Department of Industry

Our Ref: DOC18/242527

s22(1)(a)(ii)

Commonwealth Department of Environment and Energy
51 Allara St
Canberra ACT 2600

By email: seadumping@environment.gov.au

Dear s22(1)(a)(ii)

SD2008/1062: Ex-HMAS Adelaide Artificial Dive Reef Annual Report of Monitoring Results 2018

Reference is made to Sea Dumping Permit No. SD2008/1062 (the Permit). The Permit requires the Department of Industry – Lands & Water (the department) to have an approved Long Term Management and Monitoring Plan (the Plan) for the Ex-HMAS Adelaide dive reef. The Plan requires annual monitoring, the provision of monitoring reports to the Commonwealth and publication of the results on the Ex-HMAS Adelaide web page.

In accordance with the Plan, McLennan's Diving Service was engaged to undertake the 2018 Annual Monitoring Report (the Monitoring Report) of:

- Structural integrity, vessel stability, position and sediment movement
- Vessel components and specified structural monitoring points

The Monitoring Report is provided in **Attachment 1.** In summary, the Monitoring Report identified:

- The position, trim and list of the vessel were unchanged since the last inspection in April 2017.
- The steel hull was unchanged from the last inspection.
- The aluminium superstructure had deteriorated since the last inspection and there were numerous dislodged panels lying in interior passageways.
- Several panels including the portside hangar wall were reported to be close to falling away.
- Numerous corrosion breakouts were visible.
- Marine life had increased in diversity and density.

Also in accordance with the Plan, Maritime Engineers - Shearforce Maritime Services, were engaged to provide a Technical Report based on the Monitoring Report (See Technical Report - **Attachment 2**). In summary, the Technical Report identified:

- The vessel is still structurally sound and stable.
- Light aluminium plating in the accommodation and hangers areas is continuing to deteriorate.
- While it was considered there are no new factors that may affect recreational divers, Dive Masters should take precautions if taking divers near damaged structures.

In response to this advice, the department is currently modifying warning information provided to divers to alert them of site hazards which will be provided upon issuing entry permits.

In July 2018, dive moorings and special marker buoys were serviced in accordance with the requirements of the Plan.

To conclude, the department will write under separate cover, to seek amendment to the Permit condition that stipulates the publication of monitoring results at www.hmasadelaide.nsw.gov.au . This website is no longer supported due to operational issues with this site. Reports are currently

published at an alternate location – see:
https://www.industry.nsw.gov.au/lands/access/recreational-use

Should you have any questions please contact Martin Dawson on Ph: 02 4937 9346 or by email: martin.dawson@crownland.nsw.gov.au

Yours sincerely

Tim Deverell
Area Manager Hunter

27 November 2018

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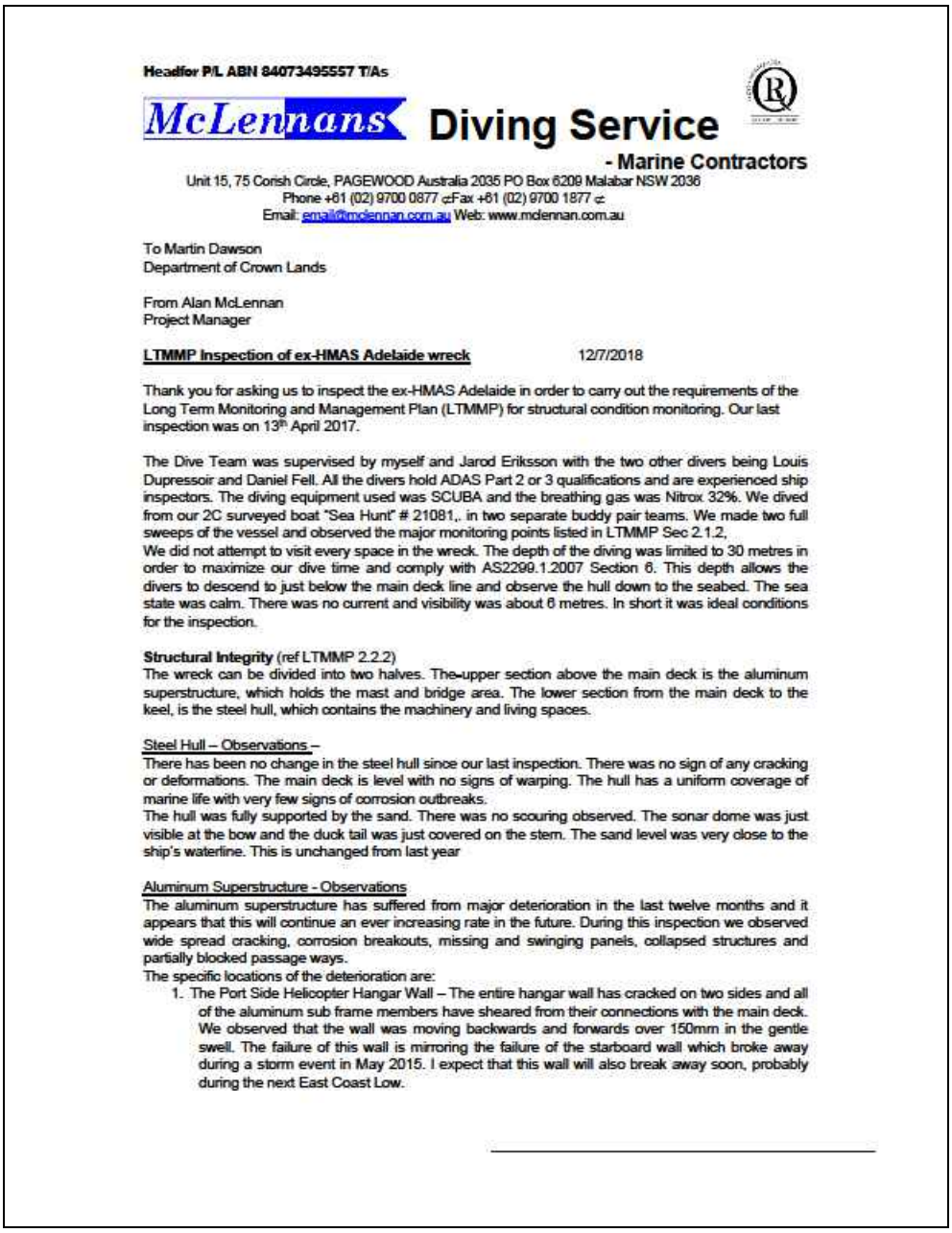

Headfor P/L ABN 84073495557 T/As

McLennans Diving Service

- Marine Contractors

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Email: email@mclennan.com.au Web: www.mclennan.com.au

To Martin Dawson
Department of Crown Lands

From Alan McLennan
Project Manager

LTMMP Inspection of ex-HMAS Adelaide wreck 12/7/2018

Thank you for asking us to inspect the ex-HMAS Adelaide in order to carry out the requirements of the Long Term Monitoring and Management Plan (LTMMP) for structural condition monitoring. Our last inspection was on 13th April 2017.

The Dive Team was supervised by myself and Jarod Eriksson with the two other divers being Louis Dupressoir and Daniel Fell. All the divers hold ADAS Part 2 or 3 qualifications and are experienced ship inspectors. The diving equipment used was SCUBA and the breathing gas was Nitrox 32%. We dived from our 2C surveyed boat "Sea Hunt" # 21081,. in two separate buddy pair teams. We made two full sweeps of the vessel and observed the major monitoring points listed in LTMMP Sec 2.1.2,
We did not attempt to visit every space in the wreck. The depth of the diving was limited to 30 metres in order to maximize our dive time and comply with AS2299.1.2007 Section 6. This depth allows the divers to descend to just below the main deck line and observe the hull down to the seabed. The sea state was calm. There was no current and visibility was about 6 metres. In short it was ideal conditions for the inspection.

Structural Integrity (ref LTMMP 2.2.2)
The wreck can be divided into two halves. The upper section above the main deck is the aluminum superstructure, which holds the mast and bridge area. The lower section from the main deck to the keel, is the steel hull, which contains the machinery and living spaces.

Steel Hull – Observations –
There has been no change in the steel hull since our last inspection. There was no sign of any cracking or deformations. The main deck is level with no signs of warping. The hull has a uniform coverage of marine life with very few signs of corrosion outbreaks.
The hull was fully supported by the sand. There was no scouring observed. The sonar dome was just visible at the bow and the duck tail was just covered on the stern. The sand level was very close to the ship's waterline. This is unchanged from last year

Aluminum Superstructure - Observations
The aluminum superstructure has suffered from major deterioration in the last twelve months and it appears that this will continue an ever increasing rate in the future. During this inspection we observed wide spread cracking, corrosion breakouts, missing and swinging panels, collapsed structures and partially blocked passage ways.
The specific locations of the deterioration are:

1. The Port Side Helicopter Hangar Wall – The entire hangar wall has cracked on two sides and all of the aluminum sub frame members have sheared from their connections with the main deck. We observed that the wall was moving backwards and forwards over 150mm in the gentle swell. The failure of this wall is mirroring the failure of the starboard wall which broke away during a storm event in May 2015. I expect that this wall will also break away soon, probably during the next East Coast Low.

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Shearforce Maritime Services Pty Ltd

A.B.N. 63 108 496 751

Technical Report

Report No. SYD/2018/18

At the request of the NSW Department of Primary Industries - Lands, the undersigned prepared this report from information gained from a review of a report prepared on the 20th July 2018 by McLennan's Diving Service. This is following their underwater inspection on 12th July 2018, of the vessel Ex-HMAS Adelaide where she rests following the vessel's scuttling.

The vessel's details are:

Ship name:	Ex-HMAS Adelaide
Displacement Tonnage:	2954.90 tonnes
LBP:	407ft
Breadth Moulded:	47ft

1. Introduction

Ex-HMAS Adelaide is a former guided missile armed frigate de-commissioned from the Royal Australian Navy. The vessel was scuttled at a position off Avoca, New South Wales on 13th April 2011 to create an artificial reef for scuba diving.

An underwater inspection of the wreck is carried out annually. The latest inspection was carried out as mentioned above, in July 2018, by McLennan's Diving Service.

2. Report

From the diver's report the underwater inspection of the vessel found that the steel structure was substantially unchanged since the previous underwater inspection which was carried out 13th April 2017.

It is reported that during the inspection there was no sign of any cracking or deformation of the hull and deck and the steel hull and deck has built up a uniform coverage of marine growth. There are very few signs of new corrosion and the divers report the corrosion level appears to be very low.

The diver's report indicates that the hull is still fully supported by the sand. There was no scouring observed by the divers. The sonar dome was just visible above the sand at the bow and the sand level was very close to the ship's design waterline.

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Structural Integrity (ref LTMMP 2.2.2)
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The hull was fully supported by the sand. There was no scouring observed. The sonar dome was just visible at the bow and the duck tail was just covered on the stern. The sand level was very close to the ship's waterline. This is unchanged from last year

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The specific locations of the deterioration are:

1. The Port Side Helicopter Hangar Wall – The entire hangar wall has cracked on two sides and all of the aluminum sub frame members have sheared from their connections with the main deck. We observed that the wall was moving backwards and forwards over 150mm in the gentle swell. The failure of this wall is mirroring the failure of the starboard wall which broke away during a storm event in May 2015. I expect that this wall will also break away soon, probably during the next East Coast Low.

July 20, 2018

2. A three metre wide by two metre high section of the port side outer wall on 01 deck has broken out amidships and is laying on the main deck. This has allowed the swell surge to enter the compartment and this has dislodged numerous large sections of aluminum paneling which are laying loose in the compartment. It is possible these loose sections which are several metres long may impact recreational divers if they move about in larger swells. They were not moving during our inspection.
3. A three metre wide by a half metre high section of the starboard side outer wall on 01 deck just below the bridge has broken away. A larger section of wall above it is flexing in the swell, and will probably break off soon. Inside the compartment the water movement has caused internal walls to break and numerous aluminum panels are loose inside.
4. The horizontal roof panels on 02 deck have a large number of white corrosion deposits visible and some show signs that the panels have cracked. A number of panels were loose and flexed apart when pushed by hand.
5. Internally numerous aluminum panels were laying loose in the passageways. This has not been the case previously.

I conclude that the aluminum superstructure has reached a point, after seven years of relative stability, that that loose and swinging panels can be expected to appear in the passageways regularly.

LTMMP Monitoring Locations

The Divers made note of the monitoring items listed in the LTMMP Locations 1 to 6.

Location 1 – the hull plating on the forecastle just aft of where the GMLA launcher. There has been no deterioration in this area.

Location 2 – amidships at the base of the forward screen (where the superstructure and hull are bonded together) – There is no visible deterioration in this area. There is no sign of any separation between the forward screen and the hull.

Location 3 - at the vertical midpoint of the main masts –The entire main mast was examined. The mast is heavily encrusted with marine life restricting a detailed examination. However no sign of cracking or deformation was observed. All parts of the mast remains straight and true. The feet of the masts were also closely examined and no sign of cracking or deformation were observed.

Location 4 – the connections of the masts to the 02 deck. There is no sign of any deterioration ion the legs. No cracking or deformation was observed.

Location 5 – the hull plating on the transom – The transom area has changed very little since the sinking. It was noted that a number of the handrails have broken away in the last year

Location 6 – where the helicopter hangars are attached to the hull. In May 2015 the starboard hangar wall suddenly broke way and fell to the seabed. As noted previously the port side wall is about to fail also. However the main framework of the hanger is steel and this is still securely attached to the main deck. This frame shows no sign of failing.

Internal Debris

As noted previously there are numerous collapsed internal panels littering the passageways in 01 deck. These have presumably been dislodged by surge coming through the new openings in the port side walls.

2.1.3 Vessel Stability – The vessel's list was checked by measuring the water depth on opposite gunwales amidships. And by measuring with spirit level. We found that there is an 800mm difference between the two sides of the vessel which is equivalent to a 4 degree list to port. This is unchanged from previous years.

2.1.4 Vessel Position and Vessel Settlement –

There has been no change since last year. The vessel's position is unchanged since our last inspection. The trim is unchanged based on our check of the water depth at the bow and stern. The vessel has not moved its horizontal position which we confirmed by testing with a GPS.

July 20, 2018

Corrosion
There was no signs of corrosion observed in the steel hull. The aluminum superstructure has displayed numerous corrosion breakouts characterized by white deposits, especially on the external horizontal surfaces. This was not observed in this quantity in previous years.

Barred off and Restricted Areas
The wreck was originally fitted with eighty nine "barred off" areas that were designed to prevent divers entering spaces that were considered unsafe for SCUBA diving. The contributing factors that made barring off necessary were; extremely narrow passageways, no other exits and a danger of a zero visibility "silt outs" in the confined space.
The "barring off" was done in two ways. Method 1 was for smaller steel openings, a solid steel bar was welded across the opening. For more complex shapes Method 2 was used, a layer of "weld mesh" was cut to shape and welded into position. These methods are illustrated on pages 25 to 27 of the LTMMP.

The barred off areas are found in all parts of the ship but particularly in the lower deck spaces.
It was not possible to inspect all of the barred off areas during the current inspection. This would take a number of additional days. However during this inspection and on previous inspections we observed that passageways barred off using Method 1 are still barred off. The areas barred off using Method 2 have mostly failed because the weld mesh was thin and the welds to the ship have broken away due to the force of the swell surge and corrosion.

In the upper decks (1, 01, 02,03) many of the aluminium partitions have been "blown out" and this has resulted in some "barred off" areas being washed away. There are no meshed areas left intact in these areas. In the lower decks (2, 3, 4, 5) the wall partitions are mostly still intact but the mesh is mostly dislodged.

The risk to divers of these meshes being dislodged would be low. This is because they are located in areas below 30 metres of water, and they do not look as they did when the vessel sank. All the paint work has now disappeared and marine growth covers every surface, which reduces access even further. So what might have been an enticing passageway for a shipwreck devotee at the time of the sinking, is now very uninviting. Only an advanced diver would make it to these areas now, and they could only enter them if they were determined. There is no possibility of entering these areas accidentally.

To replace these barred off areas would be impractical due to the very limited time available for diving at depths of more than 30 metres and the very high cost. A better alternative would be to alert those divers who are venturing below 30 metres that the barred off areas may no longer be protected.

Marine Life
The marine life has continued to increase in diversity and density every year since the sinking. All previously observed species were again seen. However this year we were entertained by a very inquisitive seal which appeared to have taken up residence and followed us through our dives.
In addition this year we noted an increased quantity of snapper, blue morwong, silver trevally, groper and long fin pike.
The fixed like has continued to increase and the helicopter deck is no becoming a home to many mature sponges and anemones. The fixed life on the masts in particular has increased in diversity and is quite spectacular.
This year for the first time the divers noticed quite a few marine snails such as volutes and dicathais

Conclusion about Structural Integrity

- The position, trim and list of the vessel are unchanged since our last inspection in April 2017
- The steel hull is unchanged since our last visit

July 20, 2018

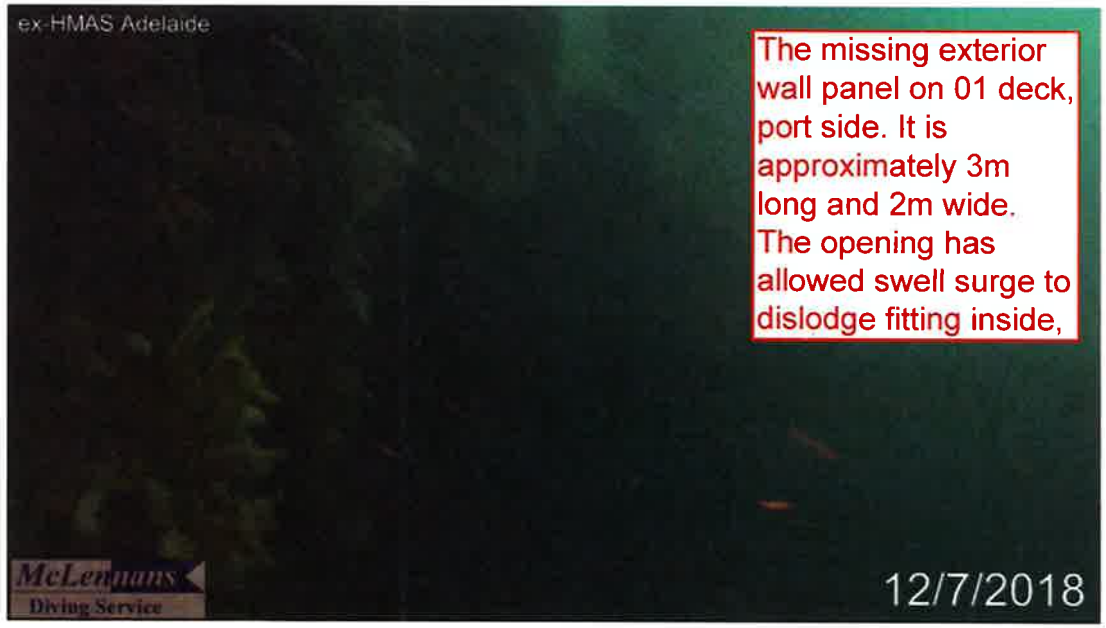
- The aluminum superstructure has deteriorated greatly since our last visit and numerous loose panels are laying in interior passageways. In addition several panels including the portside hangar wall are at the point of failing and breaking out. Numerous corrosion breakout are visible.
- The barred off areas have deteriorated and failed especially in the upper decks.
- The marine life has increased in diversity and density.

Attached: following are photographs which illustrate each part of this inspection.

Thank you for asking us to undertake this inspection, regards,

Alan McLennan
Project Manager


Missing panels on the port side. A similar panel is missing from the starboard side
Area of broken frames and panels on the hanger wall


ex-HMAS Adelaide
The missing exterior wall panel on 01 deck, port side. It is approximately 3m long and 2m wide. The opening has allowed swell surge to dislodge fitting inside,
McLennans
Diving Service
12/7/2018


ex-HMAS Adelaide
The missing wall panel on the starboard side almost opposite the missing panel on the port side. The panel remaining above it is flexing heavily and will soon break off.
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12/7/2018


ex-HMAS Adelaide
Some of the loose wall panels which are littering some of the compartments on 01 deck
McLennans
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12/7/2018


ex-HMAS Adelaide
Another view of loose wall panels inside the compartments on 01 deck
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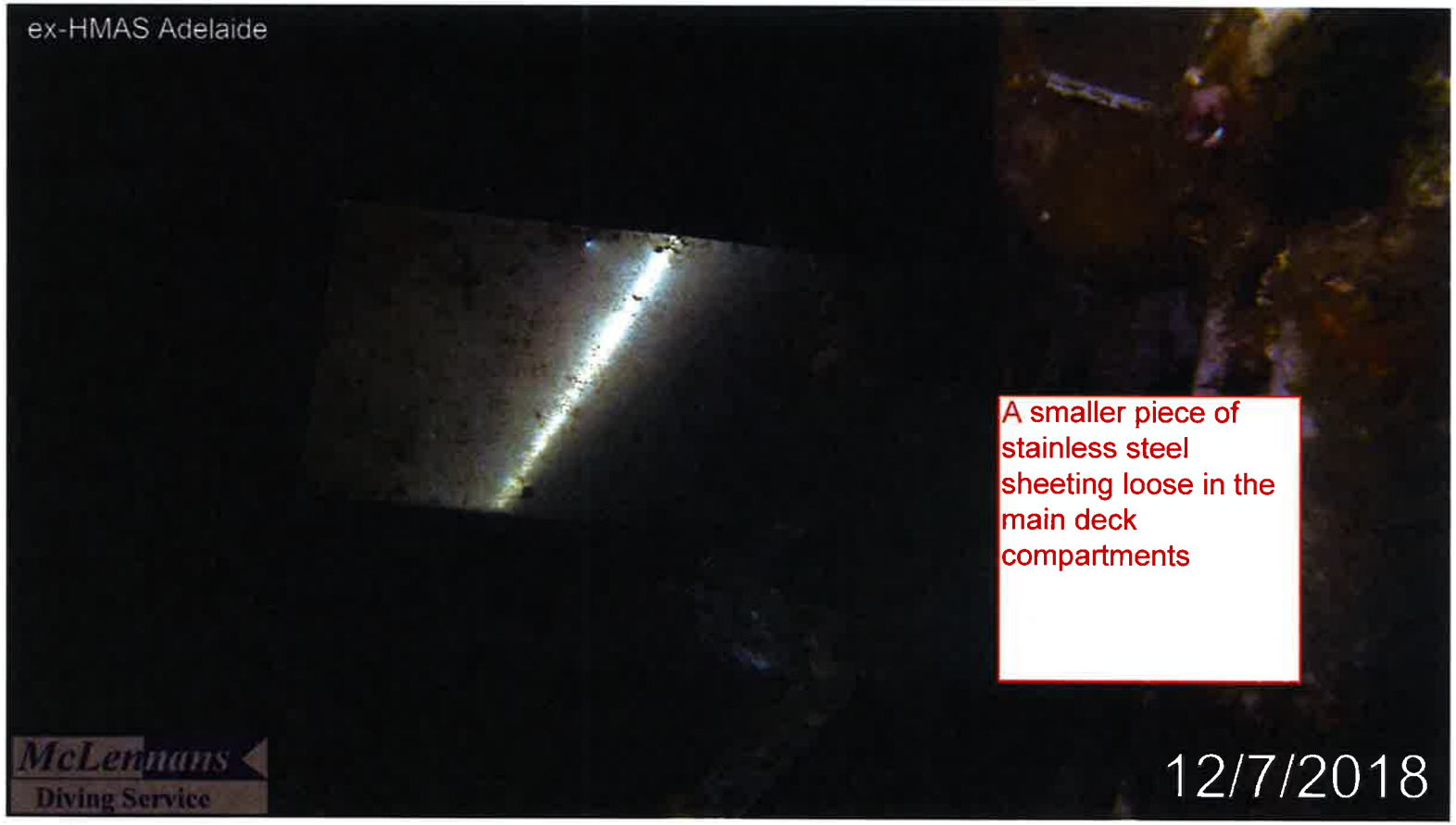
ex-HMAS Adelaide
A smaller piece of stainless steel sheeting loose in the main deck compartments
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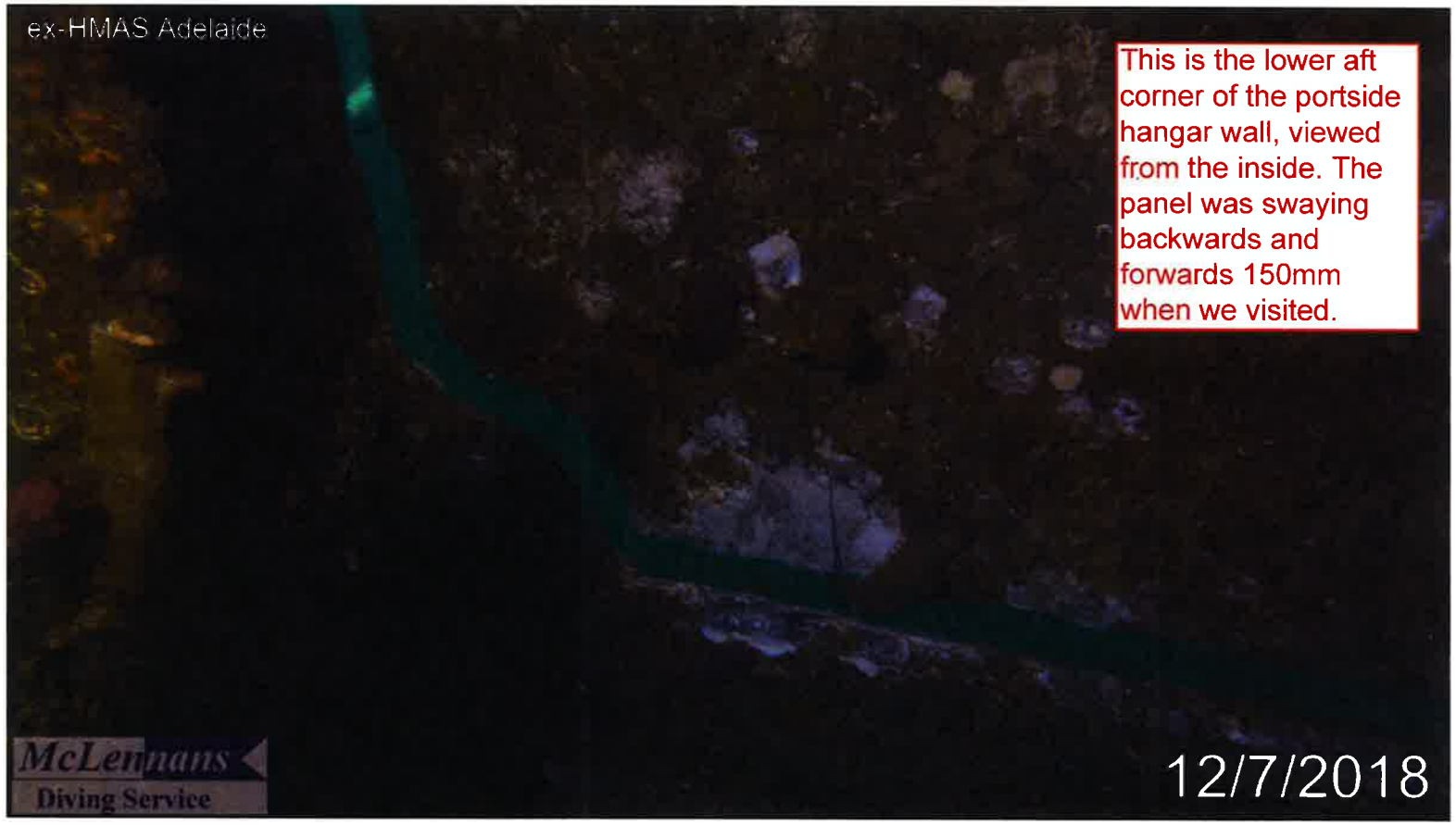
12/7/2018


ex-HMAS Adelaide
This is the lower aft corner of the portside hangar wall, viewed from the inside. The panel was swaying backwards and forwards 150mm when we visited.
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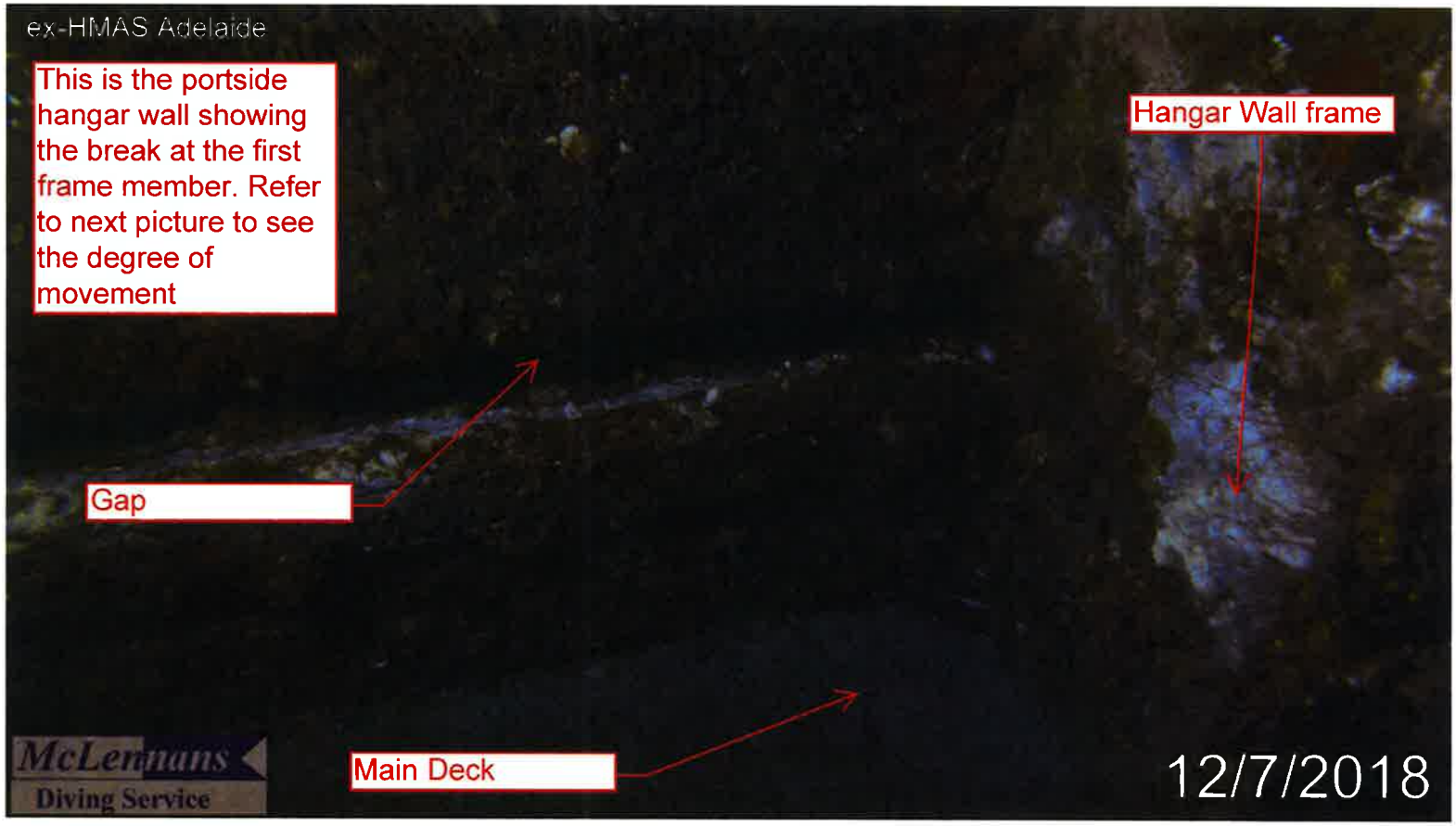
12/7/2018


ex-HMAS Adelaide
This is the portside hangar wall showing the break at the first frame member. Refer to next picture to see the degree of movement
Hangar Wall frame
Gap
Main Deck
McLennans
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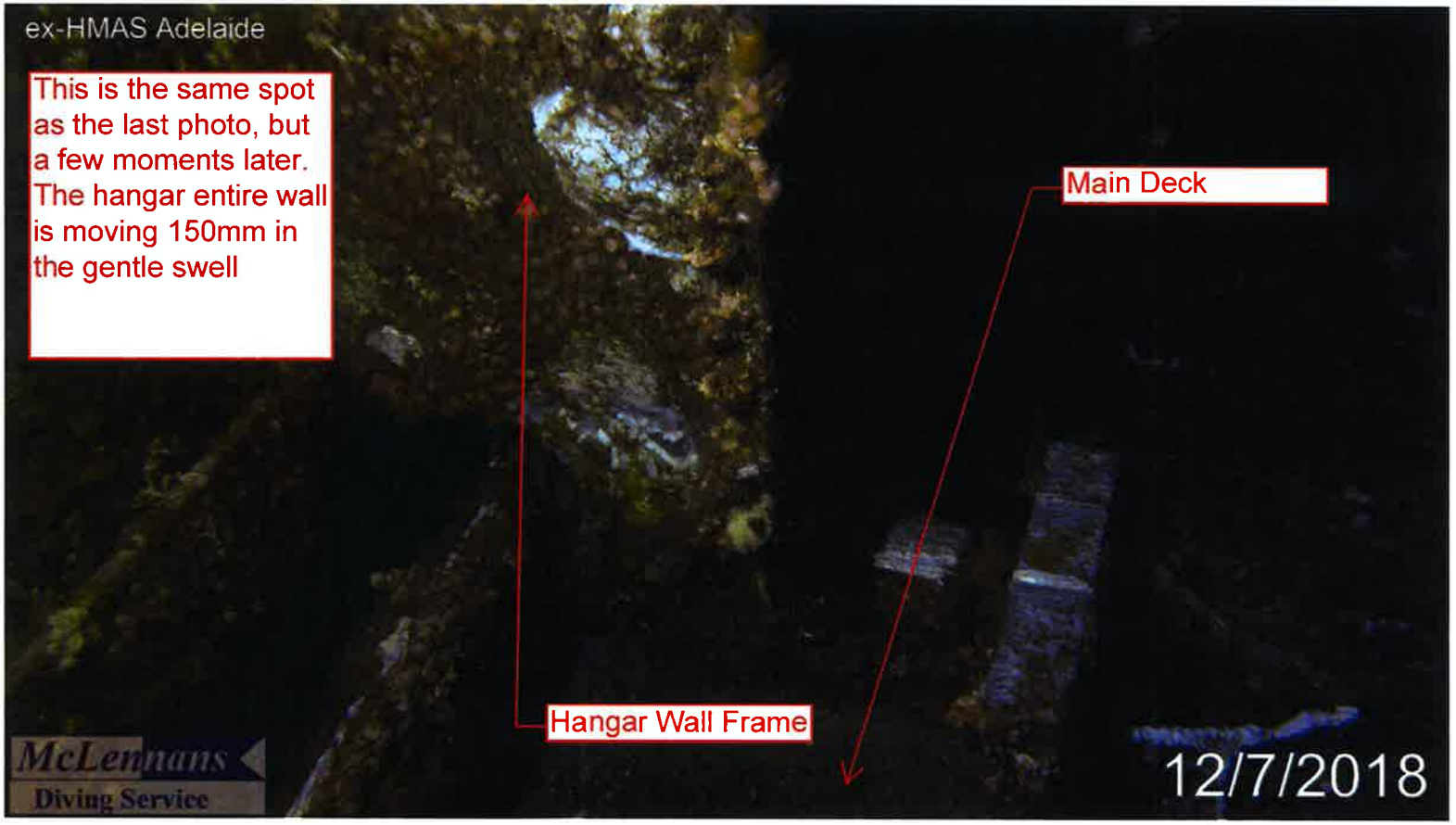
12/7/2018


ex-HMAS Adelaide
This is the same spot as the last photo, but a few moments later. The hangar entire wall is moving 150mm in the gentle swell
Main Deck
Hangar Wall Frame
McLennans
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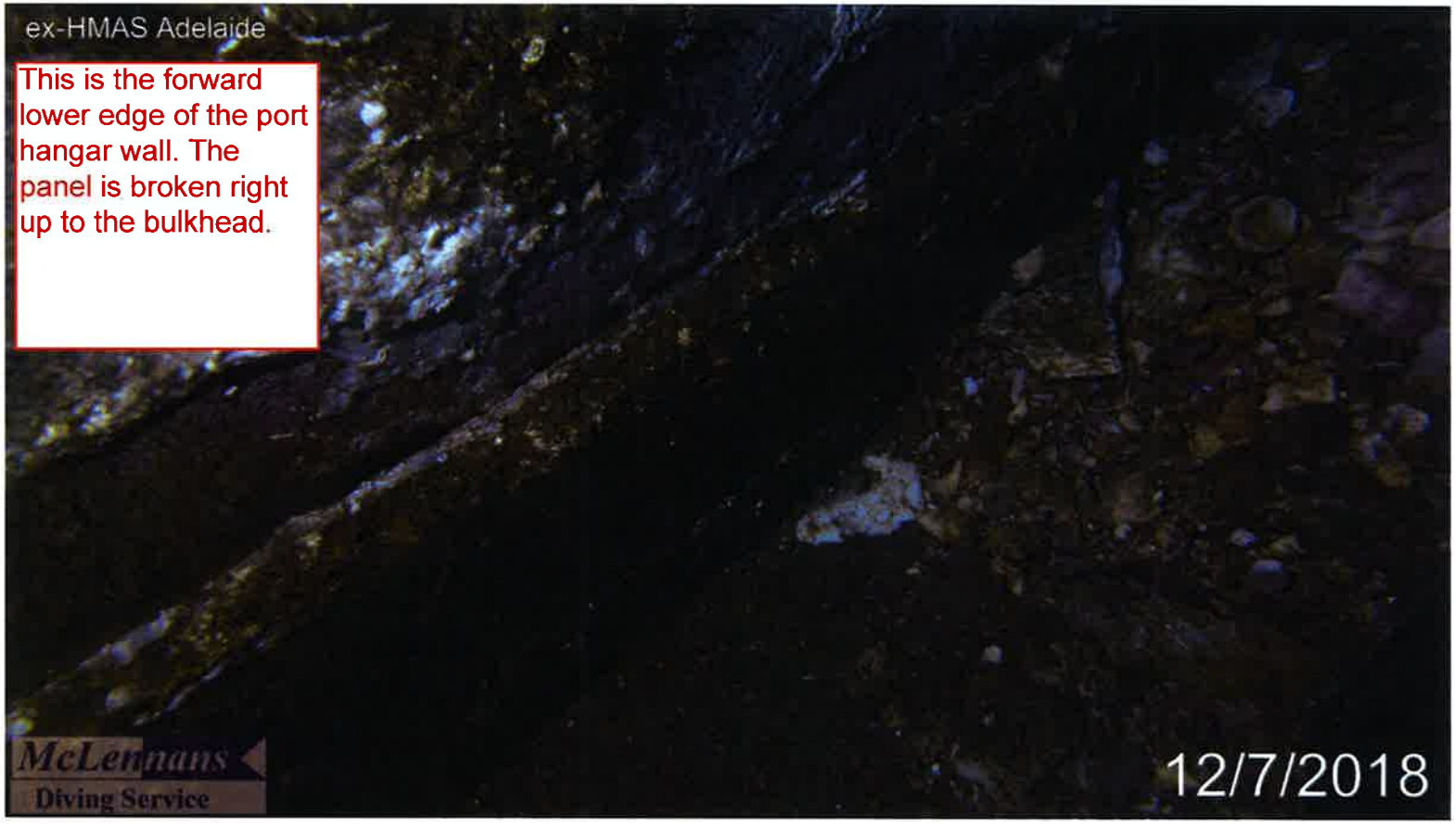
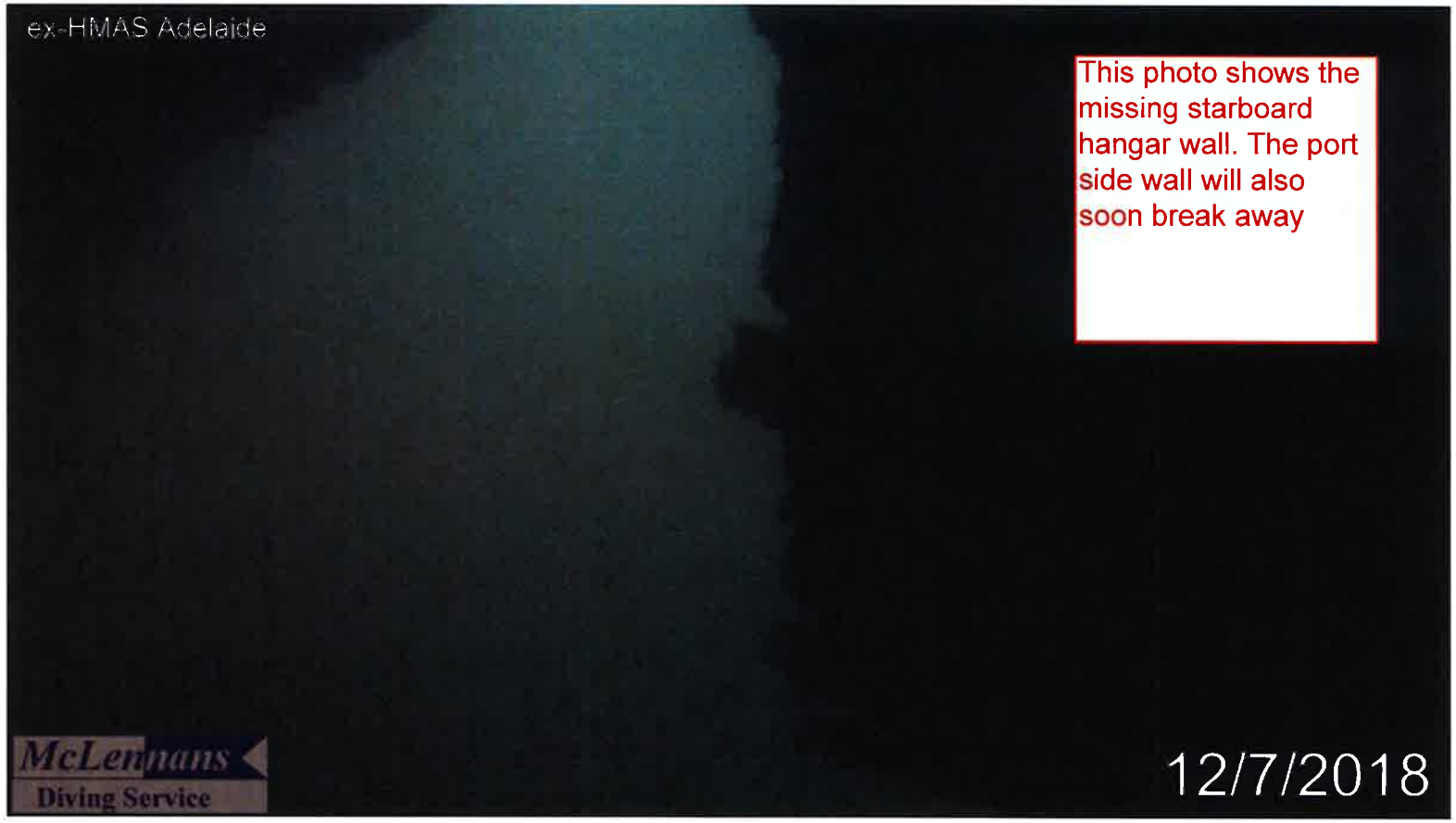
12/7/2018


ex-HMAS Adelaide
This is the forward lower edge of the port hangar wall. The panel is broken right up to the bulkhead.
McLennans
Diving Service
12/7/2018


ex-HMAS Adelaide
This photo shows the missing starboard hangar wall. The port side wall will also soon break away
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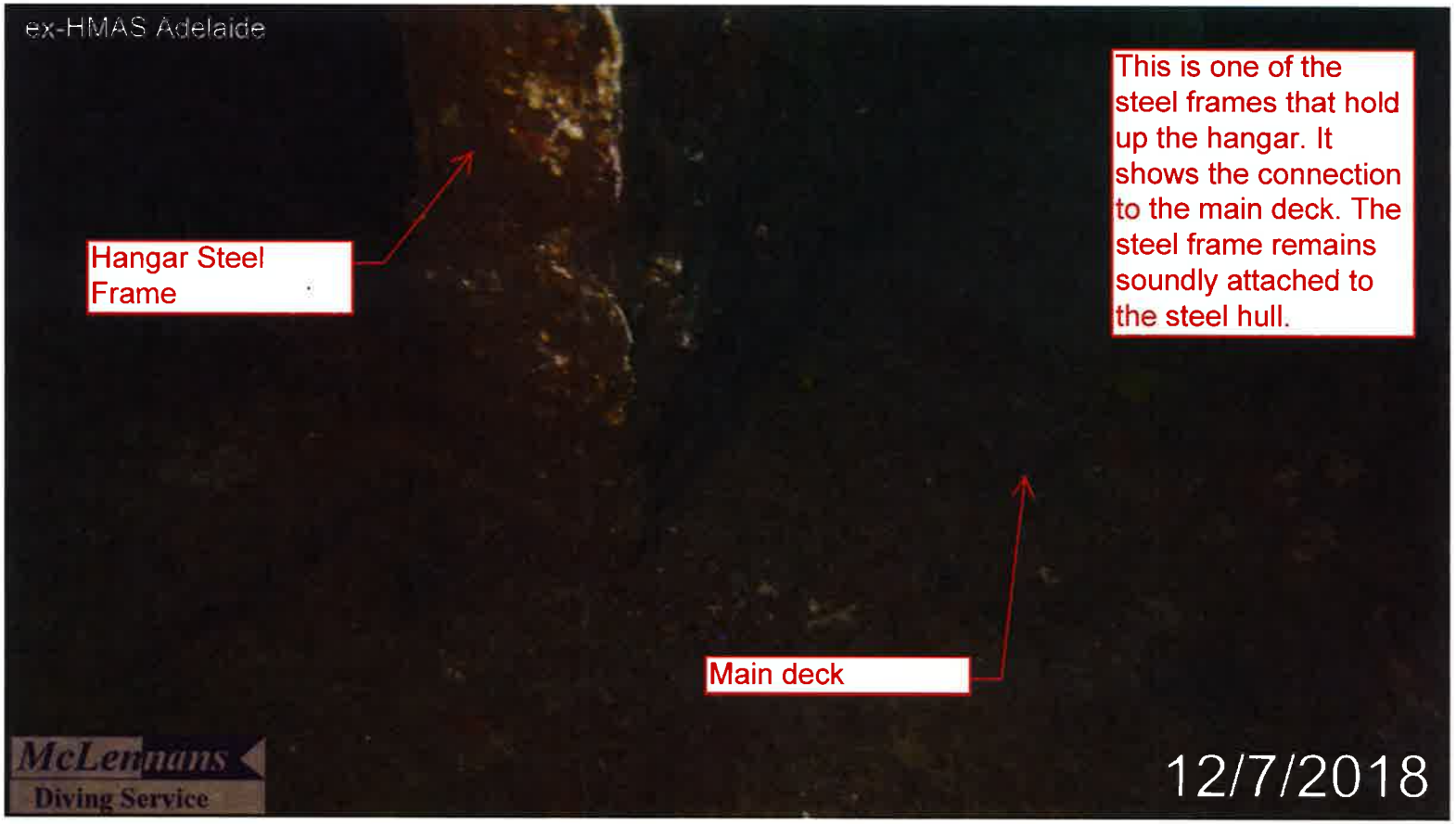
ex-HMAS Adelaide
Hangar Steel Frame
This is one of the steel frames that hold up the hangar. It shows the connection to the main deck. The steel frame remains soundly attached to the steel hull.
Main deck
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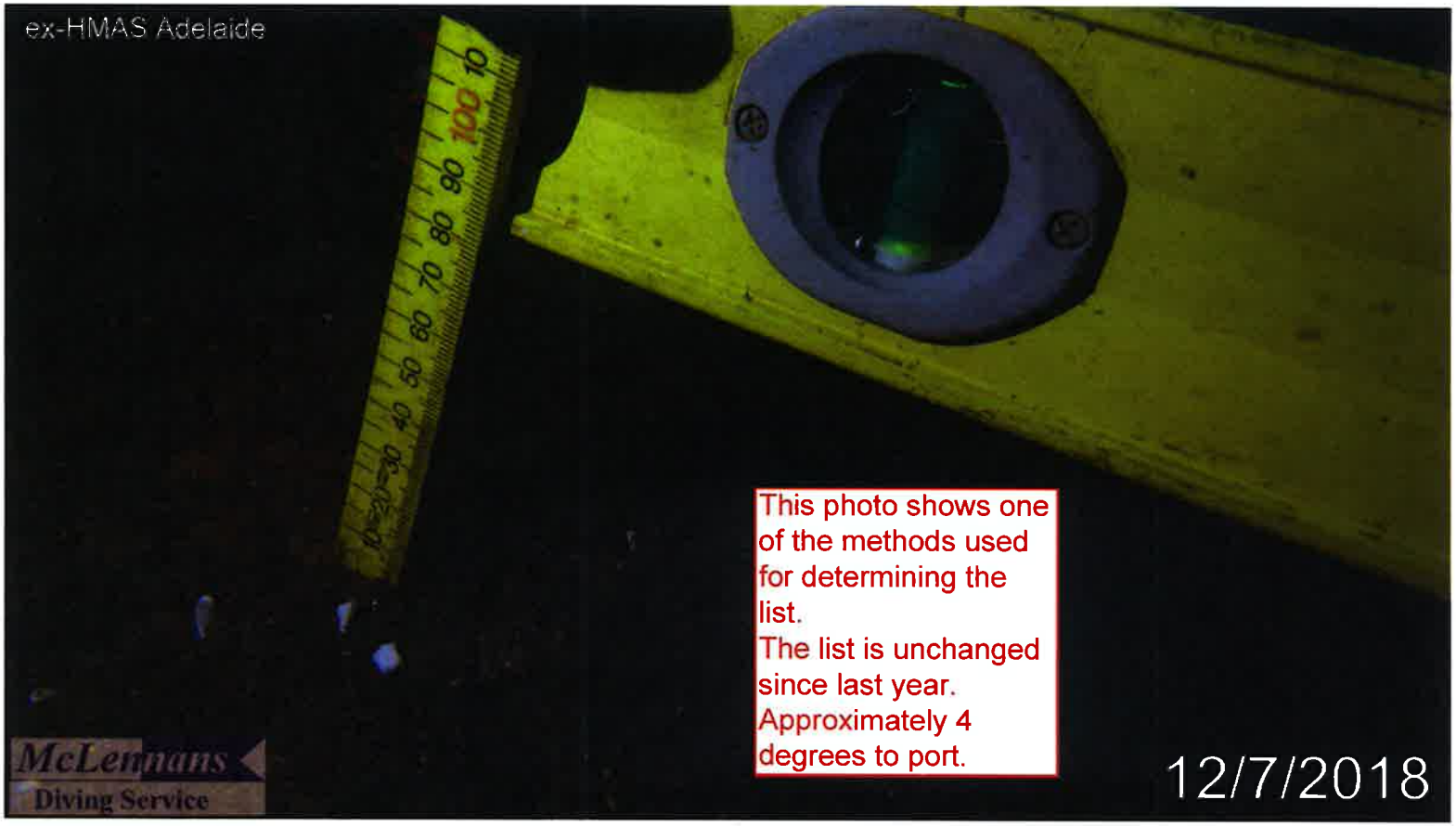
ex-HMAS Adelaide
This photo shows one of the methods used for determining the list.
The list is unchanged since last year.
Approximately 4 degrees to port.
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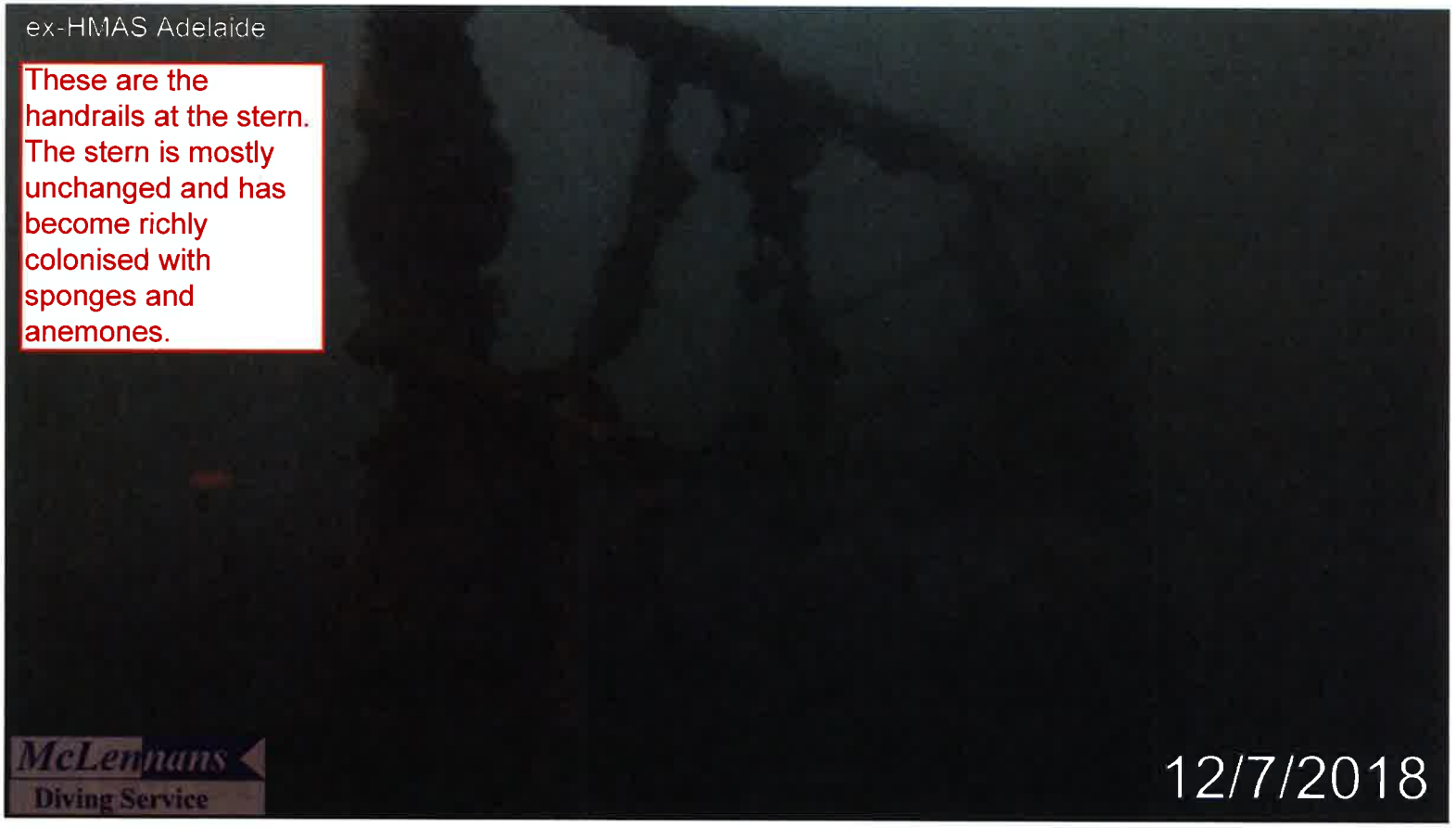
ex-HMAS Adelaide
These are the handrails at the stern. The stern is mostly unchanged and has become richly colonised with sponges and anemones.
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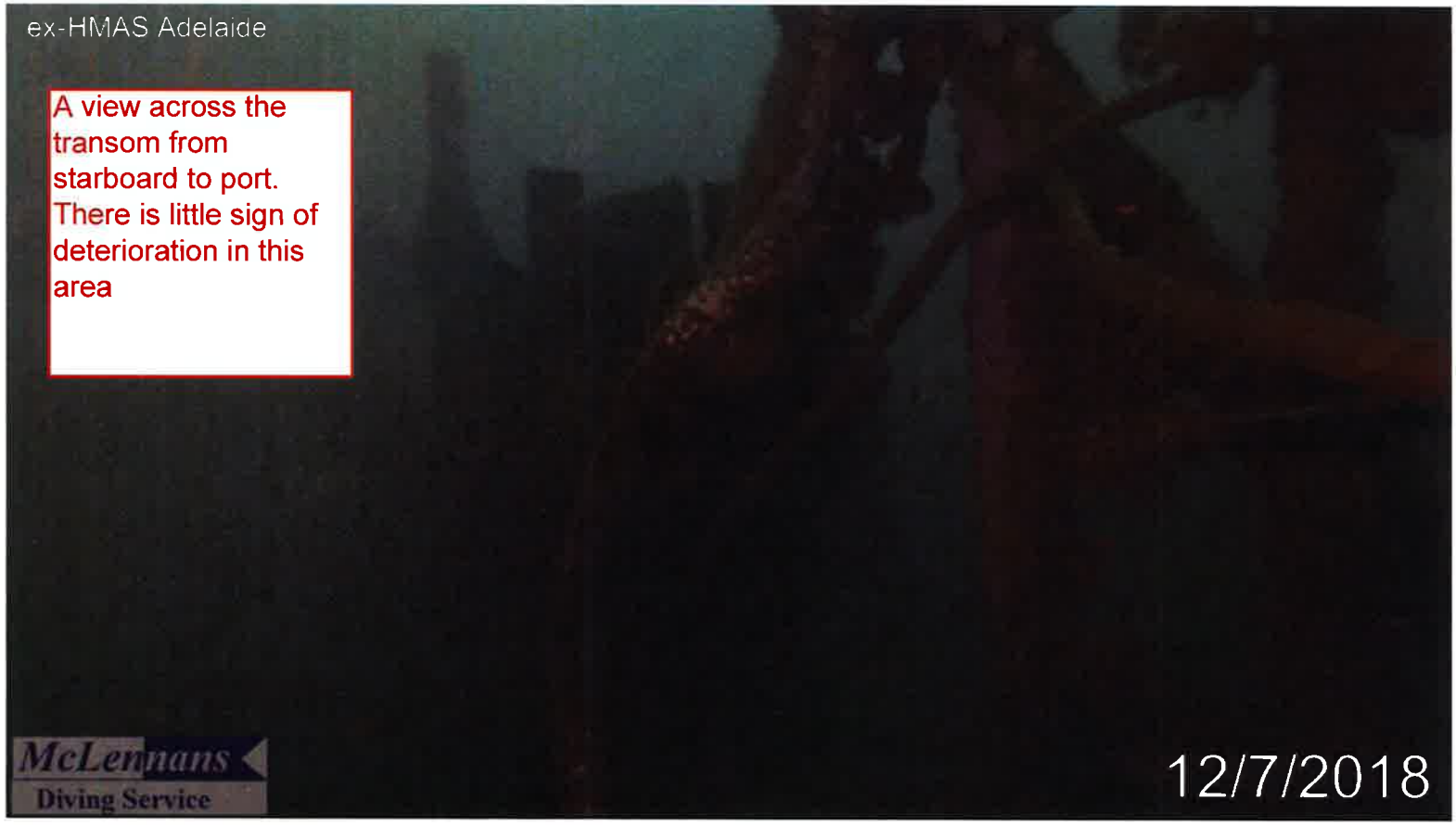
Diving Service
12/7/2018


ex-HMAS Adelaide
A view across the transom from starboard to port. There is little sign of deterioration in this area
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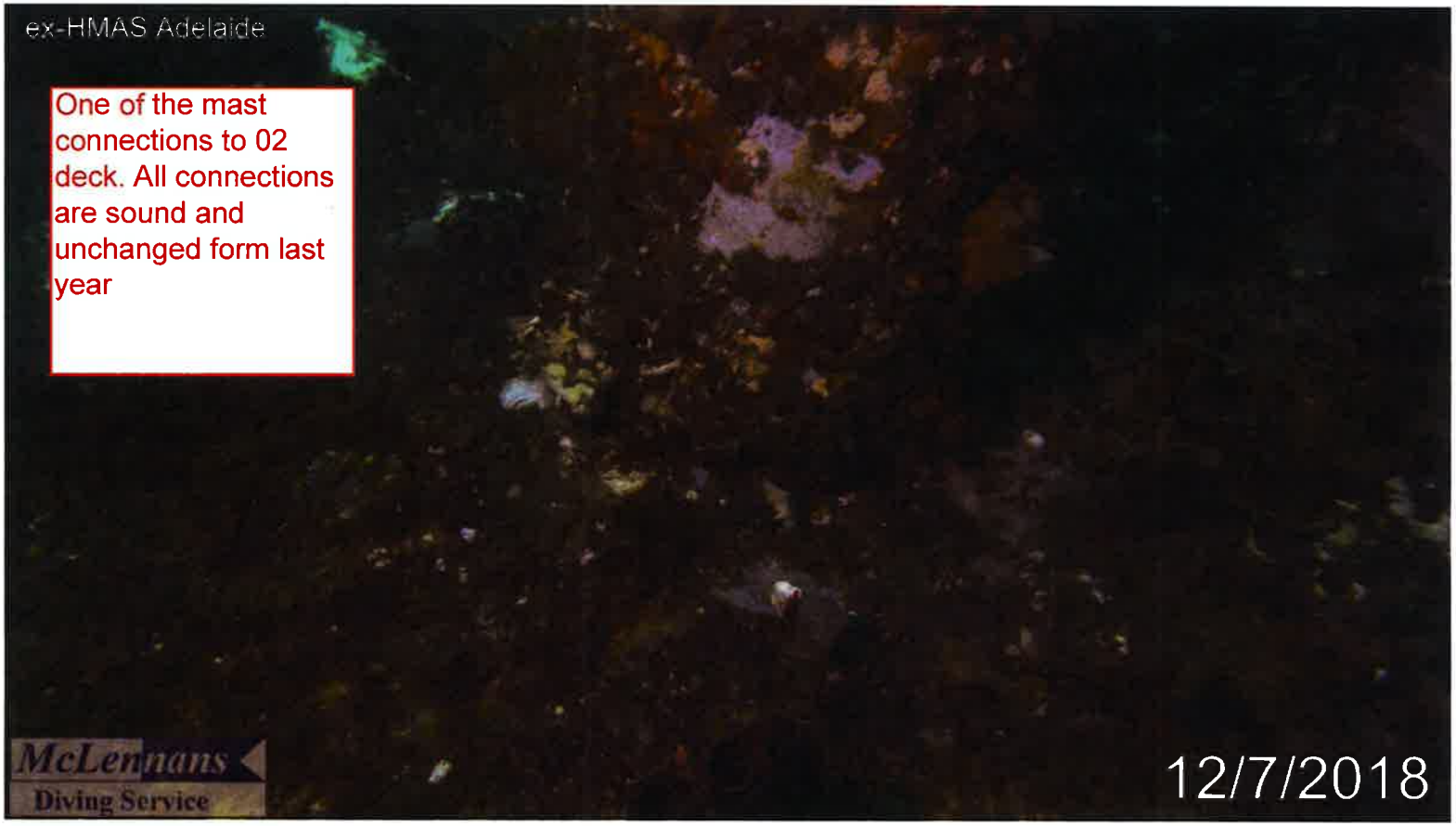
Diving Service
12/7/2018


ex-HMAS Adelaide
All mast components are intact and no sign of cracking or corrosion. The density and diversity of marine life on them has increased again from last year
McLennans
Diving Service
12/7/2018


ex-HMAS Adelaide
One of the mast connections to 02 deck. All connections are sound and unchanged form last year
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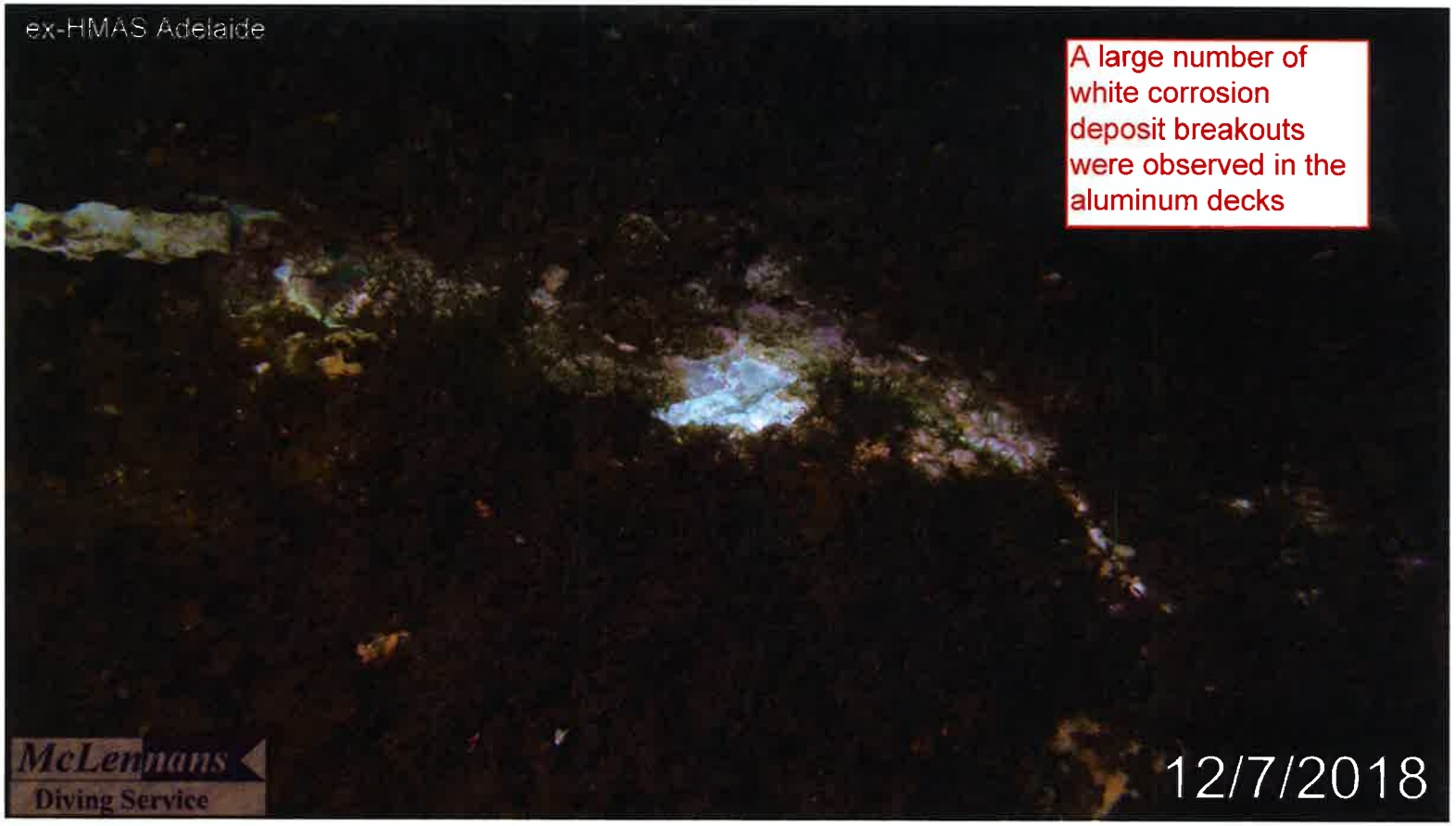
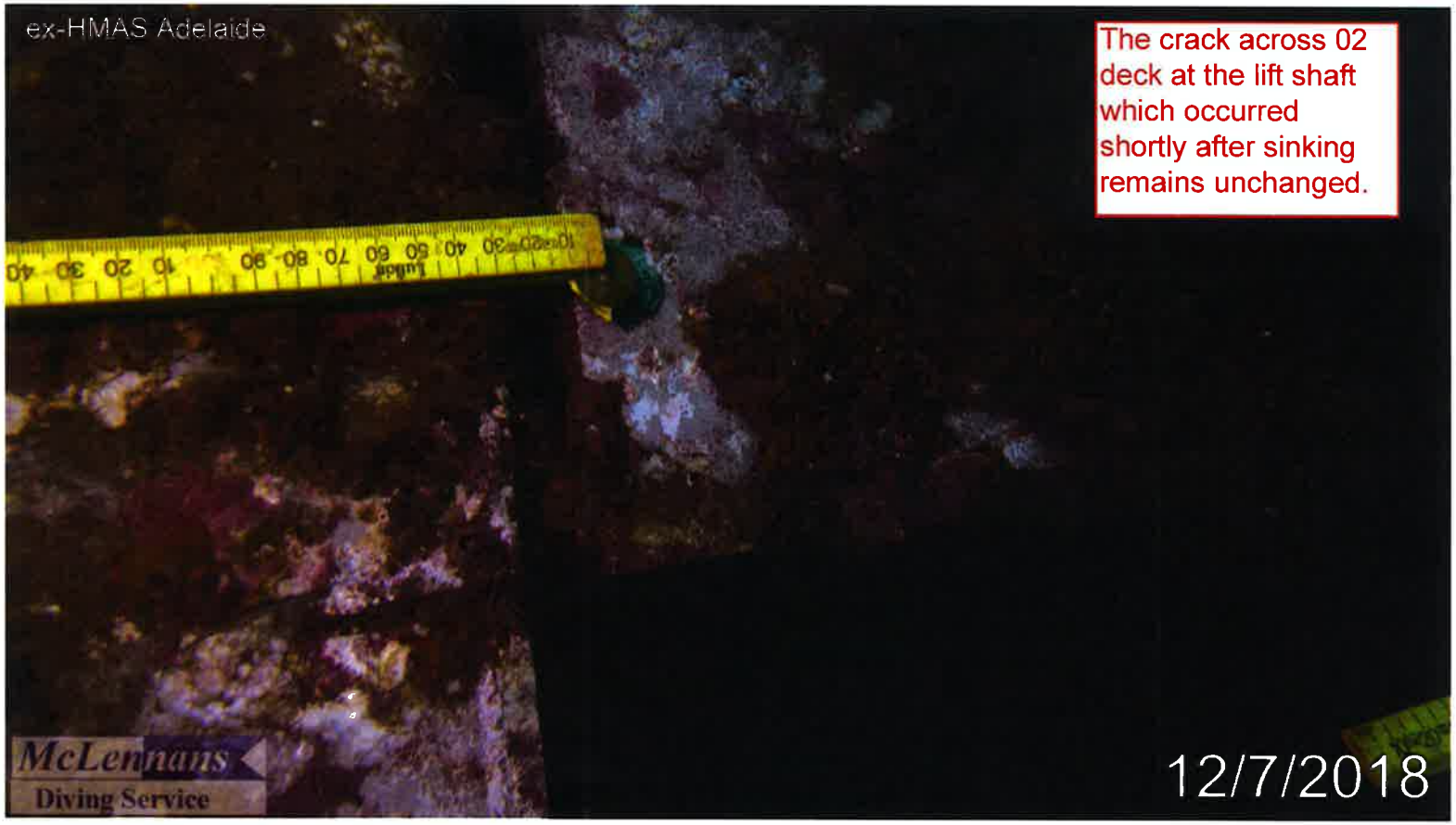
Diving Service
12/7/2018


ex-HMAS Adelaide
Looking up the main mast from 02 deck
McLennans
Diving Service
12/7/2018


ex-HMAS Adelaide
A large number of white corrosion deposit breakouts were observed in the aluminum decks
McLennans
Diving Service
12/7/2018

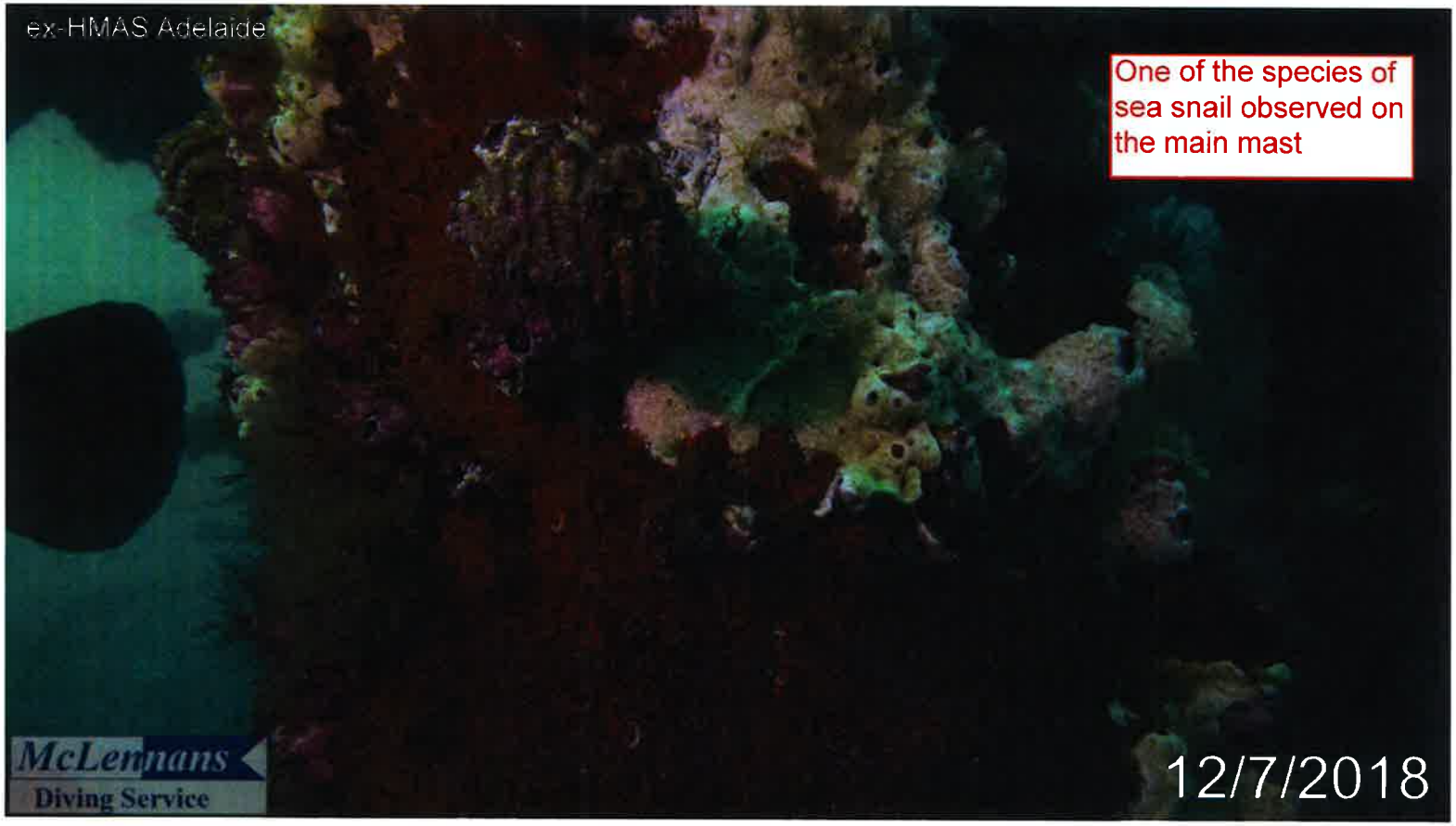

ex-HMAS Adelaide
The crack across 02 deck at the lift shaft which occurred shortly after sinking remains unchanged.
McLennans
Diving Service
12/7/2018


ex-HMAS Adelaide
The main deck around the GMLA launcher. there is no visible deterioration in this area.
McLennans
Diving Service
12/7/2018


ex-HMAS Adelaide
A second view of the GMLA launcher. Since last year the area has become colonised with sponges
McLennans
Diving Service
12/7/2018


ex-HMAS Adelaide
One of the many sponges near the GMLA launcher
McLennans
Diving Service
12/7/2018

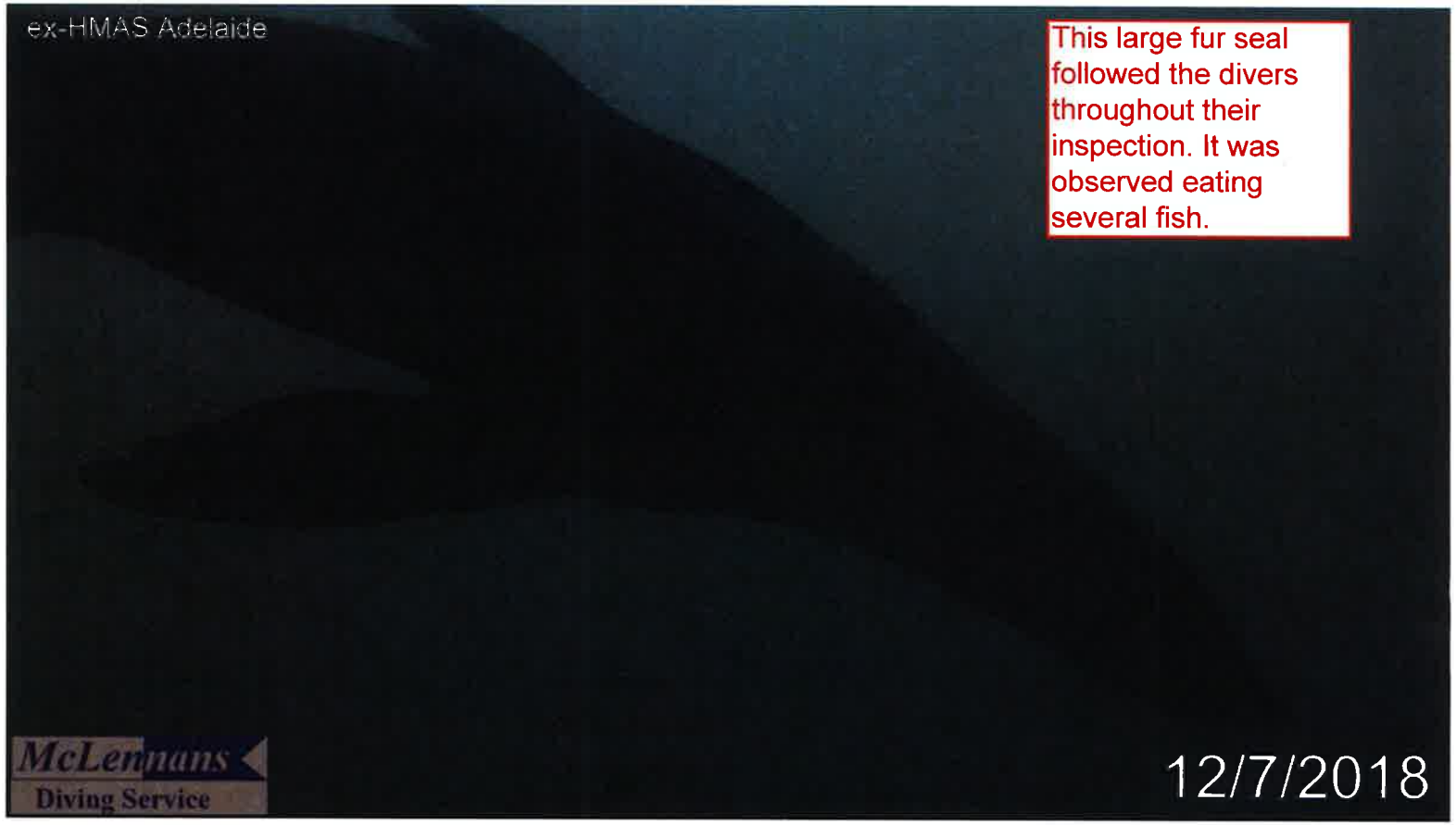

ex-HMAS Adelaide
The "Captains Chair" is still in place on the bridge but the coverings have gone leaving just the frame.
McLennans
Diving Service
12/7/2018


ex-HMAS Adelaide
One of the species of sea snail observed on the main mast
McLennans
Diving Service
12/7/2018

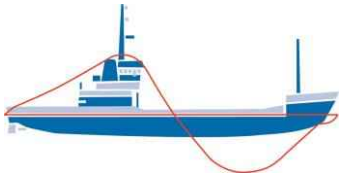

ex-HMAS Adelaide
a Volute shell grazing on the sponges at the transom
McLennans
Diving Service
12/7/2018


ex-HMAS Adelaide
The vessel has attracted more fish life than observed during previous inspections.
McLennans
Diving Service
12/7/2018


ex-HMAS Adelaide
Silver Trevally were present in dense schools on 02 deck
McLennans
Diving Service
12/7/2018


ex-HMAS Adelaide
This large fur seal followed the divers throughout their inspection. It was observed eating several fish.
McLennans
Diving Service
12/7/2018


ex-HMAS Adelaide
Sponges have become well established on the stern
McLennans
Diving Service
12/7/2018



Shearforce Maritime Services Pty Ltd

A.B.N. 63 108 496 751

Technical Report

Report No. SYD/2018/18

At the request of the NSW Department of Primary Industries - Lands, the undersigned prepared this report from information gained from a review of a report prepared on the 20th July 2018 by McLennan's Diving Service. This is following their underwater inspection on 12th July 2018, of the vessel Ex-HMAS Adelaide where she rests following the vessel's scuttling.

The vessel's details are:

Ship name:	Ex-HMAS Adelaide
Displacement Tonnage:	2954.90 tonnes
LBP:	407ft
Breadth Moulded:	47ft

1. Introduction

Ex-HMAS Adelaide is a former guided missile armed frigate de-commissioned from the Royal Australian Navy. The vessel was scuttled at a position off Avoca, New South Wales on 13th April 2011 to create an artificial reef for scuba diving.

An underwater inspection of the wreck is carried out annually. The latest inspection was carried out as mentioned above, in July 2018, by McLennan's Diving Service.

2. Report

From the diver's report the underwater inspection of the vessel found that the steel structure was substantially unchanged since the previous underwater inspection which was carried out 13th April 2017.

It is reported that during the inspection there was no sign of any cracking or deformation of the hull and deck and the steel hull and deck has built up a uniform coverage of marine growth. There are very few signs of new corrosion and the divers report the corrosion level appears to be very low.

The diver's report indicates that the hull is still fully supported by the sand. There was no scouring observed by the divers. The sonar dome was just visible above the sand at the bow and the sand level was very close to the ship's design waterline.

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The diver's report states that the aluminium superstructure has suffered from major deterioration in the last twelve months. During this inspection they observed wide spread cracking, corrosion breakouts, missing and loose panels, collapsed structures and partially blocked passage ways. The specific locations of the deterioration are:

1. the port side Helicopter Hangar plating,
2. the port side outer bulkhead plating on 01 deck,
3. the starboard side outer bulkhead plating on 01 deck,
4. the deck head panels on 02 deck and
5. aluminium panels were laying loose in the passageways.

In our report 23rd June 2015 it was noted that the starboard helicopter hanger side structure was damaged. The diver's report at the time noted that the edges of this damage had been covered up with marine growth, but most visitors would not notice that the plating is missing as It then appeared to be a normal opening in the wreck. The structural members that hold up the remaining bulkheads were still fully intact and appeared to be undamaged. The centre and port side hangar bulkheads were fully intact. The remaining hangar components appeared to be tolerating the ocean forces very well.

From the latest report it would appear the light aluminium plating is breaking away, but the main support structure is still intact.

The vessel developed a 4-degree list to port in 2012. The divers confirmed that this list remains unchanged.

3. Conclusion

It is my opinion that, the vessel is still structurally sound, and the vessel is stable. However, the light aluminium plating in way of the accommodation and hangers is continuing to deteriorate. It is my opinion that this deterioration will continue as the plating has broken away from its supports thus allowing it to move with the currents and the weather.

Therefore, from the information in the diver's report I consider there are no new factors that may affect recreational divers though the Dive Masters should take precautions when taking divers near the damaged structure.

4. Disclaimer

The under signed shall not be liable in any way to any person or company in respect to any claim for any kind, including claims for negligence, for loss occasioned to any person or company in consequence of any person or company acting or refraining from action as a result of material in this report.

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Signed,

L. H. Michaels
CEng. CMarEng, FIMarEST. MAIMS, MEngSc. Extra First Class Eng.
for Shearforce Maritime Services Pty. Ltd.
1st August 2018

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Ex-HMAS Adelaide Artificial Dive Reef

Revised Long Term Monitoring and Management Plan - 2017-2026

10 January 2018

8-14 Telford St
Newcastle East
NSW 2300

301015-03845 – Final V2

www.advisian.com

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WorleyParsons Group

Disclaimer

Project No: 301015-03845 – Ex-HMAS Adelaide Artificial Dive Reef : Revised Long Term Monitoring and Management Plan - 2017-2026

Rev	Description	Author	Review	Advisian Approval	Date
A	Issued for internal review	K Newton	H Houridis	H Houridis	3 Nov 2017
B	Draft 1 issued for client review	K Newton	Crown Lands	H Houridis	10 January 2018
C	Draft 2 issued for client review	K Newton	H Houridis / Crown Lands	H Houridis	18 Dec 2017
O	Final issued to client	K Newton		H Houridis	10 January 2018

Table of Contents

Table List

Figure List

Appendix List

Executive Summary

In 2009, the New South Wales (NSW) Government entered into a Deed of Gift arrangement with the Commonwealth of Australia for the Ex-HMAS Adelaide to be prepared and scuttled as an artificial reef and recreational dive site in Bulbararing Bay, offshore from Avoca Beach, NSW.

On 13th April 2011, the Ex-HMAS Adelaide was scuttled in front of an estimated 18,000 people. The final location of the vessel is approximately 1.4 km from Terrigal Headland and 1.9 km from Avoca Beach.

In accordance with the Sea Dumping Permit No. SD2008/1062, the Department of Industry (DoI) Crown Lands and Water was required to implement a Long Term Management and Monitoring Plan (LTMMP) for the artificial reef. The Plan was required to include structural and environmental monitoring components.

The Ex-HMAS Adelaide Long Term Monitoring and Management Plan (LTMMP) was developed in 2011 by WorleyParsons and all aspects of the plan have been implemented for the first five years post-scuttling. The results of studies and monitoring undertaken during the first five years post-scuttling have been reviewed and are summarised.

The Revised LTMMP (2017) takes into account the results of all monitoring undertaken to date and the recommendations made following first five years of post-scuttling monitoring. The LTMMP has been revised where appropriate to meet the requirements of Condition 26 of Sea Dumping Permit SD2008/1062. The Revised LTMMP covers monitoring requirements for the next 10 years (i.e. the period from six to 15 years post-scuttling; 2017-2026).

Key changes to the LTMMP for future monitoring along with a revised monitoring schedule for implementation over the next ten years are provided.

1 Introduction

1.1 Background

In 2009, the New South Wales (NSW) Government entered into a Deed of Gift arrangement with the Commonwealth of Australia for the Ex-HMAS Adelaide to be prepared and scuttled as an artificial reef and recreational dive site in Bulbararing Bay, approximately 1.87 km offshore from Avoca Beach, NSW.

The HMAS Adelaide was a long-range escort frigate with roles including air defence, anti-submarine warfare, surveillance, reconnaissance and interdiction. Built in the United States, HMAS Adelaide was commissioned in November 1980 and was the first of six Adelaide class guided missile frigates to be delivered to the Royal Australian Navy. The vessel's hull is constructed of steel and the superstructure is aluminium alloy. Antifouling was last applied to the hull of the vessel in 2003 and the product used did not contain tributyltin (TBT).

The vessel was prepared for scuttling by McMahon Services Australia in Sydney. Preparation included the removal (as far as practicable) of the following items and/or items containing the following substances:

- Polychlorinated biphenyls (PCB's)
- Chlorofluorocarbons (CFC's) (and other refrigerant chemicals)
- Hydrocarbons
- Plastics
- High pressure cylinders (removed or degassed)
- Loose items and fittings
- Items not expected to survive the scuttling event or that would degrade rapidly
- General rubbish
- Heavy metals such as lead, mercury, copper and zinc

The vessel was also prepared for use as a recreational dive site with dozens of additional access holes cut into the hull on the horizontal and vertical surfaces. Most fixtures along with non-structural bulkheads were removed to allow more room for divers to pass through the vessel safely. Some areas of the vessel were made inaccessible to divers (e.g. tanks and small void spaces), also for safety reasons. These areas either had their hatches removed or steel bars welded across their openings (to prevent diver entry) or the hatch was welded shut and the opening mechanism purposely damaged to prevent reopening.

Following an application by the No Ship Action Group (a community group against the proposed scuttling of the Ex-HMAS Adelaide) in 2010, the Administrative Appeals Tribunal reviewed the Decision of the Department of Environment and Energy (DoEE) (then the Department of Water, Heritage and the Arts; DEWHA) to issue Sea Dumping Permit No. SD2008/1062 under the *Environment Protection (Sea Dumping) Act* 1981. A copy of Sea Dumping Permit No. SD2008/1062

is provided in **Appendix A**. The Tribunal delivered its decision on 15th September 2010 adding extra permit conditions requiring the ship to be cleaned of "*all remaining wiring, including junction boxes, which might be associated with PCB's*", cleaned of "*all canvas and insulation*" and cleaned of "*all exfoliating and/or exfoliated red lead paint*". The additional preparation work to comply with these conditions was undertaken between October 2010 and March 2011.

In accordance with the Sea Dumping Permit No. SD2008/1062, the Department of Industry (DoI) Crown Lands and Water was also required to implement a Long Term Management and Monitoring Plan (LTMMP) for the artificial reef. The Plan was required to include structural and environmental monitoring components, as outlined in Section 1.2 and 2.

The original LTMMP was developed by WorleyParsons in 2011 and has been updated in the Revised LTMMP (2017) (current Plan) as per Condition 26 of the Sea Dumping Permit: *"A review of the LTMMP must be undertaken within five years of scuttling with the revised version submitted to the minister for approval. A revised LTMMP must not be implemented until it is approved by the Minister. If the Minister approves a revised LTMMP pursuant to this condition, the LPMA must implement that LTMMP instead of the LTMMP as originally approved".*

On 13th April 2011, the Ex-HMAS Adelaide was scuttled in front of an estimated 18,000 people. The final location of the vessel is approximately 1.4 km from Terrigal Headland and 1.9 km from Avoca Beach (Figure 1-1). Table 1-1 provides the scuttling co-ordinates for the ship.

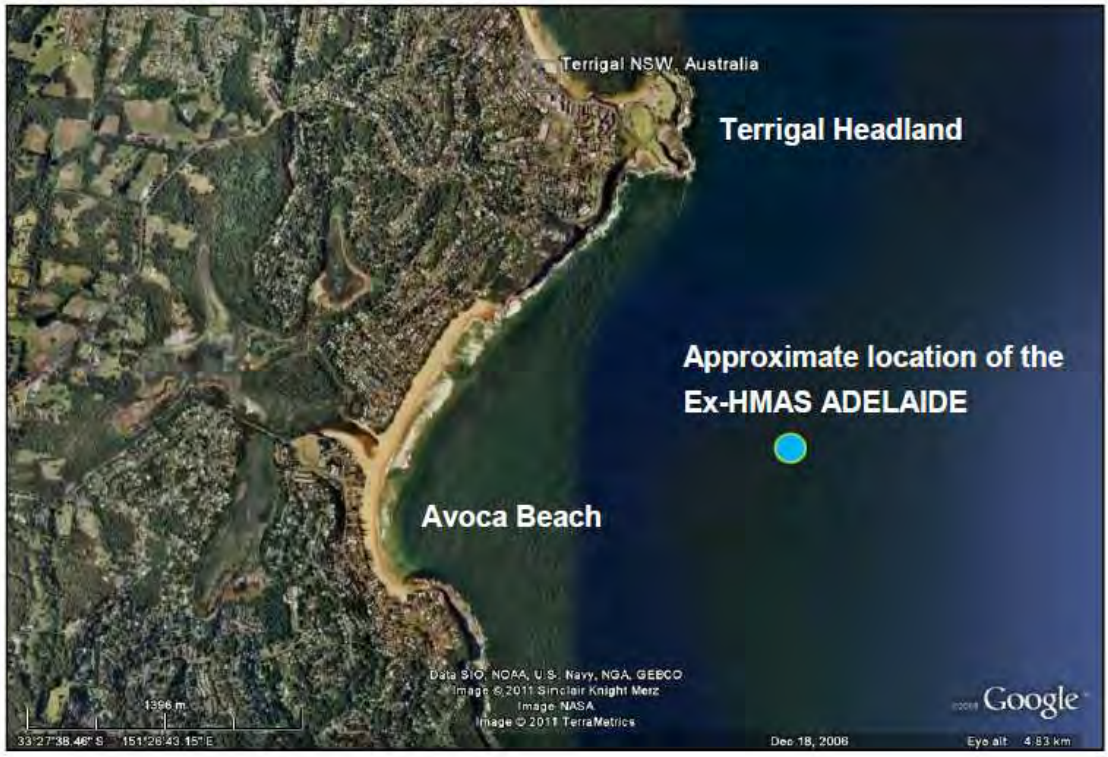


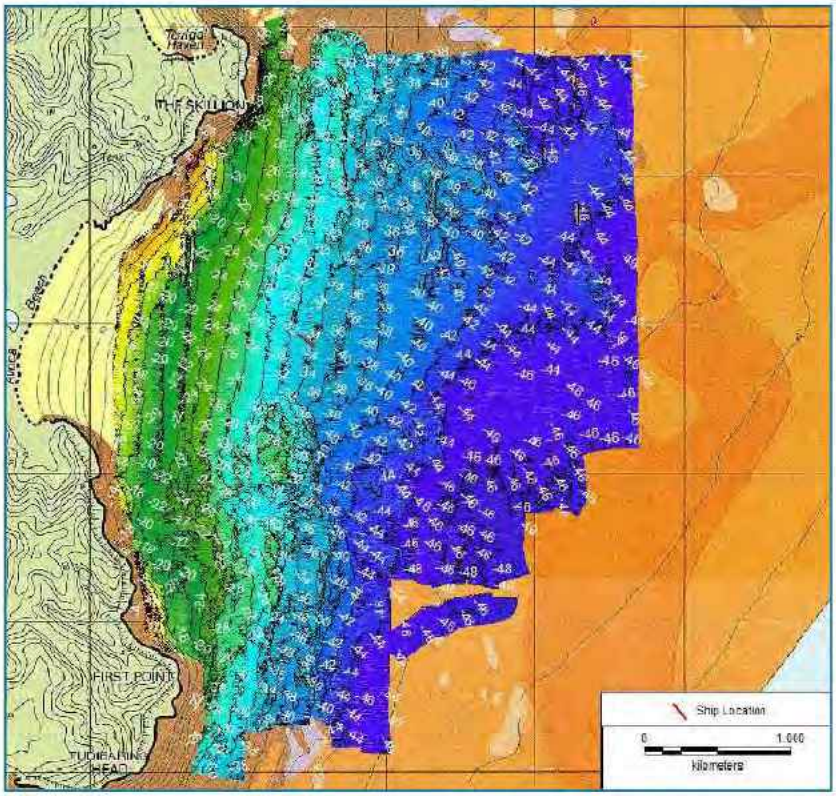
Figure 1-1 Location of the Ex-HMAS Adelaide dive reef.

Table 1-1 Co-ordinates of the scuttling location for the Ex-HMAS Adelaide.

Latitude / Longitude	Northing / Easting (MGA 94)
Latitude (south): 33°27.91'	Northing (MGA 94): 6,296,076.969
Longitude (east): 151°27.38'	Easting (MGA 94): 356,551.686

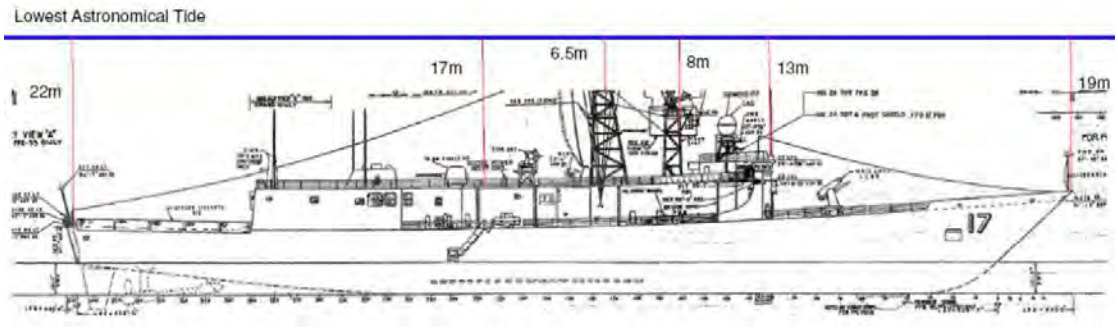
After site selection studies were completed it was determined that the vessel would be scuttled with an ESE orientation (112°), so that the bow would be facing into the general direction of the largest waves (coming from the SE, ESE and S). As sunk, the vessel is oriented at 116° and is generally upright (immediately after scuttling the vessel had a small list of 2.5 degrees to port (personal communication with DoI Crown Lands and Water in 2011)).

The final scuttling site is in 32 m of water at Lowest Astronomical Tide (LAT) and after scuttling, the depth of water over the main mast is 8.02 m LAT (personal communication with DoI Crown Lands and Water in 2011). The substrate on which the Ex-HMAS Adelaide rests is reasonably flat and sandy, with at least 6 m of sand overlaying bedrock as anticipated (Figure 1-2). Approximate depths to various levels on the ship are shown in Figure 1-3.



Note: depths relative to Australian Height Datum (AHD) (approximately 0.93m above LAT). Source: multibeam hydrographic survey data (DECC 2008) overlain on digitised NSW Public Works Department (PWD) survey (1m contours) (1984-1989).

Figure 1-2 Bathymetry in the vicinity of the scuttling site.



Note: depths in relation to Lowest Astronomical Tide (LAT) do not take into account settlement which is expected to be 0.5 m initially and approximately 2 m in the longer term.

Figure 1-3 Approximate depth to the Ex-HMAS Adelaide dive reef.

The dive reef has been operational since May 2011, following post-scuttling safety inspections of the vessel undertaken by McLennans Diving Service.

1.2 Purpose

The purpose of the Ex-HMAS Adelaide LTMMP is to provide for the post-scuttling management and monitoring (structural and environmental) of the Ex-HMAS Adelaide as an artificial reef for recreational diving, pursuant to the requirements of the *Environment Protection (Sea Dumping) Act* 1981. The focus of the vessel monitoring is to inform management actions and contingency measures to minimise potential risks to the uses of the artificial dive reef and also to the environment.

The original LTMMP (WorleyParsons 2011) addressed the monitoring requirements and methods for the vessel for the first five years post-scuttling, and forms the basis for ongoing monitoring and maintenance over the operational life of the vessel (taken to be 40 years). The original LTMMP includes schedules and methodologies for structural and environmental monitoring requirements as listed below:

1. Monitoring of Structural Integrity, Stability and Position.
2. Environmental Monitoring:
    - Sediment Quality Surveys
    - Bioaccumulation Surveys
    - Reef Community Surveys

There are a number of Plans which are independent of the LTMMP which relate to the Ex-HMAS Adelaide dive reef:

1. The *Scuttling Management Plan* (McMahon Services Australia 2010) provided a contingency plan in the event that a major storm was forecast on or around the proposed scuttling date, if the vessel did not rest upright on scuttling or if the vessel suffered damage during scuttling. The *Scuttling Management Plan* also includes repair work and checking of dive routes to assess whether other works are required to maintain safe diver ingress and egress.

2. The *Ex-HMAS Adelaide Asset Management Plan* (Capability by Design 2010) includes additional detail on management actions and contingency measures associated with structural monitoring, including repair work, if a problem is detected during the normal operational life of the vessel as a dive site (i.e. taken to be 40 years).

Condition 26 of the Sea Dumping Permit requires that a review of the Ex-HMAS Adelaide LTMMP is undertaken within the first five years post-scuttling as outlined previously. Following a review of the results of the first five years of monitoring for structural and environmental components (see summary in Section 3), the schedules and methods for these monitoring components going forward have been revised, the details of which are included in Section 4. The Revised LTMMP covers the period from six to 15 years post-scuttling inclusive (i.e. a 10 year period).

1.3 Responsible Parties

The Ex-HMAS Adelaide is located within a Crown Reserve (the Ex-HMAS Adelaide Reserve) which was gazetted for purpose on 20th June 2008 under the provisions of the NSW *Crown Lands Act* 1989. DoI Crown Lands and Water has responsibility for the administration and management of all Crown Land in NSW, including the seabed out to the 3 nautical mile (nm) limit of State waters (i.e. they are responsible for the seabed in which the Ex-HMAS Adelaide rests).

The Crown Lands Reserve Trust (CLRT) was appointed as the Trust Manager. The Trust is administered by the Lands Administration Ministerial Corporation (a statutory body representing the Crown) which has overall management responsibility of the reef, including implementation of the LTMMP.

Ongoing reporting associated with the LTMMP is required to include a description of the methodology, observations (e.g. material deterioration), any remedial works which may be required and the required timing of these works (e.g. urgent, routine). Responsibility for the ongoing implementation and reporting in accordance with the LTMMP ultimately rests with DoI Crown Lands and Water.

1.4 Goals and Objectives

The overall goal of the Ex-HMAS Adelaide artificial dive reef is to provide a world class recreational dive attraction which provides benefits to the local NSW Central Coast economy.

In relation to the artificial dive reef, the objectives are to:

- Provide a wreck which is maintained to ensure diver safety while retaining a quality diving experience;
- Provide an artificial reef that continues to remain stable and maintains its structural integrity;
- Enhance local marine biodiversity in the area and provide marine research opportunities;
- Minimise the debris field during degradation of the vessel; and
- Examine how the vessel is influencing / impacting on the surrounding marine environment and vice versa.

Section 2 of this Revised LTMMP provides the scope and rationale for all LTMMP monitoring components along with management criteria and mitigation measures, and requirements for reporting and personnel.

Section 3 (and Appendix E) of this Revised LTMMP summarises the results and recommendations of the first five years of monitoring.

Section 4 of this Revised LTMMP outlines the key changes to the LTMMP and revised monitoring schedules for the next ten years based on results and recommendations from the first five years of monitoring.

Section 5 of this Revised LTMMP provides additional information on the requirements for maintenance of dive moorings and marker buoys.

2 LTMMP Scope

The Revised LTMMP includes structural and environmental monitoring components. The scope and rationale for these are outlined below. Detailed methods for each monitoring component can be found in the original Ex-HMAS Adelaide LTMMP (WorleyParsons 2011).

2.1 Monitoring of Structural Integrity, Stability and Position

2.1.1 Structural Integrity

The rationale for investigating the structural integrity of the Ex-HMAS ADELAIDE is to ensure that the vessel remains intact and is not showing signs of significant corrosion and weathering due to major storm events and that the vessel is suitable for on-going use as a recreational dive site.

For the purpose of this plan, a major storm event is defined as when the Bureau of Meteorology (BoM) has issued a Severe Weather Warning for Damaging Waves. This essentially means when onshore waves in the surf zone are expected to reach at least 5 m, generally within the next 24 hours.

The Bureau of Meteorology (BoM) website defines an East Coast Low (ECL) as *'intense low-pressure systems which occur on average several times each year off the eastern coast of Australia, in particular southern Queensland, NSW and eastern Victoria. Although they can occur at any time of the year, they are more common during autumn and winter with a maximum frequency in June. East Coast Lows will often intensify rapidly overnight making them one of the more dangerous weather systems to affect the NSW coast.'* The Bureau of Meteorology has a detailed database of these ECLs beginning in 1973, and advises that *'Each year there are about ten "significant impact" maritime lows. 'Generally, only once per year do we see "explosive" development. Looking at all the ECL between 1973 & 2004, there is no evidence of a trend.'* A more detailed description of weather patterns is covered in Section 5.6 Coastal Storms and Wave Climate of the Ex-HMAS Adelaide Artificial Reef Review of Environmental Factors (Worley Parsons, December 2009).

Within one week following a major storm event, inspections will be undertaken to identify and report on:

- debris requiring removal from within and surrounding the vessel;
- levels of corrosion;
- blocked or impeded diver entry and access points;
- access to areas designed to have no diver access; and
- structural damage or failure.

A general assessment of structural integrity will be undertaken by annual visual inspections and visual inspections immediately following major storm events (before diving is permitted to recommence). Where the weather permits, inspections will be undertaken within 7 days. The assessment will be undertaken under the direction of a qualified maritime structural engineer or naval architect.

Annual monitoring will be carried out for vessel components (barred off areas, lockers, bunks, masts etc) and a number of specified monitoring points along principal stress flow paths and where structural weaknesses were observed/ repairs were carried out when the HMAS ADELAIDE was in service. The registers of "Barred Off Items" and "Rapid Deterioration Items" referred to in the original Plan are included in **Appendix B** and **Appendix C** respectively. Ships drawings showing the location and photographs that identify each of these monitored items are enclosed on CD-ROM at **Appendix D**.

The locations of the monitoring points are as follows:

- Location 1 - the hull plating on the forecastle just aft of where the GMLS launcher was removed
- Location 2 - midships at the base of the forward screen (where the superstructure and hull are bonded together)
- Location 3 – at the vertical midpoint of the main mast Location 4 - where the main mast attaches to 02Deck Location 5 - the hull plating on the transom
- Location 6 – where the helicopter hangars are attached to the hull

As the aluminium superstructure will provide anodic protection to the steel hull, divers will photograph and record areas where pitting is occurring and take measurements using an ultrasonic thickness tester. Where pitting becomes severe, or there is other damage due to storm waves, demolition works will be undertaken to mitigate the risk to divers (based on stability modelling, it is not anticipated that the entire vessel would become unsafe for diving following a major storm within the initial period of the LTMMP). Where possible (and where this will not pose a risk to divers), structures/ components will be left on the ship, for example, if it is necessary to remove a portion of the mast it will be placed (or secured) on the deck to give the impression that it has fallen naturally, thus maintaining interest for divers.

AS 4997-2005 Guidelines for the design of marine structures specifies a corrosion allowance for untreated steel of 0.05mm/year for permanently submerged structures in sea water within the temperate zones (south of 30^{o}S). Note that the hull will still be protected by protective paint systems until they begin to breakdown (MacLeod et al 2004 noted that protective coatings were still providing considerable protection to the Ex-HMAS SWAN four years after scuttling).

In addition to scheduled monitoring, dive tour operators and others visiting the vessel will be required to report any structural issues to the DoI – Crown Lands and Water under the terms of the

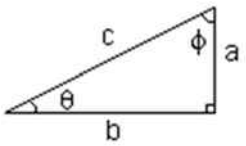
Permit / 'Code of Conduct' to dive on the wreck.

2.1.2 Vessel Stability

The rationale for investigating vessel stability is to ensure that the vessel remains stable on the seabed and is not inclining beyond acceptable limits that may result in blocked diver access holes or disorientation.

The stability of the vessel on the seabed will be examined by calculating the angle of incline of the vessel relative to a vertical surface on the superstructure, such as the helicopter hangar on the main deck. The locations selected for measuring the angle of the vessel will be marked clearly, and their exact locations accurately described relative to other permanent structures, allowing for repeat measurements to be taken.

The angle of the vessel will then be measured at each location by attaching a plumb bob (a strong cord attached to a heavy weight), to the edge of the vessel. The plumb bob will then be lowered until it remains stable in the water column. At a point toward the bottom of the vertical superstructure measuring location (e.g. near the bottom of the helicopter hanger wall), the vertical distance along the plumb bob and the horizontal distance from the plumb bob line to the vertical structure will be measured. The angle of incline is then calculated (i.e. tan θ) from the horizontal and vertical measures on the right angled triangle (see Figure 2-1).



where: tan (θ) = 0pposite / adjacent and tan $(\theta)^{-1}$= the angle of incline

Figure 2-1 Measurement of the incline of the vessel using a right angle triangle calculation

Wave loads during major storms have the potential to cause ship movement. If the ship were to list, this would most likely occur during a major storm event (when boating and hence diving would cease due to BoM weather warnings) with the ship essentially settling into a new position under its own weight.

The angle at which the vessel may become unstable would depend on a number of factors and is likely to change over time. Factors include how the ship initially settles on the seabed (upright / on an angle), depth of settlement over time and any movement under storm waves.

If thought necessary an analysis of the likely theoretical angle at which the ship becomes unstable could be undertaken for initial settlement conditions, post scuttling (taking into account the location of concrete pumped into the hull to account for the weight of material removed from the vessel during preparation).

If determined to be necessary in future, sensors (tilt monitors) and / or underwater video cameras / webcams could be installed on the vessel to record any movement immediately post storm event. An assessment could then be made of any actions required to ensure the wreck was safe for diving.

2.1.3 Vessel Position and Settlement

The rationale for investigating the position of the vessel is to document the vessel's position on the seabed and to monitor its position over time. The depth to deck level and highest points on the vessel will also provide an understanding of any changes in water depth over time, due to the vessel settling on the seabed.

The position of the vessel will be determined by divers attaching buoys to the stern and bow sections during slack water. The location of these buoys will then be determined using GPS located on the survey boat. This fieldwork should be undertaken during slack water, with minimal wind to prevent drift of the marker buoys. If fieldwork is not undertaken during slack water, the approach will be for divers to swim directly over the stern and bow of the ship and mark their locations using a waterproof hand held GPS unit.

During these dives, divers will also record the depths (relative to LAT) of the highest point of the vessel in the water column, as well as the depth at the bow and stern at main deck level. The depth at seabed will be measured using the diver's computer lowered to the seabed on a weight as the depth at the seabed is beyond the normal commercial diving (Level 1 and 2) approved depth limit of 30m. In essence, the overall vessel position task will be completed using a combination of GPS positioning and diver depth measurements, converted to LAT using published tide charts.

The extent of settlement will be determined by first calculating the vertical distance from a known point (same locations as for vessel stability) of the ship to the seabed using a plumb bob. This measurement, together with the measurements described above, will be used to calculate the angle of incline of the ship and the length of the hypotenuse, using the formula for a right angle triangle. The length of the hypotenuse will then be compared to the known vertical height of the whole hull of the Ex-HMAS ADELAIDE from naval drawings to indicate the depth of settlement.

Vessel stability, position and settlement will be measured in conjunction with annual and post

storm structural integrity inspections.

Results and recommendations from the first five years of monitoring of structural integrity, stability and position are provided in Section 3.1.

2.2 Environmental Monitoring

2.2.1 Reef Communities

The rationale for investigating reef communities on the Ex-HMAS Adelaide is to gain an understanding of the marine flora and fauna assemblages present on the vessel, examine the rate of development of fouling assemblages and how they change over time, identify whether there is variation in the rates of development on different surfaces of the vessel (i.e. horizontal versus vertical) and identify whether any introduced species are present.

Full details of the survey methods for monitoring of reef communities can be found in the original Ex-HMAS Adelaide LTMMP (WorleyParsons 2011).

Results and recommendations from the first five years of diver based reef surveys are provided in Section 3.2.

2.2.2 Sediment Movement

The rationale for examining sediment movement on the seabed is to gain an understanding of sediment movement around the vessel, accumulation rates and scour depths. Sediment movement will be reported annually and after major storm events. During a major storm it is predicted that a scour hole, approximately 0.7 m to 1.4 m in depth and 7 m to 14 m in diameter, could develop at the stern. At the bow it is estimated that a scour hole 1.5 m deep and 8 m to 10 m in diameter could develop.

The seabed will be described by taking incidental photographs around the vessel. Any sand waves or rippling effects occurring will be described. Incidental sightings of benthic fauna / flora present on the adjacent sandy substrate will also be recorded, as well as the presence or otherwise of any debris from the vessel. The ability to complete this survey using divers will be limited to making observations from above the 30 m depth limit for commercial divers. Consequently, the detail of the survey may be limited by visibility and distance off the seabed.

Full details of the survey methods for monitoring of sediment movement around the vessel can be found in the original Ex-HMAS Adelaide LTMMP (WorleyParsons 2011).

Results and recommendations from the first five years of diver based sediment movement surveys are provided in Section 3.3.

2.2.3 Sediment Quality

The rationale for documenting sediment quality around the Ex-HMAS Adelaide is to examine how metal corrosion and degradation of protective paint layers impacts on the surrounding environment, i.e. whether benthic organisms are affected by potential metal enrichment of sediments around the vessel.

Sediment samples are analysed for a suite of metals including aluminium and iron (primarily due to corrosion of the superstructure and hull) and chromium, copper, lead, nickel and zinc (heavy metals which may have been in paints or components of the vessel which were unable to be removed). Sediment quality results will be compared with ANZECC/ARMCANZ (2000) Interim Sediment Quality Guidelines (ISQG) and previous results for control sites.

Sediment samples are collected by deploying a Ponar benthic grab from a boat and testing for trace metals against NODG (National Ocean Disposal Guideline for Dredged Material and ANZECC/ARMCANZ (2000) ISQG.

The locations of sediment quality (and bioaccumulation) sampling sites are shown in Figure 2-1 and Figure 2-2. Samples are collected from three control locations (S2, S3 and S6) and six impact locations (I1, I2, I3, I4, I5 and I6) for all survey times.

Full details of the survey methods for monitoring of sediment quality around the vessel can be found in the original Ex-HMAS Adelaide LTMMP (WorleyParsons 2011) and Cardno 2016a.

Results and recommendations from the first five years of sediment quality monitoring are provided in Section 3.3.

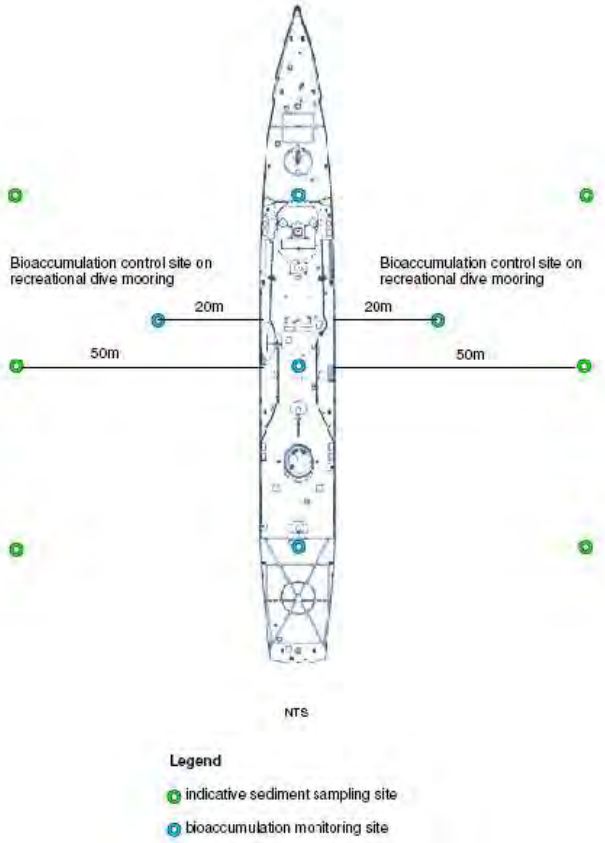


Figure 2-1 Location of sediment and bioaccumulation monitoring sites.

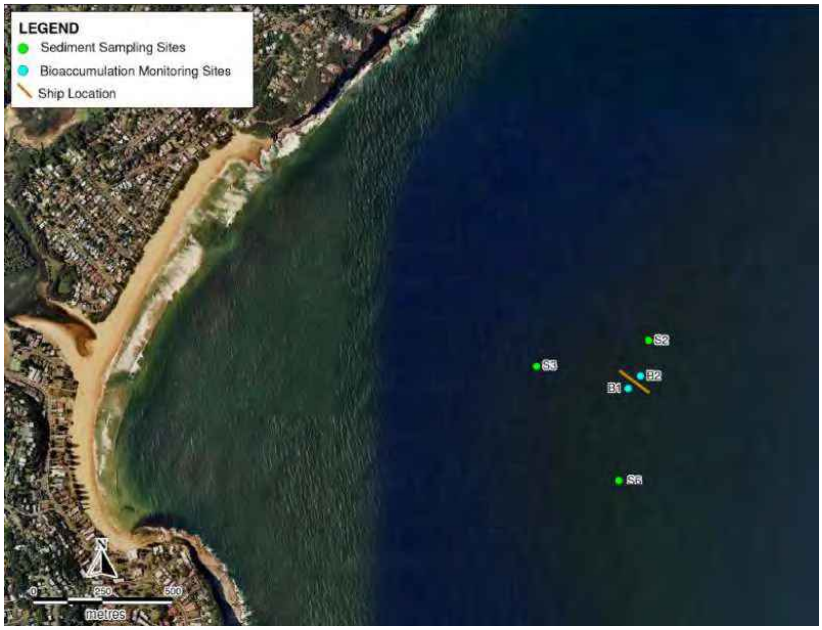


Figure 2-2 Sediment and bioaccumulation control sites.

2.2.4 Bioaccumulation Study

The aim of the bioaccumulation study is to determine whether resident biota are affected by the degradation of zinc chromate paint which may have originally been used on the aluminium alloy. As the initial process of biofouling was expected to take some time, active biomonitoring methods were to be adopted until there was sufficient growth on the ship for direct testing of resident fouling biota.

Full details of the survey methods for the bioaccumulation study can be found in the original Ex-HMAS Adelaide LTMMP (WorleyParsons 2011).

Results and recommendations from the first five years of bioaccumulation studies are presented in Section 3.4.

2.3 Management Criteria and Mitigation Measures

2.3.1 Structural Integrity, Stability, Position and Sediment Movement

A reduction in metal thickness of 50% should be used as a guide to initiate more frequent monitoring. The point at which various parts of the vessel become at risk of failure will vary in response to factors other than metal thickness, e.g. stress points. The point at which this becomes a risk to divers will also vary, e.g. collapse of the masts would be a risk to divers but severe corrosion in the centre of a plate on the side of the aircraft hangar may not pose a risk, or may be able to be managed. The point at which structural decay will warrant closing sections of the vessel or restricting access will be assessed though ongoing inspections.

An important consideration is whether diver access or egress is impeded, or disorientation of the divers inside the vessel is likely. Any major changes to structural integrity or stability of the vessel will typically occur during a major storm event. Divers would not be diving on the vessel under such conditions and so would not be subject to sudden entrapment or physical injury. Removal of encrusting biota may be required, in instances where significant fouling of the vessel is occurring, which limits diver access or egress or presents a hazard to divers.

If the wreck is deemed unsuitable for diving it will be closed until demolition / repair works and removal of debris are completed. Bookings will not be taken (or will be cancelled) and permits will not be issued for diving on the wreck until it is safe to do so.

Where monitoring determines that there is a risk to diver safety, the management actions outlined in Table 2.1 should be implemented.

Table 2-1 Diver safety management actions.

Monitoring Program	Response
Structural Integrity	Using an Ultrasonic Thickness Measurement Instrument, measure the thickness of the test site, and if there is significant deterioration (i.e. > 50% reduction compared to the pre-scuttling measurement) in the thickness of material (steel or aluminium) at the monitoring points, appoint a marine surveyor to determine the risk to divers of a structural failure. Advise divers not to enter internal spaces of the vessel until the area is certified safe and reopened.
Access holes, barring off and deterioration of furnishings and partitioning	If there is significant deterioration of the non-structural fittings or failure of the barring off then advise divers to avoid those areas until the risk can be either removed or rectified by a suitably qualified and authorised contractor. Advise divers not to enter the internal spaces of the vessel until the area is certified safe and reopened to divers.
Vessel Positional Stability (angle of rest)	In the unlikely occurrence that there is a significant change in the position of the vessel, then there will be a need to undertake a more detailed risk assessment of the impact of the change in position on diver safety. The immediate action is to advise divers not to enter the vessel. Appoint a suitably qualified marine surveyor and risk assessor to determine the significance of the change in position and to provide advice on remedial actions. Advise divers not to enter the internal spaces of the vessel until the area is certified safe and reopened to divers
Seabed Topography	If there is significant change in the sea bed topography (erosion of the sand from under the vessel) seek advice from marine surveyor to determine if there is a risk to the stability of the vessel. If there is then follow the actions outlined above. Historical information from other wreck sites indicates that once the vessel has settled into the seabed by 1.5 m it should become stable.
Introduced Marina Biota	If marine pest species are identified seek management advice from DoEE, Industry & Investment NSW (Fisheries) and/or the Office of Environment and Heritage (OEH).

Reports from dive operators regarding the safety of the dive site will be continuously monitored by DoI Crown Lands and Water. Should it become apparent that permanent closure of the site may be warranted, a working group will be formed to consider options for site management. Advice will be sought from divers, work place authorities, regulatory bodies and legal advice. It would be expected that the site would continue to be monitored to understand the potential for significant failure of the structure but diving would no longer be permitted.

As a permit condition, all dive operators will be required to have an emergency action plan and site induction plans for guides and divers, and to maintain appropriate insurances. They will also be required to comply with a Permit / "Code of Conduct" which includes hazard and incident

reporting as well as emergency contact phone numbers should any emergency response be required at the dive site.

2.3.2 Environmental Monitoring

Marine Biota

If any marine pest species are identified during the reef surveys, DoEE and Industry & Investment NSW (Fisheries) will be notified and advice sought on control / management measures.

In the event that any listed threatened or protected species are observed at the site, the appropriate authority (i.e. DoEE, Industry & Investment NSW (Fisheries) or the OEH) will be advised.

Sediment Quality

The relevant trigger levels for marine sediments identified in ANZECC/ARMCANZ (2000) will be adopted for sediment quality monitoring and are shown in Table 2-2. In the event that the ISQG-Low trigger value is exceeded for a particular metal, further investigation will be undertaken (such as leachate testing).

Table 2-2 Sediment quality guidelines (ANZECC/ARMCANZ 2000).

Parameter	ISQG - Low	ISQG – High
Aluminium	-	-
Chromium	80 mg/kg	370 mg/kg
Copper	65 mg/kg	270 mg/kg
Iron	-	-
Lead	50 mg/kg	220 mg/kg
Nickel	21 mg/kg	52 mg/kg
Zinc	200 mg/kg	410 mg/kg
PCBs	23 µg/kg	-

Notes: ISQG = Interim sediment quality guideline trigger values (metals reported in mg/kg dry wt). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000).

Bioaccumulation

If zinc chromate contamination is detected in biota then further monitoring should be undertaken. No special management strategies are proposed as removal of biota from the ship by divers is prohibited and all forms of fishing are prohibited within approximately 100 m of the ship.

2.4 Reporting

Monitoring results should be reported to the DoEE within one month of survey completion. In the event that an environmental or diver safety risk is identified, DoEE should be advised within 24 hours. Survey reports should be provided individually within one month of survey.

An annual survey report is to be prepared containing an introduction, objectives of the monitoring program, survey methods, results, conclusions and recommendations (including any necessary changes to monitoring frequency and duration). The annual survey report will include a description of sand movement around the vessel (including scour) and any changes in settlement depth and the angle of the vessel (compared to the scuttled position and previous field survey work), as well as a general description of the state of the vessel and amount of biological growth observed.

A locality plan and all photographs taken during the survey will be provided in an Appendix.

The annual survey report will form part of the Reserve Trust's annual reporting to the NSW Minister for Lands as required under Clause 32 of the *Crown Lands Regulation* 2006.

Reporting to the DoEE will be via the annual survey report or as required under the Sea Dumping Permit conditions and will occur separately to the reporting for the Minister for Lands.

2.5 Personnel

Environmental monitoring and reporting must be undertaken by qualified and experienced marine scientists using a commercially registered vessel. All diving work must be undertaken by commercially qualified divers. The assessment of structural integrity must be undertaken by a qualified naval architect or maritime structural engineer.

3 Results and Recommendations from the First Five Years of Monitoring

3.1 Monitoring of Structural Integrity, Stability and Position

Monitoring of structural integrity, stability and position was undertaken as per the original LTMMP schedules for the first five years post-scuttling. Annual and events based inspections were undertaken by McLennans Diving Service with review and comment on the structural integrity and safety of the vessel for diving undertaken by Shearforce Maritime Services Pty Ltd.

3.1.1 Results of First Five Years Monitoring

The most recent annual underwater inspection to monitor structural integrity, stability and position was undertaken by McLennans Diving Service in April 2017. The findings of this survey can be summarised as follows:

- The vessel was structurally sound and stable – it remained unchanged since the previous annual inspection in June 2016.
- No new dangers were found that could affect recreational divers.
- No signs of corrosion were observed.
- Hanger damage was stable.
- No change in the ships position or list had occurred.

A summary of the results of the most recent structural inspections are included in **Appendix E**. These provide an indication of the current structural condition of the Ex-HMAS Adelaide dive reef.

3.1.2 Recommendations for Future Monitoring

Due to a necessity to continually monitor the ship for potential hazards / risks to divers and ensure diver safety, monitoring of structural integrity, stability and position should continue as per the original LTMMP schedules, with a requirement for annual monitoring, as well as events based monitoring (i.e. following major storm events), for the next 10 years. Monitoring of corrosion as well as sediment movement around the vessel should be undertaken during all structural integrity inspections.

All ongoing structural integrity monitoring should refer to the Management Criteria for this component, as outlined in Section 2.3.1. Depending on the findings, the regularity of structural integrity monitoring may need to be increased, or the vessel closed to diving until necessary demolition or repair works are made. At any stage that the vessel is deemed unsafe for diving and

where repairs / demolitions to reduce risk to divers are not possible, all diving activities should cease either in localised areas, or on the entire vessel, permanently.

3.2 Environmental Monitoring – Reef Communities

Reef community surveys on the Ex-HMAS Adelaide were undertaken immediately post-scuttling and at numerous other time points during the first five years post-scuttling as follows, in accordance with the original LTMMP schedules:

- Baseline Survey (1 week) – 18th April and 30th May 2011 (WorleyParsons)
- Post-scuttling Survey 1 (6 months) – 11th and 13th October 2011 (Cardno)
- Post-scuttling Survey 2 (10 months) – 14th and 16th February 2012 (Cardno)
- Post-scuttling Survey 3 (12 months) – 3rd and 4th May 2012 (Cardno)
- Post-scuttling Survey 4 (15 months) – 27th July 2012 (Cardno)
- Post-scuttling Survey 5 (18 months) – 31st October and 1st November 2012 (Cardno)
- Post-scuttling Survey 6 (21 months) – 16th and 17th January 2013 (Cardno)
- Post-scuttling Survey 7 (24 months) – 29th and 30th April 2013 (Cardno)
- Post-scuttling Survey 8 (27 months) – 16th and 17th July 2013 (Cardno)
- Post-scuttling Survey 9 (2 years 6 months) – 16th and 21st October 2013 (Cardno)
- Post-scuttling Survey 10 (2 years 11 months) – 3rd and 4th March 2014 (Cardno)
- Post-scuttling Survey 11 (3 years 5 months) – 22nd, 23rd and 29th September 2014 (Cardno)
- Post-scuttling Survey 12 (3 years 11 months) – 26th and 27th March 2015 (Cardno)
- Post-scuttling Survey 13 (5 years 2 months) – 1st and 2nd June 2016 (Cardno)

The full methods and results of all reef community surveys can be found in WorleyParsons (2011b) and Cardno (2016a and 2016b).

3.2.1 Results of First Five Years Monitoring

Overall, the reef community monitoring program undertaken during the first five years post-scuttling has met the aims of the original LTMMP well:

- It documented the types of flora and fauna present on the vessel.

- It described the rates of development of fouling assemblages and changes over time.
- It described variation in rates of development on different surfaces of the vessel.

After a baseline survey (WorleyParsons 2011) and 13 post-scuttling surveys (Cardno 2016b), a total of 42 taxa / taxon groups were identified on the vessel, with the ten most numerically abundant taxa in terms of percentage cover being serpulid, barnacle and encrusting algae matrix (57.8%), large barnacles and brown filamentous algae (7.2%), solitary ascidians (6.7%), serpulid polychaetes (6.5%), jewel anemones (4.4%), brown filamentous algae (4.3%), kelp (2.3%), early colonising matrix (2.2%), base surface (1.3%) and red encrusting algae (1.3%) (Cardno 2016a and 2016b).

Multivariate analysis indicated that there were changes in reef assemblages over time, with significant differences in the overall assemblage composition between surveys (regardless of transect position / orientation). Surface orientation was a significant factor in structuring the epibenthic assemblages on the vessel for the first five years post-scuttling. The assemblages associated with horizontal deck surfaces were significantly different from those on the vertical surfaces of the hull during all surveys. Depth was also a significant factor in structuring the epibenthic assemblages on the vessel for the first five years post-scuttling. Assemblages associated with deep surfaces between 20 – 30 m were significantly different to those associated with shallower 13 – 20 m surfaces across all surveys.

Fish taxa identified during the 13 post-scuttling surveys included 62 species from 31 families. There was a clear increase in the number of species identified over time. No species of threatened or protected fish were recorded (although anecdotal evidence suggests that grey nurse sharks, *Carcharius taurus*, may occur at the site on occasion).

No listed marine pest species were detected during the first five years of monitoring, however, it was noted that the survey methods adopted may mean that small and cryptic pest species would be difficult to identify as they can be well camouflaged or found in crevices and overhangs.

Further detail on the results of the first five years of reef monitoring can be found in **Appendix E**

3.2.2 Recommendations for Future Monitoring

Reef Communities and Threatened Species

No further reef community monitoring is required under the Revised LTMMP. Any further monitoring of long-term changes to epibenthic reef communities and / or fish communities for ecological research or educational purposes could be undertaken by external agencies, educational facilities or organisations, but is not necessary to meet the goals of the LTMMP.

Any further external studies should include special consideration of the presence of threatened and protected marine species, as listed under the NSW *Fisheries Management Act* 1994 and/or NSW *Biodiversity Conservation Act* 2016 that may begin to utlise the artificial reef over longer time periods.

A volunteer sighting and reporting program for threatened and protected species may also be implemented by the local dive operators who regularly dive on the vessel with data provided to appropriate management agencies on a regular basis (e.g. a basic 6 monthly report with images if obtained). LTMMP Management Criteria (see Section 2.3.2) require that in the event that any listed threatened or protected species are observed, the appropriate authority (i.e. DoEE, Industry & Investment NSW (Fisheries) or OEH) should be advised.

Marine Pests

Ongoing surveys for marine pest species known from NSW and Australia which have the potential to occur on the vessel (see Cardno 2016a and 2016b) should occur for the next 10 years to ensure that the aims of the original LTMMP in regard to marine pest species are fully met and that environmental risk is appropriately managed.

As no pest species have been detected to date, it is considered that the frequency of these surveys could be significantly reduced. It is suggested that the next marine pest surveys are undertaken at 10 years followed by 15 years post scuttling (these could be undertaken in conjunction with the suggested future *in-situ* sediment quality and biomonitoring surveys – see Section 3.3.2 and 3.4.2).

Any future marine pest surveys should utilise a combination of survey methods including diver transects (with video footage and/or photquadrats taken), scrapings with subsequent taxonomic analysis and targeted diver searches for more cryptic pest species which have the potential to occur on the ship (refer to Cardno 2016a and 2016b for details of these). Appropriate monitoring methods for the detection of the species of interest should be implemented by the consultant / agency undertaking these surveys, with reference to The *Australian Marine Pest Monitoring Guidelines and Manual* (DAFF 2010).

In accordance with the Management Criteria for marine pests in Section 2.3.2, if any marine pest species are identified, DoEE and Industry & Investment NSW (Fisheries) should be notified and advice sought on control / management measures.

In accordance with the *Australian Marine Pest Monitoring Guidelines and Manual* (DAFF 2010), marine pest detections should also be reported to the Consultative Committee on Introduced Marine Pest Emergencies (CCIMPE) who are responsible for initiating action in response to any new or suspected new incursions of marine pests according to CCIMPE agreed protocols.

While the level of marine pest monitoring on the vessel would not necessarily adhere fully to the *Australian Marine Pest Monitoring Guidelines and Manual* (DAFF 2010), data collected during such monitoring could potentially be made available for inclusion in the National Introduced Marine Pest Information System (www.marinepests.gov.au/nimpis).

3.3 Environmental Monitoring – Sediment Quality

Sediment quality monitoring prior to scuttling and for the first five years post-scuttling was undertaken in accordance with the schedule in the original LTMMP as follows:

- Baseline sediment sampling (prior to scuttling) – 2009 (WorleyParsons)
- One month post-scuttling – 17th May 2011 (WorleyParsons)
- Six months post-scuttling – 20th October 2011 (Cardno)
- 21 months post-scuttling (i.e. 18 month event) – 11th January 2013 (Cardno)
- 62 months post-scuttling (i.e. 60 month event) – 10th June 2016 (Cardno)

Full details of the methods and results of these sampling events can be found in WorleyParsons (2009, 2011a and 2011b) and Cardno (2016c). Cardno (2016c) should be referred to for details of sediment sampling methodology and locations for any future monitoring.

3.3.1 Results of First Five Years Monitoring

The sediment quality assessment found that particle size distribution was relatively uniform across sampling sites. In addition, metal concentrations in sediments recorded at 62 months post-scuttling (June 2016) were similar to those recorded one month post-scuttling (May 2011) indicating no significant long-term effects on sediment quality as a result of the vessel being scuttled (aluminium was an exception). All metals measured for which ANZECC/ARMCANZ (2000) ISQG are available (i.e. chromium, copper, nickel, lead and zinc) had concentrations that were well below the ISQG low trigger values and therefore were not considered to be a contamination risk to the marine environment.

Further detail on the results from the first five years of sediment quality monitoring are provided in **Appendix E**.

3.3.2 Recommendations for Future Monitoring

Monitoring of sediments from within the hull of the Ex-HMAS Adelaide is not necessary going forward. Any impacts on sediments within the hull would be highly localised and contained. Furthermore, restrictions on commercial diving implemented after the preparation of the original LTMMP mean that there would be significant costs associated with undertaking this collection.

As the ship corrodes over time there remains the potential for metals to enter the surrounding marine sediments creating environmental risk, however, this is expected to be a long-term process. Considering the results of the first five years of monitoring (Cardno 2016c), continued monitoring of sediment quality at five year intervals up until 15 years post-scuttling (i.e. at 10 and 15 years post scuttling) is recommended. If after this time no impacts on sediment quality are seen, monitoring at an even further reduced rate for rest of the operational life of the vessel should be adequate (subject to future review and consideration).

For all future sediment quality sampling, additional sampling sites located further away from the vessel (i.e. several kilometres) should be included to validate the results from the existing control sites (which may be located too close to the vessel).

Ad-hoc sampling should also be undertaken if the results of any structural monitoring should warrant it.

3.4 Environmental Monitoring – Bioaccumulation Study

Bioaccumulation surveys undertaken within the first five years post-scuttling were completed in accordance with the schedule in the original LTMMP as follows:

- One week post-scuttling (baseline survey) – 19th April 2011 (WorleyParsons)
- Seven months post-scuttling – 24th November 2011 (Cardno Ecology Lab)
- 15 months post-scuttling – 21st September 2012 (Cardno Ecology Lab)

Full details of the sampling methodology and results of these sampling events can be found in WorleyParsons (2011), Cardno Ecology Lab (2012) and Cardno (2016a).

3.4.1 Results of First Five Years Monitoring

The results of the bioaccumulation study showed that there was no contamination of marine biota which could be attributed to zinc chromate paint over the 27 month post-scuttling monitoring period. However, issues with the loss of some samples limited the interpretation of results.

Further detail on the results from the first five years of bioaccumulation studies is provided in **Appendix E**.

3.4.2 Recommendations for Future Monitoring

Considering the insignificant results of the first five years of monitoring, no further active biomonitoring (i.e. deployment and testing of organisms) is required for the Ex-HMAS Adelaide to assess ecological risk from the vessel.

However, to fully meet the requirements of the original LTMMP, which requires testing of organisms directly from the vessel, at least one round of *in-situ* sampling and testing of resident biota should be undertaken. Cardno (2016a) suggested that a large gastropod or solitary ascidian be used for *in-situ* monitoring.

It is recommended that a common species with high abundance on the vessel and on nearby rocky reefs (which would be used as control sites) be selected. This is required for ease of collection and appropriate sample replication. The chosen organism should be relatively easy to collect by divers and preferably occur in shallower areas of the Ex-HMAS Adelaide dive reef for diver safety purposes.

Following a review of Cardno (2016a) and Cardno (2016b), two potential species include the sessile solitary ascidian *Herdmania momus* (red throated ascidian) and the gastropod *Dicathais orbita* (cartrutt shell). *Herdmania momus* is common and abundant on intertidal and shallow subtidal

reefs along the NSW coastline (Edgar 1997) and was also found to be common on vertical surfaces of the Ex-HMAS Adelaide dive vessel in the most recent reef surveys. Alternatively, the gastropod *D. orbita* (cartrutt shell - a genus of predatory sea snail), was identified on the vessel and is also common in rocky reef areas of the NSW coastline (Beechey 2000, Edgar 1997).

Ascidian and/or gastropod samples should be collected from the bow, midship and stern of the vessel (as per the active biomonitoring studies) and at multiple reef control sites located at a range of distances from the vessel (at least two). Once collected, sub-sampling and analysis methods should follow those outlined in Cardno Ecology Lab (2012). Sample numbers (i.e. within site replication) should be suitable to allow for meaningful statistical comparisons to be made, however, due to the nature of the study, may be limited by natural availability at the time of sampling and restrictions associated with diving. A sample size of 10-15 individuals per site / location should be collected if possible.

A Section 37 NSW Fisheries Collection Permit for Scientific Research (Section 37 Permit - https://www.dpi.nsw.gov.au/fishing/closures/section-37-permits) will be required prior to sampling.

The *in-situ* sampling and testing should be undertaken at 10 years post scuttling. Following a review of results from the first *in-situ* bioaccumulation study, along with results of corrosion monitoring on the vessel, the need for further *in-situ* sampling should be reviewed. If significant differences between metal concentrations in biota tissue between samples from the vessel and from control sites, or ecologically significant levels of chromium or zinc in tissues are detected at 10 years, the frequency of *in-situ* biomonitoring should be reviewed and an increased monitoring frequency may be required. If corrosion levels on the vessel are at any time found to increase significantly, additional biomonitoring may also be warranted.

4 Revised LTMMP and Monitoring Schedule 2017-2026

In accordance with Condition 26 of Sea Dumping Permit SD2008/1062 the original Ex-HMAS Adelaide LTMMP (WorleyParsons 2011a) was reviewed and a Revised LTMMP (current Plan) has been developed. The Revised LTMMP takes into account the results of all monitoring undertaken to date and the recommendations made by Cardno (2016a) following first five years of post-scuttling monitoring. Key changes to monitoring along with a revised monitoring schedule for the next ten years (i.e. years six to 15 post-scuttling; 2017-2026) are provided below.

4.1 Key Changes to LTMMP Requirements

4.1.1 Monitoring of Structural Integrity Structural Integrity, Stability, Position and Sediment Movement

No changes to the original monitoring schedules have been proposed in the Revised LTMMP. Annual monitoring of structural integrity, stability, position and sediment movement, along with monitoring after large storm events should continue. There may also be a requirement for increased structural integrity monitoring if Management Criteria outlined in Section 2.3.1 are met.

4.1.2 Environmental Monitoring

4.1.2.1 Reef Communities

No further monitoring of reef communities for ecological purposes is required under the Revised LTMMP, however, reef monitoring could be undertaken by external agencies for scientific research purposes. Monitoring for threatened or protected species could be undertaken concurrently or by local diver operators.

Surveys for detection of marine pest species should continue (at a reduced frequency considering the lack of positive data obtained to date) to ensure that environmental risk is managed. At this stage a marine pest survey should occur at 10 years (2021) and at 15 years (2026) with additional surveys to be scheduled during this time period if any marine pest incursions are detected. A greater range of survey methods which are targeted at pest species which are likely to occur on the vessel (i.e. for which suitable habitat is available) should be used.

4.1.2.2 Sediment Quality

Due to the insignificant results from sediment quality monitoring obtained during the first five years post-scuttling, a reduced monitoring frequency of marine sediment quality going forward is considered suitable. Monitoring every five years until 15 years post-scuttling is recommended (i.e.

at 10 and 15 years; 2021 and 2026). Additional control sites located further north and south of the vessel should also be included.

4.1.2.3 Bioaccumulation Study

Considering the insignificant results of the first five years of post-scuttling monitoring, active biomonitoring is no longer considered necessary. However, the fully meet the requirements of the original LTMMP, i*n-situ* biomonitoring (i.e. direct sampling and testing of biota from the vessel and nearby control reefs) should be undertaken at 10 years (2021). If any significant results are obtained at this stage then further testing should be considered and scheduled. The species to be used should be one which is common and abundant on the vessel and also on nearby rocky reefs, and should be easy to sample using divers (e.g. *H. momus* and/or *D. orbita*).

4.2 Revised Monitoring Schedule

A revised monitoring schedule from years six (2017) to 15 (2026) post-scuttling is provided in Table 4-1. After year 15 (2026) it is recommended that the results of monitoring from years six to 15 are reviewed and revisions once again be made to the Revised LTMMP as appropriate.

Table 4-1 Revised LTMMP monitoring schedule – years 6 - 15. (2017-2026)

Parameter	72 Months (6 years) Post-scuttling 2017	84 Months (7 years) Post-scuttling 2018	96 Months (8 years) Post-scuttling 2019	108 Months (9 years) Post-scuttling 2020	120 Months (10 years) Post-scuttling 2021	142 Months (11 years) Post-scuttling 2022	154 Months (12 years) Post-scuttling 2023	166 Months (13 years) Post-scuttling 2024	178 Months (14 years) Post-scuttling 2025	190 Months (15 years) Post-scuttling 2026	Ongoing Monitoring (operational life)
Structural integrity, vessel stability, position and sediment movement	At 72 months and 1 week after major storm events.	At 84 months and 1 week after major storm events.	At 96 months and 1 week after major storm events.	At 108 months and 1 week after major storm events.	At 120 months and 1 week after major storm events.	At 142 months and 1 week after major storm events.	At 154 months and 1 week after major storm events.	At 166 months and 1 week after major storm events.	At 178 months and 1 week after major storm events.	At 190 months and 1 week after major storm events.	Review results and revise the LTMMP for ongoing monitoring requirement.
Vessel components and specified structural monitoring points	At 72 months or as determined plus post major storm and if alerted to issue by commercial dive operators.	At 84 months and 90 months plus post major storm and if alerted to issue by commercial dive operators.	At 96 months and 102 months plus post major storm and if alerted to issue by commercial dive operators.	At 108 months and 114 months plus post major storm and if alerted to issue by commercial dive operators.	At 120 months and 126 months plus post major storm and if alerted to issue by commercial dive operators.	At 142 months and 126 months plus post major storm and if alerted to issue by commercial dive operators.	At 154 months and 126 months plus post major storm and if alerted to issue by commercial dive operators.	At 166 months and 126 months plus post major storm and if alerted to issue by commercial dive operators.	At 178 months and 126 months plus post major storm and if alerted to issue by commercial dive operators.	At 190 months and 126 months plus post major storm and if alerted to issue by commercial dive operators.	Review results and revise the LTMMP for ongoing monitoring requirement.
Reef Community Study	Not required.	Not required.	Not required.	Not required.	Marine pest survey to be undertaken at 120 months. Increased survey frequency between 10 and 15 years	Not required at this stage.	Not required at this stage.	Not required at this stage.	Not required at this stage.	Marine pest survey to be undertaken at 190 months.	Review results and revise the LTMMP for ongoing monitoring requirement.

Parameter	72 Months (6 years) Post-scuttling 2017	84 Months (7 years) Post-scuttling 2018	96 Months (8 years) Post-scuttling 2019	108 Months (9 years) Post-scuttling 2020	120 Months (10 years) Post-scuttling 2021	142 Months (11 years) Post-scuttling 2022	154 Months (12 years) Post-scuttling 2023	166 Months (13 years) Post-scuttling 2024	178 Months (14 years) Post-scuttling 2025	190 Months (15 years) Post-scuttling 2026	Ongoing Monitoring (operational life)
					if any pest incursions are detected.						
Bioaccumulation Study	Not required.	Not required.	Not required.	Not required.	In-situ bioaccumulation study to be undertaken at 120 months. Revised frequency of future sampling will be required if results are significant.	Not required at this stage.	Not required at this stage.	Not required at this stage.	Not required at this stage.	Not required at this stage.	Review results and revise the LTMMP for ongoing monitoring requirement.
Sediment Quality Study	Not required unless results of structural monitoring warrants.	Not required unless results of structural monitoring warrants.	Not required unless results of structural monitoring warrants.	Not required unless results of structural monitoring warrants.	Sampling at 120 months and if results of structural monitoring warrants.	Not required unless results of structural monitoring warrants.	Not required unless results of structural monitoring warrants.	Not required unless results of structural monitoring warrants.	Not required unless results of structural monitoring warrants.	Sampling at 190 months and if results of structural monitoring warrants.	Review results and revise the LTMMP for ongoing monitoring requirement.

5 Marker Buoys, Mooring Buoys and Navigation Aids

Following the scuttling of the Ex-HMAS Adelaide two marker buoys, six mooring buoys and associated navigation aids were installed in the vicinity of the vessel for use by dive vessels and to ensure the navigational safety of other recreational and commercial vessels which may be operating in these coastal waters. Figure 5-1 and Figure 5-2 show the location of these as originally installed. A summary of the various moorings / markers and required maintenance regimes for each is described in the following sections.

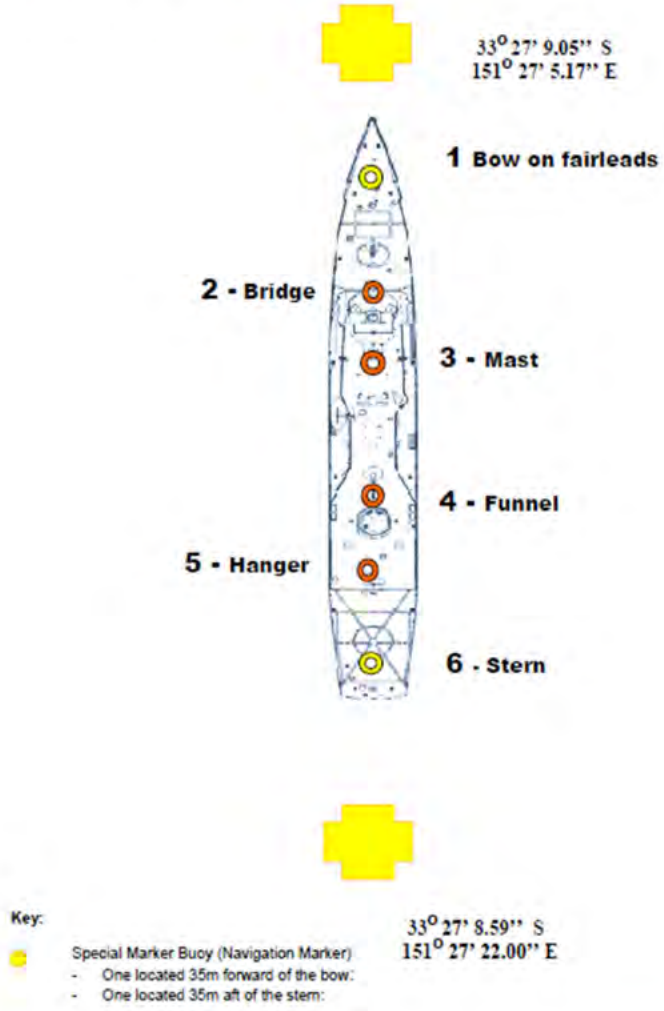


Figure 5-1 Location of all originally installed moorings and special markers around the Ex-HMAS Adelaide dive wreck. Note that the special marker buoys are now ~ 100 m off the bow and stern rather than the 35 m indicated here.

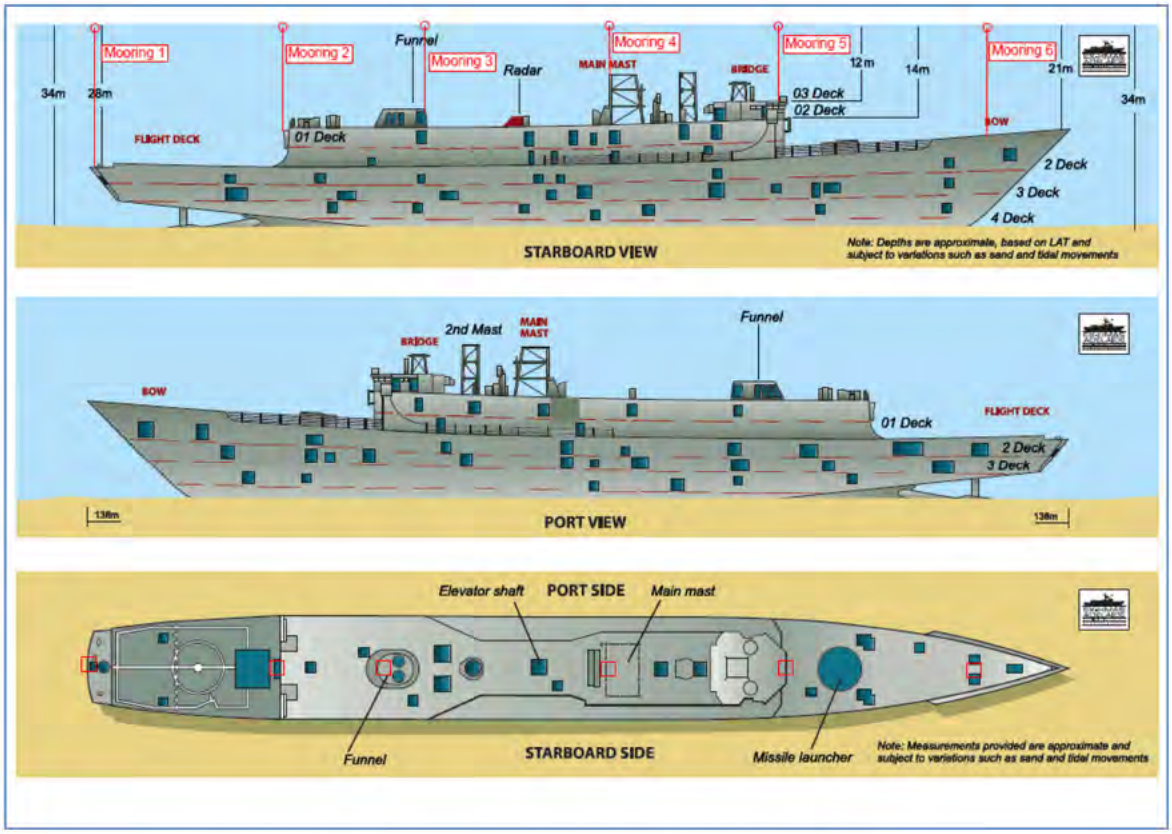


Figure 5-2 Mooring buoy numbering and locations on the Ex-HMAS Adelaide dive wreck.

5.1 Dive Moorings and Special Markers

5.1.1 Dive Moorings

There are six mooring sites on the Ex-HMAS Adelaide Reserve and one in Terrigal Haven that are authorised under commercial mooring Licence CL6353 (issued by Roads and Maritime Services). The design specifications for these moorings is shown in Figure 5-3.

Currently there are only four moorings physically available for use on the Reserve and one in Terrigal Haven. These moorings have adequately met diver demand to date (without considering visitor numbers generated by unauthorised access). Figure 5-1 and Figure 5-2 show the location of these moorings. These moorings are attached directly to the ship.

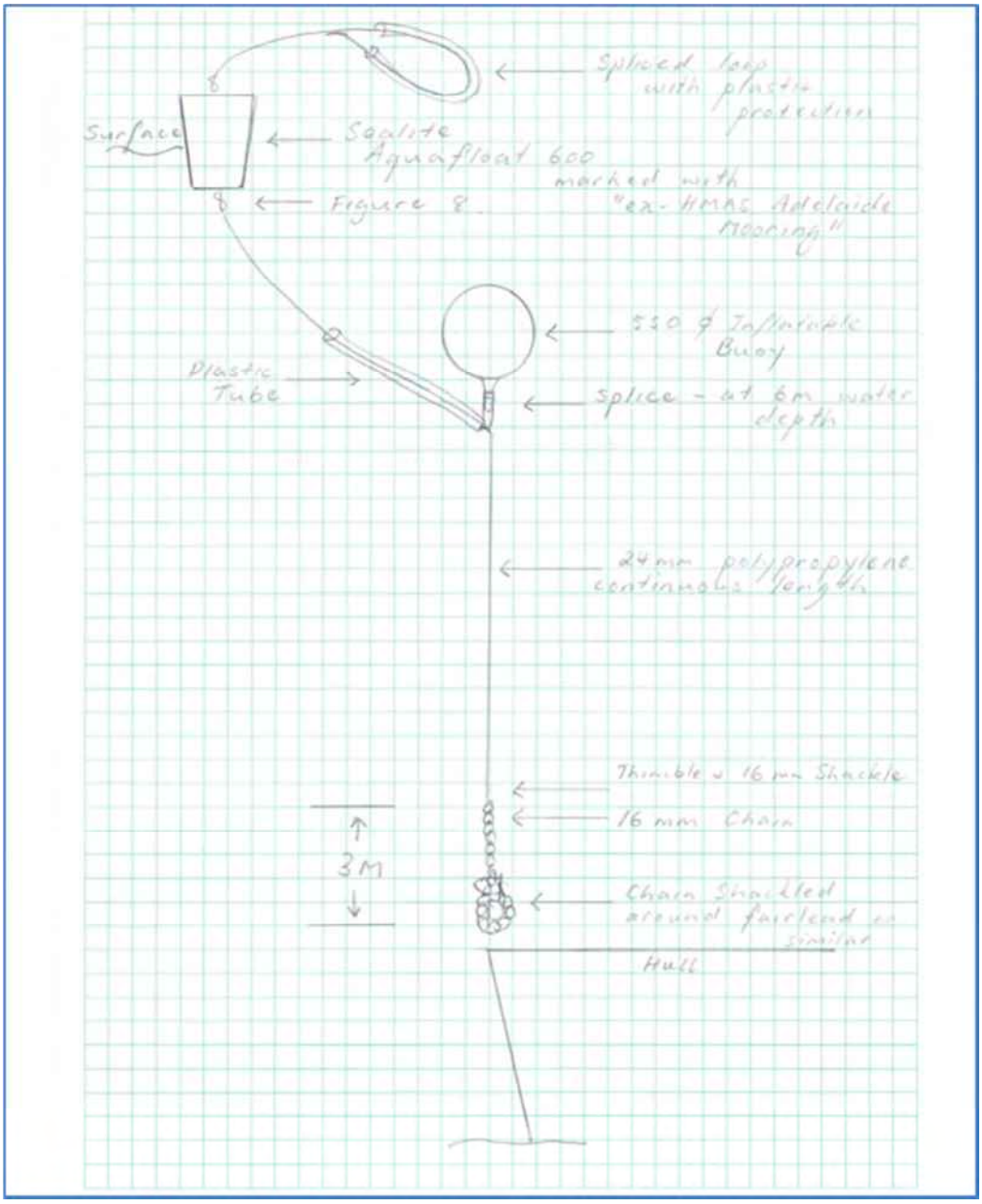


Figure 5-3 Design specifications for the mooring buoys on the Ex-HMAS Adelaide.

The commercial mooring Licence CL6353 must be renewed annually. Renewal requires a phone call to RMS and there is no charge for the Licence. If the Licence is not renewed by the due date DoI Crown Lands and Water is not lawfully occupying the mooring space. The mooring Licence is granted with the expectation that the RMS Commercial Mooring Licence Standard Conditions are adhered to. Failure to comply with any of the Conditions may lead to cancellation of the Licence. The RMS Commercial Mooring Licence Standard Conditions are provided in **Appendix F**.

5.1.2 Special Marker Buoys

There are two special marker buoys on the Reserve which mark the bow and stern of the sunken vessel. Special marker buoys are located approximately 100m forward off the bow and 100m aft of the stern of the Ex-HMAS Adelaide dive wreck. These are key for the navigational safety of Reserve users and other passing vessels. The GPS locations of the special marker buoys as installed are provided in Table 5-1.

Table 5-1 GPS locations of the special marker buoys (as installed location).

Special Marker	Latitude (S)	Longitude (E)
Bow Marker	33°27'9.05''S	151°27'5.17''E
Stern Marker	33°27'8.59''S	151°27'22.00''E

5.1.3 Terrigal Haven Mooring Buoy

The Terrigal Haven mooring buoy is used by diving vessels when transferring divers and equipment to and from the shore. The approximate location of this buoy is shown in Figure 5-4.

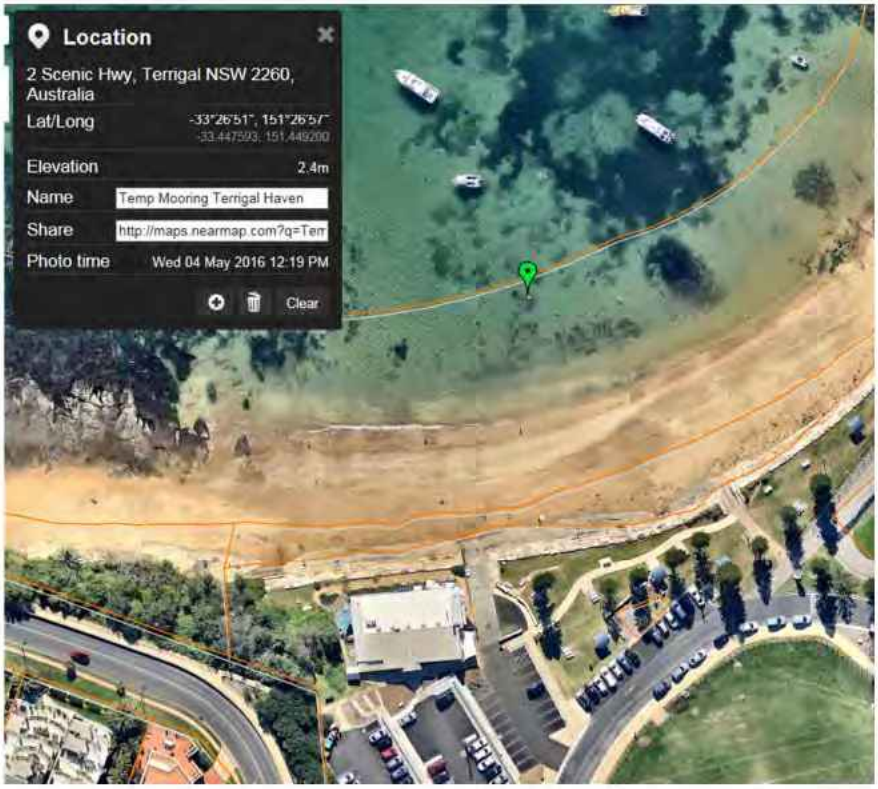


Figure 5-4 Location of the mooring buoy in Terrigal Haven.

5.2 Maintenance

Maintenance of marker and mooring buoys should be undertaken annually and also within one week of any major storm event.

5.2.1 Special Marker Buoy Maintenance

The maintenance regime for the special marker buoys is to be undertaken annually and involves the following:

- Lift both marker buoys and ground tackle.
- Clean and inspect.
- Check functionality of the flashing lights and replace all associated lights / batteries.
- Replace all fixtures and fittings annually.
- All shackles and fixtures previously welded shut are to be re-welded annually.
- Reinstall marks in the location they were retrieved from.
- Provide a report on the condition of the equipment and all works undertaken including a photographic record of before and after works.

5.2.2 Dive Mooring Buoy Maintenance

The maintenance regime for the dive moorings buoys is to be undertaken annually and involves the following:

- Divers will need to inspect mooring attachments to the Ex-HMAS Adelaide decks.
- Moorings are to be retrieved and cleaned (i.e. remove barnacles and other marine growth).
- Replace all fixtures or fittings annually.
- Any shackles welded shut are to be re-welded annually.
- Reinstall the mooring on location.
- Provide a report on the condition of the equipment and works undertaken including a photographic record of before and after works.

5.2.3 Terrigal Haven Mooring Buoy Maintenance

The maintenance of the commercial mooring buoy in Terrigal Haven is to be undertaken annually and involves the following:

- Lift the marker buoy and ground tackle.
- Mooring to be retrieved and cleaned (i.e. remove barnacles and other marine growth).
- Replace all fixtures and fittings annually.
- Reinstall on location.
- Provide a report on the condition of the equipment and works undertaken including a photographic record of before and after works.

6 References

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Appendix A Sea Dumping Permit

AUSTRALIA

ENVIRONMENT PROTECTION (SEA DUMPING) ACT 1981

SEA DUMPING PERMIT No. SD2008/1062

for

NEW SOUTH WALES LAND AND PROPERTY MANAGEMENT AUTHORITY

I, VICKI JANE MIDDLETON, a delegate of the Minister for Environment Protection, Heritage and the Arts, acting under Section 19 of the *Environment Protection (Sea Dumping) Act 1981*, hereby grant a sea dumping permit to the New South Wales Land and Property Management Authority, PO Box 2185, Dangar, NSW, 2309, for an artificial reef placement of the vessel "Ex- HMAS *Adelaide*" off Avoca Beach, New South Wales, commencing on the date of signature of this permit and extending for a period of fifty years, subject to conditions which are specified in Appendix 1.

DATE.....22nd.....day of.....March.....2010

Vicki Middleton
.....
VICKI MIDDLETON
Delegate of the Minister

This permit comprises six (6) pages, including Appendix 1.

Appendix 1

CONDITIONS FOR ARTIFICIAL REEF PLACEMENT OF THE VESSEL "Ex-HMAS *ADELAIDE*", OFF AVOCA BEACH, NEW SOUTH WALES.

Definitions

In this permit:

"the Act"	means the *Environment Protection (Sea Dumping) Act 1981*;
"the Application"	means the Application for a permit under the *Environment Protection (Sea Dumping) Act 1981* submitted by the NSW Lands and Property Management Authority, received by the Department on 16 December 2008;
"the Department"	means the Department of the Environment, Water, Heritage and the Arts, Ports and Marine Section, GPO Box 787, Canberra ACT 2601. Telephone – 02 6274 1111 Facsimile – 02 6274 1620 Email – portsandmarine@environment.gov.au or successor entities;
"Ex- HMAS *Adelaide*"	means the decommissioned FFG-7 Class Guided Missile Frigate *Ex-HMAS Adelaide*;
"environmental incident"	any event which has the potential to, or does impact, on the environment;
"environmental risk"	any risk, additional to those risks previously identified in the Application, which has the potential to, or does impact, on the environment;
" final exclusion zone"	means the area within a radius of 500 metres of the *Ex-HMAS Adelaide* following the successful scuttling of the vessel and prior to the vessel being opened to the public as specified in the scuttling Plan;
"IALA"	means the International Association of Lighthouse Authorities;
"initial exclusion zone"	means the area within a radius of 1000 metres of the *Ex-HMAS Adelaide* during placement;
"LAT"	means lowest astronomical tide;
"LTMMP"	means the Long Term Monitoring and Management Plan (Revision D) received by the Department on 17 March 2010;
"Minister"	means the Australian Government Minister who administers the *Environment Protection (Sea Dumping) Act 1981*;
"monitoring zone"	means within 2 nm radius of the *Ex-HMAS Adelaide*;
"placement"	includes all activities associated with the placement permitted under this permit, including, but not limited to the placement of the *Ex-HMAS Adelaide*.

2

"Scuttling Plan"	means the Scuttling Plan (Revision 3) for the *Ex-HMAS Adelaide* received by the Department on 17 March 2010;
"LPMA"	means the New South Wales Land and Property Management Authority, PO Box 2185, Dangar, NSW, 2309; and
"unauthorised people, boats"	means any people and boats not authorised by NSW Maritime to be within the initial exclusion zone.

1. Except so far as the contrary intention appears, terms used in these conditions to this permit have the same meaning as such terms in the Act.

Material to be Placed

2. LPMA must place the *Ex-HMAS Adelaide* in the same preparation condition as per the ship inspection on 25 February 2010, with the addition of the following clean up preparations:
   (a) all temporary barricades, planks, wooden or steel blanking and other safety fittings are removed;
   (b) all ladders not permanently fixed into place and intended to remain in that position post scuttling are to be either removed or lowered to the deck;
   (c) the mast/structure must be modified to give a minimum over water clearance of 6 m at LAT immediately after scuttling; and
   (d) the ship must be cleaned of all other loose, unattached material and debris.

   LPMA must notify the Department in writing that the above preparations have been completed prior to the scuttling of the *Ex-HMAS Adelaide*.

3. LPMA must ensure no material additional to the *Ex-HMAS Adelaide*, in the condition described under Condition 2, is to be taken to sea and disposed of in association with this placement.

Location of Placement Site

4. LPMA must place the *Ex-HMAS Adelaide* on the designated scuttling datum of 151° 27.38 East, 33°.27.91 South. (MGA 94, Easting 356,551.686, Northing 6,296,076.969)

Conditions Applying Prior to Placement

5. LPMA must ensure the scuttling of the *Ex-HMAS Adelaide* is undertaken in accordance with the Scuttling Plan.

6. LPMA must advise the Department the planned date and time of commencement of the tow and scuttling process no less than 24 hours in advance of the tow commencing.

7. LPMA must advise the Department and other relevant authorities as soon as practicable of any delay, postponement or cancellation of the final tow and scuttling, whether due to actual or forecast weather or sea conditions or any other contingency or incident.

8. LPMA must ensure the pyrotechnic display is conducted as per the scuttling plan. All 28 pyrotechnic units must be removed as part of the post scuttling activities.

9. The person engaged to manage the deployment and detonation of explosives (including pyrotechnics) used in the placement of the Ex-HMAS Adelaide, must hold a current shotfirers permit.

10. LPMA must undertake visual reconnaissance of the placement area using binoculars from the shot firing vessel and by a spotter aircraft before and during the placement phase to ensure the exclusion zone of 1000 metres is clear of all unauthorised people or boats. The initial exclusion zone must be maintained until such time as the *Ex-HMAS Adelaide* is checked for non-detonated explosives and declared safe. Any unauthorised people or boats not essential to the scuttling straying into the exclusion zone are to be requested to clear and/or be escorted to the exclusion zone boundary. Scuttling charges are not to be detonated if any unauthorised people or boats are within the exclusion zone.

11. LPMA must ensure a spotter aircraft is in the air above the placement site at least 30 minutes prior to and during the placement phase to ensure that no cetacean, seal, Grey Nurse shark or great white shark are within a 2 nautical mile radius of the *Ex-HMAS Adelaide*. Detonation of the scuttling charges is to be suspended should any cetacean, seal, Grey Nurse Shark or Great White Shark be detected within a 2 nautical mile radius of the *Ex-HMAS Adelaide*, and must remain suspended until such time as the cetacean, seal or great white shark has been seen to leave the monitoring zone or until 30 minutes after the last sighting of the cetacean, seal, Grey Nurse Shark or Great White Shark within the monitoring zone. The spotter aircraft must maintain audio contact with the shot firing vessel monitoring the scuttling to ensure that the above procedures are followed.

12. LPMA must ensure no persons, vessel or aircraft pursue, herd or harass any cetacean, seal, Grey Nurse Shark or Great White Shark prior to or during the placement phase.

Conditions Applying Following the Placement

14. LPMA must ensure that the *Ex-HMAS Adelaide* sinks and settles on the seabed, and that the placement occurs centrally within the scuttling zone specified in Condition 4.

15. LPMA must undertake visual footage of the scuttling, including video reconnaissance of the placement location, and sea surface, immediately after placement, to detect the presence, or confirm the absence, of any visible pollution or debris, such as oil slicks or floating material. Any material left floating after the placement operation must be retrieved prior to access by recreational divers.

16. LPMA must ensure that after the *Ex-HMAS Adelaide* has been placed, a diving team checks all explosives have been detonated correctly. In the event that an explosive fails to detonate, it is to be made safe prior to the initial exclusion zone being removed.

17. LPMA must ensure that the highest point of the *Ex-HMAS Adelaide* is no less than 6.0 m below sea level at LAT immediately following placement. If this was not achieved during placement, then the mast and/or other structure must be lowered to the required height prior within 14 days.

18. LPMA must ensure after the placement, and prior to the final exclusion zone being removed, that a diving team inspects the *Ex-HMAS Adelaide*, and undertakes all repair work required to ensure that the *Ex-HMAS Adelaide* is safe for recreational divers.

19. LPMA must ensure within 5 days of scuttling, the *Ex-HMAS Adelaide* is to be marked as a navigation hazard by a marker that conforms to the IALA maritime buoyage system. The marker must be effective during all visibility conditions.

20. LPMA must provide a report to the Department within 5 days of placement which includes:

    (a) date and time of placement;

    (b) the position of the *Ex-HMAS Adelaide* (confirmation of the placement site to two decimal places of a minute, plus horizontal datum, in latitude and longitude format);

    (c) the estimated depth of water over the *Ex-HMAS Adelaide* as measured at LAT, and the date and time of the observation;

    (d) video footage (as specified in Condition 15) including a discussion on the scuttling detailing whether any problems arose during the scuttling, how they were rectified and if any clean up actions were undertaken;

    (e) verification from an independent observer, agreed by the Department, of the highest point of the vessel (as specified in Condition 17) prior to the exclusion zone being removed;

    (f) details of the inspection dive (as specified in Condition 18) including whether any items were removed or hazards rectified;

    (g) confirming the removal of all pyrotechnics equipment from the vessel (as specified in condition 9);

    (h) the position and description of the cardinal mark and any other visual indicators (e.g. buoys and/or lights) marking the wreck;

    (i) evidence of notification to the RAN Hydrographic Office and NSW Maritime as specified in Condition 21;

21. LPMA must provide the details specified in Condition 20 (a), (b), (c) and (h) to the Australian Hydrographic Office and NSW Maritime within 5 days of placement.

Environmental Risk and Incidents

22. If, at any time during the course of the placement activities, an environmental incident occurs or environmental risk is identified, or the placement does not occur in accordance with the Scuttling Plan as specified in Condition 5, all measures must be taken immediately by LPMA to mitigate the risk or the impact. The Department must be notified in writing within 24 hours of the occurrence or identification of an environmental incident or risk, and the measures taken, the success or otherwise of those measures in addressing the incident or risk, and any additional measures proposed to be taken or advised by the Department.

Monitoring and Reporting

23. LPMA must implement the Long Term Management and Monitoring Plan (LTMMP) for the *Ex-HMAS Adelaide* following the scuttling of the vessel. The results of the LTMMP must be published on the *Ex-HMAS Adelaide's* website (www.hmasadelaide.nsw.gov.au) within 1 month of the completion of sampling for the life of the LTMMP.

24. LPMA may submit for the Minister's approval a revised version of the LTMMP specified under Condition 23. If the Minister approves such a revised LTMMP, that LTMMP must be implemented in place of the LTMMP as originally approved.

25. If the Minister believes that it is necessary or desirable for the better protection of the environment to do so, the Minister may request LPMA to make specified revisions to the LTMMP and submit the revised LTMMP for the Minister's approval. If the Minister approves a revised LTMMP pursuant to this condition, the LPMA must implement that LTMMP instead of the LTMMP as originally approved.

26. A review of the LTMMP must be undertaken within five years of scuttling with the revised version submitted to the Minister for approval. A revised LTMMP must not be implemented until it is approved by the Minister. If the Minister approves a revised LTMMP pursuant to this condition, the LPMA must implement that LTMMP instead of the LTMMP as originally approved.

Compliance of all Parties engaged in dumping activities

27. LPMA must ensure that all persons engaged in the placement activities under this permit, including the owner(s) and person(s) in charge of the vessel, comply with this permit and the requirements of the Act.

Access for Observers

28. LPMA must allow at least two Australian Government nominees access to witness, inspect, examine or audit any part of the operations, including any placement or monitoring activity, the vessel or any other equipment, or any documented records, and are to be provided with any necessary assistance in carrying out their duties.

Auditing

29. After placement of the *Ex-HMAS Adelaide*, if the Department believes that it is necessary or desirable to undertake an audit of the permit conditions, LPMA must comply with any such request and must provide any necessary assistance to the Department's representatives in carrying out their duties.

Appendix B Register of Barred Off Items

Advisian

WorleyParsons Group

Department of Industry Crown Lands and Water
Ex-HMAS Adelaide Artificial Dive Reef
Revised Long Term Monitoring and Management Plan - 2017-2026

Ex HMAS Adelaide
Register of Barred OFF Items

Item #	Description	Location	Deck	Compartment #	Location Frame	Photo #
1	Escape Hatch		02 Deck	Upper Deck	Frame 144 Starboard	1
2	Escape Hatch		02 Deck	Upper Deck	Frame 177 Starboard	2
3	Port Hole	Missile Launcher Control Room	01 Deck	01-100-2-C	Frame 100 Port	3
4	Ceiling	Captains Toilet & Shower	01 Deck	01-108-2-L	Frame 109	4
5	Trunk Opening	Fan Room	01 Deck	01-180-1-Q	Frame 185 Starboard	5
6	Trunk Opening	Passageway	01 Deck	01-212-0-L	Frame 213 Starboard	6
7	Escape Hatch	Plenum Chamber	01 Deck	01-250-1-Q	Frame 251	7
8	Escape Hatch	Plenum Chamber	01 Deck	01-250-2-Q	Frame 251	8
9	Trunk Opening	Sonobuoy Room #2	01 Deck	01-278-1-A	Frame 280 Inboard	9
10	Trunk Opening	Helicopter Hanger #1 Catwalk	01 Deck	1-278-1-Q	Frame 292	10
11	Trunk Openings	Helicopter Hanger #1 Catwalk	01 Deck	1-278-1-Q	Frame 309	11
12	Trunk Openings	Fan Room	1 Deck	1-100-1-Q	Frame 101	12
13	Trunk Opening	Fan Room	1 Deck	1-152-1-Q	Frame 154 Outboard	13
14	Trunk Opening	Fan Room	1 Deck	1-152-1-Q	Frame 162 Inboard	14
15	Trunk Opening	Wardroom	1 Deck	1-180-0-L	Frame 187	15
16	Opening in Deck	Wardroom	1 Deck	1-180-0-L	Frame 189	16
17	Escape Hatch	Passageway	1 Deck	1-108-2-L	Frame 210 Port	17
18	Trunk Opening	Passageway	1 Deck	1-212-0-L	Frame 213 Starboard	18
19	Trunk Opening	Passageway	1 Deck	1-212-0-L	Frame 213 Port	19
20	Trunk Opening	Passageway	1 Deck	1-212-0-L	Frame 247	20
22	Trunk Opening	Torpedo Magazine	1 Deck	1-220-0-M	Frame 247	21
21	Escape Hatch	Passageway	1 Deck	1-212-0-L	Frame 326	22
23	Escape Hatch	Passageway	1 Deck	1-250-3-L	Frame 251 Starboard	23
24	Escape Hatch	Passageway	1 Deck	1-250-4-L	Frame 251 Port	24
25	Trunk Opening	Helicopter Workshop	1 Deck	1-253-2-Q	Frame 264 Inboard	25
26	Trunk Opening	400Hz Freq Changer Room	1 Deck	1-258-1-Q	Frame 262	26
27	Trunk Opening	Helicopter Hangar #1	1 Deck	1-278-1-Q	Frame 293 Inboard	27
28	Trunk Opening	Helicopter Hangar #1	1 Deck	1-278-1-Q	Frame 312 Inboard	28
29	Trunk Opening	Helicopter Hangar #1	1 Deck	1-278-1-Q	Frame 315 Inboard	29
30	Trunk Opening	Helicopter Hangar #2	1 Deck	1-278-2-Q	Frame 312 Inboard	30
31	Trunk Opening	Helicopter Hangar #2	1 Deck	1-278-2-Q	Frame 315 Inboard	31
32	Trunk Opening	Passageway	2 Deck	2-64-0-L	Frame 100 Port	32
33	Trunk Opening	IC & Gyro Room	2 Deck	2-79-0-C	Frame 98 Starboard	33
34	Trunk Opening	CPO Dressing Space	2 Deck	2-152-0-L	Frame 154	34
35	Trunk Opening	CPO Berthing Space #3	2 Deck	2-171-3-L	Frame 178	35
36	Exhaust Opening	Galley	2 Deck	2-180-0-Q	Frame 181 Starboard	36
37	Trunk Opening	Galley	2 Deck	2-180-0-Q	Frame 190	37
38	Trunk Opening	Galley	2 Deck	2-180-0-Q	Frame 202	38
39	Trunk Opening	CPO Dining Space	2 Deck	2-180-2-L	Frame 197	39
40	Dishwasher both ends	Scullery	2 Deck	2-203-2-Q	Frame 210	40
41	Trunk Opening	Jr Sailors Dining Area	2 Deck	2-212-0-L	Frame 213 Starboard	41
42	Trunk Opening	Trash Disposal Room	2 Deck	2-237-1-Q	Frame 244 Inboard #1	42
43	Trunk Opening	Trash Disposal Room	2 Deck	2-237-1-Q	Frame 244 Inboard #2	43
44	Opening	Passageway	2 Deck	2-292-0-L	Frame 312 Port	44
45	Trunk Opening	Engineers Workshop	2 Deck	2-292-2-Q	Frame 313 Inboard	45
46	Space Around Electrical Equipment Cabinet	Electrical Shop	2 Deck	2-316-2-Q	Frame325	46 & 47

Advisian

WorleyParsons Group

Department of Industry Crown Lands and Water
Ex-HMAS Adelaide Artificial Dive Reef
Revised Long Term Monitoring and Management Plan - 2017-2026

Ex HMAS Adelaide
Register of Barred OFF Items

Item #	Description	Location	Deck	Compartment #	Location Frame	Photo #
47	Manhole	Void	3 Deck	3-64-1-V	Frame 76 Starboard	48
48	Manhole	Void	3 Deck	3-64-2-V	Frame 76 Port	49
49	Opening	Magazine Service Room	4 Deck	4-64-0-M	Frame 77	50
50	Opening Between CHT Tank and Bulkhead	Sewage Collecting Holding & Boiler	4 Deck	4-160-0-Q	Frame 179	51 & 52
51	Space Foreward of Engine between Misc Equipment	AMR1	4 Deck	5-180-0-E	Frame 182	53
52	Space under Engine and Generator	AMR1	4 Deck	5-180-0-E	Frame 182 to Frame 203	54
53	Space under Escape Trunk	AMR1	4 Deck	5-180-0-E	Frame 203 to Frame 208 Port	55
54	Deck level around Engine and Generator	AMR2	3 Deck	5-212-0-E	Frame 225 to Frame 250 Starboard	56 & 57
55	Deck level around Engine and Generator	AMR2	3 Deck	5-212-0-E	Frame 225 to Frame 250 Port	58 & 59
56	Space below Engine and Generator	AMR2	5 Deck	5-212-0-E	Frame 225 to Frame 250 Starboard	60 & 61
57	Space below Engine and Generator	AMR2	5 Deck	5-212-0-E	Frame 225 to Frame 250 Port	62 & 63
58	Space around Misc Machinery	AMR2	5 Deck	5-212-0-E	Frame 238 to Frame 250 Centreline	64, 65 & 66
59	Trunk Opening	AMR2	3 Deck	5-212-0-E	Frame 244 Port - Deckhead	67
60	Space Between Gas Turbine Intake and Bulkhead	Engine Room	2 Deck	5-250-0-E	Frame 250 Stbd	68
61	Space Between Gas Turbine Intake and Bulkhead	Engine Room	2 Deck	5-250-0-E	Frame 250 Port	69
62	Space Between Gas Turbine Intake and Gas Turbine Module	Engine Room	2 Deck	5-250-0-E	Frames 251 - 257 Stbd	70
63	Space Between Gas Turbine Intake and Gas Turbine Module	Engine Room	2 Deck	5-250-0-E	Frames 251 - 257 Port	71
64	Space Between Engine Module and Deck	Engine Room	2 Deck	5-250-0-E	Frames 254 - 275 Starboard	72
65	Space Between Engine Module and Deck	Engine Room	2 Deck	5-250-0-E	Frames 254 - 275 Port	73 & 74
66	Space Between Gas Turbine Uptake and Gas Turbine Module	Engine Room	2 Deck	5-250-0-E	Frames 271 - 277 Stbd	75
67	Space Between Gas Turbine Uptake and Gas Turbine Module	Engine Room	2 Deck	5-250-0-E	Frames 271 - 277 Port	76
68	Space under Engine Module	Engine Room	4 Deck	5-250-0-E	Frame 260, Frame 264, Frame 265 Starboard	77, 78 & 79
69	Space under Engine Module	Engine Room	4 Deck	5-250-0-E	Frame 260, Frame 264, Frame 265 Port	80, 81 & 82
70	Space Between Engine Module and Gearbox (A Frame)	Engine Room	4 Deck	5-250-0-E	Frame 278 Starboard	83
71	Space Between Engine Module and Gearbox (A Frame)	Engine Room	4 Deck	5-250-0-E	Frame 278 Port	84
72	Space Beside Gearbox lower area	Engine Room	4 Deck	5-250-0-E	Frame 282 to Frame 288 Starboard	85
73	Space Beside Gearbox lower area	Engine Room	4 Deck	5-250-0-E	Frame 282 to Frame 288 Port	86
74	Space below Gearbox	Engine Room	4 Deck	5-250-0-E	Frame 288 Starboard	87
75	Space below Gearbox	Engine Room	4 Deck	5-250-0-E	Frame 288 Port	88
76	Space under Service Tanks	AMR3	3 Deck	5-292-0-E	Frame 292 to Frame 298 Port	89

Appendix C Register of Rapid Deterioration Items

Advisian

WorleyParsons Group

Department of Industry Crown Lands and Water
Ex-HMAS Adelaide Artificial Dive Reef
Revised Long Term Monitoring and Management Plan - 2017-2026

Ex HMAS Adelaide
Register of Rapid Deterioration Items

Item #	Description	Location	Deck	Compartment #	Location Frame	Photo #
1	Captains Chair	Bridge	02 Deck	02-100-0-C	Frame 106 Starboard	1
2	Chart Table & Chart	Chart Room	02 Deck	02-116-2-C	Frame 122 Port	2
3	Cabinet	Mk 92 Equipment Room	02 Deck	02-116-1-Q	Frame 120 Starboard	3
4	Cupboards & Honeycomb Bulkhead	Captains Pantry	01 Deck	01-108-4-Q	Frame 108 Port	4
5	Cupboards	Operations Room	01 Deck	01-113-0-C	Frame 122 Starboard	5
6	Lamp with Extention Arm	Communications Centre	01 Deck	01-156-0-C	Frame 162	6
7	Desks & Cupboards	Communications Centre	01 Deck	01-156-0-C	Frame 162	7
8	Desks & Cupboards	Communications Centre	01 Deck	01-156-0-C	Frame 168	8
9	Desks & Cupboards	Communications Centre	01 Deck	01-156-0-C	Frame 178 Centreline	9
10	Cabinet	ECM Room	01 Deck	01-180-0-Q	Frame 190	10
11	Cabinet	ECM Room	01 Deck	01-180-0-Q	Frame 193	11
12	Cabinets	Officers Staterooms XO/MEO	01 Deck	01-215-2-L	Frame 223	12
13	Honeycomb Bulkhead	Officers WC & Shower	01 Deck	01-220-2-L	Frame 220 Port	13
14	Cabinet & Shelf	76mm Ammo Magazine Local Control Room	01 Deck	01-238-2-C	Frame 238 Port	14
15	Desk	Helocopter Office	01 Deck	01-285-0-Q	Frame 292 Centreline	15
16	Lamp with Extention Arm	Radar, IFF, CIC Equipment Room	1 Deck	1-100-0-C	Frame 112 Port	16
17	Desk & Cabinet	Radar, IFF, CIC Equipment Room	1 Deck	1-100-0-C	Frame 112 Port	17
18	Cabinet	Radar, IFF, CIC Equipment Room	1 Deck	1-100-0-C	Frame 125 Port	18
19	Bunks, Honeycomb Bulkhead & Cupboards	Officers Staterooms 3	1 Deck	1-140-0-L	Frame 140 Centreline	19
20	Bunks, Honeycomb Bulkhead & Cupboards	Officers Staterooms 2	1 Deck	1-140-2-L	Frame 140 Port	20
21	Honeycomb Bulkhead	Officers Staterooms 2	1 Deck	1-140-2-L	Frame 148 Port	21
22	Honeycomb Bulkhead	Officers WC & Shower	1 Deck	1-151-1-L	Frame 151 Starboard	22
23	Bunks, Honeycomb Bulkhead & Cupboards	Officers Staterooms 4	1 Deck	1-156-2-L	Frame 156 Port	23
24	Honeycomb Bulkhead & Cupboards	Officers Staterooms 5	1 Deck	1-164-1-L	Frame 164 Starboard	24
25	Bunks, Honeycomb Bulkhead & Cupboards	Officers Staterooms 6	1 Deck	1-164-2-L	Frame 164 Port	25
26	Bunks, Honeycomb Bulkhead & Cupboards	Officers Staterooms 8	1 Deck	1-172-2-L	Frame 172 Port	26
27	Trunking	Passageway	1 Deck	1-108-2-L	Frame 180 Port	27
28	Honeycomb Bulkhead	Wardroom	1 Deck	1-180-0-L	Frame 188 to Frame 202 Port	28
29	Honeycomb Bulkhead	Wardroom Pantry	1 Deck	1-198-1-L	Frame 198 Starboard	29
30	Trunking	Passageway	1 Deck	1-212-0-L	Frame 246 Starboard	30
31	Desk & Cabinet	Helicopter Workshop	1 Deck	1-253-2-Q	Frame 253 Port	31
32	Cabinet	Helicopter Hangar #1	1 Deck	1-278-1-Q	Frame 312 Starboard	32
33	Cabinet	Helicopter Hangar #2	1 Deck	1-278-2-Q	Frame 312 Port	33
34	Rack and Shelving	Bosuns Storeroom #1	2 Deck	2-Z-0-A	Frame 19 Port	34
35	Cupboards	Windlass Room	2 Deck	2-32-0-Q	Frame 32 Starboard	35
36	Desk	Registered Publication Vault	2 Deck	2-48-2-Q	Frame 52 Port	36
37	Cabinet	Foreward Repair #2	2 Deck	2-55-1-A	Frame 56 Starboard	37
38	Desks	IC, Gyro Room & Electronic Shop	2 Deck	2-79-0-C	Frame 79 Centreline & Frame 98 Starboard	38 & 39
39	Honeycomb Bulkhead	PO Sanitary Space	2 Deck	2-111-0-L	Frame 111 Centreline	40
40	Honeycomb Bulkhead	Junior Sailors Sanitary Space	2 Deck	2-111-1-L	Frame 112 Starboard	41
41	Bunks, Honeycomb Bulkhead & Cupboards	POs Sleeping Space	2 Deck	2-120-2-L	Frame 120 Port	42
42	Bunks, Honeycomb Bulkhead & Cupboards	POs Sleeping Space	2 Deck	2-120-2-L	Frame 126 Port	43
44	Bunks & Honeycomb Bulkhead	Officers Stateroom	2 Deck	2-140-1-L	Frame 140 Starboard	44
45	Honeycomb Bulkhead & Cupboards	Officers WC & Shower	2 Deck	2-140-2-L	Frame 140 Port	45
46	Honeycomb Bulkhead	Next to Passageway near doorway	2 Deck	2-140-2-Q	Frame 140 Port	46
47	Honeycomb Bulkhead & Cupboards	Medical Treatment Room	2 Deck	2-152-2-L	Frame 152 Port	47

Ex HMAS Adelaide
Register of Rapid Deterioration Items

Item #	Description	Location	Deck	Compartment #	Location Frame	Photo #
48	Operating Table	Medical Treatment Room	2 Deck	2-152-2-L	Frame 158 Port	48
49	Honeycomb Bulkheads and Doors	Medical Treatment Room	2 Deck	2-152-2-L	Frame 161 Port	49
50	Desk and Cabinet	Medical Treatment Room	2 Deck	2-152-2-L	Frame 166 Port	50
51	Honeycomb Bulkhead	CPO WC & Shower	2 Deck	2-154-0-L	Frame 154 Centreline	51
52	Bunks & Honeycomb Bulkhead	CPO Berthing	2 Deck	2-171-3-L	Frame 171 Starboard	52
53	Cupboards	CPO Berthing	2 Deck	2-171-1-L	Frame 171 Starboard	53
54	Honeycomb Bulkhead	Galley	2 Deck	2-180-0-Q	Frame 184 Starboard Outboard	54
55	Honeycomb Bulkhead and Fittings	Galley	2 Deck	2-180-0-Q	Frame 184 Starboard Inboard	55
56	Bench & Cupboards	Galley	2 Deck	2-180-0-Q	Frame 188 Starboard Inboard	56
57	Cupboard	Galley	2 Deck	2-180-0-Q	Frame 203 Starboard Inboard	57
58	Honeycomb Bulkheads & Cupboards	Galley	2 Deck	2-180-0-Q	Frame 210 Starboard Outboard	58
59	Honeycomb Bulkheads & Cupboards	Galley	2 Deck	2-180-0-Q	Frame 210 Starboard Inboard	59
60	Honeycomb Bulkhead	CPO Dining Space	2 Deck	2-180-2-L	Frame 187 Port	60
61	Honeycomb Bulkhead	CPO Dining Space	2 Deck	2-180-2-L	Frame 195 to Frame 199 Port	61
62	Honeycomb Bulkhead	Scullery	2 Deck	2-203-2-Q	Frame 203 Port (2-180-4-L printed on bulkhead)	62
63	Cabinets	JS Dining Area	2 Deck	2-212-0-L	Frame 214 Starboard	63
64	Cabinet	Repair #5	2 Deck	2-225-1-A	Frame 230	64
65	Shelving	General Workshop	2 Deck	2-292-2-Q	Frame 300 Port	65
66	Fan	General Workshop	2 Deck	2-292-2-Q	Frame 316 Port	66
67	Desk & Honeycomb Bulkhead	Disbursing Office	2 Deck	2-328-0-Q	Frame 328 Centreline	67
68	Cabinets	Aft Repair #3	2 Deck	2-344-2-A	Frame 350 Port	68
69	Honeycomb Bulkhead	PO & Coxswains Office	2 Deck	2-360-0-Q	Frame 360 Centreline	69
70	Honeycomb Bulkhead	Junior Sailors Sanitary Space	3 Deck	3-113-0-L	Frame 113 to Frame 123 Centreline	70
71	Honeycomb Bulkhead	Junior Sailors Sanitary Space	3 Deck	3-140-0-L	Frame 140 to Frame 150 Centreline	71
72	Cabinets	Junior Sailors Berthing & Dressing Space	3 Deck	3-144-0-L	Frame 150 Centreline	72
73	Cabinet	Dry Provisions Storeroom	3 Deck	3-180-5-A	Frame 191 Starboard Inboard	73
74	Cabinet	Dry Provisions Storeroom	3 Deck	3-180-5-A	Frame 191 Starboard Outboard	74
75	Lamp with Extention Arm	Naval Store Storeroom	3 Deck	3-328-0-A	Frame 342 Starboard	75
76	Ironing Presses	Laundry	4 Deck	4-140-0-Q	Frame 143 & Frame 148 Port	76 & 77
77	Fans	Laundry	4 Deck	4-140-0-Q	Frame 150 & Frame 164 Port	78 & 79
78	Workbench and Cabinet	AMR3	3 Deck	5-292-0-E	Frame 300 Starboard	80
79	Trunking	Upper Deck	02 Deck		Frame 178 Port	81
80	Trunking	Upper Deck	02 Deck		Frame 180 Starboard	82
81	Trunking	Upper Deck	02 Deck		Frame 182 Starboard	83
82	Trunking	Upper Deck	02 Deck		Frame 292 Starboard	84
83	Trunking	Upper Deck	02 Deck		Frame 293 and Fame 294 Port	85
84	Trunking	Upper Deck	02 Deck		Frame 303 Port	86
85	Trunking	Upper Deck	02 Deck		Frame 313 Port	87
86	Guardrails	Upper Deck	02 Deck			88, 89 & 90
87	Guardrails	Upper Deck	01 Deck			91
88	Guardrails	Upper Deck	1 Deck			92, 93, 94 & 95
89	Portable Gun Mount Shield	Upper Deck	1 Deck		Frame 168 Port	96
90	Portable Gun Mount Shield	Upper Deck	1 Deck		Frame 171 Starboard	97

Appendix D Ship Drawings – CD ROM

Appendix E Summary of Findings From the First Five Years of Monitoring

Monitoring of Structural Integrity, Stability and Position

Underwater Inspection by McLennans Diving Service - 18th May 2015.

The 18th May 2015 underwater inspection was undertaken by McLennans Diving Service following two significant East Coast Lows. The report prepared by McLennans (10th June 2015) provided the following details regarding impacts to the vessels structure:

- The starboard helicopter hangar wall was missing for a length of 10.5 m horizontally and its full height vertically.
- Four vertical frames were missing (sheared off their weld points at the deck). At the top of the wall the frames had sheared off the corresponding roof frames, taking the knee braces with them.
- There was a loose section at the forward end of the gap which was cracked horizontally for 700 mm near the top and bottom (at the time of survey this section was not moving but was predicted to break off in the next big swell).
- The missing wall relived pressure on the remaining hanger by allowing improved water flow through the hanger, however, one side of the roof had become unsupported. It was expected that the roof would tear apart when the next significant swell hit. If it collapsed downward (rather than onto the seabed) it would present a significant obstruction.

  A review of the above report was undertaken by Shearforce Maritime Services Pty Ltd on 23rd June 2015. Following the review it was the opinion of Shearforce Maritime Services Pty Ltd that:

- The structure forward of the helicopter hanger transverse bulkhead was structurally sound. However, the starboard hanger top structure may deteriorate over time due to a lack of support of the starboard side, therefore this area should be monitored over time.
- Diving activities around the starboard hanger should be suspended and all visiting divers warned to stay clear of that area due to risks associated with jagged metal from the failed areas.

Underwater Inspection by McLennans Diving Service – 13th April 2017.

The most recent annual underwater inspection to monitor structural integrity, stability and position was undertaken by McLennans Diving Service on 13th April 2017. During this inspection McLennans divers made two full sweeps from bow to stern and observed the major monitoring points listed in the LTMMP. The report prepared by McLennans following this dive inspection (dated 18th April 2017) provided the following details:

Structural Integrity

- Steel Hull – Remained unchanged since the previous inspection. No sign of any cracking or deformations. Main deck was free of cracking with no signs of warping. The hull had a uniform coverage of marine life with few signs of corrosion outbreaks. Corrosion levels appear to be very low. Hull was fully supported by the sand with no scouring observed. The sand level was very close to the ships waterline.
- Aluminium Superstructure – No new cracking of the superstructure was seen. Cracks that existed in the lift shaft area on Deck 02 had not propagated since the previous year's monitoring. The previously jagged edges of the cracks were now completely covered in marine growth indicating a low level of movement.
- LTMMP Monitoring Locations - A number of monitoring locations were examined and showed no new signs of deterioration or deformation.
- Internal Debris – All accessible portals above 30 m were verified as clear. The large swell restricted access to the internal parts of the wreck.

Vessel Stability

- In 2012 the vessel developed a 4 degree list to port. This list remained unchanged in the 2017 inspection.

Vessel Position and Settlement

- Vessel position was unchanged since the previous annual inspection. The trim was unchanged based on water depth measurements at the bow and stern. The vessel had not moved its horizontal position as tested using a GPS.

Corrosion

- No signs of corrosion were observed. Previous inspections had shown tell-tale signs of corrosion (red rusticles on the hull and white corrosion deposits on the superstructure) which were no longer present. The 100% cover of marine growth on exterior surfaces of the vessel indicates that the metal underneath is very stable.

Marine Life

- Marine growth was thicker and more widespread with well-developed over the aft deck, dense cunjevoi and anemones on the upper decks as well as kelp (Ecklonia) beds.
- Fish life was rich.

Conclusions

- Vessel was unchanged since previous annual inspection in June 2016.
- No new dangers were found that could affect recreational divers.
- No signs of corrosion were observed.
- Hanger damage was stable.
- No change in the ships position or list had occurred.

Images from this inspection can be found in the original report (McLennans Diving Service 2017).

A review of the above report was undertaken by Shearforce Maritime Services Pty Ltd on 20th April 2017. Following the review it was the opinion of Shearforce Maritime Services Pty Ltd that:

- The vessel was structurally sound and stable. There were no new factors that may affect recreational divers.

Reef Community Monitoring

The reef community monitoring surveys aimed to gain an understanding of:

1. The types of flora and fauna assemblages present.
2. The rates of development of fouling assemblages and changes over time.
3. Variation in the rates of development of fouling assemblages on different surfaces of the vessel (i.e. horizontal vs vertical).
4. The presence of introduced or pest species.

After a baseline survey (WorleyParsons 2011) and 13 post-scuttling surveys (Cardno 2016b), a total of 42 taxa / taxon groups were identified on the vessel, with the ten most numerically abundant taxa in terms of percentage cover being serpulid, barnacle and encrusting algae matrix (57.8%), large barnacles and brown filamentous algae (7.2%), solitary ascidians (6.7%), serpulid polychaetes (6.5%), jewel anemones (4.4%), brown filamentous algae (4.3%), kelp (2.3%), early colonising matrix (2.2%), base surface (1.3%) and red encrusting algae (1.3%) (Cardno 2016a and 2016b).

Multivariate analysis indicated that there were changes in reef assemblages over time, with significant differences in the overall assemblage composition between surveys (regardless of transect position / orientation). During the baseline survey very little growth was observed. Survey 1 was characterised by relatively monospecific matrices of serpulid worms and / or serpulids with barnacles and encrusting algae. Surveys 2 and 3 were similar to Survey 1 but also included solitary ascidians. Surveys 4 to 9 were

characterised by a high percentage of serpulids, barnacles and encrusting algae. The most recent surveys (Survey 11 to 13) were represented by more taxonomically diverse assemblages with jewel anemones, solitary ascidians, yellow sponges and brown filamentous algae (Cardno 2016a and 2016b). Ongoing changes in reef assemblages on the Ex-HMAS Adelaide indicate that the epibenthic assemblage is still developing and has not yet reached a state of equilibrium (Cardno 2016a and 2016b). To reach a state of equilibrium has been shown to take several decades, rather than years (Perkol-Finkel and Benayahu 2007) so may only be seen after much longer term surveys.

Surface orientation was a significant factor in structuring the epibenthic assemblages on the vessel for the first five years post-scuttling. The assemblages associated with horizontal deck surfaces were significantly different from those on the vertical surfaces of the hull during all surveys. The taxa predominantly associated with horizontal deck surfaces were serpulids with barnacles and encrusting algae matrix, red encrusting algae and red filamentous algae. Kelp (*Ecklonia radiata*) was only recorded on horizontal deck surfaces (mainly in the mid-ship area) and never on vertical surfaces over the five year period. The vertical surfaces of the vessel were consistently inhabited by solitary ascidians (e.g. *Herdmania momus*) and anemones (e.g. the jewel anemone, *Corynactis australis*), for all surveys during which they were recorded. Bryozoans and sponges were only ever recorded on vertical surfaces (and were only recorded in some of the 13 surveys) (Cardno 2016a and 2016b).

Depth was also a significant factor in structuring the epibenthic assemblages on the vessel for the first five years post-scuttling. Assemblages associated with deep surfaces between 20 – 30 m were significantly different to those associated with shallower 13 – 20 m surfaces across all surveys. Shallow transects were characterised by the presence of kelp (*E. radiata*), brown algae (*Lobophora sp*.) and red encrusting algae (which were not present on deep photo quadrats or had comparatively lower percentage cover). Serpulid, barnacle and encrusting algae matrix occurred on both shallow and deep surfaces but was consistently more prevalent on the deeper transects (Cardno 2016a and 2016b).

Fixed photograph analysis (of various ship structures) showed a rapid colonisation of the vessel during the first six months post-scuttling with an encrusting layer of serpulids, small and large barnacles, filamentous and encrusting algae, bryozoans and hydroids. More complex structures e.g. ladders, railings and mast structures, were quickly colonised by large barnacles, solitary ascidians, as well as a matrix of filamentous algae, hydroids, sponges and bryozoans. Over time kelp, white papillate sponges, soft tree corals and small tubular sponges appeared on the fixed photo surfaces. In general, after an initial rapid colonisation, the encrusting layer gradually developed over the first five years post-scuttling, with subtle differences in thickness and complexity between different structures seen (Cardno 2016a and 2016b).

While not a requirement of the original LTMMP, fish species utilising the vessel were recorded during all reef surveys. Fish taxa identified during the 13 post-scuttling surveys included 62 species from 31 families. There was a clear increase in the number of species identified over time. The family Monacanthidae (leatherjackets) was represented by the highest number of species (seven species), Labridae (wrasses) by six species, Carangidae (trevallies, jacks, mackerels and scad) by five species, Pomacentridae (damselfishes) by four species, Serranidae (bass and grouper) by three species and Cheilodactylidae (morwongs) by three species. All other families had less than one or two species.

Many of the species were recorded only once over the five year monitoring period. No species of threatened or protected fish were recorded (although anecdotal evidence suggests that grey nurse sharks, *Carcharius taurus*, may occur at the site on occasion) (Cardno 2016a and 2016b).

No marine pest species listed by NSW DPI which are known to occur in NSW, or known to occur in Australia, were detected on the vessel in any photquadrats, fixed photos, video footage or scrapings taken during the first five years of post-scuttling monitoring. However, one species of potentially introduced barnacle, the Panamanian large barnacle (*Megabalanus coccopoma*) has been observed on the vessel. While this species, and similar introduced species, may be problematic as fouling organisms, they do not pose a threat to native species or ecosystems (Cardno 2016a and 2016b).

Although no marine pest species have been identified on the vessel to date, the methods used for identification to date have been limited to diver observation, photquadrats and video footage. Cardno (2016a) notes that any small and cryptic pest species e.g. crabs, mussels and fan worms, would now be difficult to identify using these methods alone, as they can be well camouflaged or found in crevices and overhangs. Going forward, a greater variety of marine pest survey methods, targeted at species of interest which have the potential to occur on the vessel (see Cardno 2016a) would be more suitable for the detection of marine pests.

The full reef survey dataset can be found in WorleyParsons (2011b) and Cardno (2016b), along with the specifics of the survey methods and locations for the first five years of monitoring. This report should be referred to for any future reef surveys to allow for meaningful comparisons of changes in reef assemblages on the vessel over longer time periods.

Overall, the reef community monitoring program undertaken during the first five years post-scuttling has met the following aims of the original LTMMP well:

1. It has documented the types of flora and fauna present on the vessel.
2. It has described the rates of development of fouling assemblages and changes over time.
3. It has described variation in rates of development on different surfaces of the vessel.

Considering this, it is not thought that any further reef community monitoring to meet the above aims are necessary. Further surveys undertaken for ecological research or educational purposes could be undertaken outside the ongoing scope of the LTMMP and would provide information on long-term changes at the site. However, no further reef community monitoring to manage environmental risk or safety is considered to be required.

Since the methods adopted during the first five years of monitoring are no longer considered appropriate to properly survey the ship for the occurrence of marine pests (due to the now complex structure and thickness of the reef assemblages), ongoing targeted surveys for marine pest species utilising additional survey methods are recommended (at a reduced frequency).

Sediment Quality Monitoring

The main findings of the first five years of sediment monitoring were summarised by Cardno in their *Review of Ecological Monitoring Five Years Post-scuttling* (Cardno 2016a) as follows:

- In general, the metal concentrations recorded 62 months post-scuttling (June 2016) were similar to those recorded one month post-scuttling (May 2011), indicating that there were no significant long-term effects on sediment quality as a result of the vessel being scuttled.
- There was one exception to the above pattern which was aluminium – aluminium showed an overall increase in concentrations at the impact sites 62 months post-scuttling when compared to one month post-scuttling. The increase appeared to be greater at the impact location than the control location (in June 2016) which may indicate metal corrosion associated with the vessel. However, the difference was not statistically significant due to large variation between control samples.
- Particle size distribution was relatively uniform across sites and therefore was not considered to be a factor in the differences seen in aluminium concentrations between the control and impact sites.
- Metal concentrations recorded six months post-scuttling (October 2011) and 21 months post-scuttling (January 2013) were notably lower than the levels recorded one and 62 months post-scuttling.
- All metals measured for which ANZECC/ARMCANZ (2000) Interim Sediment Quality Guidelines (ISQG) are available (i.e. chromium, copper, nickel, lead and zinc) had concentrations that were well below the ISQG low trigger values and therefore were not considered to be a contamination risk to the marine environment.

Bioaccumulation Monitoring

WorleyParsons undertook the baseline biomonitoring survey on the Ex-HMAS Adelaide one week post-scuttling using the blue mussel, *Mytilus edulis*, as a test organism. Results of the baseline survey showed significant differences in metal (chromium, zinc and lead) concentrations in blue mussel tissue between baseline controls (i.e. mussels sampled from the aquaculture facility prior to deployment) and the vessel impact monitoring sites (i.e. mussels deployed onto the vessel). Concentrations of metals were higher in samples which had been deployed near the vessel (WorleyParsons 2011). Samples from the control sites located ~ 35 m from the vessel were all lost in large seas and via suspected tampering so could not be tested and compared. So without any local or control site data on metal concentrations in blue mussels located away from, but in the vicinity of, the ship this result could not be directly attributed to the presence of the vessel (WorleyParsons 2011).

Results of further biomonitoring surveys undertaken by Cardo Ecology Lab (2012) at seven and 15 months post-scuttling (using the Sydney rock oyster, *Saccostrea glomerata,* as a test organism) showed that chromium concentrations in oyster tissue increased slightly over time at the stern of the ship (however this was also the case for baseline controls – the samples from the aquaculture facility). Concentrations of chromium at midship appeared to decrease substantially from seven to 15 months (although there was a high level of variation in the seven month samples). Zinc concentrations in oyster tissue also increased marginally over time at the stern of the ship and baseline control while concentrations at midship decreased (Cardno Ecology Lab 2012, Cardno 2016a).

Statistical analyses of the data showed no significant differences in the concentration of chromium or zinc in oyster tissue between the seven and 15 month sampling events or between control and impact samples. No oyster tissue samples had concentrations of chromium or zinc which were considered to be of toxicological significance. In summary, the results of the bioaccumulation study showed that there was no contamination of marine biota via zinc chromate paint over the 27 month post-scuttling monitoring period. However, issues with the loss of some samples limited interpretation of results (Cardno Ecology Lab 2012, Cardno 2016a).

More detailed methods and results can be found in WorleyParsons (2011), Cardno Ecology Lab (2012) and Cardno (2016a). These should be referred to for any future biomonitoring.

Appendix F RMS Commercial Mooring Licence Standard Conditions

NSW GOVERNMENT Transport Roads & Maritime Services

THIS IS EXTREMELY IMPORTANT
KEEP FOR REFERENCE

Commercial Mooring Licence Standard Conditions

FAILURE TO COMPLY MAY RESULT IN THE CANCELLATION OF YOUR MOORING LICENCE.

Note:

- Commercial moorings are only issued to:
  - **a business entity or person approved by Roads and Maritime Services**, as trading to provide approved marine type services to the boating public (eg: boat repair, marinas, commercial fishing, charter vessels, boat brokerage, mooring contractor); and
  - Any other business which cannot be accessed by means other than the water ie: there is no land access.
- Commercial moorings can only by sub-let if associated with a marina/boatshed (ie premises consisting of one or more moorings, pontoons, jetties, piers or other structures (whether water-based or landbased)) designed to provide:
  - Accommodation for, or means of securing vessels;
  - Preferably a Slipway, or some other way of taking a vessel out of the water; and
  - One or more of the following, or similar services for vessels: shipwright service, sewage pumpout facilities, dinghy/tender storage, fuel, engineering service, mechanical repair service, tender service, or provisioning services
- The mooring sites may only be used in accordance with the approved purpose of the Licence.

The mooring

The licensee must ensure that:

- The **mooring apparatus** (block and chain) **must be suitable** for the vessel attached thereto and for the mooring area allocated having regard to all possible adverse conditions, including potential flooding in the area. In view of the Mooring Licensee's responsibility in relation to the mooring and mooring apparatus it is strongly recommended that a professional mooring contractor is consulted to ensure that an appropriate mooring apparatus is provided and that it can withstand possible flood conditions when necessary.

- **The mooring apparatus must be kept in good condition and be serviced every 12 months or more frequently if subject to specific mooring conditions. It is strongly recommended that it be serviced by a professional mooring contractor. Proof of mooring service must be produced on request. Roads and Maritime Services will randomly require documentary proof of mooring service.**

- The **mooring buoy must be orange** (unless otherwise approved by Roads and Maritime) or **red for clubs**, be of the preferred type and meet the standard and have the issued identification number on it in characters at least 50mm high.
- Where a **pole/post mooring** exists it **must be kept in good condition** and have the issued Mooring Licence Number on it in characters at least 50mm high starting 250mm from the top in black letters on a white background and face the navigation channel. Nothing is to be attached to/or between the posts except the licensed vessel, without the written permission of Roads and Maritime.
- The **mooring buoy** must be lifted from the water when the vessel is moored. It **must be secured on the foredeck** of the vessel in a way that ensures the identification number can be clearly seen from a passing vessel.

The vessel on a commercial mooring

The licensee must ensure that:

- Only **one vessel is to be attached to each mooring** (unless written approval is given by Roads and Maritime).

- **The vessel is registered or holds a Certificate of Operation** and in survey if required to be under the ***Marine Safety (Domestic Commercial Vessel) National Law Act 2012***, at all times. **NSW registration** or a **NSW issued Certificate of Operation** is required if the vessel has been in NSW for three months or more.
- **The vessel is properly displaying appropriately sized registration** numbers in accordance with the Marine Safety Regulation 2016 and as outlined in the NSW Boating handbook or a vessel Unique Identifier in accordance with the *Marine Safety (Domestic Commercial Vessel) National Law Act 2012*.
- **The vessel is not the subject of any construction, alteration repair work or use** at the mooring that causes, or is likely to cause, annoyance or pollution or contravention of any Regional or Local Environment Plan implemented under the Local Government Act. Approval from Roads and Maritime is also required.
- **The vessel is visually suitable** for the mooring area allocated and is **maintained in a seaworthy condition** (ie, capable of undertaking a voyage under its own power/sail).
- The vessel only occupies the mooring in pursuance of the approved purpose of the Licence and for no other purpose.
- **They are aware that it is prohibited to permanently live onboard a vessel attached to a mooring licensed by Roads and Maritime.** Contact Roads and Maritime for details.

Other

- **The Mooring Licensee is responsible at all times for damage caused by the licensee's vessel (or vessel in their charge) and/or mooring apparatus to any other vessel or property.** It is strongly recommended that the Mooring Licensee have adequate insurance to cover such contingencies as Roads and Maritime bears no responsibility.
- The Mooring Licensee's use of the mooring constitutes acceptance of the allocated mooring site as suitable for the licenced vessel with specific regard to sea room and water depth. Roads and Maritime bears no responsibility in relation to suitability.
- Mooring **fees are payable** until the date that the Mooring Licensee advises Roads and Maritime, in writing, of cancellation, or the date the mooring apparatus/vessel is/ are removed, whichever is the later.

- **Mooring fees are to be paid** on or before "the pay by date".
- **No more than the maximum number of mooring sites** specified by the Commercial Mooring Licence may be in the water.
- The Mooring Licensee must promptly advise Roads and Maritime of any change to the Commercial Mooring Licence details. Change of address/contact telephone number may be advised by phone, however all other changes must be advised in writing.
- The mooring licence may be transferable on sale of the business, subject to Roads and Maritime, and any other statutory approval that may be necessary.
- Roads and Maritime may impose additional conditions to be met by a Commercial Mooring Licensee.

Removal of mooring apparatus

The former Mooring Licensee* must provide to Roads and Maritime within 7 days of cancellation of the Mooring Licence a Statutory Declaration or other written evidence (from a mooring contractor or professional diver) that the mooring apparatus has been removed from the water, unless some other arrangement has been agreed with Roads and Maritime.

Failure to provide the required written evidence may result in Roads and Maritime conducting a check to establish whether the mooring apparatus has been removed. Any cost associated with such inspection, and any associated removal of the mooring apparatus, if applicable, will be the responsibility of the former Mooring Licensee*.

*former Mooring Licensee is the Licensee as at the date of mooring cancellation.

REMEMBER, FAILURE TO COMPLY WITH ANY CONDITION MAY LEAD TO CANCELLATION OF YOUR COMMERCIAL MOORING LICENCE

For further information please contact Roads and Maritime on **13 12 36** (8.30am to 5.00pm Mon to Fri and 8.30am to 4.30pm weekends) or visit our website **www.rms.nsw.gov.au**

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NSW CROWN LANDS (A DIVISION OF THE NSW DEPARTMENT OF PRIMARY INDUSTRIES)

Ex-HMAS ADELAIDE Artificial Reef

Bioaccumulation Study

301020-03410 - DRAFT REV C

28 June 2011

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Executive Summary

The Ex-HMAS ADELAIDE was scuttled off the coast of Terrigal and Avoca Beach on 13 April 2011 for the purpose of creating an artificial reef and recreational dive site. In accordance with the Artificial Reef Permit, NSW Crown Lands (a division of the Department of Primary industries) must implement the approved *Long Term Management and Monitoring Plan* (LTMMP) which includes a Bioaccumulation Study. The objective of the *Bioaccumulation Study* is to determine whether it is likely that resident marine organisms on the Ex-HMAS ADELAIDE (i.e. organisms in direct contact with the vessel) are likely to be affected by degradation of the zinc chromate paint that may have originally been applied on the vessel.

For the *Bioaccumulation Study* the Blue Mussel, *Mytilus edulis*, was used as the test organism. Mussels were deployed to three impact sites on the Ex-HMAS ADELAIDE and two reference sites on mooring lines approximately 35 m from the vessel. Mussel samples collected directly from the source (i.e. the aquaculture facility) were also tested to determine baseline levels of contaminants. In the month following scuttling most of the dive moorings and special marker buoys around the Ex-HMAS ADELAIDE were lost or displaced due to extreme weather conditions and suspected tampering. As a result, mussel bags from the reference sites were never recovered.

Mussels were retrieved from the impact sites after a six weeks deployment period. Mean values were determined for concentrations of chromium, zinc and lead in mussels from each impact site. These values were compared to pre deployment concentrations using analysis of variance (ANOVA). Unfortunately, the comparison of primary interest between the three impact sites and two reference sites was not possible.

Overall, there were significant differences in metals concentrations in mussel tissue between the zero controls and impact sites. *Post hoc* testing identified significant differences in the concentrations of chromium and lead, but no significant differences in zinc concentrations. Although an increase in metal concentrations has been observed between the transplanted mussels and the mussels placed near the vessel, the significant increase noted for lead and chromium cannot be directly attributed to the presence of the vessel without consideration of reference concentrations. Without data from the two reference areas, results are confounded.

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EX-HMAS ADELAIDE ARTIFICIAL REEF
BIOACCUMULATION STUDY

Disclaimer

PROJECT 301020-03410 - EX-HMAS ADELAIDE ARTIFICIAL REEF

DESCRIPTION	ORIG	REVIEW	WORLEY-PARSONS APPROVAL	DATE	CLIENT APPROVAL	DATE
DRAFT Issued for internal review	Dr K Newton	H Houridis		24 June 2011	N/A	
DRAFT Issued for internal review	Dr K Newton	H Houridis	H Houridis	27 June 2011	N/A	27 June 2011
DRAFT Issued for client review	Dr K Newton			28 June 2011		

NSW CROWN LANDS (A DIVISION OF THE NSW DEPARTMENT OF PRIMARY INDUSTRIES)
EX-HMAS ADELAIDE ARTIFICIAL REEF
BIOACCUMULATION STUDY

CONTENTS

Tables

Figures

Appendices

NSW CROWN LANDS (A DIVISION OF THE NSW DEPARTMENT OF PRIMARY INDUSTRIES)
EX-HMAS ADELAIDE ARTIFICIAL REEF
BIOACCUMULATION STUDY

1. INTRODUCTION

The Ex-HMAS ADELAIDE was a long-range escort frigate which was scuttled off the coast of Terrigal and Avoca Beach on Wednesday 13 April 2011 for the purpose of creating an artificial reef and recreational dive site. An Artificial Reef Permit (SD2008/1062) was issued by the Department of Environment, Water, Heritage and the Arts (DEWHA), under the *Environment Protection (Sea Dumping) Act* 1981, in March 2010. In accordance with the Artificial Reef Permit, NSW Crown Lands (a division of the Department of Primary industries) must implement the approved *Long Term Management and Monitoring Plan (LTMMP)*.

The purpose of the LTMMP is to provide for the post-scuttling management and monitoring of the Ex-HMAS ADELAIDE Artificial Reef and covers monitoring for the first five years post-scuttling. The LTMMP contains provision for review, based on the results of the monitoring.

The LTMMP includes requirements to undertake and report changes in the environmental conditions on and around the artificial reef. Specifically, the environmental monitoring includes the following:

- Reef communities survey;
- Sediment movement;
- Sediment quality; and
- Bioaccumulation study.

The results of the initial *Bioaccumulation Study* are provided in this report.

1.1 Background

Zinc chromate was routinely used as an anticorrosive application on the topside of naval vessels. It is understood that the more recent coating formulations on the Ex-HMAS ADELAIDE did not contain chromium salts. After scuttling the zinc chromate paint is expected be subjected to corrosion and microbial attack and will likely deteriorate over time. While the environmental fate of zinc chromate in the marine environment is not well understood, it is assumed that the metal constituents zinc and chromium will be liberated into the marine environment through a processes involving dissolution and flaking. The zinc and chromium will potentially affect marine organisms that foul or live directly on the vessel through a process of bioaccumulation into their tissues.

Biomonitoring of marine fouling organisms on the Ex-HMAS ADELAIDE was proposed in the LTMMP to investigate the potential for bioaccumulation of the products of zinc chromate degradation in the

tissues of resident biota. However, it is acknowledged that the development of fouling communities on the vessel may take some time, so an active biomonitoring study has been proposed until there is sufficient growth / resident biota for direct testing to occur. Active biomonitoring involves the collection of marine organisms from a non impacted / comparatively clean location (e.g. an aquaculture facility) and translocation to a test site / potentially impacted site (e.g. the Ex-HMAS ADELAIDE) for a fixed period of deployment. Following deployment for this fixed period, laboratory analysis is undertaken to determine the concentration of any contaminants of interest that may have accumulated in the tissues of the selected organism.

For the *Bioaccumulation Study* on the Ex-HMAS ADELAIDE the LTMMP proposed that the Blue Mussel, *Mytilus edulis*, be used as the test organism. The contaminant of concern was zinc chromate (N.B. zinc chromate is tested for in the laboratory as chromium and zinc, the products of zinc chromate degradation). In addition, although not stipulated in the LTMMP, lead was also tested for in mussel tissues due to community concern over the previous use of lead paint on the vessel.

The LTMMP required that mussels for the initial *Bioaccumulation Study* be deployed within a month post scuttling. Additional sampling and analysis will be undertaken 12 months post scuttling, with active biomonitoring planned to continue if concentrations of contaminants are elevated or of concern, and if insufficient fouling biota have colonised the vessel to allow for *in situ* sampling. Two control sites (located on the moorings lines located around the vessel) and three impact sites (on the vessel) are required, with mussels being deployed for a period of 6 – 8 weeks.

1.2 Location of the Dive Site

The Ex-HMAS ADELAIDE is located in Bulbararing Bay, between Avoca Beach and Terrigal Headland, on the NSW Central Coast. The ship is located approximately 1.4 km from Terrigal Headland and 1.9 km from Avoca Beach (**Figure 1.1**) with a depth of water over the main mast of 8.02 m LAT (personal communication NSW Crown Lands 2011). **Table 1.1** provides the scuttling co-ordinates for the vessel.

Table 1.1 Co-ordinates of the scuttling location for the Ex-HMAS ADELAIDE.

Latitude / Longitude	Northing / Easting (MGA 94)
Latitude (south): 33˚27.91’	Northing (MGA 94): 6,296,076.969
Longitude (east): 151˚27.38’	Easting (MGA 94): 356,551.686

After site selection studies were completed it was determined that the vessel would be scuttled with an ESE orientation (112º), so that the bow would be facing into the general direction of the largest waves (coming from the SE, ESE and S). As sunk, the vessel is oriented at 116º and is generally upright, with a small list of 2.5 degrees to port (personal communication, Land and Property

Management Authority 2011). The *Review of Environmental Factors* (REF) undertaken for the dive site describes the final scuttling site as being in 32 m of water at Lowest Astronomical Tide (LAT) (WorleyParsons 2009a). After scuttling, the depth of water over the main mast is 8.02 m LAT (personal communication LPMA 2011).

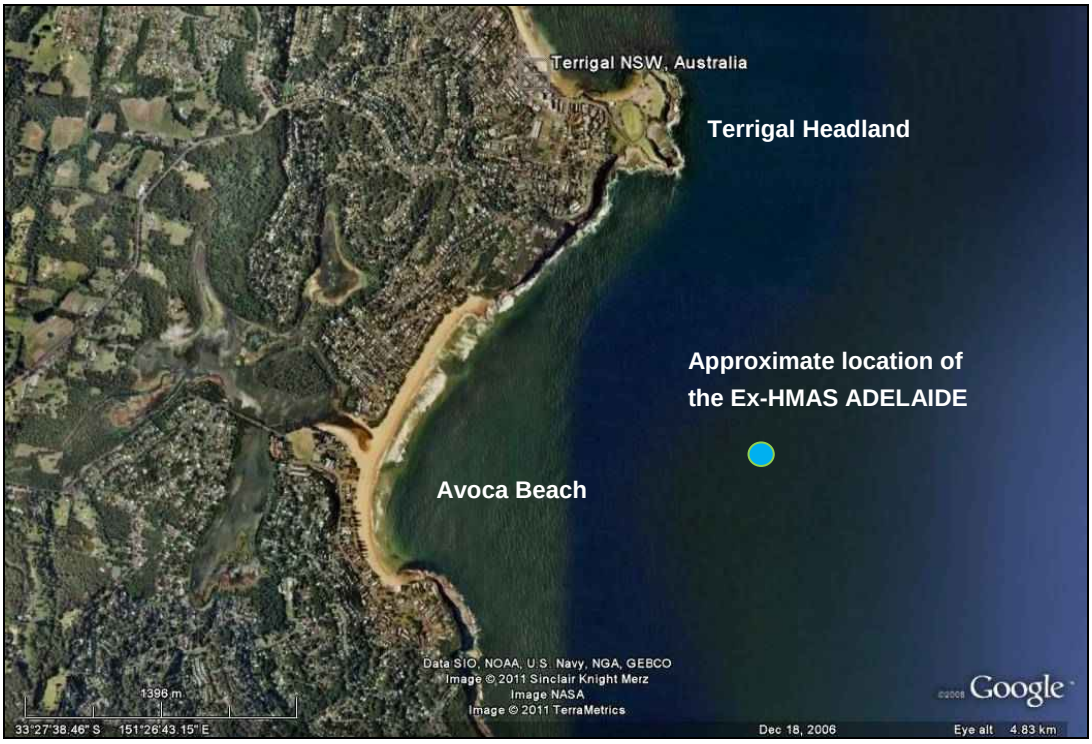


Figure 1.1 Approximate location of the Ex-HMAS ADELAIDE artificial dive reef.

1.3 Study Objective

The objective of the *Bioaccumulation Study* is to determine whether it is likely that resident marine organisms on the Ex-HMAS ADELAIDE (i.e. organisms in direct contact with the vessel) are likely to be affected by degradation of the zinc chromate paint that may have originally been applied on the aluminium alloy vessel.

Section 2 of this report outlines the study methods and **Section 3** provides the results of the *Sediment Quality Survey*. In **Section 4** a discussion of the survey results is provided.

2. METHODS

For the initial *Bioaccumulation Study,* the LTMMP required that mussels be deployed within a month post scuttling. Deployment to reference and impact sites was undertaken on Wednesday19th April 2011; one week after the Ex-HMAS ADELAIDE was sunk. The technical details regarding the mussel bioaccumulation study are based de Kock and Kramer (1994) and the survey design on a previous biomonitoring program undertaken by Haynes and Toohey (1998).

2.1 Mussels

Blue Mussels were sourced from an aquaculture facility, Eden Sea Farms, Eden, located in southern NSW. This is the only aquaculture facility in NSW from which live Blue Mussels are available. All mussels were obtained immediately prior to deployment and were in the size class of 50 to 60 mm. Mussels were transported overnight from the aquaculture facility to the study site in a dark cool Styrofoam esky which contained a small quantity of ice to ensure that mussels survived but were not frozen during transport. Any mussels that were dead on arrival were discarded and not used in the study.

2.2 Experimental Setup

2.2.1 Mussel Bags

Mussels were placed in specially constructed mussel bags, constructed using black UV stable oyster mesh, with a mesh size of 20 x 20 mm to allow sufficient water flow but prevent loss of samples (see **Figure 2.1**). The mussel bags were attached to the vessel (impact sites) and mooring lines (reference sites) using a combination of 15 mm marine grade rope and black cable ties. The mussel bags attached to the vessel were also equipped with a small buoy to ensure the bags were suspended approximately 2 m above the structure into the water column, allowing flow of water for the mussels to survive (see **Figure 2.2**).

2.2.2 Replication

Three mussel bags were deployed per site. Within each mussel bag, at least 30 mussels were deployed to insure against losses and ensure that sufficient numbers of mussels were available for laboratory analysis (i.e. 15 to 20 mussels per cage per site were required).

2.2.3 Diving

All mussel bags were deployed and retrieved by commercially qualified SCUBA divers (**Figure 2.2**).

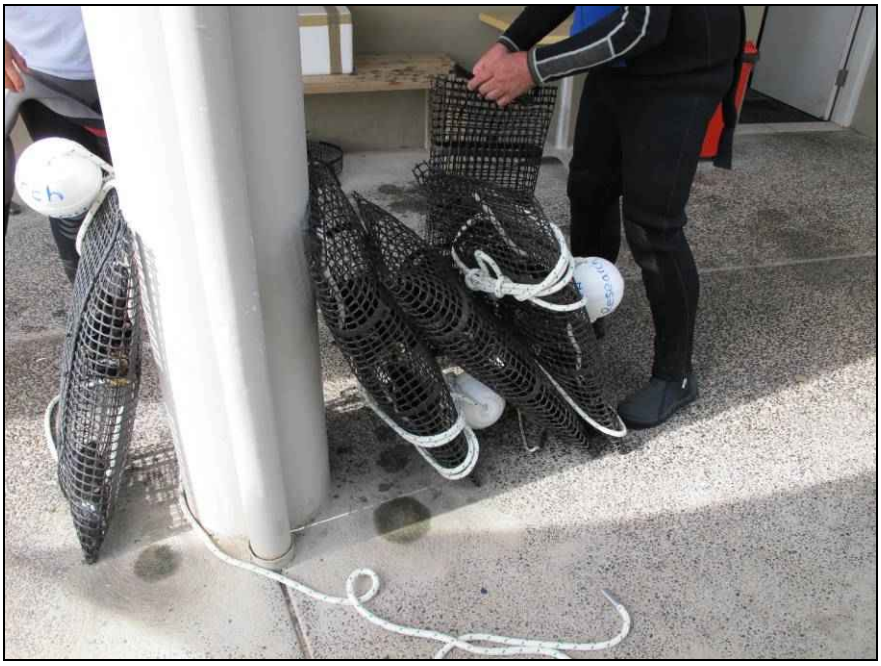


Figure 2.1 Mussel bags were constructed with UV stable oyster mesh.

a.

b.

Figure 2.2 a) example of the mussel bag setup on the Ex-HMAS ADELAIDE and b) divers installing the mussel bags.

2.3 Mussel Deployment Sites

Mussels were deployed to three impact sites (on the Ex-HMAS ADELAIDE) and two reference sites (on mooring lines around the vessel). Mussel samples collected directly from the source (i.e. the aquaculture facility) were also tested to determine baseline levels of contaminants.

2.3.1 Impact Sites

Three impact sites were selected at the bow, mid section and stern of the Ex-HMAS ADELAIDE at a depth of approximately ~ 20 m (**Figure 2.3**). Three mussel bags were deployed at each of these sites, with bags held at a height of approximately 2 m off the main deck using a small Styrofoam subsurface buoy (see **Figure 2.2**). All mussels were deployed to attachment points on the port side of the vessel.

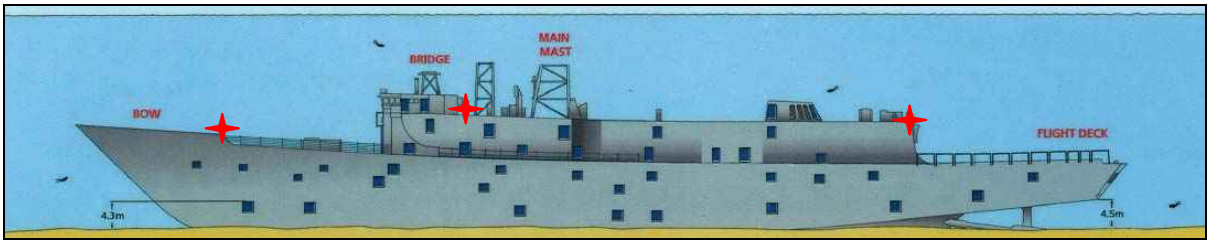


Figure 2.3 Approximate location of the attachment points (✦) for mussel bags on the vessel.

2.3.2 Reference / Control Sites

Two reference sites were located on mooring lines near the Ex-HMAS ADELAIDE. During mussel deployment, the six dive moorings were still being installed by McMahon Services so mussel bags were attached to the mooring lines of two special marker buoys for which installation had been completed (see **Figure 2.4**). The two special marker buoys are located at a distance of approximately 35 m from the bow and stern of the vessel (personal communication, Crown Lands, 2011). Attachment of mussel bags to the special marker buoy mooring lines was also considered to be preferable over attachment to the dive mooring lines as they were much stronger and there would be considerably less potential for damage or tampering by divers ascending or descending the lines. Depth of attachment at the reference sites was the same as for the impact sites (i.e. ~ 20 m).

However, in the month following installation, the dive moorings and special marker buoys around the Ex-HMAS ADELAIDE, were lost or displaced due to extreme weather conditions and suspected tampering (**Figure 2.4**). Special marker buoys were found without the mooring lines or mussel bags attached. As a result, mussel bags from the reference sites were lost. Since deployment of further mussel bags at a different time period would not have produced comparable results, analysis for the initial *Bioaccumulation Study* could only be undertaken between the impact site and zero control mussels.

a.

b.

Figure 2.4 a) the special marker buoy mooring lines were used as reference sites; b) special marker buoys and a dive mooring tied together after they were lost from the site.

2.3.3 Zero Controls

Tissue samples of mussels from the original source need to be tested. These samples will act as a "zero control" and determine the background levels of zinc, chromium and lead in the mussel tissue prior to deployment to the site. Zero control samples were taken directly from the batch of mussels supplied by the Eden Sea Farms aquaculture facility. Five replicate zero control samples consisting of 15 mussels each was sent for analysis to determine the baseline concentrations of chromium, zinc and lead.

2.4 Analysis of Tissues

2.4.1 Sub Sampling in Field

Mussels were retrieved from the vessel using SCUBA, six weeks post deployment, in accordance with the LTMMP. On land, the mussel bags were opened and any mussels which had not survived were discarded. A total of 15 mussels were selected from each of the mussel bags and placed into snap-lock freezer bags labeled as follows:

- Bow 1, 2, 3
- Mid 1, 2, 3
- Stern 1, 2, 3

Mussel samples were kept on ice in the dark for transportation to the analytical laboratory.

2.4.2 Laboratory Sampling

Under the LTMMP, sampling and analysis of mussel tissue is required to be undertaken by a NATA accredited laboratory and results are required to be reported in dry weight (N.B. wet weight reporting is needed if comparison with food standards is required however this was not the case).

Samples were analysed by the NATA accredited laboratory Advanced Analytical. In the laboratory, tissue from each of the 15 mussels making up each sample were freeze dried and homogenised into one composite sample to reduce the effect of intraspecific variability between individuals. These samples were analysed for the metals chromium and zinc (the constituents of zinc chromate) and for lead. Results were presented as dry weight in mg/kg. Laboratory QA / QC was undertaken. Laboratory Sample Receipts and original Reports of Analysis from the zero control and impact site mussels are provided in **Appendix 1**.

2.5 Data Analysis

Mean values were determined for concentrations of chromium, zinc and lead for each impact site individually, for the zero control sites combined and impact sites combined. These values were compared. Analysis of Variance (ANOVA) was also used to determine any spatial differences between the concentrations of chromium, zinc and lead in mussel tissues between the three impact sites and also differences between concentrations in the zero control and impact site mussel tissues. Prior to this the data were tested for normality. Data were normally distributed and variances were homogenous so no data transformation was necessary (see **Appendix 2**). The comparison of primary interest between the three impact sites and two reference sites was not possible. *Statistica* Version 5 was used to undertake all data analysis.

3. RESULTS

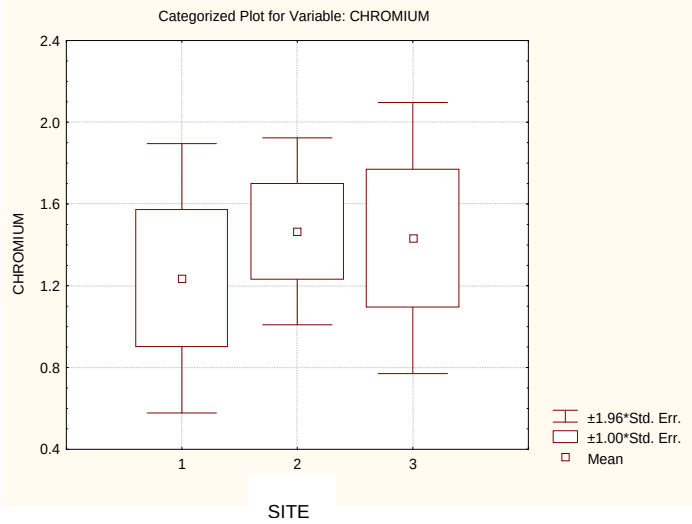
Concentrations of chromium, zinc and lead in the tissue of mussels from the zero control and impact sites were determined in the laboratory. Original laboratory reports are provided in **Appendix 1**. Results of analysis are provided below. **Appendix 2** provides outputs of the statistical analysis.

3.1 Zero Controls (Background Tissue Concentrations)

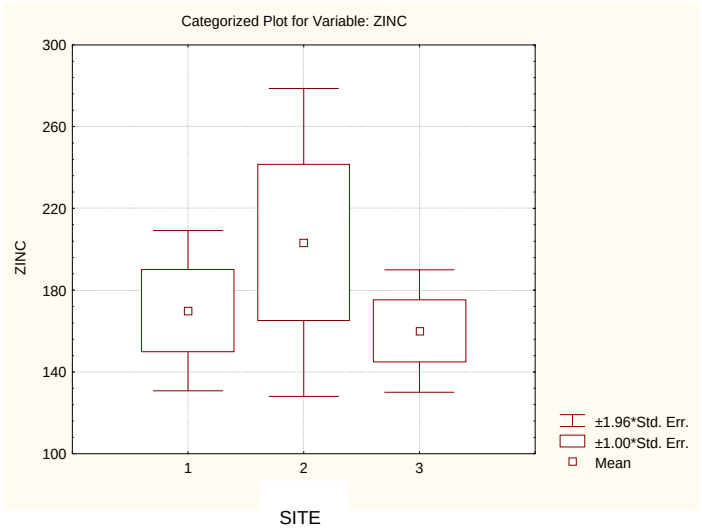
Concentrations of chromium, lead and zinc were detected above the LOR in all zero control samples and little variation was found between samples. The mean chromium concentration in mussel tissues from zero controls was 0.67 mg/kg with a standard deviation of 0.1 mg/kg. Mean zinc concentration in the in the zero controls was 152 mg/kg with a standard deviation of 29.5 mg/kg. Lead had a mean concentration in zero controls of 0.23 mg/kg with a standard deviation of 0.04 mg/kg.

3.2 Impact Sites

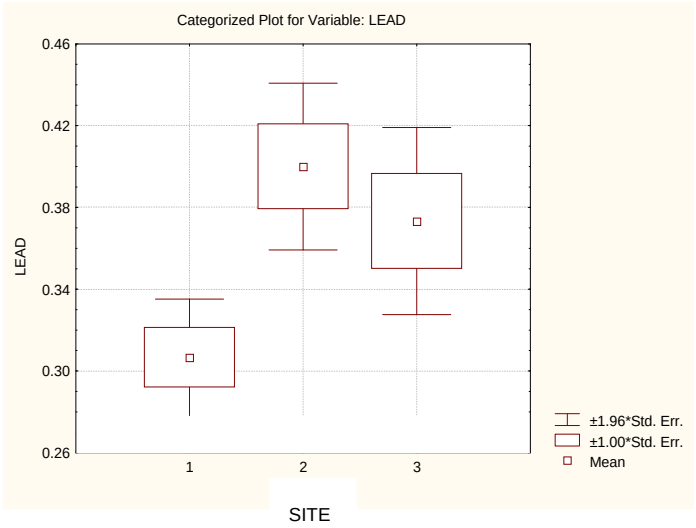
Concentrations of chromium, lead and zinc were detected above the level of reporting (LOR) in all samples analysed from the impact sites. A comparison of mean concentrations of metals in tissue between the three impact sites found that concentrations from the bow, stern and mid section were generally similar (**Figure 3.1**, **Table 3.1**). When data was combined, the impact samples had a mean chromium concentration of 1.4 mg/kg with a standard deviation of 0.47 mg/kg. Zinc was found to have a mean value of 178 mg/kg (standard deviation of 44.4 mg/kg). The mean concentration of lead in mussel tissues from the impact sites was 0.36 mg/kg and standard error was 0.05 mg/kg (**Table 3.2**). Overall, there were no significant differences in metal concentrations in tissues between the three impact sites at 6 weeks ($F_{6, 8}$ = 1.67, p = 0.244) (**Figure 3.1**, **Appendix 2**).



a. Chromium



b. Zinc



c. Lead

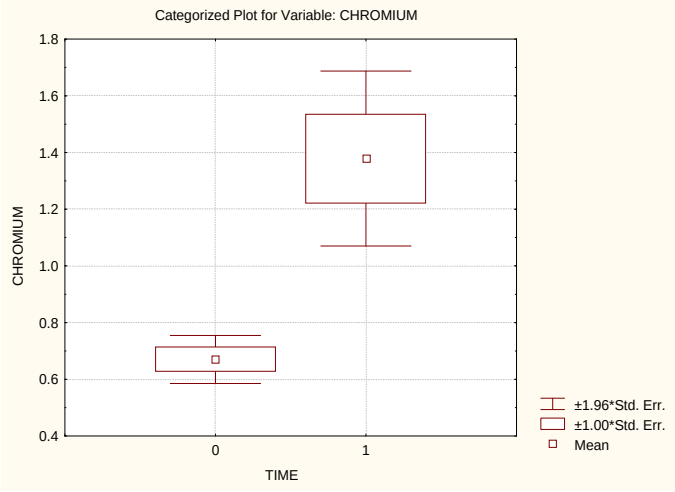
Figure 3.1 Box plots showing differences in mean values for chromium, zinc and lead concentrations at the three impact locations (1 = bow, 2 = mid, 3 = stern).

Table 3.1 Metal concentrations in mussel tissue at the impact sites.

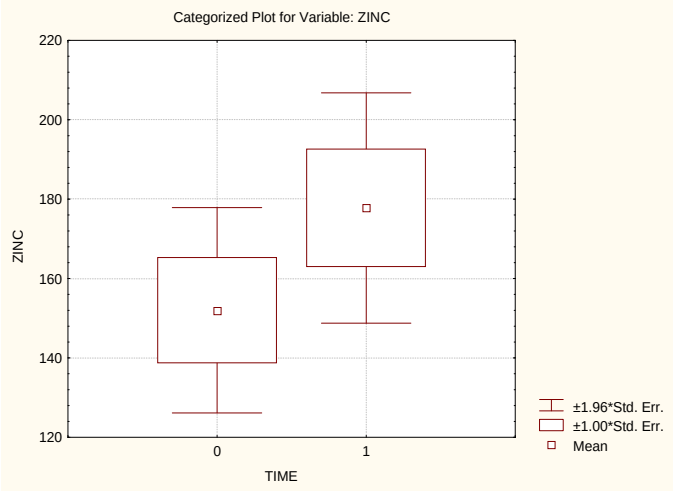
	Sample ID / Date Sampled		Chromium	Lead	Zinc
	Unit (dry weight)		mg/kg	mg/kg	mg/kg
	Level Of Reporting (LOR)		0.1	0.1	0.2
IMPACT SITES	Bow1	30/05/2011	1.9	0.33	150
	Bow2	30/05/2011	0.81	0.31	150
	Bow3	30/05/2011	1	0.28	210
	Mean		1.2	0.31	170
	StDev		0.58	0.03	35
	Median		1.0	0.31	150
	Min		0.81	0.28	150
	Max		1.9	0.33	210
	Mid1	30/05/2011	1.4	0.36	130
	Mid2	30/05/2011	1.1	0.43	260
	Mid3	30/05/2011	1.9	0.41	220
	Mean		1.5	0.4	203
	StDev		0.40	0.04	66.6
	Median		1.4	0.41	220
	Min		1.1	0.36	130
	Max		1.9	0.43	260
	Stern1	30/05/2011	2.1	0.41	170
	Stern2	30/05/2011	1.2	0.38	180
	Stern3	30/05/2011	1	0.33	130
	Mean		1.4	0.37	160
	StDev		0.59	0.04	26.5
	Median		1.2	0.38	170
	Min		1.0	0.33	130
	Max		2.1	0.41	180

3.3 Comparison between Impact Site and Zero Controls

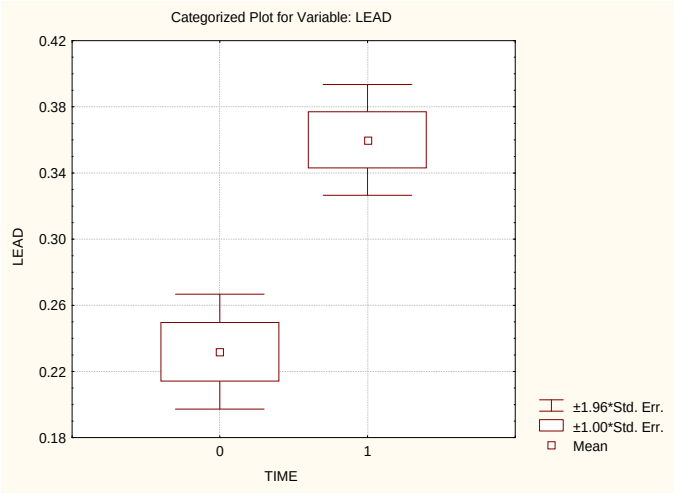
The mean concentration of all metals was higher at the impact sites that the zero control samples (**Figure 3.2**, **Table 3.2**). One way ANOVA was undertaken to assess the differences between concentrations of chromium, zinc and lead between the zero control and impact sites. Overall, there were significant differences in metals concentrations in mussel tissue between the zero controls and impact sites ($F_{3, 10} = 7.22$, $p = 0.007$). *Post hoc* testing showed that these differences were caused by differences in the concentrations of chromium and lead, however, no differences were apparent for zinc concentrations (refer to **Appendix 2**).



a. Chromium



b. Zinc



c. Lead

Figure 3.2 Box plots showing differences in mean values for chromium, zinc and lead concentrations between the zero control and impact samples (0 = zero control, 1 = impact).

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Table 3.2 Metal concentrations in mussel tissue for zero controls and impact sites.

Sample ID / Date Sampled			Chromium	Lead	Zinc
Unit (dry weight)			mg/kg	mg/kg	mg/kg
LOR			0.1	0.1	0.2
ZERO CONTROLS	ZC1	19/04/2011	0.76	0.3	180
	ZC2	19/04/2011	0.76	0.21	150
	ZC3	19/04/2011	0.59	0.20	110
	ZC4	19/04/2011	0.69	0.23	140
	ZC5	19/04/2011	0.55	0.22	180
	Mean		0.67	0.23	152
	StDev		0.10	0.04	29.5
	Median		0.69	0.22	150
	Min		0.55	0.20	110
	Max		0.76	0.30	180
IMPACT SITES	Bow1	30/05/2011	1.9	0.33	150
	Bow2	30/05/2011	0.81	0.31	150
	Bow3	30/05/2011	1	0.28	210
	Mid1	30/05/2011	1.4	0.36	130
	Mid2	30/05/2011	1.1	0.43	260
	Mid3	30/05/2011	1.9	0.41	220
	Stern1	30/05/2011	2.1	0.41	170
	Stern2	30/05/2011	1.2	0.38	180
	Stern3	30/05/2011	1	0.33	130
	Mean		1.4	0.36	178
	StDev		0.47	0.05	44.4
	Median		1	0.36	170
	Min		0.81	0.28	130
	Max		2.1	0.43	260

4. DISCUSSION

Aquatic invertebrates, in particular, bivalve molluscs, are commonly used as test organisms in active biomonitoring studies (Bervoets *et al.* 2003). Bivalve molluscs are filter feeding organisms which actively filter dissolved and suspended matter from the water by pumping water through specialised filtration structures. Filter feeders play a significant role in the removal of toxins and bacteria from the water column and so are suitable organisms to test for water contamination and the accumulation of contaminants or toxins in the tissues of marine organisms (Huber 2010).

Previous studies have utilised transplanted mussels effectively to assess the bioavailability of metals and other contaminants. A variety of mussel species, including the Blue Mussel, *M. edulis*, and the Zebra Mussel, *Dreissena polymorpha*, have been used in Australia and overseas (respectively) to assess potential water quality contamination by micro-contaminants and heavy metals and its potential impact on marine organisms (e.g. Haynes and Toohey 1998; Giusti *et al.* 1999; Romeo *et al.* 2003; Bervoets *et al.* 2005a, 2005b; Smolders *et al.* 2005).

This technique is based on the generic study known as “Mussel Watch” which is widely used in Europe and the United States where mussels are abundant (Scanes 1991). The approach applied in this study is based on active bio-monitoring (ABM) where the mussel samples are sourced from one population at one location and translocated to test sites, ensuring comparable biological samples (de Kock and Kramer 1994).

Although an increase in metal concentrations has been observed between the transplanted mussels and the mussels placed near the vessel, the significant increase noted for lead and chromium cannot be directly attributed to the presence of the vessel without consideration of reference concentrations. Without data from the two reference areas, results remain confounded.

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Appendix 1

Laboratory Sample Receipts and Reports of Analysis

SAMPLE RECEIPT NOTIFICATION

Attention : Katie Newton

Client : Worley Parsons Pty Ltd
3 Warabrook Blvd
Warabrook NSW 2304
Telephone : 02 4985 0020
Facsimile : 02 4985 0099

Project : Ex-HMAS Adelaide Monitoring **Order Number :**

Laboratory Reference : A11/1836

Completed Chain of Custody accompanied samples.	**YES**
Samples were received in good condition and correctly preserved for all tests.	**YES**
Samples were received in sufficient time to allow laboratory to meet holding times.	**YES**
Samples were received chilled/chilling (if required).	**YES**

Date samples received : **20/04/2011**
Matrix : **Mussels**
No. of samples : **5**
Scheduled reporting date : **3 May 11**

Client Services Manager : **Daniel Um**

Telephone : 02 9888 9077
Email : daniel.um@advancedanalytical.com.au

Contact your Client Services Manager for all queries and issues regarding this sample batch.

Note: Turnaround time begins at time of receipt at laboratory, surcharges may apply for fast turnaround.

Water samples will be appropriately stored for 1 month from date of receipt of samples.
Soil / Sediment samples will be appropriately stored for 3 months from date of receipt of samples.

COMMENTS:

REPORT OF ANALYSIS

Laboratory Reference: A11/1836 [R00]

Client: Worley Parsons Pty Ltd
3 Warabrook Blvd
Warabrook NSW 2304

Contact: Katie Newton

Order No:
Project: Ex-HMAS Adelaide Monitoring
Sample Type: Mussels
No. of Samples: 5
Date Received: 20/04/2011
Date Completed: 28/04/2011

Laboratory Contact Details:

Client Services Manager: Daniel Um
Technical Enquiries: Ian Eckhard
Telephone: +61 2 9888 9077
Fax: +61 2 9888 9577
Email: daniel.um@advancedanalytical.com.au

Attached Results Approved By:

Ian Eckhard
Technical Director

Comments:
All samples tested as submitted by client. All attached results have been checked and approved for release.
This is the Final Report and supersedes any reports previously issued with this batch number.
This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025. This document shall not be reproduced, except in full.

ilac-MRA NATA Accreditation No.15109

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North Ryde NSW 2113 Australia

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contact@advancedanalytical.com.au
www.advancedanalytical.com.au

Batch Number: A11/1836 [R00] **Project:** Ex-HMAS Adelaide Monitoring

Laboratory Reference: **Client Reference:** **Date Sampled:** **Analysis Description**	- - - **Method**	- - - **Units**	**A11/1836/1** **ZC1** **19/04/2011**	**A11/1836/2** **ZC2** **19/04/2011**	**A11/1836/3** **ZC3** **19/04/2011**	**A11/1836/4** **ZC4** **19/04/2011**
Trace Elements						
Chromium	04-008	mg/kg	0.76	0.76	0.59	0.69
Lead	04-008	mg/kg	0.30	0.21	0.2	0.23
Zinc	04-008	mg/kg	180	150	110	140

Laboratory Reference: **Client Reference:** **Date Sampled:** **Analysis Description**	- - - **Method**	- - - **Units**	**A11/1836/5** **ZC5** **19/04/2011**
Trace Elements			
Chromium	04-008	mg/kg	0.55
Lead	04-008	mg/kg	0.22
Zinc	04-008	mg/kg	180

Method	Method Description
04-008	Metals in food by ICP-OES, mg/kg

Result Comments

[<] Less than

[INS] Insufficient sample for this test

[NA] Test not required

Samples analysed on blended, freeze-dried mussels composites. Results are reported on this basis.

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www.advancedanalytical.com.au

Batch Number: A11/1836 [R00] **Project:** Ex-HMAS Adelaide Monitoring

QUALITY ASSURANCE REPORT

TEST	UNITS	Blank
Chromium	mg/kg	<0.1
Lead	mg/kg	<0.1
Zinc	mg/kg	<0.2

Comments:

RPD = Relative Percent Deviation
[NT] = Not Tested
[N/A] = Not Applicable
'#' = Spike recovery data could not be calculated due to high levels of contaminants

Acceptable replicate reproducibility limit or RPD: Results < 10 times LOR: no limits.
Results >10 times LOR: 0% - 50%.

Acceptable matrix spike & LCS recovery limits: Trace elements 70-130%
Organic analyses 50-150%
SVOC & speciated phenols 10-140%
Surrogates 10-140%

When levels outside these limits are obtained, an investigation into the cause of the deviation is performed before the batch is accepted or rejected, and results are released.

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SAMPLE RECEIPT NOTIFICATION

Attention : Katie Newton

Client : Worley Parsons Pty Ltd
3 Warabrook Blvd
Warabrook NSW 2304
Telephone : 02 4985 0020
Facsimile : 02 4985 0099

Project : Ex-HMAS Adelaide Monitoring **Order Number :**

Laboratory Reference : A11/2497

Completed Chain of Custody accompanied samples.	**YES**
Samples were received in good condition and correctly preserved for all tests.	**YES**
Samples were received in sufficient time to allow laboratory to meet holding times.	**YES**
Samples were received chilled/chilling (if required).	**YES**

Date samples received : **31/05/2011**
Matrix : **Mussels**
No. of samples : **9**
Scheduled reporting date : **9 Jun 11**

Client Services Manager : **Daniel Um**

Telephone : 02 9888 9077
Email : daniel.um@advancedanalytical.com.au

Contact your Client Services Manager for all queries and issues regarding this sample batch.

Note: Turnaround time begins at time of receipt at laboratory, surcharges may apply for fast turnaround.

Water samples will be appropriately stored for 1 month from date of receipt of samples.
Soil / Sediment samples will be appropriately stored for 3 months from date of receipt of samples.

COMMENTS:

REPORT OF ANALYSIS

Laboratory Reference: A11/2497 [R]

Client: Worley Parsons Pty Ltd
3 Warabrook Blvd
Warabrook NSW 2304

Contact: Katie Newton

Order No:
Project: Ex-HMAS Adelaide Monitoring
Sample Type: Mussels
No. of Samples: 9
Date Received: 31/05/2011
Date Completed: 7/06/2011

Laboratory Contact Details:

Client Services Manager: Daniel Um
Technical Enquiries: Ian Eckhard
Telephone: +61 2 9888 9077
Fax: +61 2 9888 9577
Email: daniel.um@advancedanalytical.com.au

Attached Results Approved By:

Ian Eckhard
Technical Director

Comments:
All samples tested as submitted by client. All attached results have been checked and approved for release.
This is the Final Report and supersedes any reports previously issued with this batch number.
This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025. This document shall not be reproduced, except in full.

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Batch Number: A11/2497 [R00] **Project:** Ex-HMAS Adelaide Monitoring

Laboratory Reference: **Client Reference:** **Date Sampled:** **Analysis Description**	- - - **Method**	- - - **Units**	**A11/2497/1** **Bow1** **30/05/2011**	**A11/2497/2** **Bow2** **30/05/2011**	**A11/2497/3** **Bow3** **30/05/2011**	**A11/2497/4** **Mid1** **30/05/2011**
Trace Elements						
Chromium	04-008	mg/kg	1.9	0.81	1.0	1.4
Lead	04-008	mg/kg	0.33	0.31	0.28	0.36
Zinc	04-008	mg/kg	150	150	210	130

Laboratory Reference: **Client Reference:** **Date Sampled:** **Analysis Description**	- - - **Method**	- - - **Units**	**A11/2497/5** **Mid2** **30/05/2011**	**A11/2497/6** **Mid3** **30/05/2011**	**A11/2497/7** **Stern1** **30/05/2011**	**A11/2497/8** **Stern2** **30/05/2011**
Trace Elements						
Chromium	04-008	mg/kg	1.1	1.9	2.1	1.2
Lead	04-008	mg/kg	0.43	0.41	0.41	0.38
Zinc	04-008	mg/kg	260	220	170	180

Laboratory Reference: **Client Reference:** **Date Sampled:** **Analysis Description**	- - - **Method**	- - - **Units**	**A11/2497/9** **Stern3** **30/05/2011**
Trace Elements			
Chromium	04-008	mg/kg	1.0
Lead	04-008	mg/kg	0.33
Zinc	04-008	mg/kg	130

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Batch Number: A11/2497 [R00] **Project:** Ex-HMAS Adelaide Monitoring

Method	Method Description
04-008	Metals in food by ICP-OES, mg/kg

Result Comments

[<] Less than

[INS] Insufficient sample for this test

[NA] Test not required

Samples analysed on blended, freeze-dried mussels composites.

Results are reported on this basis.

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Batch Number: A11/2497 [R00] **Project:** Ex-HMAS Adelaide Monitoring

QUALITY ASSURANCE REPORT

TEST	UNITS	Blank	Duplicate Sm#	Duplicate Results	Spike Sm#	Spike Results
Chromium	mg/kg	<0.1	A11/2497-1	1.9 || 1.9 || RPD: 0	A11/2497-2	102%
Lead	mg/kg	<0.1	A11/2497-1	0.33 || 0.34 || RPD: 3	A11/2497-2	90%
Zinc	mg/kg	<0.2	A11/2497-1	150 || 150 || RPD: 0	A11/2497-2	103%

Comments:

RPD = Relative Percent Deviation
[NT] = Not Tested
[N/A] = Not Applicable
'#' = Spike recovery data could not be calculated due to high levels of contaminants

Acceptable replicate reproducibility limit or RPD: Results < 10 times LOR: no limits.
Results >10 times LOR: 0% - 50%.

Acceptable matrix spike & LCS recovery limits: Trace elements 70-130%
Organic analyses 50-150%
SVOC & speciated phenols 10-140%
Surrogates 10-140%

When levels outside these limits are obtained, an investigation into the cause of the deviation is performed before the batch is accepted or rejected, and results are released.

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Appendix 2

Output of Statistical Analysis

Statistical Analysis Output – Statistica Version 5

1-Way ANOVA

Difference in metal concentrations between time 0 (zero controls) and time 1 (6 weeks)

Summary of all Effects; design: (mussel contam data.sta)
1-TIME

	Wilks' Lambda	Rao's R	df 1	df 2	p-level
1	.315712	7.224812	3	10	.007286

Tukey HSD test; variable CHROMIUM (mussel contam data.sta)
Probabilities for Post Hoc Tests
MAIN EFFECT: TIME

		{1} .6700000	{2} 1.378889
0	{1}		.006954
1	{2}	.006954	

Tukey HSD test; variable LEAD (mussel contam data.sta)
Probabilities for Post Hoc Tests
MAIN EFFECT: TIME

		{1} .2320000	{2} .3600000
0	{1}		.000571
1	{2}	.000571	

Tukey HSD test; variable ZINC (mussel contam data.sta)
Probabilities for Post Hoc Tests
MAIN EFFECT: TIME

		{1} 152.0000	{2} 177.7778
0	{1}		.270971
1	{2}	.270971	

1-Way ANOVA

Difference in metal concentrations between the impact sites at 6 weeks

Summary of all Effects; design: (mussel contam data2.sta)
1-TIME

	Wilks' Lambda	Rao's R	df 1	df 2	p-level
1	.196836	1.671955	6	8	.244884

Tukey HSD test; variable CHROMIUM (mussel contam data2.sta)
Probabilities for Post Hoc Tests
MAIN EFFECT: TIME

		{1} 1.236667	{2} 1.466667	{3} 1.433333
1	{1}		.859761	.894745
2	{2}	.859761		.996807
3	{3}	.894745	.996807	

Tukey HSD test; variable LEAD (mussel contam data2.sta)
Probabilities for Post Hoc Tests
MAIN EFFECT: TIME

		{1} .3066667	{2} .4000000	{3} .3733333
1	{1}		.037147	.120929
2	{2}	.037147		.633291
3	{3}	.120929	.633291	

Tukey HSD test; variable ZINC (mussel contam data2.sta)
Probabilities for Post Hoc Tests
MAIN EFFECT: TIME

		{1} 170.0000	{2} 203.3333	{3} 160.0000
1	{1}		.666591	.961929
2	{2}	.666591		.518976
3	{3}	.961929	.518976	

Cardno Ecology Lab

Shaping the Future

Marine and Freshwater Studies

Ex HMAS Adelaide Artificial Reef

Bioaccumulation Monitoring Survey 1

Job Number: EL1112024

Prepared for Department of Primary Industries – Catchments and Lands

March 2012

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Trading as Cardno Ecology Lab

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Cover Image: Preparing oyster trays for deployment, photographer Brendan Alderson, Cardno Ecology Lab.

Document Control

Report Number	Status	Date	Author		Reviewer	
1112024 C	Final	27 March 2012	Kate Reeds	KR	Marcus Lincoln Smith	MLS

Executive Summary

The Ex-HMAS Adelaide "the vessel' was gifted from the Australian to the NSW Government for the specific purpose of scuttling the ship as an artificial dive reef off the Central Coast of NSW. In accordance with the Artificial Reef (Sea dumping) permit, the Department of Primary Industries - Catchments and Lands, must implement a Long Term Monitoring and Management Plan (LTMMP) which was prepared in March 2011.

The LTMMP covers environmental and structural monitoring for the first five years post-scuttling and forms the basis for ongoing monitoring and maintenance over the operational life of the vessel as a dive site, which is estimated to be 40 years. A requirement of the LTMMP is that bioaccumulation monitoring be undertaken to determine whether resident biota (i.e. biota in direct contact with the superstructure) are likely to be affected by zinc chromate paint, which may have been used originally on the aluminium alloy of the vessel.

Sydney rock oysters (*Saccostrea glomerata*) were selected as sentinel organisms and sourced from oyster growers in the Tuncurry/Forster area. They were attached to the vessel (monitoring sites) in PVC trays and to a special marker buoy approximately 35 m from the ship (used as a control site). At the time of supply, additional oysters were sourced from the supplier to provide information on baseline levels of zinc and chromium. Oysters were deployed for 10 weeks from November 2011 to January 2012. The oysters attached to the special marker buoys, were lost due to adverse weather, hence environmental control samples were not retrieved.

Samples attached to the mid ship and stern of the vessel were successfully retrieved. All samples, including baseline controls were sent to an NATA accredited laboratory for analysis of zinc and chromium concentrations in oyster soft tissue.

The mean concentration of chromium and zinc was marginally higher in oysters at the monitoring sites than the baseline, although this was not statistically significant.

Table of Contents

List of Tables

List of Figures

List of Appendices

Glossary

Artificial Reef	A structure or formation placed on the seabed for the purpose of increasing or concentrating populations of marine plants and animals or for the purpose of being used in human recreational activities.
ANZECC/ARMCANZ	Australian and New Zealand Environment Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand.
Baseline Control	Levels of contaminants present in oysters from their original source (i.e. the aquaculture facility from which they were obtained).
Background Control Sites	Special marker buoys near to the vessel used to provide an indication of background levels of contaminants.
Bioaccumulation	The accumulation of substances, such as pesticides or heavy metals in an organism. Bioaccumulation occurs when an organism absorbs a toxic substance at a rate greater than that at which the substance is eliminated.
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities.
d.w.	Dry Weight.
EC_{50}	Half maximal effective concentration. Refers to the concentration of a toxicant which induces a response halfway between the baseline and maximum after some specified exposure time.
EP&A Act	Environmental Planning & Assessment Act 1979.
LAT	Lowest Astronomical Tide.
LC_{50}	Lethal Concentration that kills 50 % of test animals in a given time.
LOEC	Lowest-observed-effect-concentration. Means the lowest treatment (i.e., test concentration) of a test substance that is statistically different in adverse effect on a specific population of test organisms from that observed in controls.
LTMMP	Long Term Monitoring and Management Plan.
Monitoring ("Vessel") Sites	Sites located on the vessel.

1 Introduction

1.1 Background and Aims

Cardno (NSW/ACT) trading as Cardno Ecology Lab Pty Ltd was commissioned by the NSW Department of Primary Industries – Catchments and Lands (DPI Catchments and Lands), to undertake the post-scuttling environmental monitoring for the Ex-HMAS Adelaide artificial reef and dive site.

The Ex-HMAS Adelaide "the vessel" was gifted from the Australian to the NSW Government for the specific purpose of scuttling the ship as an artificial reef off the Central Coast of NSW. A comprehensive environmental assessment was undertaken for the project in accordance with state and federal environmental legislation. This included obtaining approval under the NSW Environmental Planning and Assessment Act 1979 (EP&A Act) and obtaining an Artificial Reef (or Sea Dumping) Permit issued under the Environment Protection (Sea Dumping) Act 1981 from the federal Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC).

Sea Dumping Permits ensure that appropriate sites are selected, materials are suitable and appropriately prepared, that there are no significant adverse impacts on the marine environment and that the reef does not pose a danger to marine users. A condition of the Permit is that DPI Catchments and Lands must implement a Long Term Monitoring and Management Plan (LTMMP) which was prepared in March 2011.

The LTMMP covers environmental and structural monitoring for the first five years post-scuttling and forms the basis for ongoing monitoring and maintenance over the 40 year operational life of the vessel as a dive site. The frequency of monitoring and the methodologies used will be reviewed periodically during the life of the Plan. The scope of work to be carried out by Cardno Ecology Lab is for a two year period post-scuttling, which follows on from baseline investigations in April/May 2011 and includes:

- Reef communities;
- Sediment quality; and
- Bioaccumulation studies.

This Progress Report outlines the methodology and findings for the first (of two) bioaccumulation surveys. These surveys were to be carried out six months post scuttling and again at 12 months post-scuttling. This report presents the results of the six month post-scuttling survey which was scheduled for October 2011. Due to adverse weather conditions, this survey was carried out approximately 7 months post-scuttling (November 2011). The second is scheduled for April 2012.

The main aim of the bioaccumulation study as outlined in the LTMMP is to determine whether resident biota (i.e. biota in direct contact with the superstructure), are likely to be affected by zinc chromate paint, which may have been used originally on the aluminium alloy. Zinc chromate was routinely used as an anticorrosive application on the topside of naval vessels, although it is understood that the more recent coating formulations did not contain chromium salts. Following scuttling, the zinc chromate paint (if present) is expected be subjected to corrosion and microbial attack and will likely deteriorate over time. Most available toxicological information is based on OH&S type exposure, where zinc chromate is a suspected carcinogen due to the presence of hexavalent chromium; the primary route of exposure being through inhalation of dust. The environmental fate of zinc chromate in the marine environment is less well known. It is usually described as insoluble, or very slightly soluble in Material Safety Data Sheets (Worley Parsons 2011a).

While the environmental fate of zinc chromate in the marine environment is not well understood, it is assumed that zinc and chromium will be liberated into the marine environment through processes involving dissolution and flaking. The zinc and chromium may potentially affect marine organisms that live in direct association with the vessel via accumulation within their tissues ("bioaccumulation"). Biomonitoring of marine fouling organisms was proposed as part of the LTMMP. The LTMMP recommends that until a substantial amount of marine growth has developed on the vessel, active biomonitoring involving the deployment and collection of sentinel organisms from a non-impacted / comparatively clean location (e.g. an aquaculture facility) would be deployed to the Ex-HMAS Adelaide for a period of six to eight weeks and then analysed to determine concentrations of zinc and chromium. Bivalves such as mussels or oysters are commonly used as sentinel species for this purpose.

This progress report outlines the following:

- Description of sampling dates, times, weather conditions and tidal height;
- Description of the methods used to deploy and retrieve sentinel organisms;
- Results and interpretation of laboratory analyses;
- Discussion of findings; and
- Reports of any condition or occurrence that may influence results of the study.

1.2 Study Area

The Ex-HMAS Adelaide artificial reef and dive site is located within Bulbararing Bay, approximately 1.87 km offshore from Avoca Beach. The ship lies at a depth of approximately 32 m to 34 m of water at Lowest Astronomical Tide (LAT) and is embedded approximately 1 m into the flat, sandy, seabed. There is a minimum of 6 m of sand overlying bedrock. The vessel is orientated with the bow facing into the prevailing ESE swell direction (**Figure 1**).

The ship is 138.1 m in length, with a beam of 14.3 m and an original displacement of 4,200 tonnes. The hull is made of steel and the superstructure of aluminium alloy. Heights are approximately 12 m to the main deck, 18 m to the bridge, 24 m to the top of the foremast (the mast closest to the bow), and 39 m to the top of the mainmast (NSW Government 2011). Preparation for scuttling involved the removal of the main mast structures for safety and navigation reasons and stripping of machinery, hatches and any items that could pose a risk to divers or the environment. Potential contaminants such as fuels, oils, heavy metals, batteries and electrical items containing polychlorinated biphenols (PCBs) were removed. Diver access holes were cut into the sides of the hull, floors and ceilings to allow extra vertical access between decks and also to allow light to penetrate. Further holes were also made to allow air to escape during the scuttling process (NSW Government 2011).

The Ex-HMAS Adelaide was prepared to meet DSEWPaC standards which were specified during the months of preparation prior to scuttling. DSEWPaC had conducted a series of inspections to confirm that its detailed requirements were achieved. The original clean-up process included removing loose or flaking paint in accordance with DSEWPaC's requirements.

2 Existing Information

2.1 Bioaccumulation Studies

Bioaccumulation is a dynamic indicator of water quality and ecosystem integrity and has gained universal acceptance as a measure of the bioavailable fraction of contaminants in the aquatic environment (Phillips 1980).

While direct measurements of metals in the sediments within and adjacent to the Ex HMAS Adelaide (and at reference locations) have been carried out as part of the LTMMP, the observed concentrations of metals vary according to different chemical, hydrographical and geological processes. Direct measurements of metal concentrations in the sediment and surrounding waters do not represent the metal loads actually available to biota (Bryan and Langston 1992, Hatje *et al*. 2003). Deploying filter feeding sentinel organisms such as bivalve molluscs to assess accumulation of metals is a relatively simple way of inferring metal bioavailability and assessing metal concentrations over both long and short periods of time (Rainbow 2006). Bivalve molluscs are filter feeding organisms which actively filter dissolved and suspended matter from the water by pumping water through specialised filtration structures. They are therefore suitable organisms to test for water contamination and the accumulation of contaminants or toxins (Huber 2010). Mussels and oysters, tolerate a wide range of temperatures, salinity, concentrations of suspended sediments and dissolved oxygen (Anderson 2001). These animals are able to accumulate certain contaminants in tissue to high concentrations without lethal effects. As these organisms are sedentary and easy to sample they provide an attractive biomonitoring tool (Phillips 1980). The Sydney Rock Oyster (*Saccostrea glomerata*), formerly known as *Saccostrea commercialis*, is commonly used in New South Wales (NSW) as a biomonitoring species because it is ubiquitous on the east coast, it survives transplantation and exposure to contaminants, accumulates contaminants to concentrations proportional to ambient waters and is readily available from commercial growers (Brown and McPherson 1992; Scanes 1996; Scanes and Roach 1999; Spooner *et al*. 2003, Hedge *et al*. 2009). The accumulation of metals by *S. glomerata* can occur via the gills in dissolution (Förstner *et al*. 1989; Simpson *et al*. 1998) or as particulates via digestion (Wang and Fisher 1999). There are several studies which document the use of Sydney rock oysters as sentinel organisms in toxicity studies on the east coast of Australia (e.g. Hedge *et al*. 2009, Scanes 1996, Scanes and Roach 1999). These studies may provide an indication of the concentration of metals which may be expected to occur in moderately urbanised coastal areas. Less information is available regarding the levels of metal toxicants in blue mussels. As such, the Sydney rock oyster was selected as the preferred test organism for this study. The species also accumulates contaminants to concentrations proportional to ambient waters (Brown and Macpherson 1992) and is readily available from commercial growers, as opposed to blue mussels, which can only be sourced from the far south coast of NSW.

2.2 Toxicity of Chromium in the Marine Environment

Chromium occurs naturally in the trivalent chromium (III) and hexavalent, chromium (VI) forms (Hart 1982). The form of chromium affects toxicity to aquatic organisms and the behaviour of chromium in the aquatic environment. Precipitation of chromium hydroxide is thought to be the dominant removal mechanism for chromium (III) in natural water (ANZECC/ARMCANZ 2000). Chromium (VI) may bioaccumulate to some degree and chromium (III) may be bioavailable from suspended material (ANZECC/ARMCANZ 2000). Pawlisz *et al*. (1997) reported marine toxicity data for chromium. Cr (III) was shown to affect the filtering rate of the mussel *Perna perna* at EC_{50} of 2 µg/L. The lowest acute EC_{50} reported for Cr (III) was 1600 µg/L for nauplii of *Tisbe battagliai* over 96 h. The 7-d LOEC (lowest observed effect concentration) for reproduction of this species was 320 µg/L. For Cr (VI), Pawlisz *et al.* (1997) reported marine acute toxicities to Australian crab *Portunus pelagicus* of 1300 µg/L and to the Australian amphipod *Allorchestes compressa* of 5560 µg/L. Several other species had similar toxicities. The most sensitive fish was flatfish *Citharichthys stigmaeus* with a 21-d LC_{50} of 5000 µg/L. Short-term (2−4 d) acute toxicities to marine fish were all above 16 000 µg/L. Cr (VI) is considered more toxic to marine organisms than Cr (III). For example, the diatom *Nitzschia closterium*, isolated from estuarine waters near Sydney at 33 ‰ salinity, had a 72-h EC_{50} of 2.4 mg/L for Cr (VI), compared to a 72-h EC50 of >5.0 mg/L for Cr (III) (Florence & Stauber1991). Fertilisation of the macroalga (*Hormosira banksia)*, isolated from Port Phillip Bay, was insensitive to Cr (VI), with an EC_{50} of 360 mg/L. In studies with the Australian sand crab *Portunus pelagicus*, deleterious sub-lethal effects were found at Cr (VI) concentrations of 300 µg/L (Mortimer & Miller 1994) while the 96-h LC_{50} for the Tasmanian blenny, a tidepool fish, was reported as 2.6 mg/L (Stauber *et al*. 1994a).

The ANZECC/ARMCANZ water quality guideline for chromium (at the 95 % protection level) is 4.4 µg L^{-1}. In marine and estuarine conditions, high sulfate concentrations make chromium toxicity unlikely, except at very polluted sites (ANZECC/ARMCANZ 2000). A recommendation of 5 µg L^{-1} (dissolved annual average) is broadly accepted for the protection of saltwater life, although where there is concern that the health of communities in sites of nature conservation importance may be compromised as a result of the presence of particularly sensitive species, a lower value may be used as a guideline.

2.3 Toxicity of Zinc in the Marine Environment

Zinc is an essential trace element required by most organisms for their growth and development. It is found in most natural waters at low concentrations (ANZECC/ARMCANZ 2000).

Mance and Yates (1984) reviewed data on the toxicity of zinc to marine organisms. Similar to chromium, invertebrates were generally more sensitive than the fish species investigated while effects on marine macro and microalgae were noted at concentrations slightly lower than reported for invertebrates. The apparent development of increased tolerance was noted as a complicating factor. They reported the toxicity and bioaccumulation of zinc to be greater at lower salinities. Hunt and Hedgecott (1992) proposed a guideline value of 10 µg L^{-1} as appropriate for the protection of saltwater life. This value (also expressed as a dissolved annual average) was based on the lowest, most reliable NOECs (No Observed Effects Concentrations) reported for a range of organisms. In Australia, ANZECC/ARMCANZ guidelines (at the 95 %) protection level is 15 µg L^{-1}.

Neither chromium nor zinc are listed as toxicants for which possible bioaccumulation and secondary poisoning effects require special consideration in terms of the ANZECC/ARMCANZ water quality guidelines. For some chemicals (e.g. mercury and PCBs), this is the main issue of concern, rather than direct effects of toxicants. Metals such as chromium, zinc and copper, can accumulate in shellfish without causing harm to the animals.

Acute toxicity testing of chromium and zinc has been carried out for several different groups of marine species and are published in the ANZECC Guidelines. These guidelines are not directly relevant to the current study as water quality testing was not carried out in conjunction with the bioaccumulation study.

2.4 Previous Studies

As per the requirements of the LTMMP, the first bioaccumulation study (implemented by Worley Parsons) took place one week after scuttling of the Ex-HMAS Adelaide (April 2011). Blue mussels, sourced from Eden Sea Farms aquaculture facility (southern NSW) were used as the test organism. Mussels were deployed at three monitoring sites attached to the vessel ("vessel sites") and two control sites on mooring lines approximately 35 m from the vessel to provide an indication of background concentrations of metals. Mussel samples collected directly from the aquaculture facility were also tested to determine baseline levels of contaminants. Mussels were retrieved from the monitoring sites after a six week deployment period. Mussel bags from the control sites were lost as they were attached to moorings which became displaced.

The mean concentration of chromium in mussel tissues from baseline controls was 0.67 mg/kg^{-1} d.w (S.D= 0.1 mg/kg^{-1} d.w). Mean zinc concentration in the in the baseline controls was 152 mg/kg with a standard deviation of 29.5 mg/kg^{-1} d.w.

A comparison of mean concentrations of metals in tissue among the three impact sites found that concentrations from the bow, stern and mid-section were generally similar. When data were combined, the vessel samples had a mean chromium concentration of 1.4 mg/kg^{-1} d.w (S.D. = 0.47 mg/kg^{-1} d.w). Zinc had a mean value of 178 mg/kg^{-1} d.w (S.D. = 44.4 mg/kg^{-1} d.w). Overall, there were no statistically significant differences in metal concentrations in tissues among the three vessel sites after a six week deployment period.

Significant differences in metal concentrations in mussel tissue between the baseline controls and vessel sites were evident. *Post-hoc* testing identified significant differences in the concentrations of chromium, but no differences in zinc. Although an increase in metal concentrations was observed between the baseline control mussels and the vessel samples, the significant increase noted for chromium could not be directly attributed to the presence of the vessel without consideration of environmental control concentrations as the references would have provided a measure of background concentrations. Given the limited amount of data available regarding metal concentrations in blue mussels in the study region, broader comparisons of the data with expected ambient levels were not made.

Boundary of Dive Site	Easting (MGA 94)	Northing (MGA 94)
A	356428.713	6296117.693
B	356538.438	6296341.142
C	356850.615	6296188.618
D	356742.410	6295963.310

Figure 1: Location of Ex-HMAS Adelaide Artificial Reef and Dive Site. The approximate location and orientation of the ship is indicated by the yellow line.

3 Study Methods

3.1 Sampling Design

The sampling design outlined in the LTMMP included multiple monitoring and control sites. This included three vessel monitoring sites at the bow, mid-ship and stern of the vessel and two control sites attached to mooring buoys approximately 20 m to the port and starbord of the of the vessel. At the time of deployment it was advised by DPI (catchments and Lands) that only one special marker buoy (located approximately 35 m to the bow of the vessel) was available as a control site. Both lots of control samples were therefore attached to the special marker buoy as indicated in **Figure 2**.

As per the recommendations of DPI (Catchments and Lands), attaching the control oyster trays to the special marker buoy mooring lines was considered to be preferable over attachment to the dive mooring lines (recommended in the LTMMP) as they were stronger and less likely to be damaged or tampered with by divers ascending or descending the lines (Worley Parsons 2011b). For consistency between control and monitoring locations, depth of attachment at the control sites was the same as for the vessel monitoring sites (i.e. ~ 25 m).

Three oyster trays (each containing approximately 30 oysters) were attached at each site which is similar to Worley Parsons (2011b). The sampling design includes the 'After, Control, Impact components of the widely accepted BACI' (Before, After, Control, Impact) sampling approach which makes use of multiple controls in space and time (Underwood 1991, 1992, Long *et al*. 1996). As no sampling was undertaken prior to the scuttling of the Ex-HMAS Adelaide, no 'before' data are available to compare with the 'after' data and therefore relies strongly on environmental controls. This will allow changes at a potential impact location to be evaluated against variation measured at multiple control locations. The design requires that sampling be done in at least two external control locations in addition to the potential impact locations. In summary, the sampling design would yield a total of 45 samples including:

- x 3 vessel monitoring sites (bow, stern and mid ship) attached to ship;
- x 2 control background control locations (bow special marker buoy) approx. 35 m from ship;
- x 3 trays at each location (90 mussels per location);
- x 30 oysters within each tray.
- **= Total of 450 oysters (15 samples)**

In addition, three samples (each of 30 oysters) were used as 'baseline controls' as a measure of concentrations of zinc and chromium in oysters prior to deployment.

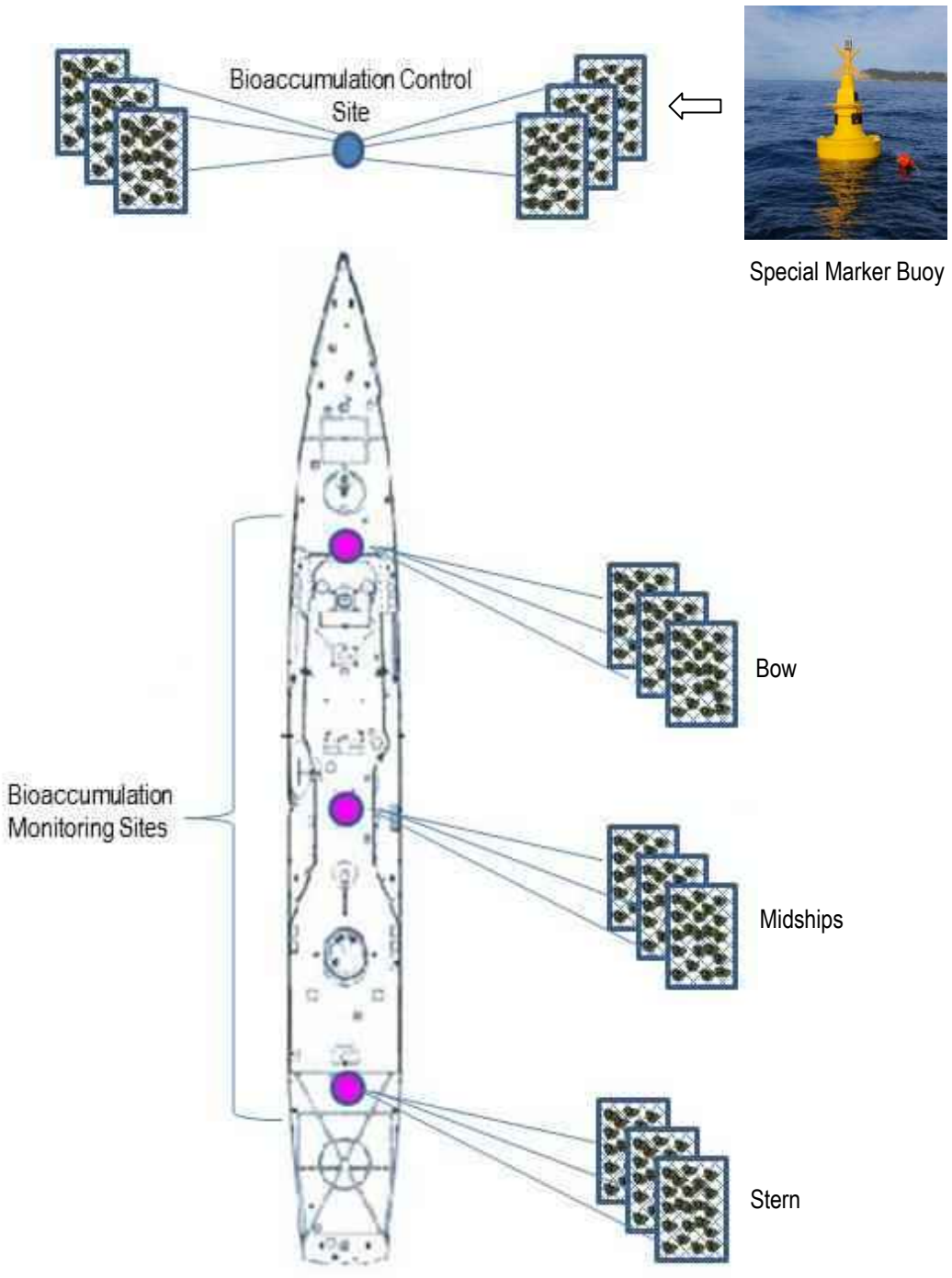

Figure 2: Positions of Control and Vessel Monitoring Sites Selected for the Deployment of Oysters.

3.2 Field Methods

Sydney rock oysters (*Saccostrea glomerata*) were sourced from a supplier in Tuncurry/Forster (Trevor Dent Oyster Suppliers) and delivered to Cardno's Sydney laboratory 24 hours prior to deployment, where they were maintained at a temperature of approximately 20°C. As oysters can survive for several weeks at this temperature, the minimal time spent out of water was not considered to have any impact on the survivorship of the test organisms once deployed. It is possible that size and growth rate may affect the rate of bioaccumulation in oysters (Pearson 1993 Phillips 1980, Richards and Chaloupka (2008). Therefore only organisms of a similar age and size (bottle grade) were used to minimise the effects of growth dilution. Individual oysters were attached to the inside of purpose built oyster trays approximately 100 cm length x 50 cm width x 10 cm deep (**Figure 3**). The trays were constructed of robust UV stable oyster mesh (2 cm x 2 cm) and were fitted with a float at one end and a weight at the bottom to ensure that they sit upright and stable in the water column. The use of oyster trays does not affect the accumulation of metals by organisms (Cain and Luoma1985). The oyster trays were attached to the vessel (monitoring sites) and mooring lines (control sites) by divers using a combination of marine grade rope, cable ties and small stainless steel shackles. Once secured, the trays were left in place for a period of approximately 10 weeks to allow sufficient time for any bioavailable chromium or zinc to be assimilated into the oyster tissue. Once collected, oysters were removed from the trays and placed in polyurethane bags labelled internally and externally with the site, date, time and replicate number. Bags containing oysters were chilled and transported back to the Cardno laboratory in eskies to be prepared for tissue analysis.

Figure 3: Preparing oyster trays for deployment.

3.3 Laboratory Methods

Oysters were opened carefully with stainless steel knives and the soft tissue was dissected from their shells using a wooden spatula to avoid the risk of metal contamination. The soft tissue for each oyster was placed into a chilled polyurethane bag and the shell was discarded. Samples were then frozen and dispatched to an NATA accredited laboratory for analysis of metal concentrations. As there is no standard methodology for analysis of hexavalent chromium, samples were analysed for total chromium and zinc.

Under the LTMMP, sampling and analysis of oyster tissue is required to be reported in dry weight (wet weights are needed if comparison with food standards are required, however, this was not the case). Tissue from each of the 30 oysters making up each sample were freeze-dried and homogenised into one composite sample to reduce the effect of intraspecific variability between individuals. These samples were analysed for chromium and zinc using digestion by concentrated nitric acid (or a mixture of nitric and hydrochloric acids) by heating on top of a boiling water bath. Elements were determined using Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) and/or Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AES). Laboratory QA / QC was undertaken. Laboratory Sample Receipts and original Reports of Analysis from the baseline control and monitoring site oysters are provided in **Appendix 1**. The level of reporting (LOR) was 0.01 mg/kg.

3.4 Data Analyses

Mean and standard errors were calculated for concentrations of chromium and zinc at all sites and for the baseline controls. Permutational Analysis of Variance was used to determine any spatial differences between the concentrations of chromium and zinc in mussel tissues between the three impact sites baseline controls and where possible at background control sites. The PERMANOVA+ routine in PRIMER v6 was used to undertake all statistical analysis.

4 Results

4.1 General Findings

Oysters were deployed on the Ex-HMAS Adelaide on 24 November 2011 and retrieved on 20 January 2012 (a period of approximately 10 weeks). Conditions at the time of deployment were calm with approximately a 1 m swell and a light wind from the SSE. Visibility was approximately 5 m. Conditions at the time of retrieval were similar with a light breeze from the SE/E and visibility of 4 - 5 m, however, due to unknown circumstances (likely to be extreme weather), several of the oyster trays were lost and could not be retrieved. These included all of the environmental controls attached to the special marker buoys. Since deployment of further oyster trays at a different time period would not have produced comparable results, analysis was only done to compare metal concentrations at the monitoring sites with those of the baseline control oysters. Monitoring samples attached to the vessel were retrieved from the mid ship and stern only.

Results of the tissues analysis are presented in **Table 1**. Receipts of laboratory testing are provided in **Appendix A.**

The mean concentration of chromium in the baseline control samples was 0.21 mg/kg $^{-1}$ d.w (S.E= <0.1). The mean concentration of chromium in monitoring samples collected from the mid ship was 0.53 mg/kg $^{-1}$d.w (S.E = 0.29). The concentration of chromium from the stern was 0.23 mg/kg^{-1} d.w. Means and standard errors were not calculated due to lack of replicate samples.

The mean concentration of zinc in the baseline control samples was 866.67 mg/kg $^{-1}$ d.w. (S.E. 44.7). The mean concentration of zinc in monitoring samples collected from the mid ship was 1033.33 mg/kg $^{-1}$d.w (S.E = 73.11). The concentration of zinc from the stern was 800 mg/kg^{-1} d.w. Moisture content measured across all samples was similar.

4.2 Comparison between Monitoring Sites and Baseline Controls

The mean concentration of both chromium and zinc was marginally higher at the monitoring sites than for the baseline control samples (**Table 1**). Univariate statistical analysis did not, however, indicate that these differences were statistically significant (*P*= 0.543, Chromium), (*P*=0.373, Zinc).

Table 1: Concentrations of Chromium and Zinc (dry weight) in Oysters Deployed at Monitoring Locations on the Ex-HMAS Adelaide and from Baseline Controls Transplanted from Forster/Tuncurry in November 2011. (n=7)

	Sample ID	Trace Metals		Moisture Content (%)
		Chromium (mg/kg)	**Zinc (mg/kg)**	
	LOR	0.01	0.01	n/a
Baseline Controls	BASELINE CONTROL R1	0.22	890.00	79.70
	BASELINE CONTROL R2	0.24	930.00	79.60
	BASELINE CONTROL R3	0.17	780.00	80.00
	Mean	**0.21**	**866.67**	**79.77**
	S.E	**0.02**	**44.85**	**0.12**
Monitoring Sites	MID SHIP R1	0.26	1010.00	80.00
	MID SHIP R2	1.10	1170.00	77.70
	MID SHIP R3	0.23	920.00	79.60
	Mean	**0.53**	**1033.33**	**79.10**
	S.E	**0.29**	**73.11**	**0.71**
	STERN R1	0.23	800.00	78.10
	Mean	n/a	n/a	n/a
	S.E.	n/a	n/a	n/a

5 Discussion

The mean concentrations of both chromium and zinc tended to be larger at the vessel monitoring sites than for the baseline control samples, although this was not statistically significant. A similar trend was observed in the previous study (Worley Parsons 2011b), but direct comparisons between the two studies cannot be made, as different species and animals of different sizes and ages (likely to bioaccumulate at different rates), were used. Thus, in the absence of appropriate environmental controls, it cannot be determined whether zinc and chromium potentially leached from the Ex-HMAS Adelaide has resulted in elevated levels of these metals in filter feeders living in association with the vessel. The statistical power of the analyses performed in the current study was also limited by the small number of samples retrieved after the 10 week period of deployment.

Zinc and chromium are essential elements for many marine organisms and as such, readily bioaccumulate. Zinc levels observed in the tissues of oysters in the present study are similar to background levels recorded at their source and would not be of toxicological significance. The levels of zinc recorded in oyster tissues are also similar or below that recorded in tissues of the same species in a recent bioaccumulation study of Port Hacking and Botany Bay (Hedge *et al*. 2009). The next bioaccumulation survey is scheduled to take place in April 2012.

6 Acknowledgements

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8 Appendices

Appendix A: Laboratory Results
Appendix B: Results of Univariate Statistical Analysis

Appendix A: Laboratory Results

Australian Government

National Measurement Institute

REPORT OF ANALYSIS

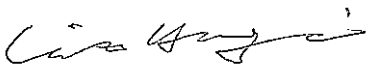
Report No. RN899277

Client	: CARDNO ECOLOGY LAB	Job No.	: CARD20/120125
	LEVEL 9, THE FORUM	Quote No.	: QT-01735
	203 PACIFIC HIGHWAY	Order No.	:
	ST LEONARDS NSW 2065	Date Sampled	: 20-JAN-2012
		Date Received	: 25-JAN-2012
Attention	: KATE REEDS	Sampled By	:
Project Name	:		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N12/002019	.	OYSTER TISSUE ZERO CONTROL R1 JOB NO EL1112024
N12/002020	.	OYSTER TISSUE ZERO CONTROL R2 JOB NO EL1112024
N12/002021	.	OYSTER TISSUE ZERO CONTROL R3 JOB NO EL1112024
N12/002022	.	OYSTER MID SHIP R1 JOB NO EL1112024

Lab Reg No.	Units	N12/002019	N12/002020	N12/002021	N12/002022	Method
Sample Reference		.	.	.	.	
Trace Elements						
Chromium	mg/kg	0.22	0.24	0.17	0.26	NT2_46
Zinc	mg/kg	890	930	780	1010	NT2_46
Moisture Content						
Moisture	%	79.7	79.6	80.0	80.0	NT2_49

N12/002019
-N12/002025.
Results are expressed on a dry weight basis.



Lisa Liu, Analyst
Inorganics - NSW
Accreditation No. 198

9-FEB-2012

REPORT OF ANALYSIS

Report No. RN899277

Client	: CARDNO ECOLOGY LAB	Job No.	: CARD20/120125
	LEVEL 9, THE FORUM	Quote No.	: QT-01735
	203 PACIFIC HIGHWAY	Order No.	:
	ST LEONARDS NSW 2065	Date Sampled	: 20-JAN-2012
		Date Received	: 25-JAN-2012
Attention	: KATE REEDS	Sampled By	:
Project Name	:		
Your Client Services Manager	: BRIAN WOODWARD	Phone	: (02) 94490151

Lab Reg No.	Sample Ref	Sample Description
N12/002023	.	OYSTER MID SHIP R2 JOB NO EL1112024
N12/002024	.	OYSTER MID SHIP R3 JOB NO EL1112024
N12/002025	.	OYSTER STERN R1 JOB NO EL1112024

Lab Reg No.		N12/002023	N12/002024	N12/002025		
Sample Reference	Units	.	.	.		Method
Trace Elements						
Chromium	mg/kg	1.1	0.23	0.23		NT2_46
Zinc	mg/kg	1170	920	800		NT2_46
Moisture Content						
Moisture	%	77.7	79.6	78.1		NT2_49

Lisa Liu, Analyst
Inorganics - NSW
Accreditation No. 198

9-FEB-2012

ACCREDITED FOR TECHNICAL COMPETENCE

Accreditated for compliance with ISO/IEC 17025.
This report shall not be reproduced except in full.
Results relate only to the sample(s) tested.

This Report supersedes reports: RN899223 RN899270

Appendix B: Permutational Analysis of Variance (PERMANOVA) comparing concentrations of zinc and chromium at control and monitoring locations in relation to the Ex-HMAS Adelaide. Significant factors are highlighted in bold. Data was not transformed as the data was normally distributed.

A. Chromium

Source of Variation	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Treatment (Monitoring vs Baseline)	1	0.1029	0.1029	0.92221	0.543	22
Residual	5	0.5579	0.11158			
Total	6	0.6608				

Estimates of components of variation

Source	Estimate	Sq.root
S(Tr)	0.002532	0.050316
V(Res)	0.11158	0.33404
Total	0.384356	

B. Zinc

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Tr	1	20119	20119	1.1839	0.3726	31
Res	5	84967	16993			
Total	6	105090				

Estimates of components of variation

Source	Estimate	Sq.root
S(Tr)	911.67	30.194
V(Res)	16993	130.36
Total	160.554	

From: s22(1)(a)(ii)
To: EPBC Monitoring
Cc: s22(1)(a)(ii)
Subject: Ex-HMAS Adelaide Artificial Reef (SD2008/1062) [SEC=UNCLASSIFIED]
Date: Tuesday, 30 October 2018 3:54:00 PM
Attachments: Ex HMAS Adelaide SD Permit.pdf

Good afternoon,

As discussed earlier, Condition 23 of permit SD2008/1062, for the placement of the Ex-HMAS Artificial Reef (attached) as an artificial reef, requires the permit holder to publish the results of the LTMMP on the Ex-HMAS Adelaide's website. However, the site where the results should be published (www.hmasadelaide.nsw.gov.au) does not seem accessible. Please action as appropriate.

Kind regards

s22(1)(a)(ii)
s22(1)(a)(ii) @environment.gov.au
s22(1)(a)(ii)
Assessment Officer
Queensland & Sea Dumping Section

AUSTRALIA

ENVIRONMENT PROTECTION (SEA DUMPING) ACT 1981

SEA DUMPING PERMIT No. SD2008/1062

for

NEW SOUTH WALES LAND AND PROPERTY MANAGEMENT AUTHORITY

I, VICKI JANE MIDDLETON, a delegate of the Minister for Environment Protection, Heritage and the Arts, acting under Section 19 of the *Environment Protection (Sea Dumping) Act 1981*, hereby grant a sea dumping permit to the New South Wales Land and Property Management Authority, PO Box 2185, Dangar, NSW, 2309, for an artificial reef placement of the vessel "Ex- HMAS *Adelaide"* off Avoca Beach, New South Wales, commencing on the date of signature of this permit and extending for a period of fifty years, subject to conditions which are specified in Appendix 1.

DATE.....22nd.....day of.....March.....2010

Vicki Middleton

.....

VICKI MIDDLETON
Delegate of the Minister

This permit comprises six (6) pages, including Appendix 1.

Appendix 1

CONDITIONS FOR ARTIFICIAL REEF PLACEMENT OF THE VESSEL "Ex-HMAS *ADELAIDE*", OFF AVOCA BEACH, NEW SOUTH WALES.

Definitions

In this permit:

"the Act"	means the *Environment Protection (Sea Dumping) Act 1981*;
"the Application"	means the Application for a permit under the *Environment Protection (Sea Dumping) Act 1981* submitted by the NSW Lands and Property Management Authority, received by the Department on 16 December 2008;
"the Department"	means the Department of the Environment, Water, Heritage and the Arts, Ports and Marine Section, GPO Box 787, Canberra ACT 2601. Telephone – 02 6274 1111 Facsimile – 02 6274 1620 Email – portsandmarine@environment.gov.au or successor entities;
"Ex- HMAS *Adelaide*"	means the decommissioned FFG-7 Class Guided Missile Frigate *Ex-HMAS Adelaide*;
"environmental incident"	any event which has the potential to, or does impact, on the environment;
"environmental risk"	any risk, additional to those risks previously identified in the Application, which has the potential to, or does impact, on the environment;
" final exclusion zone"	means the area within a radius of 500 metres of the *Ex-HMAS Adelaide* following the successful scuttling of the vessel and prior to the vessel being opened to the public as specified in the scuttling Plan;
"IALA"	means the International Association of Lighthouse Authorities;
"initial exclusion zone"	means the area within a radius of 1000 metres of the *Ex-HMAS Adelaide* during placement;
"LAT"	means lowest astronomical tide;
"LTMMP"	means the Long Term Monitoring and Management Plan (Revision D) received by the Department on 17 March 2010;
"Minister"	means the Australian Government Minister who administers the *Environment Protection (Sea Dumping) Act 1981*;
"monitoring zone"	means within 2 nm radius of the *Ex-HMAS Adelaide*;
"placement"	includes all activities associated with the placement permitted under this permit, including, but not limited to the placement of the *Ex-HMAS Adelaide;*

"Scuttling Plan"	means the Scuttling Plan (Revision 3) for the *Ex-HMAS Adelaide* received by the Department on 17 March 2010;
"LPMA"	means the New South Wales Land and Property Management Authority, PO Box 2185, Dangar, NSW, 2309; and
"unauthorised people, boats"	means any people and boats not authorised by NSW Maritime to be within the initial exclusion zone.

1. Except so far as the contrary intention appears, terms used in these conditions to this permit have the same meaning as such terms in the Act.

Material to be Placed

2. LPMA must place the *Ex-HMAS Adelaide* in the same preparation condition as per the ship inspection on 25 February 2010, with the addition of the following clean up preparations:

   (a) all temporary barricades, planks, wooden or steel blanking and other safety fittings are removed;

   (b) all ladders not permanently fixed into place and intended to remain in that position post scuttling are to be either removed or lowered to the deck;

   (c) the mast/structure must be modified to give a minimum over water clearance of 6 m at LAT immediately after scuttling; and

   (d) the ship must be cleaned of all other loose, unattached material and debris.

   LPMA must notify the Department in writing that the above preparations have been completed prior to the scuttling of the *Ex-HMAS Adelaide*.

3. LPMA must ensure no material additional to the *Ex-HMAS Adelaide,* in the condition described under Condition 2, is to be taken to sea and disposed of in association with this placement.

Location of Placement Site

4. LPMA must place the *Ex-HMAS Adelaide* on the designated scuttling datum of 151° 27.38 East, 33°.27.91 South. (MGA 94, Easting 356,551.686, Northing 6,296,076.969)

Conditions Applying Prior to Placement

5. LPMA must ensure the scuttling of the *Ex-HMAS Adelaide* is undertaken in accordance with the Scuttling Plan.

6. LPMA must advise the Department the planned date and time of commencement of the tow and scuttling process no less than 24 hours in advance of the tow commencing.

7. LPMA must advise the Department and other relevant authorities as soon as practicable of any delay, postponement or cancellation of the final tow and scuttling, whether due to actual or forecast weather or sea conditions or any other contingency or incident.

8. LPMA must ensure the pyrotechnic display is conducted as per the scuttling plan. All 28 pyrotechnic units must be removed as part of the post scuttling activities.

9. The person engaged to manage the deployment and detonation of explosives (including pyrotechnics) used in the placement of the Ex-HMAS Adelaide, must hold a current shotfirers permit.

10. LPMA must undertake visual reconnaissance of the placement area using binoculars from the shot firing vessel and by a spotter aircraft before and during the placement phase to ensure the exclusion zone of 1000 metres is clear of all unauthorised people or boats. The initial exclusion zone must be maintained until such time as the *Ex-HMAS Adelaide* is checked for non-detonated explosives and declared safe. Any unauthorised people or boats not essential to the scuttling straying into the exclusion zone are to be requested to clear and/or be escorted to the exclusion zone boundary. Scuttling charges are not to be detonated if any unauthorised people or boats are within the exclusion zone.

11. LPMA must ensure a spotter aircraft is in the air above the placement site at least 30 minutes prior to and during the placement phase to ensure that no cetacean, seal, Grey Nurse shark or great white shark are within a 2 nautical mile radius of the *Ex-HMAS Adelaide*. Detonation of the scuttling charges is to be suspended should any cetacean, seal, Grey Nurse Shark or Great White Shark be detected within a 2 nautical mile radius of the *Ex-HMAS Adelaide*, and must remain suspended until such time as the cetacean, seal or great white shark has been seen to leave the monitoring zone or until 30 minutes after the last sighting of the cetacean, seal, Grey Nurse Shark or Great White Shark within the monitoring zone. The spotter aircraft must maintain audio contact with the shot firing vessel monitoring the scuttling to ensure that the above procedures are followed.

12. LPMA must ensure no persons, vessel or aircraft pursue, herd or harass any cetacean, seal, Grey Nurse Shark or Great White Shark prior to or during the placement phase.

Conditions Applying Following the Placement

14. LPMA must ensure that the *Ex-HMAS Adelaide* sinks and settles on the seabed, and that the placement occurs centrally within the scuttling zone specified in Condition 4.

15. LPMA must undertake visual footage of the scuttling, including video reconnaissance of the placement location, and sea surface, immediately after placement, to detect the presence, or confirm the absence, of any visible pollution or debris, such as oil slicks or floating material. Any material left floating after the placement operation must be retrieved prior to access by recreational divers.

16. LPMA must ensure that after the *Ex-HMAS Adelaide* has been placed, a diving team checks all explosives have been detonated correctly. In the event that an explosive fails to detonate, it is to be made safe prior to the initial exclusion zone being removed.

17. LPMA must ensure that the highest point of the *Ex-HMAS Adelaide* is no less than 6.0 m below sea level at LAT immediately following placement. If this was not achieved during placement, then the mast and/or other structure must be lowered to the required height prior within 14 days.

18. LPMA must ensure after the placement, and prior to the final exclusion zone being removed, that a diving team inspects the *Ex-HMAS Adelaide*, and undertakes all repair work required to ensure that the *Ex-HMAS Adelaide* is safe for recreational divers.

19. LPMA must ensure within 5 days of scuttling, the *Ex-HMAS Adelaide* is to be marked as a navigation hazard by a marker that conforms to the IALA maritime buoyage system. The marker must be effective during all visibility conditions.

20. LPMA must provide a report to the Department within 5 days of placement which includes:

    (a) date and time of placement;

    (b) the position of the *Ex-HMAS Adelaide* (confirmation of the placement site to two decimal places of a minute, plus horizontal datum, in latitude and longitude format);

    (c) the estimated depth of water over the *Ex-HMAS Adelaide* as measured at LAT, and the date and time of the observation;

    (d) video footage (as specified in Condition 15) including a discussion on the scuttling detailing whether any problems arose during the scuttling, how they were rectified and if any clean up actions were undertaken;

    (e) verification from an independent observer, agreed by the Department, of the highest point of the vessel (as specified in Condition 17) prior to the exclusion zone being removed;

    (f) details of the inspection dive (as specified in Condition 18) including whether any items were removed or hazards rectified;

    (g) confirming the removal of all pyrotechnics equipment from the vessel (as specified in condition 9);

    (h) the position and description of the cardinal mark and any other visual indicators (e.g. buoys and/or lights) marking the wreck;

    (i) evidence of notification to the RAN Hydrographic Office and NSW Maritime as specified in Condition 21;

21. LPMA must provide the details specified in Condition 20 (a), (b), (c) and (h) to the Australian Hydrographic Office and NSW Maritime within 5 days of placement.

Environmental Risk and Incidents

22. If, at any time during the course of the placement activities, an environmental incident occurs or environmental risk is identified, or the placement does not occur in accordance with the Scuttling Plan as specified in Condition 5, all measures must be taken immediately by LPMA to mitigate the risk or the impact. The Department must be notified in writing within 24 hours of the occurrence or identification of an environmental incident or risk, and the measures taken, the success or otherwise of those measures in addressing the incident or risk, and any additional measures proposed to be taken or advised by the Department.

Monitoring and Reporting

23. LPMA must implement the Long Term Management and Monitoring Plan (LTMMP) for the *Ex-HMAS Adelaide* following the scuttling of the vessel. The results of the LTMMP must be published on the *Ex-HMAS Adelaide's* website (www.hmasadelaide.nsw.gov.au) within 1 month of the completion of sampling for the life of the LTMMP.

24. LPMA may submit for the Minister's approval a revised version of the LTMMP specified under Condition 23. If the Minister approves such a revised LTMMP, that LTMMP must be implemented in place of the LTMMP as originally approved.

25. If the Minister believes that it is necessary or desirable for the better protection of the environment to do so, the Minister may request LPMA to make specified revisions to the LTMMP and submit the revised LTMMP for the Minister's approval. If the Minister approves a revised LTMMP pursuant to this condition, the LPMA must implement that LTMMP instead of the LTMMP as originally approved.

26. A review of the LTMMP must be undertaken within five years of scuttling with the revised version submitted to the Minister for approval. A revised LTMMP must not be implemented until it is approved by the Minister. If the Minister approves a revised LTMMP pursuant to this condition, the LPMA must implement that LTMMP instead of the LTMMP as originally approved.

Compliance of all Parties engaged in dumping activities

27. LPMA must ensure that all persons engaged in the placement activities under this permit, including the owner(s) and person(s) in charge of the vessel, comply with this permit and the requirements of the Act.

Access for Observers

28. LPMA must allow at least two Australian Government nominees access to witness, inspect, examine or audit any part of the operations, including any placement or monitoring activity, the vessel or any other equipment, or any documented records, and are to be provided with any necessary assistance in carrying out their duties.

Auditing

29. After placement of the *Ex-HMAS Adelaide*, if the Department believes that it is necessary or desirable to undertake an audit of the permit conditions, LPMA must comply with any such request and must provide any necessary assistance to the Department's representatives in carrying out their duties.

NSW GOVERNMENT Department of Industry

CM9 reference: DOC18/246484

The Director
Queensland South and Sea Dumping Section
Commonwealth Department of Environment and Energy
GPO Box 787
CANBERRA ACT 2601

Dear Sir/Madam

RE: Variation to Sea Dumping Permit SD2008/1062

The Department of Industry – Crown Lands (the department) administers the Crown Reserve encompassing the wreck of the Ex-HMAS Adelaide (R1014968). The Ex-HMAS Adelaide was scuttled on 13 August 2011, in accordance with Sea Dumping Permit SD2008/1062.

The department is seeking a variation to the sea dumping permit. Condition 23 requires that the Long Term Management and Monitoring Plan (LTMMP) results be published on the Ex-HMAS Adelaide's website (www.hmasadelaide.nsw.gov.au) within one month of the completion of the sampling for the life of the LTMMP. This website is no longer supported by the department.

The department therefore requests that this condition be amended to permit posting of sample results within the department's main web site, in a section where information on the HMAS Adelaide is published and delete reference to the www.hmasadelaide.nsw.gov.au web page.

This will facilitate the maintenance of the currency of the reports and keep the information available within the department's public facing web site.

The department also wishes to advise that the Land and Property Management Authority (LPMA) with whom the permit was executed no longer exists as a government body. Notwithstanding, the management of Crown Reserves (including Sea Dumping Permit SD2008/1062) continues uninterrupted under the Department of Industry. To reflect this, a change of name is requested in the Sea Dumping Permit, replacing "New South Wales Land and Property Management Authority" (LPMA) to "New South Wales Department of Industry" (DoI). Attached to this correspondence are ABN Lookup outputs for both LPMA and the DoI.

If you have any questions or directions, please contact Adam Dalton on (02) 4931-6486 or via adam.dalton@crownland.nsw.gov.au

Yours sincerely

T. Deverell

Tim Deverell
Area Manager - Hunter
NSW Department of Industry – Crown Lands

28 November 2018

From: Melanie Osborne
To: EPBCMonitoring@awe.gov.au
Subject: Re-opening of the ex-HMAS Adelaide dive site reserve
Date: Tuesday, 10 March 2020 4:02:38 PM

Good afternoon,
I am pleased to advise that the ex-HMAS Adelaide dive site reserve is now re-open and available for bookings.
As you would be aware, following severe weather conditions, the reserve was closed on 10 February 2020. A post storm assessment inspection as required under Sea Dumping Permit SD2008/1062 and the conditions described in the Long Term Monitoring and Management Plan, has identified no new risks for recreational divers.
Pending the servicing and repairs of the moorings however, only the Main Mast mooring will be available for bookings at this time.
Content on the Crown Lands website will be updated to this effect shortly.
Please let me know should you require any further information.

Melanie Osborne
Group Leader Property Management

Crown Lands Division | Department of Planning, Industry and Environment
Direct T 02 4937 9332 | **E** melanie.osborne@crownland.nsw.gov.au
Generic T 1300 886 235 | **E** maitland.crownlands@crownland.nsw.gov.au
516 High Street, Maitland NSW 2320 | PO Box 2215, Dangar NSW 2309
www.dpie.nsw.gov.au

The Department of Planning, Industry and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

From: Adam Dalton
To: s22(1)(a)(ii)
Cc: Tim Deverell; Peter Draper; Martin Dawson; Melanie Osborne
Subject: Re: SD2008/1062 - Ex HMAS Adelaide - Permit Variation Draft [SEC=UNCLASSIFIED]
Date: Monday, 17 December 2018 11:08:06 AM

Hello s22(1)(a)(ii)

I have reviewed the Draft variation of Sea Dumping Permit SD2008/1062 and see no need to further amend any of the conditions.

By this email I will also confirm that the department will be in compliance with the Permit and make available the previous reports that were required under the LTMMP on the website.

Please forward the varied Permit to the Delegate for approval when you deem appropriate.

I appreciate all your efforts in managing the variation process and am available to assist if there is any further need.

Kind regards

Adam

Adam John Dalton CPV AAPI | Senior Property Management Officer
NSW Department of Industry - Crown Lands and Water
PO Box 2155| Dangar | NSW 2309
Direct T: (02) 4931 6486 | Office T: 1300 886 235
E: adam.dalton@crownland.nsw.gov.au
E: maitland.crownlands@crownland.nsw.gov.au
W: www.crownland.nsw.gov.au
W: www.industry.nsw.gov.au

Note: if I have not responded to your email in a prompt manner, please forward your enquiry to maitland.crownlands@crownland.nsw.gov.au and our correspondence manager will follow up with me directly or assign another staff member to your enquiry, should I be unavoidably unavailable.

On Mon, 17 Dec 2018 at 10:51, s22(1)(a)(ii) @environment.gov.au> wrote:

> Good morning Adam,
>
> Please see attached a draft permit variation for your review/comment. Please note that the draft permit may be amended by the Minister or his delegate, and you will be advised should that occur, and given another opportunity to review or comment. In addition, could you please confirm that the Department of Industry – Crown Lands are intending to publish previous monitoring results on the revised website.
>
> Please give me a call if you require any additional information.
>
> Regards,
>
> s22(1)(a)(ii)

s22(1)(a)(ii)

Queensland South and Sea Dumping Section | Environment Standards Division

Department of the Environment and Energy
Level 6, 51 Allara Street Canberra ACT 2600 | GPO Box 787, CANBERRA ACT 2601
Phone: s22(1)(a)(ii)

The Department acknowledges the traditional owners of country throughout Australia and their continuing connection to land, sea and community. We pay our respects to them and their cultures and to their elders both past and present.

Please consider the environment before printing

From: Sea Dumping
To: s22(1)(a)(ii)
Subject: FW: Variation to SD2008/1062 [SEC=UNCLASSIFIED]
Date: Wednesday, 28 November 2018 3:05:30 PM
Attachments: Request to vary sea dumping permit SD2008 1062.pdf
LPMA ABN_33537762019.pdf
DoI ABN_72189919072.pdf
Sea Dumping Permit - SD20081062 - Ex-HMAS Adelaide Reserve.PDF

From: Adam Dalton [mailto:adam.dalton@crownland.nsw.gov.au]
Sent: Wednesday, 28 November 2018 2:36 PM
To: Sea Dumping <Seadumping@environment.gov.au>
Subject: Variation to SD2008/1062

Good afternoon s22(1)(a)(ii)

Please find attached to this email the letter requesting variation to SD2008/1062 along with two supporting ABN lookup reports. A copy of this letter follows in the mail.

The request for the variation has been approved by the Area Manager - Hunter, Tim Deverell, to whom I report.

If there are any problems, or if I can be of any assistance please do not hesitate to contact me.

Regards,

Adam

Adam John Dalton CPV AAPI | Senior Property Management Officer
NSW Department of Industry - Crown Lands and Water
PO Box 2155| Dangar | NSW 2309
Direct T: (02) 4931 6486 | Office T: 1300 886 235
E: adam.dalton@crownland.nsw.gov.au
E: maitland.crownlands@crownland.nsw.gov.au
W: www.crownland.nsw.gov.au
W: www.industry.nsw.gov.au

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NSW GOVERNMENT Department of Industry

CM9 reference: DOC18/246484

The Director
Queensland South and Sea Dumping Section
Commonwealth Department of Environment and Energy
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Dear Sir/Madam

RE: Variation to Sea Dumping Permit SD2008/1062

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This will facilitate the maintenance of the currency of the reports and keep the information available within the department's public facing web site.

The department also wishes to advise that the Land and Property Management Authority (LPMA) with whom the permit was executed no longer exists as a government body. Notwithstanding, the management of Crown Reserves (including Sea Dumping Permit SD2008/1062) continues uninterrupted under the Department of Industry. To reflect this, a change of name is requested in the Sea Dumping Permit, replacing "New South Wales Land and Property Management Authority" (LPMA) to "New South Wales Department of Industry" (DoI). Attached to this correspondence are ABN Lookup outputs for both LPMA and the DoI.

If you have any questions or directions, please contact Adam Dalton on (02) 4931-6486 or via adam.dalton@crownland.nsw.gov.au

Yours sincerely

T. Deverell

Tim Deverell
Area Manager - Hunter
NSW Department of Industry – Crown Lands

28 November 2018

Australian Government
Australian Business Register

ABN Lookup

Current details for ABN 33 537 762 019

ABN details

Entity name:	Land and Property Management Authority
ABN status:	Cancelled from 01 Jul 2013
Entity type:	State Government Entity
Goods & Services Tax (GST):	Not currently registered for GST
Main business location:	NSW 2000

Business name(s)

Business name	From
LPI CADVIEW	01 Jul 2009
LPI STATEVIEW	01 Jul 2009
TOPOVIEW	01 Jul 2009

Trading name(s)

From 1 November 2023, ABN Lookup will not display trading names and will only display registered business names.

Trading name	From
Land and Property Information	01 Jul 2009
Crown Lands	01 Jul 2009
Crown Leaseholds Entity	01 Jul 2009
Geographical Names Board	01 Jul 2009
Land Development Working Account	01 Jul 2009
Office of Rural Affairs	01 Jul 2009
Soil Conservation Service	01 Jul 2009
Soil Services	01 Jul 2009

Deductible gift recipient status

Not entitled to receive tax deductible gifts

ABN last updated: 23 Aug 2015 **Record extracted: 14 Nov 2018**

Disclaimer

The Registrar makes every reasonable effort to maintain current and accurate information on this site. The Commissioner of Taxation advises that if you use ABN Lookup for information about another entity for taxation purposes and that information turns out to be incorrect, in certain circumstances you will be protected from liability. For more information see disclaimer.

Australian Government
Australian Business Register

ABN Lookup

Historical details for ABN 72 189 919 072

ABN details

Entity name	From	To
DEPARTMENT OF INDUSTRY	25 Jul 2017	(current)
DEPARTMENT OF INDUSTRY SKILLS AND REGIONAL DEVELOPMENT	13 Jul 2015	25 Jul 2017
DEPARTMENT OF INDUSTRY SKILLS & REGIONAL DEVELOPMENT	23 Jun 2015	13 Jul 2015
DEPARTMENT OF TRADE & INVESTMENT REGIONAL INFRASTRUCTURE AND SERVICES	01 Jul 2011	23 Jun 2015
Department of Industry and Investment	12 Apr 2011	01 Jul 2011
Department of Trade and Investment Regional Infrastructure and Services	07 Apr 2011	12 Apr 2011
Department of Industry and Investment	01 Jul 2009	07 Apr 2011
ABN Status	**From**	**To**
Active	01 Jul 2009	(current)
Entity type		
State Government Entity		
Goods & Services Tax (GST)	**From**	**To**
Registered	01 Jul 2009	(current)
Main business location	**From**	**To**
NSW 2800	13 Jul 2015	(current)
NSW 2800	11 Sep 2014	13 Jul 2015
NSW 2800	01 Jul 2009	11 Sep 2014

Business name(s)

Business name	From	To
NSW Small Business Commission	17 Oct 2018	(current)
Liquor & Gaming NSW	05 Apr 2017	(current)
NSW Office of Racing	05 Apr 2017	(current)
Responsible Gambling Fund	05 Apr 2017	(current)
Training Services NSW	09 Feb 2017	(current)
Jobs for NSW	06 Apr 2016	(current)
Dept of Industry	23 Dec 2015	(current)

Marine Parks Authority	28 Oct 2015	(current)
Cemeteries and Crematoria NSW	21 Oct 2015	(current)
Dept of Primary Industries	21 Oct 2015	(current)
Dept of Trade & Investment	21 Oct 2015	(current)
Industry & Investment NSW	21 Oct 2015	(current)
Ministerial Corporation for Industry	21 Oct 2015	(current)
National Resource Management Investment	21 Oct 2015	(current)
NSW Office for Science & Medical Research	21 Oct 2015	(current)
Public Reserves Management Fund	21 Oct 2015	(current)
Retail Tenancy Unit	21 Oct 2015	(current)
State Training Services	21 Oct 2015	(current)
Water Administration Ministerial Corporation	21 Oct 2015	(current)
Office of the NSW Small Business Commissioner	17 Sep 2014	(current)
NSW Small Business Commissioner	16 Sep 2014	(current)
Murrumbidgee Rural Studies Centre	18 Feb 2014	(current)
Tocal College	02 Aug 2012	(current)
Coal Innovation Fund	22 Oct 2015	07 May 2017
Office of Resources and Energy	21 Oct 2015	07 May 2017
Soil Conservation Service	11 Mar 2013	04 Nov 2017

Trading name(s)

From 1 November 2023, ABN Lookup will not display trading names and will only display registered business names.

Trading name	From	To
DEPARTMENT OF TRADE & INVESTMENT REGIONAL INFRASTRUCTURE AND SERVICES	30 Jun 2011	(current)
Industry and Investment NSW	01 Jul 2009	30 Jun 2011
Department of Primary Industries and Water Administration Ministerial Corporation	01 Mar 2012	(current)
National Resourse Management Investment	01 Mar 2012	(current)
Office of the Hawkesbury-Nepean	01 Mar 2012	(current)
Office of Liquor Gaming and Racing	29 Feb 2012	(current)
NSW Trade & Investment	22 Sep 2011	(current)
Retail Tenancy Unit	31 Aug 2011	(current)
Small Business Commission	31 Aug 2011	(current)
Border River/Gwydir CMA	04 Jul 2011	(current)
Central West CMA	04 Jul 2011	(current)
Chipping Norton Lake Authority	04 Jul 2011	(current)
Dams Safety Committee	04 Jul 2011	(current)
Department of Primary Industries	04 Jul 2011	(current)

DPI	04 Jul 2011	(current)
Hawkesbury Nepean CMA	04 Jul 2011	(current)
Hunter Central Rivers CMA	04 Jul 2011	(current)
Lachlan CMA	04 Jul 2011	(current)
Lake Illawarra Authority	04 Jul 2011	(current)
Lower Murray Darling CMA	04 Jul 2011	(current)
Marine Parks Authority	04 Jul 2011	(current)
Murray CMA	04 Jul 2011	(current)
Murrumbidgee CMA	04 Jul 2011	(current)
Namoi CMA	04 Jul 2011	(current)
Northern Rivers CMA	04 Jul 2011	(current)
NSW Office of Water	04 Jul 2011	(current)
Office of Primary Industries	04 Jul 2011	(current)
Office of Rural Affairs	04 Jul 2011	(current)
Southern Rivers CMA	04 Jul 2011	(current)
Sydney Metropolitan CMA	04 Jul 2011	(current)
Tocal Agricultural Centre CB Alexander Campus (has DGR status)	04 Jul 2011	(current)
Western CMA	04 Jul 2011	(current)
Office of Biofuels	29 Jun 2011	(current)
Office of Resources & Energy	29 Jun 2011	(current)
Trade & Investment	29 Jun 2011	(current)
Arts NSW	28 Jun 2011	(current)
Department of Industry and Investment	28 Jun 2011	(current)
DTIRIS	28 Jun 2011	(current)
I & I NSW	28 Jun 2011	(current)
Industry & Investment NSW	28 Jun 2011	(current)
Ministerial Corporation for Industry	28 Jun 2011	(current)
NSW Office for Science and Medical Research	28 Jun 2011	(current)
NSW Trade and Investment Centre	28 Jun 2011	(current)
OSMR	28 Jun 2011	(current)
Precinct Liquor Accord Fund	28 Jun 2011	(current)
Responsible Gambling Fund	28 Jun 2011	(current)
Small Business Development Corporation	28 Jun 2011	(current)
Department of Trade Investment and Regional Infrastructure and Services	01 May 2011	(current)
The Water Administration Ministerial Corporation	04 Jul 2011	26 Mar 2012
The Office of Hawkesbury/Nepean	04 Jul 2011	01 Mar 2012
NSW Office of Liquor Gaming and Racing	28 Jun 2011	29 Feb 2012
HMRA	28 Jun 2011	22 Aug 2011

Homebush Motor Racing Authority	28 Jun 2011	22 Aug 2011
TNSW	28 Jun 2011	22 Aug 2011
Tourism NSW	28 Jun 2011	22 Aug 2011
Office of Rural Affairs	01 Jan 2010	28 Jun 2011
Department of State and Regional Development	11 Nov 2009	28 Jun 2011
Department State and Regional development	11 Nov 2009	28 Jun 2011
DSRD	11 Nov 2009	28 Jun 2011
HMRA	11 Nov 2009	28 Jun 2011
Homebush Motor Racing authority	11 Nov 2009	28 Jun 2011
I&I NSW	11 Nov 2009	28 Jun 2011
NSW Department of State and Regional Development	11 Nov 2009	28 Jun 2011
NSW DSRD	11 Nov 2009	28 Jun 2011
NSW Office for Science and Medical Research	11 Nov 2009	28 Jun 2011
NSW Tourism	11 Nov 2009	28 Jun 2011
NSW Trade and Investment Centre	11 Nov 2009	28 Jun 2011
Office for Science and Medical Research	11 Nov 2009	28 Jun 2011
OSMR	11 Nov 2009	28 Jun 2011
SRD	11 Nov 2009	28 Jun 2011
SRD&T	11 Nov 2009	28 Jun 2011
State & Regional Development and Tourism Division	11 Nov 2009	28 Jun 2011
TNSW	11 Nov 2009	28 Jun 2011
Tourism New Wouth Wales	11 Nov 2009	28 Jun 2011
Tourism NSW	11 Nov 2009	28 Jun 2011
Tocal Agriculture Centre CB Alexander Campus	23 Oct 2009	11 Nov 2009
Department of Industry and Investment	13 Oct 2009	28 Jun 2011
Department of Industry and Investment - Primary Industries and Energy	13 Oct 2009	28 Jun 2011
NSW Department of Primary Industries	13 Oct 2009	11 Nov 2009
Primary Industries and Energy	13 Oct 2009	11 Nov 2009
Total Agriculture Centre CB Alexander Campus	13 Oct 2009	23 Oct 2009
Industry and Investment NSW- State & Regional Development & Tourism Division	14 Sep 2009	28 Jun 2011

Deductible gift recipient status

Not entitled to receive tax deductible gifts

ABN last updated: 17 Oct 2018 **Record extracted: 14 Nov 2018**

Disclaimer

The Registrar makes every reasonable effort to maintain current and accurate information on this site. The Commissioner of Taxation advises that if you use ABN Lookup for information about another entity for taxation purposes and that information turns out to be incorrect, in certain circumstances you will be protected from liability. For more information see disclaimer.

AUSTRALIA

ENVIRONMENT PROTECTION (SEA DUMPING) ACT 1981

SEA DUMPING PERMIT No. SD2008/1062

for

NEW SOUTH WALES LAND AND PROPERTY MANAGEMENT AUTHORITY

I, VICKI JANE MIDDLETON, a delegate of the Minister for Environment Protection, Heritage and the Arts, acting under Section 19 of the *Environment Protection (Sea Dumping) Act 1981*, hereby grant a sea dumping permit to the New South Wales Land and Property Management Authority, PO Box 2185, Dangar, NSW, 2309, for an artificial reef placement of the vessel "Ex- HMAS *Adelaide*" off Avoca Beach, New South Wales, commencing on the date of signature of this permit and extending for a period of fifty years, subject to conditions which are specified in Appendix 1.

DATE.....22nd.....day of.....March.....2010

Vicki Middleton
.....
VICKI MIDDLETON
Delegate of the Minister

This permit comprises six (6) pages, including Appendix 1.

Appendix 1

CONDITIONS FOR ARTIFICIAL REEF PLACEMENT OF THE VESSEL "Ex-HMAS *ADELAIDE*", OFF AVOCA BEACH, NEW SOUTH WALES.

Definitions

In this permit:

"the Act"	means the *Environment Protection (Sea Dumping) Act 1981*;
"the Application"	means the Application for a permit under the *Environment Protection (Sea Dumping) Act 1981* submitted by the NSW Lands and Property Management Authority, received by the Department on 16 December 2008;
"the Department"	means the Department of the Environment, Water, Heritage and the Arts, Ports and Marine Section, GPO Box 787, Canberra ACT 2601. Telephone – 02 6274 1111 Facsimile – 02 6274 1620 Email – portsandmarine@environment.gov.au or successor entities;
"Ex- HMAS *Adelaide*"	means the decommissioned FFG-7 Class Guided Missile Frigate *Ex-HMAS Adelaide*;
"environmental incident"	any event which has the potential to, or does impact, on the environment;
"environmental risk"	any risk, additional to those risks previously identified in the Application, which has the potential to, or does impact, on the environment;
" final exclusion zone"	means the area within a radius of 500 metres of the *Ex-HMAS Adelaide* following the successful scuttling of the vessel and prior to the vessel being opened to the public as specified in the scuttling Plan;
"IALA"	means the International Association of Lighthouse Authorities;
"initial exclusion zone"	means the area within a radius of 1000 metres of the *Ex-HMAS Adelaide* during placement;
"LAT"	means lowest astronomical tide;
"LTMMP"	means the Long Term Monitoring and Management Plan (Revision D) received by the Department on 17 March 2010;
"Minister"	means the Australian Government Minister who administers the *Environment Protection (Sea Dumping) Act 1981*;
"monitoring zone"	means within 2 nm radius of the *Ex-HMAS Adelaide*;
"placement"	includes all activities associated with the placement permitted under this permit, including, but not limited to the placement of the *Ex-HMAS Adelaide;*

"Scuttling Plan"	means the Scuttling Plan (Revision 3) for the *Ex-HMAS Adelaide* received by the Department on 17 March 2010;
"LPMA"	means the New South Wales Land and Property Management Authority, PO Box 2185, Dangar, NSW, 2309; and
"unauthorised people, boats"	means any people and boats not authorised by NSW Maritime to be within the initial exclusion zone.

1. Except so far as the contrary intention appears, terms used in these conditions to this permit have the same meaning as such terms in the Act.

Material to be Placed

2. LPMA must place the *Ex-HMAS Adelaide* in the same preparation condition as per the ship inspection on 25 February 2010, with the addition of the following clean up preparations:

   (a) all temporary barricades, planks, wooden or steel blanking and other safety fittings are removed;

   (b) all ladders not permanently fixed into place and intended to remain in that position post scuttling are to be either removed or lowered to the deck;

   (c) the mast/structure must be modified to give a minimum over water clearance of 6 m at LAT immediately after scuttling; and

   (d) the ship must be cleaned of all other loose, unattached material and debris.

   LPMA must notify the Department in writing that the above preparations have been completed prior to the scuttling of the *Ex-HMAS Adelaide*.

3. LPMA must ensure no material additional to the *Ex-HMAS Adelaide,* in the condition described under Condition 2, is to be taken to sea and disposed of in association with this placement.

Location of Placement Site

4. LPMA must place the *Ex-HMAS Adelaide* on the designated scuttling datum of 151° 27.38 East, 33°.27.91 South. (MGA 94, Easting 356,551.686, Northing 6,296,076.969)

Conditions Applying Prior to Placement

5. LPMA must ensure the scuttling of the *Ex-HMAS Adelaide* is undertaken in accordance with the Scuttling Plan.

6. LPMA must advise the Department the planned date and time of commencement of the tow and scuttling process no less than 24 hours in advance of the tow commencing.

7. LPMA must advise the Department and other relevant authorities as soon as practicable of any delay, postponement or cancellation of the final tow and scuttling, whether due to actual or forecast weather or sea conditions or any other contingency or incident.

8. LPMA must ensure the pyrotechnic display is conducted as per the scuttling plan. All 28 pyrotechnic units must be removed as part of the post scuttling activities.

9. The person engaged to manage the deployment and detonation of explosives (including pyrotechnics) used in the placement of the Ex-HMAS Adelaide, must hold a current shotfirers permit.

10. LPMA must undertake visual reconnaissance of the placement area using binoculars from the shot firing vessel and by a spotter aircraft before and during the placement phase to ensure the exclusion zone of 1000 metres is clear of all unauthorised people or boats. The initial exclusion zone must be maintained until such time as the *Ex-HMAS Adelaide* is checked for non-detonated explosives and declared safe. Any unauthorised people or boats not essential to the scuttling straying into the exclusion zone are to be requested to clear and/or be escorted to the exclusion zone boundary. Scuttling charges are not to be detonated if any unauthorised people or boats are within the exclusion zone.

11. LPMA must ensure a spotter aircraft is in the air above the placement site at least 30 minutes prior to and during the placement phase to ensure that no cetacean, seal, Grey Nurse shark or great white shark are within a 2 nautical mile radius of the *Ex-HMAS Adelaide*. Detonation of the scuttling charges is to be suspended should any cetacean, seal, Grey Nurse Shark or Great White Shark be detected within a 2 nautical mile radius of the *Ex-HMAS Adelaide*, and must remain suspended until such time as the cetacean, seal or great white shark has been seen to leave the monitoring zone or until 30 minutes after the last sighting of the cetacean, seal, Grey Nurse Shark or Great White Shark within the monitoring zone. The spotter aircraft must maintain audio contact with the shot firing vessel monitoring the scuttling to ensure that the above procedures are followed.

12. LPMA must ensure no persons, vessel or aircraft pursue, herd or harass any cetacean, seal, Grey Nurse Shark or Great White Shark prior to or during the placement phase.

Conditions Applying Following the Placement

14. LPMA must ensure that the *Ex-HMAS Adelaide* sinks and settles on the seabed, and that the placement occurs centrally within the scuttling zone specified in Condition 4.

15. LPMA must undertake visual footage of the scuttling, including video reconnaissance of the placement location, and sea surface, immediately after placement, to detect the presence, or confirm the absence, of any visible pollution or debris, such as oil slicks or floating material. Any material left floating after the placement operation must be retrieved prior to access by recreational divers.

16. LPMA must ensure that after the *Ex-HMAS Adelaide* has been placed, a diving team checks all explosives have been detonated correctly. In the event that an explosive fails to detonate, it is to be made safe prior to the initial exclusion zone being removed.

17. LPMA must ensure that the highest point of the *Ex-HMAS Adelaide* is no less than 6.0 m below sea level at LAT immediately following placement. If this was not achieved during placement, then the mast and/or other structure must be lowered to the required height prior within 14 days.

18. LPMA must ensure after the placement, and prior to the final exclusion zone being removed, that a diving team inspects the *Ex-HMAS Adelaide*, and undertakes all repair work required to ensure that the *Ex-HMAS Adelaide* is safe for recreational divers.

19. LPMA must ensure within 5 days of scuttling, the *Ex-HMAS Adelaide* is to be marked as a navigation hazard by a marker that conforms to the IALA maritime buoyage system. The marker must be effective during all visibility conditions.

20. LPMA must provide a report to the Department within 5 days of placement which includes:

    (a) date and time of placement;

    (b) the position of the *Ex-HMAS Adelaide* (confirmation of the placement site to two decimal places of a minute, plus horizontal datum, in latitude and longitude format);

    (c) the estimated depth of water over the *Ex-HMAS Adelaide* as measured at LAT, and the date and time of the observation;

    (d) video footage (as specified in Condition 15) including a discussion on the scuttling detailing whether any problems arose during the scuttling, how they were rectified and if any clean up actions were undertaken;

    (e) verification from an independent observer, agreed by the Department, of the highest point of the vessel (as specified in Condition 17) prior to the exclusion zone being removed;

    (f) details of the inspection dive (as specified in Condition 18) including whether any items were removed or hazards rectified;

    (g) confirming the removal of all pyrotechnics equipment from the vessel (as specified in condition 9);

    (h) the position and description of the cardinal mark and any other visual indicators (e.g. buoys and/or lights) marking the wreck;

    (i) evidence of notification to the RAN Hydrographic Office and NSW Maritime as specified in Condition 21;

21. LPMA must provide the details specified in Condition 20 (a), (b), (c) and (h) to the Australian Hydrographic Office and NSW Maritime within 5 days of placement.

Environmental Risk and Incidents

22. If, at any time during the course of the placement activities, an environmental incident occurs or environmental risk is identified, or the placement does not occur in accordance with the Scuttling Plan as specified in Condition 5, all measures must be taken immediately by LPMA to mitigate the risk or the impact. The Department must be notified in writing within 24 hours of the occurrence or identification of an environmental incident or risk, and the measures taken, the success or otherwise of those measures in addressing the incident or risk, and any additional measures proposed to be taken or advised by the Department.

Monitoring and Reporting

23. LPMA must implement the Long Term Management and Monitoring Plan (LTMMP) for the *Ex-HMAS Adelaide* following the scuttling of the vessel. The results of the LTMMP must be published on the *Ex-HMAS Adelaide's* website (www.hmasadelaide.nsw.gov.au) within 1 month of the completion of sampling for the life of the LTMMP.

24. LPMA may submit for the Minister's approval a revised version of the LTMMP specified under Condition 23. If the Minister approves such a revised LTMMP, that LTMMP must be implemented in place of the LTMMP as originally approved.

25. If the Minister believes that it is necessary or desirable for the better protection of the environment to do so, the Minister may request LPMA to make specified revisions to the LTMMP and submit the revised LTMMP for the Minister's approval. If the Minister approves a revised LTMMP pursuant to this condition, the LPMA must implement that LTMMP instead of the LTMMP as originally approved.

26. A review of the LTMMP must be undertaken within five years of scuttling with the revised version submitted to the Minister for approval. A revised LTMMP must not be implemented until it is approved by the Minister. If the Minister approves a revised LTMMP pursuant to this condition, the LPMA must implement that LTMMP instead of the LTMMP as originally approved.

Compliance of all Parties engaged in dumping activities

27. LPMA must ensure that all persons engaged in the placement activities under this permit, including the owner(s) and person(s) in charge of the vessel, comply with this permit and the requirements of the Act.

Access for Observers

28. LPMA must allow at least two Australian Government nominees access to witness, inspect, examine or audit any part of the operations, including any placement or monitoring activity, the vessel or any other equipment, or any documented records, and are to be provided with any necessary assistance in carrying out their duties.

Auditing

29. After placement of the *Ex-HMAS Adelaide*, if the Department believes that it is necessary or desirable to undertake an audit of the permit conditions, LPMA must comply with any such request and must provide any necessary assistance to the Department's representatives in carrying out their duties.

AUSTRALIA

ENVIRONMENT PROTECTION (SEA DUMPING) ACT 1981

VARIATION NO. 1 TO SEA DUMPING PERMIT No. SD2008/1062

for

NEW SOUTH WALES DEPARTMENT OF INDUSTRY
ABN: 72 189 919 072

I, JAMES BARKER, a delegate of the Minister for the Environment, acting under Sections 21 and 23 of the *Environment Protection (Sea Dumping) Act 1981*, hereby vary the sea dumping permit granted to the New South Wales Lands and Property Management Authority, PO Box 2185, Dangar, NSW, 2309, now the New South Wales Department of Industry, ABN: 72 189 919 072, PO Box 2185, Dangar, NSW, 2309, for the artificial reef placement of the vessel "Ex- HMAS *Adelaide"* off Avoca Beach, New South Wales, commencing on the date of signature of this permit and extending until 22 March 2060, and subject to the conditions which are specified in Appendix 1.

DATE.....22.....day of.....January.....2019

.....

JAMES BARKER
Delegate of the Minister

This permit comprises six (6) pages, including Appendix 1.

Appendix 1

CONDITIONS FOR ARTIFICIAL REEF PLACEMENT OF THE VESSEL "Ex-HMAS *ADELAIDE*", OFF AVOCA BEACH, NEW SOUTH WALES.

Definitions

In this permit:

"the Act"	means the *Environment Protection (Sea Dumping) Act 1981*;
"the Application"	means the Application for a permit under the *Environment Protection (Sea Dumping) Act 1981* submitted by the NSW Lands and Property Management Authority, received by the Department on 16 December 2008;
"the Department"	means the Australian Government Department responsible for administering the **Act**;
"DoI"	means the New South Wales Department of Industry, ABN 72 189 919 072, PO Box 2185, Dangar, NSW, 2309
"Ex- HMAS *Adelaide*"	means the decommissioned FFG-7 Class Guided Missile Frigate *Ex-HMAS Adelaide*;
"environmental incident"	means any event which has the potential to, or does impact, on the environment;
"environmental risk"	any risk, additional to those risks previously identified in the Application, which has the potential to, or does impact, on the environment;
" final exclusion zone"	means the area within a radius of 500 metres of the *Ex-HMAS Adelaide* following the successful scuttling of the vessel and prior to the vessel being opened to the public as specified in the scuttling Plan;
"IALA"	means the International Association of Lighthouse Authorities;
"initial exclusion zone"	means the area within a radius of 1000 metres of the *Ex-HMAS Adelaide* during placement;
"LAT"	means lowest astronomical tide;
"LTMMP"	means the Long Term Monitoring and Management Plan (Revision D) received by the Department on 17 March 2010, and the revised Long Term Monitoring and Management Plan received by the Department on 24 January 2018;
"Minister"	means the Australian Government Minister who administers the *Environment Protection (Sea Dumping) Act 1981*;
"monitoring zone"	means within 2 nm radius of the *Ex-HMAS Adelaide*;
"placement"	includes all activities associated with the placement permitted under this permit, including, but not limited to the placement of the *Ex-HMAS Adelaide;*
"Scuttling Plan"	means the Scuttling Plan (Revision 3) for the *Ex-HMAS Adelaide* received by the Department on 17 March 2010;

"LPMA"	means the New South Wales Land and Property Management Authority, PO Box 2185, Dangar, NSW, 2309; and
"unauthorised people, boats"	means any people and boats not authorised by NSW Maritime to be within the initial exclusion zone.
"Website"	means a set of related web pages located under a single domain name attributed to the permit holder and available to the public.

1. Except so far as the contrary intention appears, terms used in these conditions to this permit have the same meaning as such terms in the Act.

Material to be Placed

2. LPMA must place the *Ex-HMAS Adelaide* in the same preparation condition as per the ship inspection on 25 February 2010, with the addition of the following clean up preparations:

   (a) all temporary barricades, planks, wooden or steel blanking and other safety fittings are removed;

   (b) all ladders not permanently fixed into place and intended to remain in that position post scuttling are to be either removed or lowered to the deck;

   (c) the mast/structure must be modified to give a minimum over water clearance of 6 m at LAT immediately after scuttling; and

   (d) the ship must be cleaned of all other loose, unattached material and debris.

   LPMA must notify the Department in writing that the above preparations have been completed prior to the scuttling of the *Ex-HMAS Adelaide*.

3. LPMA must ensure no material additional to the *Ex-HMAS Adelaide,* in the condition described under Condition 2, is to be taken to sea and disposed of in association with this placement.

Location of Placement Site

4. LPMA must place the *Ex-HMAS Adelaide* on the designated scuttling datum of 151° 27.38 East, 33°.27.91 South. (MGA 94, Easting 356,551.686, Northing 6,296,076.969)

Conditions Applying Prior to Placement

5. LPMA must ensure the scuttling of the *Ex-HMAS Adelaide* is undertaken in accordance with the Scuttling Plan.

6. LPMA must advise the Department the planned date and time of commencement of the tow and scuttling process no less than 24 hours in advance of the tow commencing.

7. LPMA must advise the Department and other relevant authorities as soon as practicable of any delay, postponement or cancellation of the final tow and scuttling, whether due to actual or forecast weather or sea conditions or any other contingency or incident.

8. LPMA must ensure the pyrotechnic display is conducted as per the scuttling plan. All 28 pyrotechnic units must be removed as part of the post scuttling activities.

9. The person engaged to manage the deployment and detonation of explosives (including pyrotechnics) used in the placement of the Ex-HMAS Adelaide, must hold a current shotfirers permit.

10. LPMA must undertake visual reconnaissance of the placement area using binoculars from the shot firing vessel and by a spotter aircraft before and during the placement phase to ensure the exclusion zone of 1000 metres is clear of all unauthorised people or boats. The initial exclusion zone must be maintained until such time as the *Ex-HMAS Adelaide* is checked for non-detonated explosives and declared safe. Any unauthorised people or boats not essential to the scuttling straying into the exclusion zone are to be requested to clear and/or be escorted to the exclusion zone boundary. Scuttling charges are not to be detonated if any unauthorised people or boats are within the exclusion zone.

11. LPMA must ensure a spotter aircraft is in the air above the placement site at least 30 minutes prior to and during the placement phase to ensure that no cetacean, seal, Grey Nurse shark or great white shark are within a 2 nautical mile radius of the *Ex-HMAS Adelaide*. Detonation of the scuttling charges is to be suspended should any cetacean, seal, Grey Nurse Shark or Great White Shark be detected within a 2 nautical mile radius of the *Ex-HMAS Adelaide*, and must remain suspended until such time as the cetacean, seal or great white shark has been seen to leave the monitoring zone or until 30 minutes after the last sighting of the cetacean, seal, Grey Nurse Shark or Great White Shark within the monitoring zone. The spotter aircraft must maintain audio contact with the shot firing vessel monitoring the scuttling to ensure that the above procedures are followed.

12. LPMA must ensure no persons, vessel or aircraft pursue, herd or harass any cetacean, seal, Grey Nurse Shark or Great White Shark prior to or during the placement phase.

Conditions Applying Following the Placement

14. LPMA must ensure that the *Ex-HMAS Adelaide* sinks and settles on the seabed, and that the placement occurs centrally within the scuttling zone specified in Condition 4.

15. LPMA must undertake visual footage of the scuttling, including video reconnaissance of the placement location, and sea surface, immediately after placement, to detect the presence, or confirm the absence, of any visible pollution or debris, such as oil slicks or floating material. Any material left floating after the placement operation must be retrieved prior to access by recreational divers.

16. LPMA must ensure that after the *Ex-HMAS Adelaide* has been placed, a diving team checks all explosives have been detonated correctly. In the event that an explosive fails to detonate, it is to be made safe prior to the initial exclusion zone being removed.

17. LPMA must ensure that the highest point of the *Ex-HMAS Adelaide* is no less than 6.0 m below sea level at LAT immediately following placement. If this was not achieved during placement, then the mast and/or other structure must be lowered to the required height prior within 14 days.

18. LPMA must ensure after the placement, and prior to the final exclusion zone being removed, that a diving team inspects the *Ex-HMAS Adelaide*, and undertakes all repair work required to ensure that the *Ex-HMAS Adelaide* is safe for recreational divers.

19. LPMA must ensure within 5 days of scuttling, the *Ex-HMAS Adelaide* is to be marked as a navigation hazard by a marker that conforms to the IALA maritime buoyage system. The marker must be effective during all visibility conditions.

20. LPMA must provide a report to the Department within 5 days of placement which includes:

    (a) date and time of placement;

    (b) the position of the *Ex-HMAS Adelaide* (confirmation of the placement site to two decimal places of a minute, plus horizontal datum, in latitude and longitude format);

    (c) the estimated depth of water over the *Ex-HMAS Adelaide* as measured at LAT, and the date and time of the observation;

    (d) video footage (as specified in Condition 15) including a discussion on the scuttling detailing whether any problems arose during the scuttling, how they were rectified and if any clean up actions were undertaken;

    (e) verification from an independent observer, agreed by the Department, of the highest point of the vessel (as specified in Condition 17) prior to the exclusion zone being removed;

    (f) details of the inspection dive (as specified in Condition 18) including whether any items were removed or hazards rectified;

    (g) confirming the removal of all pyrotechnics equipment from the vessel (as specified in condition 9);

    (h) the position and description of the cardinal mark and any other visual indicators (e.g. buoys and/or lights) marking the wreck;

    (i) evidence of notification to the RAN Hydrographic Office and NSW Maritime as specified in Condition 21;

21. LPMA must provide the details specified in Condition 20 (a), (b), (c) and (h) to the Australian Hydrographic Office and NSW Maritime within 5 days of placement.

Environmental Risk and Incidents

22. If, at any time during the course of the placement activities, an environmental incident occurs or environmental risk is identified, or the placement does not occur in accordance with the Scuttling Plan as specified in Condition 5, all measures must be taken immediately by LPMA to mitigate the risk or the impact. The Department must be notified in writing within 24 hours of the occurrence or identification of an environmental incident or risk, and the measures taken, the success or otherwise of those measures in addressing the incident or risk, and any additional measures proposed to be taken or advised by the Department.

Monitoring and Reporting

23. **DoI** must implement the **LTMMP** for the ***Ex-HMAS Adelaide***. The results of the **LTMMP** must be published on the **website** within 1 month of the completion of sampling, and remain on the **website** for the life of the **LTMMP**.

24. **DoI** may submit for the **Minister's** approval a revised version of the **LTMMP** specified under Condition 23. If the **Minister** approves such a revised **LTMMP**, that **LTMMP** must be implemented in place of the **LTMMP** as originally approved.

25. If the Minister believes that it is necessary or desirable for the better protection of the environment to do so, the Minister may request **DoI** to make specified revisions to the **LTMMP** and submit the revised **LTMMP** for the Minister's approval. If the Minister

approves a revised **LTMMP** pursuant to this condition, the DoI must implement that **LTMMP** instead of the **LTMMP** as originally approved.

26. A review of the **LTMMP** must be undertaken within five years of scuttling with the revised version submitted to the Minister for approval. A revised **LTMMP** must not be implemented until it is approved by the Minister. If the Minister approves a revised **LTMMP** pursuant to this condition, the **DoI** must implement that **LTMMP** instead of the **LTMMP** as originally approved.

Compliance of all Parties engaged in dumping activities

27. **DoI** must ensure that all persons engaged in the placement activities under this permit, including the owner(s) and person(s) in charge of the vessel, comply with this permit and the requirements of the Act.

Access for Observers

28. **DoI** must allow at least two Australian Government nominees access to witness, inspect, examine or audit any part of the operations, including any placement or monitoring activity, the vessel or any other equipment, or any documented records, and are to be provided with any necessary assistance in carrying out their duties.

Auditing

29. After placement of the *Ex-HMAS Adelaide*, if the Department believes that it is necessary or desirable to undertake an audit of the permit conditions, **DoI** must comply with any such request and must provide any necessary assistance to the Department's representatives in carrying out their duties.

Ref: SD2008/1062

Tim Deverell
Area Manager - Hunter
NSW Department of Industry – Crown Lands
Locked Bag 2185
DANGAR NSW 2309

Sea Dumping Permit No. SD2008/1062– New South Wales Department of Industry – Crown Lands – Variation to Sea Dumping Permit Ex-HMAS Adelaide Artificial Reef

Dear Mr Deverell,

I refer to your correspondence of 28 November 2018, requesting a variation to Sea Dumping Permit No. SD2008/1062.

As delegate of the Minister for the Environment, I have decided to vary Sea Dumping Permit No. SD2008/1062, in accordance with sections 21 and 23(3) of the Sea Dumping Act. I have included a copy of the varied permit with this letter.

Although an approval has been granted under the Sea Dumping Act, this approval does not relieve the person to whom it has been granted from an obligation to comply with any other law of the Commonwealth, state or territory that is applicable to the activity, nor does it provide right, title or interest that is required to access land or waters to conduct the activity.

Should you require any further information please contact s.22(1)(a)(ii) or by email at s. 22(1)(a)(ii)

Yours sincerely

s. 47F(1)

James Barker
Assistant Secretary
Assessments and Governance Branch
22/1 2019

From: Sea Dumping
To: "Adam Dalton"
Cc: s22(1)(a)(ii)
Subject: RE: Variation to SD2008/1062 [SEC=UNCLASSIFIED]
Date: Wednesday, 28 November 2018 3:01:17 PM

Good afternoon Adam,

I wish to formally acknowledge receipt of your application to vary permit SD2008/1062 (Ex HMAS Adelaide Artificial Reef).The statutory timeframe for the Minister or their delegate to make a decision is 60 days from receipt of an application (27 January 2019)s. 22(1)(a)(ii)

s

Regards,
s22(1)(a)(ii)

s22(1)(a)(ii)
Queensland South and Sea Dumping Section | Environment Standards Division
Department of the Environment and Energy
Level 6, 51 Allara Street Canberra ACT 2600 | GPO Box 787, CANBERRA ACT 2601
s22(1)(a)(ii)

The Department acknowledges the traditional owners of country throughout Australia and their continuing connection to land, sea and community. We pay our respects to them and their

cultures and to their elders both past and present.

Please consider the environment before printing

From: Adam Dalton [mailto:adam.dalton@crownland.nsw.gov.au]
Sent: Wednesday, 28 November 2018 2:36 PM
To: Sea Dumping <Seadumping@environment.gov.au>
Subject: Variation to SD2008/1062

Good afternoon s22(1)(a)(ii)

Please find attached to this email the letter requesting variation to SD2008/1062 along with two supporting ABN lookup reports. A copy of this letter follows in the mail.

The request for the variation has been approved by the Area Manager - Hunter, Tim Deverell, to whom I report.

If there are any problems, or if I can be of any assistance please do not hesitate to contact me.

Regards,

Adam

Adam John Dalton CPV AAPI | Senior Property Management Officer
NSW Department of Industry - Crown Lands and Water
PO Box 2155| Dangar | NSW 2309
Direct T: (02) 4931 6486 | Office T: 1300 886 235
E: adam.dalton@crownland.nsw.gov.au
E: maitland.crownlands@crownland.nsw.gov.au
W: www.crownland.nsw.gov.au
W: www.industry.nsw.gov.au

Note: if I have not responded to your email in a prompt manner, please forward your enquiry to maitland.crownlands@crownland.nsw.gov.au and our correspondence manager will follow up with me directly or assign another staff member to your enquiry, should I be unavoidably unavailable.

To: James Barker, Assessments and Governance Branch (for decision)

SEA DUMPING ACT PERMIT VARIATION DECISION BRIEF – EX-HMAS ADELAIDE ARTIFICIAL REEF (SD2008/1062)

Timing: The statutory decision is due 27 January 2019

Recommendation/s:

1. Agree that the action, which is the subject of a permit variation request under the *Environment Protection (Sea Dumping) Act 1981* (Cth) (Sea Dumping Act) by the New South Wales Department of Industry does not have, will not have or is not likely to have a significant impact on the environment such that the Minister's advice does not need to be obtained under section 160 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act).

Agreed / Not agreed

2. Note the mandatory considerations for decisions under the Sea Dumping Act outlined in Attachment C, which have been taken into account in the development of the recommendations in this brief.

Noted / Please discuss

3. Consider the recommendations in this brief.

Considered / Please discuss

4. Agree to vary the permit and conditions of the permit SD2008/1062 at Attachment E under sections 21 and 23 of the Sea Dumping Act.

Agreed / Not agreed

5. If you agree to Recommendations 1 and 4, accept the reasoning in the departmental briefing package as the reasons for your decision.

Accepted / Please discuss

6. Sign the varied permit at Attachment E.

Signed / Not signed

7. Sign the letter at Attachment F.

Signed / Not signed

s. 47F(1)

Signatory

Date: 22/1/19

James Ba...,
Assessments and Governance Branch:

Comments:

Key information

1. On 28 November 2018, the New South Wales Department of Industry (DoI) submitted an application under Section 23 of the Sea Dumping Act to vary Sea Dumping permit SD2008/1062 (Attachment A). The DoI has requested a variation to the permit to update the name of the permit holder and revise Condition 23 of the permit.

Assessment

2. The Department considers that the application for a permit variation is administrative only and does not present any new risks or additional impacts beyond those considered in granting the original permit.

Permit

3. DoI has advised that the New South Wales Land and Property Management Authority (LPMA), to whom the original permit was granted, no longer exists as a government body. The management of crown reserves, including the site of the Ex-HMAS Adelaide artificial reef offshore of Avoca Beach, New South Wales, previously undertaken by the LPMA, continues under the DoI. The Department considers this is a change of name only, and not a transfer to a different agency. The Department recommends that you agree to the request to amend the name of the permit holder.

Conditions

4. Condition 23 of the permit requires that the Long Term Management and Monitoring Plan (LTMMP) results be published on the Ex-HMAS Adelaide's website (www.hmasadelaide.nsw.gov.au) within one month of the completion of the sampling, for the life of the LTMMP. The above website is no longer supported by the applicant, and the DoI requests that this condition be revised to allow the required publishing of sample results within the DoI's main web site, in a section where other information on the Ex-HMAS Adelaide is published.

5. The Department has revised the original Condition 23 in the draft permit variation at Attachment E, deleting the reference to the www.hmasadelaide.nsw.gov.au web page. The Department proposes to instead reference the term "website", and provide a definition of '*website*' which indicates that it means '*a set of related web pages located under a single domain name attributed to the permit holder and available to the public*'. The Department considers the revised condition will enable the DoI to comply with the intent of the original permit conditions.

6. The Department also also amended conditions 24 to 29, which relate to future monitoring, reporting and compliance activities, to reflect the amended name of the permit holder.

Consultation

7. The Department's Office of Compliance provided advice regarding the definition of 'website' discussed above. The DoI confirmed that results from all previous monitoring would be published on the revised website (Attachment G).

Mandatory considerations

8. Section 23(1) of the Sea Dumping Act allows the permit holder to submit an application to the Minister for a variation of the permit; or revocation, suspension or variation of the condition of a permit. Further information on the legislative requirements are available at Attachment C.

9. Under section 21(1) of the Sea Dumping Act, the Minister may, when granting a permit or at any time while a permit is in force, impose conditions in respect of the permit and may, at any time, revoke, suspend or vary, or cancel a suspension of, a condition so imposed.

Conclusion

10. The application to vary the permit and conditions:

    a. was made in accordance with section 23 of the Sea Dumping Act

    b. is for controlled material within Annex 1 of the *1996 Protocol to the Convention on the Prevention of Marine Pollution by dumping of wastes and other matter, 1972* (Protocol), and has been assessed in accordance with Annex 2 of the Protocol.

11. The variation application fee of $860 was received on 6 December 2018, in accordance with section 40 of the Sea Dumping Act.

12. The Department is of the view that the Sea Dumping Act allows for the variation of permit SD2008/1062. The Department considers the proposed varied permit and conditions (Attachment E) can be granted under sections 21 and 23 of the Sea Dumping Act.

13. If you agree, the Department recommends you sign the varied permit at Attachment E and the letter at Attachment F advising DoI of your decision.

s. 22(1)(a)(ii)

s. 22(1)(a)(ii)
Director
Queensland South and Sea Dumping Section
Ph: s22(1)(a)(ii)

Assessment Officer: s22(1)(a)(ii)
Queensland South and Sea Dumping Section
Ph: s22(1)(a)(ii)

ATTACHMENTS

A: Sea Dumping permit variation application
B: Protocol
C: Legislative framework
D: Original permit
E: Varied Sea Dumping permit – FOR SIGNATURE
F: Letter to DoI advising decision – FOR SIGNATURE
G: Response from DoI review of draft permit variation

From: Melanie Osborne [mailto:melanie.osborne@crownland.nsw.gov.au]
Sent: Monday, 10 February 2020 2:36 PM
To: s22(1)(a)(ii)@environment.gov.au
Subject: Temporary closure of the ex-HMAS Adelaide dive site reserve

Good afternoon s22(1)(a)(ii)

I wish to advise that the ex-HMAS Adelaide dive site reserve, a diving wreck off the coast of Terrigal / Avoca, has been temporarily closed until further notice in response to severe weather conditions of a nearby onshore swell height in excess of 5 metres recorded by Manly Hydraulics Laboratory over the weekend 8-9 February 2020.

Under Sea Dumping Permit SD2008/1062 and the conditions described in the Long Term Monitoring and Management Plan (LTMMP), such weather conditions require the NSW Department of Planning, Industry and Environment - Crown Lands (the department) to close the reserve and arrange for post storm assessment inspection/s and report/s. The department is currently arranging for the post storm assessment inspection/s and report/s to be undertaken as soon as possible once conditions permit.

The LTMMP states that any risk to diver safety or the environment identified by the assessment inspection/s must be reported to the Commonwealth Department of the Environment within 24 hours of identification. Should any risks or hazards be identified, the department will provide further advice.

The ex-HMAS Adelaide dive site reserve is closed until further notice.

Please let me know should you require any further information.

Melanie Osborne
Group Leader Property Management

Crown Lands Division | Department of Planning, Industry and Environment
Direct T 02 4937 9332 | **E** melanie.osborne@crownland.nsw.gov.au
Generic T 1300 886 235 | **E** maitland.crownlands@crownland.nsw.gov.au
516 High Street, Maitland NSW 2320 | PO Box 2215, Dangar NSW 2309
www.dpie.nsw.gov.au

The Department of Planning, Industry and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

From: EPBC Monitoring
To: Melanie Osborne; epbcmonitoring@awe.gov.au
Subject: RE: Temporary closure of the ex-HMAS Adelaide dive site reserve [SEC=OFFICIAL]
Date: Thursday, 3 December 2020 9:36:24 AM

Good morning, s22(1)(a)(ii)

Thank you for your email. The notification of temporary closure of the dive site reserve has been added to our records.

If you have any questions or concerns, please do not hesitate to contact me.

Kind regards,

s22(1)(a)(ii)

Compliance Monitoring Team
Environment Compliance Branch
Compliance Division
Department of Agriculture, Water and the Environment
GPO Box 858, CANBERRA ACT 2601

From: Melanie Osborne <melanie.osborne@crownland.nsw.gov.au>
Sent: Thursday, 3 December 2020 9:18 AM
To: epbcmonitoring@awe.gov.au
Subject: Temporary closure of the ex-HMAS Adelaide dive site reserve

Good morning,

I wish to advise that the ex-HMAS Adelaide dive site reserve, a diving wreck off the coast of Terrigal / Avoca, has been temporarily closed until further notice.

Under the Commonwealth Sea Dumping Permit SD2008/1062 and the conditions described in the Long Term Monitoring and Management Plan (LTMMP), certain ocean conditions require the NSW Department of Planning, Industry and Environment - Crown Lands (the department) to close the reserve and arrange for a structural assessment to ensure diver safety. It has come to the department's attention that such an assessment is required prior to allowing further entry to the dive site.

As such, all mooring bookings and entry permits are suspended and no further bookings will be accepted until the reserve has been re-opened.

No vessels are authorised to enter the reserve or divers permitted to access the site until further notice. The assessment is scheduled for 10 December 2020, pending favourable conditions.

The department's website will be updated once the site is re-opened.

Any enquiries may be directed to 1300 886 235.

Regards,

Melanie Osborne
Group Leader Property Management

Crown Lands Division | Department of Planning, Industry and Environment
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