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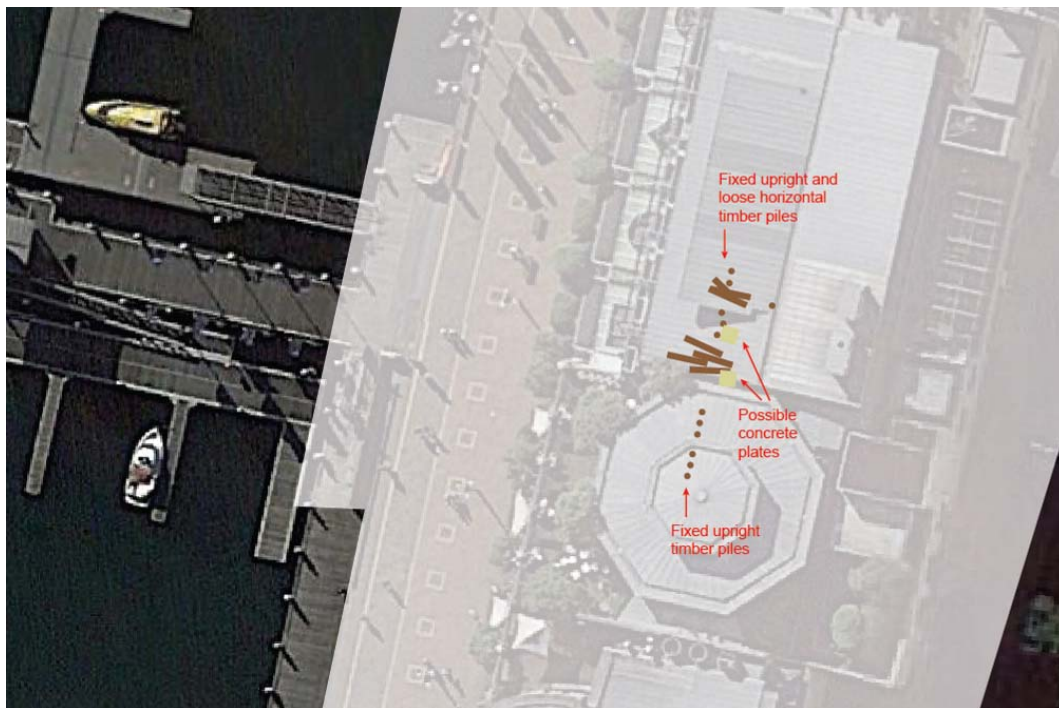
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Cockle Bay Park Development



Maritime Archaeological Assessment

Cockle Bay
Sydney
NSW

September 2017

Cockle Bay Park Development Maritime Archaeological Assessment

Prepared for:

Thelem Consulting

On behalf of DPT Operator Pty Ltd as trustee of the Darling Park Trust
and DPPT Operator Pty Ltd as trustee of the Darling Park Property Trust

By:

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Cosmos Archaeology Job Number J17/23

Cover image: Main group of historic features identified during the site inspection on 21st August, 2017. (Base image: Google Earth)

Revision	Description	Date	Originator	Reviewer	Approver
V1	Draft MAA Desktop Analysis	11-08-2017	DW	CC	CC
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EXECUTIVE SUMMARY

Cosmos Archaeology has been engaged by Thelem Consulting, on behalf of DPT Operator Pty Ltd and DPPT Operator Pty Ltd, to prepare a maritime archaeological assessment (MAA) for the Cockle Bay Park Development project. The MAA has been prepared in response to comments received from the lodgement of a Stage 1 State Significant Development Application for the proposed development. As part of the response, the NSW Heritage Council (HC) made a number of requests that will be addressed by MAA which will comprise a number of reports.

This report supports the Response to Submissions and amended Concept Proposal associated with a State Significant Development Application (SSDA 7684) submitted to the Minister for Planning and Infrastructure pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act). The key findings of this MAA are summarised below.

The 2017 Aboriginal Heritage Due Diligence Report prepared by GML Heritage for this project identified Aboriginal activities that may have taken place within the study area based on known sites in the vicinity. Evidence of additional inundated sites may be within the study area.

The eastern side of Cockle Bay has been used for maritime purposes since the beginning of the 19th century and continued until the mid-20th century. This included the construction of 24 historic wharves within or adjacent to the study area. There have also been episodes of seawall construction and land reclamation on the eastern side of Cockle Bay throughout the last two centuries.

A diving site inspection was undertaken on 21st August. The inspection identified the 1997 seawall along the entire of the study area as well as earlier steel sheet piling in the northern half of the study area. Remains of timber sheet piling with Monier concrete plating was identified, these being remains of a c.1903-1908 seawall, as well as two other piles that may be associated with historic wharves.

Potential historic sites within the study area include wharves and related material, seawalls, shipwrecks, discard from vessels and discard in and under reclamation fill. A map with likelihood ratings of archaeological potential is provided in Figure 112.

Remains of wharves and related material (c.1830 to 1970) were assessed to be of State significance as they represent the earliest private maritime infrastructure development in Sydney Harbour and a finite archaeological resource. The timber sheet piling with Monier concrete plates and potential remains of other seawalls were assessed to be of State significance as the archaeological remains may yield information on the adaption of seawalls and/or the location, material and form of seawalls which are not be available in the historic record. The steel sheet piling was identified as having no heritage significance.

A preliminary impact assessment was provided based on initial structural drawings of the piles presented in this report and considers construction options. This found that potential impacts on remains of wharves, seawalls and related material (c.1830 to 1970) could be satisfactorily mitigated by select archaeological excavation in areas of high maritime archaeological potential and monitoring in areas of low archaeological potential. The potential impact on sheet piling is likely to be acceptable without mitigation.

The Stage 2 SSDA should include a MASoHI and MAMP, which may require additional information from pre-disturbance surveys or test excavations once the project design is determined. Mitigation measures may need to be implemented prior to construction, during construction and after construction.

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1 INTRODUCTION

Cosmos Archaeology has been engaged by Thelem Consulting, on behalf of DPT Operator Pty Ltd and DPPT Operator Pty Ltd, to prepare a maritime archaeological assessment (MAA) for the Cockle Bay Park Development project. The MAA has been prepared in response to comments received from the lodgement of a Stage 1 State Significant Development Application for the proposed development. As part of the response, the NSW Heritage Council (HC) made a number of requests that will be addressed by MAA which will comprise a number of reports.

This report supports the Response to Submissions and amended Concept Proposal associated with a State Significant Development Application (SSDA 7684) submitted to the Minister for Planning and Infrastructure pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

DPT Operator Pty Ltd and DPPT Operator Pty Ltd (the Proponent) is seeking to secure approval to establish concept proposal details for the development of Cockle Bay Park to create a new area of open space and commercial, retail and tourist precinct in the heart of the central business district (CBD) (now referred to as Cockle Bay Park). The amended concept plan includes:

- A large area of publicly accessible open space;
- New retail outlets, including new food and beverage destinations;
- New cultural and entertainment destinations; and
- A new commercial office tower.

The project will add new open space to the Sydney CBD and help to reconnect the city to the Darling Harbour waterfront. Cockle Bay Park will take its place in a revitalised Sydney CBD and speaks directly to local government objectives to create a ‘Green, Global and Connected City’ (City of Sydney) as well as the strategic vision outlined in ‘Towards Greater Sydney 2056’ to grow the “developing central city”. The vision for this project was developed with consideration for the NSW Government objectives to support and “grow the knowledge industry”, double tourism expenditure and “strengthen our local environment and communities” as outlined in ‘NSW 2021: A Plan to Make NSW Number One’.

Please note that all plans, diagrams, images and graphics within this report and the supporting documentation (excluding the amended Concept Proposal Envelope Plans prepared by Francis-Jones Morehen Thorp Pty Ltd) are indicative only and have been included to communicate the intent of the amended Concept Proposal, including representative building shapes, forms, locations, layouts and relationships. It is proposed that these representations, together with acceptance of the building envelopes and massing, and associated design principles, will then be used to inform the Design Excellence process to follow the Stage 1 SSD Determination. Design Excellence outcomes will form the basis of the Stage 2 SSDA.

1.1 Background

The Proponent controls the lease of the site, and also of the adjacent Darling Park precinct. The Darling Park site is a successful premium grade office precinct located on the west of the Sydney CBD, the associated Crescent Garden, located to the west of the three existing Darling Park towers, is a key area of open space in this part of the city.

The Proponent has recognised a number key issues with the existing layout of the Darling Park and Cockle Bay precinct, these being:

- The existing Cockle Bay Wharf building is not well integrated with the city, the Western Distributor freeway currently acts as a barrier to separate this area from the CBD;

- Publicly accessible open space is limited to the existing Crescent Garden in Darling Park; and
- The existing Cockle Bay Wharf building is outdated and is not in keeping with the future of Darling Harbour area as a vibrant entertainment and tourist destination.

The Cockle Bay precinct is at risk of being left behind and undermining the significant investment being made in Darling Harbour that will see it return to the world stage as a destination for events and entertainment. Accordingly, the Proponent is taking a carefully considered and staged approach to the complete revitalisation of the site and its surrounds. The envisaged development, which will be facilitated by the proposed building envelopes will:

- Reconnect the city with the Darling Harbour waterfront;
- Create new publicly accessible open space in the heart of the Sydney CBD;
- Create new public land above the Western Distributor;
- Provide new access routes between the city and the International Convention Centre (ICC) Sydney / Darling Harbour Live precinct;
- Support the Sydney economy by providing a new premium commercial building; and
- Refresh and renew an existing entertainment and tourist destination.

1.2 Site Description

The Site is located within Darling Harbour. Darling Harbour is a 60 hectare waterfront precinct on the south-western edge of the Sydney Central Business District that provides a mix of functions including recreational, tourist, entertainment and business.

The site is located to the immediate south of Pyrmont Bridge, within the Sydney CBD on the eastern side of the Darling Harbour precinct. The Site is also located within the City of Sydney local government area (LGA). A locational context area plan and location plan are provided at Figure 1 below.

The project area has been slightly amended by this Response to Submissions, a comparison of the exhibited and now-proposed site area is provided as Figure 2, and the now proposed site area is shown below as Figure 3.

The Darling Harbour precinct is undergoing significant redevelopment as part of the Sydney International Convention, Exhibition and Entertainment Precinct (SICEEP), Darling Square, and IMAX renewal projects. The urban, built form and public transport / pedestrian context for Harbourside will fundamentally change as these developments are progressively completed.

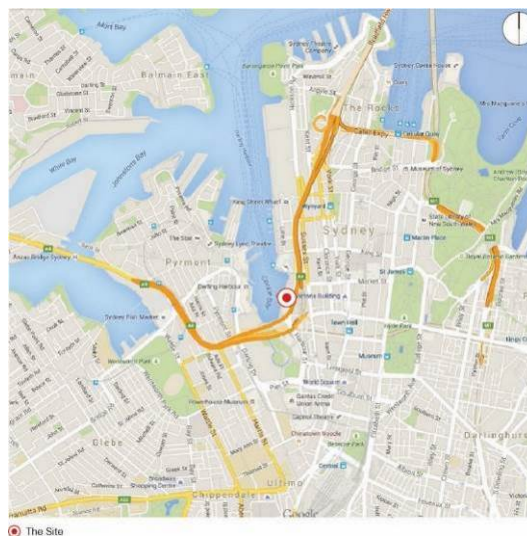


Figure 1: Location Context Area Plan.



Figure 2: Location Plan (revised site area in yellow).



Figure 3: Amended Location Plan.

1.3 Overview of Proposed Development

The proposal relates to a staged development application and seeks to establish concept proposal details for the renewal and re-imagining of Cockle Bay Park. The concept proposal establishes the vision, planning and development framework which will be the basis for the consent authority to assess future detailed development proposals. The Cockle Bay Park site is to be developed for a mix of Retail, Cultural and Commercial (Office) uses, including retail and restaurants, commercial offices, and open space.

The amended Concept Proposal seeks approval for the following key components and development parameters:

- Demolition of existing site improvements, including the existing Cockle Bay Wharf building complex, pedestrian bridge links across the Western Distributor, and obsolete monorail infrastructure;
- Building envelopes;
- Land uses across the site;
- A maximum total Gross Floor Area (GFA) across the Cockle Bay Park of 75,000m² for commercial development and 14,000m² for retail (including food and beverage) development;
- Urban Design and Public Realm design principles to provide a Design Excellence framework; and
- Strategies for utilities and services provision, drainage and flooding, and ecological sustainable development.

1.4 Gap Analysis and Requirements

A Historical Archaeological Assessment (HAA) has been prepared for the Cockle Bay Park Development by GML Heritage.¹ This report assessed the site's potential to contain historical archaeological resources and their potential heritage significance. It also identified potential development impacts on the site's potential archaeological resources and provided recommendations for mitigation.

Comments received from the NSW Heritage Council (HC) in response to the lodgement of a Stage 1 State Significant Development Application for the proposed development noted that the HAA identified the potential for maritime archaeological evidence and the likelihood that maritime archaeological resources will be impacted, require assessment and require management. It was noted by HC that the HAA report did not consider water-front occupation layers under reclamation or under water, and these parts of the site are hence to form the scope of the MAA.

Specifically, HC requested that:

- 1) The MAA should be prepared by a suitably qualified heritage professional who has demonstrated experience on state significant archaeological sites. This assessment should address the following issues:
 - a) Comprehensive assessment of the potential of this site for archaeological relics or resources including assessment of the level of significance; including assessment of any potential remains of crossings which may predate the Pyrmont Bridge/punt crossing sites;
 - b) Specific assessment of any potential submerged Aboriginal sites or relics in current and formerly submerged sections of the site;
 - c) Remote sensing and/or diver surveys of the seabed under any piled areas that currently form waterfront or paved areas of the proposed development

¹ **GML Heritage, August 2017a**, *Cockle Bay Park: Historical Archaeological Assessment*, draft report prepared for DPT and DPPT.

- d) Specific processes for the treatment of any newly-discovered archaeological sites, prior to the commencement of any works at the site, specifically how they would be;
- o Investigated;
 - o Recorded;
 - o Conserved (including long term conservation and storage of relics and archival lodgement of the results of recording and investigations);
 - o Interpreted (i.e. meaningful incorporation of this heritage into the proposed public domain, including landscaping, artwork and internal heritage interpretation in publically-accessible areas of the development. This will ensure future users and visitors are aware of this hidden waterfront heritage and would add greatly to the public benefit and enjoyment from redevelopment of the site. These works should be undertaken in accordance with current Heritage Council standards and guidelines where they apply.)
- 2) Demolition works and any proposed excavation works should be monitored by a suitably qualified and experienced maritime archaeologist.
 - 3) All these works should be undertaken by a suitably qualified maritime archaeologist who has an understanding of the effects of dredging and reclamation process on former submerged maritime infrastructure sites.
 - 4) There should be clear inclusion of what will be done if unexpected sites are discovered during the demolition process and how they will be recovered and or excavated, the conservation techniques to be employed, and if *in situ* preservation and interpretation can be undertaken.
 - 5) Specific assessment of the visual impact of the proposed works on the identified heritage values of SHR-listed sites (e.g. Pyrmont Bridge). It is noted that the SS *South Steyne*, which was moored at the opposite Harbourside wharves within Darling Harbour, may still sustain a visual impact because of this proposed redevelopment, when it is returned. The potential visual impact should be considered to this item in the supporting Statement of Heritage Impact and any mitigating measures clearly outlined to reduce negative impacts.

A separate Aboriginal Heritage Due Diligence Report was also prepared to address the potential for Aboriginal archaeological remains to be present within the subject site.² This report did not include areas under reclamation or under water, hence, these areas are included within the Aboriginal scope of this MAA.

1.5 Objectives

The objective of this project is:

To prepare a MAA for the proposed Cockle Bay Park Development which will address the requirements of the NSW Heritage Council. The MAA will be undertaken for the water-front occupation layers under reclamation and under water for the whole of the site of 241-249 Wheat Road, Cockle Bay (Darling Harbour Precinct).

1.6 Approach

The MAA will satisfy all of the requirements put forward by HC that can be addressed at the Concept proposal phase. General advice will also be provided in the MAA on how to fulfil the other HC requirements in future phases of the project. For example, specific strategies and procedures can only be addressed once the design is known and impacts are better understood. General advice will also be provided that can be used to guide design and construction to avoid areas of potential State significance. The following table details the Steps of the MAA assessments for the Stage 1 SSSA and compliance with HC

² **GML Heritage, August 2017b**, *Cockle Bay Park: Aboriginal Heritage Due Diligence Report*, prepared for DPT and DPPT.

requirements. This report satisfies the Maritime Archaeological Assessment which shall be used to guide future management of the maritime archaeological resource.

Additional assessments will be required for the Stage 2 SSDA and future stages of the project. Once the project design is determined, the Stage 2 SSDA should include a Maritime Archaeological Statement of Heritage Impact (MASoHI) of the design and a Maritime Archaeological Management Plan (MAMP). The MAMP would detail archaeological measures that will need to take place before, during and after construction to mitigate any impacts that the development would have.

Table 1: Methodology to complete the MAA in two stages.

Step	Description	Compliance
<i>Desktop Analysis – Provides a desktop gap analysis as well as opportunities and constraints for the development</i>		
A	<p>Review the available information that will lead to a comprehensive assessment of the potential for maritime archaeological relics and resources and their level of significance (in Step C).</p> <p>Review research in relation to Aboriginal sites and also the disturbances to the area as a result of developments in recent history.</p> <p>Provide initial advice on potential maritime heritage sites and mitigation requirements.</p>	<i>Partial compliance with HC requirement 1a and 1b, to be finalised after the diving inspection (see Step C).</i>
<i>Maritime Archaeological Assessment – This includes a diving inspection, assessment of potential sites significance assessments and advice</i>		
B	<p>Undertake a site inspection (dive survey of the seabed beneath the piled area of the wharf) to inform the assessment of maritime archaeological potential. The investigation will be carried out in accordance with the relevant Occupational Health and Safety (OH&S) standards and Australian Diver Accreditation Scheme (ADAS) standard AS2299. Diving will be undertaken from a boat by the qualified maritime archaeologist(s) and supported by an ADAS certified dive team who will supply all necessary equipment (including boating requirements).</p>	<i>The diving inspection will satisfy HC requirement 1c.</i>
C	<p>Undertake an assessment of archaeological potential for historic and Aboriginal sites and an assessment of their level of significance.</p>	<i>These assessments will satisfy HC requirements 1a and 1b.</i>
D	<p>Provide initial management advice for the treatment of any newly-discovered archaeological sites including how they should be investigated, recorded, conserved and interpreted as well as any additional required assessments.</p>	<i>This is in partial compliance with HC requirement of 1d. Note that only general advice can be provided in the MAA. A detailed process for treatment can only be provided once the site has been discovered, identified and specifically assessed. This then will satisfy the whole of requirement 1d.</i>

Step	Description	Compliance
E	<p>Provide advice for ongoing management of the potential maritime archaeological resource including:</p> <ol style="list-style-type: none"> 1. Additional assessments, such as statement of heritage impacts and management plans, that will be required as part of future development applications (including for visual impacts on heritage listed sites such as the SS <i>South Steyne</i>). 2. Maritime archaeological monitoring during the demolition and excavation stages of works by a suitably qualified maritime archaeologist. 3. An outline of the procedure for unexpected finds that will be enacted by the maritime archaeologist including a guide of the level of recording, excavation, conservation, preservation and/or interpretation that should be undertaken for the find. 	<ol style="list-style-type: none"> 1. <i>Note that specific assessments of visual and other impacts cannot be provided in the MAA without detailed design plans that reveal the impacts. Management of unknown impacts cannot be assessed at this stage. The MAA will recommend assessments to be completed in later stages of the project that will satisfy HC requirement 5. As such, only general non-site specific advice can be provided in the MAA.</i> 2. <i>Plans for a programme of monitoring during specific stages of impacts will satisfy requirement 2. However, undertaking the monitoring programme will take place in the construction stage.</i> 3. <i>Note that only a general outline of the procedure can be provided in the MAA. The specific procedure for a find can only be provided once the find has been made and specifically assessed, which will then satisfy the whole of requirement 4. As such, only general non-site specific advice can be provided in the MAA.</i>

1.7 Abbreviations

The following abbreviations are used throughout this report:

ADAS	Australian Diver Accreditation Scheme	NPW Act	<i>National Parks and Wildlife Act 1974</i>
AHIMS	Aboriginal Heritage Information Management System	NSW	New South Wales
CBD	Central Business District	OEH	Office of Environment and Heritage (NSW)
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>	OH&S	Occupational Health and Safety
GFA	Gross Floor Area	PAD	Potential Archaeological Deposit (type of Aboriginal site feature on AHIMS)
HAA	Historical Archaeological Assessment	REP	Regional Environmental Plan
HC	Heritage Council (NSW)	Proponent	DPT Operator Pty Ltd and DPPT Operator Pty Ltd
ICC	International Convention Centre	SEPP	State Environment Planning Policy
LEP	Local Environment Plan	SHR	State Heritage Register (NSW)
LGA	Local Government Area	SICEEP	Sydney International Convention, Exhibition and Entertainment Precinct
MAA	Maritime Archaeological Assessment	SREP	Sydney Regional Environmental Plan (Sydney Harbour Catchments 2005)
MAMP	Maritime Archaeological Management Plan	SSD	State Significant Development
MASoHI	Maritime Archaeological Statement of Heritage Impact	SSDA	State Significant Development Application

2 STATUTORY ISSUES

2.1 Cultural Heritage Statutory Protection – Introduction

Cultural heritage in New South Wales (NSW) is protected and managed under a hierarchy of legislation. The following section provides a brief summary of the relevant statutory regulations relating to the current project area.

2.1.1 NSW Heritage Act 1977 (amended 1999)

The NSW *Heritage Act 1977* is the primary piece of State legislation affording protection to all items of non-indigenous environmental heritage (natural and cultural) in NSW. Under the Act, “items of environmental heritage” include places, buildings, works, relics, moveable objects and precincts identified as significant based on historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic values. Items of heritage identified as having State significance are listed on the NSW State Heritage Register (SHR) and are afforded automatic protection against any activities that may damage the item or affect its heritage significance under the Act.

Under Section 89J(c) of the *Environmental Planning and Assessment Act 1979* (EP&A Act), a developer 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.

Relic provision and protection

In addition to buildings and items listed on the SHR, various cultural heritage sites, items, archaeological features and deposits are afforded automatic statutory protection by the relic provisions of the NSW *Heritage Act 1977*. The Act defines a ‘relic’ as something that:

- a) *Relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and*
- b) *Is of State or local heritage significance.*

Sections 139 to 145 of the Act prevent the disturbance or excavation of any land if there is a reasonable cause to suspect that a relic will be discovered, exposed, moved, damaged or destroyed, unless an excavation permit has been issued by the Heritage Council of NSW. The type of permit that is required depends on whether the relic or relics have been listed on the State Heritage Register.

There is also an obligation under the Heritage Act to stop work and contact the Heritage Office if relics are unexpectedly disturbed or uncovered. Any relics located are required to be reported under the NSW *Heritage Act 1977*, Section 145.

Infrastructure still in use today that has been identified as a heritage item is known as a ‘work’. These items are not defined as a relic, and development affecting them can be carried

out under a list of Standard Exceptions for State significant items published by the Heritage Council.³ The significance of the item and the level of impact determine the requirement to undertake a heritage assessment and proposed suitable mitigation works; however, a permit application is not required. Impacts to the cultural significance of relics assessed to be minor can qualify for an exception from the requirement for a permit.⁴

For the purposes of this Act, the State of NSW includes the seabed and the water column up to 3 nautical miles (nm) from the coast. The NSW *Heritage Act 1977* therefore, within 3 nm of the NSW coast, can protect shipwrecks. Shipwrecks currently under the jurisdiction of the NSW *Heritage Act* are identified in the Historic Shipwrecks Register, maintained by the NSW Heritage Council.

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

Management of heritage assets by NSW Government agencies

The NSW Heritage Act 1977 also requires all government agencies to identify and manage heritage assets in their ownership and control. Under Section 170 of the Act, government instrumentalities must establish and keep a register entitled the “Heritage & Conservation Register” which includes all items of environmental heritage listed on the State Heritage Register, an environmental planning instrument or that may be subject to an interim heritage order, which are owned, occupied or managed by that government instrumentality.

Under Section 170A of the Heritage Act 1977, each government agency must also ensure that all items entered on its Heritage and Conservation Register are maintained with due diligence in accordance with State Owned Heritage Management Principles approved by the NSW Minister for Infrastructure & Planning on advice of the NSW Heritage Council.⁵ These principles serve to protect and conserve the heritage significance of identified sites, items and objects, and are based on relevant NSW heritage legislation and statutory guidelines.

2.1.2 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) established the framework for cultural heritage values to be formally assessed in the land use planning and development consent process. The Act requires that environmental impacts are considered prior to land development; this includes impacts to cultural heritage items and places as well as archaeological sites and deposits. The Act also requires that Local Government agencies prepare planning instruments (such as Local Environmental Plans, Development Control Plans) in accordance with the Act to provide guidance on the level of environmental assessment required.

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.

³ NSW Heritage Branch, 2000, Schedule of General Exceptions; NSW Heritage Branch, 2006, Standard Exceptions for Works Requiring Heritage Council Approval.

⁴ NSW Heritage Branch, 2006, Schedule of Additional Exceptions.

⁵ NSW Heritage Office, 2005.

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

Sydney Regional Environmental Plan – Sydney Harbour Catchment (2005)

NSW Regional Environmental Plans (REPs) are plans drafted by the Department of Planning and apply to a nominated “region,” covering broad issues such as urban growth, commercial centres, extractive industries, recreational needs, rural lands and heritage and conservation. They provide the framework for detailed local planning by councils. The local council of the area in which development is proposed to be carried out is usually the consent authority for that development for the purposes of the REP, unless the Department of Planning selects to substitute the Minister or Director General of Planning as the consent authority in respect to particular forms of development.

The stated objections of the *Sydney Regional Environmental Plan (SREP) – Sydney Harbour Catchment (2005)* with regards to foreshores and waterways areas are as follows (Section 53);

- (a) To conserve the environmental heritage of the land to which this Part applies, and*
- (b) To conserve the heritage significance of existing significant fabric, relics, settings and views associated with the heritage significance of heritage items, and*
- (c) To ensure that archaeological sites and places of Aboriginal heritage significance are conserved, and*
- (d) To allow for the protection of places which have the potential to have heritage significance but are not identified as heritage items.*

Note: Attention is drawn to the provisions of the Heritage Act 1977 and the National Parks and Wildlife Act 1974 under which an approval or permit under either or both of those Acts may be required for certain activities, whether or not development consent is required by this clause.

Part 5 of the *SREP – Sydney Harbour Catchment (2005)* contains provisions for the protection and conservation of cultural heritage sites, items and values – both Aboriginal and non-Aboriginal.

Under the REP, a “heritage item” is defined as:

- (a) A building, work, archaeological site or place:*
 - (i) That is specified in an inventory of heritage items prepared for the purposes of this plan, being an inventory that is available at the head office of the Department, and*
 - (ii) That is situated on a site described in Schedule 4 and identified on the Heritage Map, or*
- (b) A place:*
 - (i) That is specified in an inventory of heritage items prepared for the purposes of this plan, being an inventory that is available at the head office of the Department, and*
 - (ii) That is described in the inventory as a place of Aboriginal heritage significance.*

Clause 55 of the REP provides protection for heritage items. Under this clause, the following development may be carried out only with development consent:

- (a) Demolishing or moving a heritage item,*
- (b) Altering a heritage item by making structural or non-structural changes to its exterior, including changes to its detail, fabric, finish or appearance,*
- (c) Altering a heritage item by making structural changes to its interior,*
- (d) Disturbing or damaging a place of Aboriginal heritage significance or an Aboriginal object,*

- (e) *Erecting a building on, or subdividing, land on which a heritage item is located.*
- (2) Development consent is not required by this clause if:
- (a) *In the opinion of the consent authority:*
- (i) *The proposed development is of a minor nature or consists of maintenance of the heritage item, and*
- (ii) *The proposed development would not adversely affect the significance of the heritage item, and*
- (iii) *The proponent has notified the consent authority in writing of the proposed development and the consent authority has advised the applicant in writing before any work is carried out that it is satisfied that the proposed development will comply with this subclause and that development consent is not otherwise required by this plan.*
- (4) Before granting development consent as required by this clause, the consent authority must assess the extent to which the carrying out of the proposed development would affect the heritage significance of the heritage item concerned.
- (5) The assessment must include consideration of a heritage impact statement that addresses at least the following issues (but is not to be limited to assessment of those issues, if the heritage significance concerned involves other issues):
- (a) *The heritage significance of the item as part of the environmental heritage of the land to which this Part applies, and*
- (b) *The impact that the proposed development will have on the heritage significance of the item and its setting, including any landscape or horticultural features, and*
- (c) *The measures proposed to conserve the heritage significance of the item and its setting, and*
- (d) *Whether any archaeological site or potential archaeological site would be adversely affected by the proposed development, and*
- (e) *The extent to which the carrying out of the proposed development would affect the form of any historic subdivision.*
- (6) The consent authority may also decline to grant development consent until it has considered a conservation management plan, if it considers the development proposed should be assessed with regard to such a plan.

Clause 59 – Development in Vicinity of Heritage Items:

- 1) Before granting development consent to development in the vicinity of a heritage item, the consent authority must assess the impact of the proposed development on the heritage significance of the heritage item.
- 2) This clause extends to development:
- (a) *That may have an impact on the setting of a heritage item, for example, by affecting a significant view to or from the item or by overshadowing, or*
- (b) *That may undermine or otherwise cause physical damage to a heritage item, or*
- (c) *That will otherwise have any adverse impact on the heritage significance of a heritage item.*
- 3) The consent authority may refuse to grant development consent unless it has considered a heritage impact statement that will help it assess the impact of the proposed development on the heritage significance, visual curtilage and setting of the heritage item.
- 4) The heritage impact statement should include details of the size, shape and scale of, setbacks for, and the materials to be used in, any proposed buildings or works and details of any modification that would reduce the impact of the proposed development on the heritage significance of the heritage item.

Cockle Bay falls under the *Darling Harbour Development Plan No. 1*, which means that the 'consent authority' is the Minister for Planning.

Darling Harbour Development Plan No 1

The Darling Harbour Development Plan No 1 is made under the Environmental Planning Assessment Act 1979 and from 2009 is taken to be a State Environment Planning Policy (SEPP). The plan encourages the development of a variety of tourist, educational, recreational, entertainment, cultural and commercial facilities within Darling Harbour and makes provisions with respect to controlling development. Clause 6 details that a permit is required for certain development including:

- (a) *For the purposes of tourist, educational, recreational, entertainment, cultural or commercial facilities (other than facilities used for pawn broking or other forms of moneylending),*
- (b) *For the purposes of transport facilities,*
- (c) *For the purposes of beautifying the landscape,*
- (d) *For any purpose specified in Schedule 1, or*
- (e) *For any purpose incidental or subsidiary to a purpose referred to in paragraph (a), (b), (c) or (d).*

Schedule 1 includes the following list of developments that may be carried out under a permit: Amusement parks; art galleries; child care centres; commercial premises (other than premises used for pawn broking or other forms of moneylending); car parking stations; charter boat facilities; convention centres; entertainment centres; exhibition centres; film, television and radio studios; hotels; light industries; markets; motels; museums; parks and gardens; places of assembly; places of public worship; professional consulting rooms; public buildings; public utility undertakings; recording studios; recreation facilities; refreshment rooms; residential buildings; serviced apartments; shops; theatre restaurants; utility installations.

Clause 7 of the plan prohibits all other development not referred to in clause 6, and Clause 8 explains that permits are also required for renovation or demolition of a building or work.

2.1.3 National Parks and Wildlife Act 1974 (amended 2010)

The *National Parks and Wildlife Act 1974* (NPW Act) protects Aboriginal objects and Aboriginal places in NSW. It has been amended by the National Parks and Wildlife Regulation 2009 (NPW Regulation). Under the NPW Act, the following are offences unless an exemption or defence is provided for under the Act:

- *A person must not knowingly harm or desecrate an Aboriginal object (knowing offence), and;*
- *A person must not harm or desecrate an Aboriginal object or Aboriginal place (strict liability offence).*

Harm includes acts or omissions that "destroy, deface or damage" an Aboriginal object or Aboriginal Place, and in relation to an object, move the object from the land on which it has been situated. Harm does not include something that is trivial or negligible.

Section 91 of the Act also obliges any person who discovers an Aboriginal object to report it to the Office of Environment and Heritage for it to be entered on the Aboriginal Heritage Information Management System. An Aboriginal object is defined as:

Any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.

An Aboriginal object is legally protected irrespective of land tenure, the significance of the object and whether or not it has been recorded. “Aboriginal Places” are places so declared under Section 84 of the Act.

2.2 Statutory Heritage Register Search

In NSW there are four types of statutory listings for non-indigenous cultural heritage sites, objects and places:

- National Heritage List;
- NSW State Heritage Register;
- *Regional Environmental Plan (REP)*;
- *Local Environmental Plan (LEP)*; and,
- Section 170 Heritage and Conservation Register;

Heritage register searches were undertaken for the project area with the following results.

2.2.1 National Heritage List

The National Heritage List is a register of natural and cultural places with outstanding heritage significance to the Australian nation. Each entry to the National Heritage List is assessed by the Australian Heritage Council as having exceptional heritage value and is protected under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. The Act requires that approval is obtained from the Australian Government Minister for the Environment Protection, Heritage and the Arts before any action takes place that has, will have, or is likely to have, a significant impact on the national heritage values of a listed place.

There are no sites listed on the National Heritage List located within the study area.

2.2.2 NSW State Heritage Register

The *State Heritage Register* is a statutory list of places and items of State heritage significance made by the Minister Planning. The Register lists a diverse range of places, including archaeological sites, that are particularly important to the State and which enrich our understanding of the history of NSW.

Places and items listed on the Register are legally protected under the NSW *Heritage Act 1977* and approval is required from the Heritage Council of NSW prior to undertaking work that results in their alteration or modification.

S.S. South Steyne is listed on the State Heritage Register as a moveable Item of State Significance (Item Number 00755). S.S. South Steyne is currently moored against Harbourside Wharf in Cockle Bay.

The Pyrmont Bridge is listed on the State Heritage Register as an Item of State Significance (Item Number 01618). The listing includes a heritage curtilage area that extends to the either side of the bridge (Figure 4).

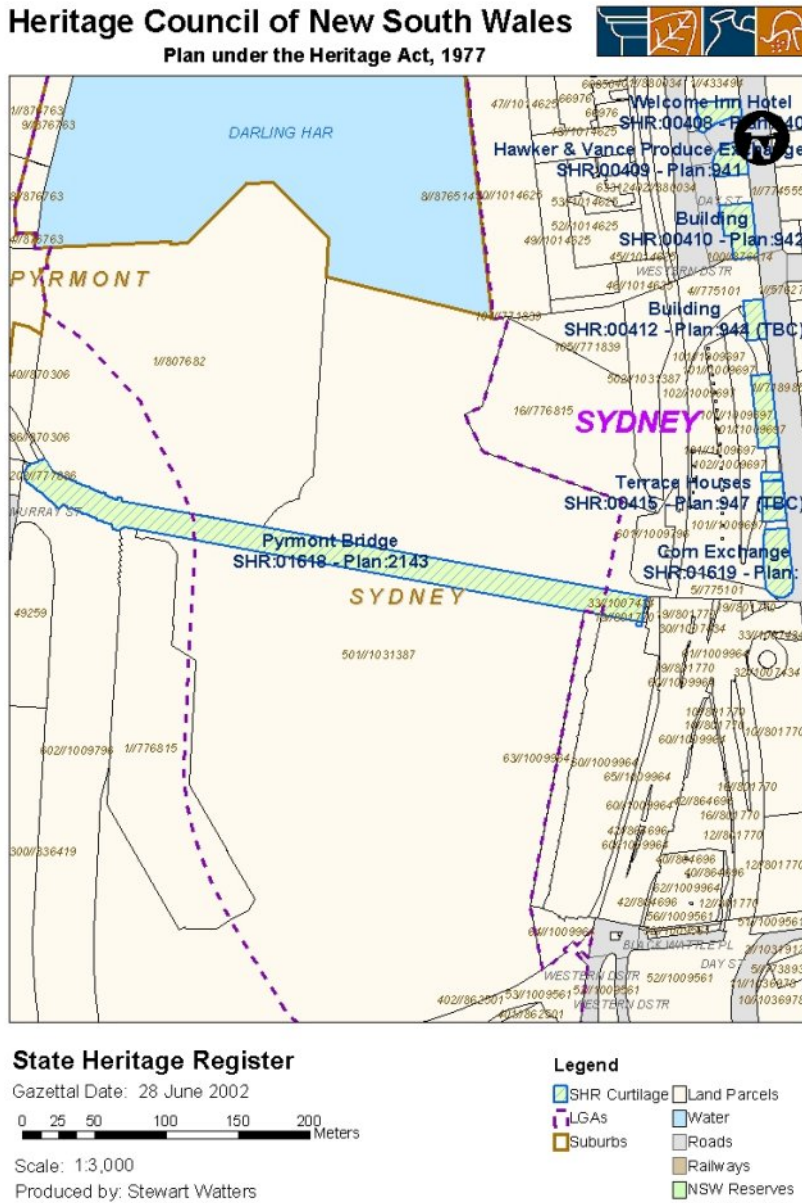


Figure 4: Curtilage for Pyrmont Bridge.⁶

2.2.3 NSW Historic Shipwreck Register

The NSW Historic Shipwreck Register is a database maintained by the NSW Heritage Division and contains upwards of 1,800 wrecks.⁷ This database has been built up around historical accounts of the loss of vessels, mainly through the systematic examination of newspapers from the 1790s to the present day. The database has been augmented by other sources such as archival information from the Australian Hydrographic Office.

The database has been searched to locate any known or potential shipwrecks that have occurred specifically in Darling Harbour / Cockle Bay and greater in Sydney Cove. There are 112 registered vessels that are listed as wrecked in “Sydney Harbour” that have not been located. This description includes vessels that were reported lost within “Sydney

⁶ NSW Environment and Heritage, 2002, “Pyrmont Bridge”, available <http://www.environment.nsw.gov.au/heritageapp/HeritageItemImage.aspx?ID=5053337#ad-image-8>, accessed 26 February 2015.

⁷ NSW Heritage Office, 2007 ‘Maritime Heritage Online’, NSW, available <http://www.environment.nsw.gov.au/maritimeheritage/index.htm>

Harbour Heads”, or general locations such as “just outside Circular Quay” whereby the location may be further afield than the location described.

Refining the search to closer to the study area, there were four shipwrecks that have occurred in Darling Harbour. These were:

William Woolley – 201 ton wooden hulled brig that was lost in 1854 when it caught fire and was scuttled while bring timber into Sydney Harbour. The location of the wreck is unknown.

Sterling – an iron hulled single screw steamer lost in 1919 when it collided with another vessel at Federal Wharf. The vessel was later refloated and removed from the site.

Orphan Girl – a woodern hulled lighter that collided with another vessel in 1880. The vessel was travelling from Pennant Hills to Darling Harbour. The vessel was wrecked and it’s location is unknown.

Omeo – 16 ton wooden screw steamer harbour tug who’s boiler expolded at it’s wharf at Bathurst Street Wharf.

There is the potential for archaeological remains associated with the shipwreck of *Sterling* to be present within the project area. While the vessel was refloated, there is the potential for remains associated with the collision to still be on the seabed.

The vessels *William Woolley* and *Orphan Girl* have Darling Harbour included in their shipwreck register listings as this was their destinations. It is possible that both of these wrecks are within the greater Darling Harbour area, however, they are unlikely to be within the study area of the report.

The vessel of *Omeo* was lost at the Bathurst Street Wharf. These wharves are now covered over by reclamation works and are located behind the current seawall. Therefore, the wreck likely to be to the south and outside of the study area of this report.

2.2.4 Sydney Local Environmental Plan 2012

Identified items of cultural heritage significance within the project area are listed on Schedule 5 of the *Sydney Local Environmental Plan 2012*. Each item listed on Schedule 5 is subject to protection under the planning and development controls of the LEP.

There are no listings on the Sydney LEP that are located close to the study area and be impacted by the proposed works.

2.2.5 NSW Section 170 Heritage and Conservation Register

All NSW State Government Agencies are required to keep an up to date record to assist in total asset management by providing information on their assets which have identified heritage significance. The Register has been prepared in accordance with the NSW Heritage Office guidelines and corresponds with information in the State Heritage Inventory, as managed by the NSW Heritage Office.

Pymont Bridge is listed on the Sydney Harbour Foreshore Authority’s Section 170 Heritage and Conservation Register.

2.3 Summary of Statutory Provisions

The table below provides a summary of the heritage listed items that are located within or near the study area (Table 2 and Figure 5).

Pymont Bridge and any impacts to its heritage significance have been assessed in a separate document and are hence not discussed in this report.⁸

⁸ **Weir Phillips Heritage, August 2017**, Heritage Impact Statement: Cockle Bay Park Redevelopment: 241-249 Wheat Road, Cockle Bay.

Table 2: Summary of heritage listed sites.

Item	NSW Heritage Act (1977)		Environmental Planning and Assessment Act (1979)	
	SHR	S170	REP	LEP
S.S. South Steyne – movable heritage item	00755			
Pymont Bridge – Sydney, Part of Lot 501, DP 1031387 and part of Lot 1010, DP 1147364	01618	Sydney Harbour Foreshore Authority		

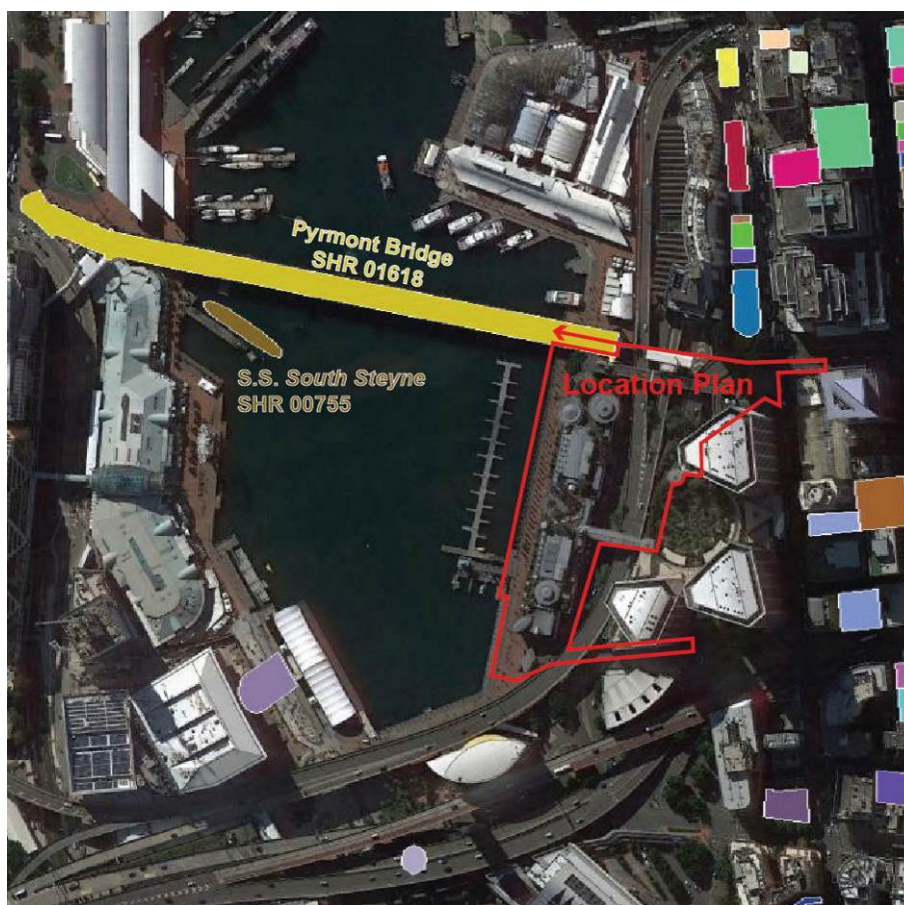


Figure 5: Curtilages of nearby heritage listed sites.

3 ABORIGINAL BACKGROUND

3.1 *Evolution of the submerged landscape*

The Port Jackson estuary is a drowned river valley system comprising the three watercourses of Middle Harbour, Lane Cove River and Parramatta River. The configuration of the Port Jackson drainage system is controlled by the underlying geological structures of the Sydney Basin, formed during the Permian-Triassic Era (300-220 million years ago) as an uplifted coastal plain. As fluvial creeks and rivers developed across the Sydney Basin, the waters began eroding pathways into the bedrock of Hawkesbury sandstone. Throughout each glacial period since the formation of the Sydney Basin, these pathways have been successively incised, creating deep and steep-sided river valleys – in some instances valleys that are now up to eighty-five metres deep. During the intervening interglacial periods of milder climate and higher sea levels, these river valleys were flooded and partially infilled with sediment deposited by both marine and fluvial processes; sediments that were subsequently eroded and flushed from the river valley floors with the dropping sea levels during each following glacial period.

During the Pleistocene epoch of the Quaternary period (approximately 2.5 million years BP to 11,700 years BP) sea level oscillations from 5 metres above to 120 metres below the present position occurred every 100,000 to 150,000 years as a result of repeated glaciations and climate change. Throughout this period, the eastward extent of individual river catchments and the drainage patterns in the lower parts of estuarine systems would have varied at each interglacial interval, contingent on the height to which sea level rose.

Approximately 17 to 18,000 years BP, a climate reversal ushered the end of the last glacial period. At this time, sea levels were approximately 100 metres below the current level and the eastern coastline of Australia was approximately 25 to 30 km further east. The current Port Jackson catchment would have comprised a meandering river system running through deeply incised sandstone gorges, draining the sandstone plateaus to the west and north-west and fed by numerous creeks and streams. Sediment deposition within the river systems would have been minimal, and the river beds would have been predominantly formed of eroded gravels.

With increasing global temperatures and the melting of the ice caps at the end of the last Pleistocene glacial period, the sea level rose quickly, advancing eastwards across the continental shelf and flooding into river systems. Large quantities of marine sediments were accumulated with the rising seas, pushed into coastal embayments and transported by wave energy into river mouths. As the river systems flooded, fluvial sediments of eroded sand and muds were also simultaneously deposited in the upper parts of estuaries. At approximately 11,700 years BP, the world entered the current interglacial period; the Holocene epoch.

By approximately 10,000 years BP, sea levels had risen to only 25 metres below current levels and only 3 to 5 km off the present coastline. It was around this time that Port Jackson was formed by the drowning of Parramatta River – with its tributary, Lane Cove River – and Middle Harbour Creek. These two rivers became joined as one with the flooded interfluvium between them being shallow water running between the mainland and several large islands – what are now the North and South Heads of Sydney Harbour. Former ridges became promontories, valleys became inlets and some former hills became islands. The sea finally reached its present level at approximately 6-7,000 years BP, and has not fluctuated more than approximately one metre since.⁹

⁹ **Birch, G. F., 2007**, "A short geological and environmental history of the Sydney estuary, Australia." In Birch, G. F. (ed) *Water, Wind, Art and Debate*, Sydney University Press, The Sydney University; **Harris, P. and O'Brien, P., December 1998**, *Australian Ports Environmental Data and Risk Analysis. Phase 1; Literature Review*, Prepared for Australian Quarantine Inspection Service (AQIS) Petroleum and Marine Division, Australian Geological Survey Organisation, Canberra, ACT; **Roy, P.S., 1981**, "Quaternary Geology." in Herbert C, (ed.) *Geology of the Sydney, 1:1000,000 Sheet 9130*. Geological Survey of New South Wales, Sydney; **Roy P.S., Zhuang, W., Birch, G. F., Cowell, P.J. and Li, C., 1997**, *Quaternary geology of the Forster-Tuncurry coast and*

3.2 Prehistoric Aboriginal Occupation of the Greater Sydney Region

Aboriginal populations are known to have inhabited the greater Sydney region for at least 20,000 years, and possibly longer. Aboriginal archaeological sites excavated in the Blue Mountains and the Hawkesbury – Nepean River system have provided some of the earliest firm evidence of Aboriginal occupation. They include:

- A radiocarbon date of ca. 14,700 years BP at Shaws Creek KII rock shelter on the western bank of the Nepean River, north of Penrith;¹⁰
- An optically stimulated luminescence (OSL) date of at least ca. 15,000 years BP at a deep sand levee site adjacent to the Hawkesbury River near Pitt Town;¹¹ and
- A radiocarbon date of ca. 22,000 years BP at the Kings Tableland rock shelter site in the Blue Mountains.¹²

Archaeological sites on the south coast of New South Wales in the Illawarra region provide complimentary dates; Pleistocene occupation has been identified at a rock shelter at Burrill Lake, dated to c. 20,000 years BP,¹³ and an open shell midden site at Bass Point, date to c. 17,000 years BP.¹⁴ Much older Aboriginal occupation dates of up to 40,000 years BP have been obtained from stone artefacts found in Cranebrook Terrace gravels along the Nepean River¹⁵; however, the stratigraphic association between these artefacts and dated sediments has since come under question, and these early dates remain controversial.

The majority of Aboriginal archaeological sites situated on the south-east coast of New South Wales, however, date to the period after the post-glacial marine transgression and the Holocene stabilisation of sea levels at approximately 6,000-7,000 years BP. Archaeological evidence within the greater Sydney region has generally been interpreted to suggest that early Aboriginal occupation was relatively sporadic and the population levels fairly low, until approximately 5,000 years BP when there appears to have been an increasing and continued use of many occupation sites.¹⁶ At present, the earliest dates obtained from Aboriginal archaeological deposits along the shorelines of the Port Jackson catchment is ca. 4,500-5,000 years BP.¹⁷

Over the last twenty to thirty years, several broad scale archaeological investigations have been conducted within the greater Sydney region – including several areas within the Hawkesbury sandstone, Port Jackson foreshores and estuarine land systems.¹⁸

shelf, Southeast Australia. Geological Survey of New South Wales, Department of Minerals Resources, Sydney; **Sale, C., 2000**, "Sydney: Olympic City 2000" *Geography Bulletin*. (Summer); **Thom, B.G., and P.S. Roy, 1985**, "Relative sea levels and coastal sedimentation in southeastern Australia in the Holocene." *Journal of Sedimentary Petrology*. Volume 55 (2); **Williams, R. J., 2014**, *Estuarine shorelines of southeastern Australia*. In Swapan, P. (ed) *Workbook for Managing Urban Wetlands in Australia*. Sydney Olympic Park Authority, NSW.

¹⁰ **Kohen, J.L., E.D. Stockton and M.A.J. Williams, 1984**, "Shaws Creek KII Rockshelter: a prehistoric occupation site in the Blue Mountains piedmont, eastern New South Wales." *Archaeology in Oceania*. Vol. 19: 57-93.

¹¹ **Williams, A.N., P. Mitchell, R.V.S. Wright and P.S. Toms, 2012**, "A Terminal Pleistocene Open Site on the Hawkesbury River, Pitt Town, New South Wales." *Australian Archaeology*. No. 74.

¹² **Stockton, E.D. and W.N. Holland, 1974**, "Cultural sites and their environment in the Blue Mountains." *Archaeology and Physical Anthropology in Oceania*. Vol. 9: 36-64.

¹³ **Lampert, R.J., 1971**, "Burrill Lake and Currarong." *Terra Australis 1*. Department of Prehistory, Australian National University, Canberra.

¹⁴ **Bowdler, S., 1970**, *Bass Point: the excavation of a south-east Australian shell midden, showing cultural and economic change*. Unpublished BA (Hons) Thesis, Sydney University.

¹⁵ **Nanson, G.C. et al., 1987**, "Chronology and paleoenvironment of the Cranebrook Terrace (near Sydney) containing artefacts more than 40,000 years old." *Archaeology in Oceania*. Vol. 22 (2): 72-78.

¹⁶ **Attenbrow, V., 1987**, *The Upper Mangrove Creek Catchment: a study of quantitative change in the archaeological record*. Unpublished PhD Thesis, University of Sydney.; **Hiscock, P., 2008**, *Archaeology of Ancient Australia*. London and New York: Routledge; **Lourandos, H. and A. Ross, 1994**, "The great 'Intensification Debate': Its history and place in Australian archaeology." *Australian Archaeology* 39:54-63.

¹⁷ **Attenbrow, V.J., 2002a**, *Sydney's Aboriginal Past: Investigating the Archaeological and Historic Records*. UNSW Press, Sydney.

¹⁸ Such as **Attenbrow, V., 1990**, *The Port Jackson Archaeological Project: Stage 1*. Unpublished report to the NSW National Parks and Wildlife Service; **Attenbrow, V.J., 2002b**, *Resource and land use patterns around*

Aboriginal archaeological site type and distribution models have consequently been proposed on the basis of data from several different topographies and sub-areas. These studies have indicated that Aboriginal archaeological sites are distributed across almost all landforms within the Hawkesbury Sandstone formations and along Quaternary flats adjacent to estuaries – from valley floors to ridge tops. However, there is considerable variation in the proportion and distribution of different site types in different areas with certain types of sites being found in association with particular physiographic and environmental units.

An examination of patterns in Aboriginal archaeological sites along the shores of Port Jackson indicates that shell midden deposits are by far the most common site type, occurring both inside rock shelters and on exposed sandstone ledges and platforms near the water edge. It should be recognised, however, that these middens all appear to be associated with Holocene occupation and the estuarine environment created during the post-glacial marine transgression.

The eastern side of the study area is located on the GyMEA soil landscape, underlain by Hawkesbury Sandstone, and characterised by shallow to moderately deep soils with frequent rock outcrops. The western side of the study area was located on the sloping foreshore of the GyMEA landscape but has since been reclaimed with deep layers of fill in the early-to-mid nineteenth century.¹⁹

3.3 Aboriginal Heritage Information Management System

An extensive search was conducted by GML of the Office of Environment and Heritage (OEH) Aboriginal Heritage Information Management System (AHIMS) on 19th August, 2016. This search was conducted from Latitude -33.8807, Longitude 151.1839 to Latitude -33.8598, Longitude 151.217 and included 1 km buffer zone around the study area. The findings of this search are presented in the 2017 GML report.²⁰

No registered site or Aboriginal places were identified within the study area. However, the search results of surrounding areas provide an indication of activities that may have occurred within the study area. There were 32 identified valid Aboriginal sites located outside the study area, largely dominated by Potential Archaeological Deposits (PADs) which made up 13 of the 32 sites. Artefact sites and open camp sites with artefacts are also common within the Sydney region.

There are a small number of other site types recorded in the vicinity of the study area including an Aboriginal Ceremony and Dreaming with shell and artefact feature at Goat Island, an Aboriginal Ceremony and Dreaming burial site, and an Aboriginal Resource Gathering site. Art and rock engraving sites have been recorded on rocky outcrops on the foreshore of the harbour, and middens have also been identified on the foreshore of the harbour, on sandstone cliffs and rock platforms.

Based on general Aboriginal landscape use in the vicinity of the study area, the original GyMEA soil landscape could hold archaeological potential.

Sydney Harbour. Unpublished seminar, Australian Museum, Prehistoric and Historical Archaeology Department.; **Attenbrow, V. and D. Steele, 1995**, "Fishing in Port Jackson, New South Wales – more than meets the eye." *Antiquity*. V. 69: 47-60; **Vinnicombe, P., 1980**, "Predilection and Prediction: A Study of Aboriginal Sites in the Gosford-Wyong Region." Unpublished report to the NSW National Parks and Wildlife Service.

¹⁹ *Op. Cit.* GML Heritage, August 2017b: 8-9.

²⁰ *Op. Cit.* GML Heritage, August 2017b: 6.

4 HISTORICAL BACKGROUND

The following historical summary, unless otherwise referenced, is taken from a previous report based on the Cockle Bay area.²¹ This section presents a summary of the development of maritime industry and infrastructure on the eastern side of Cockle Bay. It also includes identification of historic maritime infrastructure likely to have been situated within the study area based on numerous archival charts and plans.

4.1 Historical Summary

Following the arrival of the First Fleet in 1788, the NSW colony was initially centred around Sydney Cove, with all shipping activity conducted from landings within the cove itself. Settlement was largely dictated by topography and the availability of fresh water, and land and along Darling Harbour and Cockle Bay – both originally known as “Long Cove” – saw little occupation for the following two decades due to the rugged terrain separating the area from Sydney Cove.

4.1.1 The First Wharf and the First Half of 19th century

In 1811, Governor Macquarie ordered the construction of the first wharf in Cockle Bay; Market Wharf, established to receive produce from outlying settlements and serve the Sydney market place. In conjunction with the new wharf, a new access road – Market Street – was laid out and the market itself was moved from Sydney Cove to the site of the present Queen Victoria Building.

Maritime activity began to expand from Sydney Cove around Miller’s Point into the northern end of Cockle Bay; the southern portion of the bay, however, remained largely undeveloped due to a combination of relatively shallow waters and limited access between the shoreline and the town grid. In 1815, Mr. John Dickson opened a steam powered mill near the base of current Goulburn Street, utilising the fresh water streams at the head of Cockle Bay; and for the following decade, Dickson’s wharf and mill complex comprised the only maritime structures south of Market Wharf (Figure 6). In 1826, Governor Darling renamed Cockle Bay “Darling Harbour” in honour of himself.

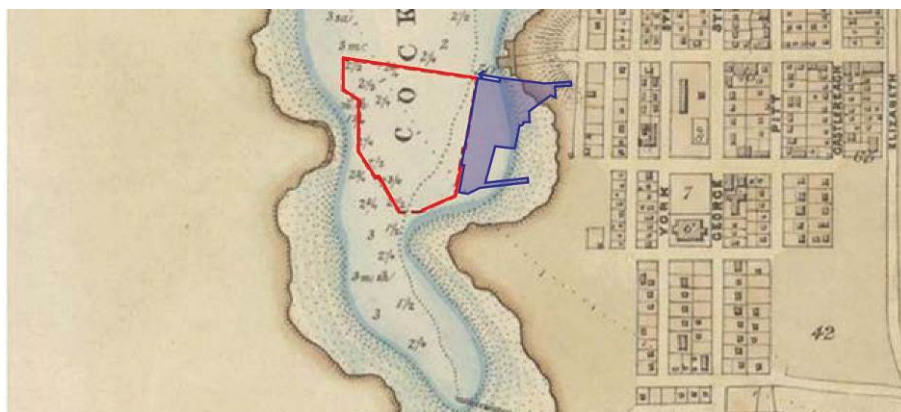


Figure 6: 1822 map of Cockle Bay showing Market Wharf above study area. An indicative outline of the current extent of Cockle Bay, south of Pymont Bridge, is marked in red, and the study area marked in blue. Note this plan is not accurate in regard to the alignment of the Sydney town grid and orientation of Cockle Bay.²²

²¹ **Cosmos Archaeology, May 2015**, Cockle Bay Marine Structures Redevelopment: Maritime Archaeological Survey and Statement of Heritage Impact, report for Sydney Harbour Foreshore Authority.

²² **Anon, 1822**, *Plan of the town and suburbs of Sydney, August, 1822*, Ferguson Collection, Map 107, State Library of New South Wales.

During the late 1820s-early 1830s, the NSW colony saw a period of rapid expansion, economic growth and increasing transition towards free settlement and private enterprise. Shipping activities expanded further south into Darling Harbour and numerous water frontages along the eastern shore were taken up and private commercial wharves with associated warehouses constructed. The first episodes of land reclamation began to be undertaken by private settlers, particularly towards the shallower head of the harbour in order to facilitate construction and gain access to deeper water.

It is during the mid-1830s that the first documentary evidence of maritime development within the proximity of the current study area occurs; “Streets Wharf” situated on the southern side of Market Street was constructed during the early to mid-1830s by timber merchant Mr. Thomas Street (Figure 7). In the 1840s the trade of agricultural produce and other bulk materials through Sydney continued to expand, creating a boom in the coastal shipping industry and providing impetus for the increased establishment of wharf and warehouse facilities. The eastern shore of Darling Harbour saw rapid development, with large expanses of land reclamation and wharf construction conducted by private shipping companies and professional wharf owners who let the berths and provided storage and handling facilities. By the mid-1840s, the rapid growth in wholesaling activity firmly established the warehousing sector along the western side of Sydney township.



Figure 7: 1836 map of Darling Harbour showing “Streets Wharf” to immediate north of study area. Study area of Cockle Bay Park shown in red.²³

²³ **Great Britain Parliament, House of Commons, Select Committee on Transportation, 1836, Plan of Sydney with Pyrmont, New South Wales: the latter the property of Edwn Macarthur Esqre, divided into allotments for building, 1836.** National Library of Australia, Map T 1551.

Several episodes of private land reclamation occurred along the eastern side of Darling Harbour within the current study area during the early to mid-1840s, followed by the construction of four new wharves; including Albion Wharf just to the south of Market Street, associated with Messrs. Hughes and Hosking's Albion Mills; a new Streets Wharf, situated between Market and DrUITT Streets and seemingly replacing the previous Streets Wharf; Mr. Jaques Wharf just south of Streets Wharf, and Mr. Thomas Hyndes Wharf at the end of DrUITT Street – the latter three all offering rent of wharfage and storage to coastal shipping businesses (Figure 8 and Figure 9).



Figure 8: 1844 map of Darling Harbour showing wharves within the study area. Study area of Cockle Bay Park shown in red.²⁴



Figure 9: ca. early 1840s painting of Albion Mills with associated timber wharf visible in foreground on left-hand-side.²⁵

²⁴ Sheilds, F. W., 1844, *Map of the City of Sydney, New South Wales*. "Historical Atlas of Sydney." City of Sydney Archives – Digital Information <http://www.photosau.com.au/CoSMaps/scripts/home.asp>

4.1.2 The Gold Rush and Second Half of the 19th Century

The discovery of large gold deposits in rural NSW in 1851 and the subsequent gold rushes led to a proliferation of industrial enterprises and warehouse facilities soon sprang up along the eastern shore of Darling Harbour, coinciding with a boom in the coastal shipping industry and intensification in maritime trade. More and more sections of the foreshore were reclaimed as maritime infrastructure was upgraded and expanded, and wharves were pushed out further into the harbour to accommodate larger ships needing deeper berths.

By 1853, almost the entirety of the eastern shore of Darling Harbour had been taken up. Land within the vicinity of the study area was more intensively occupied and the beginnings of additional land reclamation were being undertaken; however, no new wharves were constructed during this time (Figure 10).

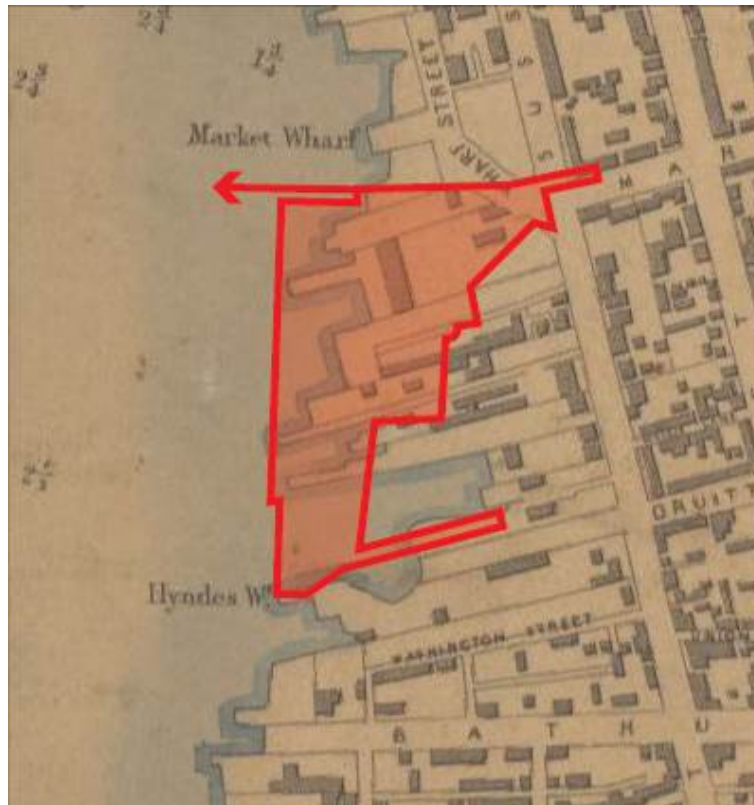


Figure 10: 1853 map of Darling Harbour showing wharves within the study area (shown in red).²⁶

The wealth generated by the gold rush also reinvigorated the broader economy and provided venture capital for large scale development. Two significant features were completed at Darling Harbour during the mid-late 1850s; the Darling Harbour branch railway line on the western side of the harbour and the Pyrmont Bridge.

In 1853, the Pyrmont Bridge Company was formed to erect a bridge across Darling Harbour, connected to the existing Market and Union Streets. Completed in 1857, the bridge, designed by Edward Orpen Moriarty, NSW Department of Public Works Engineer-in-Chief, included an opening bascule span to allow passage of ships to the wharves at the southern end of the harbour.

Construction of extended and additional wharves and warehousing facilities along the eastern shore continued at a constant pace. By the late 1860s, a substantial amount of additional land reclamation had been undertaken and seven new wharves had been

²⁵ **Anon., c.1840**, "Albion Mills (Darling Harbour) c.1840", archival print, State Library of New South Wales, available <https://shop.sl.nsw.gov.au/albion-mills-darling-harbour-c-1840/>, accessed 10 August 2017.

²⁶ **Mitchell, Sir. T., Lt. Coll.; Surveyor General, 1853**, Trigonometrical survey of Port Jackson: commenced as a military survey by order of General Darling and continued as civil duties permitted or required. Engraved by J. W. Lowry. T. & W. Boone, New Bond Street, London. National Library of Australia MAP RM 1267; Tile C1.

constructed within the current study area; including Corporation Wharf just to the south of the Pyrmont Bridge; Baltic Wharves, a pair of narrow wharves between Corporation Wharf and the existing Albion Wharf; a second Albion Wharf to the south of the original; Fagan Bros pair of wharves just to the north of Jaques Wharf, and the Jones Bros coaling wharf at the end of Bathurst Street. The original (northern) Albion Wharf had also been extended by this time (Figure 11 and Figure 12). By the mid-1860s, this collection of wharves and associated warehouses and shipping facilities on the eastern side of Darling Harbour between the Pyrmont Bridge and Bathurst Street catered almost exclusively to timber and coal industries.



Figure 11: 1865 surveyors plans of Darling Harbour showing detail of wharves on the eastern shore. Study area of Cockle Bay Park shown in red.²⁷



Figure 12: 1866 photograph of Darling Harbour showing wharves along the eastern shore within the study area.²⁸

²⁷ City of Sydney Council, Surveyor's Department, 1865, *Trigonometrical Survey of Sydney; Sections E & W, 1865*. City of Sydney Archives – Digital Information <http://www.photosau.com.au/CoSMaps/scripts/home.asp>

The sustained economic growth of the 1860s and early 1870s led to increased prosperity in the NSW colony, culminating in an era of building boom and substantial port expansion. In 1872, the NSW Legislative Assembly made the decision to redevelop port facilities in Darling Harbour to cater for the overseas cargo trade and improve the railway freight and cargo shipping network. The shorter jetties and wharves serving the coastal shipping industry in the northern portion of Darling Harbour began to be replaced with longer wharves to meet the needs of larger steam vessels. The shallow head of the harbour, roughly from Campbell Street to Liverpool Street, was reclaimed to provide for the construction of a railway goods yard with extensive sidings.

The substantial changes to Darling Harbour during the 1870s and early 1880s were limited to the south-west section and the eastern shore north of Pymont Bridge. The private wharves on the south eastern side of the Harbour continued to serve the interstate coastal trade and remained largely unchanged. The only documented maritime development within the current study area during this period was the expansion of the Streets Wharf facilities, and construction of a second wharf at the former Jaques Wharf allotment; now known as Wentworth Wharf (Figure 13).

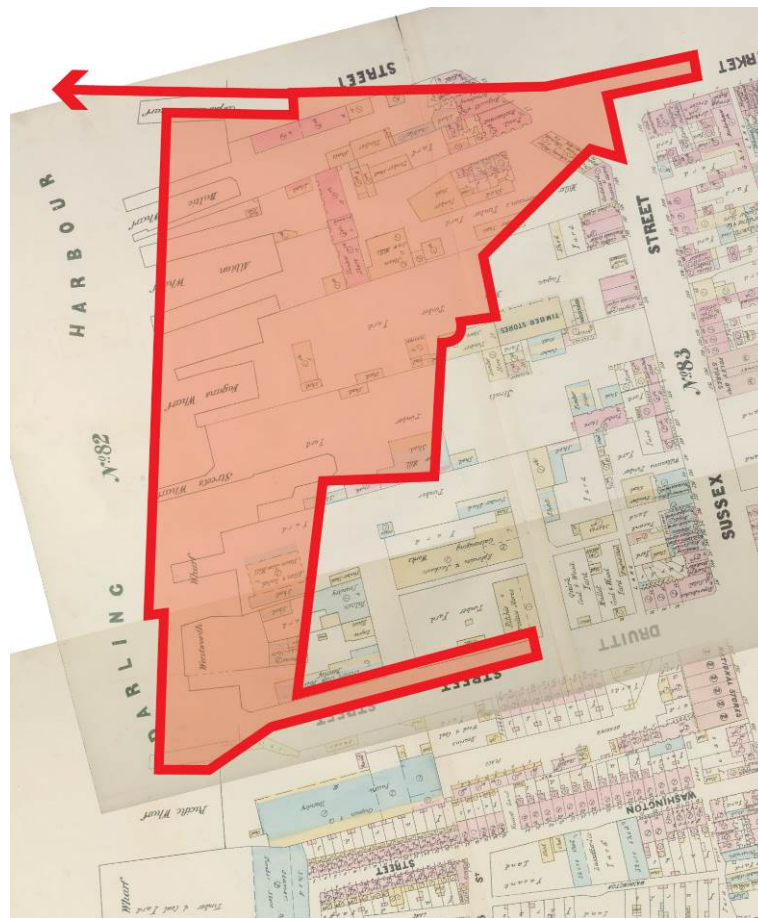


Figure 13: 1880 surveyors plans of Darling harbour showing detail of wharves within study area; the study area is outlined in red.

While areas north of Pymont Bridge were redeveloped to serve larger ocean-going vessels, the interstate coastal shipping industry was progressively confined to the shallower southern end of the harbour as it declined with the increased transportation of goods by rail. The collection of private wharves and associated infrastructure along the south-eastern shore of Darling Harbour within the current study area subsequently saw a resurgence of expansion and development to cater for the concentration of the coastal trade (Figure 14). During the

²⁸ Anon, 1866, "Views of Sydney and N.S.W. No. 58. Darling Harbour, East Side, 1866." Dixon Library, State Library of New South Wales, Image No. DL PX 148.

period between the mid-1880s to late 1890s, the twin Baltic Wharves were reconstructed into a single larger wharf; the Fagan Bros pair of wharves were demolished and a much longer single wharf (shortly thereafter known as Federal Wharf North) constructed; Streets Wharf was demolished and a second long wharf (later known as Federal Wharf South) built in its place; Wentworth Wharves were directly taken over by the Union Steam Ship Company (New Zealand) with the existing structures demolished and a pair of two long much longer wharves built (Figure 15); Hyndes Wharf was demolished and replaced by a new long wharf for Pacific foundry; and an additional wharf was constructed along the northern side of the Jones Bros. coal wharf.



Figure 14: 1895 surveyors plans of Darling Harbour showing detail of wharves within the study area. Study area of Cockle Bay Park shown in red.²⁹



Figure 15: ca. 1890s photograph of ships at Union Wharves, Darling Harbour.³⁰

²⁹ NSW Department of Lands, 1895, *City of Sydney, Sections 21 & part of 30, 2nd ed., 1895* (Sydney Metropolitan Detail Series). Lithographed & printed at the Surveyor General's Office Sydney N.S.W. State Library NSW, Digital Order No. a1367424

A final substantial development in the southern end of Darling Harbour commenced in the late 1890s; the construction of a new Pyrmont Bridge. The original bridge had been purchased by the NSW Government in 1884 and inspections soon revealed that many timber elements were badly deteriorating and the bridge was reaching the end of its operational lifespan. A public competition for a design of a new bridge was announced in 1891, however, in 1894, it was decided that a design for a higher level steel bridge with bascule swing span prepared by Percy Allen, NSW Department of Public Works Engineer-in-Chief, would be adopted. Construction commenced in late 1899, with the new bridge erected just to the south of the original and completed in 1902 (Figure 16 and Figure 17). The construction of the eastern approach necessitated the resumption of the waterfront allotment immediately to the south of the original bridge and the subsequent demolition of Corporation Wharf.



Figure 16: Pyrmont Bridge just after completion, with remnants of original bridge in foreground, 1902.³¹



Figure 17: Pyrmont Bridge, facing east, 1907.³²

An outbreak of bubonic plague in Sydney in January 1900, commencing in the waterfront areas and spreading throughout large portions of the city, was the catalyst for the NSW Government to improve building and planning controls, sanitation and general public health issues. In May 1900, the Government commenced the resumption of large tracts of private property and associated wharves along the eastern side of Darling Harbour – areas deemed particularly susceptible to disease and most in need of cleansing and redevelopment – as the first step in the “Darling Harbour Improvement Scheme” (Figure 18).

Federal Wharf, and additional wharfage alongside the Jones Bros coal wharf; known as Chapmans Wharf. The establishment of a rat proof sea wall within the vicinity of the current study area was first conducted along the eastern shore of the harbour, largely completed by 1907; with the southern and western shorelines rat-proofed by 1911 (Figure 19 and Figure 20).

³⁰ **Bayliss, C., ca. 1890s**, “Union Wharf, Darling Harbour, New South Wales.” Collection of photographs of New South Wales, ca. 1876-1897, National Library of Australia, Image pic-vn4193945-v.

³¹ **Anon, 1902**, “Views of Sydney and N.S.W. No. 46. Pyrmont Bridge.” Dixson Library, State Library of New South Wales, Image No. DL PX 146.

³² **Anon, 1907**, “Pyrmont Bridge.” Geoff Ward collection, NSW Transport - Roads and Maritime Services archives, Image No. H032110.

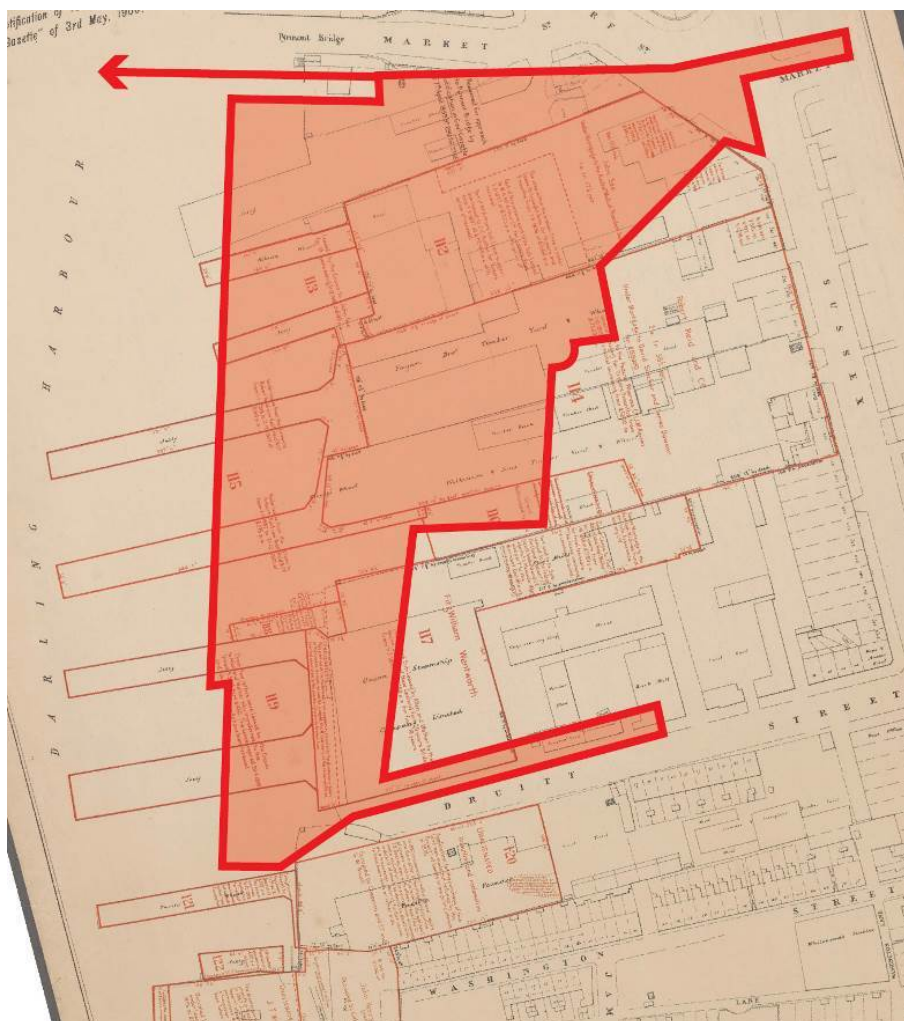


Figure 18: 1900 surveyors plan showing allotments and wharves on the eastern side of Darling Harbour within the study area resumed by the NSW Government (outlined in red). Study area of Cockle Bay Park shown in red.³³

³³ **NSW Roads and Bridges Branch, 1900**, Darling Harbour Resumptions, Showing by red tint part of land resumed in connection with the Darling Harbour Improvement Scheme, City of Sydney, Within Section 21 and part of Section 30 (Plan K). City of Sydney Archives – Digital Information <http://www.photosau.com.au/CoSMaps/scripts/home.asp>



Figure 19: 1907 plan of Darling Harbour showing improvements carried out by Sydney Harbour Trust; blue-green shading denotes wharves or jetties erected, green marks the length of rat proof retaining wall erected, and orange shading signifies buildings erected / altered. The study area is outlined in red.³⁴

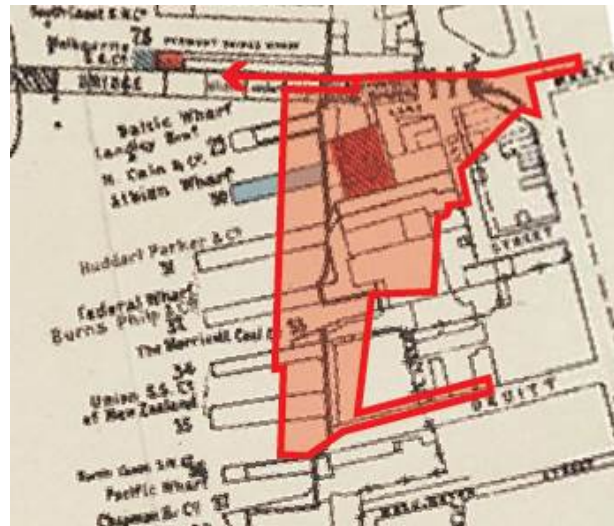


Figure 20: 1911 plan of Darling Harbour showing improvements carried out by Sydney Harbour Trust; blue shading denotes wharves or jetties erected, green marks the length of rat proof retaining wall erected, and orange shading signifies buildings erected / altered. The study area is outlined in red.³⁵

4.1.3 “Rat Proofing” and the First Half of the 20th Century

In 1901, the NSW Parliament formed the first port authority, the Sydney Harbour Trust, to oversee the redevelopment of wharves and adjacent areas. This major port improvement scheme involved extensive demolition of existing maritime infrastructure – particularly clusters of small, private jetties and wharves, construction of larger finger wharves and the establishment of a “rat proof” seawall around the entire length of the Sydney port waterfront.

In the southern end of Darling Harbour, rat proofing and redevelopment of existing wharves was largely carried out between 1903 and 1911. The advent of World War I brought a halt to much of the work, with further phases of wharf improvement delayed until late 1918. Along the eastern shoreline within the current study area, various stages of wharf demolition and reconstruction were carried out during this period including: the construction of Wharf 28 / Melbourne Steam Ship Co. Wharf, underneath the Pyrmont Bridge; demolition of Baltic Wharf and construction of a longer wharf in its place, known also as Baltic Wharf or Wharf 29; demolition of the pair of Albion Wharves and construction of a larger and longer single wharf, also known as Albion Wharf or Wharf 30, repairs and extensions to the northern By the early 1910s, goods traffic on the railway branch line to Darling Harbour and adjacent suburban lines had become excessive, with over one thousand wagons using the network every day. The NSW Railway Department proposed to construct additional goods lines to Darling Harbour and substantially extend the Darling Harbour goods yards. In 1917, via extensive conference with the Sydney Harbour Trust Commissioners, a scheme was adopted whereby the southern portion of Darling Harbour from the head to Bathurst Street, would be reclaimed using spoil from the excavation of the Sydney City Railway underground tunnels (a scheme proposed by the NSW Public Works Department in 1915 to improve the passenger railway system), providing land for the expansion of the goods yards.

³⁴ Walsh, H. D and S. E. Perdriau / *Sydney Harbour Trust, 1907*, Map of part of the water frontage of the City of Sydney showing parts of the land and wharfage vested in the Sydney Harbour Trust Commissioners. State Library of New South Wales, Image No. Z/M3 811.15/1907/1.

³⁵ Walsh, H. D and S. E. Perdriau / *Sydney Harbour Trust, 1911*, Map of part of the water frontage of the Port of Sydney showing parts of the land and wharfage vested in the Sydney Harbour Trust Commissioners. State Library of New South Wales, Image No. Z/M3 811.15/1911/1.

In the meantime, the Sydney Harbour Trust continued redevelopment of the wharfage on the eastern side of Darling Harbour within the current study area, including the demolition of two Union Steam Ship Co. Wharves and Pacific Wharf, strips of infill land reclamation and subsequent construction of the much larger Wharves 35 and 36 (Figure 21 to Figure 23).

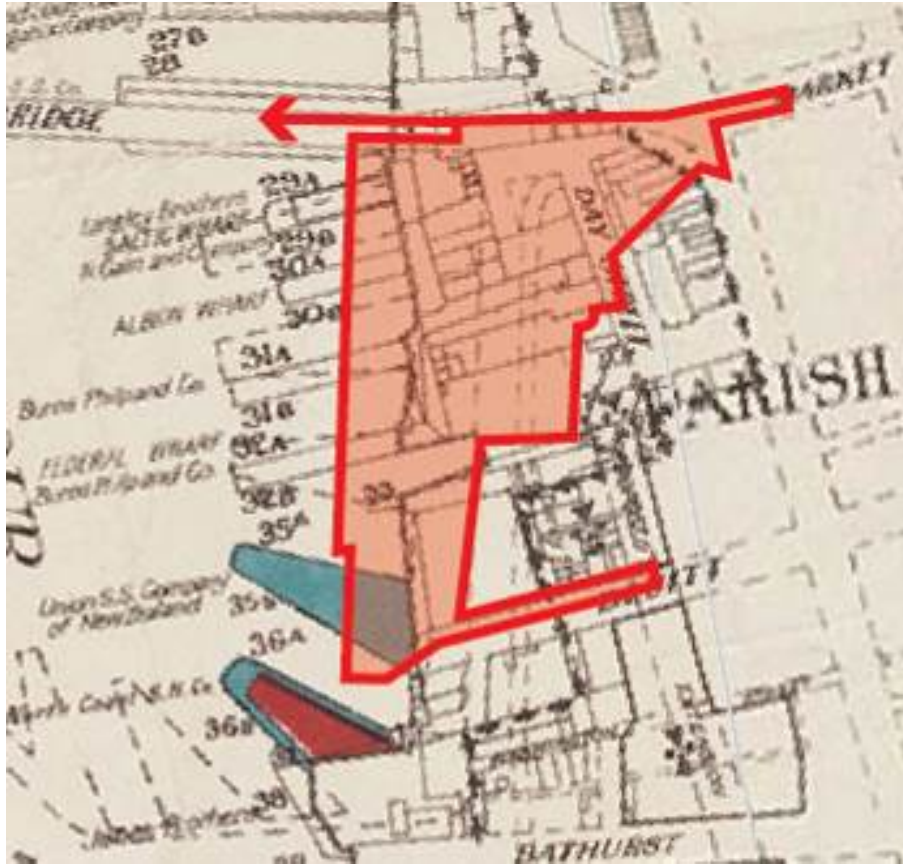


Figure 21: 1919 plan of Darling Harbour showing improvements carried out by Sydney Harbour Trust; blue shading denotes wharves or jetties erected and red shading signifies buildings erected / altered. The study area is outlined in red.³⁶

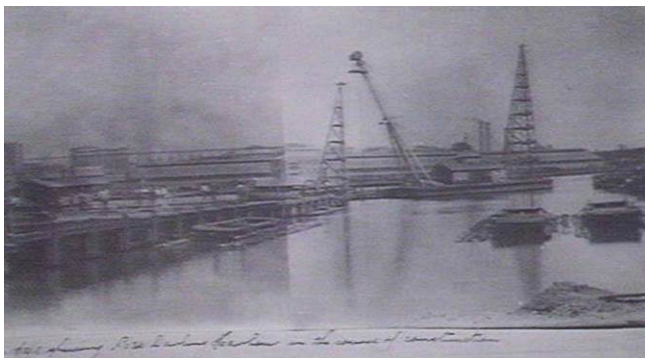


Figure 22: Wharf 36 under construction, December 1918.³⁷



Figure 23: Wharf 35 under construction, September 1918.³⁸

³⁶ Walsh, H. D and S. E. Perdriau / Sydney Harbour Trust, 1919, *Map of part of the water frontage of the Port of Sydney showing parts of the land and wharfage vested in the Sydney Harbour Trust Commissioners.* State Library of New South Wales, Image No. Z/M3 811.15/1919/1.

³⁷ Anon, 18th December 1918, "No. 36 Darling Harbour under construction." Government Printing Office Collection, State Library of NSW, Image No. GPO/1-21062.

³⁸ Anon, 13th September 1918, "Construction of new No. 35 Darling Harbour." Government Printing Office Collection, State Library of NSW, Image No. GPO/1-21067.

Construction of the underground Sydney City Railway scheme finally commenced in 1923, allowing the reclamation of the head of Darling Harbour to be undertaken using the excavated spoil (Figure 24 and Figure 25). These works were completed in 1926 and over the course of the following two years, the Sydney Harbour Trust undertook the final stages of the Darling Harbour port improvement scheme; including works on the eastern side of Cockle Bay such as the extension of Wharf 36 and the demolition of the pair of Federal Wharves on the eastern shoreline to allow for the construction of Wharves 31 and 34 (Figure 26 and Figure 27).



Figure 24: 1923 panorama showing commencement of reclamation works at the head of Darling Harbour.³⁹



Figure 25: Continuation of 1923 panorama showing Darling Harbour railway goods yard in foreground and wharves along eastern shore in background.⁴⁰

³⁹ Foster, A. E., 1923, "Panorama of Darling Harbour and Pymont Bridge from Pymont, 1923." Box 32, No. 357, Series 06; Sydney views, ca. 1916-1947, State Library of New South Wales.

⁴⁰ *Op. Cit.* Foster, A. E., 1923



Figure 26: 1943 aerial photograph of Darling Harbour with the study area in red.⁴¹



Figure 27: 1930s photograph of the head of Darling Harbour showing Wharves 34-37.⁴²

All of the new wharves erected as part of the improvement scheme were owned and administered by the Sydney Harbour Trust, and operated as a co-ordinated set of commercial wharves. Much of the surviving wharfage resumed in 1900 had been gradually leased back to the private sector; in many cases the original owners. In 1936, the Maritime Services Board was established to coordinate all port and navigation services for NSW, subsequently taking over administration and control of Darling Harbour. Throughout the following few years, further improvements to the wharfage were undertaken, including the construction of substantial cargo sheds and facilities on Wharves 35-38.

⁴¹ **Adastra Aerial Survey, May-June 1943**, Commissioned by NSW Main Roads Department; available from NSW Land and Property Information, SIX viewer <http://maps.six.nsw.gov.au/>

⁴² **Anon, 1930s**, "The coastal cargo ship *Craigend* departing wharf 37B, Darling Harbour, during the 1930s." Sam Hood Collection, Australian National Maritime Museum.

In the years following World War II, Sydney enjoyed an economic boom due to international demand for raw materials such as wool and wheat and the Darling Harbour railway goods yards and large cargo wharves north of the Pyrmont Bridge consequently saw increasing trade. The domestic coastal shipping traffic that occupied the southern end of Darling Harbour, however, began to decrease due to the rise of motor vehicles and road cargo transport networks.

4.1.4 Decline of Coastal Trade and the Second Half of the 20th Century

In the late 1940s to 1950s, the Maritime Services Board commenced an extensive remodelling scheme throughout Sydney Harbour, directed towards the removal of ageing infrastructure, alteration and expansion of wharfage to serve the larger international cargo and container ships, and the overall improvement of cargo handling facilities. The maritime infrastructure at the head of Darling Harbour, however, received little attention as the shallow waters and confined space prevented the establishment of large shipping facilities and the continued decline of the coastal trade made upgrading wharfage largely unnecessary. The only development that occurred within the study area during the 1940s to mid-1950s was the reconstruction of Wharf 31 on the eastern shoreline (Figure 28).

In the late 1950s to early 1960s, the Maritime Services Board embarked on further redevelopment at the southern end of Darling Harbour, including improvement of road access via establishment of the Port Roadway between Market and Bathurst Streets, and an upgrade of wharfage through the demolition of Wharves 29-31 and the construction of a longshore berth – Wharf 33 – stretching from the Pyrmont Bridge to Wharf 34, in order to provide access for larger vessels and easier cargo handling (Figure 29 and Figure 30). By the late 1960s, however, the continued growth of container trade making increasing demands on wharf space and facilities in Sydney ports led to the construction of a custom-built container terminal at Port Botany and the ultimate demise of the commercial shipping and railway freight industry in Darling Harbour.

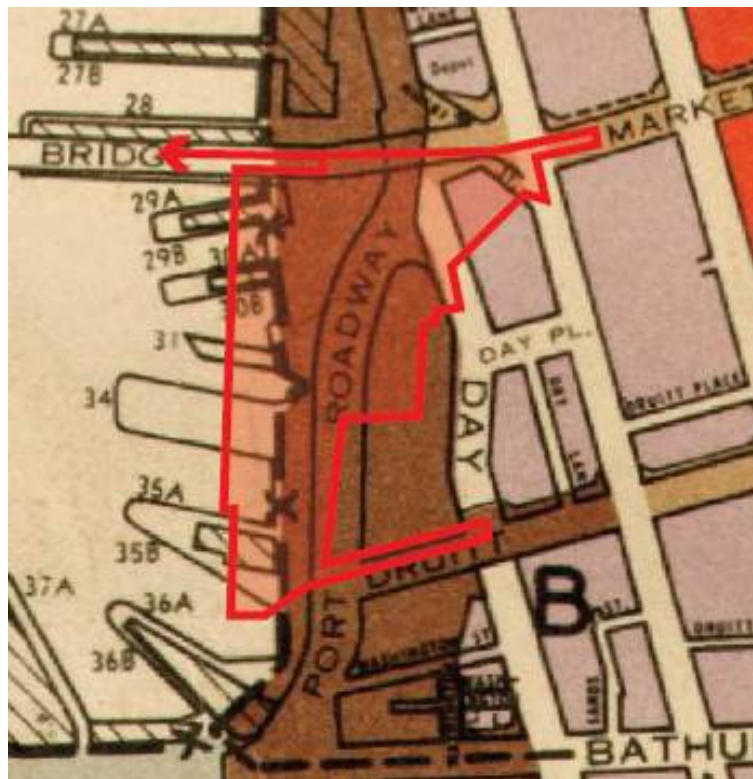


Figure 28: 1958 plan of Darling harbour showing reconstructed Wharf 31 with study area in red.⁴³

⁴³ **City of Sydney, 1958**, *City of Sydney Planning Scheme*. "Historical Atlas of Sydney." City of Sydney Archives – Digital Information <http://www.photosau.com.au/CoSMaps/scripts/home.asp>

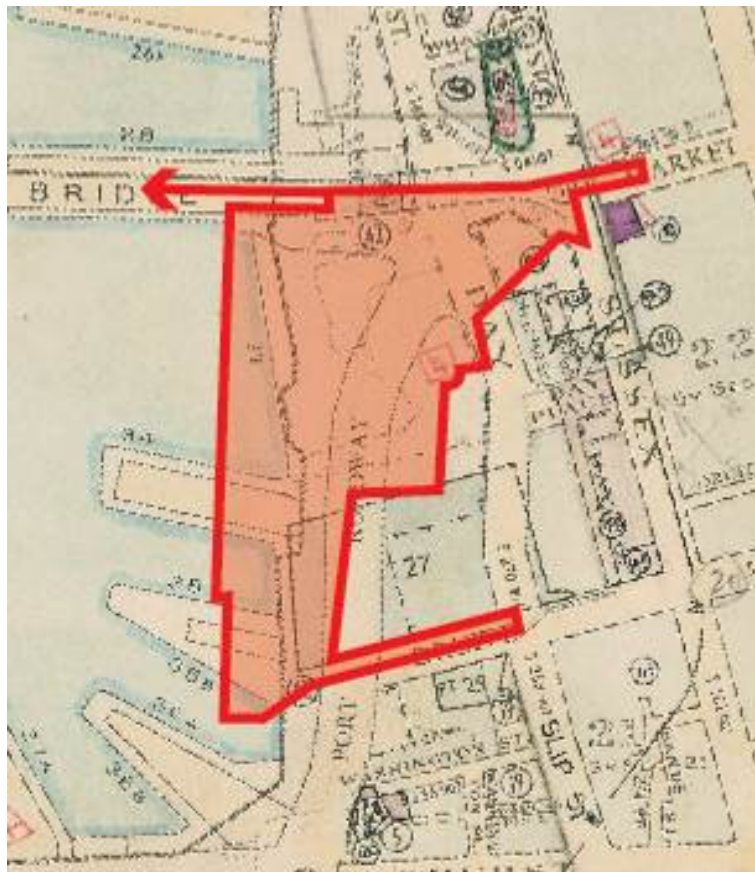


Figure 29: 1970 parish map showing longshore wharf 33 with study area in red.⁴⁴



Figure 30: 1969 aerial photograph.⁴⁵

In the early 1970s, the Sydney City Council began considering options for remodelling parts of Darling Harbour for recreational and / or residential purposes. By the early 1980s, both the NSW State and Federal Governments began to see wider opportunities to convert much of the southern extent of Darling Harbour to a public recreation precinct, particularly in light of the approaching NSW bicentenary and the opportunity for international exposure during celebrations.

In 1982-1984, a development design plan was prepared by the NSW Department of Planning and Public Works Department, with the major components being a new exhibition centre, convention centre, market building and maritime museum on the western side of Darling Harbour, with landscaped gardens and a harbour promenade on the eastern side. A new

⁴⁴ **NSW Department of Lands, 1970**, *Parish of St Andrew, County of Cumberland*. 2nd Edition. NSW Land & Property Information.

⁴⁵ **Putnam, C., 1969**, "Darling Harbour, 1969." Contributed by G. Putnam, *Dictionary of Sydney*. <http://dictionaryofsydney.org/item/20947>

government agency, the Darling Harbour Authority, was subsequently formed in 1984 to manage and deliver the redevelopment project. Over the course of the following four years, the Darling Harbour railway goods yards and wharves, and all wharves, warehouses and associated facilities along the southern and eastern shores of Darling Harbour south of Pyrmont Bridge, were demolished to make way for the construction of the proposed new recreational waterfront facilities. The Darling Harbour redevelopment project was completed in 1988 and officially opened during bicentenary celebrations; with the head of the harbour and associated entertainment precinct renamed “Cockle Bay”. The works continued in the 1990s as part of Stage 2 of the Darling Park Development (Figure 31 and Figure 32).



Figure 31: 1984 aerial photograph showing early stages of demolition of railway yards and wharves.⁴⁶



Figure 32: 1988 aerial photograph showing complete Cockle Bay precinct.⁴⁷

⁴⁶ Anon, 1984, “Darling Harbour.” Sydney Reference Collection, City of Sydney Archives, Image No. 071490.

⁴⁷ Anon, 1988, “Aerial view of Darling Harbour.” Sydney Reference Collection, City of Sydney Archives, Image No. 031482.

4.2 Wharves

A total of twenty-four (24) historic wharves have been identified that are likely to have been situated within, or very close to, the current Cockle Bay Park study area. Figure 33 shows a full overlay of all these structures, as depicted on charts and plans from the 1830s to 1970s, on a current aerial photograph of Cockle Bay. Table 3 below provides a brief summary description of each wharf.

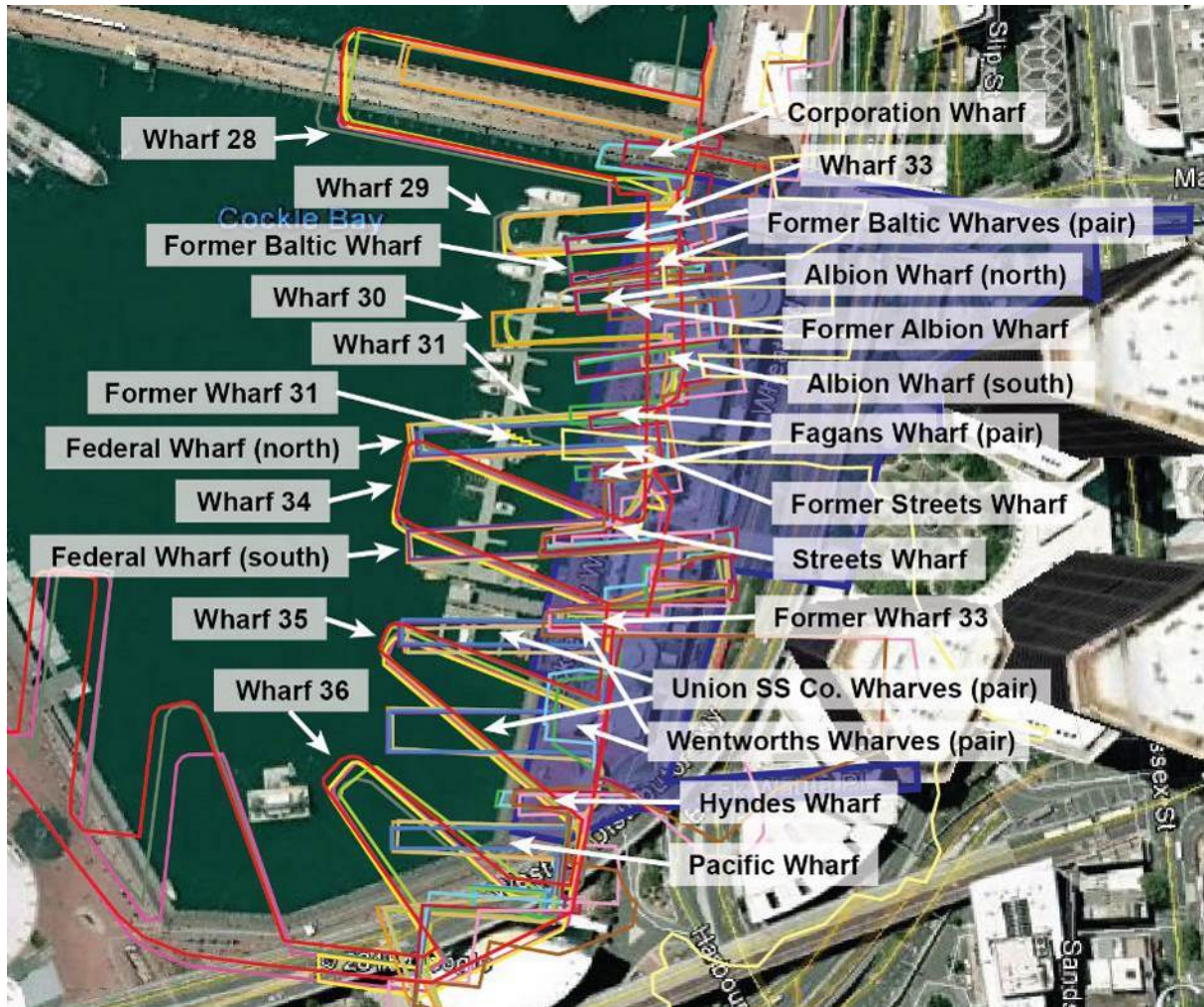
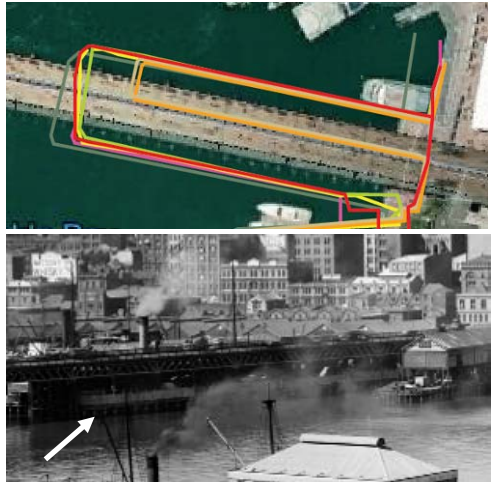
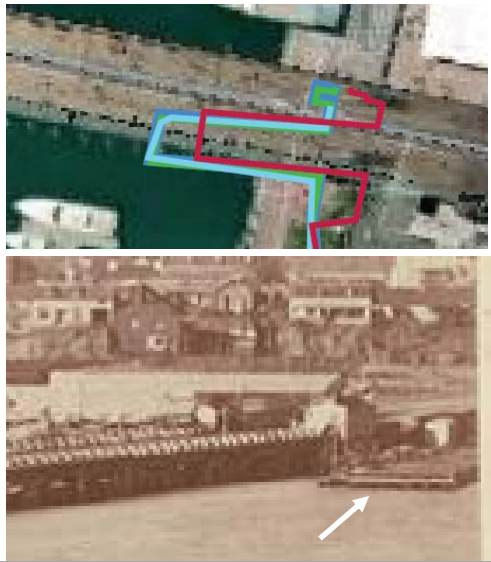




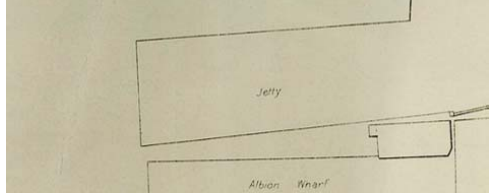


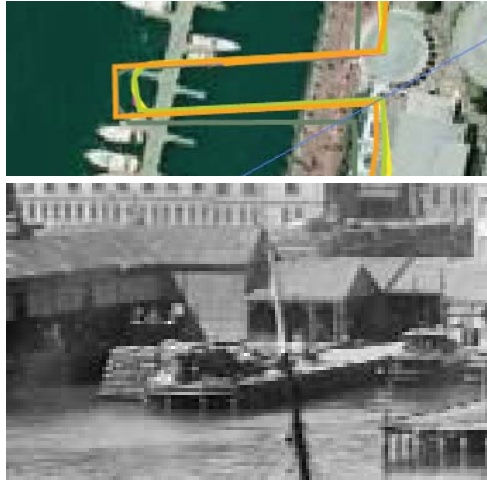
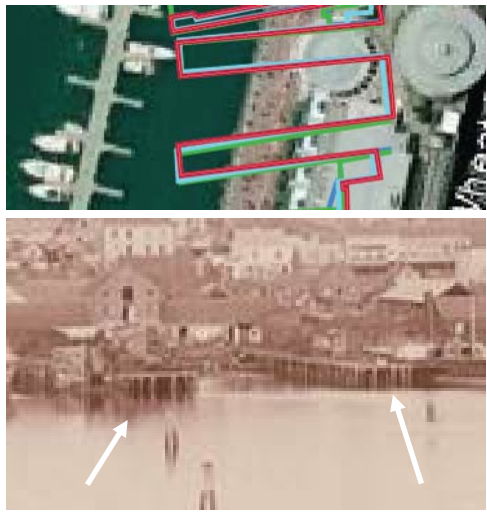
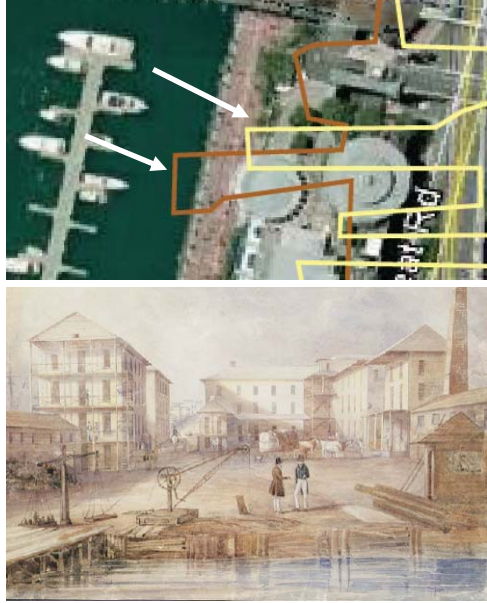


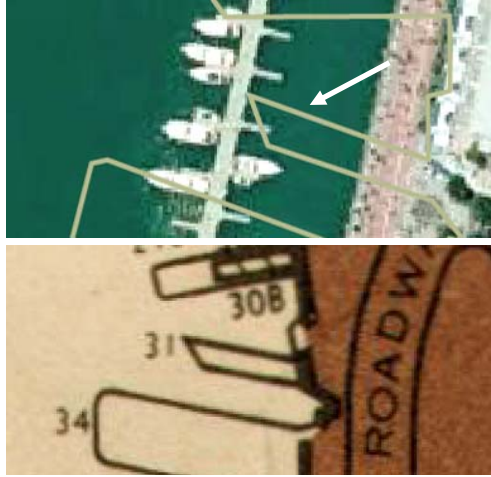
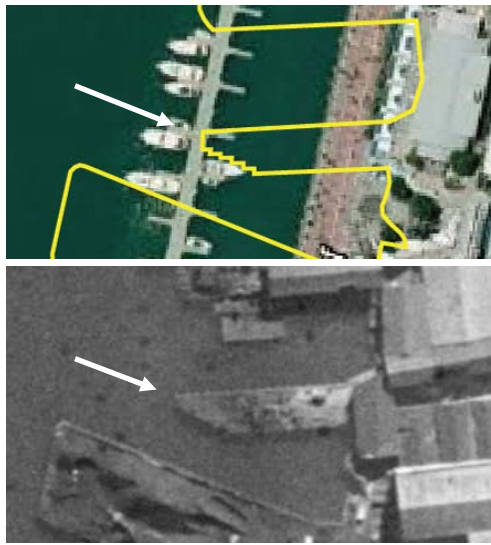
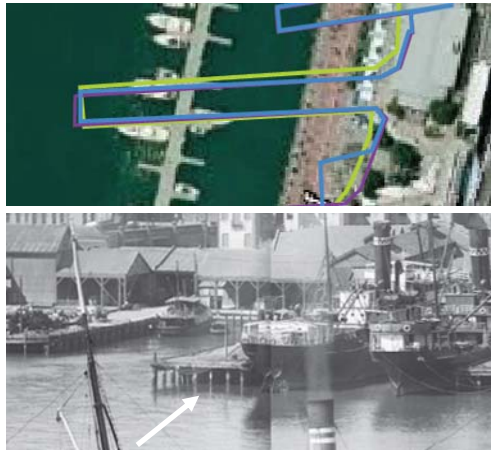
Figure 33: Full overlay of all identified historic wharves potentially within the Cockle Bay Park study area (shown in dark blue).

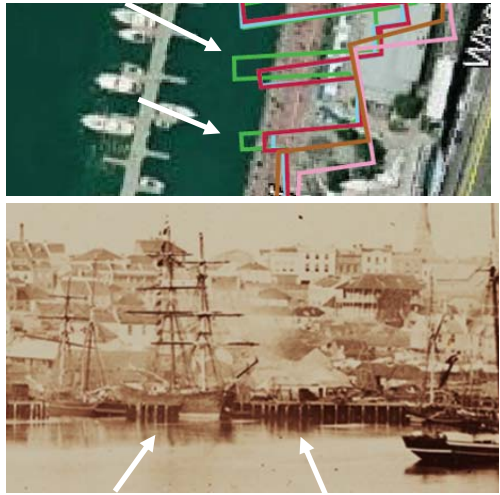
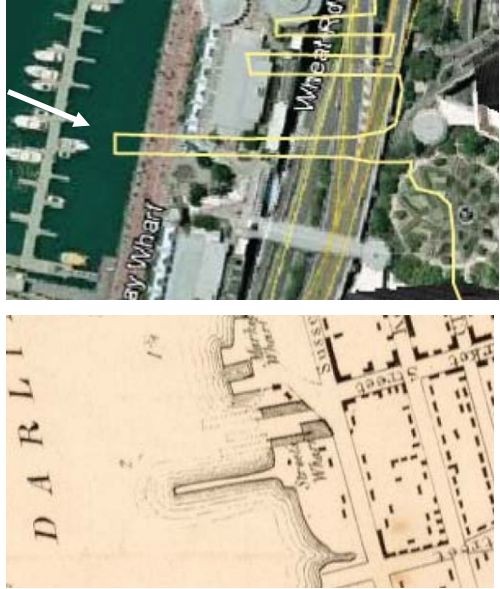
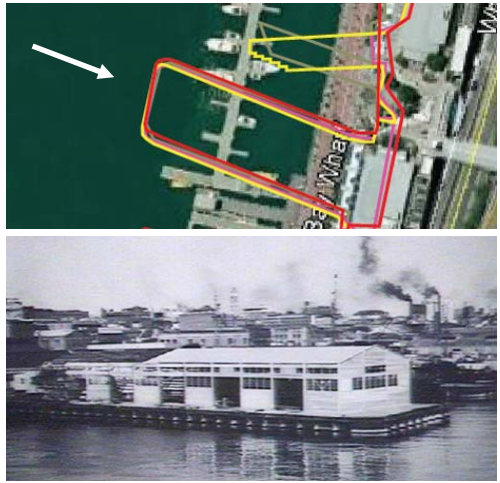
Table 3: Summary description of identified historic wharves potentially within Cockle Bay (described clockwise from north-east corner).



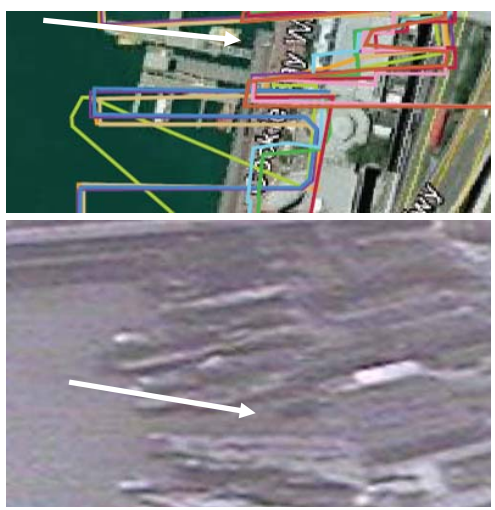
Wharf No.	History and Description	Outline Overlay and Historic Images
<p>Wharf 28 ca. 1906/1907 – mid 1980s</p> <p>Also "Melbourne Steam Ship Co. Ltd. Wharf" or "Pyrmont Bridge Wharf"</p>	<p>Wharf 28 was initially constructed by the Sydney Harbour Trust ca. 1906-1907 on the northern side of Pyrmont Bridge. The wharf was lengthened and widened to extend south underneath the bridge in ca. 1908-1911; and further widened to extend beyond the southern side of the bridge by 1919. The wharf was constructed of timber piles, with a timber deck that was later resurfaced with concrete. A galvanised iron shed sat atop the wharf on the northern side of the bridge. Wharf 28 was demolished during the mid-1980s redevelopment of Cockle Bay by the Darling Harbour Authority. Previous structures within the footprint of Wharf 28 include Corporation Wharf.</p>	
<p>Corporation Wharf ca. late 1860s – 1899/1900</p>	<p>Corporation Wharf was constructed on the frontage of reclamation sometime in the late 1860s. Corporation Wharf was an open wharf, constructed of timber piles and timber decking. The outline of Corporation Wharf changes slightly between an 1865 (burgundy on the overlay) and 1880 plan (light blue). It is possible that the wharf was extended sometime during this period, however, it is sketched in as a later addition to the 1865 plan and the differing outline is perhaps just a result of this wharf not being properly surveyed on the 1865 plan. The wharf was resumed for the construction of the second Pyrmont Bridge and demolished ca. 1899-1900. No previous structures are location within the footprint of Corporation Wharf.</p>	
<p>Wharf 33 ca. 1961/1962 – mid 1980s</p>	<p>Wharf 33 was a longshore wharf built ca. 1961-1962 as part of port improvements conducted by the Maritime Services Board. These works included the demolition of Wharfs 29-31 and associated warehouses, the construction of Wharf 33 in their place, and the establishment of the Port Roadway along the eastern shore of Darling Harbour between Market and Bathurst Streets. Wharf 33 was built out from the existing ca. 1908-1911 seawall and is likely to have been constructed with a combination of timber and concrete piles, with concrete decking. Wharf 33 was demolished and / or buried under reclamation during the mid-1980s redevelopment of Cockle Bay by the Darling Harbour Authority. Previous structures within the footprint of Wharf 33 include sections of Wharves 29-31, the former Wharf 31, the former Baltic Wharf and earlier pair of Baltic Wharves, the former pair of Albion Wharves and earlier Albion Wharf, Fagans Wharves, the northern Federal Wharf and the former Streets Wharf.</p>	

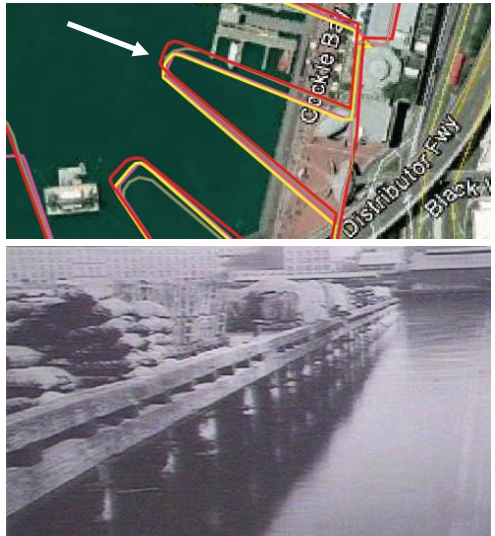
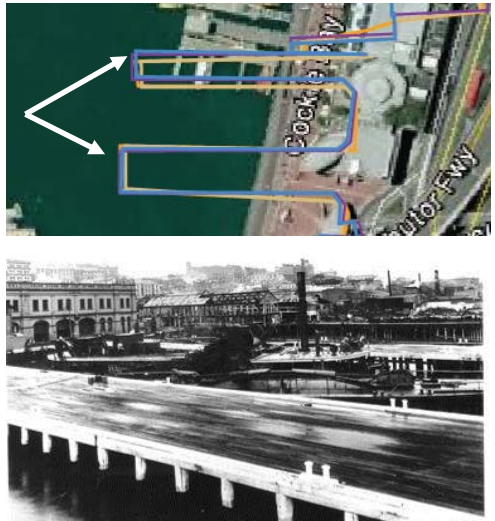

Wharf No.	History and Description	Outline Overlay and Historic Images
<p>Wharf 29 ca. 1905/1907 – 1959/1962</p> <p>Also "Baltic Wharf", "Langley Bros. Wharf", "Cains Coastal Co-op SS Co. Wharf" or "N. Cain & Co Wharf"</p>	<p>Wharf 29 was constructed in ca. 1905-1907 as part of the Sydney Harbour Trust improvements of Darling Harbour. The wharf was constructed of timber piles and timber decking, with a long galvanised iron shed erected on top. Wharf 29 was demolished between 1959-1962 during the development of the Port Roadway, constructed along the eastern shore of Darling Harbour between Market and Bathurst Streets and involving extensive resumptions. Previous structures within the footprint of Wharf 29 include part of the former Baltic Wharf and the northern wharf in the pair of even earlier Baltic Wharves.</p>	 
<p>Former Baltic Wharf ca. mid 1880s – 1903/1905</p>	<p>The former Baltic Wharf consisted of a single open wharf, with timber piles and decking, constructed in the mid-1880s. The footprint of this wharf overlies a pair of earlier wharves, also known as Baltic Wharves, and it is possible that the 1880s structure represents a reconstruction involving joining the two former wharves, rather than an entirely new construction. This Baltic Wharf was demolished in ca. 1903-1905 as part of the Sydney Harbour Trust improvements of Darling Harbour. Previous structures within the footprint of Baltic Wharf include the earlier pair of Baltic Wharves.</p>	 
<p>Former Baltic Wharves (pair) ca. early 1860s – mid 1880s</p>	<p>The original Baltic Wharves were constructed as a pair in ca. early 1860s as an extension on an earlier 1840s structure (outside study area). Both wharves were quite narrow, open wharves, built of timber piles and decking. The southern of the pair had a narrow gauge rail / trolley track running along its length. These wharves were either demolished or converted into the larger single Baltic Wharf (see above) in ca. mid 1880s. No previous structures occur in the footprint of this pair of Baltic Wharves.</p>	 

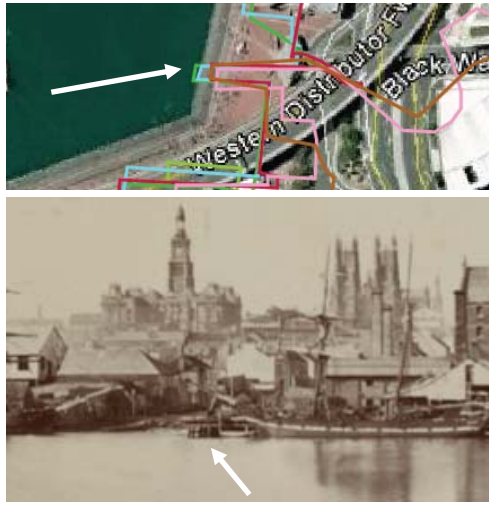
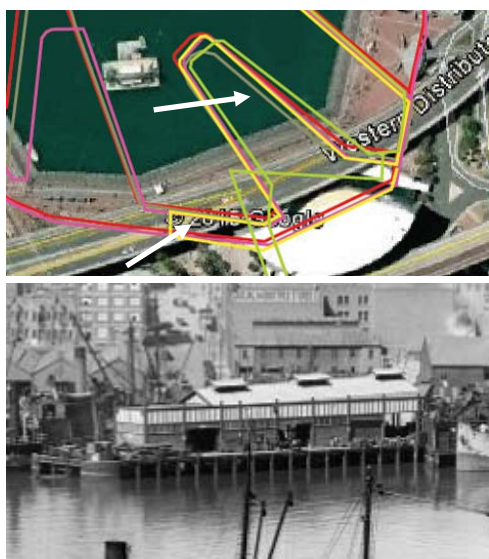
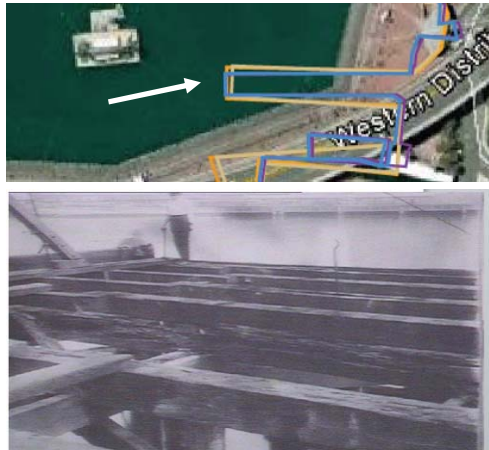
Wharf No.	History and Description	Outline Overlay and Historic Images
<p>Wharf 30 ca. 1910 – 1959/1962 Also "Albion Wharf"</p>	<p>Wharf 30 was constructed on the frontage of reclamation in ca. 1910 as part of the Sydney Harbour Trust improvements of Darling Harbour. Wharf 30 was originally an open wharf, built of timber piles and decking, however, an open sided shed was added sometime during the 1920s. Wharf 30 was demolished between 1959-1962 during the development of the Port Roadway, constructed along the eastern shore of Darling Harbour between Market and Bathurst Streets and involving extensive resumptions. Previous structures within the footprint of Wharf 30 include the northern wharf in the former pair of Albion Wharves and possibly an even earlier alignment of Albion Wharf (single wharf).</p>	
<p>Former Albion Wharves (pair) ca. late 1850s/early 1860s – 1905/1910 Also "Lysaghts Wharf" "North Albion" & "South Albion"</p>	<p>The pair of Albion Wharves were constructed sometime in the late 1850s – early 1860s; with the northern one of the pair appearing to be an extension and / or reconstruction of an earlier structure (see below). Both Albion Wharves were open wharves, built of timber piles and decking. The northern one also having a narrow gauge rail / trolley track running along its length. Both wharves were demolished in ca. 1905-1910 as part of the Sydney Harbour Trust improvements of Darling Harbour (the southern one was demolished ca. 1905-1907; the northern one demolished ca. 1908-1910). Previous structures in the footprint of Albion Wharves include an earlier alignment of Albion Wharf (single).</p>	
<p>Former Albion Wharf ca. early 1840s – late 1850s/early 1860s</p>	<p>Albion Wharf, associated with the Albion Mills, was originally constructed in the mid to late 1830s; however, the original structure (yellow outline) is likely to be just beyond the current study area. Albion Mills (shown in sketch) were destroyed by fire in 1841 and the wharf was rebuilt and lengthened shortly thereafter (brown outline); consisting of an open wharf constructed of timber piles and decking. The wharf was either demolished or extended to form the northern pair of the later Albion Wharves (see above) in the late 1850s early 1860s. The outlines of the 1840s wharf and the 1850s/1860s northern wharf are slightly different, with the earlier wharf being slightly wider; however, this is likely to be due to inaccuracies in the 1840s plan. No earlier structures have been identified in the footprint of Albion Wharf.</p>	

Wharf No.	History and Description	Outline Overlay and Historic Images
<p>Wharf 31 ca. 1956/1958 – 1963</p>	<p>Wharf 31 was constructed ca. 1956-1958 by the Maritime Services Board as part of improvement works to Darling Harbour. The wharf either replaced or involved the reconstruction of an earlier Wharf 31, and seems to represent a short lived attempt to improve wharfage by changing the alignment of Wharf 31 to match that of the larger Wharf 34 to the south. Wharf 31 is likely to have been built of timber piles and decking, and was demolished altogether by 1963. Previous structures in the footprint of Wharf 31 include part of the former Wharf 31, the northern wharf of Federal Wharves, the earlier pair of Fagans Wharves and the former Streets Wharf.</p>	
<p>Former Wharf 31 ca. late 1920s – late 1940s/early 1950s</p>	<p>Wharf 31 was constructed in this configuration in the late 1920s as part of the Sydney Harbour Trust improvements to Darling Harbour. The alignment of Wharf 31 perfectly matches that of the previous Wharf 31 / northern of the former pair of Federal Wharves, and it is most likely that this Wharf 31 was a reconstructed / cut-down version of the former structure rather than an entirely new wharf. Wharf 31 was an open wharf, constructed of timber piles and decking. It was demolished by the Maritime Services Board sometime in the late 1940s – early 1950s. Previous structures identified within the footprint of Wharf 31 include the former Wharf 31 / northern of pair of Federal Wharves, the pair of earlier Fagans Wharves and the former Streets Wharf.</p>	
<p>Federal Wharf (north) ca. late 1880s/early 1890s – late 1920s Also "Wharf 31," "Fagans Bros Wharf", Huddart Parker & Co. Wharf", "Burns Philp & Co. Wharf."</p>	<p>The northern Federal Wharf was constructed ca. late 1880s to early 1890s; consisting of an open wharf built of timber piles and decking. The northern side of this Federal Wharf was repaired or rebuilt in ca. 1907 as part of the Sydney Harbour Trust improvements of Darling Harbour and was later rebuilt or cut-down by the Trust in the late 1920s to form the former Wharf 31 (see above). Previous structures within the footprint of the northern Federal Wharf include Fagans Wharves and the former Streets Wharf.</p>	

Wharf No.	History and Description	Outline Overlay and Historic Images
<p>Fagans Wharves (pair) ca. late 1850s/early 1860s – late 1880s/early 1890s</p>	<p>Fagans Wharves were constructed ca. late 1850s – early 1860s; comprising a pair of open wharves with timber piles and decking. There is a slight change in alignment and length of the wharves between and plans from 1865-1880 (light blue and burgundy outline) and an 1887 plan (green outline); possibly indicating that the wharves were partially rebuilt and lengthened during the early to mid-1880s. However, it is also quite likely just a case of the plans not quite matching up. Fagans Wharves were demolished ca. late 1880s-early 1890s. Previous structures in the footprint of Fagans Wharves include the former Streets Wharf.</p>	
<p>Former Streets Wharf ca. mid 1830s – late 1850s</p>	<p>During the late 1820s-1830s, Thomas Street had two properties on Sussex Street fronting the eastern side of Darling Harbour between Market Street and Druitt Street; and had constructed wharves on both (both of which are outside the current study area). By 1836, plans indicate that at least one of these wharves (seemingly the northern one) had been significantly extended (to within the current study area); likely to have been an open wharf with timber piles and decking. However, this 1836 plan does not appear to be particularly accurate and it is possible that Streets extended wharf was slightly further to the south (i.e. in the position of the later Streets Wharf) and not quite as long. By the mid-1840s, this wharf is no longer depicted on plans and a structure slightly further south (presumably on Streets second property) is labelled "Streets Wharf." It would appear that the original Streets Wharf was either demolished by this time or the 1836 plans is inaccurate and the original wharf was incorporated into the later Fagans Wharves or (the slightly further south) later Streets Wharf.</p>	
<p>Wharf 34 ca. 1927/1928 – mid 1980s</p>	<p>Wharf 34 was constructed on the frontage of reclamation in 1927-1928 as part of the Sydney Harbour Trust improvements of Darling Harbour. The wharf was constructed of timber piles with partial concrete sleeves, a timber deck that was later resurfaced with concrete, and a galvanised iron shed. Wharf 34 was demolished during the mid-1980s redevelopment of Cockle Bay by the Darling Harbour Authority, with the landward end of the wharf buried in reclamation. Previous structures within the footprint of Wharf 34 include Federal Wharves, Streets Wharf and Former Wharf 33.</p>	

Wharf No.	History and Description	Outline Overlay and Historic Images
<p>Federal Wharf (south) ca. late 1890s – mid 1920s Also “Wharf 32,” “Burns Philp & Co. Wharf.”</p>	<p>The southern Federal Wharf was constructed ca. late 1890s; consisting of an open wharf built of timber piles and decking. This wharf was demolished ca. mid 1920s as part of the Sydney Harbour Trust improvements of Darling Harbour. Previous structures within the footprint of the southern Federal Wharf include Streets Wharf.</p>	
<p>Streets Wharf ca. late 1830s/early 1840s – late 1890s Also “Taylors Wharf”</p>	<p>This Streets Wharf was constructed on the frontage of reclamation in the late 1830s-early 1840s. It appears to correspond with the second, southernmost property of Thomas Street on Sussex Street between Market and Druitt Streets. Streets Wharf comprised an open wharf built of timber piles and decking with a narrow gauge rail / trolley track situated along the northern edge. This wharf was either demolished or rebuilt and extended in the late 1890s to form the southern Federal Wharf. No previous structures have been identified within the footprint of Streets Wharf.</p>	
<p>Former Wharf 33 ca. late 1830s/early 1840s – 1927/1928 Also “Morrissett Coal Co. Wharf”, “Wentworth Wharves (northern wharf) and “Jaques Wharf”</p>	<p>There has been a wharf in the position and alignment of the former Wharf 33 since the late 1830s-early 1840s. The original wharf – known as Wentworth Wharf (comprising the northern wharf of the later pair of Wentworth Wharves) – was constructed on the frontage of reclamation, consisting of an open wharf with timber piles and decking. In the late 1880s-early 1890s, the southern portion of the former Wharf 33 was either demolished or rebuilt and incorporated into the construction of a new wharf; the former Wharf 34 / northern of the Union SS Co. pair of Wharves (see below). Once the former Wharf 34 was completed, the northern portion of the former Wharf 33 survived, directly abutting the northern edge of the former Wharf 34. The former Wharf 34 was demolished in 1917-1918, however, the former Wharf 33 remained. It was finally demolished altogether in 1927-1928 as part of the Sydney Harbour Trust improvements to Darling Harbour.</p>	

Wharf No.	History and Description	Outline Overlay and Historic Images
<p>Wharf 35 ca. 1918-1919 – mid 1980s</p>	<p>Wharf 35 was constructed in 1918-1919 as part of the Sydney Harbour Trust improvements of Darling Harbour. Wharf 35 was an open wharf, comprising timber piles and decking. It was demolished during the mid-1980s redevelopment of Cockle Bay by the Darling Harbour Authority, with the landward end of the wharf buried in reclamation. Previous structures identified within the footprint of Wharf 35 include the pair of Union SS Co. Wharves (former Wharves 34 and 35) and the earlier Hyndes Wharf and Wentworth Wharves.</p>	
<p>Union SS Co. (of NZ) Wharves (pair) ca. late 1890s – 1917-1918</p> <p>Also former "Wharf 34" (northern wharf) & "Wharf 35" (southern wharf)</p>	<p>The Union SS Co. Wharves were constructed in the late 1890s; both comprising open wharves with timber piling and decking. A 1908 Sydney Harbour Trust plan indicates that some reconstruction or upgrading of these wharves was undertaken in ca. 1906-1907; however, the outline of the wharves remains the same. Both Union SS Co. Wharves were demolished in 1917-1918 as part of the Sydney Harbour Trust improvements to Darling Harbour. Previous structures within the footprint of Union SS Co. Wharves includes Wentworth Wharf; within the footprint of the southern Union SS Co. Wharf.</p>	
<p>Wentworth Wharves (pair) ca. late 1830s/early 1840s – late 1880s/early 1890s (south) and 1927/1928 (north)</p> <p>Also "Morrissett Coal Co. Wharf", and "Jaques Wharf" (the northern wharf) and "Burns Wharf" (the southern wharf).</p>	<p>The northern Wentworth Wharf was constructed in the late 1830s to early 1840s, forming the earliest version of the former Wharf 33 (see above). The southern Wentworth Wharf was constructed ca. late 1860s to 1870s on the frontage of late 1850s-early 1860s reclamation. The wharf was a wide, open wharf, built of timber piles and decking. The southern wharf was demolished in the late 1880s – early 1890s during the construction of the southern Union SS Co. Wharf; the northern one remained until 1927/1928 (see former Wharf 33 above). No earlier structures were identified in the footprint of either of the Wentworth Wharves.</p>	

Wharf No.	History and Description	Outline Overlay and Historic Images
<p>Hyndes Wharf ca. late 1830s/early 1840s – late 1880s Also “Dearins Wharf.”</p>	<p>Hyndes Wharf was constructed on the frontage of reclamation ca. late 1830s-early 1840s. Hyndes Wharf was an open wharf, built of timber piles and decking. It was demolished ca. late 1880s – early 1890s. It appears that the earlier reclamation was determined to be unauthorised and a Department of Lands inquiry was made into the matter of illegal occupation of the site in the late 1880s; it is possible that the demolition of the wharf was associated with this inquiry. No earlier structures have been identified within the footprint of Hyndes Wharf.</p>	
<p>Wharf 36 ca. 1918-1919 – mid 1980s Also “North Coast S.N.Co Wharf.”</p>	<p>Wharf 36 was constructed in 1918-1919 as part of the Sydney Harbour Trust improvements of Darling Harbour. The wharf was initially built as an extension to the existing Jones Bros. Wharf (see below), however, reclamation and wharf remodelling by the Sydney Harbour Trust in 1928 saw the Jones Bros. Wharf resumed and incorporated into Wharf 36. Wharf 36 was constructed of timber piles; some appearing to have concrete collars or sleeves, with a concrete deck and concrete “curtain” on the seaward end of the wharf, and a large galvanised iron shed on top. The landward end of Wharf 36 incorporated the previous Jones Bros. Wharf and possibly also the seawall previously surrounding the earlier wharf. A connecting section of wharf, parallel to the shoreline, was also constructed between Wharf 36 and Wharf 37 in 1927-1928; consisting of timber piles with a concrete deck and galvanised iron shed on top – part of this wharf may be just within the current study area. Wharf 36 was demolished during the mid-1980s redevelopment of Cockle Bay by the Darling Harbour Authority, with the landward end of the wharf buried in reclamation. Previous structures identified within the footprint of Wharf 36 include Pacific Wharf.</p>	
<p>Pacific Wharf ca. late 1880s/1890s – late 1880s/early 1890s Also former “Wharf 36” & “North Coast S.N. Co. Wharf.”</p>	<p>Pacific Wharf was constructed ca. late 1880s-early 1890s on the frontage of late 1850s – early 1860s reclamation. Pacific Wharf consisted of an open wharf with timber piles and decking. It was demolished in 1918 as part of the Sydney Harbour Trust improvements to Darling Harbour. No previous structures have been identified within the footprint of Pacific Wharf.</p>	

4.3 Reclamation and Seawalls

During the early years of European colonisation, the head of Darling Harbour extended as far south as Haymarket; reaching almost to Harbour Street and Sussex Street in the east and Pyrmont Street and Murray Street in the west (Figure 34).



Figure 34: Indicative outline of the extent of Darling Harbour south of the Pyrmont Bridge in the 1820s (see Figure 6).

Since that time, numerous episodes of land reclamation have occurred; ranging from small reclamations conducted by waterfront residents and leaseholders in an attempt to acquire larger properties and extend shipping facilities into deeper waters, to large-scale reclamation of the head of Darling Harbour undertaken by the NSW Railway Department in the late 1860s-1870s and 1920s.

The eastern side of Cockle Bay has been subject to many staggered stages of reclamation and associated waterfront construction by occupants and leaseholders – both authorised and unauthorised – from the 1820s to the 1890s. Following resumption of the foreshore by the Sydney Harbour Trust at the turn of the century, reclamation along the eastern shore ceased save for some small infilling and straightening undertaken by the Trust in the 1900s to 1910s. The current southern extent of Cockle Bay was largely established in the 1920s

when the head of Darling Harbour was resumed by the NSW Railway Department to a point in alignment with Bathurst Street. Large wharves were subsequently constructed on the frontage of the reclamation by the Sydney Harbour Trust.

Limited alterations to Cockle Bay were conducted in the 1940s-1960s, as part of the improvements to wharfage by the Maritime Services Board and the construction of the Port Roadway along the eastern shore of the bay, however, no new reclamation was undertaken. Finally, major redevelopment of Cockle Bay by the Darling Harbour Authority in the mid-1980s saw the extent of the bay slightly reduced again through the construction of Cockle Bay Wharf, Convention Wharf and Harbourside Promenade.

Figure 35 below depicts the broad phases of land reclamation and construction around Cockle Bay from the 1820s to the 1960s, overlain on a current aerial photograph of Cockle Bay.

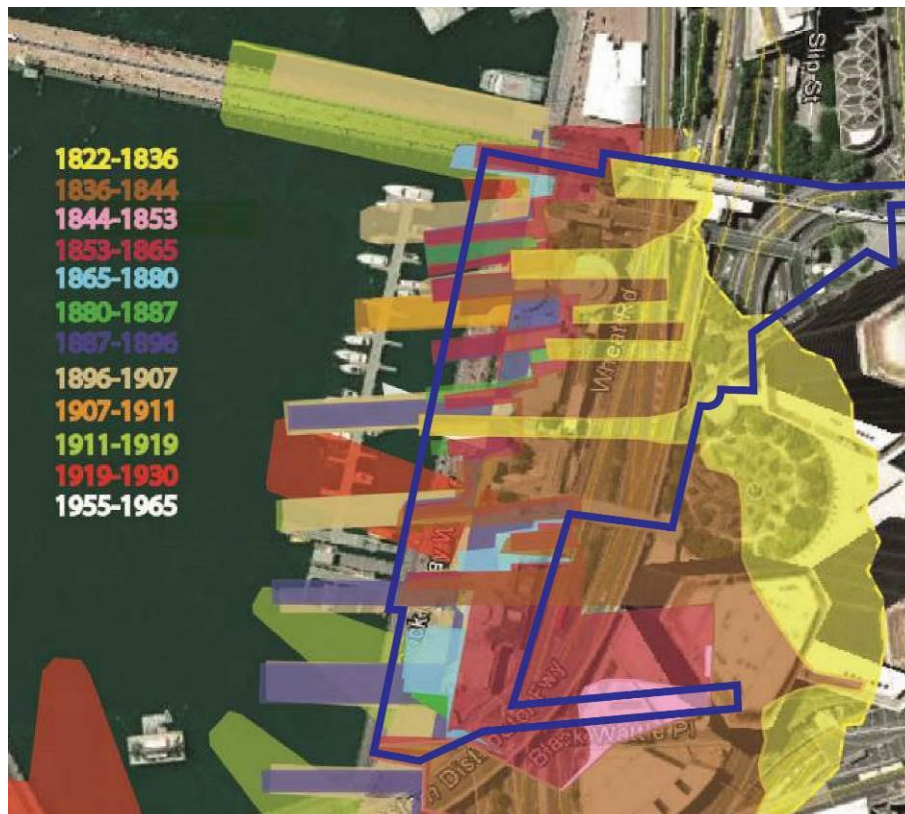


Figure 35: Overlay showing phases of land reclamation and wharf construction around the eastern side of Cockle Bay since the 1820s.
Study area shown in blue.

An examination of the same set of historical overlays, minus the outlines of wharves and jetties constructed, gives a clearer indication of the phases and extent of actual land reclamation on the eastern side of Cockle Bay since the 1820s (Figure 36). This image shows that the most substantial phases of reclamation on the eastern side of the bay occurred during the 1820s to the mid-1860s. By the late 1860s, the eastern shoreline had neared its current extent, reaching almost to the landward edge of Cockle Bay Wharf. The 1870s to late 1890s saw only relatively small patches of reclamation on the eastern shore; predominantly focussed at the base of expansion and reconstruction of certain wharves, followed by further limited infilling and straightening by the Sydney Harbour Trust in the 1900s-1910s.

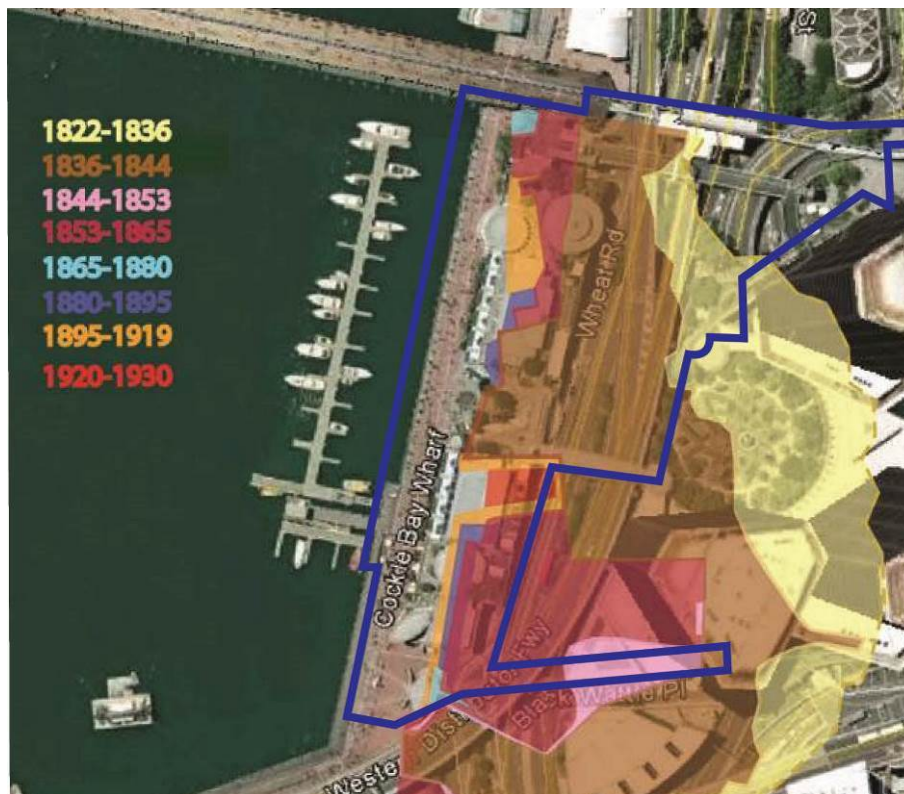


Figure 36: Overlay showing phases of land reclamation around the eastern side of Cockle Bay during the 1820s to 1930s. Study area shown in blue.

Mapping areas of reclamation based on changes in the shoreline shown on historic plans provides a basic indication of the potential locations of seawalls. However, such features are commonly not specifically marked or identified on historic plans, and it is often difficult to ascertain whether a straight section of shoreline depicts a seawall or the edge of a wharf. Additional information regarding the seawalls close to the current extent of Cockle Bay is not available, however, Sydney Harbour Trust records detail the rat-proofing of Darling Harbour in the 1900s-1920s.

Following the formation of the Sydney Harbour Trust in 1901, a series of maps of the Sydney waterfront outlining the areas vested in the Trust were prepared. These maps were updated every couple of years to depict the improvements effected by the Trust, including alterations, demolitions and construction of wharves, buildings and streets. These maps also detailed the length and locations of “rat-proof retaining walls” erected.

It should be clarified at this point that the erection of “rat-proof retaining walls” by the Trust did not necessarily involve the construction of entirely new seawalls. The “rat-proofing” programme was directed towards ensuring the sides of the harbour were faced with smooth “rat-proof” surfaces, and it seems that in cases where an existing seawall was deemed to be sound – such as cut stone walls built on solid stone ballast foundations – no physical “rat-proofing” was conducted. Seawalls constructed of timber sheet piling filled with rubble and soil, on the other hand, were modified. These types of seawalls, quite common in Darling Harbour during the 19th century, had proved to be large contributors to the rat problem as the spaces between the piles allowed the fill to settle and wash out, thus creating hollows behind the piles that were perfect for rat warrens. In most cases, the timber sheet piling itself was sound and “rat-proofing” of these walls involved only the installation of Monier concrete plates across the front of the piling, extending to a foot (0.3 m) below low water mark (Figure 37 and Figure 38). It was generally only in locations of new reclamation that actual “rat-proof retaining walls,” consisting of Monier concrete trestles faced with Monier concrete plates, were erected (Figure 39 to Figure 41).⁴⁸

⁴⁸ **Walsh, H.D., 1911, *Notes on Harbour Engineering*. A Paper read before the Sydney University Engineering Society on 8th November 1911.**

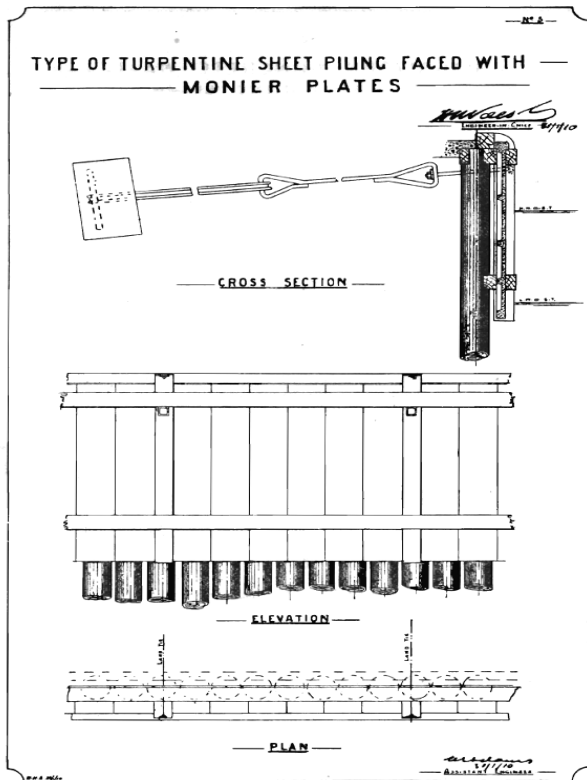


Figure 37: Design of timber sheet piling seawall faced with Monier concrete plates.⁴⁹

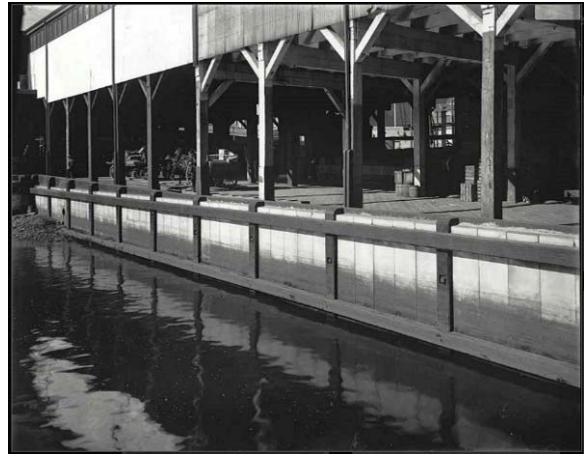


Figure 38: Example of completed Monier faced seawall.⁵⁰



Figure 39: Example of Monier trestle seawall being constructed, Darling Harbour, 1909.⁵¹

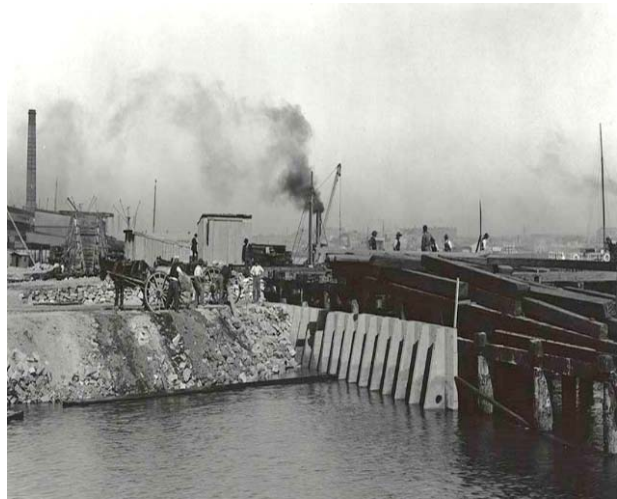


Figure 40: Example of Monier trestle seawall being constructed, Darling Harbour (n.d.).⁵²

⁴⁹ *Op. Cit.* Walsh, H.D., 1911

⁵⁰ **Anon, n.d.**, "View of a rat-proofed wall." NSW State Records, Digital ID: 9856_a017_A017000018.

⁵¹ **Anon, 1909**, "Darling Harbour, 1909." City of Sydney Archives, Graeme Andrews "Working Harbour" Collection; 79983. MSBK 451.

⁵² **Anon, n.d.**, "Construction of a "rat proof" wall at Darling Harbour, NSW." NSW State Records, Digital ID: 9856_a017_A017000009.

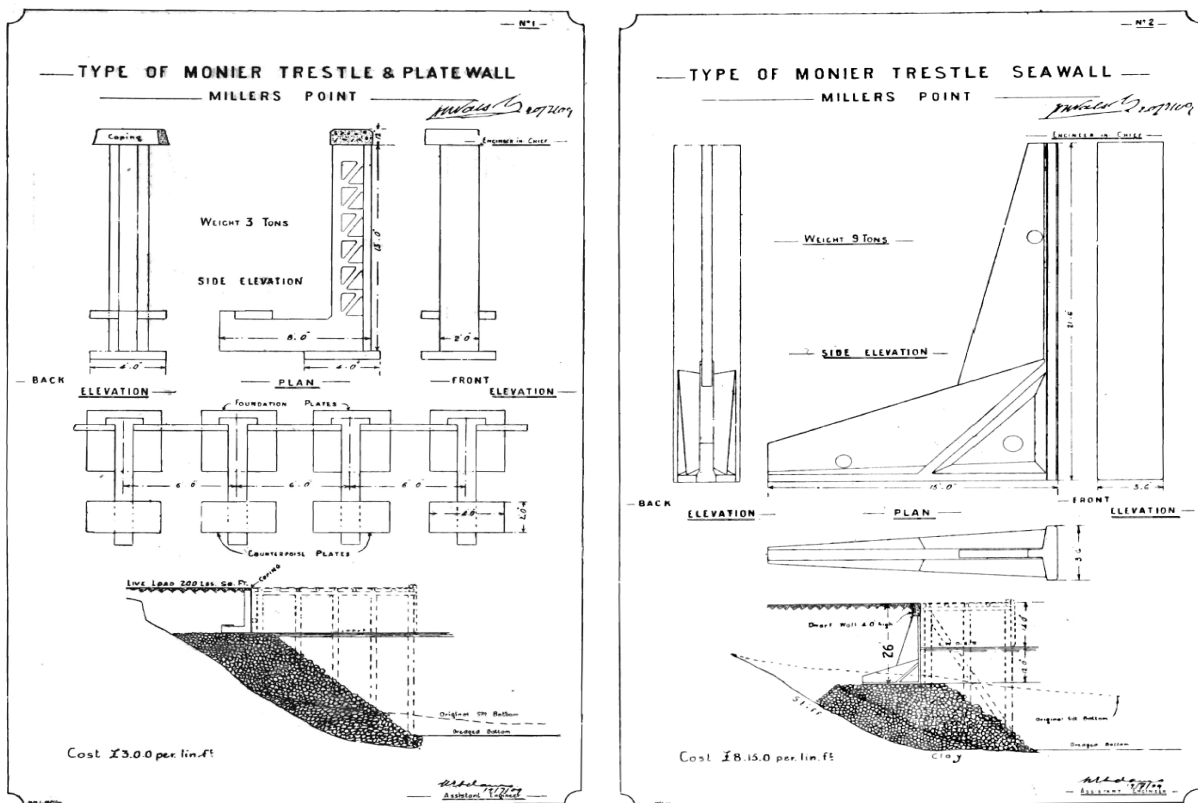


Figure 41: The two standard designs of Monier trestle and plate walls.⁵³

That being said, the lines marked on the Sydney Harbour Trust plans depicting the locations of “rat-proof retaining walls” may be taken to indicate existing seawalls that were either determined to be sound or were partially modified, as well as the location of newly constructed walls. Either way, these outlines are very good indicators of the positions of seawalls existing in the 1900s to 1920s.

Figure 42 below provides an overlay of “rat-proofing” conducted by the Trust from ca. 1903-1930, with segments of the lines colour coded according to the general period of “rat-proofing.”

The line of wall marked as “rat proofed” in the 1920s (red line) crosses over several sections of pre-existing walls, most marked as “rat proofed” between 1903 and 1911. When viewed in comparison to historic overlays showing the wharves and reclamation in this area (Figure 33 and Figure 36), it is clear that the red line of wall runs along the base of Wharves 34 to 36 and the associated small strips of reclamation constructed by the Sydney Harbour Trust in 1918-1919 (Wharves 35 and 36) and 1927-1928 (Wharf 34). Photographs taken in 1919 during the construction of Wharves 35 and 36 indicate that this section of wall comprised timber sheet piling faced with Monier concrete plates (Figure 43 and Figure 44).

The form and fabric of the pre-existing seawalls behind the red line of wall is largely unknown. These walls front various pockets or stages of reclamation from the 1850s -1890s and could range from cut stone seawalls, rubble seawalls, timber piling seawalls, or a combination thereof. The corner section of seawall situated near the south-eastern extent of Cockle Bay, cut off by the late 1920s seawall, appears to have consisted of timber sheet piling, faced with Monier concrete plates in ca. 1903-1907. This wall corresponds to the outline of the former ca. late 1850s – early 1860s Whittles Wharf / later Jones Bros. Wharf and is likely to have been erected along the edges of the wharf, which was still in operation until the late 1920s. Part of this wall formed the base of Wharf 36, constructed by the Sydney Harbour Trust in 1918-1919 (Figure 45).

⁵³ *Op Cit.* Walsh, H.D., 1911



Figure 42: Overlay showing lines of “rat-proof retaining walls” established by the Sydney Harbour Trust in the 1900s-1920s. Study area shown with blue outline.



Figure 43: Timber sheet piling between Wharves 35 and 36, Darling Harbour, 1919.⁵⁴



Figure 44: Completed Monier plate facing of seawall between Wharves 35 and 36, Darling Harbour, 1919.⁵⁵

⁵⁴ Anon, 24th February 1919, “Cross Wharf, No. 35-36, Darling Harbour.” NSW State Library, NSW Government Printing Office Series, Image MSBL907, Digital # d1_25064.

⁵⁵ Anon, 5th June 1919, “Seawall between No.35 & 36, Darling Harbour.” NSW State Library, NSW Government Printing Office Series, Image MSBL908, Digital # d1_25066.



Figure 45: Construction of Wharf 36, Darling Harbour, 1918, showing what appears to be a Monier plate faced seawall at the base of the wharf, fronting the northern edge of the Jones Bros. Wharf.⁵⁶

The Jones Bros. Wharf was resumed during the reclamation of the head of Darling Harbour in the 1920s and Wharf 36 was expanded southwards, backed by the newly erected Monier trestle and plate seawall fronting the reclamation. It is quite possible, however, that sections of the earlier Monier plate faced timber piling wall were actually incorporated into the expanded Wharf 36 rather than demolished altogether.

Finally, the line of seawall marked along the north-eastern shore of Cockle Bay is identified as being “rat proofed” in two stages between 1903-1907 and 1908-1911. This wall runs along the frontage of various stages of reclamation from the 1860s-1910s and could comprise a combination of cut stone seawalls, rubble seawalls and / or timber sheet piling; the latter two types, if they occurred, would have been faced with Monier concrete plates. Figure 46 below provides a summary identification of the seawalls in close proximity to the eastern side of Cockle Bay.

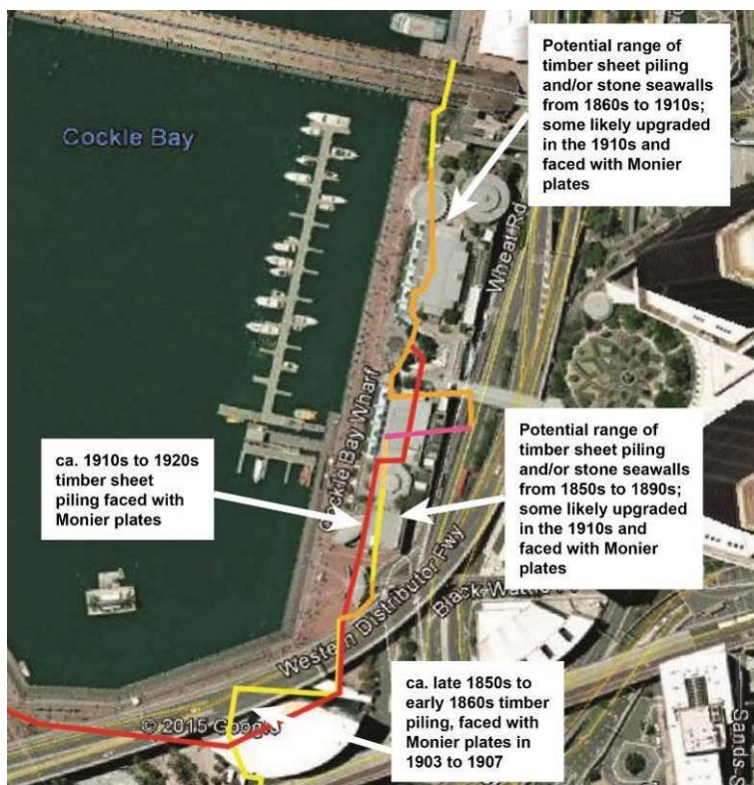


Figure 46: Identified seawalls within the vicinity of the current extent of the Cockle Bay Park study area.

⁵⁶ Anon, 13th September 1918, “Construction No. 36, Darling Harbour.” NSW State Library, NSW Government Printing Office Series, Image MSBL810, Digital # d1_21066.

The line of seawalls established around Cockle Bay by the end of the 1920s reclamation, consisting of a combination of sandstone seawall, Monier trestle and plate seawall, and timber sheet piling faced with Monier plates, remained operational until the mid-1980s redevelopment. Minor modification and repairs may have been conducted between the 1920s and 1980s; however, no alteration of alignment appears to have occurred.

The 1980s redevelopment of Cockle Bay involved the retention of a portion of the sandstone seawall in the north-west and the burial, and possibly partial demolition in places, of the remainder of seawalls along the south-west, south and eastern sides of Cockle Bay. A plan produced for the 1980s development shows the existing structures and outfalls (Figure 48, on following page). This shows that at this time the seawall consisted of sections of steel sheet piling, precast concrete sheet piling and close drive timber piles with concrete facing panels. The rest of the harbour was faced with precast concrete plate and trestles

A structural report produced for the current proposed development contains an overlay of the footprints of the 1985 and 1997 construction on the eastern side of Cockle Bay, reproduced in Figure 47.⁵⁷ This overlay includes the seawall, in blue, from the 1985 plan of existing structures and outfalls reproduced in Figure 48.

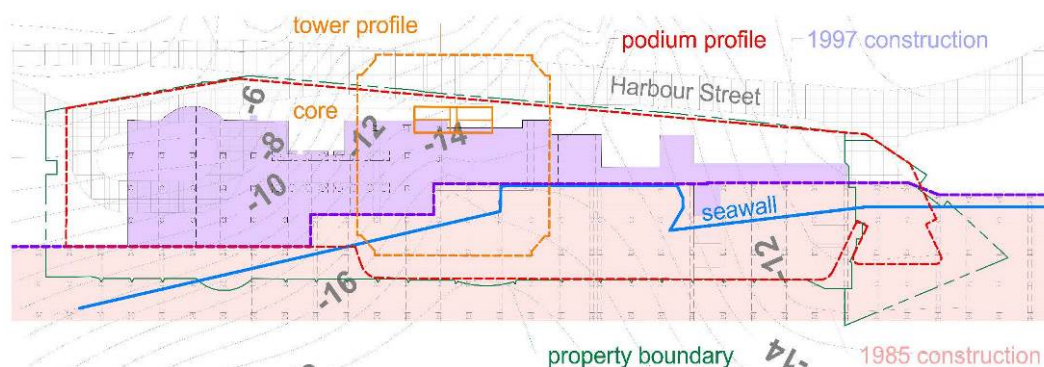


Figure 47: Rock contour, seawall (blue), 1980s and 1990s suspended slabs (pink and purple respectively) and the proposed development (red, orange and green).⁵⁸

4.4 Geotechnical Profile and Recent Disturbance

An initial geotechnical assessment has been conducted for the proposed Cockle Bay Park Development.⁵⁹ This assessment found that the site is overlain by up to 6 m of fill. This covers a clayey estuarine deposit (predominantly to the west of the promenade) over silty sandy clay (alluvium) and underlain by sandstone. The depth of fill decreases gradually across the site from north to south, from approximately 5 m to 3 m, while the sandstone bedrock drops from approximately -3 m LAT to -15 m LAT and the interval between is formed with the estuarine and alluvium deposits.

Towards the north of the site, from east to west, the fill layer ranges in depth from approximately 3 m to 6 m to the edge of the promenade, where the sandstone bedrock drops from -5 m LAT to -20 to -25 m LAT. On the western side of the promenade there is no fill, just approximately a 2 m depth of estuarine deposit over 12 m of alluvium deposit.

A similar profile is presented midway down the site, with the fill layer maintaining a 3-4 m depth to the east of the promenade, with estuarine and alluvium deposits of 5 to 15 m depth as the sandstone bedrock drops from approximately -3 m LAT to -17 m LAT.

With a fill depth of up to 6 m, it is likely that the 1980s and 1990s developments on the eastern side of Cockle Bay have included piling or building foundations that have exceeded this depth and impacted the estuarine and alluvial deposits beneath. It is also likely that, for

⁵⁷ Enstruct Group Pty Ltd, August 2017, *Cockle Bay Park Structural Engineering Report*, prepared for DPT Operator Pty Ltd & DPPT Operator Pty Ltd.

⁵⁸ Op. Cit. Enstruct Group Pty Ltd, August 2017: p.15.

⁵⁹ Coffey Corporate Pty Ltd, 2016, Proposed Development (CBW Project) at Cockle Bay: Initial Geotechnical Assessment, report for DPT Operatory Pty Ltd.

structural stability, such piles and foundations have penetrated into and been founded in the sandstone bedrock below.

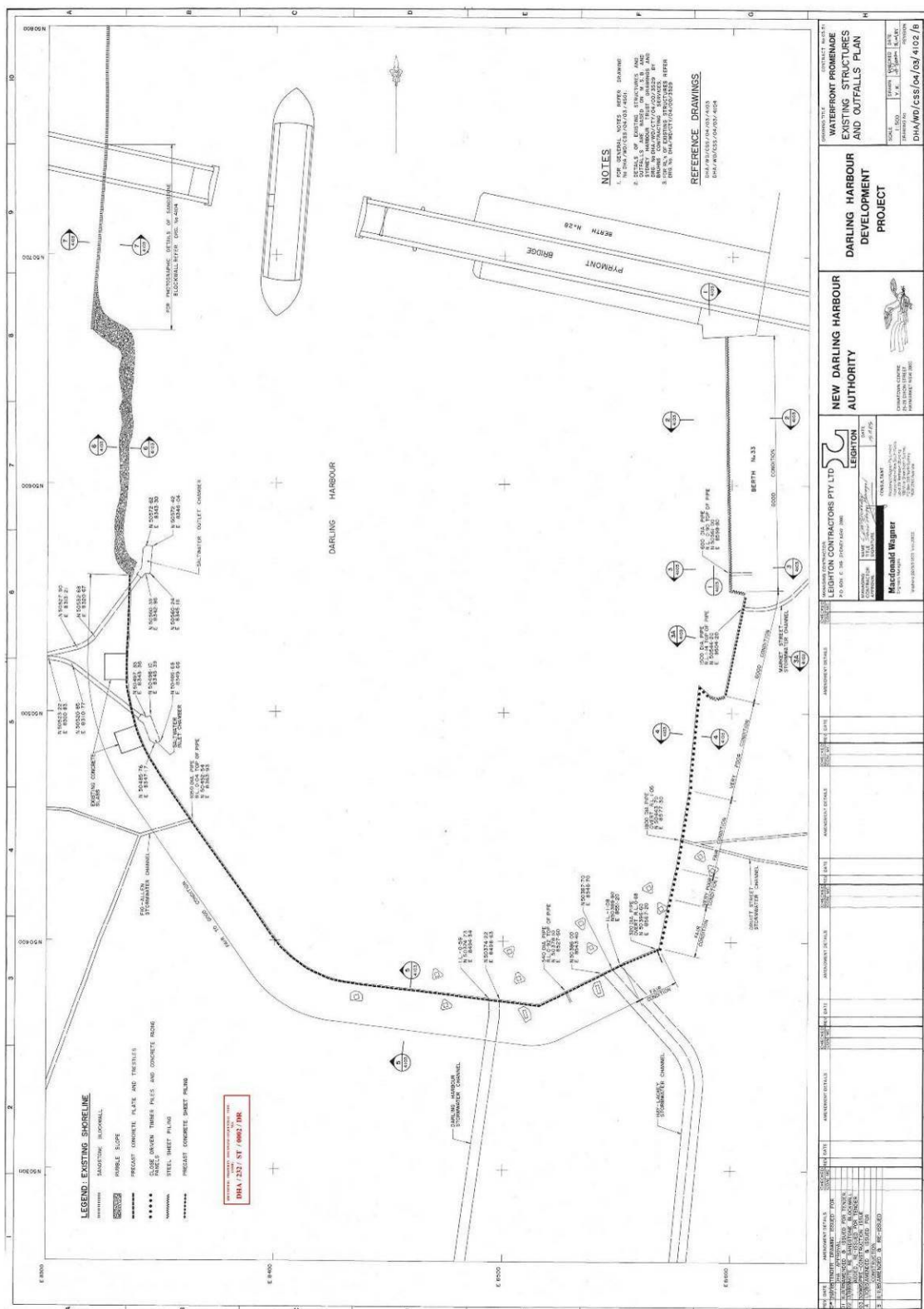


Figure 48: Existing Structures and Outfalls Plan of Waterfront Promenade, for the Darling Harbour Development Project, 1985.⁶⁰

⁶⁰ Macdonald Wagner, 1985, “Darling Harbour Development Project: Waterfront Promenade: Existing Structures and Outfalls Plan”, for Leighton Contractors Pty Ltd on behalf of New Darling harbour Authority, as found in

5 SITE INSPECTION

5.1 Dates and Personnel

A maritime archaeological inspection was carried out on the 21st August, 2017. Danielle Wilkinson (Archaeologist, Cosmos Archaeology Pty Ltd) directed the inspection. Ryan Sosso (Gray Diving Services) and Sean Pyne (Gray Diving Services) conducted the inspections under supervision of Elliott Small (Gray Diving Services). A total of 13 transects were undertaken, along with two additional surveys along the seawall (Figure 49).

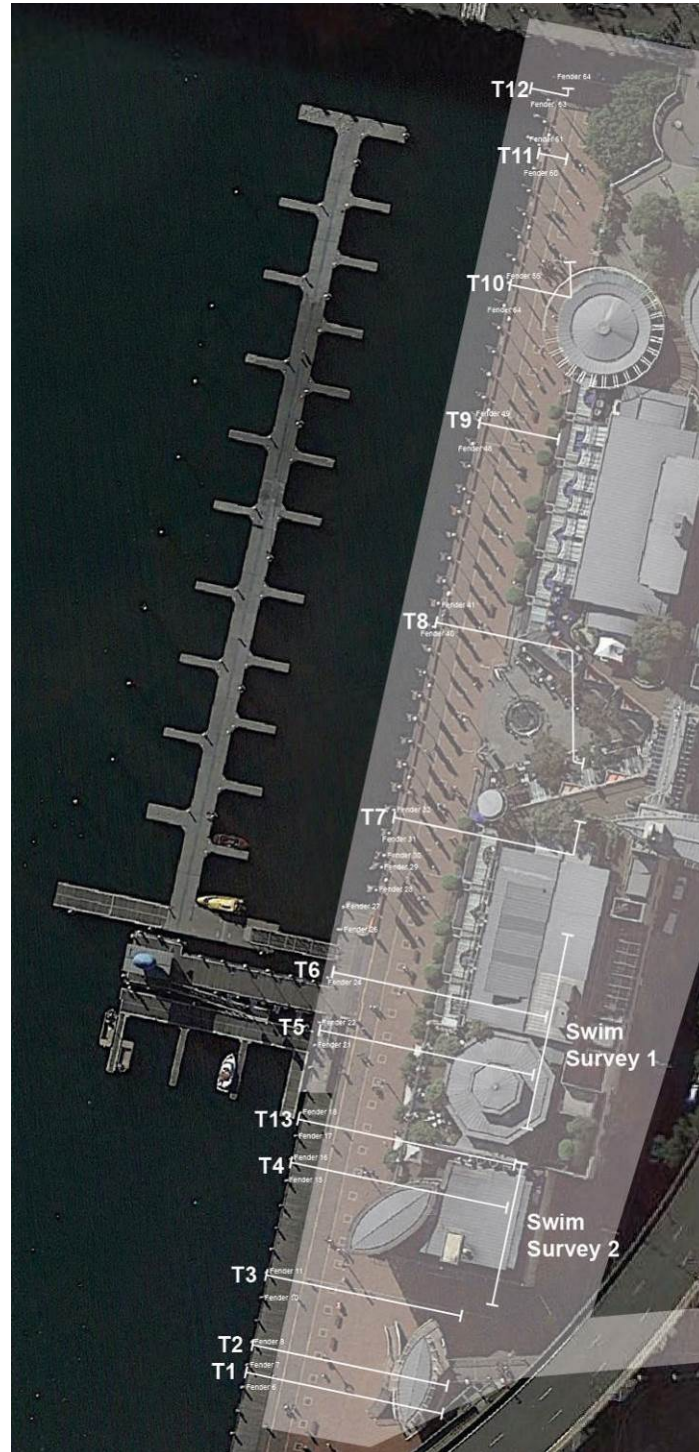


Figure 49: Location of Transects.

Enstruct Group Pty Ltd, August 2017, Cockle Bay Park Structural Engineering Report, prepared for DPT Operator Pty Ltd & DPPT Operator Pty Ltd: 14.

5.2 Weather and Tide Conditions

Sydney Harbour conditions are not greatly affected by the minimal changes in tide but rainfall on previous days transports silt and debris from land which can severely dampen visibility (Table 4). Fortunately, only a small amount of rain had fallen on the previous day to diving and the strong winds from three days previous had dropped considerably (Table 5). Conditions were overcast during the inspection, limiting visibility but enabling clearer video footage without the glare that direct sunlight can cause.

Table 4: Tides for the 21st August, 2017.⁶¹

21-Aug-2017	Time	0147	0748	1334	2000
	Height (m LAT)	0.17	1.48	0.32	1.93

Table 5: Rain and wind conditions for the three days previous as well as for 21st August, 2017.⁶²

Date	Rain (mm)	Wind 0900 (km/h)	Wind 1500 (km/h)
18-Aug-2017	0.0	46 W	61 W
19-Aug-2017	0.0	30 WSW	28 SSW
20-Aug-2017	0.2	24 W	22 SSW
21-Aug-2017	0.0	11 W	7 NE

5.3 Conduct of Inspection

The underwater survey was conducted by the commercial divers under the direction of the maritime archaeologist. All of the surveys were conducted with the use of Surface Supplied Breathing Apparatus (SSBA), other than one surface swim which did not require breathing apparatus.

The transects for this survey were located by the archaeologist in accordance to places where former wharf features may be present or to inspect certain areas of the seawall. A total of 13 transects were inspected in order to accomplish this, spread over the entire length of the study area. The transect surveys were undertaken by the diver starting at a designated place beneath the outer edge of the wharf and then travelling east, following piles or a compass bearing, until they reached the seawall. Video footage was undertaken during the survey as well as additional observations being verbally transmitted through in-water communications to the archaeologist aboard the boat.

Two additional survey swims were undertaken along the seawall in an attempt to search for and locate particular features. The first swim survey was undertaken on SSBA, but the second swim survey was undertaken as a surface swim to inspect areas above the water line. An underwater camera was taken on the second swim survey with observations reported to the archaeologist upon the diver's return to the boat. Distances from the edge of the wharf were estimated by relative locations to the steel piers supporting the wharf (labelled A, B, C etc. consecutively towards the east) or by distances marked on the diver's umbilical cord.

⁶¹ Bureau of Meteorology, Australian Government, 2017a, 'Tide Predictions for Australia, South Pacific and Antarctica', available <http://www.bom.gov.au/australia/tides>, accessed 22 August 2017.

⁶² Bureau of Meteorology, Australian Government, 2017b, 'Sydney, New South Wales, August 2017 Daily Weather Observations', available <http://www.bom.gov.au/climate/dwo/IDCJDW2124.latest.shtml>, accessed 22 August 2017.

5.4 Seabed Type

The seabed throughout all areas inspected consisted of a fine soft silt which was easily disturbed resulting in restricted visibility (Figure 50). Probing of the sediment was conducted throughout all transects and the soft silt extended to beyond 0.5 m depth at every occasion, other than when adjacent to the rock embankment (described in **Section 5.5** below). There was a scatter of litter on top of the sediment in the form of wrappers, paper labels, aluminium cans and other light refuse items (Figure 51). No marine growth was noted which possibly indicates a low oxygen and low turbid environment.



Figure 50: Example of seabed type. (Cockle Bay 170821 T1_2, 3:39)



Figure 51: Example of aluminium can surface litter. (Cockle Bay 170821 T1_2, 2:20)

5.5 Transect Results

Visibility on all transects averaged to about 0.5 m. The depth of the dives ranged between 4 m on the western end at the edge of the wharf to 0 m at the eastern end facing the seawall, with the diver viewing the eastern extremity above water level. On all transects the seabed rose on an angle of approximately 10-15° from west to east before again increasing in angle close to the rock embankment.

The transects were located in relation to fender piles on the outside of the wharf (refer to Figure 103 to Figure 105). Every second fender pile was in line with large steel piers (labelled A, B, C etc. consecutively towards the east) supporting the wharf structure itself. Results from the individual transects are described below. A digital representation of the findings is presented in the **Section 5.6** below.

Transect 1		
<i>Location: Between fender piles 6 and 7</i>		<i>Diver: Ryan Sosso (Gray Diving Services)</i>
<i>Starting point (UTM Zone 56H): 3335664.00 m E, 6250475.00 m S</i>		<i>Bearing: Right angles to wharf</i>
<i>Time in (min): 0855, 0905</i>	<i>Time out (min): 0900, 0912</i>	<i>Total time (min): 12</i>
<i>Depth: 0-4 m</i>	<i>Visibility: 0.5 m</i>	<i>Length: ~25 m, seawall at ~30 m</i>

An upright steel pile with marine growth was identified near the first concrete pile, along with recent rubbish litter such as aluminium cans. A fishing net was identified towards the eastern end of the transect, approximately 2 m before the rock embankment (Figure 52). The rock of the embankment is irregularly shaped but of approximately 300 mm by 300 mm, and forms an incline at an angle of approximately 45° (Figure 53).

The rock embankment meets the concrete seawall at the end of Transect 1, with the seawall located approximately 25 m east from the edge of the wharf. Here the seawall is not linear

and appears to wrap around the concrete pillar, creating a curved corner before continuing behind the pile (Figure 54). The view to the north of the seawall shows again that the seawall is not linear. It curves around to the east before protruding out at a stormwater drain, just behind the next series of concrete pillars (Figure 55). The seawall itself appears relatively modern and contemporary with the concrete structures supporting the current promenade wharf.



Figure 52: Fishing net identified near end of T1. (Cockle Bay 170821 T1_2, 3:32)



Figure 53: Example of the rock forming the embankment. (Cockle Bay 170821 T1_2, 4:18)



Figure 54: Concrete seawall at the end of Transect 1. (Cockle Bay 170821 T1_2, 5:11)



Figure 55: View north along seawall at end of Transect 1. (Cockle Bay 170821 T1_2, 4:45)

Transect 2		
<i>Location: Between fender piles 7 and 8</i>		<i>Diver: Ryan Sosso (Gray Diving Services)</i>
<i>Starting point (UTM Zone 56H): 3335665.00 m E, 6250478.00 m S</i>		<i>Bearing: Right angles to wharf</i>
<i>Time in (min): 0915</i>	<i>Time out (min): 0925</i>	<i>Total time (min): 10</i>
<i>Depth: 0-4 m</i>	<i>Visibility: 0.5 m</i>	<i>Length: ~35 m, seawall at ~40 m</i>

A traffic cone, safety barrier and other modern refuse were identified at the start of Transect 2, with a modern bottle at 25 m from the edge of the wharf. At approximately 27 m was a modern ridged pipe heading east for at least 2 metres, and is possibly a drain pipe (Figure 56). At approximately 30 m was a timber pile, horizontally protruding to the south-west from an increased sloping sandy seabed (likely part of rocky embankment buried by sediment). The pile was snapped at the end and hollowed out through degradation, protruding 800 mm with a 350 mm diameter (Figure 57).

The rock embankment starts at 32 m from the edge of the wharf on this transect, with the concrete seawall located at approximately 35 m from the edge. The seawall here is again

modern concrete and on the same alignment as that at the end of Transect 1, but the seawall curves around to the east about 1 m to the north of this transect before curving again to the north and meeting the wall of the stormwater pipe to the north (Figure 58 and Figure 59).



Figure 56: Modern potential drain pipe, approximately 27 m from edge of wharf. (Cockle Bay 170821 T2, 5:14)



Figure 57: Timber pile protruding from rock embankment at 30 m from edge of wharf. (Cockle Bay 170821 T2, 5:55)



Figure 58: View to north from seawall, showing storm water pipe to immediate north of the next concrete pillar alignment. (Cockle Bay 170821 T2, 9:39)



Figure 59: Curve of the seawall, between alignment of seawall at end of Transect 2 and the storm water drain. (Cockle Bay 170821 T2, 9:41)

Transect 3		
<i>Location: Between fender piles 10 and 11, against 11</i>		<i>Diver: Ryan Sosso (Gray Diving Services)</i>
<i>Starting point (UTM Zone 56H): 3335668.00 m E, 6250495.50 m S</i>		<i>Bearing: Right angles to wharf</i>
<i>Time in (min): 0930</i>	<i>Time out (min): 0942</i>	<i>Total time (min): 12</i>
<i>Depth: 0-4 m</i>	<i>Visibility: 0.5 m</i>	<i>Length: ~35 m, seawall at ~40 m</i>

There was a higher concentration of litter and modern bottles on the surface of the seabed along this transect. Another ridged modern drainage pipe was located at approximately 25 m from the edge of the wharf. At approximately 27 m were two upright timber piles of approximately 400 mm diameter and 3 m in height, with the southern pile protruding above the water with a cut end and modern bolts protruding (Figure 60). These piles had a number of timber planks stretched horizontally across and abutting each other forming a kind of board or barrier (Figure 61 and Figure 62). This feature is positioned directly opposite the opening of the stormwater drain, about five metres away, and likely acts as a kind of diffuser or barrier for fast-rushing water or refuse (Figure 63). The timber appears relatively modern due to lack of damage and wear indicating that this structure is contemporary with the

concrete stormwater drain. The location of the stormwater drain here also explains the increased litter on the seabed. The stormwater drain itself appears to protrude about 2.5 m.

At the end of the transect was a degraded old timber pile stump of 300 mm diameter with 500 mm exposed, broken at the top and hollowed out due to degradation (Figure 64). It is encased in marine growth. Above it is concrete or grout pour from the seawall, which is immediately adjacent to the pile located against the southern side of the stormwater drain. The seawall is again of modern concrete and contemporary with the concrete wharf structure.



Figure 60: Top of the timber pile forming part of the diffuser. (Cockle Bay 170821 T3, 5:59)



Figure 61: Detail of the horizontal timber planking forming the diffuser. (Cockle Bay 170821 T3, 6:09)



Figure 62: View north along the top of the diffuser, showing other steel piers in background. (Cockle Bay 170821 T3, 6:04)



Figure 63: Storm water drain viewed over the top of the diffuser. (Cockle Bay 170821 T3, 5:54)



Figure 64: Degraded timber pile stump below concrete pour, against southern wall of storm water drain. Scale in 100 mm increments. (Cockle Bay 170821 T3, 9:19)

Transect 4		
<i>Location: Between fender piles 15 and 16, against 16</i>		<i>Diver: Ryan Sosso (Gray Diving Services)</i>
<i>Starting point (UTM Zone 56H): 3335671.00 m E, 6250511.00 m S</i>		<i>Bearing: Right angles to wharf</i>
<i>Time in (min): 0945</i>	<i>Time out (min): 0948</i>	<i>Total time (min): 3</i>
<i>Depth: 0-4 m</i>	<i>Visibility: 0.5 m</i>	<i>Length: Seawall at ~40 m</i>

No cultural material was identified along Transect 4, other than litter and a piece of PVC pipe near the rock embankment that matches the drainage currently in place above the embankment (Figure 65). The seawall was again of recent concrete and contemporary with the concrete wharf structure and in line with the E row of steel piers.



Figure 65: Seawall at the end of Transect 4 showing current PVC drainage pipe on left hand side. (Cockle Bay 170821 T4, 7:13)

Transect 5		
<i>Location: Between fender piles 21 and 22, against 22</i>		<i>Diver: Ryan Sosso (Gray Diving Services)</i>
<i>Starting point (UTM Zone 56H): 333675.00 m E, 6250534.50 m S</i>		<i>Bearing: Right angles to wharf</i>
<i>Time in (min): 1000</i>	<i>Time out (min): 1026</i>	<i>Total time (min): 26</i>
<i>Depth: 0-4 m</i>	<i>Visibility: 0.5 m</i>	<i>Length: ~35 m, seawall at ~40 m</i>

The rock embankment along Transect 5 began at 25 m from the wharf edge. At approximately 28 m was a feature consisting of two groups of three timber piles in a line parallel and about 4-5 m in front of the seawall (Figure 66 and Figure 67). The piles were all broken at the top with the same 300-350 mm diameter and spaced approximately 500 mm apart within the groups of three, with the groups spaced approximately 1.5 m apart (Figure 68 and Figure 69). The height of each pile varied between approximately 1.4 m and 2.5 m high and all were quite degraded and hollowed out. Behind these piles, the rock embankment is considerably higher as if the timbers are incidentally or purposefully forming a retaining wall. The rock embankment has collapsed through in the gap between the two groups and it is possible that other piles were placed between the two groups and have been broken lower down and buried.

The seawall is also approximately 40 m from the end of the wharf in this transect and is again a recent concrete seawall (Figure 70). A view to the north along the seawall shows that this type of seawall is consistent, and that the rock embankment appears to undulate and/or vary in size along the seawall (Figure 71).



Figure 66: Northern group of three timber piles. (Cockle Bay 170821 T5, 6:27)



Figure 67: Two of the southern group of three timber piles. (Cockle Bay 170821 T5, 7:54)



Figure 68: Detail of one of the northern group of timber piles. Scale in 100 mm increments. (Cockle Bay 170821 T5, 12:13)



Figure 69: Detail of one of the southern group of timber piles. Scale in 100 mm increments. (Cockle Bay 170821 T5, 12:51)



Figure 70: Seawall at the end of Transect 5. (Cockle Bay 170821 T5, 13:50)



Figure 71: View north along the seawall showing no variation but possible undulation. (Cockle Bay 170821 T5, 13:55)

<i>Transect 6</i>		
<i>Location: Between fender pile 24 and northern gangway</i>		<i>Diver: Ryan Sosso (Gray Diving Services)</i>
<i>Starting point (UTM Zone 56H): 333677.00 m E, 6250544.50 m S</i>		<i>Bearing: Right angles to wharf</i>
<i>Time in (min): 1055</i>	<i>Time out (min): 1120</i>	<i>Total time (min): 25</i>
<i>Depth: 0-4 m</i>	<i>Visibility: 0.5 m</i>	<i>Length: ~35 m, seawall at ~40 m</i>

Modern ferrous debris was identified a few metres from the western end of Transect 6. There was no cultural material identified until approximately 20 m from the edge of the wharf where a timber pile stump protruded 500 mm out of the seabed towards the north-east at a 45° angle to the seabed (Figure 72). The timber was of approximately 300 mm diameter with a broken end and hollowed out from degradation.



Figure 72: Single timber pile protruding north-east. (Cockle Bay 170821 T6, 3:06)

At 30 m from the edge of the wharf the rock embankment began, and close to this edge were located three vertical timber piles in a north-south alignment, approximately 4 m from the seawall. These piles were quite degraded, measured approximately 300 mm in original diameter and protruding from 1 m to 1.5 m in height from the seabed with a spacing of approximately 600 mm (Figure 73 to Figure 75). To the north of these piles were another three timber piles of 300-350 mm diameter lying at an angle on top of the embankment in a roughly east-west orientation, with two large on top (lengths of at least 2 m) and the third angled beneath them and protruding almost horizontally (length at least 1.5 m) (Figure 76).

On the northern side of the horizontal pile where two more vertical timber piles of the same dimensions, protruding approximately 1.5 m and 2 m from the embankment. These five piles appeared to be in relatively better condition than the first three vertical piles. To the south of the vertical piles was another group of piles lying down, including at least four piles of similar dimensions, lying again in an east-west orientation (all of at least 2 m length) (Figure 77). There were to flat features amongst this assemblage, including one approximately 1 by 1 m square plate, possibly of concrete, of approximately 100 mm thickness. This was sitting behind two of the vertical piles. Another possible concrete plate of similar thickness was sitting to the south-east of the southern group of vertical piles but other dimensions could not be discerned.

Towards the east of the northern horizontal piles was another heavily degraded vertical timber pile, with an approximately 250 mm diameter and protruding 600 m high (Figure 78).

The seawall was again modern concrete and in line with the E row of steel piers. The view to the north along the seawall showed that this type continues for at least another two bays of steel wharf piers, where they may be a stormwater drain (Figure 79).



Figure 73: Vertical timber pile, being the most southern in the group of three with possible concrete plating behind. Scale in 100 mm increments. (Cockle Bay 170821 T6, 10:33)



Figure 74: Vertical pile, being the middle in the group of three with possible concrete plating behind. Scale in 100 mm increments. (Cockle Bay 170821 T6, 11:16)



Figure 75: Vertical pile, being the most northern in the group of three. Scale in 100 mm increments. (Cockle Bay 170821 T6, 11:46)



Figure 76: Group of piles with two against embankment and one horizontal pile beneath. Vertical piles behind this group are not visible. (Cockle Bay 170821 T6, 5:57)



Figure 77: Some of the piles in group to the south with piece of possible concrete plating. (Cockle Bay 170821 T6, 6:40)



Figure 78: Vertical pile to east of other group. (Cockle Bay 170821 T6, 17:13)



Figure 79: Seawall at the end of Transect 6, and view along seawall to the north. (Cockle Bay 170821 T6, 17:51)

<i>Swim Survey 1</i>		
<i>Location: North and south along seawall from Transect 6</i>		<i>Diver: Ryan Sosso (Gray Diving Services)</i>
<i>Starting point (UTM Zone 56H): 333715.00 m E, 6250537.00 m S</i>		<i>Bearing: Parallel to seawall</i>
<i>Time in (min): 1120</i>	<i>Time out (min): 1145</i>	<i>Total time (min): 25</i>
<i>Depth: 0-4 m</i>	<i>Visibility: 0.5 m</i>	<i>Length: N/A</i>

A swim survey was conducted north and south along the seawall for approximately 20 m from the end of Transect 6. This survey was to examine the seawall and double check that it was straight and of the same type. The survey identified no change in the seawall.

<i>Transect 7</i>		
<i>Location: Between fender piles 31 and 32, and north along seawall</i>		<i>Diver: Sean Pyne (Gray Diving Services)</i>
<i>Starting point (UTM Zone 56H): 333686.50 m E, 6250570.50 m S</i>		<i>Bearing: Right angles to wharf then parallel to seawall</i>
<i>Time in (min): 1210</i>	<i>Time out (min): 1217</i>	<i>Total time (min): 7</i>
<i>Depth: 0-4 m</i>	<i>Visibility: 0.5 m</i>	<i>Length: ~35 m, seawall at ~40m</i>

A modern concrete mooring block was identified about 5 m from the western end of Transect 7, measuring 1 by 2 m and sitting 200 mm proud of the seabed (Figure 80). The rock embankment started at approximately 25 m from the edge of the wharf, with a diameter of approximately 200 mm squared near the base and reducing to 100 mm squared near the top. The seawall was once again modern concrete against the E steel piers with a ferrous stormwater drain to the north (Figure 81).

At the end of the transect the diver turned north along the seawall and travelled approximately 10 m to view the seawall beyond the stormwater drain. While looking around, the diver noted another timber diffuser or barrier in front of the stormwater outlet (Figure 82). Later closer inspection identified this was formed of two timber piles of 400 mm diameter, both 3 m in height on a northwest-southeast bearing. Between the two piles and starting from the top of the piles were approximately 11 timber planks measuring 3 m in length, 200 m wide and 100 mm thick.

The seawall on the northern side of the drain continued in the same style, with another stormwater drain beyond (Figure 83). There appears to be some kind of physical barrier approximately 15 m away but visibility through the diver’s helmet restricted identification.



Figure 80: Modern mooring block. (Cockle Bay 170821 T7, 1:10)



Figure 81: Seawall at the end of Transect 7 with ferrous storm water drain to north. (Cockle Bay 170821 T7, 3:37)



Figure 82: Timber diffuser or barrier in front of the storm water outlet, behind the D steel pier. (Cockle Bay 170821 T7, 4:53)



Figure 83: View north beyond the storm water outlet showing continued seawall and another storm water drain. (Cockle Bay 170821 T7, 6:44)

Transect 8		
<i>Location: Between fender piles 40 and 41, against 40, and south along seawall</i>		<i>Diver: Sean Pyne (Gray Diving Services)</i>
<i>Starting point (UTM Zone 56H): 333693.50 m E, 6250608.00 m S</i>		<i>Bearing: Right angles to wharf</i>
<i>Time in (min): 1232</i>	<i>Time out (min): 1245</i>	<i>Total time (min): 13</i>
<i>Depth: 0-3 m</i>	<i>Visibility: 0.5 m</i>	<i>Length: ~25 m, seawall at ~30 m</i>

A timber pile stump was identified within a few metres of the western end of the transect, measuring approximately 1 m in length and 300 mm diameter and protruding at a 45° angle towards the south (Figure 84). The rock embankment started in line with the C steel piers, rising at a 45° angle and once again with 200 mm squared rock at the base and 100 mm squared rock near the top. Along this transect there appeared to be a split transition, with a 2 m flat level before another 45° angle rise of 200 mm squared rock.

The seawall at the end of Transect 8 was different to the other transects. While the rock embankment and concrete seawall appears consistent, here the rock embankment is faced with a deep-web steel sheet piling retaining wall (Figure 85 to Figure 89). At this point the retaining wall is in front of the D steel pier. Looking north, the sheet piling disappears beneath an overflow of the rock embankment, but a continuation of the sheet piling can be seen about two piers down (Figure 86). The angle of the sheet piling and rock embankment is at an obvious angle, encroaching on the C steel pier to the north. Looking south, the sheet

piling continues at an angle behind the D steel pier and appears to stop about two piers down (Figure 87).

The diver travelled south along the seawall to investigate the end of the sheet piling. Behind the D steel pier, the sheet piling turns on a 90° angle and continues for approximately 1 m into the rock embankment (Figure 89). The entire length of sheet piling visible is damaged along the top edge, presumably from impacts of the rock forming the embankment.



Figure 84: Timber pile on Transect 8. (Cockle Bay 170821 T8, 0:40)



Figure 85: Sheet piling at the end of Transect 8, in front of the D steel pier with more rock embankment behind. (Cockle Bay 170821 T8, 6:12)



Figure 86: Looking north along seawall with rock embankment spilling over sheet piling, but the sheet piling becoming visible again approximately two piers down. (Cockle Bay 170821 T8, 6:25)



Figure 87: Looking south along seawall with sheet piling continuing to second pier down then terminating. (Cockle Bay 170821 T8, 6:15)



Figure 88: Close up of sheet piling. Scale is in 100 mm increments. (Cockle Bay 170821 T8, 7:07)



Figure 89: Looking along the sheet piling where it has turned eastward towards the concrete seawall. (Cockle Bay 170821 T8, 12:35)

Transect 9

<i>Location: Between fender piles 48 and 49, against 49</i>		<i>Diver: Sean Pyne (Gray Diving Services)</i>
<i>Starting point (UTM Zone 56H): 333700.00 m E, 6250642.00 m S</i>		<i>Bearing: Right angles to wharf</i>
<i>Time in (min): 1246</i>	<i>Time out (min): 1250</i>	<i>Total time (min): 4</i>
<i>Depth: 0-3 m</i>	<i>Visibility: 0.5 m</i>	<i>Length: ~15 m, seawall at ~20 m</i>

A garbage bin was located towards the western end of this transect after the A steel pier (Figure 90). Some short lengths of steel reinforcement bar were lying on the embankment adjacent to the B steel pier, which again had rocks of 200 mm square diameter at the base, increasing to 300 mm square diameter and then 800 mm square diameter. The seawall here was similar to as viewed at the end of Transect 8, with the rock embankment spilling over the sheet piling (Figure 91). The sheeting was visible to the south and north. The seawall itself was immediately behind the C steel piers with the rock embankment engulfing the piers. Looking south, the concrete seawall turns a right angled corner to the east before continuing south in line with the D steel piers (Figure 92). From the angle of the sheet piling, it is possible that it continues in a straight, albeit angled, line from south to north behind the rock embankment.



Figure 90: Garbage bin on Transect 9. (Cockle Bay 170821 T9, 0:51)



Figure 91: Seawall with rock embankment, looking north to where the sheet piling continues. (Cockle Bay 170821 T9, 3:11)



Figure 92: Seawall with rock embankment, looking south to where the sheet piling continues. (Cockle Bay 170821 T9, 3:20)

<i>Transect 10</i>		
<i>Location: Between fender piles 54 and 55</i>		<i>Diver: Sean Pyne (Gray Diving Services)</i>
<i>Starting point (UTM Zone 56H): 333704.50 m E, 6250665.50 m S</i>		<i>Bearing: Right angles to wharf</i>
<i>Time in (min): 1255</i>	<i>Time out (min): 1300</i>	<i>Total time (min): 5</i>
<i>Depth: 0-2 m</i>	<i>Visibility: 0.5 m</i>	<i>Length: ~10 m, seawall at ~20 m</i>

The rock embankment on this Transect started 3 m from the edge of the wharf. The embankment was formed of 200 mm square diameter rocks and the bottom, decreasing to 100 mm square diameter rocks at the top. There were some scattered modern ferrous debris on the embankment. Amongst the debris and on top of it was a loose degraded timber pile, measuring 3 m long and of 250 mm diameter at the southern end (Figure 93). This appears to be a pile that has floated in or been discarded with the debris. The debris abuts against the sheet piling, about 10 m from the end of the wharf and directly behind the B steel pier.

At the end of the transect, the diver travelled north to inspect the end of the sheet piling, about a metre to the north of the B steel pier in line with timber fender pile 56 (Figure 94).

More steel debris was piled on top of the rock embankment against the sheet piling.

Although the sheet piling appeared to terminate here on the surface, the diver found that the sheet piling continued below the waterline. The top of the sheet piling was covered in brick and behind it was silt for approximately 3 m before the rock embankment continued against the concrete seawall behind the C steel pier (Figure 95).



Figure 93: Sample of steel debris and loose timber pile. Scale is in 100 mm increments. (Cockle Bay 170821 T10, 2:19)



Figure 94: Visible end of sheet piling above water, with shadow of continued sheet piling below water level. Rock embankment and concrete seawall in background around the C steel pier. (Cockle Bay 170821 T10, 4:34)



Figure 95: Brick on top of sheet piling with silt seabed behind. (Cockle Bay 170821 T10, 4:57)

Transect 11

<i>Location: Between fender piles 60 and 61</i>		<i>Diver: Sean Pyne (Gray Diving Services)</i>
<i>Starting point (UTM Zone 56H): 333708.50 m E, 6250688.00 m S</i>		<i>Bearing: Right angles to wharf</i>
<i>Time in (min): 1302</i>	<i>Time out (min): 1307</i>	<i>Total time (min): 5</i>
<i>Depth: 0-4 m</i>	<i>Visibility: 0.5 m</i>	<i>Length: ~5 m, seawall at ~20 m</i>

The rock embankment of Transect 11 spread over the western end of the transect. Modern bottles and ferrous debris was sitting on the embankment beneath the end of the wharf. The embankment along this transect appeared to contain more brick and building rubble, with approximately 75% brick and 25% rock, with the bricks measuring approximately 230 mm long (Figure 96).

The sheet piling was present on this transect, visible only below the water line extending approximately 1 m above the batter. Behind the piling was black sediment, approximately 100 mm below the top of the piling (Figure 97). Above water, the rock embankment continued above the water line half way between the B and C steel piers, with the seawall against the C steel piers (Figure 98). The sheet piling was approximately 5 m to the west of the C steel piers.



Figure 96: Example of the brick, bottles and steel debris on top of the rock embankment. (Cockle Bay 170821 T11, 2:42)



Figure 97: Silt behind the sheet piling (to the right of image) and drop in front of the sheet piling. (Cockle Bay 170821 T11, 4:16)



Figure 98: Second rock embankment against the seawall at the C steel piers. (Cockle Bay 170821 T11, 4:35)

Transect 12		
<i>Location: Between fender piles 63 and 64</i>		<i>Diver: Sean Pyne (Gray Diving Services)</i>
<i>Starting point (UTM Zone 56H): 333710.50 m E, 6250699.50 m S</i>		<i>Bearing: Right angles to wharf</i>
<i>Time in (min): 13010</i>	<i>Time out (min): 1315</i>	<i>Total time (min): 5</i>
<i>Depth: 0-2 m</i>	<i>Visibility: 0.5 m</i>	<i>Length: ~3 m, seawall at ~20 m</i>

The western end of Transect 12 has a number of loose timber piles mixed with steel debris. This pile all appears to be modern refuse. The piles are of approximately 350 to 400 mm diameter and measure between 2 and 4 m. One of these was oriented east-west along the transect line, measuring a total of 10 m in length. One end appeared broken, split and hollowed. The other end tapered to a point and appeared to have a ferrous shoe (Figure 99). This end sat against the sheet piling. About 1 m from the eastern end of this pile was a 2 m piece of discarded steel pier and a 1 m length of sheet piling, both lying on top of the pile, as well as a mound of brick (Figure 100). It appears that this pile is part of the collection of discarded refuse from building the current wharf, and may have been originally intended as one of the fender piles.



Figure 99: Ferrous toe on the tapered end of the long pile. Scale in 100 mm increments. (Cockle Bay 170821 T12, 2:49)



Figure 100: Pile (centre) with steel pipe (left) and sheet piling (foreground). (Cockle Bay 170821 T12, 1:52)

Ferrous sheet piling is also at the end of this transect. The diver followed the piling to the north until the edge was found, which has the piling turning on a 90° angle to the east and intersecting with the rock embankment (Figure 101). The last couple of metres of the sheet piling could be seen above water, intersecting the second rock embankment stretching between the B and C steel piers, and about 1 m south of the piers in line with fender pile 64 (Figure 102).



Figure 101: Corner of the sheet piling where it turns east, with debris. (Cockle Bay 170821 T12, 4:28)



Figure 102: Second rock embankment with end of sheet piling above the water level to left, to the inside of the C pier. (Cockle Bay 170821 T12, 4:33)

Transect 13		
<i>Location: Between fender piles 17 and 18, against 18</i>		<i>Diver: Sean Pyne (Gray Diving Services)</i>
<i>Time in (min): 1330</i>	<i>Time out (min): 1338</i>	<i>Total time (min): 8</i>
<i>Depth: 0-4 m</i>	<i>Visibility: 0.5 m</i>	<i>Length: Seawall at ~10 m</i>

Transect 13 was undertaken as there was uncertainty over a perceived transition in the type and condition of the concrete seawall. This transect and the following swim survey were located in the area where the transition was anticipated, but it became apparent that no transition had occurred and that the concrete seawall was consistent south of the marina.

No features were identified on the seabed during this transect. The seabed, rock embankment and seawall were consistent with that observed in Transects 4 and 5 to either side.

Swim Survey 2

<i>Location: Against seawall from Transect 13 to south</i>		<i>Diver: Sean Pyne (Gray Diving Services)</i>
<i>Time in (min): 1340</i>	<i>Time out (min): 1350</i>	<i>Total time (min): 10</i>
<i>Depth: 0 m</i>	<i>Visibility: 20 m</i>	<i>Length: N/A</i>

As described above, a swim survey was undertaken along the seawall from the end of Transect 13 to the south in order to check the type and condition of the seawall. The seawall was consistent concrete with a 45° rock embankment in front.

5.6 Summary of Results

The following overlay images represent the findings of the site inspection for this project. The modern concrete seawall and rock embankment is consistent throughout the length of the study area. The rock embankment does diverge towards the north where it extends at an angle further to the north than the seawall from just south of Transect 9. Sheet piling is also present along the northern half of the study area.

Most of the features identified on the seabed are of modern origin from within the last 50 years including the garbage bin, steel structural items, concrete mooring block, fishing net, drainage pipes and diffusers or barriers for the stormwater outlets. There is one collection of potentially earlier remains (prior to the major works undertaken in the 1980s) consisting of fixed and loose piles arranged in a row oriented roughly north south, intersecting with Transects 5 and 6. These piles also had two pieces of what may be concrete plating. Three other isolated timber piles that may be earlier (prior to the 1980s) are located at the western end of Transect 8 and the eastern ends of Transect 3 and Transect 2.

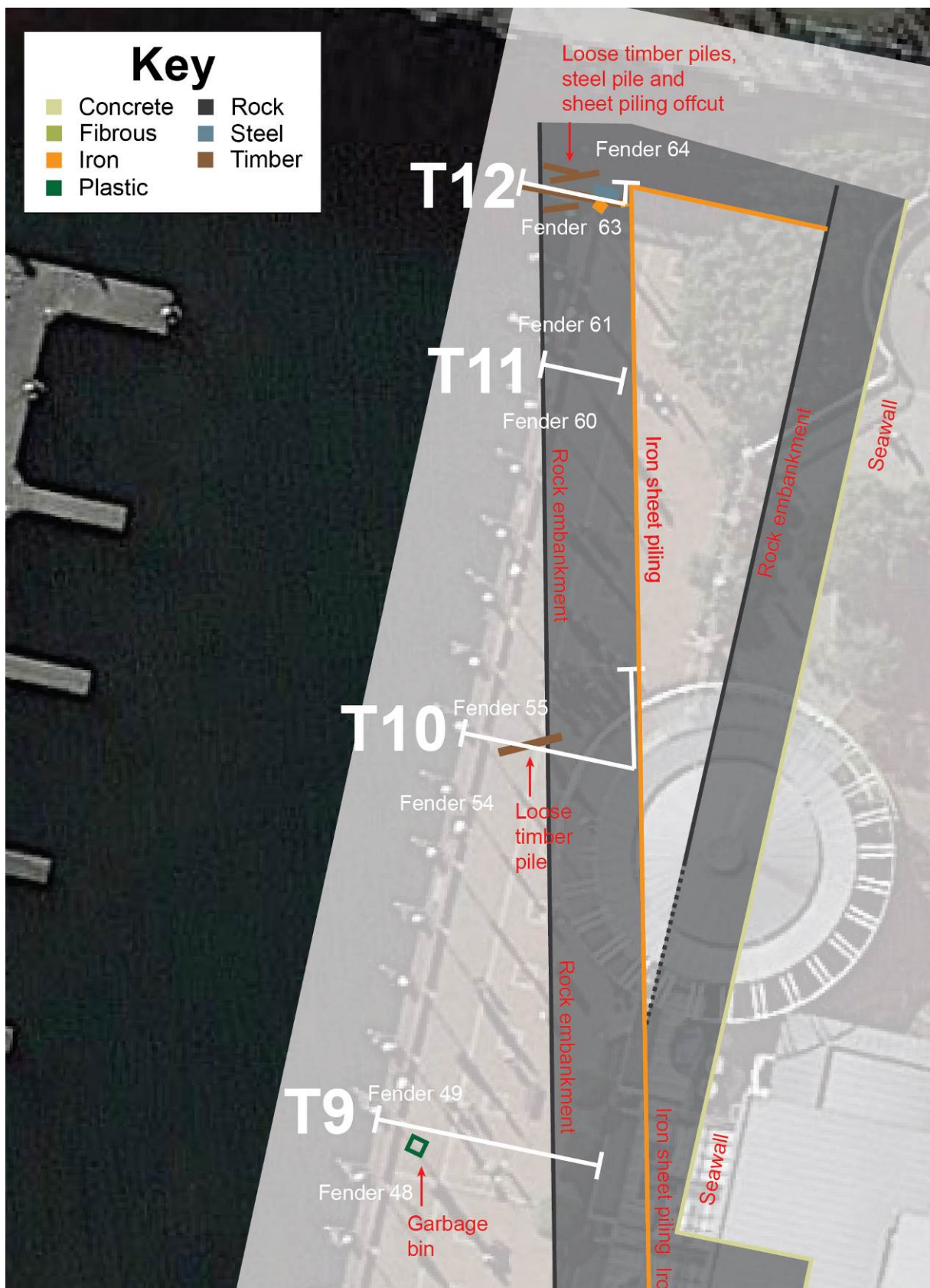


Figure 103: Overlay of site inspection findings for northern part of the site.

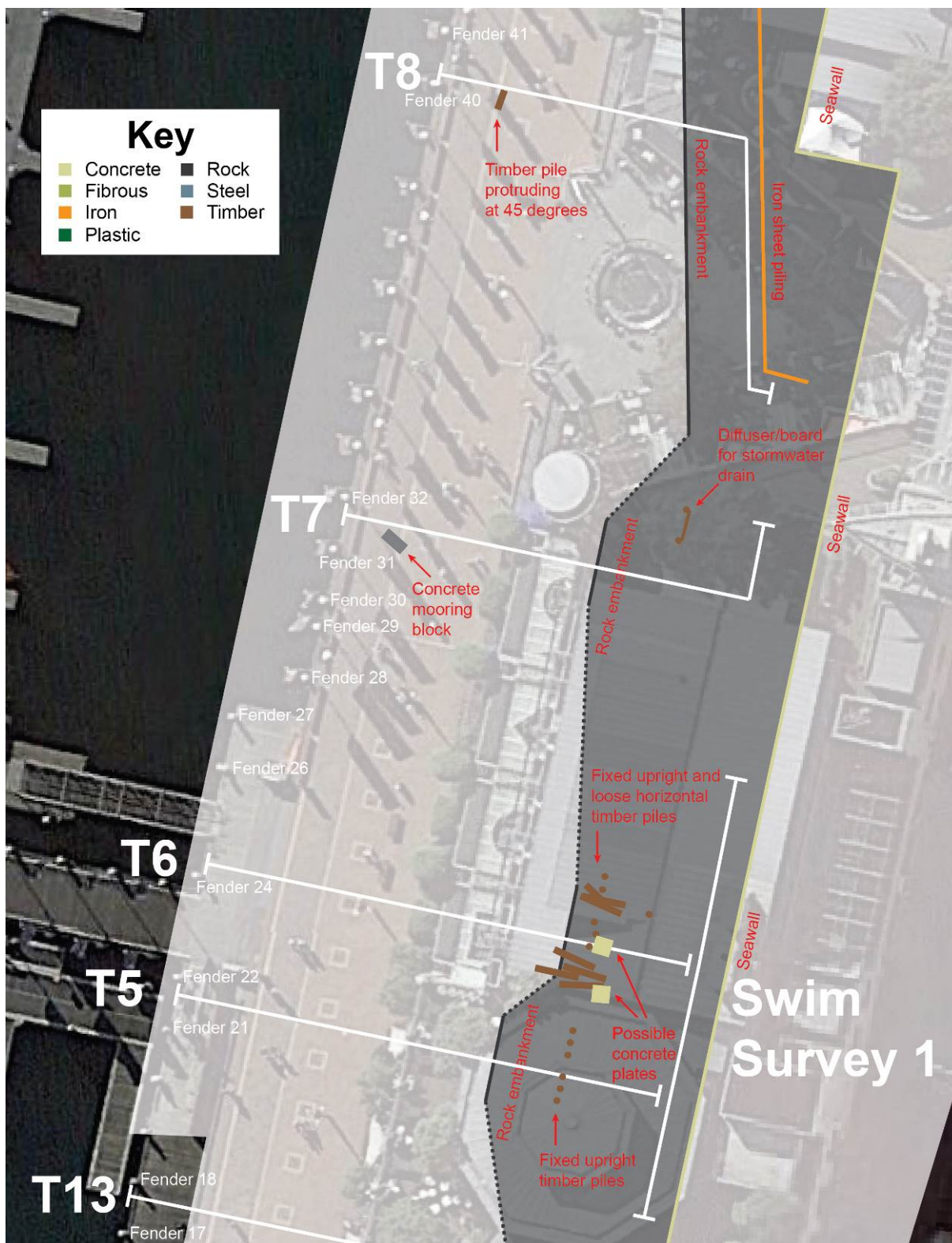


Figure 104: Overlay of site inspection findings for middle part of the site.

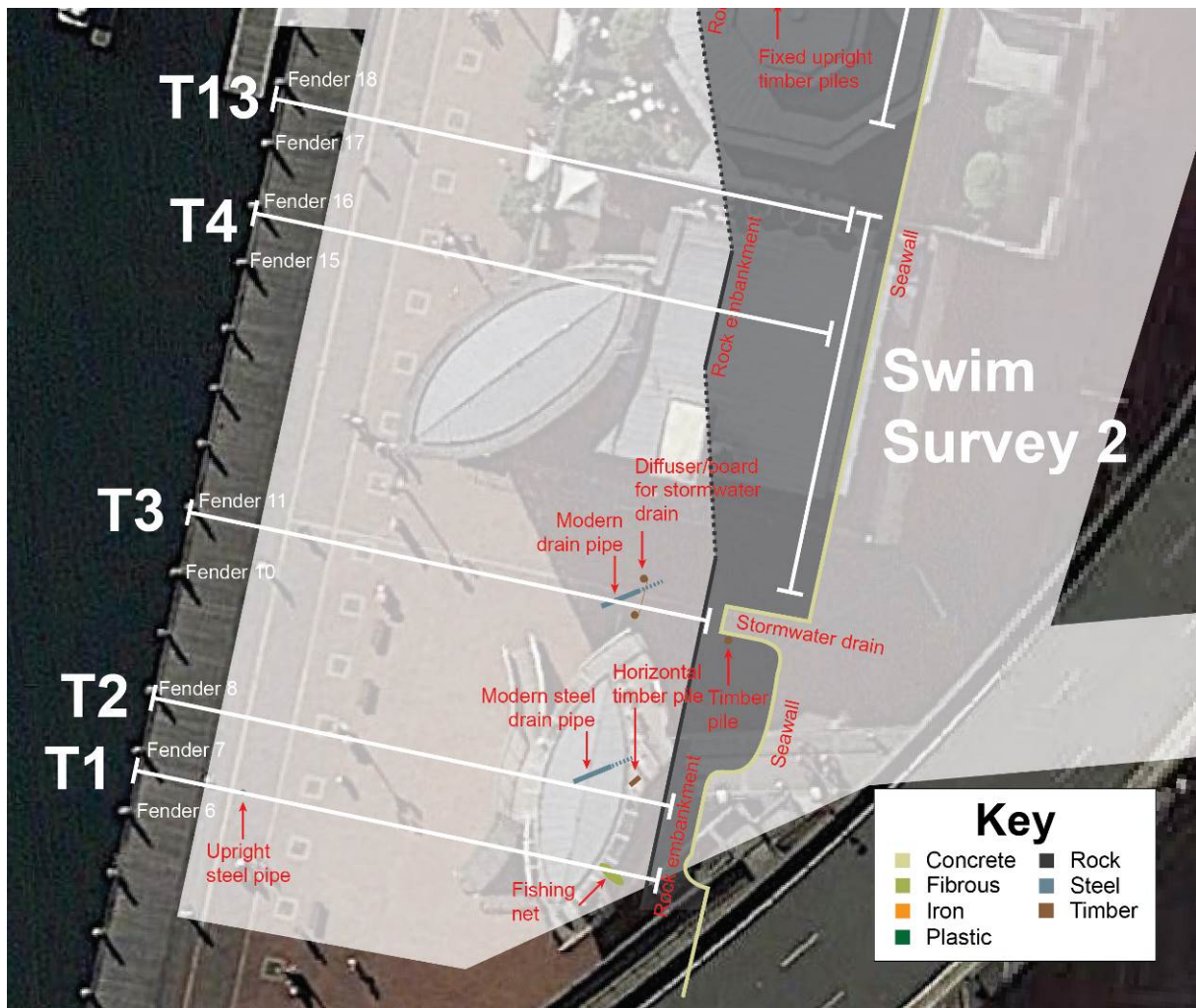


Figure 105: Overlay of site inspection findings for southern part of the site.

5.7 Interpretation of Results

The seawall identified during the survey has been overlaid with a plan showing the 1985 and 1997 suspended slabs for the development of the eastern side of Cockle Bay in these periods (see Figure 47 and Figure 106). From this it is obvious that the modern concrete seawall identified along the length of the study area was constructed in 1997. The line of the concrete seawall follows that of the 1997 construction outline exactly.

It is also apparent that the length of steel sheet piling visible in the northern half of the study area also matches the alignment of the seawall as noted in the plan. This section of seawall is noted to be 'steel sheet piling' on the 1985 plan of existing structures for Cockle Bay (see Figure 48). The sheet piling was likely installed sometime between the 1930s and 1980s. In the 1985 plan, the seawall that intersected with the southern extremity of the sheet piling was 'precast concrete sheet piling' which was not noted during the site inspection. It appears that this seawall aligns with the current edge of the 1997 development so the old seawall has either been replaced, buried behind the new seawall, or was not visibly distinguishable during the survey.

However, further to the south, the 1985 plan describes a seawall of 'close driven timber piles and concrete facing panels'. The site inspection did identify fixed and loose timber piles along with potential remains of concrete plating within the vicinity of this seawall (Figure 107, blue line). However, historic research of the 'rat-proof retaining walls' and the overlay presented in Figure 42 show that this seawall may have extended further, including the extent of our identified remains. This seawall was constructed in c.1903-1908 and is likely the original or replaced timber sheet piling faced with Monier concrete plates (see Figure 37).

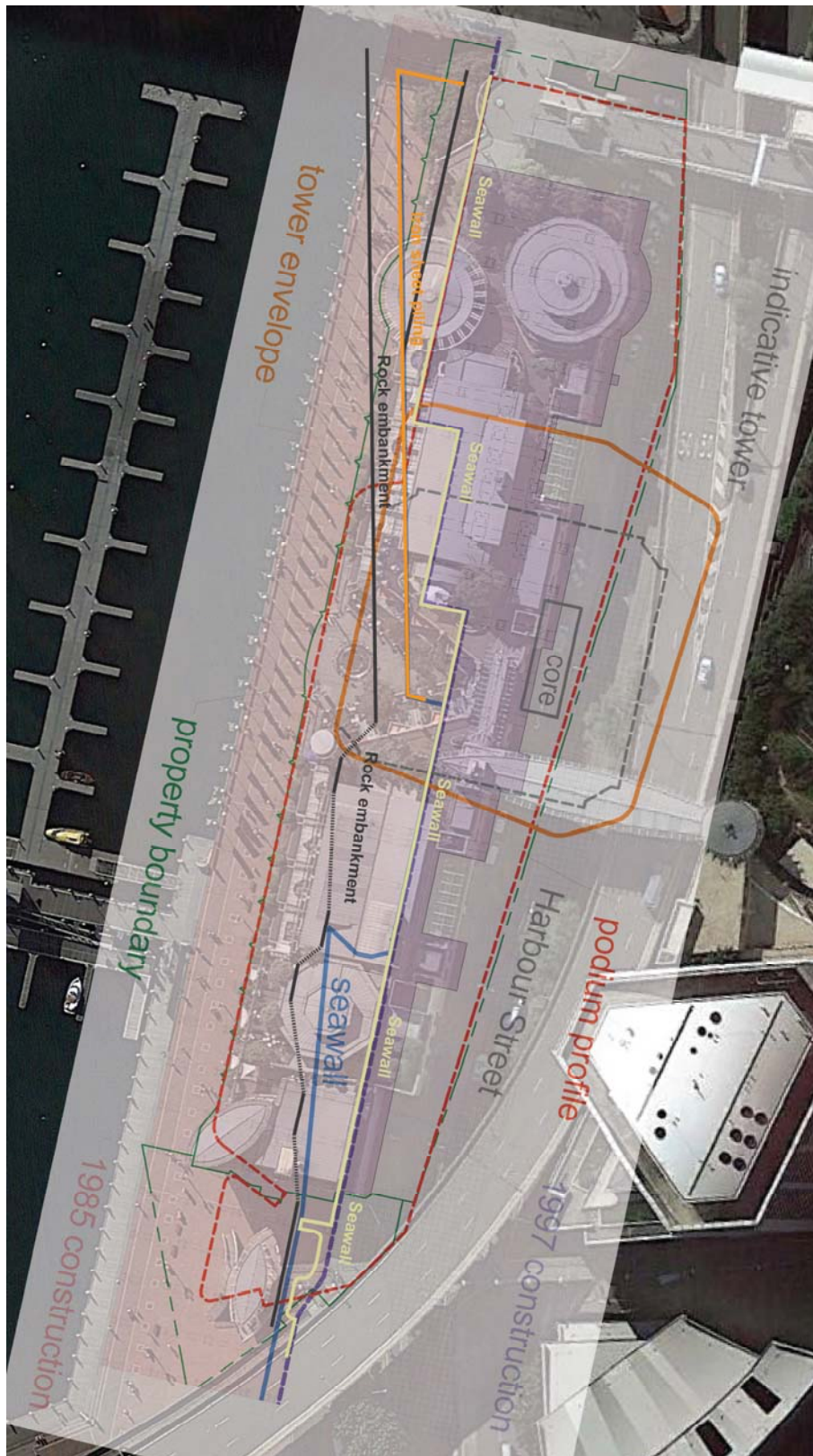


Figure 106: Overlay of 1985 construction (pink), 1997 construction (purple) and seawall as current in 1980s (blue) as well as the seawall (yellow), iron sheet piling (orange) and rock embankment (dark grey) identified in the site inspection.

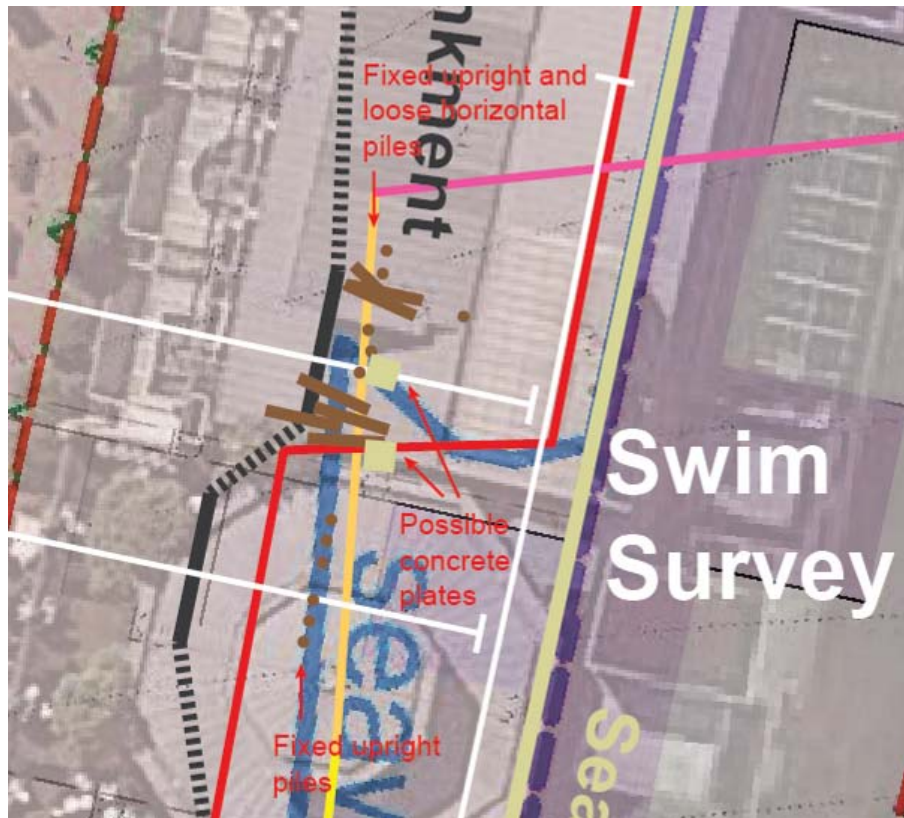


Figure 107: Overlay of timber and concrete features from Transect 5 and Transect 6 with rat-roofing retaining walls (yellow, red and pink lines, Figure 42) and seawall from 1985 plan (Figure 47).

As for the isolated timber piles, the pile protruding at a 45° angle towards the south-west at the western side of Transect 8 is not located in the vicinity of any seawalls. However, comparison with an overlay of historic wharves shows that it is within the wharf outlines of Former Streets Wharf (c. mid-1830s to late-1850s), Former Wharf 31 (c. late-1920s to early-1950s) and Wharf 31 (1956 to 1963) (Figure 108). It is possible that this pile is associated with Wharf 31.

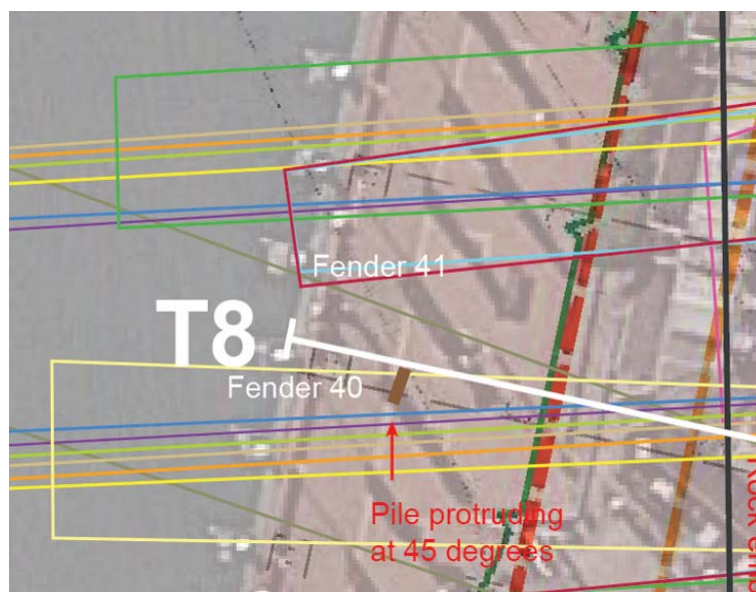


Figure 108: Location of pile along Transect 8 with overlay of wharves (see Figure 33).

The standing pile at the end of Transect 3, located immediately adjacent to the storm water drain, also matches the alignment of the seawall, shown by the nearby blue and yellow lines. The horizontal timber pile does not appear to be part of a seawall, but does fall within the wharf outline of possibly Hyndes Wharf (c. late-1930s to late-1880s) and Wharf 35 (c.1918 to mid-1980s). It is possible that this pile is from Wharf 35.

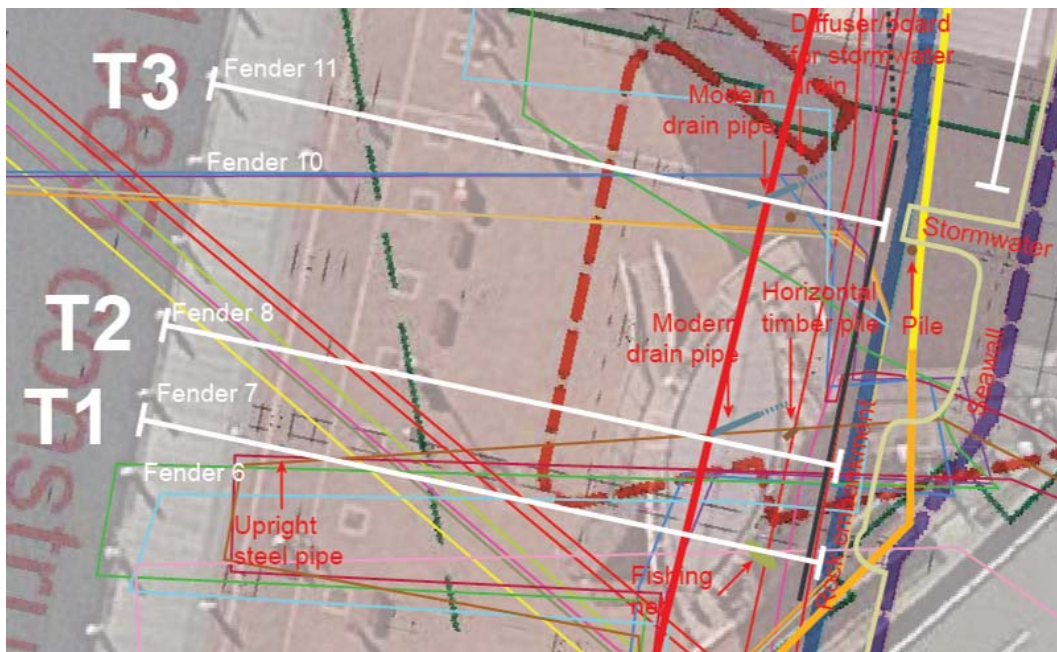


Figure 109: Location of identified piles on Transect 3 and Transect 2 with overlay of seawalls and wharves (see Figure 33, Figure 42 and Figure 47).

6 KNOWN AND POTENTIAL SITES

6.1 *Known Maritime Heritage Sites*

6.1.1 Remains of Wharves from the Late 19th Century

Two piles have been identified as potentially relating to previous wharf structures (see Figure 111). One of these piles may be related to Former Streets Wharf (c. mid-1830s to late-1850s), Former Wharf 31 (c. late-1920s to early-1950s) or Wharf 31 (1956 to 1963). The other pile may be related to Hyndes Wharf (c. late-1930s to late-1880s) and Wharf 35 (c.1918 to mid-1980s). Based on the condition of the piles and the fact that they are both protruding at odd angles from the seabed, it is more likely that the piles are related to the later wharves in the sequence of development.

6.1.2 Remains of Timber Sheet Piling with Monier Concrete Plates from the Early 20th Century

Twenty piles were identified during the site inspection that are possible remains of timber sheet piling along the eastern side of Cockle Bay, as well as two pieces of possible concrete plates that may be remains of Monier plates used to face the timber sheet piling during rat-proofing upgrades to the seawalls. All of these features have been identified in the southern half of the site (Figure 111).

6.1.3 Steel Sheet Piling Retaining Wall from the Mid-20th Century

A length of steel sheet piling was identified during the site inspection (Figure 110). This was likely placed between the last recorded rat-proofing upgrade in 1920-1929 and the 1985 plan of seawalls prior to development in the 1980s-1990s. An approximately 120 m length of the retaining wall was noted during the site inspection.

6.1.4 S.S. South Steyne

S.S. *South Steyne* is a moveable heritage item that is currently moored on the northern side of Harbourside Wharf, on the western side of Cockle Bay. Despite not being located within the study area, the vessel has been included in the list of known maritime heritage sites as it is listed on the State Heritage Register, has State significance, and may incur visual impacts as a result of the proposed development.

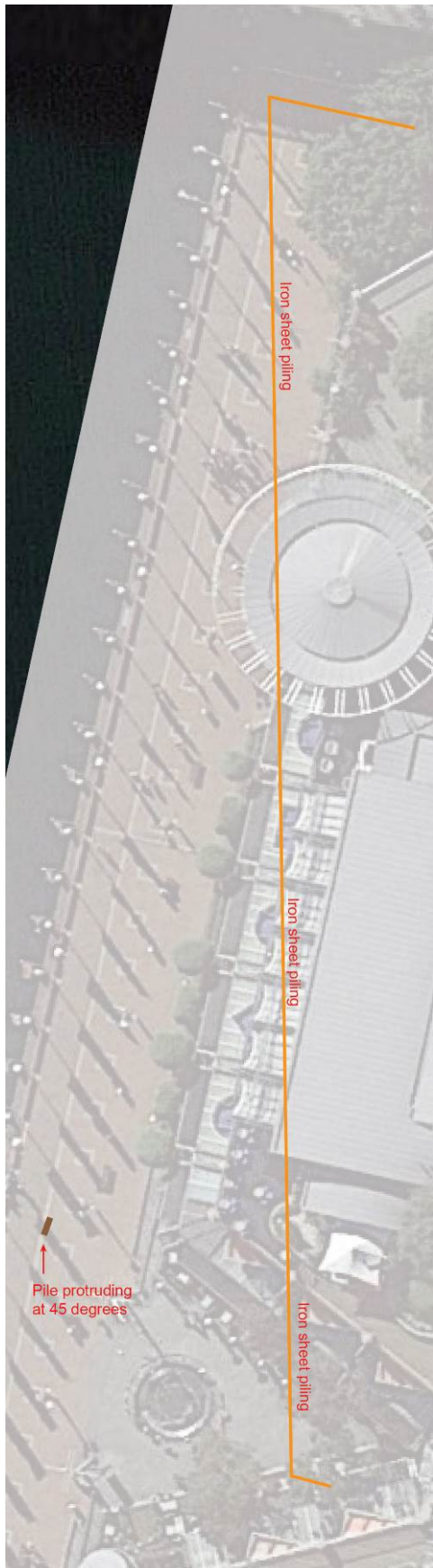


Figure 110: Known sheet piling.

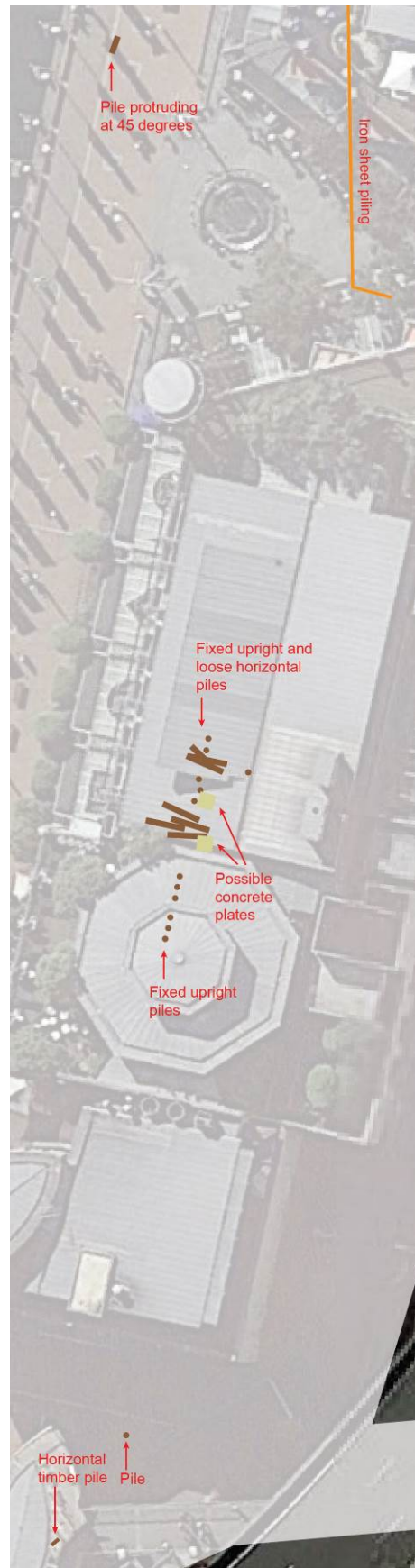


Figure 111: Known timber sheet piling and potential wharf remains.

6.2 Potential Maritime Heritage Sites

6.2.1 Physical Setting

Reclamation and seabed type within the study area all have an effect on the preservation of potential maritime heritage sites. Wharves, seawalls or other forms of infrastructure are not likely to be removed in their entirety for reclamation to take place as remains can easily be buried and add to the reclamation fill. The construction of seawalls has the same effect, as the new seawall is typically constructed on the outside of older seawalls, effectively burying the old seawall within fill. Burial within reclamation, behind a seawall or simply by accumulated sediments can improve the survival rate of remains as it creates an anaerobic environment that is beneficial for the preservation of organic materials. The seabed within the study area is a soft silt of over 500 mm depth other than in proximity to the rock embankment. It is likely that metres of silt has accumulated over time within Cockle Bay and the western edge of the study area burying potential wharf, seawall and artefact remains that are not already buried behind the seawall and reclamation. The apparent low oxygen environment and low-turbidity under the current wharf creates conditions that reduces damaging impacts by biological agents, such as marine borers, on timber material.

6.2.2 Inundated Aboriginal Sites

Aboriginal landscape use since the inundation of Port Jackson has been established for the study area based on the sites recorded in the vicinity of the study area and the types of these sites (see **Section 3.3**). The dominant site type is Potential Archaeological Deposits (PADs), but also includes artefact sites and open camp sites with artefacts, Aboriginal Ceremony and Dreaming with shell and artefacts, Aboriginal Ceremony and Dreaming burial site, Aboriginal Resource Gathering site, art and rock engraving sites, and middens. Other sites, such as rock shelters, may also be located within the study area.

It can be considered that the site types identified in a post inundation Port Jackson landscape would also have existed prior to sea level rise which commenced around 18,000 years ago. Any inundated Aboriginal sites would be located at the interface between the estuarine/alluvial deposits and the sandstone bedrock within the study area.

Any archaeological evidence of Pleistocene Aboriginal occupation that may have been situated along the banks and lower-middle slopes of Middle Harbour Creek would have been submerged by the rising seas during the post-glacial marine transgression. Such inundation would likely have caused contextual disturbance and possibly degradation of sites and artefacts within the landscape. However, Aboriginal archaeological sites and deposits that may have survived the initial stages of inundation would subsequently have been gradually buried by the deposition of fluvial and marine sediments during the Holocene period.

Estuarine systems formed from mature river systems, as is the case with Port Jackson with low energy backwaters, mud flats, swampland or marsh environments, are potentially capable of trapping and protecting cultural materials in ever increasing layers of sedimentation. Artefacts that settle into such an anaerobic environment are likely to avoid significant damage; however, substantial contextual disturbance is likely to occur.⁶³

6.2.3 Historical Sites

Wharves and Related Material

The potential for archaeological deposits associated with the shipping and transportation immediately around each wharf built is affected by site formation processes that have occurred during and after the lifespan of the wharf. This includes shipping movements, but also the demolition and removal of one wharf and the construction of another in the same

⁶³ Nutley, D. M., 2005, *Surviving Inundation: An examination of environmental factors influencing the survival of inundated Indigenous sites in Australia within defined hydrodynamic and geological settings*. Unpublished thesis (MA Maritime Archaeology), Department of Archaeology, Flinders University, South Australia.

area. Any deposits within the footprint of current building structural supports or piers would also have been removed.

Typically, archaeological deposits associated with vessels berthed at a wharf are located immediately between the wharf and the vessel or on the opposite side of the vessel away from the berth. The limit of these deposits is based on the width of the vessels berthed at the wharf. Relics associate with the working life of the wharf also have the potential to be deposited immediately below the footprint of the former wharf, particularly from material that has fallen between deck planking. This material would relate directly to the working life of the wharf.

Given the number and scale of the wharves constructed on the eastern side of Cockle Bay, and the 150 year continuous maritime activity at Cockle Bay, the archaeological potential located within the seabed within this area is considered to be high.

It is likely that dredging has occurred on the eastern side of Cockle Bay including smaller-scale private dredging around particular wharves as well as larger scale dredging by the later Sydney Harbour Trust. Dredging has the potential to remove surface archaeological remains and expose remains of piles from previous structures which may then be cut or removed. Dredging in this area has the effect of reducing the archaeological potential to moderate.

Seawalls

It has been established that a number of seawalls extend across the western half of the study area, consisting of a combination of forms and materials and built between the 1860s and 1910s. The 1980s to 1990s development of Cockle Bay wharf included construction of the current promenade wharf and concrete seawall observed in the site inspection. However, based on the identification of remains of the timber sheet piling seawall, it is highly likely that other sections of these seawalls still survive within the study area both beneath the wharf and behind the current concrete seawall. The archaeological potential is considered to be very high, other than within the footprint of the current building structural supports or piers where the archaeological potential would be nil.

Shipwrecks

There are four shipwrecks known to have occurred in Darling Harbour, as detailed in **Section 2.2.3**. There is the potential for archaeological remains associated with the shipwreck of *Sterling* to be present within the project area. While the vessel was refloated, there is the potential for remains associated with the collision to still be on the seabed. However, the archaeological potential of remains is considered very low.

The vessels *William Woolley* and *Orphan Girl* have Darling Harbour included in their shipwreck register listings as this was their destinations, however, they are unlikely to be within the study area.

The vessel of *Omeo* was lost at the Bathurst Street Wharf. These wreck sites are now covered over by reclamation works and are located behind the current seawall. Therefore, the wreck likely to be to the south and outside of the study area of this report.

Discard from Vessels

Vessel movement and mooring in the eastern side of Cockle Bay inevitably coincides with discard from industrial vessels. Discard can take the form of accidental or deliberate discard of items such as personal objects, food and drink containers, ships fittings and equipment, fishing and boating equipment as well as cargo and shipping materials being loaded or offloaded at the wharves on the eastern side of Cockle Bay.

Discard In and Under Reclamation Fill

The eastern side of Cockle Bay has been gradually reclaimed throughout the 19th and 20th centuries. This reclamation would have the effect of burying and preserving any potential archaeological remains on and under the seabed, such as wharf remains described above, as well as possibly containing items within the fill from the original source of the material. There may have also been opportunistic discard within the fill as locals, workers or even the

local council took advantage of the operation to bury unwanted refuse. The type, material kind, size and extent of these remains cannot be predicted. Regardless, the process of burial generally conserves material and it is likely that these items are relatively intact. The archaeological potential of discard within reclamation fill is considered moderate, other than within the footprint of the current building structural supports or piers where the archaeological potential would be nil.

6.2.4 Summary

Based on the findings of the historical information presented in **Section 4** and observations made during the site inspection presented in **Section 5**, the following map of maritime archaeological potential has been produced (Figure 112).

Zones of high potential indicate areas where there were maritime structures, including wharves and seawalls, which are likely to remain buried within the seabed or beneath reclamation. Zones of low potential are areas where there are no built structures but maritime activities took place that may have left artefacts which are now buried within the seabed or beneath reclamation. The zones marked as not applicable are areas where there was no maritime archaeological development or there are no proposed ground disturbances and hence are outside the scope of this assessment.

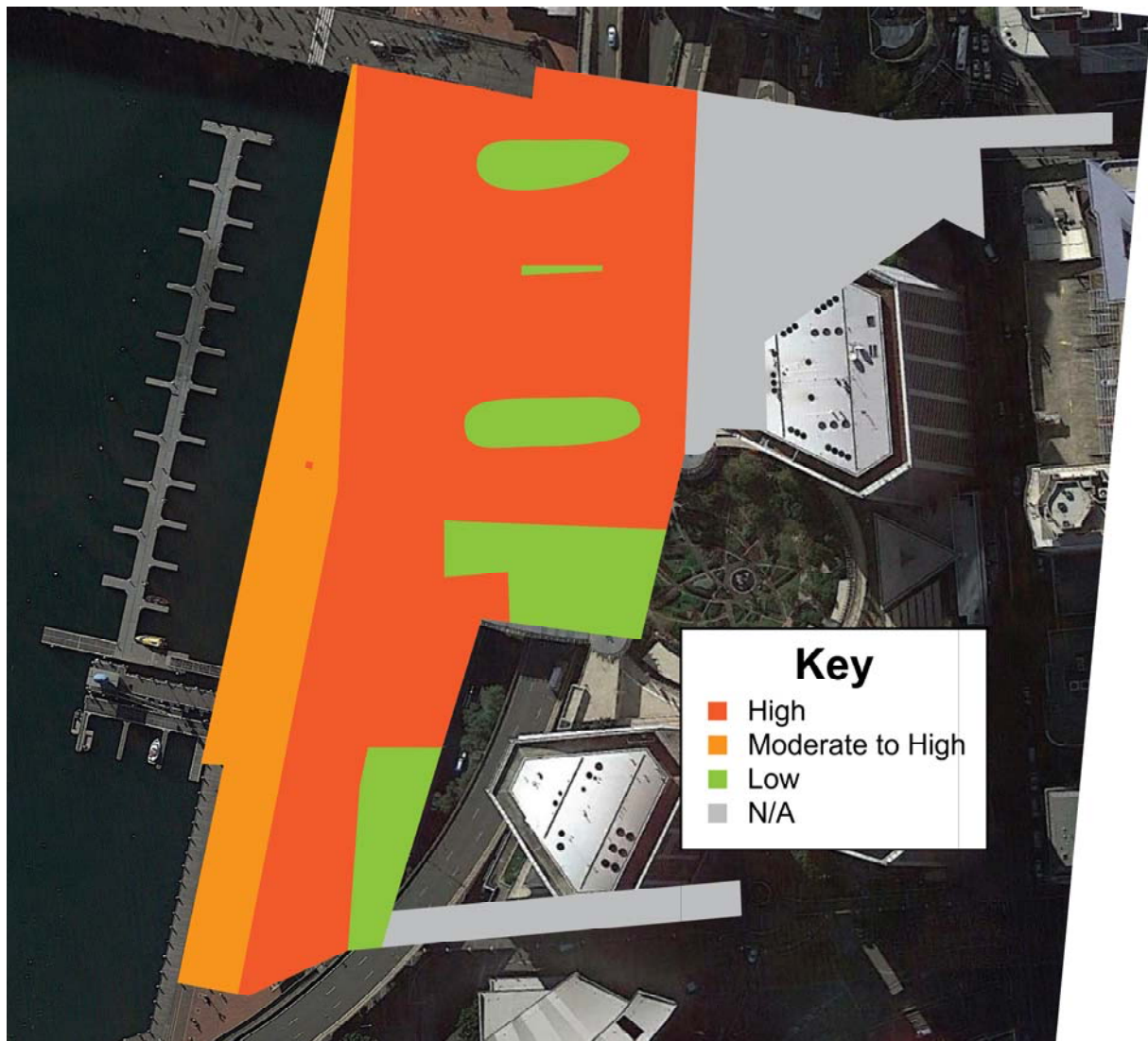


Figure 112: Likelihood of archaeological potential for the study area.

7 ASSESSMENT OF SIGNIFICANCE

7.1 *Significance Criteria*

7.1.1 Aboriginal Significance Criteria

An assessment of cultural heritage significance seeks to understand and establish the importance or value that a site, place or landscape may have to the community at large. The concept of cultural significance is intrinsically connected to the physical components of a site, its location, setting and relationship with its surrounds; as well as the traditional, spiritual, historical and social meaning attached to the site. The assessment of cultural significance is ideally a holistic approach that draws upon the response all these factors evoke from the community.

The Australian ICOMOS *Charter for the conservation of places of cultural significance 1999* – the Burra Charter – divides heritage significance into four main categories for the purpose of assessment; social, historical, scientific and aesthetic values. These principles have been adapted by the NSW OEH to specifically address the identification and assessment of Aboriginal cultural heritage.⁶⁴

Social value – refers to the spiritual, traditional, historical or contemporary associations and attachments which the place or area has for the Aboriginal community. Places of social significance have associations with contemporary community identity, and social or cultural value is seen as the way in which people express their connection with a place and the meaning that place has for them. These places can have associations with tragic or warmly remembered experiences, periods, or events. Communities can experience a sense of loss should a place of social significance be damaged or destroyed. These aspects of heritage significance can only be identified through consultation with relevant Aboriginal communities.

Historic value – refers to the associations of a place with a person, event, phase, or activity of importance to the history of an Aboriginal community. Places of historic value may or may not have physical evidence of their historical importance (such as structures, planted vegetation or landscape modifications). These places may also have ‘shared’ historic values with other (non-Aboriginal) communities – i.e. places of post-contact Aboriginal history.

Scientific value – refers to the importance of a landscape, area, place, or object because of its archaeological and/or other technical aspects. Assessment of scientific value is often based on the likely research potential of the area, place, or object and will consider the importance of the data involved, its rarity, quality or representativeness, and the degree to which it may contribute further substantial information.

Aesthetic value – refers to the sensory, scenic, architectural, and creative aspects of the place. It is often closely linked with social values and may include consideration of form, scale, colour, texture, and material of the fabric or landscape, and the smell and sounds associated with the place and its use.

7.1.2 Historical Significance Criteria

An assessment of cultural significance or heritage significance seeks to understand and establish the importance or value that a place, site or item may have to select communities and the general community. The Australian ICOMOS *Charter for the Conservation of Places of Cultural Significance*⁶⁵ (the *Burra Charter 1979*, most recently revised in 1999) is the standard adopted by most heritage practitioners in Australia when assessing significance. It defines cultural significance as “aesthetic, historic, scientific or social value for past, present or future generations”.

⁶⁴ NSW Office of Environment and Heritage, Department of Premier and Cabinet, 2011, Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW.

⁶⁵ The Australia ICOMOS, 1999, Charter for the conservation of places of cultural significance.

This value may be contained in the fabric of the item, its setting and relationship to other items, the response that the item stimulates in those who value it now, or the meaning of that item to contemporary society.

Accurate assessment of the cultural significance of sites, places and items is an essential component of the NSW heritage assessment and planning process. A clear determination of a site's significance allows informed planning decisions to be made for place, in addition to ensuring that their heritage values are maintained, enhanced, or at least minimally affected by development.

Assessments of significance are made by applying the following standard evaluation criteria provided by the NSW Office of Environment and Heritage⁶⁶ in order to establish a statement of significance:

- a. An item is important in the **course or pattern** of NSW's **cultural or natural history** (or the cultural or natural history of the local area);
- b. An item has strong or special **associations with the life or works of a person, or group of persons, of importance in NSW' cultural or natural history** (or the cultural or natural history of the local area);
- c. An item is important in demonstrating **aesthetic characteristics** and/or a high degree of **creative or technical achievement** in NSW (or the local area);
- d. An item has strong or special **associations with a particular community or cultural group** in NSW (or the local area) for **social, cultural or spiritual reasons**;
- e. An item has **potential to yield information** that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area);
- f. An item possesses **uncommon, rare or endangered** aspects of NSW's cultural or natural history (or the cultural or natural history of the local area);
- g. An item is important in **demonstrating the principal characteristics of a class of NSW's cultural or natural places**; or cultural and natural environments.

7.2 Assessment of Aboriginal Significance

An assessment of Aboriginal cultural heritage significance cannot be conducted without the input of Aboriginal stakeholders and communities – particularly with regard to social and historical values. As recognised by OEH, Aboriginal people are the primary determinants of the cultural significance of their heritage. Due to the fact that the current study is a preliminary desktop review only, and no Aboriginal consultation has yet been conducted, an attempt to assess the significance of the potential submerged Aboriginal archaeological resource will not be made.

Needless to say, it should be noted that numerous Aboriginal archaeological sites along the foreshore landscapes adjacent to the current study areas have previously been determined to possess scientific, traditional, cultural and social significance, with human burial sites of particular social and spiritual importance; and it may be anticipated that submerged Aboriginal archaeological sites and landscapes would also hold similar values.

It should also be noted that any surviving submerged Aboriginal archaeological resources will likely have very high scientific significance via the potential to yield information that will contribute to an understanding of the NSW's natural and cultural history. Maritime Aboriginal archaeological sites and Pleistocene Aboriginal archaeological sites are both, on their own, rare site types within a NSW context; and the identification of submerged Pleistocene landscapes and associated Aboriginal archaeological resources would be a unique discovery. An examination and analysis of such archaeological landscapes could contribute substantial information regarding Aboriginal technologies, land use strategies and exploitation of natural resources during the Pleistocene era; as well as important information regarding post-depositional processes and survival rates of Aboriginal archaeological sites and landscapes following sea level rise and inundation.

⁶⁶ NSW Heritage Office, 2001, *Assessing Heritage Significance*

7.3 Assessment of Historic Significance

The cultural heritage significance of known archaeological sites within the study area are assessed below using the criteria presented in **Section 7.1.2**. Preliminary statements of cultural significance have also been provided for other potential sites types. A full significance assessment for these would only be possible once a site has been identified.

7.3.1 Remains of Wharves and Related Material (c.1830 to 1970)

Criterion a) *An item is important in the **course or pattern** of NSW's **cultural or natural history** (or the cultural or natural history of the local area)*

The southern section of Darling Harbour, now known as Cockle Bay, has served as a trade hub for Sydney from the 1830s when the first private wharves were built along the eastern and southern sides of the harbour. The early development of this section of Darling Harbour was done so under private ownership with extensive development and redevelopment occurring that included reclamation and construction of new wharves and associated infrastructure up until 1900. The number of wharves and maritime infrastructure that was stacked on the eastern side of Cockle Bay, largely under private development, shows the value of this waterfront area, as well as the importance to commerce and trade in and out of Sydney. The known and potential archaeological resource that is present on the eastern side of Cockle Bay is likely to show the strategic building and operational activity that was running out of this section of Darling Harbour in between each private wharf and private lease.

The resumption of the waterfront area along Darling Harbour, which included Cockle Bay, in 1900 saw the change in governance and control of the wharves and associated infrastructure, including seawalls. This shift was an integral part of the change of design and thinking that allowed for a holistic approach to the design of wharves in Darling Harbour, and particularly at the southern end in Cockle Bay. This is clearly seen in the longevity of wharves built from the 1920s onwards and their continued use until the 1970s.

The archaeological remains of the former wharves and associated maritime archaeological deposits on the eastern side of Cockle Bay are of **State Significance** under this criterion.

Criterion b) *An item has strong or special **associations with the life or works of a person, or group of persons, of importance in NSW' cultural or natural history** (or the cultural or natural history of the local area);*

The site is likely to have associations with a many number of early Sydney people, given the large number of private holdings along the eastern and southern side of Cockle Bay. The rat proofing and future design of wharves in Cockle Bay were managed by Henry Walsh, engineer-in-chief of the Sydney Harbour Trust, whose designs were implemented throughout Sydney Harbour. Specifications created by Walsh were certainly implemented on the eastern side of Cockle Bay, however, they were not considered to be individual or independent from the designs that were implemented elsewhere around the harbour.

The archaeological remains of the former wharves and associated maritime archaeological deposits on the eastern side of Cockle Bay are of **local significance** under this criterion.

Criterion c) *An item is important in demonstrating aesthetic **characteristics** and / or a high degree of **creative or technical achievement** in NSW (or the local area);*

The known and potential maritime archaeological remains present on the eastern side of Cockle Bay and associated with the c.1830s to 1900s wharves are likely to have a capacity to demonstrate creative and/or technical achievement relating to the construction and maintenance of those wharves at a time when construction of the wharves were done so via private contracts and not done so based on any one standard.

The post 1900s resumption and the construction of the 1930s wharves in Cockle Bay were based on a design standard created for the redevelopment works of Sydney Harbor.

Archaeological remains of these wharves would not be unique to these wharves built after 1930s.

The archaeological remains of the former wharves and associated maritime archaeological deposits on the eastern side of Cockle Bay are of **local significance** under this criterion.

Criterion d) *An item has strong or special **associations with a particular community or cultural group** in NSW (or the local area) for **social, cultural or spiritual reasons**;*

The wharves and associated maritime infrastructure present in the eastern side of Cockle Bay up until the 1900s were private holdings that worked independently of each other. The 1930s wharf redevelopment under the Sydney Harbour Trust integrated the wharves at Cockle Bay into the larger wharf system in operation in Sydney Harbour. While these wharves at Cockle Bay were an integral part of the goods transportation and waterside warehousing needs from the turn of the Century onwards, there were no single particular community or cultural groups who were associated with the wharf.

The wharves built on the eastern side of Cockle Bay from the 1830s through to the 1970s **do not** meet the requirements of this criterion.

Criterion e) *An item has **potential to yield information** that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area);*

There is a high potential for archaeological remains associated with the chronology of wharves built on the eastern side of Cockle Bay dating from the 1830s through to the 1970s to be present within the seabed and immediately behind the seawall at Cockle Bay. The historical information regarding the construction of wharves along the eastern side dating from the 1830s is limited with only primary sources, mostly photographs and maps, revealing the location and likely construction type of each wharf. Any archaeological remains present on the eastern side of Cockle Bay will likely contribute to our understanding of materials and construction methods used as well as how wharves were removed and new wharves constructed over the top of the previous.

Artefacts discarded, accidentally or deliberately, from the wharves present in the study area and from vessels moored alongside can contribute towards knowledge of the variety of traffic and goods that passed between Sydney and the rest of the world from the early 19th century through to the 20th century. Through 150 years of maritime operations on the eastern side of Cockle Bay, these relics have the potential to contribute to our understanding of the working operation of the wharves.

Archaeological sites associated with the former wharves built on the eastern side of Cockle Bay have the potential to contribute to a greater understanding of wharf construction that has rarely been documented in the archaeological record previously.

The archaeological remains of former wharves and associated maritime archaeological deposits on the eastern side of Cockle Bay are of **State Significance** under this criterion.

Criterion f) *An item possesses **uncommon, rare or endangered** aspects of NSW's cultural or natural history (or the cultural or natural history of the local area);*

The archaeological resource that is present underneath the seabed and behind the seawall in the eastern side of Cockle Bay can be considered to be a finite resource relating to a specific industry in Sydney. The maritime archaeological site is likely to include remains of early harbour development dating from the 1830s and continuing through an intense private construction history up until 1900. Archaeological remains under the seabed are likely to

relate to the physical structures of the wharves as well as relics relating to 150 years of maritime activity.

Archaeological remains associated with the post-resumption development of the harbour can still be seen in the harbour today. Wharves such as Woolloomooloo, Walsh Bay and Jones Bay wharves all relate to the post 1900 resumption redevelopment. While many wharves have been removed from the harbour there are surviving examples today that are considered to be common.

The archaeological remains of the former wharves and associated maritime archaeological deposits on the eastern side Cockle Bay relating to pre-1900 construction activity are of **State Significance** under this criterion.

Criterion g) *An item is important in **demonstrating the principal characteristics of a class of NSW's cultural or natural places; or cultural and natural environments.***

The maritime archaeological infrastructure constructed in Cockle Bay, namely the series of wharves, are likely to be represented by maritime archaeological remains present below the seabed and/or behind the seawall. These remains will not be intact or complete given the extensive amount of redevelopment that has occurred before and after the resumption of wharves in 1900. As such, the site is not likely to retain the principal characteristics of its type or design, but a representation.

The archaeological remains of the former wharves and associated maritime archaeological deposits on the eastern side of Cockle Bay **do not** meet the standards of this criterion.

Statement of Cultural Significance

The southern end of Darling Harbour, now known as Cockle Bay, has been associated with maritime transport in Sydney Harbour since c.1830s. From this time up until 1900 the eastern side of the harbour was utilised by wharves constructed on private holdings that dominated the waterfront around Sydney Cove. These early wharves were eventually demolished and replaced by larger wharves over a similar footprint as space along the waterfront was limited. This continued until the resumption of wharves and the creation of the Sydney Harbour Trust in 1900. Immediately after this time the seawalls were improved and rat proofed, and new wharves were built in Cockle Bay in the 1930s.

The wharves present in Cockle Bay represent over 150 years of maritime commerce and trade that functioned with the other wharves located along the eastern side of Darling Harbour. The archaeological resource present on and under the seabed as well as behind the seawall is representative of the earliest private maritime infrastructure development in Sydney Harbour. This includes not only the potential for physical remains of these structures but also relics associated with the operation of these wharves. As such, the remains of these wharves and related material are assessed to be of **State Significance**.

7.3.2 Remains of Seawalls and Retaining Walls

The following significance assessment of the seawalls and retaining walls is split between the different types of walls and presented together below each criterion.

Criterion a) *An item is important in the **course or pattern** of NSW's **cultural or natural history** (or the cultural or natural history of the local area)*

Timber sheet piling with Monier concrete plates

Timber sheet piling was a common type of seawall in Darling Harbour and Sydney in the 19th century. This method of seawall construction was the predominant form prior to reinforced concrete seawalls.

The introduction of reinforced concrete towards the end of the 19th century provided some solutions to difficult engineering problems. Of relevance is the application of reinforced concrete to the improvement and construction of seawalls for rat-proofing. The Monier plates used for the timber sheet piling seawalls on the eastern side of Cockle Bay likely represents one of the earliest uses of reinforced concrete to update existing infrastructure in Sydney.

*Remains of timber sheet piling and Monier concrete plates are of **Local significance** under this criterion.*

Sheet piling retaining wall

The sheet piling retaining wall was likely installed between the 1930s and 1980s. Steel sheet piling was a standard form of retaining or seawall at this time and is unremarkable due to its commonness in the marine engineering milieu.

*The sheet piling retaining wall **does not meet** the standards of this criterion.*

Other seawalls

Information regarding any seawalls constructed as part of various stages of reclamation between the 1850s and 1890s is only available from the archaeological record. This includes cut stone walls on solid stone ballast foundations, rubble seawalls and timber piling seawalls. The location of rat-proof seawalls are noted on plans by Sydney Harbour Trust after 1903, however, the specific type of seawall is not distinguished on the plans nor are details whether it was an existing, upgraded or newly constructed seawall. Again, this information is only available in the archaeological record.

*Remains of other seawalls are of **Local significance** under this criterion.*

Criterion b) *An item has strong or special **associations with the life or works of a person, or group of persons, of importance in NSW' cultural or natural history** (or the cultural or natural history of the local area);*

Timber sheet piling with Monier concrete plates

The timber sheet piling has no known associations with particular persons or groups. However, the personages of Joseph Monier, who patented the reinforced concrete used in Monier plates, and H.D. Walsh, Engineer in Chief of the Sydney Harbour Trust, could be considered to have derivative associations with the Monier plate seawall on the eastern side of Cockle Bay.

*Remains of timber sheet piling and Monier concrete plates are of **Local significance** under this criterion.*

Sheet piling retaining wall

The sheet piling has no known associations with particular persons or groups.

*The sheet piling retaining wall **does not meet** the standards of this criterion.*

Other seawalls

The other seawalls have no known associations with particular persons or groups, however, associations may be identified if the provenance of the seawall can be determined.

*Remains of other seawalls **do not currently meet** the standards of this criterion.*

Criterion c) *An item is important in demonstrating aesthetic **characteristics** and / or a high degree of **creative or technical achievement** in NSW (or the local area);*

Timber sheet piling with Monier concrete plates

The timber sheet piling and Monier concrete plates that have been identified are fragmentary. Any additional remains are likely to also be fragmentary and buried within sediment or behind the current seawall. However, the Monier systems were highly innovative and cutting-edge technology when applied to these seawalls.

*Remains of timber sheet piling and Monier concrete plates are of **State significance** under this criterion.*

Sheet piling retaining wall

The sheet piling retaining wall is a common feature in Australian maritime infrastructure. Its concretion and wear as well as its commonness of design minimise its aesthetic values.

*The sheet piling retaining wall **does not meet** the standards of this criterion.*

Other seawalls

Remains of other seawalls are likely to be fragmentary and buried within sediment or behind the current seawall.

*Remains of other seawalls **do not meet** the standards of this criterion.*

Criterion d) *An item has strong or special **associations with a particular community or cultural group** in NSW (or the local area) for **social, cultural or spiritual reasons**;*

Timber sheet piling with Monier concrete plates

The timber sheet piling and Monier concrete plates have an association with the workers on wharves on the eastern side of Cockle Bay, however, they would not be able to readily identify the remains.

*Remains of timber sheet piling and Monier concrete plates are of **Local significance** under this criterion.*

Sheet piling retaining wall

The sheet piling retaining wall would not have special associations with a particular community or cultural group.

*The sheet piling retaining wall **does not meet** the standards of this criterion.*

Other seawalls

Remains of other seawalls are likely to have associations with the workers on related wharves on the eastern side of Cockle Bay, however, the remains would no longer be identifiable.

*Remains of other seawalls are of **Local significance** under this criterion.*

Criterion e) *An item has **potential to yield information** that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area);*

Timber sheet piling with Monier concrete plates

Remains of timber sheet piling and Monier concrete plates can provide additional information on the adaption of existing seawalls in Sydney Harbour in the early 20th century using a new technology.

*Remains of timber sheet piling and Monier concrete plates are of **State significance** under this criterion.*

Sheet piling retaining wall

Sheet piling is common throughout Australia and is well documented. Little new information can be obtained from further archaeological investigation.

*The sheet piling retaining wall **does not meet** the standards of this criterion.*

Other seawalls

There is no historic information regarding the other seawalls on the eastern side of Cockle Bay. Any archaeological remains will contribute to our knowledge of materials and construction methods used, as well as to a greater understanding of seawall construction rarely documented in the archaeological record.

*Remains of other seawalls are of **State significance** under this criterion.*

Criterion f) *An item possesses **uncommon, rare or endangered** aspects of NSW's cultural or natural history (or the cultural or natural history of the local area);*

Timber sheet piling with Monier concrete plates

The timber sheet piling with Monier concrete plates was an innovative response to engineering and public health issues using a new technology. Remains of this seawall are rare, if not unique, examples of its type.

*Remains of timber sheet piling and Monier concrete plates are of **State significance** under this criterion.*

Sheet piling retaining wall

Sheet piling is common throughout Australia and is well documented.

*The sheet piling retaining wall **does not meet** the standards of this criterion.*

Other seawalls

The archaeological resource that is present underneath the seabed and behind the current seawall on the eastern side of Cockle Bay can be considered to be a finite resource relating to a specific form of maritime infrastructure in Sydney.

*Remains of other seawalls are of **State significance** under this criterion.*

Criterion g) *An item is important in **demonstrating the principal characteristics of a class of NSW's cultural or natural places; or cultural and natural environments.***

Timber sheet piling with Monier concrete plates

Remains of timber sheet piling with Monier concrete plates on the eastern side of Cockle Bay, including identified and potential remains, are not a good example of the early application of Monier concrete plates due to their fragmentary nature.

*Remains of timber sheet piling and Monier concrete plates **do not meet** the standards of this criterion.*

Sheet piling retaining wall

The sheet piling retaining wall cannot be considered a good example of its type.

*The sheet piling retaining wall **does not meet** the standards of this criterion.*

Other seawalls

Other seawalls are likely to be represented by maritime archaeological remains present below the seabed and/or behind the seawall. These remains will not be intact or complete and as such will not likely retain the principle characteristics of its type or design.

*Remains of other seawalls **do not meet** the standards of this criterion.*

Statement of Cultural Significance

Timber sheet piling with Monier concrete plates

Timber sheet piling was a common type of seawall used around wharf facilities including along the eastern side of Cockle Bay, which has been associated with maritime transport since the c.1830s. Wharves and seawalls were constructed on private holdings until 1900 when Sydney Harbour Trust undertook improvement and rat-proofing, including upgrading of

timber sheet piling with Monier concrete plates. Reinforced concrete was a new technology and provided a solution for engineering and public health problems. Archaeological remains may yield information on the adaption of seawalls which may not be available in the historic record. As such, remains of timber sheet piling with Monier concrete plates is of **State** significance.

Sheet piling retaining wall

Sheet piling is a common technology used throughout Australia and in association with maritime infrastructure. The sheet piling on the eastern side of Cockle Bay has no known associations, potential to reveal information or unique elements, and as such the sheet piling retaining wall has no heritage significance.

Other seawalls

Information regarding seawalls constructed between the 1850s and 1890s on the eastern side of Cockle Bay is only available from the archaeological record. Seawalls may have included cut stone walls, rubble seawalls and timber piling seawalls. Even from the 1900s, plans of the seawalls do not distinguish the type of seawall or whether the rat-proofed seawalls were existing, upgraded, or newly constructed. Any archaeological remains are a finite resource relating to a specific form of maritime infrastructure in Sydney and will contribute to a greater understanding of seawall construction rarely documented in the archaeological record.

7.3.3 The Vessel *South Steyne*

The following significance assessment has been taken from the State Heritage Register listing of the motor vessel *South Steyne*.

Criterion a) *An item is important in the **course or pattern** of NSW's **cultural or natural history** (or the cultural or natural history of the local area)*

The *South Steyne* was the best known of the Manly ferry line which played a major role in the suburbanisation of Sydney and the development of its recreational patterns. It symbolises the progressive approach of the Board of the Port Jackson and Manly Steamship Company and, in particular, the creative ingenuity of the General Manager, Walter Leslie Dendy, who assisted design of the vessel and created much of the image for which the Manly ferry was famous in the twentieth century. It is associated with the development and culture of Manly and Warringah as a residential and recreational area. (Heritage Branch 1992).

Criterion b) *An item has strong or special **associations with the life or works of a person, or group of persons, of importance in NSW' cultural or natural history** (or the cultural or natural history of the local area);*

It does not appear to meet this criterion of State significance.

Criterion c) *An item is important in demonstrating aesthetic **characteristics** and / or a high degree of **creative or technical achievement** in NSW (or the local area);*

It is a very high quality example of naval architecture and an outstanding example of the plating (having no flat plates) for which Henry Robb of Leith was famous. It is the finest example of the most significant Australian contribution to sea navigation technology - the development of high speed double-ended operation in deep sea conditions. It has an intact operating example of propulsion by steam reciprocating engine. (Heritage Branch 1992).

Criterion d) *An item has strong or special **associations with a particular community or cultural group** in NSW (or the local area) for **social, cultural or spiritual reasons**;*

It epitomised the Manly ferry as part of Sydney's image and its popular urban culture; it remains, like the Harbour Bridge, a powerful piece of Sydney imagery. It has featured in Sydney poster-art for over 50 years. It is held in high esteem by the local community and remains in the collective memory of the nation.

Criterion e) *An item has **potential to yield information** that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area);*

It provides a working example of the propulsion and auxiliary functions of marine steam power.

Criterion f) *An item possesses **uncommon, rare or endangered** aspects of NSW's cultural or natural history (or the cultural or natural history of the local area);*

It is one of three Manly ferries of the Port Jackson and Manly Steamship Company surviving afloat and the only one in operating condition and the only steam-powered example. It is rare evidence of the large ferry systems which stimulated the growth of suburban Sydney. It is uniquely Australian in concept and design. It has the largest and most powerful operating marine reciprocating steam engine surviving in the world today (including original Scotch boilers and auxiliaries), providing rare international evidence of the machinery that powered the Industrial Revolution at sea.

Criterion g) *An item is important in **demonstrating the principal characteristics of a class of NSW's cultural or natural places**; or cultural and natural environments.*

It is representative of twentieth-century Manly ferries and is the optimal development of the steam-propelled Manly ferry.

This vessel was built to very high standards of structural strength and is in excellent condition, though requiring a constant high level of maintenance to maintain that condition. Hull, machinery and exterior generally in original condition. The open shelters at the ends of the promenade deck were enclosed and the interiors were significantly altered in the 1980s. Both reversible at some expense.

Statement of Cultural Significance

The *South Steyne* was the best known of the Manly ferry line which played a major role in the suburbanisation of Sydney and in the development of its recreational patterns. It is a very high quality example of naval architecture and an outstanding example of the plating (having no flat plates) for which Henry Robb of Leith was famous. It is the finest example of the most significant Australian contribution to sea navigation technology - the development of high speed, double-ended operation in deep sea conditions. It has an intact operating example of propulsion by steam reciprocating engine. It epitomised the Manly ferry as part of Sydney's image and its popular urban culture; and remains, like the Harbour Bridge, a powerful piece of Sydney imagery. It is held in high esteem by the local community and remains in the collective memory of the nation. It provides a working example of the propulsion and auxiliary functions of marine steam power.

7.3.4 Other Site Types

Shipwrecks

There is a low archaeological potential for remains of *Sterling* to be present within the study area, along with remains of other unidentified and unrecorded shipwrecks. These shipwrecks would all have had an industrial purpose for being in Cockle Bay. Any wrecked vessels would likely have been stripped of cargo, superstructure and/or usable equipment. Industrial vessels may have been personalised for a specific task but generally conformed to certain types. However, they were also likely have more obvious repairs than recreational vessels. Wrecks can demonstrate the sequence of maintenance that the vessel has undergone in its working life. Vessels may also be associated with specific industries or businesses related to the eastern side of Cockle Bay.

Discard In and Under Reclamation Fill

The placement of a large amount of fill in one area has a high opportunity to also accompany discarded items either within or under the reclamation. While these items are largely disassociated from their original context, the act of burial enhances their preservation. These items can reflect a large number of societal themes including diet, trade, socioeconomic patterns and what is considered as 'refuse' over time. The items themselves may also show evidence of modifications, re-use, and damage other than that related to burial.

8 PRELIMINARY IMPACT ASSESSMENT

8.1 Proposal

The proposed development of Cockle Bay Park is consistent with the amended Concept Proposal. It establishes the vision, Planning and development framework which will be the basis for the consent authority to assess future development proposals within the Site. The proposal articulates the intent and massing envelopes which the applicant is seeking to achieve for future development and sets the broad parameters for the development of the site.

8.2 Potential Impacts

In this Concept Proposal phase, construction details are yet unknown and, as such, impacts to the cultural heritage values of the maritime archaeological resource cannot be fully assessed. Similar developments provide an idea of the types of impacts that may be caused as a result of this development.

In particular relation to maritime archaeological sites, potential impacts, as observed from other developments, may include:

- Removal of current piles that may involve disturbances to the seabed, former seabed, and sediment profiles below fill;
- Placement of piles, including piling supports for deck or wharf structures, that may disturb the seabed, former seabed, or sediment profiles below fill;
- Excavations for building foundations or other structural features that may disturb the seabed, former seabed, or sediment profiles below fill; and,
- Construction methods, such as the use of a cofferdam, which may disturb the seabed, former seabed, or sediment profiles below fill.

However, initial structural drawings have been prepared for the Concept Proposal. The plans are only indicative but they can be used as a basis to prepare a preliminary impact assessment. The assessment below is solely provided as an example for how potential impacts are assessed and can be mitigated. This assessment would need updating and completing once the construction details for this proposal are finalised. Details required for assessment would include the type of pile (hollow or filled), method of installation and details regarding the method of construction in general.

The plan showing potential seabed, former seabed and sediment profile disturbances is that of the tower foundations (Figure 113). The outline of the tower, its location within the study area and in relation to the wharf and seawall is shown in Figure 47. The tower is supported by a core structure and 12 columns. The core sits on a core raft supported by 24 piles and each column sits on a pile cap supported by four piles with a total of 72 piles for the tower. Each pile, for both the core raft and the pile caps, is of steel encased reinforced concrete and 1.5 m in diameter. Each pile has an impact area of 1.77 m², which gives a total impact area of 127.44 m². This is only in relation to surface area and does not factor the depth of impact. Depending on the method of construction, the close proximity of the piles for each pier and the core would likely result in the impact of the sediment between the piles. For the purposes of this preliminary impact assessment, an impact surface area of 5 m x 5 m is being considered for each column and 23.5 m x 8.5 m for the core.

An overlay of the tower piles and maritime archaeological potential is presented in Figure 114. This shows that one of the columns and half of the core would be positioned in areas of low maritime archaeological potential while the rest of the tower foundations would be within areas of high maritime archaeological potential. The total surface impact within areas of low maritime archaeological potential would be approximately 125 m² and the total surface impact of areas with high maritime archaeological potential would be approximately 375 m². The exception would be within the footprint of current structural supports or piers for the present buildings where the maritime archaeological potential is nil.

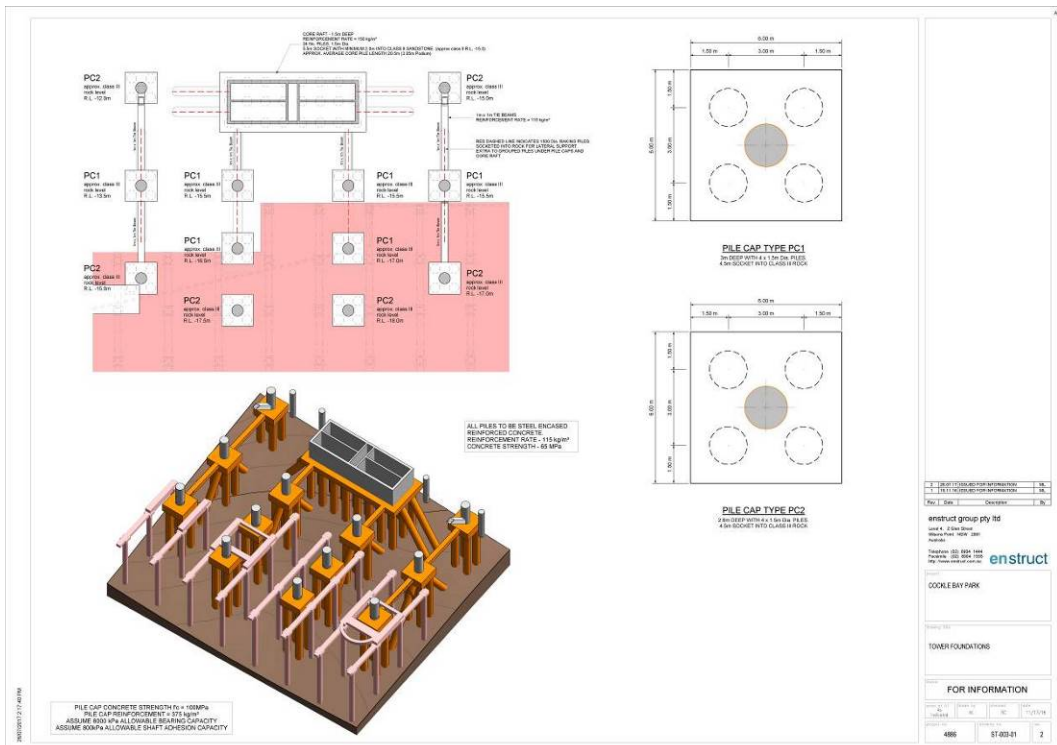


Figure 113: Initial structural plan of the tower foundations for Cockle Bay Park.⁶⁷

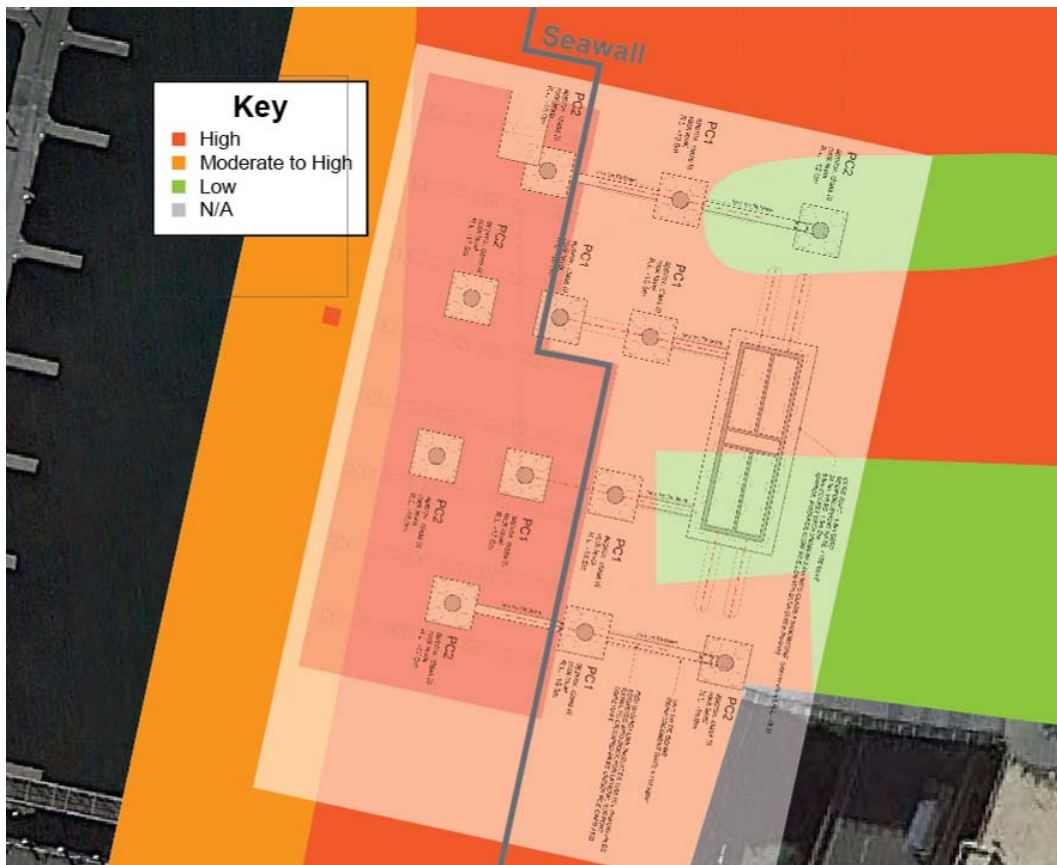


Figure 114: Overlay of tower foundations with map of maritime archaeological potential (see Figure 112).

⁶⁷ Enstruct Group Pty Ltd, July 2017, Cockle Bay Park Structural Drawings, prepared for DPT Operator Pty Ltd & DPPT Operator Pty Ltd.

8.3 Preliminary Impact Assessment

Based on the NSW Heritage Office Manual 'Statements of Heritage Impact', an impact assessment for an item of heritage significance must address a number of questions relevant to the proposed works. These questions help to ascertain whether all options have been explored prior to the proposed works taking place and whether the proposed option will have an acceptable or unacceptable impact on the heritage significance of the item.

8.3.1 Impact on Remains of Wharves, Seawalls and Related Material (c.1830 to 1970)

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

There are no aspects of the proposed works that enhance the heritage significance of the archaeological remains associated with the former wharves and related material present on the eastern side of Cockle Bay.

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

The piles associated with the tower structure will have a direct impact on the potential maritime archaeological deposits identified to be present underwater and beneath reclamation on the eastern side of Cockle Bay. This impact, however, is expected to be a small area relative to the size of the potential archaeological resource. The total surface impact within areas of low maritime archaeological potential is approximately 125 m², and the total surface impact of areas with high maritime archaeological potential is approximately 375 m². No additional indirect impacts are expected to occur on the site. The proposed works are expected to have a moderate impact to the heritage significance of the potential maritime archaeological remains present in Cockle Bay.

Have more sympathetic options been considered and discounted? Why?

This impact is based on initial concept structural plans. During the design excellence process, opportunities may arise to mitigate piling impacts. Sympathetic construction methodologies should also be explored, such as using hollow piles in preference to solid piles.

Are the proposed changes sympathetic to the heritage item/study area? In what way? (e.g. form, proportions, design)

The extent of impact to potential maritime archaeological remains caused by the tower structure is a relatively small area of impact in relation to the size the potential maritime archaeological resource.

Is the assessed impact acceptable / can it be mitigated?

The proposed piling works associated with the tower structure consists of installing 72 piles within clusters that will impact approximately 125 m² within areas of low maritime archaeological potential and approximately 500 m² within areas with high maritime archaeological potential. This impact to potential remains of State significance is assessed as moderate, however, mitigation could reduce the severity of the impact to acceptable. The impact in areas of high maritime archaeological potential could be mitigated with selected archaeological excavation, focused on areas of impact towards the east where older remains may be located. Impact in areas of low maritime archaeological potential may be mitigated by implementing a monitoring program during demolition and excavation works.

8.3.2 Impact on Sheet Piling (c.1930s to 1980s)

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

The sheet piling present on the eastern side of Cockle Bay as this sheet piling has no heritage significance to enhance.

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

Two piles associated with the tower structure will have a direct impact on the sheet piling. However, the sheet piling does not have any heritage significance.

Have more sympathetic options been considered and discounted? Why?

Consideration of more sympathetic options is not required as the sheet piling has no heritage significance.

Are the proposed changes sympathetic to the heritage item/study area? In what way? (e.g. form, proportions, design)

The proposed changes are neither sympathetic nor not sympathetic as the sheet piling has no heritage significance.

Is the assessed impact acceptable / can it be mitigated?

The impact to the sheet piling is acceptable without requiring mitigation.

8.3.3 Impact to S.S. South Steyne

The heritage significance of S.S. *South Steyne* is in no way directly related to its current position at Harbourside Wharf. As a moveable item, its significance would not be impacted by a change in location or a change of the surrounding environment and landscape. As such, any development on the eastern side of Cockle Bay will not impact, visually or otherwise, the heritage significance of S.S. *South Steyne*. In addition, an overshadow analysis has been produced for the proposed development on the eastern side of Cockle Bay.⁶⁸ This analysis demonstrates that the closest shadowing created by the proposed tower to the vessel (on 21st December at 9am, shown in yellow) is still to the south of the current position of S.S. *South Steyne* and not impact the vessel (Figure 115).



Figure 115: 21st December shadow visualisations.⁶⁹

8.4 Potential Mitigation Measures

There are a number of potential mitigation measures that may be required to reduce the severity of the impact of a development to an acceptable level. These mitigation measures would be undertaken during design development and documented as part of the projects SSDA Stage 2 EIS. Also, further assessment would be required once the development plans are finalised to assess the impact to known and potential maritime archaeological sites as well as to select the most effective and proportionate method(s) of mitigation in relation to the significance of the archaeological site and extent of impact. This assessment is usually undertaken as part of a Maritime Archaeological Management Plan (MAMP) once the design for the proposed development is finalised, and would be part of the SSDA Stage 2 EIS.

The preliminary impact assessment prepared in the previous section demonstrates the type of impacts to the heritage significance of potential maritime archaeological remains as a result of tower foundations. The mitigation measures proposed to reduce the impact includes select archaeological excavation and a monitoring program.

⁶⁸ FJMT Studio, 2017, *Cockle Bay Development*, draft report for GPT, Brookfield and AMP: 90-101

⁶⁹ *Op. Cit.* FJMT Studio, 2017: Fig. 8, p. 100.

Should there be additional impacts, the extent of mitigation measures would proportionately increase. Additional impacts could include piling for other structures and/or the installation of plant equipment as part of the construction methodology. Unlike the confined potential impacts of the tower structure, piling for additional structures could span over a large area. Potential mitigation measures for a wide-spread impact may include selected sample excavations in key areas of impact or where there is a predicted concentration of remains.

The types of mitigation measures described above are detailed below, along with other potential mitigation measures.

Pre-Disturbance Survey

Once the design of the proposed development is finalised and the specific seabed impact areas are identified, a pre-disturbance survey may be recommended within the footprint of the impact. This would be similar to the site inspection undertaken for this assessment but would be targeted at the footprint of impact and involve more highly detailed archaeological recording of a site without causing disturbance through creating a site plan using measurements, photographs and video.

The information recorded in pre-disturbance surveys can be used as the basis for informed planning for a salvage excavation. It can also be used as an archival recording of the site before demolition or burial, for recovery of object(s) for detailed recording above water, or for baseline data to be used in the ongoing monitoring of the site.

Monitoring During Development Excavation

For monitoring to be effective, a comprehensive monitoring protocol is essential along with thorough inductions for work crews. On-site monitoring is effective during any excavation phases of construction in order to identify and record unexpected sites, both on land and underwater. On-call monitoring takes place when the likelihood of encountering finds of cultural heritage significance is very low. In this case, finds can be transmitted to the on-call archaeologist via text and email and the archaeologist will respond with advice.

Test Excavation, Excavation or Salvage

Maritime archaeological test excavation and/or future salvage works could be undertaken on land or underwater in the location of works that will directly impact known and potential maritime archaeological sites. The maritime archaeological work could either extend to the limit of the known impact or to the sandstone bedrock which would mark the extent of potential archaeological remains.

Underwater excavations can be equipment intensive with the use of surface supplied breathing apparatus, diver operated water induction dredges or airlifts and dive platforms. For foreshore sites, it may be possible to erect watertight sheet piling or bunds around the site which would allow for de-watering and an excavation using similar techniques to those on land.

Artefact relocation

Conserving and long-term storage of artefacts from past or current marine environments is a high-cost and demanding process. Because of this, agencies responsible for the management of underwater cultural heritage often consider artefact relocation as a preferable measure.

For artefacts to be reburied successfully they require to be returned to a similar environment from which they were recovered. For example, if an artefact is recovered from a sandy seabed at 10 m depth of water where there is little current, a similar environment should be sought. This usually means they should be re-buried close to where they were found. The artefacts should also be buried at a depth to effect anaerobic conditions, which can dramatically slow down fabric degradation. Wrapping the artefacts in geo-fabric facilitates the creation of an anaerobic environment. The location(s) for the underwater repository should be chosen to ensure accessibility and security. It should be located close to the study area.

9 MANAGEMENT ADVICE

9.1 Management of Discovered Archaeological Sites

A number of archaeological sites were identified in the site inspection, however, additional archaeological sites may also be identified during pre-disturbance survey detailed inspection of impact areas prior to development or during monitoring during development excavation. In any situation, the management of discovered archaeological sites largely depends on the type of site, its heritage significance and the extent of impact.

Known and potential sites have been assessed for heritage significance within this report. Once the design of the proposed development is known and specific impacts can be assessed, a Maritime Archaeological Statement of Heritage Impact (MASoHI) will be required to assess the level of impact to the heritage significance of the sites. This will guide appropriate mitigation for known archaeological sites and for potential archaeological sites and site types, the management of which would be detailed in a Maritime Archaeological Management Plan (MAMP).

The management of discovered archaeological sites may involve mitigation measures as described in **Section 8.4** including additional pre-disturbance surveys, excavation, and salvage and/or artefact relocation. Specific details for the management of a discovered site or potential site would be detailed in the MAMP, including how the site should be:

- Investigated;
- Recorded;
- Conserved – including long term conservation and storage of relics; and,
- Interpreted – such as meaningful incorporation of this heritage into the proposed public domain, including landscaping, artwork and internal heritage interpretation in publically-accessible areas of the development.

9.2 Advice for Ongoing Management

Additional assessments will be required for the Stage 2 SSDA and future stages of the project. Once the project design is determined, the Stage 2 SSDA should include a full MASoHI of the design and a MAMP for the proposed development. While these assessments can use this MAA as a basis, full assessments of the impacts and detailed management measures may require additional information from pre-disturbance surveys or test excavations.

The MAMP would detail archaeological measures that will need to take place before, during and after construction to mitigate any impacts that the development would have on known and potential archaeological sites. This may include additional excavations for the recovery or salvage of information prior to development.

The MAMP would also include protocols for the management of archaeological sites during demolition and excavation stages by a suitably qualified maritime archaeologist. This would involve a procedure for the assessment and management of unexpected finds with a guide of the level of recording, excavation, conservation, preservation and interpretation that should be undertaken for the find.

In summary, the ongoing assessment and management of the site should follow the process outlined in Table 6.

Table 6: Maritime archaeological management stages per development phase.

Development Phase	Maritime Archaeological Management
Stage 2 SSDA	<ul style="list-style-type: none"> • Pre-disturbance survey (if required) • Test excavation (if required) • MASoHI • MAMP
Pre-construction	<ul style="list-style-type: none"> • Additional recording (if required) • Excavation / salvage (if required)
During Construction	<ul style="list-style-type: none"> • Monitoring • Excavation / salvage (if required) • Conservation (if required) • Artefact relocation (if required)
After Construction	<ul style="list-style-type: none"> • Provision of interpretation (if required) • Ongoing conservation (if required)

10 CONCLUSION AND SUMMARY OF KEY FINDINGS

The key findings of this MAA are as follows:

- The Stage 1 SSDA 7684 for the Cockle Bay Park Development project received comments from NSW Heritage Council that included a number of requests concerning maritime archaeological assessments. The MAA is intended to address these requests.
- The S.S. *South Steyne* is listed on the State Heritage Register as a moveable item of State Significance (Item Number 00755). The proposed development will not impact, visually or otherwise, the heritage significance of this item in its current mooring location.
- The 2017 Aboriginal Heritage Due Diligence Report prepared by GML Heritage for this project identified Aboriginal activities that may have taken place within the study area based on known sites in the vicinity. Evidence of additional inundated sites may be within the study area.
- The eastern side of Cockle Bay has been used for maritime purposes since the beginning of the 19th century and continued until the mid-20th century. This included the construction of 24 historic wharves within or adjacent to the study area. There have also been episodes of seawall construction and land reclamation on the eastern side of Cockle Bay throughout the last two centuries.
- A diving site inspection was undertaken on 21st August.
- The inspection identified the 1997 seawall along the entire of the study area as well as steel sheet piling in the northern half of the study area.
- Remains of timber sheet piling with Monier concrete plating was identified, being remains of a c.1903-1908 seawall, as well as two other piles that may be associated with historic wharves.
- Potential historic sites within the study area include wharves and related material, seawalls, shipwrecks, discard from vessels and discard in and under reclamation fill.
- A map with likelihood ratings of archaeological potential is provided in Figure 112
- Remains of wharves and related material (c.1830 to 1970) were assessed to be of State significance as they represent the earliest private maritime infrastructure development in Sydney Harbour and a finite archaeological resource.
- The timber sheet piling with Monier concrete plates and potential remains of other seawalls were assessed to be of State significance as the archaeological remains may yield information on the adaption of seawalls and/or the location, material and form of seawalls which are not be available in the historic record.
- The sheet piling was identified as having no heritage significance.
- A preliminary impact assessment was provided based on initial structural drawings of the piles presented in this report. This found that potential impacts on remains of wharves, seawalls and related material (c.1830 to 1970) could be satisfactorily mitigated by select archaeological excavation in areas of high maritime archaeological potential and monitoring in areas of low archaeological potential. The potential impact on sheet piling is likely to be acceptable without mitigation.
- The Stage 2 SSDA should include a MASoHI and MAMP, which may require additional information from pre-disturbance surveys or test excavations once the project design is determined. Mitigation measures may be required prior to construction, during construction and after construction.

REFERENCES

Archival Images

- Adastra Aerial Survey, May-June 1943**, Commissioned by NSW Main Roads Department; available from NSW Land and Property Information, SIX viewer <http://maps.six.nsw.gov.au/>
- Anon, n.d.**, “Construction of a “rat proof” wall at Darling Harbour, NSW.” NSW State Records, Digital ID: 9856_a017_A017000009.
- Anon, n.d.**, “View of a rat-proofed wall.” NSW State Records, Digital ID: 9856_a017_A017000018.
- Anon, 1822**, *Plan of the town and suburbs of Sydney, August, 1822*, Ferguson Collection, Map 107, State Library of New South Wales.
- Anon., c.1840**, “Albion Mills (Darling Harbour) c.1840”, archival print, State Library of New South Wales, available <https://shop.sl.nsw.gov.au/albion-mills-darling-harbour-c-1840/>, accessed 10 August 2017.
- Anon, 1866**, “Views of Sydney and N.S.W. No. 58. Darling Harbour, East Side, 1866.” Dixson Library, State Library of New South Wales, Image No. DL PX 148.
- Anon, 1902**, “Views of Sydney and N.S.W. No. 46. Pyrmont Bridge.” Dixson Library, State Library of New South Wales, Image No. DL PX 146.
- Anon, 1907**, “Pyrmont Bridge.” Geoff Ward collection, NSW Transport - Roads and Maritime Services archives, Image No. H032110.
- Anon, 1909**, “Darling Harbour, 1909.” City of Sydney Archives, Graeme Andrews “Working Harbour” Collection; 79983. MSBK 451.
- Anon, 13th September 1918**, “Construction of new No. 35 Darling Harbour.” Government Printing Office Collection, State Library of NSW, Image No. GPO/1-21067.
- Anon, 13th September 1918**, “Construction No. 36, Darling Harbour.” NSW State Library, NSW Government Printing Office Series, Image MSBL810, Digital # d1_21066.
- Anon, 18th December 1918**, “No. 36 Darling Harbour under construction.” Government Printing Office Collection, State Library of NSW, Image No. GPO/1-21062.
- Anon, 24th February 1919**, “Cross Wharf, No. 35-36, Darling Harbour.” NSW State Library, NSW Government Printing Office Series, Image MSBL907, Digital # d1_25064.
- Anon, 5th June 1919**, “Seawall between No.35 & 36, Darling Harbour.” NSW State Library, NSW Government Printing Office Series, Image MSBL908, Digital # d1_25066.
- Anon, 1930s**, “The coastal cargo ship *Craigend* departing wharf 37B, Darling Harbour, during the 1930s.” Sam Hood Collection, Australian National Maritime Museum.
- Anon, 1984**, “Darling Harbour.” Sydney Reference Collection, City of Sydney Archives, Image No. 071490.
- Anon, 1988**, “Aerial view of Darling Harbour.” Sydney Reference Collection, City of Sydney Archives, Image No. 031482.
- Bayliss, C., ca. 1890s**, “Union Wharf, Darling Harbour, New South Wales.” Collection of photographs of New South Wales, ca. 1876-1897, National Library of Australia, Image pic-vn4193945-v.
- City of Sydney Council, Surveyor’s Department, 1865**, *Trigonometrical Survey of Sydney; Sections E & W, 1865*. City of Sydney Archives – Digital Information <http://www.photosau.com.au/CoSMaps/scripts/home.asp>
- City of Sydney, 1958**, *City of Sydney Planning Scheme*. “Historical Atlas of Sydney.” City of Sydney Archives – Digital Information <http://www.photosau.com.au/CoSMaps/scripts/home.asp>
- Foster, A. E., 1923**, “Panorama of Darling Harbour and Pyrmont Bridge from Pyrmont, 1923.” Box 32, No. 357, Series 06; Sydney views, ca. 1916-1947, State Library of New South Wales.
- Great Britain Parliament, House of Commons, Select Committee on Transportation, 1836**, Plan of Sydney with Pyrmont, New South Wales: the latter the property of Edwn Macarthur Esqre, divided into allotments for building, 1836. National Library of Australia, Map T 1551.

- Mitchell, Sir. T., Lt. Coll.; Surveyor General, 1853**, Trigonometrical survey of Port Jackson: commenced as a military survey by order of General Darling and continued as civil duties permitted or required. Engraved by J. W. Lowry. T. & W. Boone, New Bond Street, London. National Library of Australia MAP RM 1267; Tile C1.
- NSW Department of Lands, 1895**, *City of Sydney, Sections 21 & part of 30, 2nd ed., 1895 (Sydney Metropolitan Detail Series)*. Lithographed & printed at the Surveyor General's Office Sydney N.S.W. State Library NSW, Digital Order No. a1367424.
- NSW Roads and Bridges Branch, 1900**, Darling Harbour Resumptions, Showing by red tint part of land resumed in connection with the Darling Harbour Improvement Scheme, City of Sydney, Within Section 21 and part of Section 30 (Plan K). City of Sydney Archives – Digital Information <http://www.photosau.com.au/CoSMaps/scripts/home.asp>
- NSW Department of Lands, 1970**, *Parish of St Andrew, County of Cumberland*. 2nd Edition. NSW Land & Property Information.
- Putnam, C., 1969**, “Darling Harbour, 1969.” Contributed by G. Putnam, *Dictionary of Sydney*. <http://dictionaryofsydney.org/item/20947>
- Sheilds, F. W., 1844**, *Map of the City of Sydney, New South Wales*. “Historical Atlas of Sydney.” City of Sydney Archives – Digital Information <http://www.photosau.com.au/CoSMaps/scripts/home.asp>
- Walsh, H. D and S. E. Perdriau / Sydney Harbour Trust, 1907**, Map of part of the water frontage of the City of Sydney showing parts of the land and wharfage vested in the Sydney Harbour Trust Commissioners. State Library of New South Wales, Image No. Z/M3 811.15/1907/1.
- Walsh, H. D and S. E. Perdriau / Sydney Harbour Trust, 1911**, *Map of part of the water frontage of the Port of Sydney showing parts of the land and wharfage vested in the Sydney Harbour Trust Commissioners*. State Library of New South Wales, Image No. Z/M3 811.15/1911/1.
- Walsh, H. D and S. E. Perdriau / Sydney Harbour Trust, 1919**, *Map of part of the water frontage of the Port of Sydney showing parts of the land and wharfage vested in the Sydney Harbour Trust Commissioners*. State Library of New South Wales, Image No. Z/M3 811.15/1919/1.

Secondary Sources

- Attenbrow, V., 1987**, *The Upper Mangrove Creek Catchment: a study of quantitative change in the archaeological record*. Unpublished PhD Thesis, University of Sydney.
- Attenbrow, V., 1990**, *The Port Jackson Archaeological Project: Stage 1*. Unpublished report to the NSW National Parks and Wildlife Service.
- Attenbrow, V., 2002a**, *Sydney's Aboriginal Past: Investigating the Archaeological and Historic Records*. UNSW Press, Sydney.
- Attenbrow, V., 2002b**, *Resource and land use patterns around Sydney Harbour*. Unpublished seminar, Australian Museum, Prehistoric and Historical Archaeology Department.
- Attenbrow, V. and D. Steele, 1995**, “Fishing in Port Jackson, New South Wales – more than meets the eye.” *Antiquity*. V. 69: 47-60.
- Birch, G. F., 2007**, “A short geological and environmental history of the Sydney estuary, Australia.” In Birch, G. F. (ed) *Water, Wind, Art and Debate*, Sydney University Press, The Sydney University.
- Bowdler, S., 1970**, *Bass Point: the excavation of a south-east Australian shell midden, showing cultural and economic change*. Unpublished BA (Hons) Thesis, Sydney University.
- Bureau of Meteorology, Australian Government, 2017a**, ‘Tide Predictions for Australia, South Pacific and Antarctica’, available <http://www.bom.gov.au/australia/tides>, accessed 22 August 2017.
- Bureau of Meteorology, Australian Government, 2017b**, ‘Sydney, New South Wales, August 2017 Daily Weather Observations’, available <http://www.bom.gov.au/climate/dwo/IDCJDW2124.latest.shtml>, accessed 22 August 2017.
- Coffey Corporate Pty Ltd, 2016**, *Proposed Development (CBW Project) at Cockle Bay: Initial Geotechnical Assessment*, report for DPT Operatory Pty Ltd.

- Cosmos Archaeology, May 2015**, *Cockle Bay Marine Structures Redevelopment: Maritime Archaeological Survey and Statement of Heritage Impact*, report for Sydney Harbour Foreshore Authority.
- Enstruct Group Pty Ltd, July 2017**, *Cockle Bay Park Structural Drawings*, prepared for DPT Operator Pty Ltd & DPPT Operator Pty Ltd.
- Enstruct Group Pty Ltd, August 2017**, *Cockle Bay Park Structural Engineering Report*, prepared for DPT Operator Pty Ltd & DPPT Operator Pty Ltd.
- FJMT Studio, 2017**, *Cockle Bay Development*, draft report for GPT, Brookfield and AMP: 90-101.
- GML Heritage, August 2017a**, *Cockle Bay Park: Historical Archaeological Assessment*, draft report prepared for DPT and DPPT.
- GML Heritage, August 2017b**, *Cockle Bay Park: Aboriginal Heritage Due Diligence Report*, prepared for DPT and DPPT.
- Harris, P. and O'Brien, P., December 1998**, *Australian Ports Environmental Data and Risk Analysis. Phase 1; Literature Review*, Prepared for Australian Quarantine Inspection Service (AQIS) Petroleum and Marine Division, Australian Geological Survey Organisation, Canberra, ACT.
- Hiscock, P., 2008**, *Archaeology of Ancient Australia*. London and New York: Routledge.
- JBA, 2016**, *Environmental Impact Statement: State Significant Development Application: 241-249 Wheat Road, Cockle Bay (SSD 7684): Cockle Bay Wharf Redevelopment*, report for Department of Planning on behalf of DPT and DPPT Operator Pty Ltd: iii.
- Kohen, J.L., E.D. Stockton and M.A.J. Williams, 1984**, "Shaws Creek KII Rockshelter: a prehistoric occupation site in the Blue Mountains piedmont, eastern New South Wales." *Archaeology in Oceania*. Vol. 19: 57-93.
- Lampert, R.J., 1971**, "Burrill Lake and Currarong." *Terra Australis 1*. Department of Prehistory, Australian National University, Canberra.
- Lourandos, H. and A. Ross, 1994**, "The great 'Intensification Debate': Its history and place in Australian archaeology." *Australian Archaeology* 39:54-63.
- Macdonald Wagner, 1985**, "Darling Harbour Development Project: Waterfront Promenade: Existing Structures and Outfalls Plan", for Leighton Contractors Pty Ltd on behalf of New Darling harbour Authority, as found in **Enstruct Group Pty Ltd, August 2017**, *Cockle Bay Park Structural Engineering Report*, prepared for DPT Operator Pty Ltd & DPPT Operator Pty Ltd: 14.
- Multiplex, Brookfield and AMP Capital, August 2017**, *DP5-CMP-SK02 Construction Staging Plan Part 1 for Cockle Bay Park Project*, prepared for DPT Operator Pty Ltd & DPPT Operator Pty Ltd.
- Nanson, G.C. et al., 1987**, "Chronology and paleoenvironment of the Cranebrook Terrace (near Sydney) containing artefacts more than 40,000 years old." *Archaeology in Oceania*. Vol. 22 (2): 72-78.
- Nutley, D. M., 2005**, *Surviving Inundation: An examination of environmental factors influencing the survival of inundated Indigenous sites in Australia within defined hydrodynamic and geological settings*. Unpublished thesis (MA Maritime Archaeology), Department of Archaeology, Flinders University, South Australia.
- Roy, P.S., 1981**, "Quaternary Geology." in Herbert C, (ed.) *Geology of the Sydney, 1:1000,000 Sheet 9130*. Geological Survey of New South Wales, Sydney.
- Roy P.S., Zhuang, W., Birch, G. F., Cowell, P.J. and Li, C., 1997**, *Quaternary geology of the Forster-Tuncurry coast and shelf, Southeast Australia*. Geological Survey of New South Wales, Department of Minerals Resources, Sydney.
- Sale, C., 2000**, "Sydney: Olympic City 2000" *Geography Bulletin*. (Summer).
- Stockton, E.D. and W.N. Holland, 1974**, "Cultural sites and their environment in the Blue Mountains." *Archaeology and Physical Anthropology in Oceania*. Vol. 9: 36-64.
- Thom, B.G., and P.S. Roy, 1985**, "Relative sea levels and coastal sedimentation in southeastern Australia in the Holocene." *Journal of Sedimentary Petrology*. Volume 55 (2)

- Vinnicombe, P., 1980**, "Predilection and Prediction: A Study of Aboriginal Sites in the Gosford-Wyong Region." Unpublished report to the NSW National Parks and Wildlife Service.
- Walsh, H.D., 1911**, *Notes on Harbour Engineering*. A Paper read before the Sydney University Engineering Society on 8th November 1911.
- Weir Phillips Heritage, August 2017**, *Heritage Impact Statement: Cockle Bay Park Redevelopment: 241-249 Wheat Road, Cockle Bay*.
- Williams, R. J., 2014**, *Estuarine shorelines of southeastern Australia*. In Swapan, P. (ed) *Workbook for Managing Urban Wetlands in Australia*. Sydney Olympic Park Authority, NSW.
- Williams, A.N., P. Mitchell, R.V.S. Wright and P.S. Toms, 2012**, "A Terminal Pleistocene Open Site on the Hawkesbury River, Pitt Town, New South Wales. *Australian Archaeology*. No. 74.

Legislative Items and Guidelines

- Australia ICOMOS Inc. 1999** *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance*. Article 1.2.
- NSW Heritage Branch, 2000**, Schedule of General Exceptions
- NSW Heritage Branch, 2006**, Standard Exceptions for Works Requiring Heritage Council Approval
- NSW Heritage Branch, 2006**, Schedule of Additional Exceptions
- NSW Environment and Heritage, 2002**, "**Pyrmont Bridge**", available <http://www.environment.nsw.gov.au/heritageapp/HeritageItemImage.aspx?ID=5053337#ad-image-8>, accessed 26 February 2015
- NSW Environment and Heritage, 2002**, "**Corn Exchange**", available www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?id=5050763, accessed 09 August 2017.
- NSW Heritage Office, 2007**, 'Maritime Heritage Online', NSW, available <http://www.environment.nsw.gov.au/maritimeheritage/index.htm>
- NSW Heritage Office and Department of Urban Affairs and Planning, 2002**, *Statements of Heritage Impact*