

[1] Douglas Partners Pty Ltd (November 2008) Report on Seismic and sidescan sonar investigation: Scuttling of Ex-HMAS Adelaide, Avoca, NSW p1

[2] *Ibid* p1

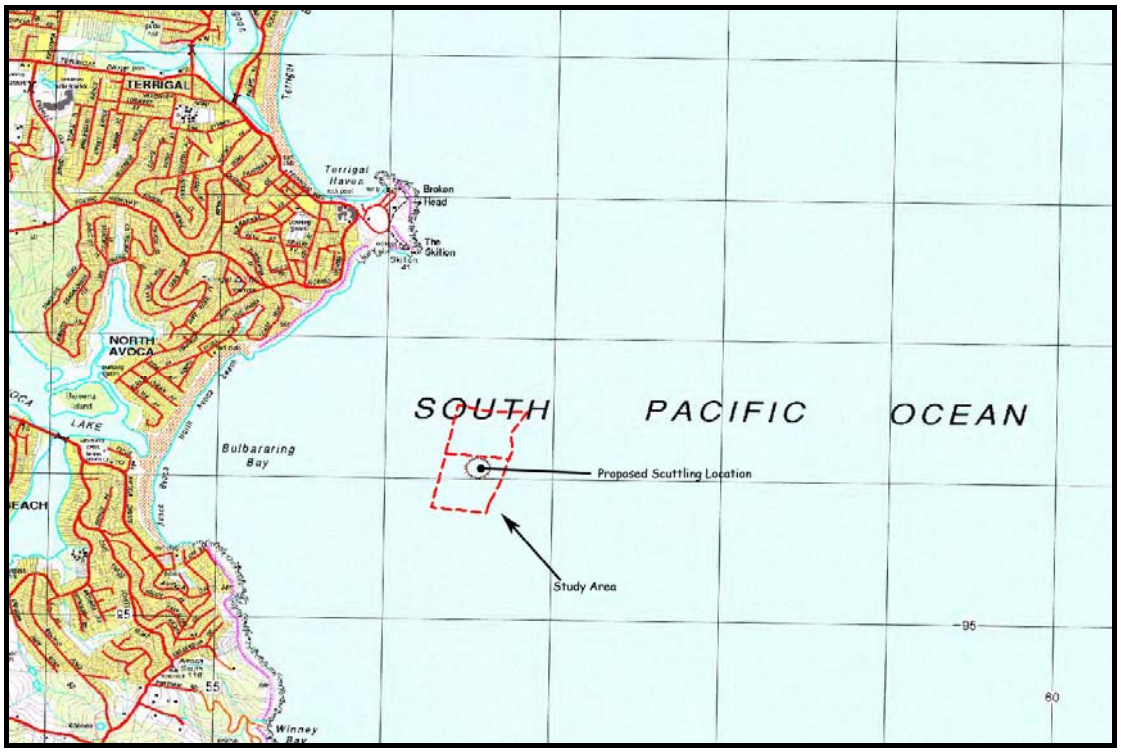

Figure 1: Study area

1.5 Objectives of Study

The objectives of the study are to:

- Undertake a detailed desktop search of known and potential shipwrecks and other forms of cultural heritage that may be in the designated locations;
- Review of the environmental data that has been collected to date Douglas Partners Pty Ltd;
- Review of the Sidescan sonar data;
- Present an assessment of the expected condition of wrecks located within each designated area based on size, hull type, age, seabed type and other environmental conditions, and;
- Present recommendations which will include preferred locations as a result of the research findings.

1.6 Conduct of the Study

The study was conducted in the following manner:

A. *Identification of the variety, frequency, extent and condition of the submerged cultural heritage within the study area.*

As the study area is located off the Central Coast of NSW, the overwhelming majority of cultural heritage on the seabed are shipwrecks, most of which have been accidentally created. Sites whose positions are known within an acceptable degree of accuracy are presented in **Section 3.2**. Those sites which could only be located within a wide geographical area are listed in **Section 3.3**.

The sources accessed to obtain this information are listed and described in **Section 2.1**. A discussion on the quality of the spatial information for individual wrecks according to the source is presented in **Section 2.2**. As site specific information is not available for most of the wrecks, general statements on the predicted condition of the sites are presented in **Section 2.3**. **Section 2.4** sets out the criteria and nomenclature for assessing the likelihood of submerged cultural sites to be in the vicinity of the study area.

B. *Legislative compliance requirements*

A review of relevant legislation, both Commonwealth and State, is required to determine what, if any, approvals are required with respect to the protection of the cultural heritage values of the identified submerged cultural heritage sites. A discussion on each relevant Act is presented in sub-sections in **Section 5.0**.

C. *Mitigation Strategy*

The recommended measures to reduce or negate the impact of the proposed development on the submerged cultural heritage are presented in **Section 6.0**.

2.0 STUDY APPROACH

2.1 Sources Consulted

A number of different sources were consulted for this study, they are as follows:

NSW Historic Shipwrecks Database (Maritime Heritage Online)

This database is maintained by the NSW Heritage Office and contains upwards of 2,000 wrecks.[3] This database has been built up around historical accounts of the loss of vessels, mainly through the systematic examination of newspapers from the 1790s to the present day. The database has been augmented by other sources such as archival information from the Australian Hydrographic Office (see below). This source formed the basis of the study.

Shipwreck Atlas of NSW

Published by the NSW Heritage Office, the Atlas is a graphic and abbreviated version of the NSW Historic Shipwrecks Database.[4] Last printed in 1995, the information in the Atlas is not as up to date as the Database but does graphically depict the location of wrecks known at the time of publication.

Australian Hydrographic Office

A list of wrecks and their positions, plotted on a 1966 edition (printed 1987) of navigation chart AUS 808, given to the Heritage Office, NSW, by the then Australian Hydrographic Office in 1990. This information has been incorporated into the NSW Historic Shipwreck Database (see above).

Australian Hydrographic Service

The Australian Hydrographic Service (AHS) has presented on its web site a list of scuttled wrecks off the Australian coast. The AHS also provides the location of other material that has been dumped by the Royal Australian Navy in Australian waters; this includes the dumping of ammunition, spoil dumping grounds, non-dangerous materials (such as pallets and vehicles) as well as chemicals dump sites.[5] This is provided in the interests of public safety, and particularly for mariners to help prevent accidental discovery of dumped hazardous substances. The spreadsheet of wreck sites, hazardous material dump sites and dredge (and other) spoil sites, provided on the website was obtained from the Australian Department of the Environment and Water Resources website on Coastal and Marine Pollution.[6]

John Riley, diver and iron shipwreck expert.

Mr. Riley has dived on many of the deep water wrecks off the Sydney coast and is considered an expert on steam ship technology. Through his own personal efforts he has located many of these vessels lost of the NSW coastline. Mr Riley has compiled a database of vessels that he has both dived on and recorded, or knows the location of that have yet been registered on the NSW Shipwrecks Database. This resource aids in

[3] Heritage Office, NSW (2007) *Maritime Heritage Online*, NSW (http://maritime.heritage.nsw.gov.au/public/welcome.cfm)
[4] Heritage Office, NSW (1995) *Shipwreck Atlas of NSW*
[5] Australian Hydrographic Service (2007) *Sea Dumping in Australia* (http://www.hydro.gov.au/n2m/dumping/dumping.htm)
[6] Department of the Environment and Water Resources, (2007) *Coastal and Marine Pollution.* (http://www.environment.gov.au/coasts/pollution/dumping/index.html)

including and excluding shipwrecks that may be within each of the study areas. His 1988 report on shipwrecks in NSW is based on his own research and is unpublished.[7]

2.2 General Statements on Site Locations

Few of the sites (all shipwrecks) presented in this study have accurate positions. This is because most of the shipwrecks identified in the study have not been located (or more precisely, their location is not known by the relevant Government authorities) and therefore, only broad areas within which they can be expected to be found can be presented with any confidence. The size of the area within which a given wreck may be located depends on the quality of the data available – 'sunk 2 nm east of South Head' as opposed to 'left Sydney for New Caledonia and never seen again'. With such information a determination can only be made as to the likelihood or probability of a given wreck being within close proximity to proposed scuttling location.

As for the wrecks which have been located, designating accurate positions was not always possible either as, in most cases, it is not known how their positions were recorded, i.e. GPS , compass or sextant. This applies to wrecks so marked on recently published charts, as such information is usually transferred from older charts without verification.

A summary of the expected accuracy of wreck positions from the sources consulted is as follows :

NSW Historic Shipwrecks Database (Maritime Heritage Online)

Most of the shipwrecks obtained from this source have not been found (or more accurately, if they have been found they have not been reported to the NSW Heritage Office). Some wrecks that have been found have a latitude and longitude position but the accuracy of that position could not be determined as the method used in obtaining the position is not known. In rare cases the datum used has not be defined.

Shipwreck Atlas of NSW

The positions for known wreck sites marked on the Shipwreck Atlas of NSW are not meant to be accurate but are intended to give a general location.[8]

Hydrographic Office

The positions given for the wrecks from this source appear to have been obtained prior to the introduction of GPS and have been rounded off to the nearest 10" to 12". This information was indirectly obtained through the use of the NSW Historic Shipwrecks Database.

Australian Hydrographic Service

It is unclear where the Australian Hydrographic Service obtained the positions of the wrecks and dumping grounds.

[7] Riley, J. 1988 *Shipwrecks of NSW*. Unpublished manuscript.
[8] Nutley, David, Senior Maritime Archaeologist, Heritage Office. pers. comm. 23/3/98

2.3 General Statements on Site Formation Processes and Site 'Detectability'

Assessing the condition, or more precisely, the structural integrity of the shipwrecks in this study is of relevance because this can provide an indication of the nature and scale of the obstacle that could affect the scuttling of the ex-HMAS *Adelaide*. Shipwreck condition also relates to its 'detectability'. A number of factors influence the condition of shipwrecks, the primary ones being; the materials used in the construction of the vessel, the bottom type upon which the wreck rests on, the depth of the wreck and its age.

With regards to detecting wreck sites, the three most common remote sensing techniques that could be applied would be a magnetometer, a side scan sonar or a multi-beam sonar. The side scan sonar would be more useful in detecting high profile wreck sites while the magnetometer is best employed in searching for sites, with a high ferrous content, which are partially buried or resting on a rocky bottom. Multi-beam sonar data needs to be examined with care. Firstly the multi-beam sonar survey needs to have been carried out with sufficient resolution so as to pick up the at times subtle, signs of a shipwreck. Secondly the data collected is 'cleaned' by the operators, removing eccentric points which are thought to be computing errors, floating weed or fish. Sometimes these 'errors' may again be the subtle signs of a shipwreck. For the optimum use of multi-beam sonar data for the identification of submerged cultural sites, the operators need to be briefed beforehand as to what they should be looking for.

Generally speaking, the deeper and 'younger' the wreck, the better preserved it would be. Also a wreck resting on sandy bottom would be better preserved than if it was resting on a rocky bottom. In conjunction with these factors, the method and type of construction of the vessel is the most important variable when it comes to assessing the condition of a wreck. The shipwrecks presented in this report have been subdivided into categories based on their construction, they are:

Iron/steel hulled wrecks

If resting on a sandy bottom, it could be expected that the hull integrity of the wreck would be relatively well intact. The hull along midships may have collapsed but the stern and bow sections may still be upright, or heeled to one side. The engine components, if any, would be largely intact and *in situ*. Such vessels on a rocky bottom would be relatively disarticulated, though the components of the vessel would still be present. Iron/steel wrecks on either bottom type can be detected using a magnetometer. Locating such a wreck site on a rocky bottom with a side scan sonar or multi-beam sonar would be difficult but the opposite is true with such wrecks on a sandy seabed.

Wooden hulled wrecks with engines

In most cases the hulls of such wrecks would have disappeared. In situations however where the wreck rests on a sandy bottom sections of the hull may have been preserved under the sand. The engine components of such wrecks would be visible. A magnetometer can detect such wrecks on either bottom type. Such wrecks on a rocky bottom would be difficult to detect with a side scan sonar or multi-beam sonar but the opposite is true with such wrecks on a sandy seabed.

Large tonnage (> 100 ton) wooden hulled wrecks (sail)

In most cases the hulls of such wrecks would have disappeared. However, in situations where the wreck rests on a sandy bottom, significant sections of the hull may have been preserved under the sand. There would be enough ferrous material present, anchors, chain, winches etc. for such wreck sites to be detected using a magnetometer. The identification of such wrecks site using side scan sonar or multi-beam sonar would be difficult as it could appear as scattered dumped debris, unless the cargo the vessel was carrying was non - perishable, in which case a linear mound may be visible.

Small tonnage (< 100 ton) wooden hulled wrecks (sail)

The same as for large tonnage vessels except that the size of the target and the amount of ferrous material present would be considerably less. It would be difficult to detect using a magnetometer and may be mistaken for dumped material debris from side scan sonar or multi-beam sonar imaging.

2.4 Assessing the Likelihood for the Presence of Sites

Given that the majority of shipwrecks identified in this assessment have not been located, a measure or assessment of the possibility of they being present within close proximity (< 0.25 nm) of the scuttling area is required. The table below provides a guide as to the likelihood of any given historically documented shipwreck being in close proximity to a proposed scuttling area (Table 1). The level of historical information available on the wrecking event largely dictates the chance or risk of a wreck being possibly impacted by the scuttling of the ex-HMAS *Adelaide*.

Qualitative Description	***Order of probability***	***Example***
Certain	1 (0.999)	Site is known and positioned with a GPS
Almost certain	0.2 – 0.9	Site is known but method of position fixing is unknown
Highly probable	0.1	Vessel lost within 0.1 nm of the scuttling area – i.e. ‘Lost 1nm off Avoca Beach’.
Possible	0.01	Vessel lost within 1 nm of the scuttling area.
Unlikely	1×10^{-4}	Vessel lost within 3 nm of the scuttling area.
Highly improbable	1×10^{-5}	Vessel lost between 3 to 5 nm of the scuttling area.
Almost impossible	1×10^{-6}	‘Vessel left Sydney for New Caledonia and never seen again’

Table 1 Likelihood guide for the occurrence of submerged cultural sites within close proximity (< 0.25 nm) of the scuttling area.

3.0 THE INVESTIGATION

3.1 Cultural Behaviour within the Study Area

From the time of the establishment of Sydney in 1788, vessels have traversed the central coast of NSW, that is, the waters north and south of the entrance to Port Jackson. Initially, the volume of traffic was small and limited, maintaining communication with the Hawkesbury and Illawarra region as well as British colonial possessions in South and East Asia. As the colony of New South Wales developed throughout the 19th century, vessel traffic increased substantially.

Mining of coal on the central coast began in the 1790s with the first loads exported to Sydney via ship from Newcastle in 1798.[9] The exporting of coal from the Newcastle/Hunter region was done via ship as road transport was slow and greater quantities could be sent by sea. Colliers were sent to Port Jackson full, where the coal was then redistributed, and the vessel was sent back empty or with other supplies for the mining communities. The amount of coal exported from the area increased during the mid 19th century, which led to an increase in the amount of shipping out of the Newcastle area heading south to Sydney.

From the early 1800s, Timber cutters worked their way into the area around the Central Coast, logging cedar for the Sydney market. Many of these operations established makeshift jetties and wharves in the Terrigal, Gosford, and Norah Head area, to allow vessels to come into shore and load the timber logs, and as such, increased shipping in the local area.[10] Much of this timber cutting was not sanctioned by the colony, and as such much of these early operations were not recorded.

Other significant shipping movements through the study area during the 19th and 20th Centuries were coastal trades, travelling along the coast, transporting cargo, as well as, passenger along the north coast of NSW and beyond.

3.2 Known Submerged Cultural Sites Within The Study Area

There are three known shipwreck sites located within 2.5 nm of the study area. These are the *Lord Ashley*, located 1 nm north-northwest, the *Yambacoona*, approximately 0.8 nm to the north, and the wreck of the *Galva*, approximately 2.2 nm to the northeast of the study area boundary (Figure 2; Table 2). All three of these wrecks are outside of the study area.

Name	Date Lost	Latitude	Longitude	Source	Approximate Distance to Study area
Lord Ashley	1877	Not Stated		HO wreck dbase	1 nm
Yambacoona	1917	Not Stated		HO wreck dbase	0.86 nm
Galava	1927	Not Stated		HO wreck dbase	2.2 nm

Table 2 Known submerged cultural heritage sites close to the scuttling area

[9] Huntington, H., 2009, *Huntington's history of Newcastle and the northern district*. Newcastle Family History Society

[10] Strom, Beryl, 1982, *Gosford/Wyong, history and heritage.* Gosford District Historical Research and Heritage Association

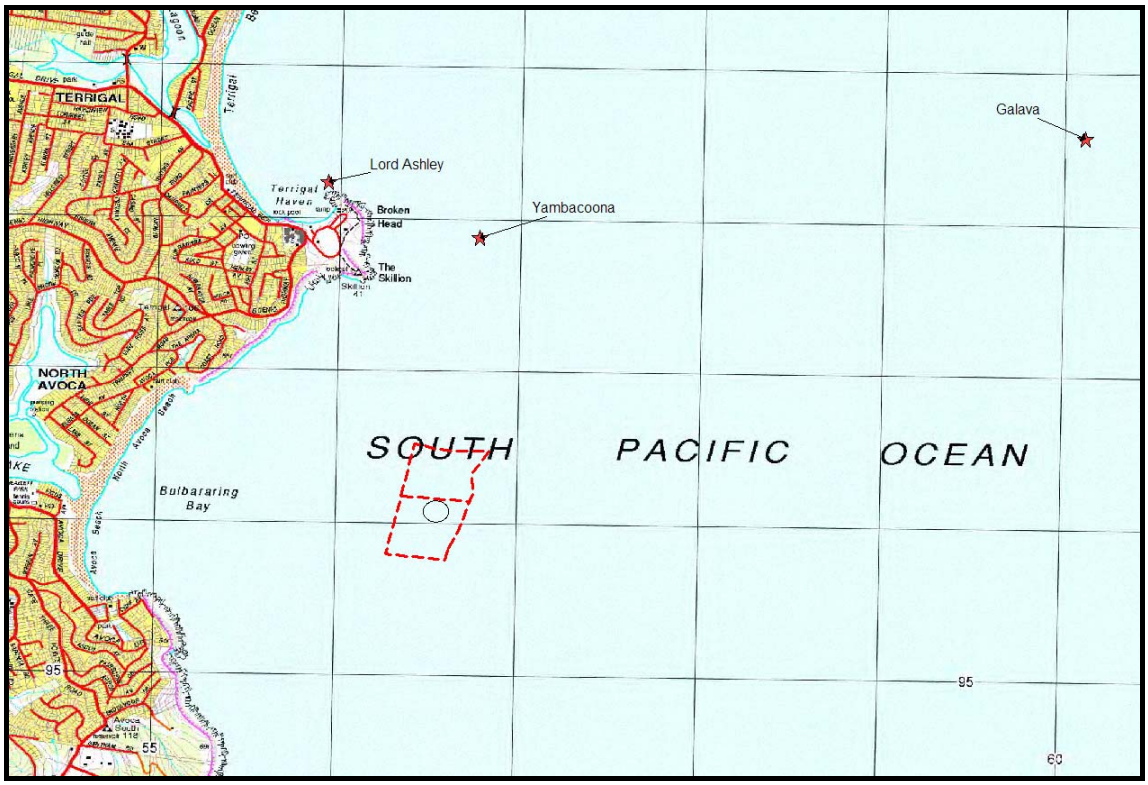

Figure 2: The wrecks Lord Ashley, Yambacoona and Galva in relation to the proposed scuttling area.

3.3 Potential Submerged Cultural Sites Within The Study Areas

In addition to the location of known shipwrecks, there are a number of shipwrecks that have yet to be found in the general locality of the proposed scuttling area. There are 18 shipwrecks that have been reported "*Lost x nm of Terrigal*" or "*off Terrigal*" that have not been located. Nine of these wrecks were driven ashore, one was lost in Terrigal Harbour and eight were lost out to sea (Table 3).

The coastal trader ***Union*** was lost off "Avoca Bay" near Terrigal during a storm in 1848. The report of the wrecking states the vessel was lost with no other details are known. The position of the wrecking, "Avoca Bay", may relate to the waters off Avoca Beach, and potentially may be located within the scuttling area. The cargo listed for the voyage was recorded as "general", and as such may not include any material that would be recognisable on sidescan or other remote sensing imaging data. Identifiable features relating to this wreck are likely to be limited to hull and other structural remains, such as the mast, that may still exist on the seabed.

The ***Barangaroo*** was wooden hulk that began to leak when being towed from Sydney to Port Stephens, and eventually sunk off Terrigal. The vessel was classed as "no longer required", and it is likely that it was not carrying any cargo at the time other than

ballast.[11] As such, potential remains of this wreck would be limited to hull and other intact framing.

The ***Fame*** was a coastal trader carrying 96 ton of coal from Newcastle to Sydney when the vessel sprang a leak and wrecked between Cape Three Points (south of the study area) and Terrigal.[12] Possible remaining features of this wreck would include a low mount of coal.

The collier ***Maud Weston*** sprang a leak off Terrigal before foundering near Terrigal Head.[13] Similar to the Fame, a visible feature of this wreck would be a mound of coal the collier was carrying at the time of wrecking.

The 10 ton cutter ***Friend*** was reportedly sailing from Newcastle to Port Stephens when it floundered and eventually became swamped, wrecking off Terrigal Head. No details were presented as to distance from shore or position off of the headland. As the *Friend* was only a 10 ton cutter and the cargo it was carrying was unknown, limited identifiable material would be expected to remain of this wreck, possibly making it difficult to identify.

The ***Juno*** was sailing from Sydney to Camden Haven when it struck a floating object and quickly sank 5 to 6 nm east of Terrigal.[14] The wooden carvel ***Surprise*** was reportedly wrecked 10 miles east of Terrigal during its journey from Newcastle to Sydney.[15]

The motor vessel ***The Pathfinder*** was heading from Broken Bay to Sydney when the vessel sprang a leak. It is not known why the vessel ventured north instead of south from Broken Bay, but the vessel was lost 1.5 nm east of Terrigal. It is unlikely remains associated with these wrecks are within the study area.

Of the remaining 10 shipwrecks, nine were driven ashore, either during adverse weather conditions or navigational error; including the *Fifeshire*[16], the *Kathleen*[17], the *Pompey*[18], the *Rainbow*[19], the *Rose*[20], the *Sir Robert Peel*[21], the *Tamar*[22], the *Wave*[23], and the *William and Alexander*[24]. The tenth shipwreck lost in the area, the *Gitana*, sank in Terrigal Harbour. It is considered highly unlikely that any material from these shipwrecks would be within the proposed scuttling area.

[11] NSW Maritime Heritage Database Maritime Heritage Online, ID=1790
[12] NSW Maritime Heritage Database Maritime Heritage Online, ID=1423
[13] NSW Maritime Heritage Database Maritime Heritage Online, ID=958
[14] NSW Maritime Heritage Database Maritime Heritage Online, ID=1228
[15] NSW Maritime Heritage Database Maritime Heritage Online, ID=456
[16] NSW Maritime Heritage Database Maritime Heritage Online, ID=1444
[17] NSW Maritime Heritage Database Maritime Heritage Online, ID=1080
[18] NSW Maritime Heritage Database Maritime Heritage Online, ID=696
[19] NSW Maritime Heritage Database Maritime Heritage Online, ID=738
[20] NSW Maritime Heritage Database Maritime Heritage Online, ID=644
[21] NSW Maritime Heritage Database Maritime Heritage Online, ID=562
[22] NSW Maritime Heritage Database Maritime Heritage Online, ID=491
[23] NSW Maritime Heritage Database Maritime Heritage Online, ID=353
[24] NSW Maritime Heritage Database Maritime Heritage Online, ID=220

Name	Wrecking Event	Hull Type	Engines	Tonnage	Cargo	Source	Probability within the study area
Barangaroo	*Wrecked "Off Terrigal when started to leak under tow when sailing from Sydney To Port Stephens*	Wood	Yes (2)	205	Unknown	HO wreck dbase	Unlikely
Fame	Sprang a leak and wrecked between Cape Three Points and Terrigal	Wood	No	60	Coal	HO wreck dbase	Unlikely
Friend	Swamped at Terrigal Head	Wood	No	10	Unknown	HO wreck dbase	Unlikely
Gitana	Wrecked at Terrigal Harbour	Wood	No	Unknown	Unknown	HO wreck dbase	Unlikely
Juno	Wrecked 5 to 6 nm east of Terrigal after striking a floating object	Wood	No	17	Ballast	HO wreck dbase	Highly Improbable
Kathleen	Ran ashore halfway between Terrigal and Norah Head due to a navigational error	Wood	No	227	Ballast	HO wreck dbase	Almost Impossible
Maud Weston	Sprang a leak and foundered near Terrigal Head	Wood	Yes	130	Coal	HO wreck dbase	Possible
Pompey	Driven ashore in a gale between Lake Macquarie and Terrigal	Wood	No	36	Unknown	HO wreck dbase	Unlikely
Rainbow	Driven ashore and wrecked at Terrigal during a storm	Wood	No	18	Timber	HO wreck dbase	Unlikely
Rose	Ran ashore, possibly at Terrigal Beach, but was refloated	Wood	No	23	Timber	HO wreck dbase	Unlikely
Sir Robert Peel	Wreck at Avoca Beach due to a navigational error	Wood	No	724	Passengers and Stores	HO wreck dbase	Unlikely
Surprise	Wrecked 10 nm east of Terrigal	Wood	No	115	Unknown	HO wreck dbase	Highly Improbable
Tamar	Went ashore on a beach near Terrigal and was wrecked	Wood	Unknown	200	Tug	HO wreck dbase	Highly Improbable
The Pathfinder	Sprung a leak and was wrecked 1.5 miles east of Terrigal	Wood	Yes	44	Unknown	HO wreck dbase	Unlikely
Union	Wrecked at Avoca Bay during a gale	Wood	No	32	General	HO wreck dbase	Possible
Wave	Wrecked 3 nm north of Terrigal	Wood	No	174	Coal	HO wreck dbase	Highly Improbable
William and Alexander	Cables parted during voyage and wrecked on Terrigal Beach	Wood	No	58	Coal	HO wreck dbase	Highly Improbable

Table 3: Assessment of possibility of potential submerged cultural heritage sites close to the study area

3.4 Review of Sidescan Sonar data

The sidescan sonar data collected by Hydrographic Services Pty Ltd for Douglas Partners was reviewed on 3rd March. The data was viewed accompanied by Greg Halls (Hydrographic Services Pty Ltd). A copy of the raw imagery data was also given to Cosmos Archaeology to review at a later date if required.

The sidescan survey was conducted on 25th September and 17th October 2008. The data was collected using a dual channel C-Max CM2 325 kHz Sidescan Sonar towfish. Each transect collected was 75 m wide on both the port and starboard sides, and each run overlapped the previous to create a complete seabed coverage of the area.[25] The raw data was viewed using C-max *MaxView* data reading software.

3.4.1 Seabed Topography

Hydrographic Services and Douglas Partners have reviewed the sidescan data and determined the seabed topography in the area. The seabed was summaries as follows:

- Study area is a genuinely uniform sandy seabed; with the thickness of the deposit from 1 m to greater than 6 m in the middle of the study area,
- Low sand banks are present in the south western corner of the study area (Figure 3),
- Presents of low reef and low reef and gravel outside of the study area in the southwest corner (Figure 4).

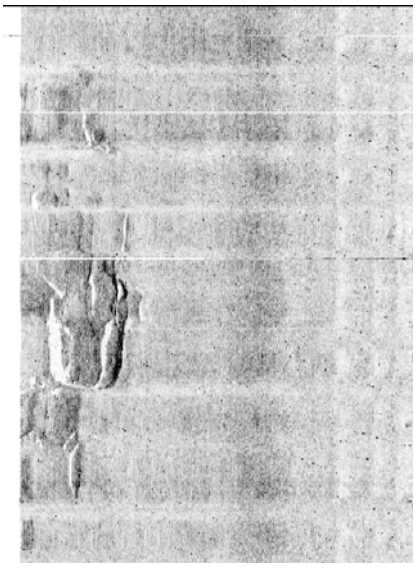

Figure 3: Example of a low reef profile within the study area (source: Hydrographic Services)

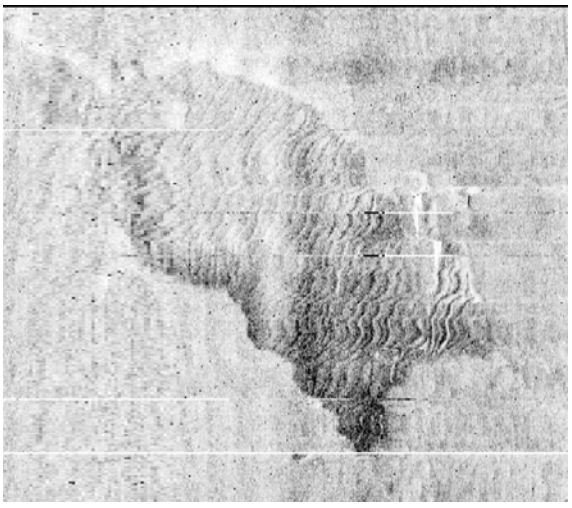

Figure 4: Example of a low sandbank within the study area (source: Hydrographic Services)

[25] Douglas Partners Pty Ltd (November 2008): p3

3.4.2 Anomalies and Cultural Heritage Potential

A review of the sidescan data for the purposes of identifying cultural heritage sites has identified one anomaly of cultural heritage potential within the study area.

The anomaly is located on the second run, on the north western corner of the study area [33°27.7455S 151°27.2517E].Situated adjacent to a sand bed, there is a cluster of three individual anomalies within 20 m of each other (Figure 5; Figure 6). The anomaly at the top of the three is possibly a raised sand bed (ripple), however, the two anomalies to the south are possibly scour marks cause by a tall object collecting the passing sediment. From the sidescan image it is difficult to determine if there are any shapes or forms within the anomalies; the two scours are only 6.4 m and 9 m long respectively.

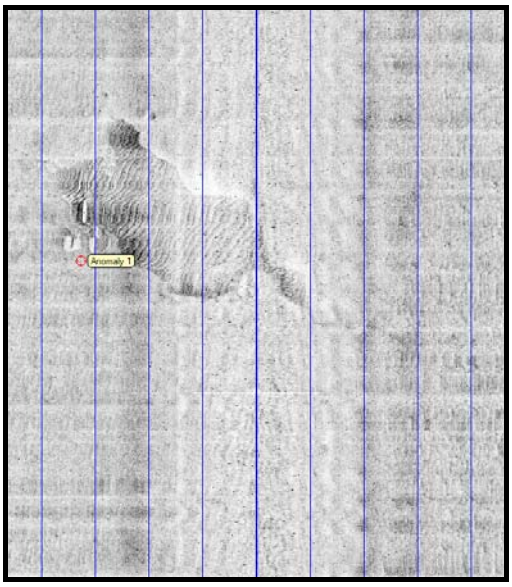

Figure 5: View of the anomaly identified from the sidescan sonar data (source: Hydrographic Services)

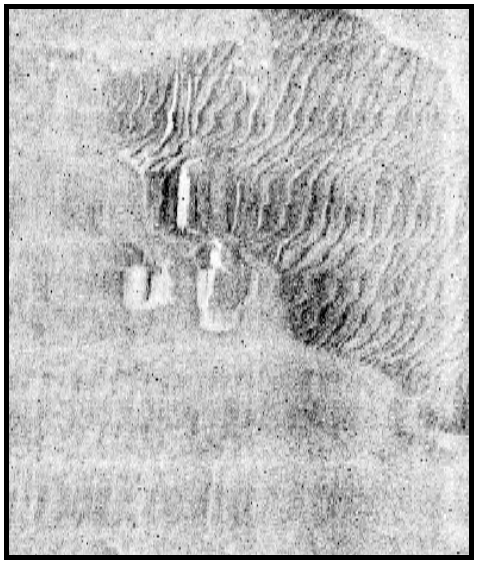

Figure 6: Closer view of the anomaly identified from the sidescan sonar data **(**source: Hydrographic Services)

4.0 SCUTTLING IMPACTS ON POTENTIAL CULTURAL HERITAGE SITES

The scuttling of the ex-HMAS *Adelaide* can have both a direct and indirect impact on potential cultural heritage sites, such as shipwrecks, within the study area. Direct impacts from the proposed scuttling are considered to be if the vessel is scuttled immediately on top of an existing cultural heritage site. This is unlikely as there are no known shipwrecks located within the study area, and the one anomaly within the study area is situated approximately 250 m to the north east of the proposed scuttling location. A direct impact to cultural heritage sites is considered to be remote.

The scuttling also has the potential for indirect impacts on known or potential cultural heritage sites. The positioning of the vessel, intended to remain upright, has the potential to alter hydrodynamic activity in the immediate vicinity, specifically, the potential to cause erosion or depositional activity. Erosion in the vicinity of a cultural heritage site has the potential to expose remains once buried and protected by the marine sediments, making them susceptible to environmental factors, including abrasion from sand scolding, which may deterioration a site, and therefore impact the site.

Increased deposition on a cultural heritage site has both a negative and positive impact. Sites already covered by marine sediments will not incur any additional impacts. However, cultural sites that are currently exposed on the seabed that are then subjected to increased sedimentation have the potential to impact on during the depositional process, such as from sediment abrasion. This occurs until the site becomes totally covered.

It is difficult to determine the extent of indirect impacts from events such as from scuttling vessels, and as such, all known sites and/or anomalies identified within 100 m of the proposed scuttling location are investigated further prior to scuttling. This is done to investigate anomalies and positively identify any cultural heritage sites, determine the nature and extent of each site, and to understand and record current environmental activity for each site. Known sites within 100 m of the scuttling location can also monitored over time after the scuttling event to any observe changes to the site and mitigate any adverse effects.

5.0 RELEVANT LEGISLATION

5.1 Commonwealth *Historic Shipwrecks Act 1976*

The *Historic Shipwrecks Act 1976* protects historic wrecks and relics in Commonwealth waters, extending from below the low water mark. For the purposes of this study, any shipwrecks within the scuttling area would be under the jurisdiction of this Act.

Under Section 4 of the Act, all shipwrecks 75 years of age and older are declared historic and afforded automatic protection. At the time of writing, vessels wrecked before 1933 are protected under the Act. Other shipwrecks can be declared historic and granted this protection on an individual basis according to their particular merits - such as the M24 Japanese submarine.

Under Section 13 of the Act, it is an offence to damage, interfere, remove or destroy an historic shipwreck or artefacts associated with it. A permit can be issued under special circumstances, with conditions, to carry out a specified action that would otherwise be prohibited under Section 13.

For shipwrecks under threat, a protected zone can be declared that can prohibit certain activities within a specified radius around the wreck. The SS *Duckenfield* and the *M24* Japanese Submarine are located within declared protected zones.

Under Section 17 of the Act persons discovering a shipwreck are legally obligated to notify the appropriate authorities of the discovery "..as soon as practicable..."

Though this is a Commonwealth Act administered by the Department of the Environment and Water Resources, the Heritage Branch, NSW Department of Planning, is the delegated authority for this State. The Heritage Branch has maritime archaeologists on-staff and has the authority to issue permits under the Act.

5.2 NSW *Heritage Act 1977* (amended 1999)

The NSW *Heritage Act 1977* is the primary piece of State legislation affording protection to all items of environmental heritage (natural and cultural) in New South Wales. "Items of environmental heritage" include *places, buildings, works, relics, moveable objects* and *precincts* identified as significant based on *historical, scientific, cultural, social, archaeological, architectural, natural* or *aesthetic* values. The Act defines a 'relic' as:

> *"any deposit, object or material evidence relating to the settlement of the area that comprises NSW, not being an aboriginal settlement, and which is fifty or more years old."*

Sections 139 to 145 of the Act prevent the excavation or disturbance of land for the purpose of discovering, exposing or moving a relic, except by a qualified archaeologist to whom an excavation permit has been issued by the NSW Heritage Council / Heritage Branch, NSW Department of Planning. In cases where relics, or the potential for relics, are identified, the following procedures are required to be followed in order to comply with the *Heritage Act 1977*:

- The proponent will be required to apply for an archaeological excavation permit (S140) under Section 139 of the *Heritage Act 1977* if the proposed development design cannot be modified to avoid disturbance of relics;

- This application would be submitted to the NSW Heritage Council Office accompanied by an archaeological assessment report that describes relics present and the impact of the development on the relics;

- In order to consider the permit application, the Heritage Council requires the applicant to supply a separate document known as a *Research Design & Excavation Methodology,* which is essentially an archaeological scope of work.

The NSW Heritage Office has issued exceptions to the above procedure, the most applicable to this study being;

(a) where an archaeological assessment has been prepared in accordance with Guidelines published by the Heritage Council of NSW which indicates that any relics in the land are unlikely to have State or local heritage significance; or

(b) where the excavation or disturbance of land will have a minor impact on archaeological relics; or

(c) where the excavation or disturbance of land involves only the removal of unstratified fill which has been deposited on the land.[26]

The developer in this case must write to the Director of the Heritage Office and describe the proposed excavation or disturbance of land and set out why it satisfies the above criteria. If the Director of the Heritage Office is satisfied that the proposed development meets the criteria, the applicant will be notified.

For the purposes of this Act, the State of NSW includes the seabed and the water column up to 3 nm from the coast. The NSW *Heritage Act 1977* therefore, within 3 nm of the NSW coast, can protect shipwrecks*,* though the Commonwealth *Historic Shipwrecks Act 1976* may take precedence in some matters. Shipwrecks currently under the jurisdiction of the *NSW Heritage Act* are identified in the Historic Shipwrecks Register, maintained by the NSW Heritage Council.

Part 3C of the Act contains provisions for the protection of shipwrecks over 75 years old. This section is included in the Act to provide a link to and consistency with the (Commonwealth) *Historic Shipwrecks Act 1976*. In NSW the 'relics' provision takes precedence over Part 3C when it comes to determining the legal and protected status of a wreck and associated artefacts.

There are also provisions within the Act, which allow for the declaration of an emergency Interim Heritage Order. The wreck of the *M24* Japanese submarine, is currently the subject of an Interim Heritage Order.

[26] NSW Heritage Council, April 2004 *Heritage Act 1977*Notice Of Order Under Section 139(4)

5.3 Relevant comparisons between the *Historic Shipwrecks Act 197*6 and *Heritage Act 1977* (amended 1999)

At first glance it would appear that both Acts are largely compatible in that archaeological/cultural sites are automatically protected after a stated number of years. They differ markedly however on two key points:

1) What type of sites are protected, and;

2) The automatic rolling dates for when sites become protected.

The Commonwealth *HSA 1976* only protects artefacts associated with shipwrecks. The Commonwealth at present is reviewing the Act with the aim of making it conform to the UNESCO *Convention on the Protection of Underwater Cultural Heritage 2001*.[27] The Convention recognises all forms of underwater cultural heritage as worthy of being protected from development and/or looting. The (NSW) *HA 1977* already has provisions which mirror the Convention as it affords protection to all forms of non-Aboriginal material culture.

As mentioned, both Acts have a mechanism which automatically protects cultural heritage after a period of time has elapsed. The *HSA 1976* grants automatic protection to shipwrecks that were wrecked over 75 years ago. At the time of writing wrecks earlier than 1933 are protected. Next year it will be 1934. The *HA 1977* protects cultural heritage if it was created more than 50 years ago – that is, 1958. There is a critical distinction between the two Acts. The *HSA 1976* protects shipwrecks from the date of the shipwreck occurring, while the *HA 1977* protects cultural heritage from the time an object or objects were created. The above discussion is summarised in Table 8 below:

Act	Shipwrecks	Aircraft	Other
Up to 3 nm from coast			
(NSW) *HA 1977*	Protected if made over 50 years ago	Protected if made over 50 years ago	Protected if made over 50 years ago
(Cwlth) *HSA 1976*	Protected if wrecked over 75 years ago	Not protected	Not protected
Beyond 3 nm from coast			
(NSW) *HA 1977*	Not protected	Not protected	Not protected
(Cwlth) HSA 1976	Protected if wrecked over 75 years ago	Not protected	Not protected

Table 4: Comparison between (Cwlth) HSA Act 1976 and (NSW) HA Act 1977.

[27] UNESCO *Convention on the Protection of Underwater Cultural Heritage 2001* (http://unesdoc.unesco.org/images/0012/001260/126065e.pdf)

6.0 CONCLUSION

6.1 Summary of Key Findings

The key findings of the desktop review for the underwater cultural heritage impact assessment for the scuttling of the ex-HMAS *Adelaide* are as follows:

- There are no known shipwrecks, or other submerged cultural heritage, within close proximity (< 0.25 nm) of the proposed scuttling study area;
- There are two possible shipwrecks reported lost in the vicinity of the study area that have yet to be located, *Maud Weston* and *Union;*
- A review of the sidescan sonar imagery has identified one anomaly of cultural heritage potential[33°27.7455S 151°27.2517E] located in the north western corner of the study area;
- The identified submerged cultural heritage (shipwrecks) identified in this study are protected by the Commonwealth *Historic Shipwrecks Act 1976* and/or NSW *Heritage Act 1977*;

6.2 Recommendations

Based on the findings of the study the following recommendations are presented:

Recommendation 1 : *If the proposed final scuttling position of the ex-HMAS* Adelaide *is within 100 m of identified anomaly* [33°27.7455S 151°27.2517E]*, additional maritime archaeological works, including an underwater visual inspection, of the anomaly will be required prior to scuttling.*

The underwater visual inspection will determine if the anomaly is a cultural heritage site, such as a shipwreck or other material, and, if so, will define the nature or extent of the site. The field investigation should be co-ordinated by a maritime archaeologist, and the results of the field survey presented in a report. The results of the field inspection can recommend, but not be limited to, the following:

- No further Maritime archaeological work required;
- Recommend an assessment to be conducted into potential sedimentation pattern changes that may occur as a result of the scuttling works on the site;
- Archaeological monitoring of the site post scuttling to determine what changes, if any, occur to the site and recommend mitigation measures, such as sandbagging of the site.

Recommendation 2 : *If the proposed final scuttling position is a distance greater than 100 m from the identified anomaly* [33°27.7455S 151°27.2517E]*, no further maritime archaeological work is required.*

REFERENCES

Secondary Sources

Douglas Partners Pty Ltd, November 2008 *Report on Seismic and sidescan sonar investigation: Scuttling of Ex-HMAS Adelaide, Avoca, NSW*. Report prepared for Worley Parsons Services Pty Ltd.

Heritage Office, NSW (1995) *Shipwreck Atlas of NSW*

Huntington, H. 2009 *Huntington's history of Newcastle and the northern district*. Newcastle Family History Society

Riley, J. 1988 *Shipwrecks of NSW*. Unpublished manuscript.

Strom, Beryl, 1982. *Gosford/Wyong, history and heritage*. Gosford District Historical Research and Heritage Association

Internet

Australian Hydrographic Service (2007) Sea Dumping in Australia (http://www.hydro.gov.au/n2m/dumping/dumping.htm)

Department of the Environment and Water Resources, (2007), Coastal and Marine Pollution. (http://www.environment.gov.au/coasts/pollution/dumping/index.html)

Department of the Environment and Water Resources, (2007), Coastal and Marine Pollution. (http://www.environment.gov.au/coasts/pollution/dumping/index.html)

Heritage Office, NSW (2007) *Maritime Heritage Online*, NSW (http://maritime.heritage.nsw.gov.au/public/welcome.cfm)

UNESCO 2001 *Convention on the Protection of Underwater Cultural Heritage* (http://unesdoc.unesco.org/images/0012/001260/126065e.pdf)

Personal communications

Nutley, David, Senior Maritime Archaeologist, Heritage Office. pers. comm. 23/3/98