

Sydney 46 Gale Road
Maroubra, NSW, 2035
Northern 2 Queen St
NSW Murwillumbah, NSW
P.O. Box 42 Condong, 2484

General Inquiries +61 2 9568 5800
www.cosmosarch.com



A.B.N. 83 082 211 498

Diana Alonso
Project Manager
Sydney Harbour Foreshore Authority
Email: Diana.Alonso@shfa.nsw.gov.au

Dear Diana,

RE: Cockle Bay Marine Structures Redevelopment – Response to Heritage Council's Comments

Introduction

The NSW Heritage Council have provided comments to the Maritime Archaeology Statement of Heritage Impact (MASoHI) report in the form of six comments relevant to the MASoHI report that require a response (NSW Heritage Council document EF14/23309). This short report provides the responses to each point as part of the formal submission to Heritage Council's comments. The sixth comment in the Heritage Council submission regarding the listing of the exposed section of seawall is not directly relevant to the MASoHI and is not addressed in this short report.

Dot Point 1

The Maritime Archaeological Survey and Statement of Heritage Impact (MAS&SOHI) states that the proposal would not diminish the heritage significance SS South Steyne (SHR 755) which is listed on the State Heritage Register (SHR). The current use of the vessel as a restaurant in a busy recreational precinct provides financial viability of the item and ensures its ongoing maintenance. The proposed relocation of the vessel may impact on this. Whilst the report states that the vessel will be moved to another wharf within six months, future management options and exact mooring locations have not been addressed. To reduce the likelihood of adverse impacts to SS South Steyne, it is recommended that a strategy for the ongoing management of the vessel is provided, including mooring locations, prior to the approval of the SSD.

The ongoing use and maintenance of the SS South Steyne (SHR 755) is the responsibility of the owner of the SS South Steyne. SHFA does not own or manage the vessel and future management, including the relocation of the vessel, is the responsibility of the owner of the item.

Recommending a strategy for the ongoing management of the vessel should be directed to the owner of the SS South Steyne. The owners of the SHR listed item should enact the management guidelines in its conservation management plan regarding the possibility for the relocation of the vessel in the event its current location is no longer viable.

Dot Point 2

The SOHI does not address any impacts to the setting of SS South Steyne, including any visual impacts that relocating the vessel would have on nearby SHR items Pymont Bridge and Woodward Water Feature. The report should be updated to address these impacts.

The following impact assessment has been prepared in the Visual Impact Assessment to nearby Pymont Bridge and Woodward Water Feature. This was under heading 6.3.5 of the updated MASoHI report, copied below.

6.3.5 Impacts to the Pymont Bridge and Woodward Water Feature from the relocating of the SS South Steyne

The proposed removal of the Harbourside Wharf will result in the relocation of the SS South Steyne which is currently leasing wharf space on the Harbourside Wharf. This relocation will not have any direct impact to the physical structures of the Pymont Bridge or the Woodward Water Feature, however, there may be visual impacts from the removal of the vessel from its current locations.

What aspects of the proposal respect or enhance the heritage significance of the item/study area?

The proposed removal of the Harbourside Wharf and the relocation of the SS South Steyne from its current berth is not expected to have a negative or positive impact to the significance of the Pymont Bridge or the Woodward Water Feature. Both the Pymont Bridge and the Woodward Water Feature were both constructed prior to the arrival of the SS South Steyne at the Harbourside Wharf in Cockle Bay. The presence of the South Steyne, and the possible relocation of the vessel is not expected to enhance or detract from the significance of either the Pymont Bridge or the Woodward Water Feature.

What aspects of the proposal could have a detrimental effect on the heritage significance of the item/study area?

There are no aspects from the potential relocation of the SS South Steyne that could have a detrimental effect to the heritage significance of the Pymont Bridge and the Woodward Water Feature. Both the Pymont Bridge (1902) and the Woodward Water Feature (1988) were constructed prior to the South Steyne leasing its berth at the Harbourside Wharf (c2000). The removal of the vessel will not diminish the significance of either heritage item, or from the significance of the South Steyne.

Have more sympathetic options been considered and discounted? Why?

The relocation of the SS South Steyne from the Harbourside Wharf is not expected to have a positive or negative impact to the Pymont Bridge or the Woodward Water Feature. As such, no alternate or sympathetic options have been proposed.

Is the assessed impact acceptable / can it be mitigated?

The proposed concept design and the removal of the Harbourside Wharf and relocation of the SS South Steyne has been assessed as not having a negative or positive impact to the significance of the Pymont Bridge or to the Woodward Water Feature. As such, the impact is considered to be acceptable and no permit or further archaeological or heritage work is required.

Dot Point 3

The EIS states there is a high potential for remains associated with previous wharves, jetties, and activities in Cockle Bay buried below sediment that has accumulated since the last dredging in the 1980s. This is representative of the earliest maritime infrastructure in Sydney Harbour and is considered to have State heritage Significance (EIS section 8.11.3). Physical remains evidence in the survey only identified modern debris and high sediment content. The MAS&SOHI and the EIS did not provide a specific assessment of the effects of the proposed piling on these phases of occupation or their likely significance. The EIS needs to compare the known phases of occupation and relics against the proposed piling locations in order to assess any likely impacts.

A significance assessment for the wharves constructed in Cockle Bay between c1830 and 1970 was prepared in section 5.2.1 of the MASoHI report. An impact assessment was also undertaken for the proposed works in section 6.3.1 of the MASoHI report.

Section 4.5 of the MASoHI report also details the archaeological potential that may be present based on the historical research and results of the maritime archaeological survey. This section outlined that there is a high potential for remains associated with the former wharf and jetty structures, as well as potential for relics associated with activities associated with the use of those structures in Cockle Bay.

The following table compares the location of proposed piling works to the identified building phases based on historical plans of Cockle Bay used in the MASoHI report.

1836



1836 East 1

The proposed piles in this location will not directly impact any wharves that were present in this area in 1836.



1836 East 2

The proposed piles in this location will not directly impact any wharves that were present in this area in 1836.



1844



1844 East 1

A single pile associated with the proposed new marina is located close to the footprint of one of the wharves constructed c.1844.

Given the potential inaccuracy of the original plan and the overlay produced for this report, it is possible that this pile may impact directly within the foot print of this wharf.

This pile is proposed to be 400 mm in diameter.



1844 East 2

There is one pile associated with the new marina that is located close to the footprint of a wharf constructed in c.1844.

Given the potential inaccuracy of the original plan and the overlay produced for this report, it is possible that this pile may impact directly within the foot print of this wharf.

This pile is proposed to be 400 mm in diameter



1853

**1853 East 1**

There is one pile associated with the new marina that is located close to a wharf that appears in this 1853 plan. The wharf is likely to be the same, or modified, as the wharf that appears in 1844 (above).

The pile appears to be located to the north of the former wharf. Given potential inaccuracies with the original plan and the overlay created for this report, it is possible that this pile may impact directly within the foot print of this wharf. This pile is proposed to be 400 mm in diameter.

**1853 East 2**

There is one pile that appears to be located within or immediately adjacent to a wharf that appears in the 1853 plan.

The wharf is likely to be the same, or modified, as the wharf that appears in 1844 (above).

The pile appears to be located to the north of the former wharf. Given potential inaccuracies with the original plan and the overlay created for this report, it is possible that this pile may impact directly within the foot print of this wharf. This pile is proposed to be 400 mm in diameter.



1865



1865 East 1

There is one proposed pile that appears to be located within the boundary of a wharf dating from c.1865, and another pile that is located close to the northern end of a separate wharf. Both of these piles have the potential to impact on archaeological remains associated with structural remains and/or objects associated with the use of these wharves. Both of these piles are proposed to be 400 m in diameter.



1865 East 2

There is one proposed pile that appears to be located immediately to the south of a wharf that is present in this 1865 plan. This pile has the potential to impact on any potential archaeological remains associated with structural remains and/or objects associated with the use of that wharf. This pile is proposed to be 400 m in diameter.



1880

**1880 East 1**

The wharves present on the 1880 plan of Cockle Bay are similar to those that were present in the 1865 plan (described above). There is one proposed pile that appears to be located within a wharf dating from c.1865, and another pile that is located close to the northern end of a separate wharf.

Both of these piles have the potential to impact on archaeological remains associated with structural remains and/or objects associated with the use of these wharves.

Both of these piles are proposed to be 400 m in diameter

**1880 East 2**

The wharves present on the 1880 plan of Cockle Bay are similar to those that were present in the 1865 plan (described above). There is one proposed pile that appears to be located immediately to the south of a wharf that is present in this 1865 plan.

This pile has the potential to impact on any potential archaeological remains associated with structural remains and/or objects associated with the use of this wharf.

This pile is proposed to be 400 m in diameter.



1887



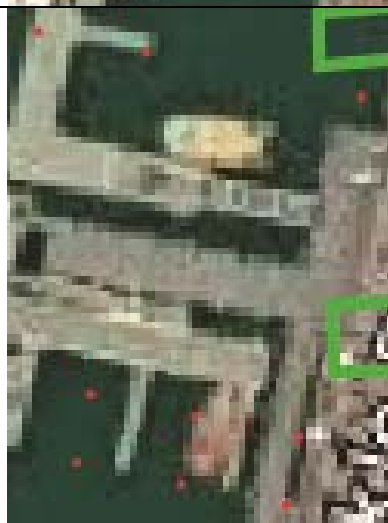
1887 East 1

There are two proposed piles that appear to be located within the footprint of two separate wharves present in 1887. Both of these piles appear to be located within the footprint of the former wharves and have the potential to impact on potential archaeological remains associated with structural remains and/or objects associated with the use of these wharves. Both of these piles are proposed to be 400 m in diameter.



1887 East 2

There is one proposed pile that is located to the south of a wharf present in this 1887 plan. This pile may have the potential to impact on potential archaeological remains associated with the operation of this wharf. This pile is proposed to be 400 mm in diameter.



1895



1895 East 1

There are two piles in this section that appear to be located within the footprint of two separate wharves present in this 1895 plan.

Both of these piles have the potential to impact on archaeological remains associated with structural remains and/or objects associated with the use of these wharves. Both of these piles are proposed to be 400 m in diameter.



1895 East 2

There are six proposed piles that appear at the bottom of this image that are located within and immediately to the south of the footprint of a wharf present in 1895.

The three piles that appear within the footprint of the former wharf have the potential to impact on archaeological remains associated with structural remains and/or objects associated with the use of this wharf. The three pile located to the south of the footprint have the potential to impact on archaeological remains associated with the use of this wharf. All of these piles are proposed to be 400 mm in diameter.



1900

**1900 East 1**

There are two piles in this section that appear to be located within the footprint of separate wharves present in this 1900 plan.

Both of these piles have the potential to impact on archaeological remains associated with structural remains and/or objects associated with the use of these wharves.

Both of these piles are proposed to be 400 m in diameter.

**1900 East 2**

There are three piles located within or immediately adjacent to a wharf present in the 1900 plan of Cockle Bay. These three piles have the potential to impact on archaeological remains associated with structural and/or objects associated with the use of these wharves.

There are six proposed piles that appear at the bottom of this image that are located within and immediately to the south of the footprint of a wharf present in 1900.

The three piles that appear within the footprint of the former wharf have the potential to impact on archaeological remains associated with structural remains and/or objects associated with the use of this wharf. The three pile located to the south of the footprint have the potential to impact on archaeological remains associated with the use of this wharf.

All of these of these piles are proposed to be 400 m in diameter.



1907

**1907 East 1**

There are two proposed piles that are located close to two separate wharves present in 1907, and another three located either within or immediately adjacent to a separate wharf at the bottom of the image opposite.

The one pile located within the footprint of the wharf at the bottom has the potential to impact on archaeological remains associated with structural and/or objects associated with the use of these wharves.

The four piles located immediately adjacent to the wharves have the potential to impact on archaeological remains associated with the use of these wharves.

All of these piles are proposed to be 400 mm in diameter.

**1907 East 2**

There are three piles located within or immediately adjacent to a wharf present in the 1907 plan of Cockle Bay. These three piles have the potential to impact on archaeological remains associated with structural and/or objects associated with the use of these wharves.

There are six proposed piles that appear at the bottom of this image that are located within and immediately to the south of the footprint of a wharf present in 1907.

The three piles that appear within the footprint of the former wharf have the potential to impact on archaeological remains associated with structural remains and/or objects associated with the use of this wharf. The three pile located to the south of the footprint have the potential to impact on archaeological remains associated with the use of this wharf.

All of these of these piles are proposed to be 400 m in diameter.



1907 West 1

There are eight proposed piles to be placed within the former footprint of the railway wharf present on the western side of Cockle Bay. These piles have the potential to impact on archaeological remains associated with the former structure, as well as potential remains associated with the use of the former wharf.

All of these piles are proposed to be 400 mm in diameter.



1911



1911 East 1

The wharf layout in 1911 is similar to that seen in 1907 (above).

There are two proposed piles that are located close to two wharves present in 1911, and another three located either within or immediately adjacent to a separate wharf at the bottom of the image opposite.

The one pile located within the footprint of the wharf has the potential to impact on archaeological remains associated with structural and/or objects associated with the use of these wharves.

The four pile located immediately adjacent to the wharves have the potential to impact on archaeological remains associated with the use of these wharves.

All of these piles are proposed to be 400 mm in diameter.



1911 East 2

The wharf layout in 1911 is similar to that seen in 1907 (above).

There are three piles located within or immediately adjacent to a wharf present in 1911 plan of Cockle Bay. These three piles have the potential to impact on archaeological remains associated with structural and/or objects associated with the use of this wharf.

There are six proposed piles that appear at the bottom of this image that are located within and immediately to the south of the footprint of a wharf present in 1911.

The three piles that appear within the footprint of the former wharf have the potential to impact on archaeological remains associated with structural remains and/or objects associated with the use of this wharf. The three pile located to the south of the footprint have the potential to impact on archaeological remains associated with the use of this wharf. All of these of these piles are proposed to be 400 m in diameter.



1911 West 1

There are approximately 11 proposed piles to be placed within the former footprint of the railway wharf present on the western side of Cockle Bay. These piles have the potential to impact on archaeological remains associated with the former structure, as well as potential remains associated with the use of the former wharf.

All of these piles are proposed to be 400 mm in diameter.



1919



1919 East 1

The wharf layout in 1919 is similar to that seen in 1907 and 1911 (above).

There are two proposed piles that are located close to two wharves present in 1919, and another three located either within or immediately adjacent to a separate wharf at the bottom of this image opposite.

The one pile located within the footprint of the wharf has the potential to impact on archaeological remains associated with structural and/or objects associated with the use of this wharf. The four piles located immediately adjacent to the wharves have the potential to impact on archaeological remains associated with the use of these wharves.

All of these piles are proposed to be 400 mm in diameter.



1919 East 2

There are three piles located within the footprint of a former wharf present in 1919. This wharf is also present in the previous 1907 and 1911 plans (above).

There are three piles located within or immediately adjacent to a wharf present in 1919 plan of Cockle Bay. These three piles have the potential to impact on archaeological remains associated with structural and/or objects associated with the use of this wharf.

There are at least two proposed piles that are located immediately adjacent to a new wharf that appears in the 1919 plan of Cockle Bay. These piles have the potential to impact on archaeological remains associated with the use of this wharf.

All of these piles are proposed to be 400 mm in diameter.



1919 West 1

The footprint of the wharf present on the western side of Cockle Bay is similar to the footprint present in the 1911 plan (above).

There are approximately 11 proposed piles to be placed within the former footprint of the railway wharf present on the western side of Cockle Bay. These piles have the potential to impact on archaeological remains associated with the former structure, as well as potential remains associated with the use of the former wharf.

All of these piles are proposed to be 400 mm in diameter.



1948

**1948 East 1**

There are five piles that appear to be adjacent to wharves located on the eastern side of Cockle Bay present in the 1948 plan and one pile likely to be located within the footprint of another former wharf.

The one pile present within the footprint of the former wharf has the potential to impact on archaeological remains, such as structural remains associated with the wharf, and potential archaeological remains associated with the use of the wharf. The remaining five piles are likely to have an impact on any potential archaeological remains associated with the former use of the wharves. All six proposed piles will be 400 mm in diameter.

**1948 East 2**

There are three piles in the section of Cockle Bay that will be placed within the footprint of the former wharf present in 1948. These piles, being within the footprint, have the potential to impact on archaeological remains, such as structural remains associated with the wharf, and potential archaeological remains associated with the use of the wharf.

Two of the six proposed piles present in the lower half of image adjacent may impact of any archaeological remains that are present associated with the former use of the wharf.

The proposed piles will be 400 mm in diameter.



1956

**1956 East 1**

Three piles present at the top of the image opposite may impact on potential archaeological deposits present immediately adjacent to the wharf that appears in the 1956 plan

These three piles are likely to have an impact on any potential archaeological remains associated with the former use of the wharf but not on the footprint of the wharf itself.

All three proposed piles will be 400 mm in diameter.

**1956 East 2**

Three proposed piles have the potential to impact on archaeological remains present within the footprint of a former wharf present in the 1956 plan.

These piles, being within the footprint, have the potential to impact on archaeological remains such as structural remains associated with the wharf, and potential archaeological remains associated with the use of the wharf.

Three of the six piles proposed at the bottom of the image opposite may also have the potential to impact on potential archaeological remains associated with the use of the southern wharf.

These three piles are likely to have an impact on any potential archaeological remains associated with the former use of the wharf but not on the footprint of the wharf itself.

All three proposed piles will be 400 mm in diameter.



1956 West 1

The footprint of the wharf present on the western side of Cockle Bay in the 1956 plan is similar to the footprint present in the 1911 and 1919 plans (above).

There are approximately 10 proposed piles to be placed within the former footprint of the railway wharf present on the western side of Cockle Bay.

These piles have the potential to impact on archaeological remains associated with the former structure, as well as potential remains associated with the use of the former wharf.

All of these piles are proposed to be 400 mm in diameter.

**1956 West 2**

There are two groups of proposed piles that have the potential to impact on the footprint of two former wharves that are present in the 1956 plan of Cockle Bay. There are two piles present on the left hand side wharf directly on, or immediately adjacent to, this wharf.

There is also a group of proposed piles located at the southern end of the wharf located on the right-hand side of the image opposite. These include piles that are located within and immediately adjacent to the footprint of this wharf.

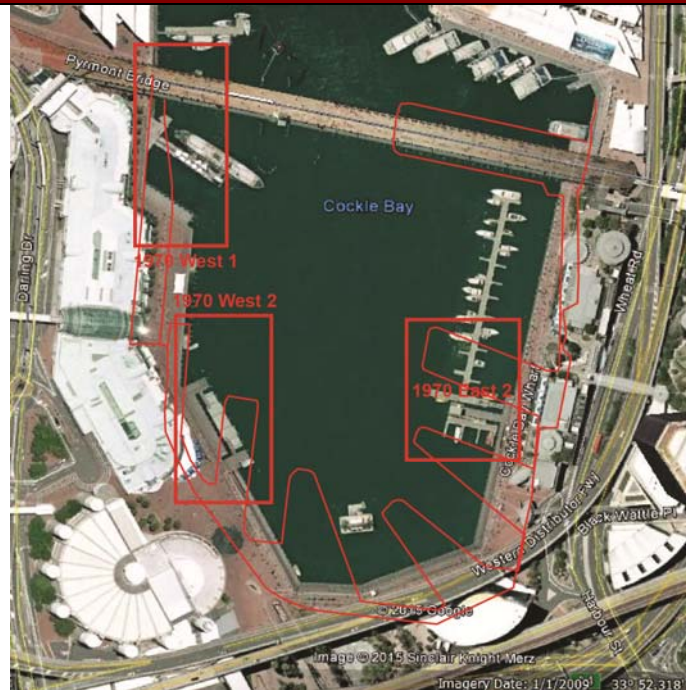
The piles located within the footprint of the former wharf have potential to impact on archaeological remains associated with the former structure, as well as potential remains associated with the use of the former wharf.

The remaining piles located immediately adjacent to the wharf may impact on potential archaeological remains associated with the use of the former wharf.

All of these piles are proposed to be 400 mm in diameter.



1970

**1970 East 2**

Similar to plans 1948 and 1956 (above) there are three proposed piles that may impact on archaeological remains present within the footprint of a former wharf present in the 1970 plan.

These pile, being within the footprint, have the potential to impact on archaeological remains, such as structural remains associated with the wharf and potential archaeological remains associated with the use of the wharf.

Three of the six piles proposed at the bottom of the image opposite may also have the potential to impact on potential archaeological remains associated with the use of the southern wharf.

These three piles are likely to have an impact on any potential archaeological remains associated with the former use of the wharf but not on the footprint of the wharf itself.

All three proposed piles will be 400 mm in diameter.

**1970 West 1**

Similar to plans 1948 and 1956 (above) there are approximately 10 proposed piles to be placed within the former footprint of the railway wharf present on the western side of Cockle Bay. These piles have the potential to impact on archaeological remains associated with the former structure, as well as potential remains associated with the use of the former wharf.

All of these piles are proposed to be 400 mm in diameter.



1970 West 2

Similar to the wharves seen in the 1956 plan (above) there are two groups of proposed piles that have the potential to impact on the footprint of two former wharves. There are two piles present on the left hand side wharf directly on, or immediately adjacent to, this wharf.

There is also a group of proposed piles located at the southern end of the wharf located on the right-hand side of the image opposite. These include piles that are located within and immediately adjacent to the footprint of this wharf.

The piles located within the footprint of the former wharf have potential to impact on archaeological remains associated with the former structure, as well as potential remains associated with the use of the former wharf.

The remaining piles located immediately adjacent to the wharf may impact on potential archaeological remains associated with the use of the former wharf.

All of these piles are proposed to be 400 mm in diameter.



Dot Point 4

The MAS&SOHI and EIS have not considered the impact of this proposal on the state significant archaeology. The proposal has stated that the piling will cause harm to state significant archaeology within the seabed. On this basis, it is recommended that any impact should be minimised as much as possible through a careful consideration of the pile design in this area. The mitigation of the loss of state significant archaeology should be clearly outlined in the EIS prior to any approval of the SSD by the DPE. It is recommended that upon receipt, DPE refer this additional information to the Heritage Council for consideration of its adequacy and to advise DPE of any additional conditions of approval that may be appropriate.

The potential impact of the piling works on the identified state significance archaeological remains identified in the MASoHI report has been addressed in section 6.3.1 of the report. The report stated that:

The proposed piling works associated with the installation of the new walkway and marina consists of installing 56 piles for the walkway and 14 piles for the new marina. The area that each pile will impact will be 0.354 square metres, or a total of less than 25 square metres for the whole proposed development. The approximate total area where maritime archaeological potential is likely to exist within Cockle bay is approximately up to 30,000 square metres. Therefore, the proposed piling works is expected to directly impact is less than 0.01 % of the predicted maritime archaeological remains on the site.

The proposed works are not expected to create any long term indirect impacts to the archaeological remains on the seabed.

Based on the above arguments, the impact to the archaeological remains associated with the former wharves and potential maritime archaeological deposits in Cockle Bay are considered to be minor. These works are considered an acceptable impact, but should be done with an Exception under Section 139(4) of the Heritage Act 1977.

Pile type and locations have been designed to minimise the total number of piles while still being able to allow for the design of the marine and floating walkways. The mapping provided (see Dot Point 3 above) shows that few piles will have a direct impact directly or immediately adjacent to the location of former wharves constructed in Cockle Bay, and the diameter of the piles – 400 mm – has been kept as narrow as possible. The likelihood of one of the piles intersecting the remains of a pile from an earlier jetty would be minimal.

In addition steel piles are hollow, so impacts could be confined to the piercing or breaking through of larger features such as collapsed piles and/or headstocks – should they be present – with smaller objects being pushed away or encased within the pile.

The amount and nature of the proposed piling is analogous with the level of impact that could be expected with a geotechnical investigation.

In relation to additional options available to assist with the mitigation of these impacts will be discussed below, with a discussion to follow after.

Option 1: Direct – Test Excavation and/or Salvage Works

Maritime archaeological test excavation and/or future salvage works could be undertaken on the location of the piles that have been identified in the report to be directly impacting within or immediately adjacent to wharves constructed in Cockle Bay. The maritime archaeological work could have to penetrate up to approximately 2 m of silt laying over the site before getting to a substrate where potential archaeological remains, both structural and relics, may be present. The direct form of archaeological investigation could be undertaken by one of these methods:

▪ Open trench/pit

A diver on SSBA with a commercial dive team and dive platform would, using a manually operated water induction dredge – would open a trench down to the desired substrate. As it cannot be relied on that the sides of the trench would remain intact, an inverted cone shaped hole would need to be excavated. If the silt cover is expected to be around 2 m deep, a hole of around 5 m in diameter would need to be excavated so as to examine 1 m diameter of desired substrate.

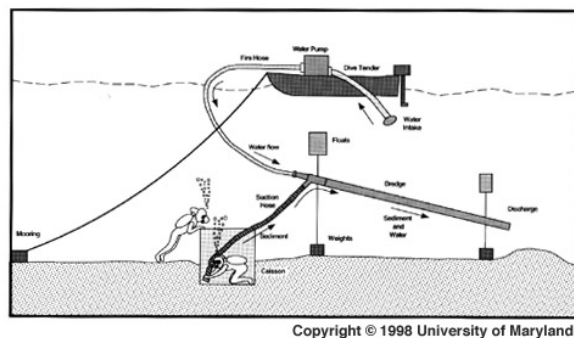
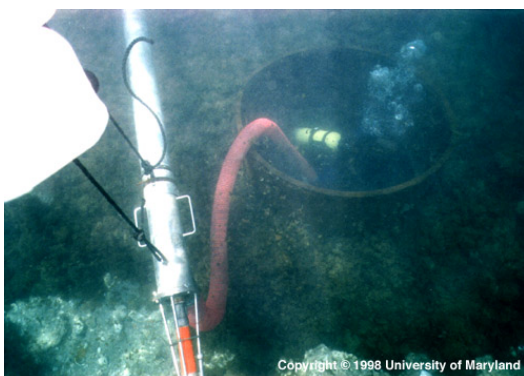
The excavation of such a trench could take one day, likely two days given the amount of recent debris that may be present in the upper two metres of silt and if time is allowed for visibility to improve so as to maximise the amount of archaeological recording that could be carried out. Given the anticipated visibility during excavation the dumping of spoil onto a screen at the surface would be recommended.

▪ Caisson Excavation

So as to minimise the amount of silt removal required to expose the substrate, a caisson style excavation could be attempted. This technique has a diver dredging inside a cylinder which drops through the sand/silt. This is not a common excavation technique but has been used with some success such as in Caesarea (see images below). Caisson excavation was proposed at Queens Wharf, Parramatta in 1991. A form of caisson excavation was recently used on the *Clarence in situ* preservation project for the long term storage of excavated materials.

For this technique to be successful an area of approximately 1.5 m in radius would need to be excavated to allow for the diver to have sufficient space to adequately undertake the excavation. One of the reasons why caisson excavation is not common is that for the caisson to work effectively it has to descend uniformly and so if it encounters a log or shopping trolley the excavation cannot proceed. Trenches excavated using a caisson at Cockle Bay would have a high risk of abandonment due to obstacles.

The excavation of such a trench could take one day if no obstacles are encountered. It would need an archaeology team supported by a commercial dive team and dive platform as well as extra equipment such as the cylinders. Given the anticipated visibility during excavation the dumping of spoil onto a screen at the surface would be recommended.



(Source: <http://www.digcaesarea.org/documents/1997fieldwater.html>)

▪ Mechanical Excavator

Using a mechanical excavator to raise sediments and deposit them onto a screen for sorting is technique that is sometimes used as a sampling method prior to the commencement of a dredging campaign or as part of the monitoring process. There is

obviously little control with respects to stratigraphical excavation using this technique on account of the archaeologist not being able to see the area being excavated.

The outcome of a maritime archaeological test or salvage regime would better inform the understanding of the composition of the strata and archaeological potential that exists within Cockle Bay. Though direct investigation has a high potential to identify relics and other structural remains that may be present within the strata below the seabed of Cockle Bay, it also will result in impacting an area greater than that, which would be impacted from the proposed directly drilled piles.

Option 2: Indirect – Remote Sensing and Probing

Geophysical and remote sensing techniques (such as side scan sonar, multi-beam, sub-bottom profiling) could be undertaken to assist with identifying potential maritime archaeological remains, such as piles, and if conditions are conducive and the correct equipment used, archaeological deposits and relics. A geophysical survey is non-destructive and could be used to assist with the location of material but not necessarily its identification.

A sub-bottom profiler would be the preferred method to use for locating large objects and possibly identifying culturally rich strata. Sub bottom profilers are used mostly to identify sedimentary strata and rock head so are calibrated to emit low frequency kHz. This allows for greater penetration of the seabed but with a loss of resolution. Such surveys do not pick up waterlogged wood buried within the first few metres under the seabed. A higher frequency survey would be required for Cockle Bay and while it could pick up buried piles and cultural strata of heritage significance, it would also pick up all other types of cultural material which would make for a 'noisy' dataset which would make for challenging – though potentially rewarding – interpretation.

Side scan sonar is used to map the seabed surface. It has been our experience that side scan sonar can provide imagery of compact shell strata or concrete construction debris under one metre of soft silt. However this is a secondary and little understood use of the side scan sonar and not recommended to be used on this site to investigate sub-surface cultural deposits.

Probing or a similar type of small hole probe (such as water jetting) is a form of indirect investigation that is often used to locate buried structures such as wrecks or rubble remains of jetties.

On this site probing may come into contact with an object, however, there would be no way of identifying what that object is, without direct investigation. The probing of the location of each proposed pile could ensure that there is no obstacle in the way, however the cultural heritage significance of an object encountered by probing could not be assessed without direct investigation.

The geophysical techniques described above could be used to identify anomalies in the vicinity of the proposed piling. It cannot determine the cultural heritage significance of an anomaly (unless a significant site such as a wreck is expected to be in the area) and conversely not every culturally significant relic/feature will necessarily be captured as an anomaly.

Discussion on Mitigation Techniques

The possibility to conduct a maritime archaeological test excavation on the location of piles that have been identified as impact within or immediately adjacent to the footprint of former wharves (where it would be expected that archaeological deposits would accumulate) would accurately identify the presence or absence of archaeological deposits, the condition, extend and possible site formation processes that are local for that site. Converse to this is the area that would be required to be impacted to undertake an archaeological excavation for each pile location. The area required to be excavated would be significantly larger than the impact from the proposed pile. The

size of the excavation trench required would have to be large enough for the diver to operate within. Reinforcing of the walls of the trench would be undertaken via a range of methods, such as a caisson that slipped down the excavation extended deeper into the strata.

The expected time required to undertake each maritime archaeological test trench would vary from between 1 to 2 days. This would be depended on the depth of silts present over the top of the potential archaeological site, as well as time require to adequately sieve through material, including the silt deposit to identify any potential transitory artefacts that are present within this strata, and collect and record any material. A sample of piles that were identified as likely to impact on the footprint of former wharves would still require a substantial amount of field and analysis time to complete.

Using geophysical survey techniques, such as sub-bottom profiling, have the capability to cover a larger area in a shorter amount of time, but has the limitation of positively identifying anomalies. With the correct specifications and equipment, a sub-bottom profile survey of Cockle Bay has the potential to locate archaeological deposits, including structural remains that are present below the seabed. This survey can be undertake as a targeted area survey, focusing in on pile locations, or as a larger survey used as part of a long term management strategy by the SHFA for Cockle Bay. The use of other types of geophysical survey options, such as side scan sonar and/or multi-beam survey, could also be implemented as part of a short term and long term management plan for potential maritime archaeological deposits, as well as for the greater silt and other management of Cockle Bay. Comparing pre-construction and post-construction survey results could identify what, if any, impacts the piling works have had on potential archaeological deposits, both directly within the 0.354m² impact area, as well as the greater area immediately around each pile.

As the impact from the proposed direct piling will be 0.354m², the size of the impact from a maritime archaeological test excavation (1.7 m²) would be larger and would impact on a greater area of archaeological potential. As the piles will be directly placed on site, there would not be expected to be any long term impact from their installation, resulting in the direct impact area to be relatively small.

Undertaking geophysical survey of the seabed, including survey penetrating the seabed, could assist in mapping the potential location and spread of archaeological deposits, but would less likely aid in positively identifying what the material actually is. As a management tool, short and long term, a geophysical survey could be used to record changes to the seabed, including within the strata, pre and post construction.

The mitigation advice provided balances the assessed scale of impact of proposed piling on the identified archaeological resource against the potential impact to that same resource from feasible direct investigative techniques implemented to mitigate the impact of the piling. We believe that any direct archaeological investigation will have a greater impact to the archaeological resource than the proposed piling. If the proposed impacts were greater than those identified, for example such as dredging or scouring from propeller jet turbulence, or that a wreck was identified as being likely to be present, one or more of the direct and indirect mitigation measures described above would have been recommended.

Dot Point 5

The EIS and SOHI incorrectly advise that an approval under Section 139(4) is appropriate under the Heritage Act 1977. Approval under Part 4, section 89J of the Environmental Planning & Assessment Act 1979 negates the need for approvals under the Heritage Act 1977 where this area forms part of the proposed SSD activity.

The report will be updated to include at the bottom of Section 2.2.1:

Under Section 89J(c) of the EP&A Act, Sydney Harbour Foreshore Authority would not be required to apply for approvals or excavation permits under the Heritage Act for State Significant Development. However, under Schedule 2, Part 2(4) of the Environmental Planning and Assessment Regulation 2000 the Director General is required to:

consult with the relevant public authorities and have regard to the need for the requirements to assess any key issues raised by those public authorities.

Under Section 146 of the Heritage Act, the discovery of a relic also requires that:

a person who is aware or believes that he or she has discovered or located a relic (in any circumstances, and whether or not the person has been issued with a permit) must: (a) within a reasonable time after he or she first becomes aware or believes that he or she has discovered or located that relic, notify the Heritage Council of the location of the relic, unless he or she believes on reasonable grounds that the Heritage Council is aware of the location of the relic, and (b) within the period required by the Heritage Council, furnish the Heritage Council with such information concerning the relic as the Heritage Council may reasonably require.

The following section will be added to the end of the first paragraph of Section 2.1.2:

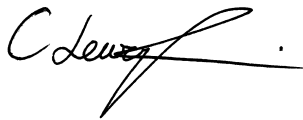
The EP&A Act is the main act regulating land use planning and development in NSW. Part 5.1 Division 115Y of the Act provides a process for the assessment and approval of State Significant Development (SSD).

Applications made under Part 5.1 of the EP&A Act are subject to environmental assessment requirements, prepared by the Director General of Planning and Infrastructure. Under Schedule 2(3)(4) of the Environmental Planning and Assessment Regulation 2000 the Director-General is required to:

consult relevant public authorities and have regard to the need for the requirements to assess any key issues raised by those public authorities.

This should include consultation with Heritage Division regarding items, places and archaeological sites that have heritage significance.

Yours sincerely,



Chris Lewczak

Senior Archaeologist