Cockle Bay Park Redevelopment

Appendix NN: Technical Paper - Non-Aboriginal Archaeological Assessment

State Significant Development, Development Application (SSD DA)

Report to DPT Operator Pty Ltd and DPPT Operator Pty Ltd

8 October 2021
Revision [A]

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EXECUTIVE SUMMARY

This report has been prepared to accompany a detailed State Significant Development (SSD) Development Application (DA) (Stage 2) for a commercial mixed use development, Cockle Bay Park, which is submitted to the Minister for Planning and Public Spaces pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The development is being conducted in stages comprising the following planning applications:

- **Stage 1** – Concept Proposal setting the overall 'vision' for the redevelopment of the site including the building envelope and land uses, as well as development consent for the carrying out of early works including demolition of the existing buildings and structures. This stage was determined on 13 May 2019 and is proposed to be modified to align with Stage 2.
- **Stage 2** – Detailed design, construction, and operation of Cockle Bay Park pursuant to the Concept Proposal.

DPT Operator Pty Ltd and DPPT Operator Pty Ltd (the proponent) have engaged Artefact Heritage Services Pty Ltd (Artefact Heritage) to prepare an Aboriginal Cultural Heritage Assessment Report (ACHAR) for the study area located in Darling Harbour, in the City of Sydney Local Government Area (LGA) as part of the SSD DA Stage 2 (SSD-9978934). The proposal consists of the multistorey redevelopment of the site as a mixed-use commercial office development, and also the construction of a land bridge across part of the Western Distributor between Darling Harbour and Darling Park.

The study area is situated in the first industrial precinct in the history of Australia and for over a century it played a central role as an industrial and maritime hub. It therefore has potential to hold archaeological deposits of considerable technical and research significance. Archaeological excavations that have been undertaken in the immediate vicinity of the study area have illustrated the potential for archaeological remains to be present at considerable depth below current ground levels. This depth of deposition largely results from the significant and multiple phases of land reclamation that have taken place at Darling Harbour. Land reclamation has also resulted in the successive creation and subsequent burial of sea walls in the surrounds of the study area such as at Barangaroo.

Findings

It was found that:

- The study area is within the first industrial precinct in Australia
- The study area includes the location of what is among the earliest dedicated shipping and maritime infrastructure in Australia
- This shipping and maritime activity continued up to the second half of the twentieth century
- Significant land reclamation has taken place in the study area associated with this shipping and maritime industry
- Archaeological excavations carried out near the study area have recovered remains often deeply buried beneath land reclamation fill. Such remains have included:
    - Substantial stone seawalls
    - Stone footings and wharves
    - Timber wharf piles and retaining walls
    - Remnants of industrial machinery and infrastructure
    - Substantial footings and wall remnants of industrial

- Historical processes of demolition and reconstruction will have impacted the remains of these structures in the study area. It is uncertain to what extent archaeological evidence of these structures remain
- Assessment has been made of zones of relative archaeological potential and this has been cross referenced to the proposed impacts
- Archaeological potential is modelled as:
    - High in locations of known historical construction and significant land reclamation and fill events
    - Moderate in locations of known historical construction that have not been subject to land reclamation and fill and where modern construction/development has taken place
    - Nil-low in locations of known historical construction, not subject to land reclamation and fill, and where modern excavation such as for multistorey subsurface car parking has taken place
- Overall, it has been assessed that the proposal would result in moderate impacts to potential archaeological resources within the study area
- Management and mitigation measures have been formulated to appropriately address the potential impacts of the proposal on the modelled archaeological values.

Summary of mitigation measures

Ref.	Mitigation measure	Description
NAH1	Heritage Management Plan (HMP)	A HMP must be prepared for the project to provide heritage guidance for the project during the construction phase. The HMP should be incorporated into the project Construction Environmental Management Plan (CEMP) and/or prepared as a standalone Construction Heritage Management Plan (CHMP). The objectives of the HMP would include: • To identify the heritage constraints and requirements of the project including the Conditions of Approval • Provide details on management and mitigation measures, such as those outlined in this Technical Paper, to be implanted to prevent or minimise impacts on heritage items • To outline the required archaeological management strategies.
NAH2	Heritage induction	All relevant construction staff, contractors and subcontractors must be made aware of their statutory obligations for heritage under the *NSW Heritage Act 1977* and best practice as outlined in *The Burra Charter* (Australia ICOMOS 2013) to ensure no archaeological remains or heritage fabric are impacted during the proposed works without appropriate mitigation measures in place. This will be implemented through a heritage induction carried out prior to works commencing and continued throughout the works program as staff are inducted to the work place
NAH3	General archaeological management	This Technical Paper, which has been informed by the results of archaeological background investigations, has determined that the project may result in impacts to archaeological objects at locations where projected depths of excavation or piling will impact locations in which identified or potential archaeological remains are likely to be

Ref.	Mitigation measure	Description
		present. **Monitoring, test excavation and salvage** Where proposed excavations may impact potential archaeological remains, programs of archaeological monitoring and test excavation would be undertaken to identify the presence of archaeological remains. If archaeological remains are identified, programs of archaeological salvage excavation would be undertaken to investigate and document the potential extent and significance of these archaeological remains. Artefacts retrieved during the archaeological investigations must be professionally cleaned, catalogued, analysed and reported on as part of final project reporting. Artefacts will remain the property of the proponent. The long-term management of these artefacts may include their incorporation to project heritage interpretation or other avenues as deemed suitable in consultation with Heritage NSW, Department of Premier and Cabinet (Heritage NSW, DPC) and heritage professionals. This process of archaeological investigation would be guided by an Archaeological Research Design (ARD) that would be prepared for the project (discussed below) and would be managed by a suitably qualified Excavation Director
NAH4	Archaeological management: Piling	The ARD would also contain provisions for piling location management. These may vary with regard to the particular location of piles and the accessibility or feasibility of varied management methods ranging from programs of active archaeological investigation including monitoring, test excavation, and salvage excavation, to management through an Unexpected Finds Procedure
NAH5	Archaeological Research Design	An ARD would be prepared prior to the commencement of the construction phase to outline the required archaeological management within the construction boundaries. The ARD would confirm the areas requiring archaeological management (following the detailed design), outline the archaeological methodology to be implemented during archaeological investigations, and outline research questions that the archaeological investigations would aim to answer. The ARD may be supported by additional Archaeological Work Method Statements to be prepared during the construction phase as required
NAH6	Heritage Interpretation	The project design should incorporate appropriate heritage interpretation in accordance with the NSW *Heritage Manual*, the NSW Heritage Office's *Interpreting Heritage Places and Items: Guidelines* (August 2005), the NSW Heritage Council's *Heritage Interpretation Policy*. A Heritage Interpretation (HIS) has been prepared for the project EIS by Weir Phillips (2021, Appendix T) in accordance with CoA C11 and SEARs no. 13. The HIS has been prepared to guide the incorporation of heritage interpretation, such as displays and panels, into the project design. The heritage interpretation should consider the results of archaeological investigations undertaken as part of the project. Where appropriate, opportunities should be considered for visually or virtually representing archaeological remains and incorporating them into the visual landscape

GLOSSARY OF TERMS

Acronym	Definition
Artefact Heritage	Artefact Heritage Services Pty Ltd
ARD	Archaeological Research Design
DPIE	Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
Heritage NSW, DPC	Heritage New South Wales, Department of Premier and Cabinet
HIS	Heritage Interpretation Strategy
ICOMOS	International Council of Monuments and Sites
LEP	Local Environmental Plan
LGA	Local Government Area
NAAA	Non-Aboriginal Archaeological Assessment
NSW	New South Wales
SEARS	Secretary's Environmental Assessment Requirements
SHR	State Heritage Register
SoHI	Statement of Heritage Impact
SSD	State Significant Development

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1.0 INTRODUCTION

1.1 Proposal background

This report has been prepared to accompany a detailed State Significant Development (SSD) Development Application (DA) (Stage 2) for a commercial mixed use development, Cockle Bay Park, which is submitted to the Minister for Planning and Public Spaces (the Minister) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The development is being conducted in stages comprising the following planning applications:

- **Stage 1** – Concept Proposal setting the overall 'vision' for the redevelopment of the site including the building envelope and land uses, as well as development consent for the carrying out of early works including demolition of the existing buildings and structures. The Concept Proposal was informed by a Historical Archaeological Assessment prepared by GML Heritage. [1] This stage was determined on 13 May 2019 and is proposed to be modified to align with the Stage 2
- **Stage 2** – Detailed design, construction, and operation of Cockle Bay Park pursuant to the Concept Proposal.

DPT Operator Pty Ltd and DPPT Operator Pty Ltd (the proponent) have engaged Artefact Heritage Services Pty Ltd (Artefact Heritage) to prepare a Non-Aboriginal Archaeological Assessment (NAAA) for land at the study area located in Darling Harbour, in the City of Sydney Local Government Area (LGA) as part of the SSD DA Stage 2 (SSD-9978934). The proposal consists of the multistorey redevelopment of the site as a mixed-use commercial office development, and also the construction of a land bridge across part of the Western Distributor between Darling Harbour and Darling Park.

1.1.1 Location

The site is located at 241-249 Wheat Road, Sydney, to the immediate south of Pyrmont Bridge. It is located on the eastern side of the Darling Harbour precinct within the Sydney Central Business District (CBD). The site encompasses the Cockle Bay Wharf development, parts of the Eastern Distributor and Wheat Road, Darling Park and Pyrmont Bridge.

The Darling Harbour Precinct is undergoing significant redevelopment as part of the Sydney International Convention, Exhibition and Entertainment Precinct, including Darling Square, and the IMAX renewal and W Hotel (The Ribbon) projects. More broadly, the western edge of the Sydney CBD has been subject to significant change following the development of the Barangaroo precinct.

The study area is owned by the NSW Government and administered by Property NSW (formerly the Sydney Harbour Foreshore Authority), with the majority of the site currently subject to a long-term lease to the proponent. The study area is within the boundaries of the Metropolitan Local Aboriginal Land Council. The study area is located within the City of Sydney Local Government Area (LGA).

The location of the study area is shown in Figure 1.

[1] GML Heritage. 2017. *Cockle Bay Park. Historical Archaeological Assessment.* Report prepared for DPT and DPPT.

The study area consists of multiple cadastral lots (shown in Figure 2):

- Lot 10 DP801770
- Lot 17 DP801770
- Lot 19 DP801770
- Lot 42 DP864696
- Lot 50 DP1009561
- Lot 60 DP1009964
- Lot 65 DP1009964
- Lot 30 DP1007434
- Lot 32 DP1007434
- Lot 33 DP1007434
- Lot 34 DP1007434
- Lot 35 DP1007434
- Lot 37 DP1007434
- Lot 56 DP1009561
- Lot 61 DP1009964
- Lot 63 DP1009964
- Lot 64 DP1009964
- Lot 11 DP1125890
- Lot 2 DP1048307
- Lot 2015 DP1234971
- Lot 1 DP1199026
- Lot 2 DP1199026

1.1.2 Local context of the project

The study area is situated on the eastern shore of Cockle Bay. Existing development on the site comprises the Cockle Bay Wharf entertainment precinct, which includes a range of tourism oriented restaurants, cafés, function spaces and entertainment venues. The existing three-storey building in the study area extends from the edge of Pyrmont Bridge in the north down to the Druitt Street Bridge connection in the south and is bounded by the Darling Harbour promenade to the west and the Western Distributor to the east. Completed in 1988 the current three storey building in the study area coincided with Australia's Bicentenary and the urban renewal of Darling Harbour. Like other projects completed within Darling Harbour in this era, such as the former Convention Centre, Exhibition Centre, Entertainment Centre and the IMAX, the existing building is due for renewal and serves as a significant opportunity to reconnect Darling Harbour with the Sydney CBD.[2]

[2] Ethos Urban 2020. Request for Secretary's Environmental Assessment Requirements. Cockle Bay Wharf - Stage 2 State Significant Development Application.

Figure 1: Map of the study area

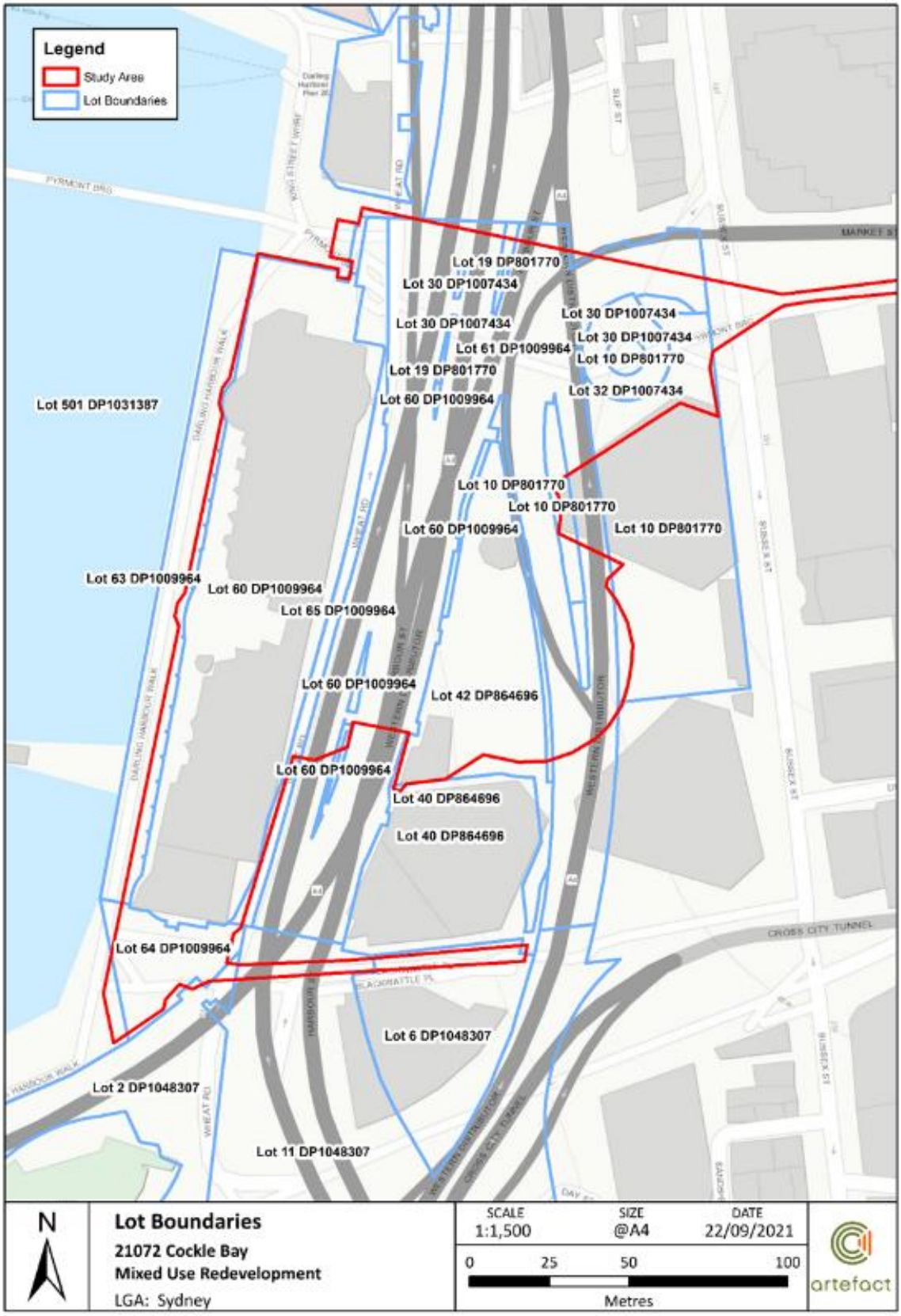


Figure 2: Cadastral lot boundaries and the study area

1.2 Overview of the proposal

1.2.1 Stage 1 Concept Proposal

The SSD DA (SSD-7684) Stage 1 Concept Proposal includes the following approved works and designs:

- Concept proposal for a commercial building envelope, comprising:
    - A maximum height of RL 183.0 Australian Height Datum (AHD)
    - A maximum GFA of 89,000 square metres (sqm) including
        - Up to 75,000sqm commercial office GFA
        - Up to 14,000sqm retail GFA
        - Minimum publicly accessible open space of 6,500 sqm
        - Building controls and design guidelines
- Works for the demolition of:
    - Existing Cockle Bay Wharf buildings and structures
    - The Crescent Garden to Cockle Bay Wharf enclosed pedestrian bridge and associated structure.
    - The former monorail station and associated structure.

Approval of the SSD DA (SSD-7684) followed an extensive planning assessment process undertaken by DPIE and the proponent between 2016 and 2019. This process included development of technical studies and assessments including that by GML Heritage.[3] GML Heritage identified zones of varying archaeological potential within the study area, with the potential for preservation of archaeological remains of local and possibly state significance. GML Heritage made recommendations for a program of historical archaeological excavation in the study area, to inform future management and mitigation measures associated with the project. This current report responds to the recommendations of GML Heritage by providing more detailed assessment of the likely location of areas of archaeological potential within the study area, and identifying based on currently available design, where impacts to archaeological potential are most likely to occur. In addition to this process of updated archaeological evaluation, there have also been multiple rounds of community consultation and public exhibition of the proposal, and an independent urban design review commissioned by DPIE, which resulted in the proponent making substantive changes to the project to improve its environmental impacts.

The building envelope approved under the Stage 1 Concept Proposal (Figure 3 and Figure 4) comprises a podium form connecting to the Darling Harbour promenade, a large expanse of public open space spanning across the Western Distributor to Sussex Street, and a tower form comprising a mid-podium with the tower above chamfered at the top to minimise overshadowing of surrounding public places. The Stage 1 Concept Proposal is proposed to be modified to align with the Stage 2 Proposal for detailed design, construction, and operation.

[3] GML Heritage. 2017. *Cockle Bay Park. Historical Archaeological Assessment.* Report prepared for DPT and DPPT.

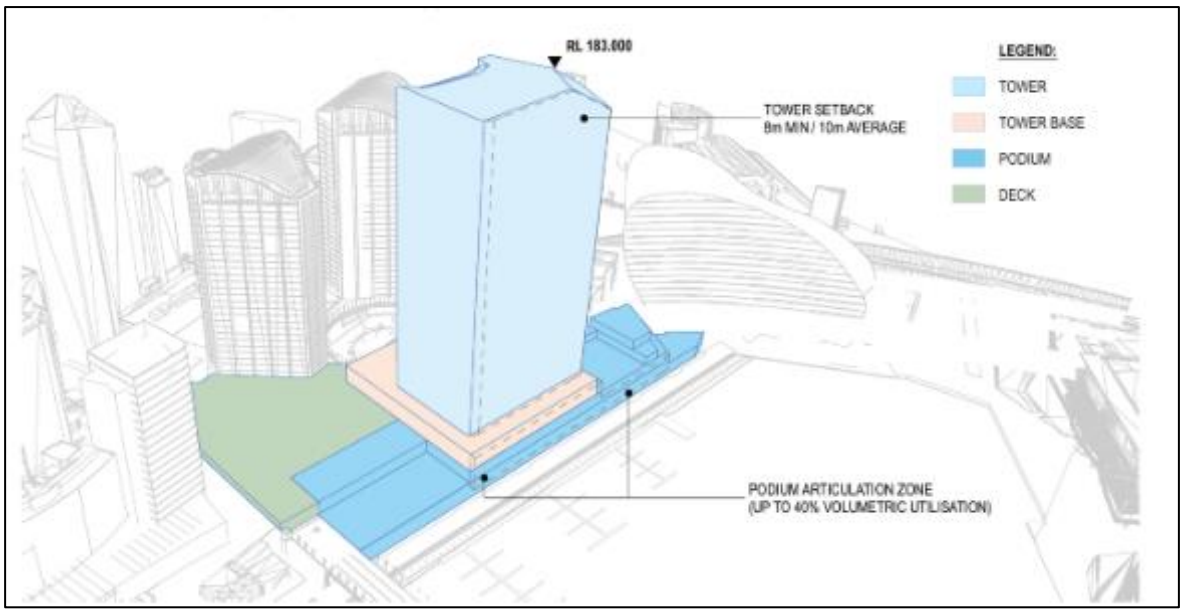


Figure 3: Stage 1 Concept Proposal - approved building envelope (Ethos Urban 2020)

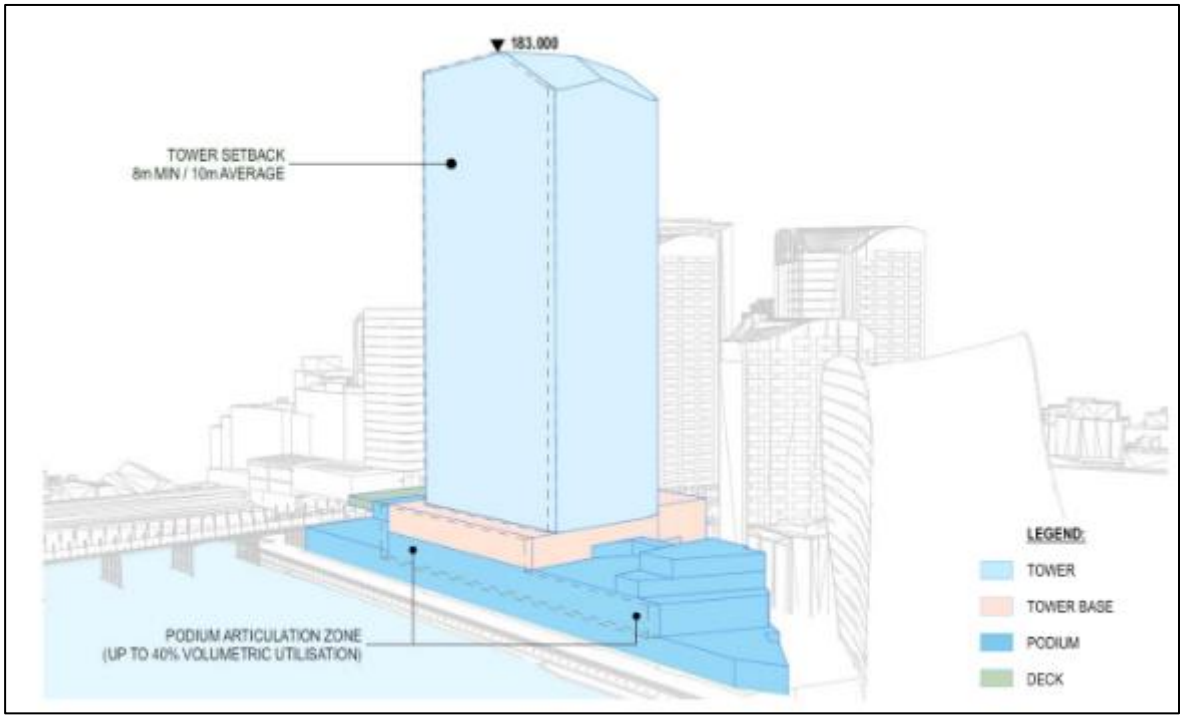


Figure 4: Stage 1 Concept Proposal - approved building envelope (Ethos Urban 2020)

1.2.2 Stage 2 Detailed Design proposal

The SSD DA (SSD-9978934) Stage 2 Detailed Design will seek consent for the detailed design development, based on the competition-winning scheme by Henning Larsen, comprising:

- Construction of a land bridge across part of the Western Distributor between Darling Harbour and Darling Park
- The design, construction and use of the new 43 storey mixed-use development, including:
    - Up to 89,000sqm of retail and commercial GFA
    - At least 6,500sqm of publicly accessible open space.
    - Site interface works to ensure the provision of appropriate interfaces and connectivity between the new development and the Pyrmont Bridge and Darling Park towers.
    - Subdivision of current cadastral lots to facilitate development.

Construction

The prime feature of the development will be the construction of a 43 level structure rising to 183m above sea level, and resting on a multistorey retail and mixed purpose platform that will lead from the Cockle Bay waterfront to existing frontages at Sussex and Market Street. Early plans (CBP-SK-HEN-ARC-DRW-10-0030 27/8/2020) indicate that there are four proposed levels of retail, from ground floor upwards. At the fourth floor building use transitions to a mixed retail and lobby setting, with floors above being commercial in nature.

Demolition and excavation

The primary location of bulk excavations for the proposal will take place along the waterfront of Cockle Bay Wharf, to the west of Harbour Street with maximum proposed excavations reaching RL -3.95 at locations where ground surface is currently RL 2.441 (Drawings No A-DA-0301, A-DA-0310). Existing approval has been obtained for the demolition of (Drawings A-D-A-0901, A-D-A-0903):

- The Cockle Bay Wharf main structure
- The footbridge between the Cockle Bay Wharf main structure and the Crescent Garden, including the escalator to and from this footbridge
- The existing Monorail Station
- Walkways and pedestrian access between the Crescent Garden and the Pyrmont Bridge Overpass
- The current alignment of Wheat Road and all joining kerbs, sidewalks and driveways.

New approval is to be sought for the demolition of the following items of (Drawings A-D-A-0901, A-D-A-0903):

- The existing interface with the Crescent Garden
- The Crescent Garden central feature
- The existing interface between the Cockle Bay Wharf main structure and the Pyrmont Bridge.
- Part of the existing footbridge leading north from the terminus of the Pyrmont Bridge
- The existing Pyrmont Footbridge which adjoins the Pyrmont Bridge and crosses Sussex Street.
- Multiple minor works associated with removal of the above items.

1.3 Purpose and scope of the report

This NAAA is one of several Technical Papers that form part of the EIS that has been prepared for the proposal. The purpose of this non-Aboriginal heritage Technical Paper is to identify and assess the non-Aboriginal archaeological heritage impacts of the proposal during construction and operation. It responds directly to the Secretary's Environmental Assessment Requirements (SEARs) outlined in Section 1.4.

This Technical Paper considers the construction and operational impacts on potential archaeological resources within the proposal area and includes:

- Identification of areas of archaeological potential and significance that would be materially affected by the proposal during construction, by field survey and research, including any potential works, relics, views, or items of heritage significance
- Consideration of the potential impacts on the values, setting and integrity of archaeological resources located near the proposal, including items both above and below ground, and where such potential exists, the likely significance of those impacts
- Provision of mitigation measures including measures to avoid, reduce or manage significant impacts to potential archaeological resources.

This Technical Paper only assesses potential impacts to non-Aboriginal archaeological values. Preparation of a Statement of Heritage Impact (SoHI) is to be undertaken by Weir Phillips Architects.[4] The Aboriginal heritage impacts of the proposal are assessed in the EIS Aboriginal Heritage Technical Paper: Aboriginal Cultural Heritage Assessment Report (ACHAR), which has been prepared by Artefact Heritage.[5] The maritime heritage impacts of the proposal, which also include impacts to non-Aboriginal heritage, are assessed in the EIS Under Water Cultural Heritage Technical Paper, which has been prepared by Cosmos Archaeology Pty Ltd.[6]

1.4 Approval framework

Conditions of Approval (SSD 7684)

The following Conditions of Approval (CoA) relevant to non-Aboriginal archaeological heritage were issued for the Stage 1 Concept Proposal (SSD 7684).

Part C – Future Environmental Assessment Requirements. Conditions to be met in Future Development Applications:

Archaeology

> ***C12*** *Future Development Application(s) shall include a Non-Aboriginal Archaeological Assessment (NAAA) including a Maritime Archaeological Statement*

[4] Weir Phillips (2021a). Cockle Bay Redevelopment Heritage Interpretation Strategy. Report to DPT Operator Pty Ltd and DPPT Operator Pty Ltd.
[5] Artefact Heritage (2021). Cockle Bay Park Redevelopment Preliminary Draft Aboriginal Cultural Heritage Assessment Report. Report to DPT Operator Pty Ltd and DPPT Operator Pty Ltd.
[6] Cosmos Archaeology Pty Ltd (2021). Cockle Bay Redevelopment Maritime Archaeology Statement of Heritage Impact. Report to Artefact Heritage Services Pty Ltd.

of Heritage Impact and a Maritime Archaeological Management Plan. The NAAA shall be prepared in consultation with the Heritage Council NSW.

This report is a NAAA in satisfaction of the CoA.

1.4.1 Secretary's Environmental Assessment Requirements

The SEARs were issued for the proposal on 12 November 2020. Section 13 of the SEARs relate to heritage. The following requirements were issued for investigation of non-Aboriginal heritage for the proposal.

Table 1 Secretary's Environmental Assessment Requirements

Item	Secretary's Environmental Assessment Requirements	Where addressed in this report
13	The EIS must include:	
13.a	A Statement of Heritage Impact (SOHI), prepared in accordance with relevant guidelines, assessing potential impacts on State and local heritage items (including conservation areas, natural heritage areas, heritage fabric, relics, gardens, landscapes, views and trees)	This report is limited to assessment of archaeological values. A SoHI will be provided by Weir Phillips [7]
13.b	and historical archaeology	This report as a whole, in particular Sections 5.0 and Section 6.0
13.b	and recommending mitigation and management measures where required	Section 8.0

1.5 Structure of report

- **Section 1.0** – Proposal overview (this section)
- **Section 2.0** – The heritage management framework including the legislative and policy context, and relevant criteria applicable to the proposal
- **Section 3.0** – An overview of the assessment methodology
- **Section 4.0** – An overview of the historical context of the proposal area
- **Section 5.0** – An assessment of archaeological potential and significance in the proposal area and an overview of impacts to archaeology arising from the proposal
- **Section 6.0** – Archaeological impact assessment
- **Section 7.0** – Management measures
- **Section 8.0** - Conclusions and mitigation measures
- **Section 9.0** – References for sources cited in this Technical Paper.

[7] Weir Phillips (2021b). Cockle Bay Redevelopment Statement of Heritage Impact. Report to DPT Operator Pty Ltd and DPPT Operator Pty Ltd.

1.6 Limitations and constraints

This report is limited to an assessment of the potential terrestrial non-Aboriginal archaeological remains only. This report does not include an assessment of potential maritime archaeological remains located within the study area to the east of the current seawall. A separate maritime assessment has been prepared by Cosmos Archaeology.[8] The location of the current seawall is shown on Figure 1. This report only assesses land to the east (inshore) of this seawall. This report also does not provide an assessment of potential Aboriginal archaeological remains.

The study area is occupied by current developments that have not allowed for archaeological investigations to be undertaken as part of the preparation of this Technical Paper. The capacity to accurately test and model the non-Aboriginal archaeological potential of the study area is constrained significantly by the inability to carry out archaeological testing until the EIS process is complete.

1.7 Authorship

This report was prepared by Michael Lever (Heritage Consultant, Artefact Heritage). Management input and review was provided by Jayden van Beek (Senior Associate, Artefact Heritage), Adele Zubrzycka (Senior Associate, Artefact Heritage) and Sandra Wallace (Director, Artefact Heritage).

[8] Cosmos Archaeology Pty Ltd 2021. Cockle Bay Redevelopment Maritime Archaeology Statement of Heritage Impact. Report to Artefact Heritage Services Pty Ltd.

2.0 LEGISLATIVE CONTEXT

2.1 Introduction

This section identifies items of legislation and heritage management guidelines that are relevant to the proposal. A summary of these Acts and the potential legislative implications for the proposal are outlined below.

2.2 Environmental Planning and Assessment Act 1979

The EP&A Act establishes the framework for cultural heritage values to be formally assessed in the land use planning and development consent process. The EP&A Act requires that environmental impacts are considered prior to land development; this includes impacts on cultural heritage items and places as well as archaeological sites and deposits. The Stage 1 Concept Proposal was declared to be SSD by the Minister under Part 4 of the EP&A Act on 13 May 2019 (SSD-7684). The SSD DA Stage 2 (SSD-9978934) is also being considered under Part 4 Division 4.7 of the EP&A Act and must be approved before the project can proceed. The proponent of the project in this case DPT Operator Pty Ltd and DPPT Operator Pty Ltd, must therefore prepare an EIS in accordance with the SEARs issued by the Secretary of the DPIE (see section 1.4.1 above). The Technical Paper has been prepared to inform the project EIS. The EIS is then reviewed by the Department and, once finalised, is placed on public exhibition. After the public exhibition has finished, the proponent will prepare a report for the Department responding to the submissions and, as part of the post-exhibition process, will have an opportunity to modify the project. The Department will then conclude its assessment and prepare a report to the Minister for determination of the proponent's request for approval.

Part 3 of the EP&A Act also requires that local governments prepare planning instruments (such as Local Environmental Plans [LEPs] and Development Control Plans [DCPs]) to provide guidance on the level of environmental assessment required. The aim of the LEP in relation to heritage is to conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings, views and archaeological sites. Although LEP controls do not apply to SSD projects, relevant LEP lists have been reviewed for the purpose of preparing this EIS to identify known archaeological sites.

The study area falls within the boundaries of the City of Sydney LEP 2012. There are no archaeological sites listed in the City of Sydney LEP 2012 within the study area.

Under Section 3.9.3 of the City of Sydney DCP 2012, archaeological management within the City of Sydney LGA is also informed by the Central Sydney Archaeological Zoning Plan (AZP).[9] The aim of the Central Sydney AZP is to provide a basic overview of the potential below ground archaeological resources within the Sydney CBD. A review of the Central Sydney AZP identifies that the majority of the study area is not located within the area considered as part of the Central Sydney AZP. Only a small portion of the study area at Market Street extends into the area of the Central Sydney AZP (Figure 5). However, the Central Sydney AZP is primarily limited to assessment of buildings, and states that 'the archaeological potential of roads, laneways, plazas etc, was not surveyed or assessed in detail'.[10]

[9] https://www.cityofsydney.nsw.gov.au/development-guidelines-policies/the-central-sydney-archaeological-zoning-plan.
[10] https://www.cityofsydney.nsw.gov.au/development-guidelines-policies/the-central-sydney-archaeological-zoning-plan - Item 3.2.

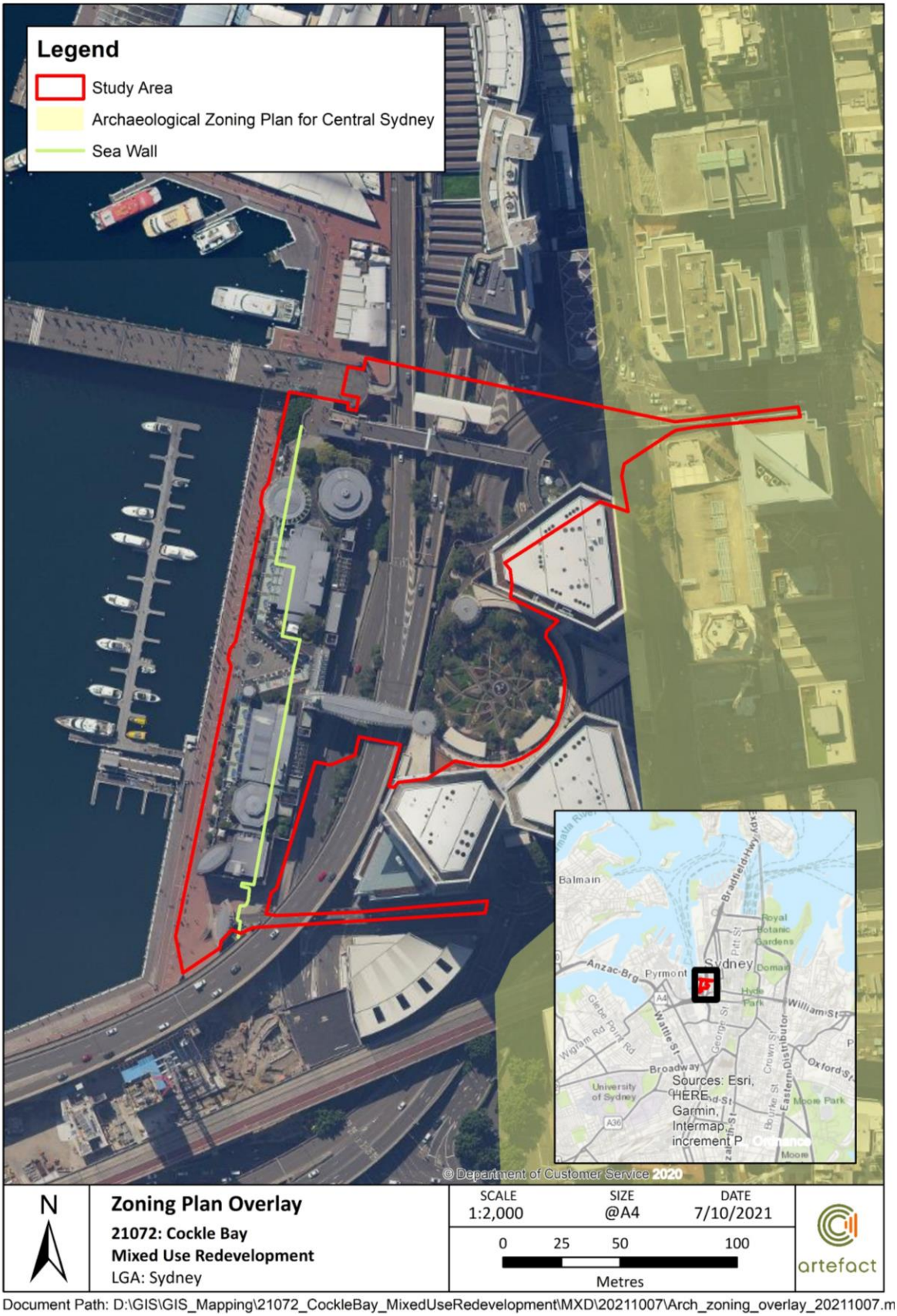


Figure 5: Study area relative to the Central Sydney AZP

2.3 *Heritage Act 1977*

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

There are no archaeological sites listed on the SHR within the study area.

2.3.1 Relics Provisions

The Heritage Act also provides protection for 'relics', which includes archaeological material or deposits. According to Section 139 (Division 9: Section 139, 140-146):

(1) A person must not disturb or excavate any land knowingly or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, damaged or destroyed unless the disturbance is carried out in accordance with an excavation permit.

(2) A person must not disturb or excavate any land on which the person has discovered or exposed a relic except in accordance with an excavation permit.

(3) This section does not apply to a relic that is subject to an interim heritage order made by the Minister or a listing on the State Heritage Register.

(4) The Heritage Council may by order published in the Gazette create exceptions to this section, either unconditionally or subject to conditions, in respect of any of the following:

(a) Any relic of a specified kind or description

(b) Any disturbance of excavation of a specified kind or description

(c) Any disturbance or excavation of land in a specified location or having specified features or attributes,

(d) Any disturbance or excavation of land in respect of which an archaeological assessment approved by the Heritage Council indicates that there is little likelihood of there being any relics in the land.

Section 4(1) of the Heritage Act (as amended in 2009) defines a relic as:

> *…Any deposit, artefact, object or material evidence that: relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and is of State or local heritage significance.*

A relic has been further defined as:

> *Relevant case law and the general principles of statutory interpretation strongly indicate that a 'relic' is properly regarded as an object or chattel. A relic can, in some circumstances, become part of the land be regarded as a fixture (a chattel that becomes permanently affixed to land).*[11]

Section 4.41(1c) of the EP&A Act states that archaeological permits and approvals under the Heritage Act are not required for SSD projects and would therefore not be required for the proposal. This includes excavation permits issued by the Heritage Council of NSW, or its delegate, under Section 140 of the Heritage Act for relics outside SHR curtilages, or an exception under Section 139 (4) of the Heritage Act for minor works that will have a minimal impact on archaeological relics. However, in accordance with Heritage NSW, Department of Premier and Cabinet (Heritage NSW, DPC) archaeological guidelines, an Archaeological Research Design (ARD) would still be prepared if it is expected that archaeological investigations would be undertaken as part of the project. Furthermore, Section 4.41(1c) of the EP&A Act does not extinguish the requirements of Section 146 of the Heritage Act to notify Heritage NSW, DPC (as a delegate of the NSW Heritage Council) in the event of the discovery of 'relics'.

2.3.2 Works

The Heritage Act defines 'works' as being in a separate category to archaeological 'relics'. 'Works' refer to remnants of historical structures which are not associated with artefactual material that may possess research value. 'Works' may be buried, and therefore archaeological in nature, however, exposure of a 'work' does not require approved archaeological excavation permits under the Act.

The following examples of remnant structures have been considered to be 'works' by the NSW Heritage Council:

- Former road surfaces or pavement and kerbing
- Evidence of former drainage infrastructure, where there are no historical artefacts in association with the item
- Building footings associated with former infrastructure facilities, where there are no historical artefacts in association with the item
- Evidence of former maritime infrastructure such as wharves and sea walls.

Where buried remnants of historical structures are located in association with historical artefacts in controlled stratigraphic contexts (such as intact historic glass, ceramic or bone artefacts), which have the potential to inform research questions regarding the history of a site, the above items may not be characterised as 'works' and may be considered to be 'relics'. The classification of archaeological remains as a 'work' therefore is contingent on the predicted remains being associated with historical structures as well as there being no prediction of the recovery of intact artefactual deposits which may be of research interest.

[11] NSW Heritage Branch, Department of Planning 2009. *Assessing Significance for Archaeological Sites and 'Relics'*, p. 7.

3.0 ASSESSMENT METHODOLOGY

3.1 Significance assessments

3.1.1 NSW heritage assessment criteria

Determining the significance of heritage items or a potential archaeological resource is undertaken by utilising a system of assessment centred on the *Burra Charter* of Australia ICOMOS. The principles of the charter are relevant to the assessment, conservation and management of sites and relics. The assessment of heritage significance is outlined through legislation in the Heritage Act and implemented through the *NSW Heritage Manual* and the *Archaeological Assessment Guidelines*.[12]

If an item meets one of the seven heritage criteria, and retains the integrity of its key attributes, it can be considered to have heritage significance. The significance of an item or potential archaeological site can then be assessed as being of local or state significance. If a potential archaeological resource does not reach the local or state significance threshold, then it is not classified as a relic under the Heritage Act.

'State heritage significance', in relation to a place, building, work, relic, moveable object or precinct, means significance to the State in relation to the historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value of the item.

'Local heritage significance', in relation to a place, building, work, relic, moveable object or precinct, means significance to an area in relation to the historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value of the item.[13]

The overall aim of assessing archaeological significance is to identify whether an archaeological resource, deposit, site or feature is of cultural value. The assessment will result in a succinct statement of heritage significance that summarises the values of the place, site, resource, deposit or feature. The heritage significance assessment criteria are as follows:

Table 2: NSW heritage assessment criteria

Criteria	Description
A – Historical Significance	An item is important in the course or pattern of the local area or states cultural or natural history.
B – Associative Significance	An item has strong or special associations with the life or works of a person, or group of persons, of importance in the local area's or state's cultural or natural history.
C – Aesthetic Significance	An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in the local area or state.
D – Social Significance	An item has strong or special association with a particular community or cultural group in the local area or state for social, cultural or spiritual reasons.
E – Research Potential	An item has potential to yield information that will contribute to an understanding of the local area's or state's cultural or natural history.

[12] NSW Heritage Office 1996; 25-27.
[13] This section is an extract based on the Heritage Office Assessing Significance for Historical Archaeological Sites and Relics 2009:6.

Criteria	Description
F – Rarity	An item possesses uncommon, rare or endangered aspects of the local area's or state's cultural or natural history.
G - Representativeness	An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places of cultural or natural environments (or the cultural or natural history of the local area or state).

3.2 Non-Aboriginal archaeological assessment

3.2.1 Archaeological potential

An overview approach to the identification of potential archaeological resources has been adopted in this NAAA. Historical archaeological potential is defined as the potential of a site to contain significant archaeological remains, including works or relics as identified in the Heritage Act. The assessment of historical archaeological potential is based on the identification of former land uses and evaluating whether subsequent actions (either natural or human) may have impacted on archaeological evidence for these former land uses. Knowledge of previous archaeological investigations, understanding of the types of archaeological remains likely to be associated with various land uses, and the results of site inspection are also taken into consideration when evaluating the potential of an area to contain archaeological remains.

The assessment of archaeological potential contained in this Heritage Impact Assessment is based on analysis of historical plans and readily available secondary sources, such as archaeological zoning plans and archaeological investigations undertaken in the vicinity of the study area.

Assessments of significance are preliminary in nature and where possible significance has been assessed against the NSW Heritage Assessment Criteria. The assessment is informed by the NSW Heritage Division's 2009 guidelines *Assessing Significance for Historical Archaeological Sites and Relics.*

3.2.2 Research potential and archaeological significance

In 1984, Bickford and Sullivan examined the concept and assessment of archaeological research potential; that is, the extent to which archaeological resources can address research questions. They developed three questions which can be used to assess the research potential of an archaeological site:

- Can the site contribute knowledge that no other resource can?
- Can the site contribute knowledge that no other site can?
- Is this knowledge relevant to:
    - General questions about human history?
    - Other substantive questions relating to Australian history?
    - Other major research questions?

In the 2009 guidelines *Assessing Significance for Historical Archaeological Sites and 'Relics'*, the NSW Heritage Division has since provided a broader approach to assessing the archaeological significance of sites, which includes consideration of a site's intactness, rarity, representativeness, and whether many similar sites have already been recorded, as well as other factors. This document

acknowledges the difficulty of assessing the significance of potential subsurface remains, because the assessment must rely on predicted rather than known attributes.[14]

A site can have high potential for archaeological remains, and yet still be of low research potential if those remains are unlikely to provide significant or useful information.

[14] NSW Heritage Branch 2009.

4.0 GENERAL HISTORICAL BACKGROUND

In the following sections the study area is first introduced from an ethnographic and historical perspective. This adopts a thematic phased approach to depiction of development. Following this, a detailed archaeological assessment is provided which draws on previous archaeological assessment and excavation in the area.

4.1 Introduction

The study area is in a location once intensively utilised by Aboriginal people prior to and during the early years of European colonisation. Aboriginal use of the study area over millennia had resulted in large deposits of dietary shell. These shell deposits were utilised by early colonists in the manufacture of lime for mortar. From this time on, the surrounds of the study area became increasingly industrial in character, with large scale land reclamation carried out to form additional waterside loading and offloading areas around the numerous wharves that were constructed there.

In addition to land reclamation a dam was constructed across the intertidal zone of Cockle Bay at its south western end, to reduce the effects of tidal variation in water height on vessels moored at Cockle Bay wharves. Over time the south western end of Cockle Bay was reclaimed and its eastern shore took on a wholly industrial and maritime character. It was only in the late twentieth century, particularly associated with development prior to the 2000 Sydney Olympics, that the study area shifted in character to the current mix of entertainment and office infrastructure present there. The following sections will outline in greater detail the development of the study area in order to inform assessment of the potential archaeological values that may be present within it.

4.2 Aboriginal occupation and European contact

Cockle Bay is located in Cadi Country, the menfolk of which were called Cadigal and the women Cadigalleon. Such is the account of one early European observer, Governor Arthur Phillip. [15] Early European recorders often had difficulty discerning Aboriginal consonants, and the convention is now generally to spell these names as Gadi / Gadigal / Gadigalleon.[16] Many Aboriginal tribal boundaries in Australia have been estimated from linguistic evidence. They are therefore only approximations. Social interaction, tribal boundaries and linguistic evidence often do not precisely correlate. Further, a western understanding of the nature of borders and boundaries appears at times to be incompatible with Aboriginal spatial understandings as described by anthropological authors such as W. Stanner (1905-1981).[17]

The term *Eora* has often been used as a collective name for the Aboriginal people of the greater Sydney region. There is some debate however whether the term *Eora* specifically referred to people from the Sydney area, or should simply be translated as “local people”. Val Attenbrow succinctly summarises the various positions on the issue.[18] It is suggested here that it should be left to local Aboriginal people whether or not they wish to identify with the term *Eora* and here the terms Gadigal / Gadigalleon are used.

Aboriginal life near Cockle Bay commenced many millennia prior to the arrival of the First Fleet and Arthur Phillip’s descriptions there in 1788. The earliest known archaeological date for Aboriginal habitation in the Greater Sydney region is over 30,000 years old, derived through carbon dating of

[15] Phillip 1788 in Attenbrow, V. (2010). *Sydney's Aboriginal Past.* Sydney: UNSW Press. P 22.
[16] Troy, J. (1993). *The Sydney Language.* Canberra: Australian Dictionaries Project and Australian Institute of Aboriginal and Torres Strait Islander Studies.
[17] Stanner, W. E. (1974). *The 1968 Boyer Lectures: After the Dreaming.* Sydney: ABC.
[18] Attenbrow, (2010), pp. 35-36.

archaeological material from Cranebrook Terrace near Penrith.[19] The lack of identified older archaeological dates may well result from the fact that the local coastline has varied considerably over tens of thousands of years, particularly during the colder climatic epoch of the Pleistocene (1.6 million to 11,500 years ago). During these colder periods large amounts of water were trapped in polar and land-glacier ice sheets. This resulted in significantly lower sea levels around the Australian coast.[20]

The view at Cockle Bay during these colder periods would have differed significantly from the current climate. Port Jackson was then not a port but a river valley and the greater fall that was required for the Parramatta River to reach its outlet at lower sea levels resulted in faster water flow which in turn sharply incised the sandstone sides of the river. Cockle Bay - if it existed then, would not have been a bay, but would have comprised a shallow creek bed for a waterway that would have fallen over sandstone cliffs into the Parramatta River below.

By 4,000 years ago, climatic conditions and local flora almost certainly resembled those that were present up to the time of the arrival of the First Fleet in 1788. Analysis of pollen from archaeological sites along the Tank Stream valley that runs north-south through the northern central section of the Sydney CBD indicates that in 1788 the location was predominantly vegetated by she-oak (*Allocasuarina / Casuarina*), with a ground cover of ferns, particularly in damper locations.[21] Tim Flannery proposes that the higher ground such as towards Parliament House would have been dominated by fire-resistant local species including Port Jackson Fig (*Ficus rubiginosa*), Cheese Tree (*Glochidion ferdinandi), and Red Ash / Soap Tree (Alphitonia excelsa).* From early British records we know that the Cabbage Tree Palm (Livistonia australis) was endemic to the surrounds of Sydney Cove too.[22]

4.2.1 First contact

Little is known of the Gadigalleon / Gadigal, and other nearby clan groups. At the time of first contact it is estimated they may have numbered up to 70 individuals with traditional country ranging along the south coast of Port Jackson from South Head approximately to Petersham, and south to the Cooks River near Botany Bay.[23] They were the first Aboriginal people to experience the effects of physical and social dislocation as a result of the arrival and settlement of the First Fleet at Sydney Cove. Furthermore, epidemics of smallpox dramatically affected the Aboriginal population in Sydney.

In 1790, it was estimated to Governor Phillip that over half of Sydney's original Aboriginal population had died as a result of the smallpox epidemic that broke out in 1789.[24] A graphic account of these events is provided by Watkin Tench, a Marine officer in the First Fleet. In his published diaries he noted that through April and May 1789 his men brought him repeat accounts of finding Aboriginal bodies "in all the coves and inlets of the harbour".[25] The disease rapidly spread inland. One month later in June 1789, Tench met Aboriginal people with smallpox along the Hawkesbury River.[26] The ongoing effects of smallpox were disastrous for the small local Aboriginal population. Val Attenbrow[27]

[19] Attenbrow, (2010), p. 18.
[20] Brooke, B., Nichol, S., Huang, Z., & Beaman, R. (2017). Palaeoshorelines on the Australian continental shelf: Morphology, sea-level relationship and applications to environmental management and archaeology. *Continental Shelf Research*, 26-38.
[21] MacPhail, T & Owen, T (2018). What was growing along the Tank Stream Valley, Sydney Cove in 1788? *Australasian Historical Archaeology* No. 36, pp16-28.
[22] Watkin Tench. (1788 (1990)). *Watkin Tench1788.* Melbourne: Text Publishing.
[23] Attenbrow (2010).
[24] Karskens, G. (2010). *The Colony.* Sydney: Allen & Unwin.
[25] Watkin Tench (1788 (1990)), p102.
[26] Watkin Tench (1788 (1990)), p 110.
[27] Attenbrow, (2010), p. 21.

quotes the contemporary account of David Collins, who claimed that the Gadigal / Gadigalleon people were reduced to a population of three.[28]

4.3 Post 1788 historical phasing

This section provides a background and context to the development of the study area, through a depiction of the nature of colonisation and development of the general surrounds of the study area. The historical phasing of the study area surrounds differs somewhat from that within the study area proper, however it is still important to comprehend the setting within which the study area developed. Of particular relevance to this and following sections are the works of P.R.Proudfoot[29] and G.P Walsh,[30] both of whom have researched and published extensively on the history of manufacturing and industry in Sydney.

Although it was quite near to Sydney Cove and the Rocks, the eastern side of Cockle Bay was relatively little used by the new colony during its first 20 years. Convict women supplemented their diet by collecting shellfish from the area, and larger scale collection of shells was carried out to provide lime for mortar.[31] As the city of Sydney grew the facilities for shipping at Sydney Cove became increasingly inadequate. The Tank Stream had been rendered largely unusable through siltation and pollution which meant no ready source of water was available to resupply ships or workers.

The Government Domain including the government dockyard prevented expansion along the eastern shore of Sydney Cove, while private holdings and warehouses, particularly those of Robert Campbell, similarly constrained expansion to the west. By the time Lachlan Macquarie took office as Governor (1810) Cockle Bay and Cockle Bay Point had emerged as logical options for the expansion and relocation of wharfage and market activities. In 1810, a market wharf was constructed at Cockle Bay and the main Sydney market place was relocated to the current location of the Queen Victoria Building. Both these moves represented a considerable shift of activity from the shore at Sydney Cove.

4.3.1 Phase 1: Early land grants and development

Large land grants were made around Cockle Bay, including those to John Harris at Ultimo and John Macarthur at Pyrmont.[32] Business development was constrained during the early years of the colony, when emphasis was laid on its function as a penal colony. In 1810 the construction was announced of the Sydney Market Wharf at the terminus of Market Street slightly north of or just within the study area. This wharf was constructed to service the new Sydney Market that was located then at the current location of the Queen Victoria Building. By 1822 only two major constructed items are known to have been situated on the east shore of Cockle Bay, being a wharf and grain mill. By 1839 at least

[28] Collins, D. (1798). *An account of the English colony in New South Wales: with remarks on the dispositions, customs, manners, &c. of the native inhabitants of that country.* London: T. Cadell Jun. and W. Davies.
[29] Proudfoot, P. R. 1983. Wharves and Warehousing in Central Sydney 1790-1890. *The Great Circle*. Vol5, No.2, pp. 73-86; 1988. The Extension of Maritime Activity in Sydney: Pyrmont, Glebe Island and Balmain, 1890-1950. *The Great Circle,* Vol 10, No.2, pp. 110-135; 1986: Changing Patterns of Maritime Activity in Central Sydney. *The Great Circle.* Vol 8. No.1, pp. 33-53.
[30] Walsh, G. 1969. A History of Manufacturing in Sydney, 1788-1850. Thesis for the degree of Master of Arts, Australian National University.
[31] Weir Phillips Heritage. October 2016. Heritage Impact Statement Cockle Bay Wharf Redevelopment 241-249 Wheat Road, Cockle Bay.
[32] Otto Cserhalmi + Partners, June 2006. Pyrmont Bridge Darling Harbour, Sydney, Conservation Management Plan. Prepared for the Sydney Harbour Foreshore Authority, p. 36.

eight flour mills were active along the shore of Cockle Bay, including the substantial but short-lived Albion Mill.[33]

From the 1830's onwards the rate of construction and change at Cockle Bay increased dramatically in response to the increase in goods arriving both inland and from along the coast. An indicator of the quantity of goods being handled is that in 1855 the Darling Goods Line was constructed to transport freight between Cockle Bay (now named Darling Harbour after Governor Ralph Darling), and the Sydney-Parramatta Rail Line near the current site of Central Railway Station. By this time too, Darling Harbour had become a sought-after location for warehousing and wharfage, and historical mapping provides evidence of the unlicenced reclamation of land from the harbour to provide larger wharf and loading areas.

4.3.2 Phase 2: A mixed use location

By 1839, Sussex Street which runs parallel to the eastern foreshore of Darling Harbour, had become an established thoroughfare linking wharves, mills factories and shipyards. In 1842 when the City of Sydney was incorporated, the area west of George Street to Darling Harbour already contained a mix of residential and commercial premises. Change came to this largely unregulated location with the construction of the first Pyrmont Bridge, completed in 1857. This was a toll bridge constructed of timber which swung open to allow access to and from the southern extent of Darling Harbour. This bridge operated as a private enterprise until purchased by the government in 1884. [34] Between 1864-1865 the intertidal zone at the south of Darling Harbour was reclaimed both through infill and the construction across it of a stone wall. In Figure 6 below, Darling Harbour is shown in the 1870's from an elevated location, likely the Sydney GPO, and is viewed south west across the timber Pyrmont Bridge. The mixed nature of construction in the area is readily apparent, ranging from very modest cottages to large corner hotels, warehouses, and along the waterfront large warehouses and at least one substantial brick chimney.

4.3.3 Phase 3: Increased specialisation to the end of the nineteenth century

The area continued to attract an increasing number of commercial and maritime tenants as the prominence of Darling Harbour as a freight destination grew. Wharves grew in number and size, including a large iron wharf at the southern end of Darling Harbour.

In only the short time since its construction in 1857, the timber Pyrmont Bridge had already approached the end of its usable lifespan. A new bridge was constructed and opened in 1902, next to the location of the previous timber bridge. The relocation of the city's main markets to the current location of the Queen Victoria Building was noted above as a factor which in the early nineteenth century led to a growth of commerce around Darling Harbour. This pattern of increased trade rejuvenating the area repeated itself in the late nineteenth century with the construction in 1887 of a fruit market next to Pyrmont Bridge in the building that in 1900would become the Corn Exchange.[35]

4.3.4 Phase 4: Late nineteenth to mid twentieth century developments

In the early years of the twentieth century an outbreak of Bubonic Plague (although in small numbers) provided the government with the justification on which to resume large waterfront areas including those in the Rocks and along Darling Harbour. As part of this endeavour, the wharves and jetties of Sydney Harbour were resumed by the newly formed Sydney Harbour Trust. It was perceived that the

[33] Godden Mackay. 1992. Little Pier Street Precinct Archaeological Excavation. Volume 1, Executive Summary. Report prepared for the Darling Harbour Authority.
[34] Weir Phillips.
[35] Otto Cserhalmi + Partners 2006.

disease was passed on by rats that were particularly associated with the waterfront and large-scale construction was carried out to 'rat-proof' the wharves of Sydney's shoreline. Smaller scale warehouses and enterprises were replaced with facilities that were larger, better planned and constructed, particularly wool stores. Utilisation of the location accelerated for a short period, but then rapidly decreased from the mid twentieth century onwards, chiefly due to changes in freight handling technology and ship size.

Figure 6: Pyrmont viewed to south west in the 1870s[36]

4.3.5 Phase 5: Decline and repurposing

From the 1950's onwards, freight and international marine freight underwent a technological revolution. Designed and first implemented in 1955, the ocean-going shipping container provided a secure, modular and time saving method for bulk shipment. Previously, bulk shipped goods generally required handling as 'break bulk cargo' which entailed each sack, barrel or case of product needing to be hand loaded and unloaded onto ships in cargo nets. Considerable expertise was required of stevedores to tightly and securely pack freight loads into ships. Modular shipping containers however allowed for many tonnes of goods to be shipped and unshipped within a matter of minutes. Shipping container use however, required the availability of cranes and gantries of a size not available at the southern end of Darling Harbour and which could not be feasibly constructed there. Together with this trend towards container shipping came drastic increases in the size of shipping vessels calling at Australian ports. The drafts of these vessels were frequently too deep for Darling Harbour. With the development of a deep-water harbour and container handling facilities at Botany Bay, Darling Harbour effectively fell into disuse as a maritime trade centre and fell into commercial decline.

In 1972 the area was physically and visually separated from the Sydney CBD through the formation of the Western Distributor. In the years approaching the Bicentennial Celebrations, the Darling Harbour area was considerably revitalised through the construction within it of multiple tourism and tourist-

[36] City of Sydney Archives.

oriented hospitality and entertainment venues. The Cockle Bay Wharf Centre which currently stands in the study area was constructed in 1998.[37]

[37] Weir Phillips Heritage. October 2016.

5.0 ARCHAEOLOGICAL ASSESSMENT

As outlined in Section 3.0, the assessment methodology adopted here appraises the archaeological potential of the study area not only through an examination of historical themes associated with its development, but also through an examination of evidence from local archaeological studies.

5.1 Local archaeological studies

A number of archaeological assessments and excavations have been conducted near the study area. Each subsection here provides a short overview of these archaeological reports, the results of which will be taken into consideration when modelling the archaeological potential of the study area.

5.1.1 Wilson, A. 1985[38]

This brief report (15 pages) consists of a very short management methodology with select statements of potential value of the area managed by Wilson, chiefly to the south and west of the study area of this report. Wilson describes the Darling Harbour area generally as “the cradle of industrialisation in Australia” reflected in the location there in 1815 of the first steam mill on the continent.

5.1.2 Wilson, A. 1985a[39]

Wilson’s short (21p) report was carried out in urgent response to impending demolition of structures within his study area located at closest some 150m south east of the study area for this report. Wilson found that then-standing buildings incorporated walls dating to 1823, representing the earliest standing industrial remains in Australia. Recommendations were made for the protection and further study of these walls.

5.1.3 Godden Mackay (GM) 1992[40]

This report related to proposed redevelopment of a study area located immediately south and west of Pier Street, also immediately west of the Chinese Garden of Friendship. The Chinese Garden occupies land previously represented by the southern reaches of Cockle Bay. This had been reclaimed for close to 200 years by the time the Chinese Gardens were constructed, although reclamation took place in an uneven manner. The report by GM therefore addresses a location which was once of similar waterside nature to the current study area.

The study by GM included the location of John Dickson’s Steam Mill complex in addition to a range of later industrial activities including soap manufacture, brewing, distilling and meat salting and the first galvanising works in Australia. A six week program of archaeological test excavation was carried out in this location by GM in 1992. Substantial archaeological remains were identified ranging from sandstone and brick walls, floors and related deposits, various chimney flues and the firebox for an early boiler.

The excavations by GM revealed a complex layering and phasing of archaeological remains with generally lower levels of direct evidence for earlier phases evident. The low lying nature of the location and the ongoing historical processes of fill that were carried out to counteract possibilities of flooding had resulted in considerable capping and preservation of archaeological features. The

[38] Wilson, A. 1985. Archaeological Investigations for the Darling Harbour Development Project. Interim Report 1.
[39] Wilson, A. 1985a. Archaeological Investigations for the Darling Harbour Development Project. Barker’s Mill.
[40] Godden Mackay. 1992. Little Pier Street Precinct Archaeological Excavation. Volume 1, Executive Summary. Report prepared for the Darling Harbour Authority.

elements of the Dickson's Mill site encountered by GM were dated to 1830 onwards from a period following further reclamation, with the earliest phases of Dickson's Mill considered likely to be present beneath Harbour and Goulburn Streets. The site was rated by GM as of high significance, including on a world scale as a rare example of the arrival of industrial technology in a post-industrial-revolution colonial settlement.

5.1.4 Godden Mackay (GM) Pty Ltd & W Thorp 1993[41]

The study area of this report was at Paddy's Market / Market City, which although located over 800m south of the study area for this report, was once in proximity of the southern end of Cockle Bay. As such the findings of this report may provide relevant indications to conditions and archaeological potential at the Cockle Bay study area. Prior to excavation, the site studied by GM and Thorp was dominated by a market building constructed in 1909, only the façade of which was retained through the development process. A program of mechanical test trenching was carried out in 1990-1991 with almost all trenches continued until bedrock or until the water table was reached. Depths of test trenches ranged from 1m to 4.5m with early phase archaeological remains including those of an early nineteenth century flour mill identified. Trench B1 comprised a slit trench approximately 25m long varying in width from 2.5m to 4m and varying in depth from 2.5m to 4m. Trench B1 included seven principal phases dating from the early nineteenth century to the twentieth century. Following mechanical test trenching and the removal of between 1m to 1.5m of overburden, a process of archaeological open area excavation was carried out with a wide variety of archaeological remains identified that were in deposits characteristically of between 300mm to 500mm depth and dating from the early nineteenth century to the twentieth century.

Indications from this report by GM and Thorpe are that clearly there is the potential for early industrial, commercial and residential archaeological remains to be present at depth in locations that have been subject to significant redevelopment. This is particularly the case where these locations are low lying and have been subject to phases of fill deposit over previous structural remains.

5.1.5 Crook, P., Ellmoos, L., & T. Murray 2002[42]

This report is a retrospective analysis of the report by GM and Thorp summarised above. It found in particular that artefact cataloguing and analysis was lacking in theory and practice resulting in the inability of future researchers to meaningfully analyse findings resulting from GM and Thorp's excavations. Specific items that required addressing were the lack of Minimum Number of Vessel counts (MNV), accuracy in recording artefact find locations, development of type series for integration into the artefact catalogue, and recording of disposed material.

5.1.6 Casey, M. and T. Lowe 2002[43]

The primary area of interest to the current report from Casey and Lowe (2002) are the sections which assess the impacts of the Cross City Tunnel on non-Indigenous heritage near Harbour Street and its approaches to the Bathurst Street tunnel, approximately 150m south of the study area of this report. Casey and Lowe provide a historical thematic and detailed analysis of the development of the Darling Harbour precinct. This history illustrates well the highly diverse and at times rapidly changing nature

[41] Godden Mackay Pty Ltd & W Thorp. 1993. Market City Development Paddy's Market. Archaeological Excavation. Report for Rockvale Pty Ltd.
[42] Crook, P., Ellmoos, L., & T. Murray. Assessment of Historical and Archaeological Resources of the Paddy's Market Site, Darling Harbour, Sydney. *Archaeology of the Modern City Series Volume 1*. Historic Houses Trust of NSW.
[43] Casey & Lowe Pty Ltd. 2002. Non-Indigenous Archaeological Assessment. Cross City Tunnel Route – Darling Harbour to Kings Cross. Report to CW-DC Pty Ltd.

of land use in the study area and the need for modelling of archaeological potential to be built on finely detailed historical understanding.

Casey and Lowe had predicted the presence of substantial archaeological remains in their study area. In particular, Barker's flour mill was predicted to contain preserved walls to several metres height. However, operational constraints meant that full scale archaeological excavation and salvage of these remains were not possible. Given this, recommendations were made by Casey and Lowe for the detailed archaeological recording of features that were exposed during works.

The implications of Casey and Lowe (2002) are that deeply buried and substantial archaeology may be present in low lying locations such as at the study area, and that due to the rapidly changing nature of development at Darling Harbour over time, multiple phases of archaeology are likely to be present in any given location.

5.1.7 Casey and Lowe Pty Ltd. 2010[44]

The study area for the report by Casey and Lowe was located at Barangaroo South and terminated in the south approximately 400m north of the study area of this report. A total of seven archaeological test trenches were excavated in several phases each a minimum of 8m x 6m at surface level to accommodate benching required for anticipated excavation to depth. Archaeological features dating to between the early to late nineteenth century were identified in three test trenches. Two test trenches were excavated in locations known to have been historically reclaimed from Cockle Bay. These did not contain archaeological material. Test Trench 2 provided an illustration of site results in a test trench containing archaeology. In this trench, seventeen phases of archaeological surfaces and remains were identified at depths of between .96m and 1.91m with the earliest phase comprised of early nineteenth century fill and the latest phase dating to the late twentieth century.

The large number of phases identified in Test Trench 2 by Casey and Lowe highlights the rapidly changing nature of land use noted in summary of reports above, and that the potential exists for deeply buried complex archaeological stratigraphy to be present in the study area of this report.

5.1.8 Casey and Lowe Pty Ltd 2012[45]

The study area at Barangaroo South was approximately 600m north of the study area for this report. Several previous phases of archaeological investigation had identified a high probability for the presence of archaeological remains, particularly in the eastern section of the study area along Hickson Road. Initial archaeological test excavation by Casey and Lowe was mechanical and large scale comprising 14 test trenches each measuring 30m x 20m.

Findings included a very substantial sandstone wall (Figure 7) and large areas of reclaimed land that had been infilled with sandstone rubble (Figure 8) topped by clay-rich fill and inset with timber piles. These phases almost certainly dated to the 1830-40s. A further minimum three phases of infill and site use were identified above this initial fill. Evidence of later phases of site use included substantial paved yard areas, building foundations and large wharf timbers in situ. The conditions and historical site formation processes at Barangaroo South appear similar to those in the study area. The indications from excavations at Barangaroo South by Casey and Lowe are that multiple strata of fill deposits may be present in addition to substantial sea walls.

[44] Casey & Lowe Pty Ltd (2010) Non-Indigenous Archaeological Testing. Barangaroo South. Report to Lend Lease.
[45] Casey and Lowe Pty Ltd (2012). Archaeological Excavation. Barangaroo South. Preliminary Results. Report to Lend Lease.

Figure 7: Sandstone seawall at Barangaroo South, identified through archaeological excavation by Casey and Lowe[46]

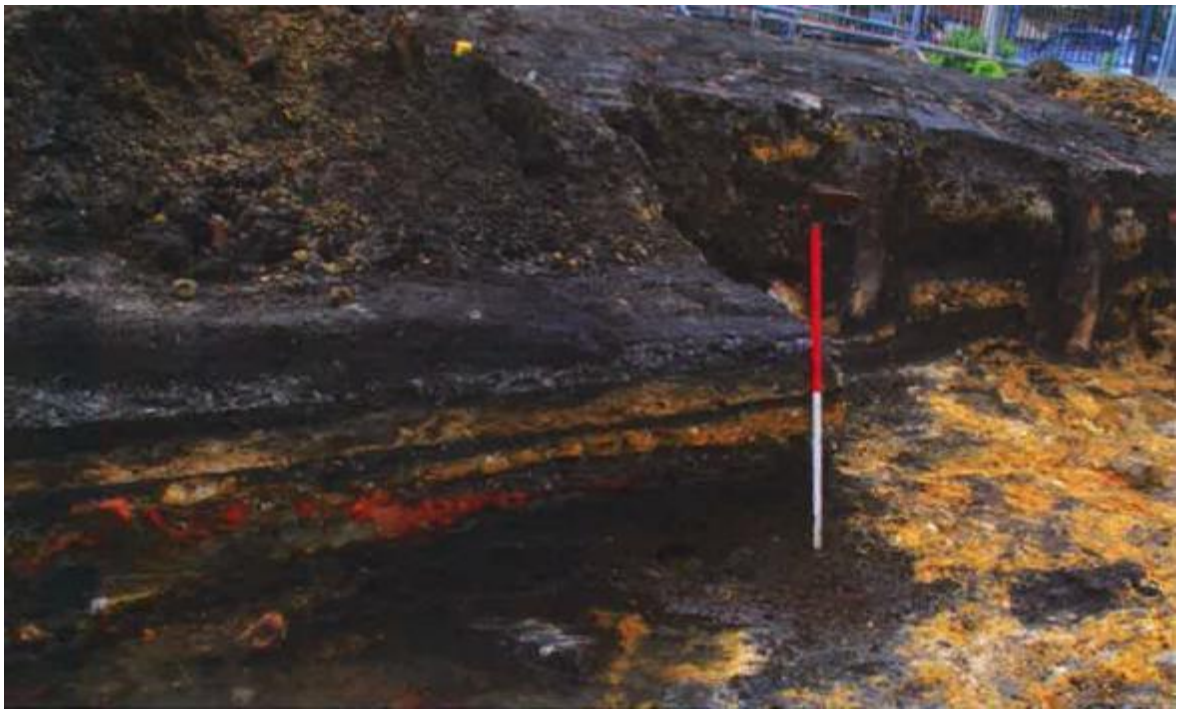


Figure 8: Bulk fill layers identified by Casey & Lowe 2012. Characteristic yellow crushed sandstone is evident[47]

5.1.9 Casey & Lowe Pty Ltd 2016[48]

The archaeological investigations carried out by Casey and Lowe were situated approximately 800m south of the study area of this report. Results of their archaeological test excavation included buried original foreshore sands from the southern extremity of Cockle Bay, reclamation fills dating from 1860s-1870s, working surfaces and fills and dumps associated with the 1872 cooperage located there, structural evidence of an 1882 wool store and remnants of a 1960s carpark.

5.1.10 Archaeological reports summary

The reports summarised above have indicated that the surrounds of the study area of this report, and likely the study area of this report too, were the site of rapidly changing industrial development which included the earliest substantial industrial infrastructure in the country. The burgeoning character of

[46] Casey and Lowe 2012 cover image.
[47] Casey and Lowe 2012.
[48] Casey & Lowe Pty Ltd 2016. Archaeological Investigation. The Cooperage, South West Plot Darling Square, Darling Harbour. Report to Lend Lease.

the early colony and the availability of convict labour meant that the funding and workforce were available for carrying out substantial works. These works included the construction of sea walls and wharves and the reclamation of land - whether this reclamation was documented and licensed or not.

These built items have frequently been identified in archaeological excavations. The commercial and industrial nature of the area also resulted in the construction of large warehouses and factories, the footings and basements of which have also been encountered on a regular basis by archaeological excavation. The low lying nature of the area together with its frequently changing developed nature has seen it subject to multiple phases of fill and development, resulting in what is often a complex multi-layered archaeological stratigraphic record.

The depths at which archaeological remains have been identified varies significantly and is largely dependant on original ground surface levels and the degree of subsequent infill. Areas immediately adjacent to former foreshore or previously low lying ground such as swampland are most likely to contain deeply buried historical remains. At Barangaroo South near the current shoreline, retaining walls and wharf structures were identified by Casey and Lowe[49] to several meters below current ground surface. Substantial remains to several metres depth were also identified by Casey and Lowe at the southern terminus of Darling Harbour. [50] In both locations, remains had been impacted by multiple phases of historic and modern development.

5.2 Evidence from geotechnical bore logs

A program of geotechnical testing has been carried out in the study area, consisting of 15 boreholes. The locations of geotechnical boreholes are shown in Figure 9. The results of this testing program are summarised in Table 3 below. Indications from these tests for the presence of archaeological material within the study area are elaborated below. It is noted that while the boreholes may identify potential archaeological materials, due to the limited extent of the boreholes they are generally unable to provide conclusive evidence of whether the materials are associated with intact archaeological remains, or if the material is only loose objects within disturbed fill contexts.

Boreholes CW1, W1, W2, W3, W4 and W5 were located on concrete slab jetty, beyond the current and historical waterline. Historical archaeological material in the form of sandstone, brick and timber was encountered within CW1 and W1 between depths of 5.2m to 10.5m below the surface level. This material could potentially indicate the presence of former wharfage infrastructure and seawalls.

Boreholes CW2, CW3, CW4, CW5, CW6 and CW7 were located inland between the existing (modern) seawall and Wheat Road. Of these CW3 was the only borehole which did not appear to contain evidence of historical building rubble. The other five boreholes all encountered what appeared to be historical building rubble, including concrete rubble in all of them and evidence of glass and ceramic fragments in CW2, CW4, CW6 and CW7. Historical landfill is known to contain discarded rubbish so it cannot be determined from the boreholes whether the artefacts present are associated with *in situ* historical deposits from historical developments or if they are simply part of the landfill. These fill layers containing concrete rubble typically continued to a depth of about 5m below the ground surface. In CW2 and CW4 however, an additional layer of building rubble was encountered underneath the first layer. In CW4 the second layer of rubble was located between 1.7m to 5.2m below the ground surface, which was fairly comparable to the other boreholes. In CW2 though, the second layer was located at a greater depth of between 2.6m to 9.5m below the ground surface. The presence of concrete rubble within the boreholes is more likely to be indicative of twentieth century activities within the study area, rather than development during the nineteenth century. However, it is

[49] Casey & Lowe Pty Ltd (2012). Archaeological Excavation. Barangaroo South. Preliminary Results. Report to Lend Lease
[50] Casey & Lowe Pty Ltd (2002). Non-Indigenous Archaeological Assessment. Cross City Tunnel Route – Darling Harbour to Kings Cross. Report to CW-DC Pty Ltd

again uncertain whether this material is associated with former structures or if it is only part of the reclamation fill that was deposited during the twentieth century.

Borehole CP2 was located on the east side of the study area on the east side of Wheat Road. CP2 was similar to CW7 in that it consisted of a layer of a layer fill over possible estuarine sandy clay. However, the top layers of fill were shallower in comparison, only extending to a depth of about 2m below the ground surface. In addition, unlike the boreholes described above, the layered fill encountered in CP2 did not contain any evidence of potential historical archaeological material.

Boreholes SS1 and SS2 were located towards the east side of the study area between the Western Distributor ad Sussex Street. Like CP2 above, SS1 and SS2 contained a thinner layer of fill material that continued to a depth of between 2.16-2.79m. However, the fill was located immediately above what appears to be the sandstone bedrock. The thinner layers of fill encountered is indicative of the reduced level of land reclamation activity through the eastern portion of the study area that is above the natural waterline. Unlike the other fill layers, the fill encountered in SS1 and SS2 did not appear to contain evidence of building rubble.

Although the program of geotechnical investigations cannot conclusively demonstrate that intact archaeological remains are present, the bore logs do indicate the presence of historical materials that would are expected to be found in association with former structural developments. On the land side of the study area these historical materials were typically found within about 5m of the ground surface, though in CW2 historical material was found up to 9.5m deep. This indicates the possibility for relatively deep deposits of historical material. The presence of concrete rubble within most of the boreholes though suggests that a large portion of the material identified is likely associated with the twentieth century development and reclamation of the study area.

Table 3: Results of geotechnical boreholes

Borehole #	Unit 1	Unit 2	Unit 3	Unit 4	Potential archaeological material
CW1	Concrete 0m-1.3m	Water 3.4m-6.8m	Sandy fill incl. sandstone & brick 6.8m-10.5m	Sandy clay to sandstone at 20m	Unit 3
CW2	Layered sandy gravel fill incl. bricks, concrete rubble & glass fragments 0m-2.6m	Sandy fill incl. sandstone, brick & a possible timber sleeper 2.6m-9.5m	Silty clay dark grey, with roots and rootlets, trace charcoal, 9.5m-11.2m	Silty sand medium to coarse, pale grey, with sandy clay beds, trace shells, wet, loose, alluvial, 11.2m-12.5m (on sandy clay to sandstone at 18m)	Unit 1 & Unit 2
CW3	Layered concrete and fill to 5.0m	Silty brown & grey clay & sand, shell fragments, rootlets to 6.5m	Silty sand and clay grey, fine sand, shell fragments, estuarine to 16m	Clayey sand & sandstone at 18.25m	Nil
CW4	Layered gravelly sand fill incl. brick & ceramic fragments 0m-1.7m	Building rubble fill (brick and concrete) 1.7m-5.2m	Silty clay – 7.3m	Sandy clay – 8.5m (on sandstone at 9.2m)	Unit 1 & Unit 2
CW5	Layered sandy gravel & sandy clay fill, incl. brick, sandstone & concrete building rubble 0m-5m	Silty clay dark grey, with rootlets, trace shells very soft, alluvium 5m-6.5m	Silty sand with shells, wet 6.5m-12m	Clayey sand to sandstone at 13.8m	Unit 1
CW6	Layered fill & concrete incl. brick rubble & glass 0m-5m	Sandy clay dark grey, shell fragments, estuarine to 6.85m	Sand, shell fragments, estuarine to 6.85m	Sandstone	Unit 1
CW7	Fill, sand & rubble incl. brick and ceramic fragments and a possible concrete at base at 4.9m	Sandy clay, dark grey, silt, rootlets, shell fragments, estuarine to 7.3	Sandstone		Unit 1
CP2	Layered fill & concrete to 2m	Sandy clay, dark grey, silt, rootlets, shell fragments, estuarine to 14m	Sandstone		Nil

Borehole #	Unit 1	Unit 2	Unit 3	Unit 4	Potential archaeological material
SS1	Layered concrete & fill direct on sandstone at 2.16m				Nil
SS2	Concrete & fill direct onto sandstone at 2.79m				Nil
W1	Layered concrete, fill & water 0m-5.2m	Building fill incl. sandstone, timber, and brick fragments 5.2m-9.5m	Loose sand 9.5m-11.75m	Sandstone	Unit 2
W2	Fill above concrete & water 0m-9.2m	Clayey sands 9.2m- 20.4m	Sandstone		Nil
W3	Fill above concrete & water 0m-8.9m	Clayey sands 8.9m-15.6m	Sandstone		Nil
W4	Fill above concrete & water 0m-7.9m	Clayey sands 7.9m-12.5	Sandstone		Nil
W5	Fill above concrete and water 0m-6.7m	Clayey sands 6.7m-12.9m	Sandstone		Nil

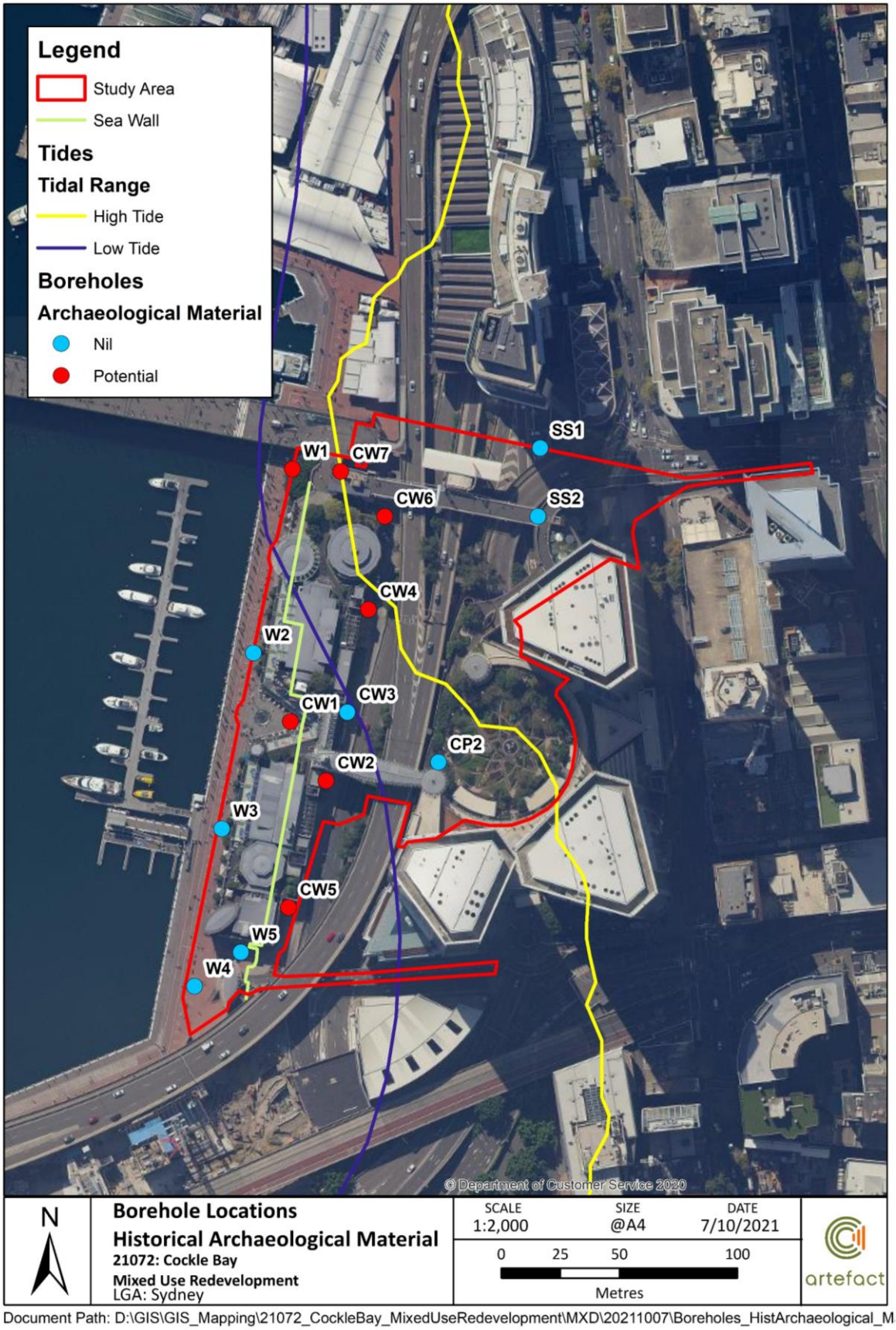


Figure 9 Location of completed geotechnical bore holes

5.3 Mapped history of land use

In this section, land use is primarily examined through mapping rather than title search. Mapping generally provides a clearer indication of the nature of structures and alteration to landform carried out within the study area, than would a list of title transfers. Where notable historical figures are identified as associated with particular locations or with businesses shown on maps, these individuals are briefly described here in order to further inform the historical significance of such locations. The time intervals used here differ from the thematic phasing used in Section 4.3 as they are determined by the phases of mapping information.

5.3.1 1800-1850

The first map of the study area reproduced here is derived from a map produced by Alexandre Leseuer in 1802 (Figure 10). This map is not sufficiently accurate to allow for detailed superimposition of the study area and an approximate outline of the study area has been provided in a Plan of Sydney prepared in 1822 (Figure 11).

The 1822 plan shows the north east corner of the study area incorporated a natural protrusion or minor raised headland. In the 1802 map, the study area is shown as primarily located within the waters of Cockle Bay (Figure 10). This portion of the study area appears to have been the first area subject to development with the construction on it of the Sydney Market Wharf at the terminus of Market Street. This wharf was constructed to service the new Sydney Market that was located then at the current location of the Queen Victoria Building (Figure 11).

The location of Market Wharf as shown in Figure 11 appears to be within the intertidal zone. While it is understandable that construction of a longer wharf beyond the intertidal zone may have been a considerable undertaking, it would appear that the construction of market wharf in the intertidal zone would have seen large parts of it inoperable during low tide.

At this stage, the study area was still a relatively unutilised location, situated between the slaughterhouse to the south, Market Street to the north and Sussex Street to the east. A far greater concentration of industry, particularly of mills and breweries is evident along the central spine of the Sydney CBD as shown in another plan depicting the area in 1821 and shown in Figure 12.

By 1845, very large-scale land reclamation had apparently taken place, with at times up to 100m of encroachment into the previous waters of Cockle Bay. This is evident in Figure 13, a plan dated to 1845, in which four wharves are shown in the study area. These are from south to north:

- Hynde's Wharf
- Street's Wharf
- Albion Wharf
- Market Wharf.

Only one building is shown as wholly within the study area by 1845, apparently associated with Albion Wharf (likely the Albion Grain Mill (see Section 5.3.1.3 below), and one building partially within the study area associated with Street's Wharf. This figure does not provide sufficient detail to identify whether these wharves were timber jetties or were formed of seawall and landfill, or a combination of both.

Evidence from a map dated ten years later, in 1855 would suggest these wharves were such combinations (Figure 14). In this map it appears that dry land in the Sydney CBD is shaded dark brown, while buildings, roads and wharves are shaded various tones of yellow. This would suggest

that where wharves in the study area are shaded in a combination of yellow and brown, that they are composite constructions of both landfill and timber. Each of these four wharves will be discussed individually.

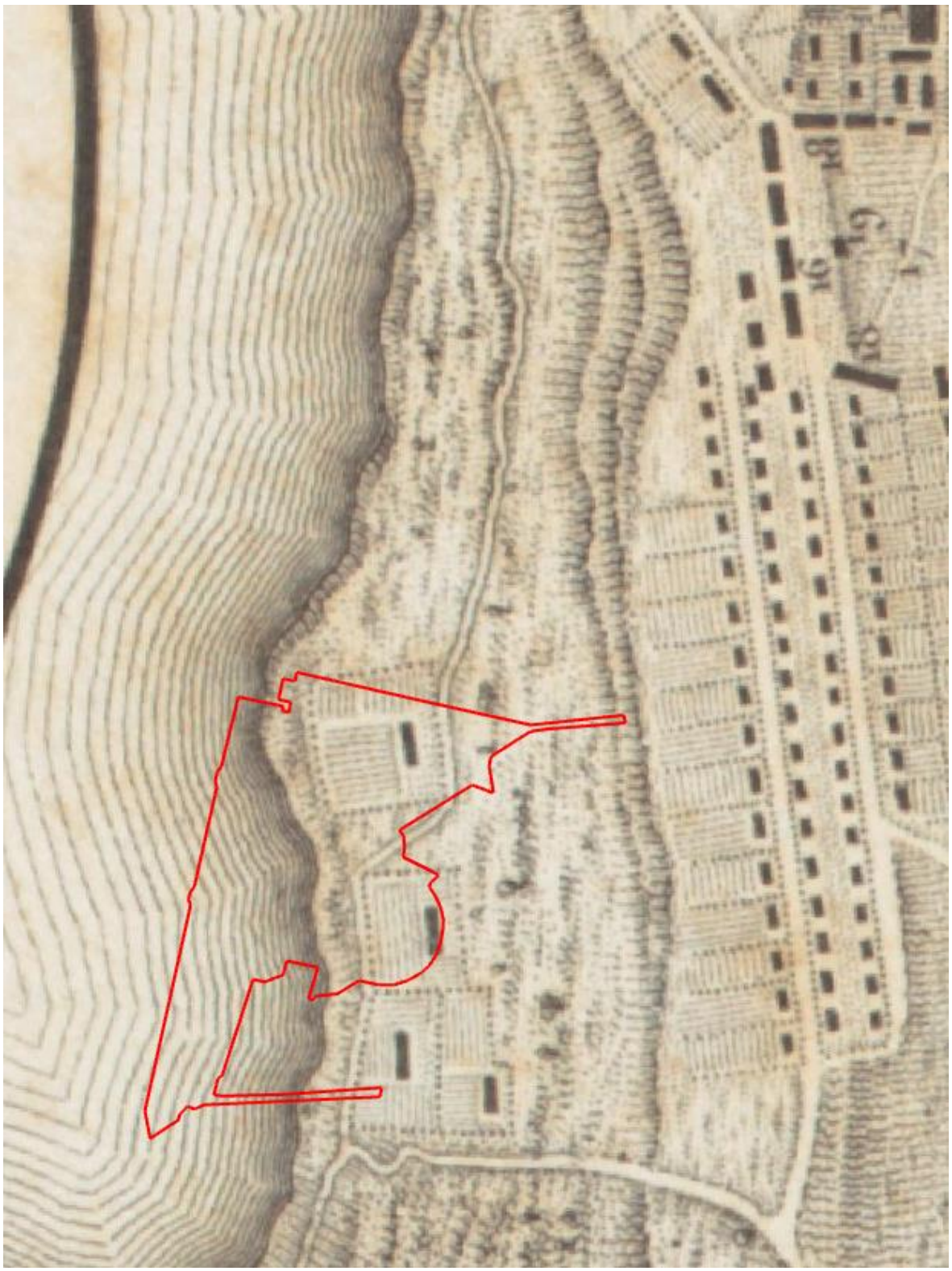


Figure 10: Extract from Plan de la Ville de Sydney[51]

[51] A. Leseuer 1802 - Trove NLA.

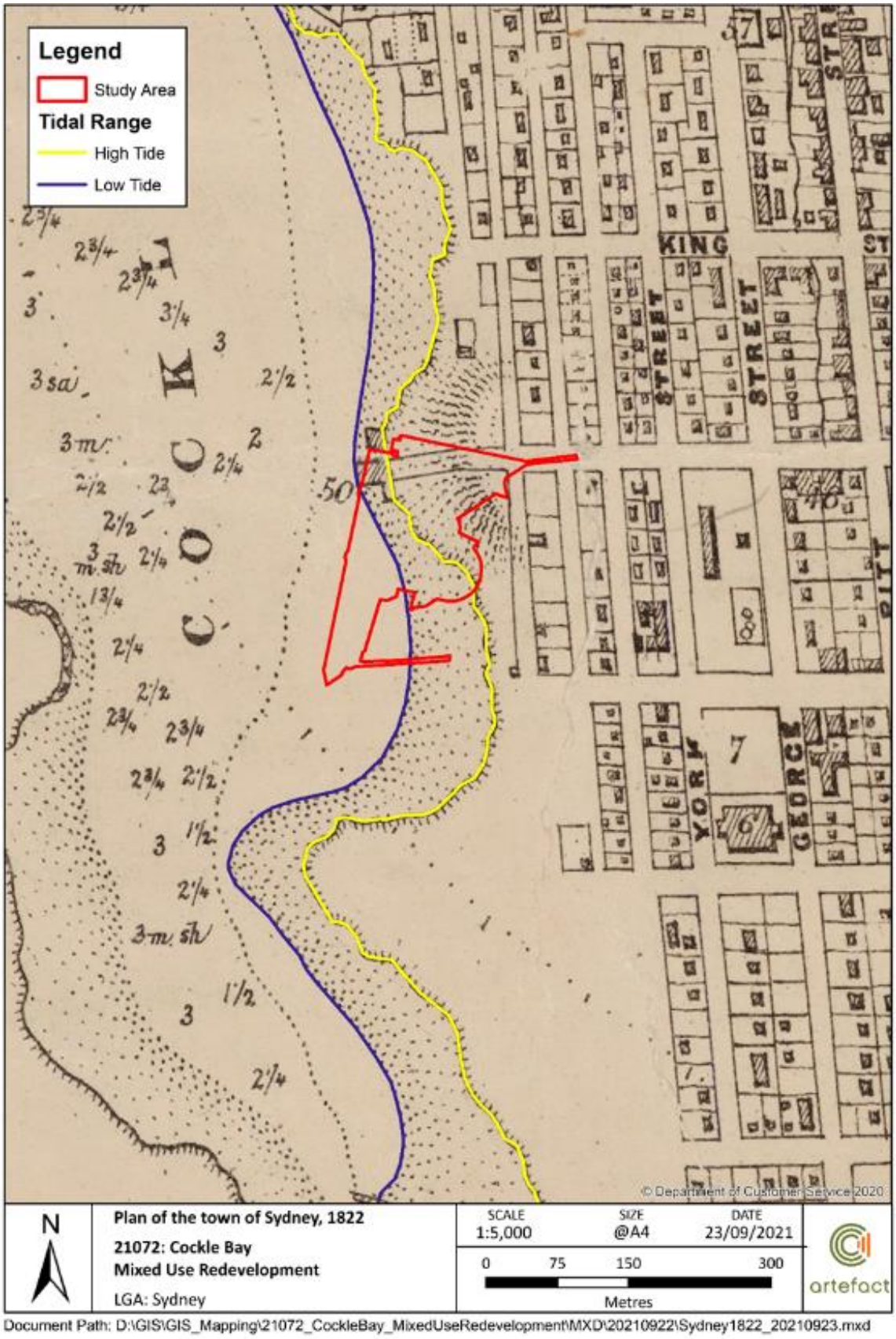


Figure 11: Study area over extract from 1822 Plan of Sydney[52]

[52] Trove NLA.

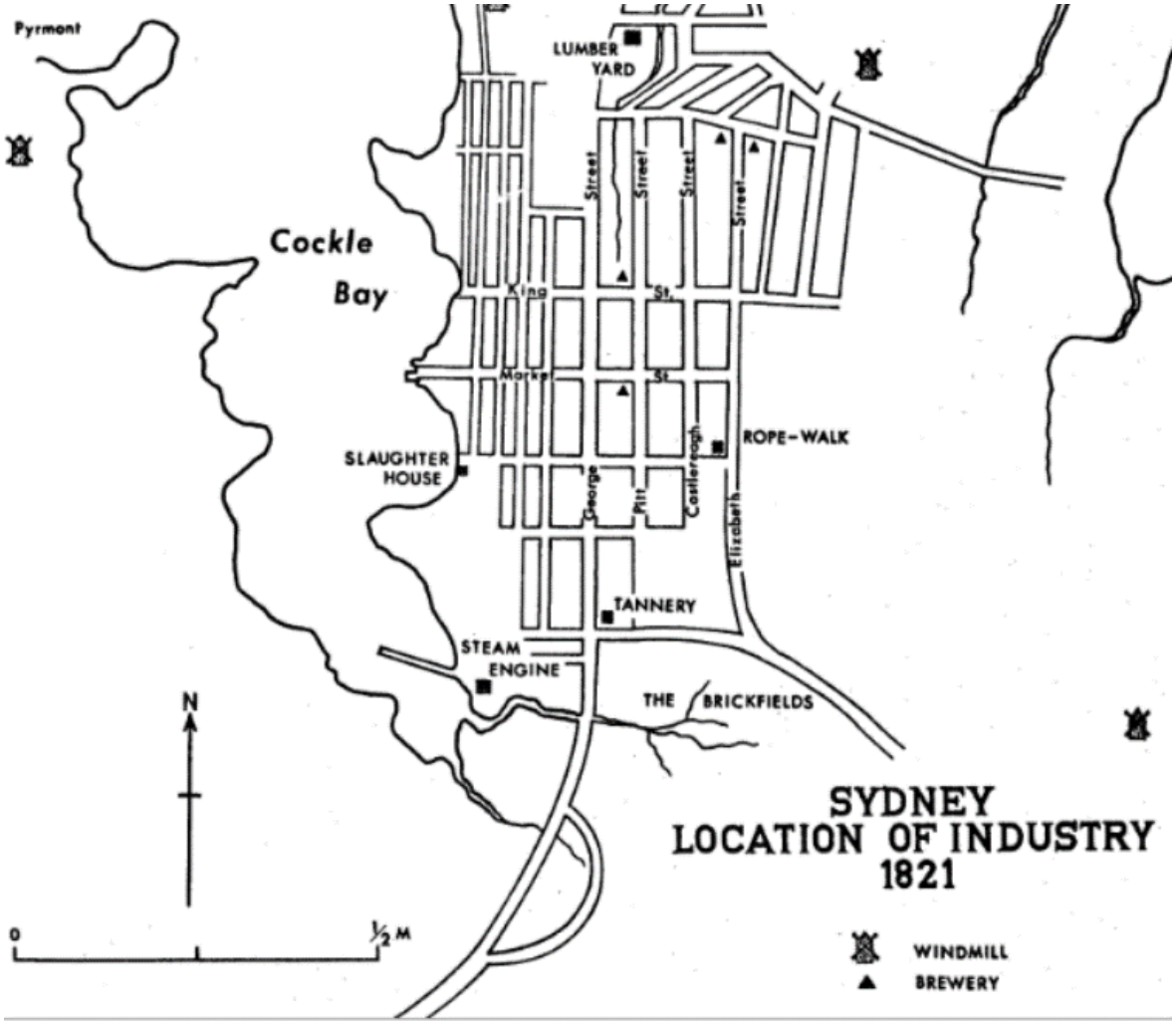


Figure 12: Extract from G. Walsh 1969 (Figure 5)[53]

[53] Walsh, G. 1969. A History of Manufacturing in Sydney, 1788-1850. Thesis for the degree of Master of Arts, Australian National University.

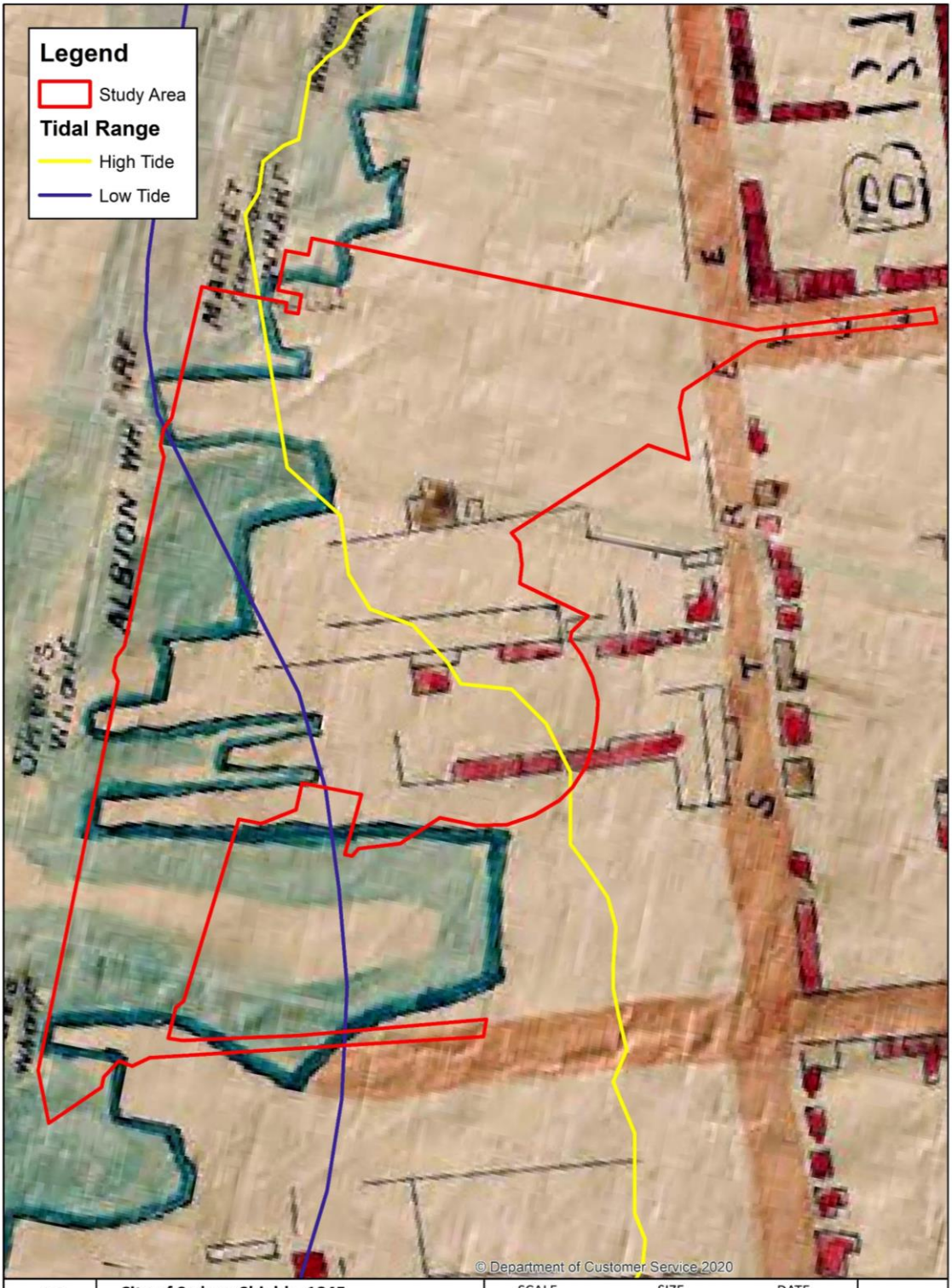


Figure 13: Extract from Shields Map of Sydney 1845[54]

[54] City of Sydney Archives.

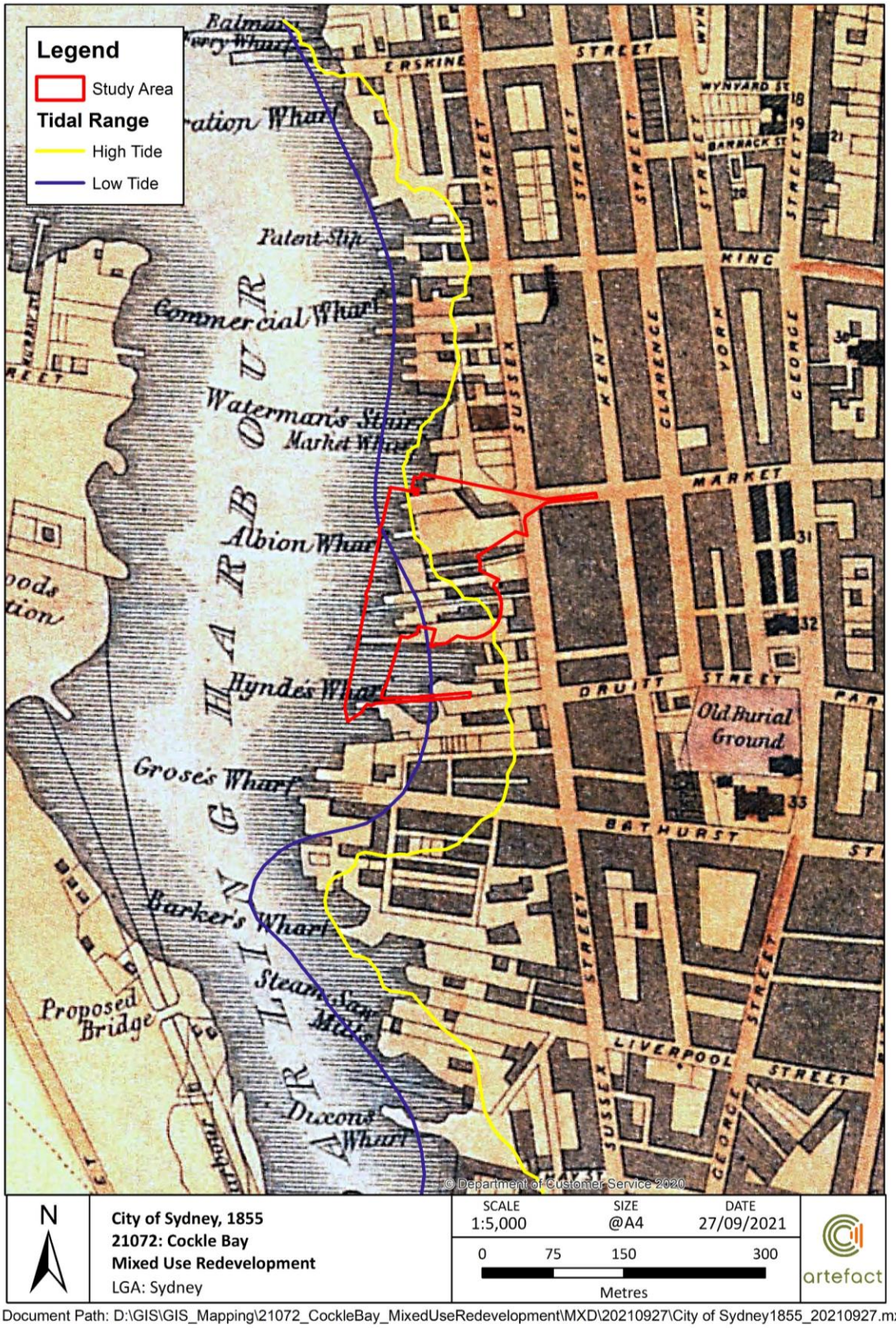


Figure 14: City of Sydney Plan 1855[55]

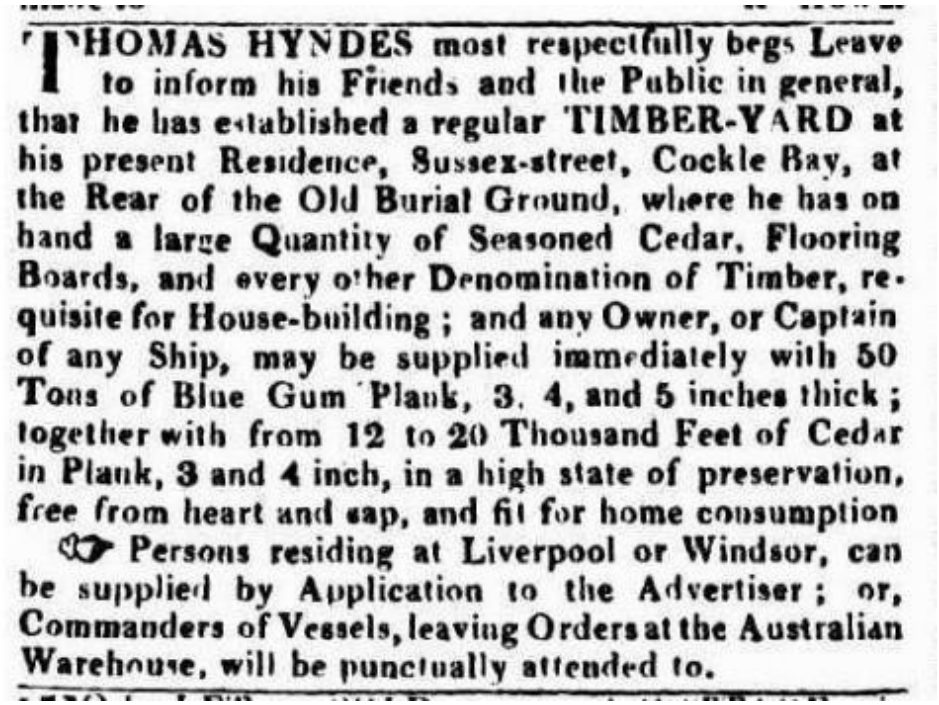
[55] City of Sydney Archives.

5.3.1.1 Hyndes' Wharf and Thomas Hyndes

Thomas Hyndes (1780-1853), after whom Hyndes' Wharf's was named, arrived in NSW in 1803 having been sentenced to transportation for life for the crime of highway robbery. This was a surprisingly light sentence for this crime at the time, and Hyndes was to spend two years in a prison hulk before departing for the colony. In 1806 Hyndes was married to Charlotte Green at Samuel Marsden's York Street Church in Sydney, and from this point his course in life appears to have risen steadily. In 1808 Hyndes was given a conditional pardon and in 1809 he was granted 100 acres in St George Parish. In 1814 Hyndes was employed as a clerk in a lumber yard, although the following advertisement dated to the same year would suggest that he was already in business for himself. [56]

> *THOMAS HYNDES begs leave to inform Captains and Owners of Vessels arriving at this Port and the Inhabitants of the Colony likewise, that they can be supplied with Masts, Yards, or spars of any dimension; also Timber Plank for Ship Building Timber in Log or other-wise; requisite for House Building, on the most reasonable Terms, by application to him, either at his Residence in Castlereagh street, or his Saw Pits at Government Warf.*

By 1822 (aged 52) Hyndes had been assigned convict workers whom he oversaw in his role as a master sawyer. Only a year later in 1823, Hyndes advertised that he had established a timber yard at Cockle Bay and was capable of supplying very large quantities of timber (Figure 15). Given the size of operation indicated here, it is likely that Hyndes Wharf at Cockle Bay would have dated from considerably earlier than its first appearance on Shield's 1845 map. The 20,000 feet of timber advertised by Hyndes equates to six linear kilometres of planking - an extraordinary amount of timber.



THOMAS HYNDES most respectfully begs Leave to inform his Friends and the Public in general, that he has established a regular TIMBER-YARD at his present Residence, Sussex-street, Cockle Bay, at the Rear of the Old Burial Ground, where he has on hand a large Quantity of Seasoned Cedar, Flooring Boards, and every other Denomination of Timber, requisite for House-building; and any Owner, or Captain of any Ship, may be supplied immediately with 50 Tons of Blue Gum Plank, 3, 4, and 5 inches thick; together with from 12 to 20 Thousand Feet of Cedar in Plank, 3 and 4 inch, in a high state of preservation, free from heart and sap, and fit for home consumption

☞ Persons residing at Liverpool or Windsor, can be supplied by Application to the Advertiser; or, Commanders of Vessels, leaving Orders at the Australian Warehouse, will be punctually attended to.

Figure 15: T. Hyndes advertisement 1823[57]

[56] *The Sydney Gazette and New South Wales Advertiser*. 22 October 1814, Classified advertisements, p2.
[57] *The Sydney Gazette and New South Wales Advertiser*. 4 December 1823, Classified advertisements, p1.

In the 1828 census Hyndes appears as a timber merchant at Sussex Street employing 18 convicts and 9 free men, and he also possessed a wharf at Druitt Street. Hyndes retained his Sussex Street lumber business until at least 1844, and still possessed stables in Sussex Street and his Druitt Street wharf at the time of his death in 1853 - in addition to a very substantial business and real estate portfolio. [58]

A major turning point in Hyndes' wealth came when he was issued a permit in 1823 to procure 20,000 feet of cedar from Illawarra. A ban on cedar-getting had previously been in place and Hyndes was now in possession of a rare licence and the facilities to offload and mill this valuable timber at Sydney. He had apparently already been engaged in pilfering cedar from other licence holders, and this apparently only increased now that he held both a licence and also a boat commissioned for his (officially) new trade). [59] An estimation of Hyndes' entrepreneurial nature can be obtained from the fact that his 1823 timber advertisement (Figure 15) offered for sale his entire legal allotment of 20,000 feet of cedar.

5.3.1.2 Streets Wharf

Little information is available on this wharf. The earliest identified reference is an advertisement of the location in 1833 as a refitting facility for ships. [60] A further reference is made in 1840 to the location as the previous premises of a coal supplier who had left Street's Wharf for larger premises.[61] It is possible that the location was not a large loading facility – mentions of it are scarce in newspapers and far later references mention it as serving small vessels plying domestic waters. [62]

5.3.1.3 Albion Wharf

In 1833 John Terry Hughes (1802-1851) and John Hosking (1806-1882) opened the Albion steam powered flour mill in Darling Harbour, slightly south of the Market Wharf. Hosking had married the daughter of 'The Botany Bay Rothschild' - the emancipated Samuel Terry (?-1838) who had risen to significant wealth in the colony. Hughes was a nephew and son-in-law of Samuel Terry. Despite their relationship to such a wealthy individual, the partnership between Hughes and Hosking did not prosper.

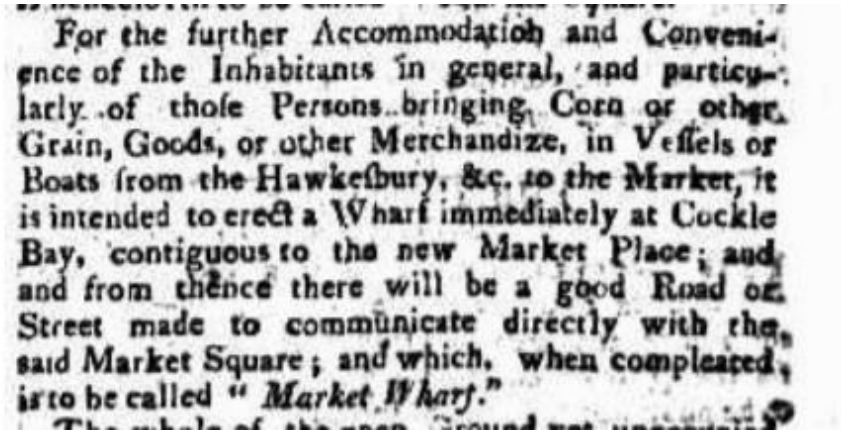
The Albion mill burned down in 1841 while significantly under-insured and Hughes and Hosking had to borrowed heavily from a bank to attempt to rebuild. Their unsuccessful attempt to resurrect their business sent their lender the Bank of Australia into bankruptcy. The image below by Frederick Garling (Figure 16) dates prior to the fire at the Albion Mill. It is of note as it gives perspective to the large scale of the operation and built infrastructure of the mill. It is equally noteworthy for the information it provides on the likely nature of land reclamation and seawall and jetty construction. It seems the mill and the foreground are of packed dirt that is restrained by a fairly rudimentary timber retaining wall of rough cut logs. A commercial weighing scale and a small derrick stand to the side of a low jetty, built without rails, fenders or visible bollards.

5.3.1.4 Market Wharf and Market Street

The construction of this wharf was announced in 1810, and it accompanied the relocation of the Sydney Market to the current location of the Queen Victoria Building (Figure 17). At the same time that the Market Wharf was announced, the establishment or upgrade of Market Street to the Wharf was also proclaimed (Figure 17).

[58] Davis, J. (N.D.) The Convict Thomas Hyndes: From Highway Robbery To Timber Robbery Down In The Cedar Swamps Of Gerringong: https://www.academia.edu/44978040/THE_CONVICT_THOMAS_HYNDES_FROM_HIGHWAY_ROBBERY_TO_TIMBER_ROBBERY_DOWN_IN_THE_CEDAR_SWAMPS_OF_GERRINGONG.
[59] Davis, J. (N.D.).
[60] *The Sydney Gazette and New South Wales Advertiser*.19 September 1833, Advertising, p2.
[61] The Sydney Monitor and Commercial Advertiser. 21 September 1840. Advertising, p1.
[62] *Sydney Morning Herald*. 8 December 1876, Advertising, p1.

Figure 16: The Albion Mill Darling Harbour, c1833-1841[63]



For the further Accommodation and Convenience of the Inhabitants in general, and particularly of those Persons bringing Corn or other Grain, Goods, or other Merchandize, in Vessels or Boats from the Hawkesbury, &c. to the Market, it is intended to erect a Wharf immediately at Cockle Bay, contiguous to the new Market Place; and and from thence there will be a good Road or Street made to communicate directly with the said Market Square; and which, when compleated, is to be called "*Market Wharf.*"

Figure 17: Announcement of intent to construct Market Wharf[64]

The structure of the wharf itself is likely to have been largely timber, or so might be inferred from a government order to protect it from damage through regular use. Restrictions included prohibitions on tying vessels to points other than designated mooring ring, and on bringing vehicle onto the wharf itself as seen in the quote below (bold emphasis added).[65]

[63] Trove NLA.
[64] *The Sydney Gazette and New South Wales Advertiser*. 13 October 1810, p1.
[65] *Sydney Gazette and New South Wales Advertiser.* 23 February 1811, p1.

> *GOVERNMENT PUBLIC NOTICE.*
> ***No Boats or Vessels of any description are to be moored or made fast to the Rails, or any Part of the Wharf in Cockle-bay, except the Iron Rings which have been fixed for that Purpose in those Timbers at the end of the Wharf next to the Sea. Carts may be brought to the Extremity of the New Street which leads to, and joins the Wharf but they are at no time whatever to be brought upon the wharf itself : And should any Persons be found to violate this Order, either with respect to Boats or Carts, they will be prosecuted and punished according to Law.***

At first, the Market Wharf would not have been of as substantial size as nearby commercial wharves. The Market Wharf was intended for incoming goods, and these would likely be fresh or easily damaged food produce of a nature that would be rapidly removed from the wharf to the Sydney Market. In contrast, nearby commercial wharves almost certainly handled both incoming and outgoing freight, and required sufficient space and facilities for the storage of bulk goods such as timber and coal that have been described as handled at Hyndes and Street's wharves respectively.

5.3.2 1850 - 1880

By 1850-60 development and use of the study area as a specialised industrial and shipping precinct was in full swing. The City of Sydney 1865 Trigonometric Survey reproduced below illustrates approximately the increased level of development including greater number of jetties and buildings in the study area, along with continued land reclamation (Figure 18). Far better detail is visible in the Doves Map produced in 1880. This map not only provides information on changes to wharf names and ownership, but also on the function of structures, their number of stories and at times the names of occupants. The Doves 1880 Map likely also reflects changes implemented in response to a Parliamentary Committee of the NSW Legislative Assembly which recommended generally that shorter existing wharves should be replaced with longer 'finger' style wharves (Figure 19).

This change to longer wharves was more comprehensively carried out following the formation of the Sydney Harbour Trust in 1901, and the shift to higher tonnage vessels at the study area in Darling Harbour South. In Doves' maps, pink shaded structures are built of stone or brick, yellow of timber and blue of iron, while circled numbers represent the number of built storeys. A number of changes are immediately visible along the foreshore, which will be described here first, followed by description of development along Susses and Market Street. There are now six primary wharves in the study area, which from north to south are:

- Corporation Wharf - this appears to be a separate entity to Market Wharf. Market Wharf continued to function through this period, possibly slightly north of Corporation Wharf
- Baltic Wharf
- Albion Wharf
- Fagan's Wharf
- Street's Wharf
- Wentworth Wharf.

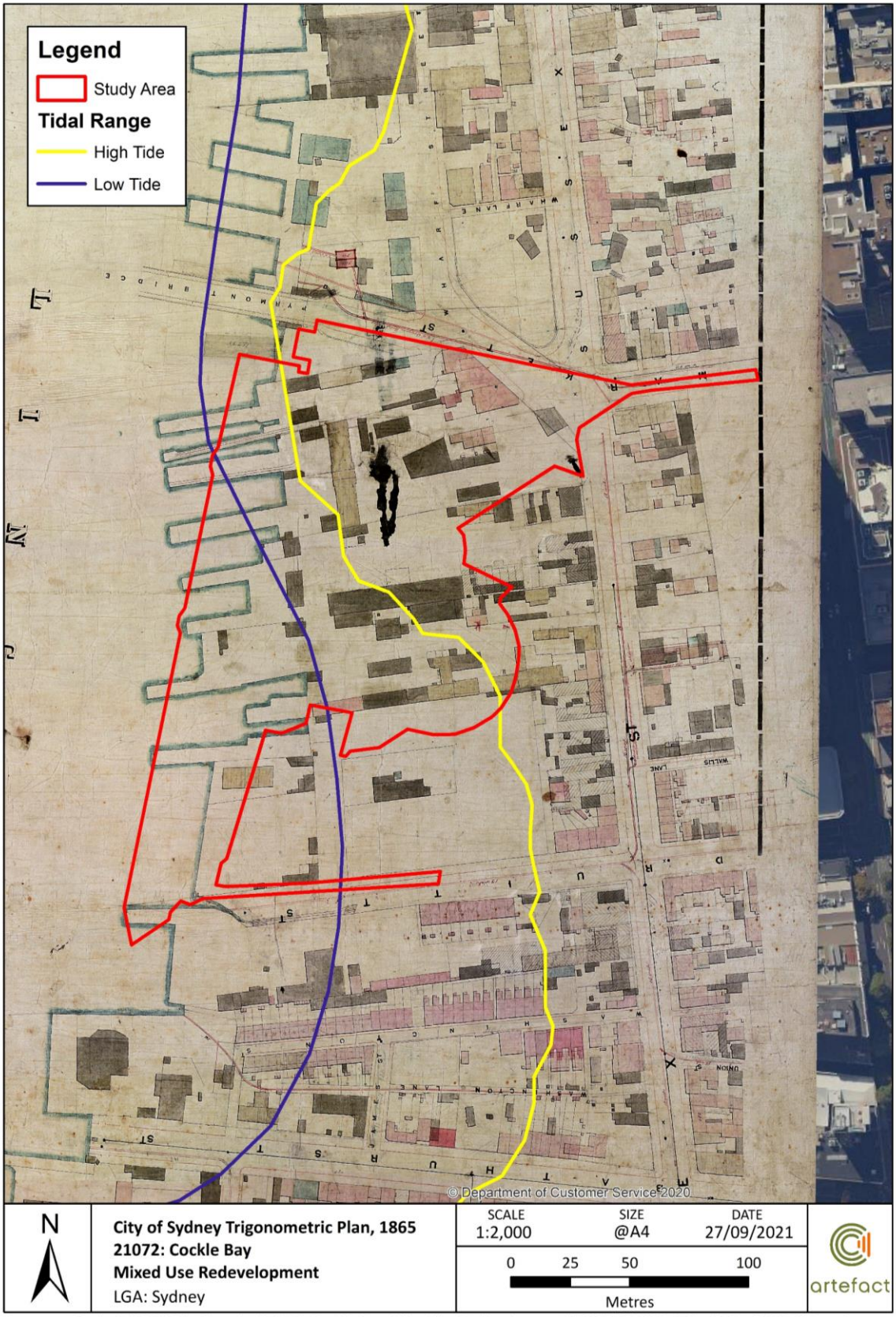


Figure 18: The City of Sydney 1865 Trigonometric Survey[66]

[66] Trove NLA.

Figure 19: Doves 1880 Map of Sydney[67]

5.3.2.1 Corporation Wharf

The relationship between the location of Corporation Wharf and Market Wharf has not yet been clarified in this report. By the late nineteenth century, the built infrastructure around Market Wharf had evidently significantly expanded to incorporate a row of three storey substantial and ornately finished warehouses at the corner of Market and Sussex Streets. These are shown in Figure 20, and it is possible that the single storey buildings visible to the left of these warehouses are associated with Corporation Wharf. The three neighbouring wharves - Market, Corporation and Baltic, were sufficiently well known to constitute landmarks in the NSW Legislative assembly discussions of proposed railway extension.[68]

Figure 20: Approach to Market Wharf looking to Market and Sussex Street (1887), view north west[69]

5.3.2.2 Baltic Wharf

On 28 October 1858 a Mr Northwood wrote to the Mayor and Council of Sydney to complain about the deteriorated state of the approaches to the Baltic Wharf that had resulted from the construction of the Pyrmont Bridge. Northwood signed “Northwood & Co. Baltic Wharf”.[70]

William Northwood was born in England around 1806. He arrived in Sydney in 1832 having received a life sentence. By 1844 he was advertising as a general dealer in Market Street Sydney. Northwood was elected as an Alderman of Sydney between 1857 and 1871. In 1858 he entered into business with James and Robert Cox at the Baltic Wharf and had returned to England by 1871.[71]

[67] Trove NLA.
[68] *Sydney Evening News* 20 July 1876. Page 3 ‘Legislative Assembly’.
[69] MAAS Powerhouse.
[70] Letter: Northwood & Co, Baltic Wharf. Complaining of the state of the approach to their premises (28/10/1858), [A-00290024]. City of Sydney Archives, accessed 05 Jul 2021, https://archives.cityofsydney.nsw.gov.au/nodes/view/1095474.
[71] https://www.sydneyaldermen.com.au/alderman/william-northwood/.

The Baltic Wharf appears to have functioned far more as a shipping depot and mixed business than as a concentrated location of heavy industry or chandlery as was the case for other nearby wharves. Advertisements refer to the Baltic Wharf as a boarding point for ships plying local waters including rivers.[72] The Baltic Wharf was associated with the highest ratio of brick or stone buildings as a proportion of the total built structures within or adjacent to it as shown on Doves' 1880 Map, when compared to other wharves within the study area. These include two two-storey structures along its north boundary, and along Sussex Street the three storey Buzacott & Armstrong Ship Chandlers and the three storey Pyrmont Bridge Hotel. Paul's restaurant appears to have enjoyed some longevity still being mentioned in newspaper articles including one passing reference to a fire there in 1892.[73] Little is available on the Pyrmont Bridge Hotel at Sussex and Market Streets other than passing mention of insolvency of the publican in 1887.[74]

Buzacott & Armstrong Ship Chandlers

The owner of Buzacott & Armstrong Ship Chandlers was an individual of some note. **Andrew Bell (A.B.) Armstrong** was born in Ireland around 1811. He married in Sydney in 1844, and with his wife raised their three children in addition to Sarah, a child of his wife's previous relationship. Sarah Armstrong would later marry W.S. Buzacott who subsequently joined A.B. Armstrong in business. W.B. Armstrong was conflicted between his Christian beliefs and his family tradition of military service. He came to the colony with the 80th Regiment, but resigned before the regiment was despatched to India. By 10 October 1860. Armstrong had become a key member of the pacifist Peace Society which contended that all war was incompatible with the teachings of Jesus. W.B. Armstrong became a frequent and key speaker on pacifism and later went on to found the Society for the Abolition of Capital Punishment. Through this time Armstrong was active in keeping various church organisations running, and in 1868 he was elected president of the Wesleyan or Protestant Benefit Society, which functioned as a medical benefits scheme. Armstrong enjoyed a widespread reputation as a philanthropist being behind initiatives including the Sunday Morning Breakfast and the Francis Street Night Refuge and Reformatory.

W.B. Armstrong supported himself through this time having first worked in his wife's uncles Ironmongery (L. Iredale, Ironmonger, 67 George Street) and later taking over a ship chandlery which after his step-daughter's marriage to W.S. Buzacott became known as Buzacott and Armstrong.[75]

5.3.2.3 Albion Wharf

This wharf retained the name that was once given it when it served the Albion Flour Mill mentioned above. Its use shown on the Dove's 1880 Map seems far more specialised than the Baltic Wharf, being almost wholly taken up by Miller and Harrison's Timber Yard and buildings specific to this use. Buildings associated with this Yard were almost wholly single storey, with the exception of a wooden two storey steam powered saw mill, and a three storey brick structure facing the waterfront. Advertisements for Miller and Harrison first appear in 1876, and the partnership seems to have had timberyards in several locations including Milson's Point and Darling Harbour. [76] The last mention of the partnership at Darling Harbour is in 1896. [77]

John Booth, founder of Garrard and Booth, the produce agents which held a brick / stone and a timber building at the Sussex Street frontage of Miller and Harrison's Timber Yard was an individual of some note Little is available on this business which seems to have carried out almost no

[72] *Empire* (Sydney). 1 September 1855. "For the Richmond River", p1.
[73] *Macleay Argus* (Kempsey). 25 March 1892 "Daring Burglary in George Street".
[74] *Sydney Morning Herald* 28 October 1887. 'The Bailiff" p, 8.
[75] Paul F Cooper. Andrew Bell Armstrong (1811-1872) Founder of the Sunday Morning Breakfast for the Poor Philanthropy and Philanthropists in Australian Colonial History Available at https://colonialgivers.com/2020/11/24/andrew-bell-armstrong-1811-1872/(opens in a new tab).
[76] *Sydney Morning Herald* 4 August 1876. 'Wanted good carpenters' Advertising p12.
[77] *Maitland Weekly Mercury* 21 March 1896. 'news of the Week' P10.

advertising.[78] Booth was born in England in 1832, he married in 1855 and went on to father 13 children. He served as an Alderman of the City of Sydney for two terms. Prior to moving to Sydney from southern NSW, Booth had subdivided land to form the present township of Milton – of which he is considered the founder. In 1861 Booth moved to Sydney and took up business in Sussex Street, working as a produce agent there from 1880 until his retirement in 1900. [79] On his passing in 1914, the flags at Town Hall were flown at half-mast.[80]

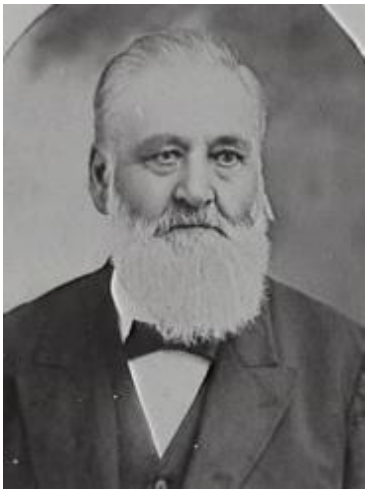


Figure 21: John Booth 1832-1914

5.3.2.4 Fagan's Wharf

This wharf serviced the Fagan Brother's Timber Yard which had several depots. No brick or stone structures are shown on Doves 1880 Map as present in the study area (Figure 19). The Fagan brothers William and Peter had several vessels in commission trading their timber between Sydney and Camden Haven. It is evident they had been active at Darling Harbour since at least the mid to late 1860's as indicated by a letter of complaint addressed by them to the City of Sydney over works carried out by the City of Sydney within their private road at Darling Harbour.[81]

5.3.2.5 Street's Wharf and Timber Yard

No added information has been gained for this wharf beyond the few details noted in the previous section. The wharf is largely empty of infrastructure in the study area, with the exception of one timber shed along the north boundary and a series of connected buildings constructed in composites of brick/stone, timber and iron, including a saw mill.

5.3.2.6 Wentworth Wharf

Little detail is available on this wharf which appears to have predominantly been occupied by small business concerns, working at close quarters to each other. Within the study area are Allen and Zahel's Steam Saw Mill - a two storey timber building, and parts of both the Burns Timber Store and Beverley Steam Saw Mill – both constructed in timber and Iron. Nearby stood an Engine House and the Vulcan Foundry - a one storey iron building.

[78] The sole identified advert is: *Daily Telegraph* (Sydney) 14 October 1896. Advertising p5.
[79] https://www.sydneyaldermen.com.au/alderman/john-booth/.
[80] 'Booth, John James (1831–1914)', Obituaries Australia, National Centre of Biography, Australian National University, https://oa.anu.edu.au/obituary/booth-john-james-19667/text30986, accessed 5 July 2021.
[81] Letter: P.F.Fagan & Co., Coal and Timber Merchants, applying for compensation for loss of business (27/01/1869 - 15/03/1869), [A-00299221]. City of Sydney Archives, accessed 05 Jul 2021, https://archives.cityofsydney.nsw.gov.au/nodes/view/1101141.

5.3.3 1880-1920

From the 1870's foreign investment poured into Australia, resulting in a boom in construction at Darling Harbour. This ended with the depression of the 1890's by which time significant increases to local infrastructure at Darling Harbour had been implemented. Major changes are evident to the character of jetties shown in Figure 22, dated to 1903, two years after the resumption of Sydney Harbour's Wharves by the Sydney Harbour Trust. With the exception of the Albion Wharves, all other wharves have changed title which in at least two cases is associated with their having been taken over by the largest shipping company in the southern hemisphere at the time - the Union Steam Ship Company (N.Z.) (U.S.S. Co.). The outline of buildings shown in Figure 22 bears resemblance to those shown in Figure 19 dating to 1880. It is uncertain whether these buildings continued in their previous function, or were put to different use by the new tenants of their adjoining wharves.

The change in nature of wharfage, from use by relatively small tenants to very large ones such as the U.S.S. Co. was reflected in the statistic that through this period and to 1927 there was a 43% decrease in the number of ships using this part of Darling Harbour, but at the same time there was a 9% increase in the tonnage of freight being handled, with a drastic decrease in local or intranational freight.[82] Also visible in Figure 22 is the formalisation of Wharf Street through the north east of the study area.

Far greater detail is available on site usage from the 1917 Fire Underwriters Association of NSW map reproduced in Figure 23. Several primary changes to land use are visible in this figure which will be briefly discussed before detailed analysis of site use within the study area. Figure 23 illustrates that very significant wharf construction and likely land reclamation has been carried out, as is reflected in the increased width of wharves and the land immediately adjoining them at the new coastline. Wharf Street, which was shown in 1880 as terminating in the north east of the study area with a dog-leg to Sussex Street has now been renamed Day Street, and runs from Market Street to Druitt Street, with its previous dogleg renamed Day Place. There also appears to have been a three-fold division in the nature of site use. While the wharves themselves evidently continue as shipping facilities, they are no longer named after their chief tenants- who now had to access these wharves through the Sydney Harbour Trust. Immediately inland of the wharves we see that significant proportions of the study area are warehouses under lease to or title of the major shipping companies who previously (in 1880) had their names on wharves - the U.S.S. Co. and Federal Shipping. In between these large warehouses are a number of larger businesses associated with maritime industry. Day Street runs to the east of these, and forms a boundary between these maritime concerns and far smaller businesses that generally have no direct connection to maritime industry. The occupants of the study area shown on Figure 23 are examined for potential historical association immediately following Figure 23.

Figure 23 is significant in that it gives detailed description of the built character and materials used in construction of structures within the study area, ranging from iron walled wharves to those of timber piles and decking, and a detailed itemisation of smaller buildings.

[82] Proudfoot, 1986. p35.

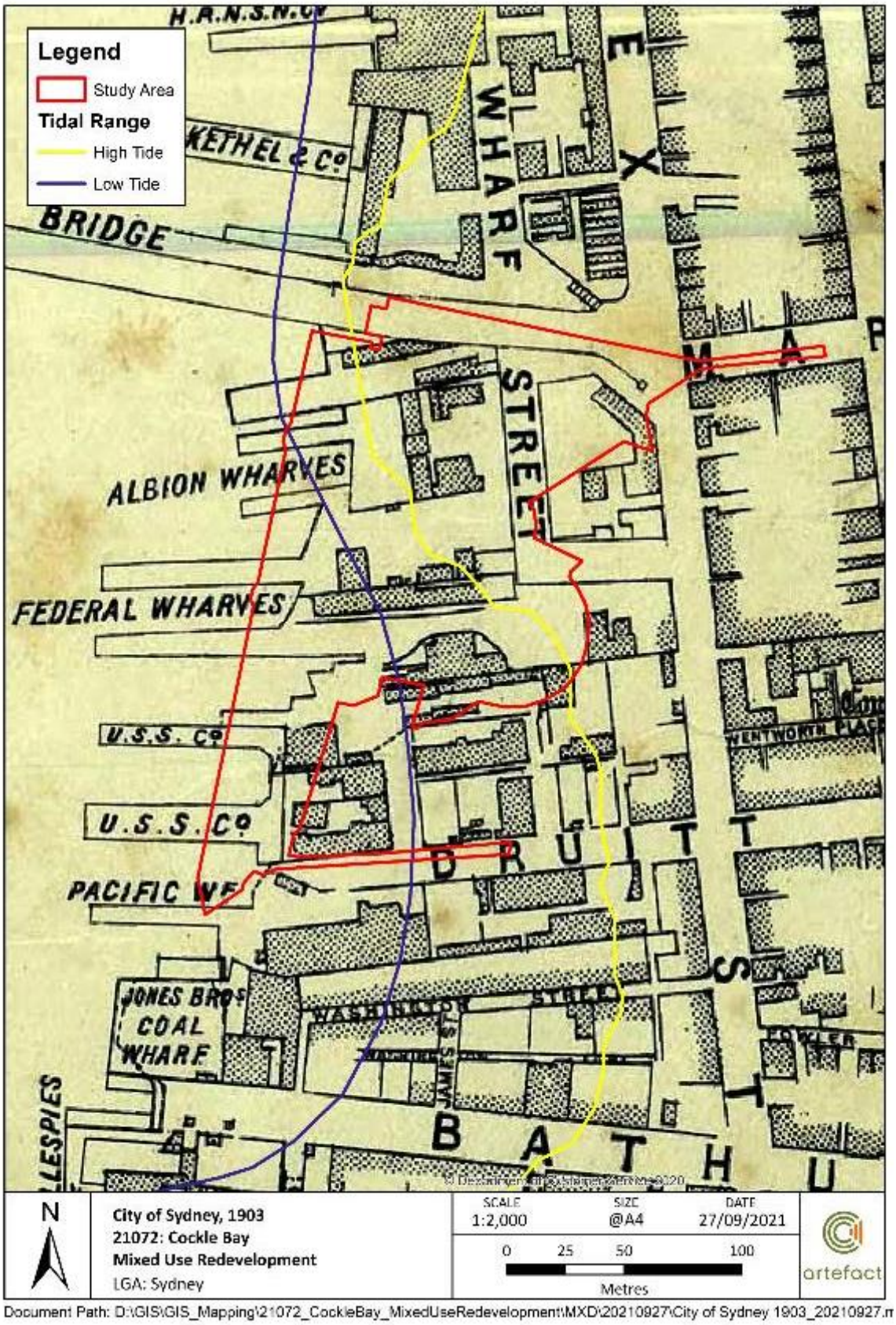


Figure 22: City of Sydney Map 1903[83]

[83] City of Sydney Archives.

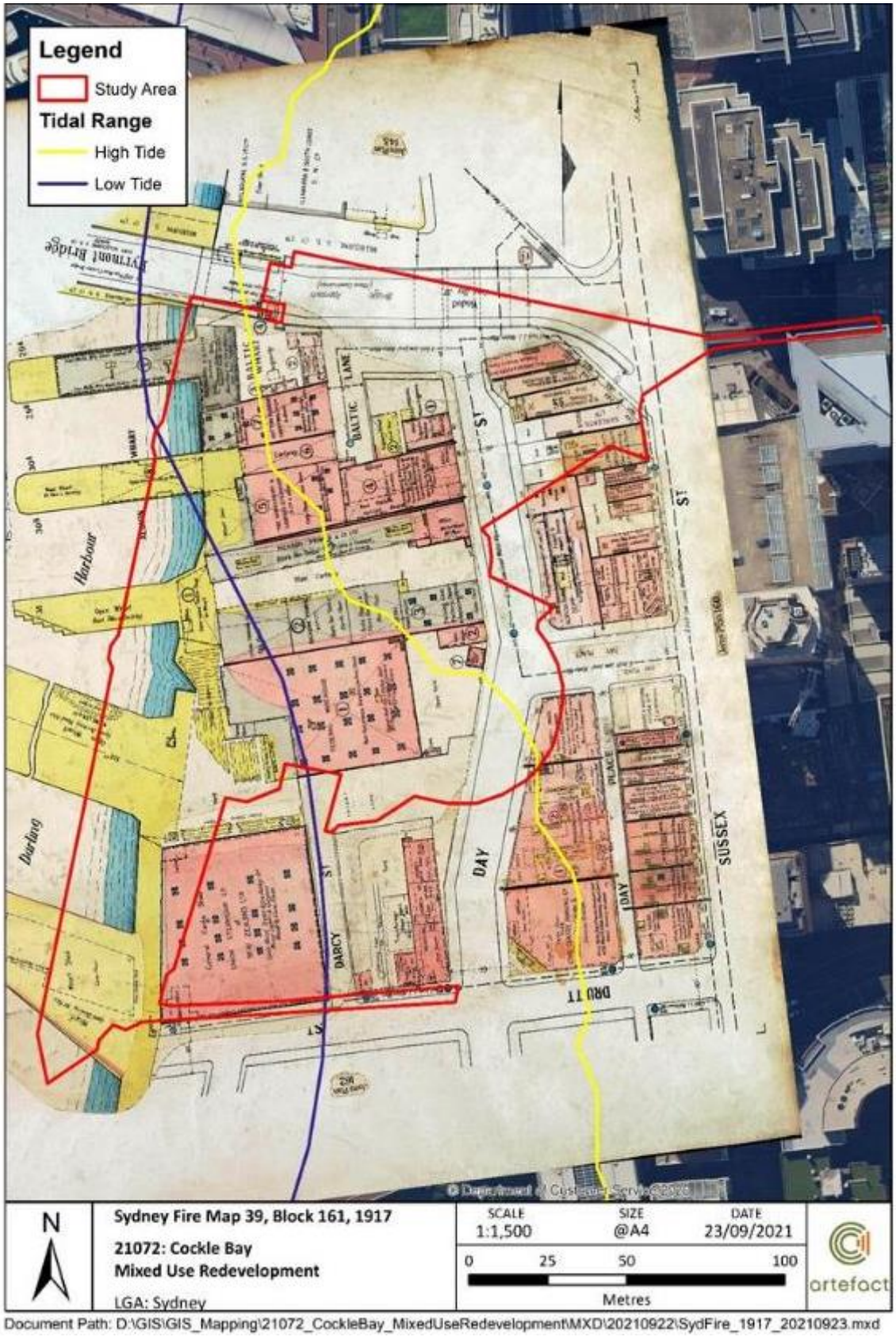


Figure 23: Sydney Fire Map 1917. Block 161[84]

[84] City of Sydney Archives.

5.3.3.1 Occupants of the Study Area shown on Sydney Fire Map 1917. Block 161

- **Melbourne Steam Ship Company (MSSC)**
    - Founded in 1895 after several years trading as the Melbourne Coal, Shipping & Engineering Company, the MSSC chiefly serviced main Australian ports. Following World War 2 and the sharp decline in intranational Australian shipping, MSSC sold its last ship in 1961.
- **Sutton-Rudder Carrying Co.**
    - This company was registered in 1929 with the considerable capital of £25,000 and head offices in Sydney under the directorship of A.E. Rudder and H.L. Sutton. The company functioned as general carriers and shipping agents. [85] The company was placed into liquidation in 1953.[86] Mr **A.E. Rudder** went on to considerably greater success as a director of Empire Airways which subsequently merged with Qantas Airways in 1934 as Qantas Empire Airways.[87]. After resigning from the board of the airline in 1947, A.E. Rudder sought to float his general shipping and customs business which apparently had continued successfully separate to his partnership with H.L. Sutton. In 1948 Rudder had apparently been in business for over 50 years with a workforce of over 150 employees split between Sydney and Melbourne.[88]

Figure 24: A. E. Rudder as Chairman of the Tasman Empire Airways in 1946[89]

[85] *Sun* Companies Registered. 25 October 1929, p 17.
[86] *NSW Government Gazette* Sutton Rudder Carrying Co. 15 May 1953 page 1627.
[87] *Cloncurry Advocate* Qantas Empire Airways Chronological History, 30 May 1947, p4.
[88] *Herald* (Melbourne) Float for Rudders 1 July 1948, p6.
[89] https://natlib.govt.nz/records/30657793.

- **The Hawkesbury & Gosford Steamship Co**
    - This company formed in 1929 through a change of name from the Hawkesbury Steamship Co. It does not appear to have prospered, being liquidated in 1935, but resurrected to continue trading at least until 1942.[90], [91],[92]
- **Dickson Primer & Co.**
    - This company appears first registered in 1922 as a partnership between James Arthur Stanley Dickson and Tom Joseph Coleby Primer, with offices at Bridge St Sydney.[93] The company appears to have enjoyed long standing success advertising their interest in 1968 in representing a large range of American manufactured industrial and medical equipment listed.[94]
- **Mackanness & Avery Pty Ltd Produce & Dealers Store**
    - Little is available on this company which appears to have functioned as a fairly small-scale shipper of produce such as the 96 crates of potatoes it shipped to Colombo in April 1947.[95]
- **E. Twomey Printers**
    - Little is available on this business which first appears in newspaper searches with a 1912 advertisment for an assistant.[96] The proprietor Edward Twomey of Annandale Street Annandale had passed away in 1937.[97] His son, also E Twomey had predeceased him during service in World War 1.[98]
- **B.M. Corrigan Ships Chandlers**
    - **Bartholomew Corrigan** operated a small fleet of ships and a chandlery in Sydney from the late 1870's to 1920.[99] Bartholomew died in 1910[100] and in 1920 his sons split the company and sold the shipping concern to the North Coast Steam Navigation Co. The premises of B.M. Corrigan experienced a significant fire in 1913.[101] Bartholomew's son Francis continued running the business until his death in 1928. Francis Bartholomew's death was noted in newspapers at the time as being a "Noted Shipping Man".[102]
- **J. Jones & Co.**
    - Little is available on this company which in the 1930's advertised itself as "The Largest Distributors of Potatoes in the Commonwealth".[103]
- **Watson Noble & Co. Grain Crushing & Produce Store**

[90] *Sydney Morning Herald* Company News. 30 July 1929, p1.
[91] *NSW Government Gazette*, Notice of Liquidation, 28 June 1935, p2697.
[92] *Commonwealth of Australia Gazette* Court of Conciliation and Arbitration, 3 December 1942, p 2800.
[93] *Dun's Gazette for NSW*. Vol. 28, No.11 (1822).
[94] *Foreign Commerce Weekly* International Commerce, Sales Representation. 22 April 1968, p42.
[95] *Daily Commercial News and Shipping List* Overseas Export Manifests, 16 April 1947, p2.
[96] *Sydney Morning Herald* Advertising 18 November 1912, p14.
[97] *Sydney Morning Herald* Family Notices. 25 June 1937, p10.
[98] http://www.leichhardt5000.com.au/wp-content/uploads/2015/04/TWOMEYEdward-John-.pdf.
[99] http://collections.anmm.gov.au/objects/10824.
[100] *Northern Star* (Lismore). The Late B. Corrigan's Will. 25 May 1916, p2.
[101] *Barrier Miner* (Broken Hill) Big Sydney Fires. 25 November 1913.
[102] *Evening News* (Sydney). Noted Shipping Man. 30 March 1928, p11.
[103] *Daily Examiner* (Grafton) Advertising. 7 January 1930, p7.

- This business first appears listed at 257 & 259 Sussex Street in 1908, having taken over the previous concern of Greenwood and Son. Advertised wares included a wide range of grain for human or animal consumption in addition to specialised poultry food. [104] The last identified mention of the company is almost exactly 30 years later in 1938, now located at 193 Sussex Street and advertising similar wares.[105]

- **Lyons Trading Co**
  - First mention of this company is found in import customs duty listings for July 1922. Lyons Trading Co would not appear to have been engaged in large scale import at this stage with the entirety of their imported batch being 3 drums and 2 barrels of oil, and 10 kegs of paint.[106] Lyons apparently also ran at least one small trading boat. [107] In 1949 a significant fire affected Lyons premises in Sussex Street. [108] During 1950 the company was subject to a union ban against handling Lyons Barges which were moving Shell Oil during a dispute.[109]

5.3.4 Historical aerial evidence of land use

5.3.4.1 1920-1950

A gap exists between the last detailed map dated to 1917 (Figure 23) and the first available clear aerial image of the study area. This aerial image, dated to 1951 is reproduced below in Figure 25. Considerable changes are visible in the layout of jetties as compared to 1917 mapping. In particular the open wharf south of the Albion Wharf has been changed from angling southwards from the shore to now angle sharply northwards, parallel with the two wharves to the south. The southern wharves have also undergone modification in shape with the second from southernmost wharf being trimmed to a trapezoid shape, creating greater space between it and adjacent wharves. These changes almost certainly correspond to the noted increase in ship size through this period, which would have required not only larger wharves, but also greater space between wharves.

Additional land reclamation is evident along the foreshore at the three southern wharves, again almost certainly to facilitate movement of larger quantities of freight. There appears to have been a fair degree of rearrangement of warehouse facilities in the south and centre of the study area including the moving or demolition of the previous Federal Warehouse and the U.S.S.Co warehouse. Far more continuity is apparent in the north west at the Baltic Wharf and surrounds, where built structure outlines still closely resemble those shown in 1917. No change is evident in the small properties facing Sussex Street (187-193 Sussex Street).

[104] *Daily Telegraph* (Sydney) Advertising, 4 April 1908, p17.
[105] *Macleay Argus* (Kempsey) Advertising, 15 April 1938, p2.
[106] *Daily Commercial News and Shipping List*, Import Entries, 8 July 1922, p2.
[107] *Sydney Morning Herald.* Ketch Ashore. 29 February 1932, p9.
[108] *Sun* (Sydney) Buildings Damaged By Fire, 26 December 1949, p3.
[109] *Sun* (Sydney) Ban on Shell. 8 February 1950.

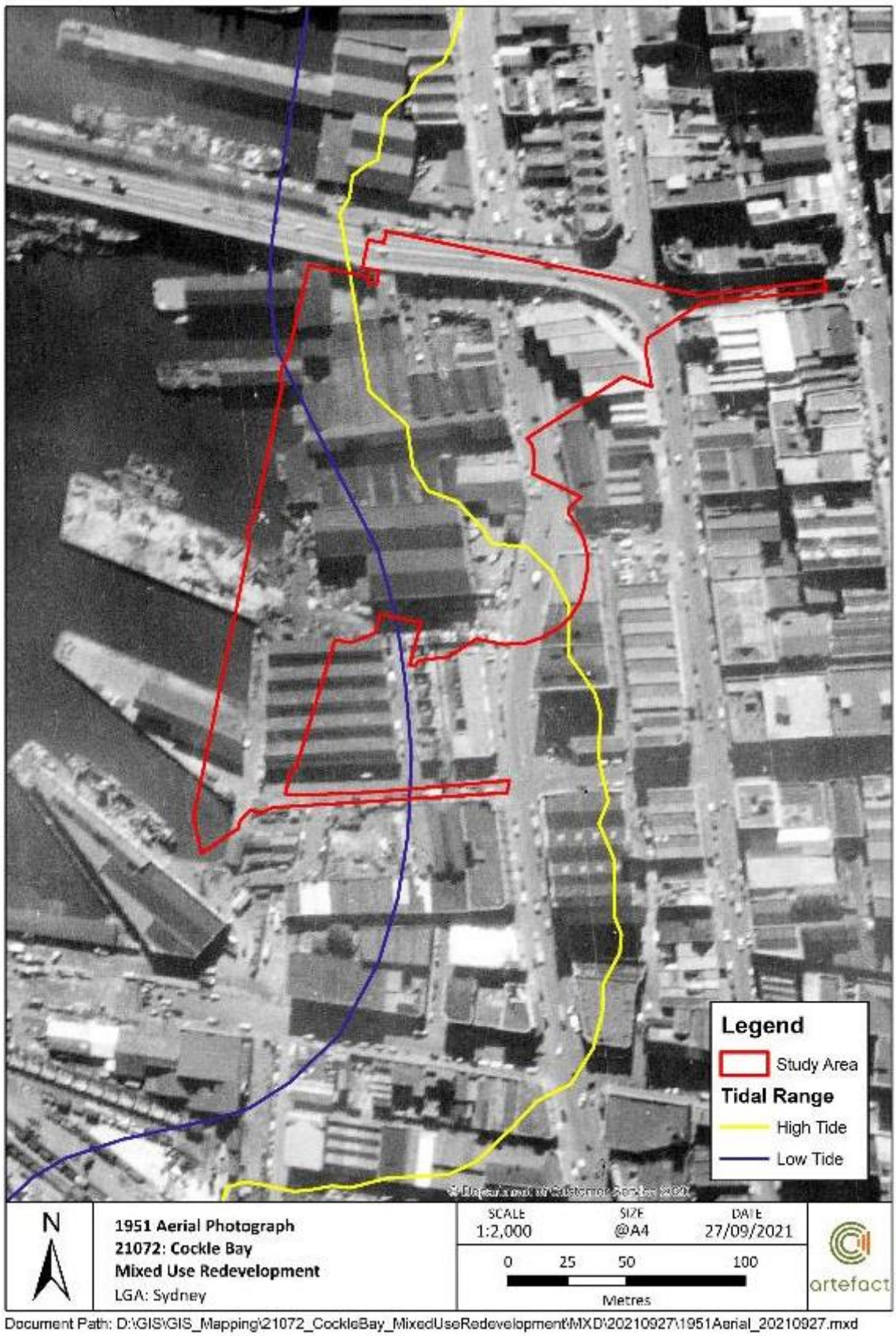


Figure 25: Study area in 1951[110]

[110] NSW Historical Image Viewer.

5.3.4.2 1951-1961

Very significant change is visible in aerial imaging dated to 1961 (Figure 26). The Baltic Wharf at the north of the study area and its adjoining southerly wharf both of which had previously angled southwards have both been totally demolished apart from short shore-side stubs. The buildings previously immediately behind all wharves in the study area have been demolished to provide significantly improved road access to all wharves through the formation of a shipping road.

Although no shipping containers are clearly visible in this image, it is likely that these changes were made in order to facilitate road-based movement of containers to and from ships. With goods no longer loose packed into ship holds and therefore not requiring bulk breakdown and temporary storage in weatherproof sheds, goods within weatherproof shipping could be relatively speedily moved directly from ships to a lay-down area and then to waiting trucks. No change is evident in the small properties in the study area facing Sussex Street (187-193 Sussex Street).

5.3.4.1 1961-1986

By 1978 the era of shipping that had lasted in the study area for over 150 years had ended (Figure 27). Works are visible underway that reflect the changed and changing character of the study area. To the south, the Western Distributor is under construction reflecting the booming population of the city and it's increasing reliance on road transport. None of the wharves in the study area appear to be in commission for bulk shipping. All wharves have had smaller piers or jetties attached to them, which would preclude access for larger vessels. The shipping road behind the wharves has been closed and its southerly extent redirected northwards via Day Street. The majority of open space in the study area appears to be in use as a lay-down area for construction. The small properties in the study area facing Sussex Street (187-193 Sussex Street) have all been demolished at this stage.

5.3.4.2 1986-current

Aerial imaging dating to 1986 (Figure 28) shows further dramatic change in the study area in the eight years since 1978. No jetties or piers remain, although two ships and a derrick barge are moored immediately south of the Pyrmont Bridge. Very little of the ground surface of the study area is visible, with much of the area now occupied by multi-lane road distribution networks. The remains of only one historical warehouse appear preserved - those of the Federal Warehouse in the south central portion of the study area. Further reclamation of land along the shoreline seems apparent in this image. Construction of entertainment-quarter infrastructure is already visible across Darling Harbour from the study area. The study area would continue to lag behind development to the west, as illustrated in the next section.

By 1994 (Figure 29) much of the current entertainment and tourist infrastructure was in place along the western shore of Darling Harbour. In distinct contrast, the study area was largely undeveloped. It had been paved in keeping with other public space in Darling Harbour and further land reclamation had straightened the foreshore that once veered in and out between the wharves it once held. No buildings of any substance are visible in the study area at this time. By 2002 the study area had been developed as the Cockle Bay Wharf entertainment precinct which constitutes its current form (Figure 30).

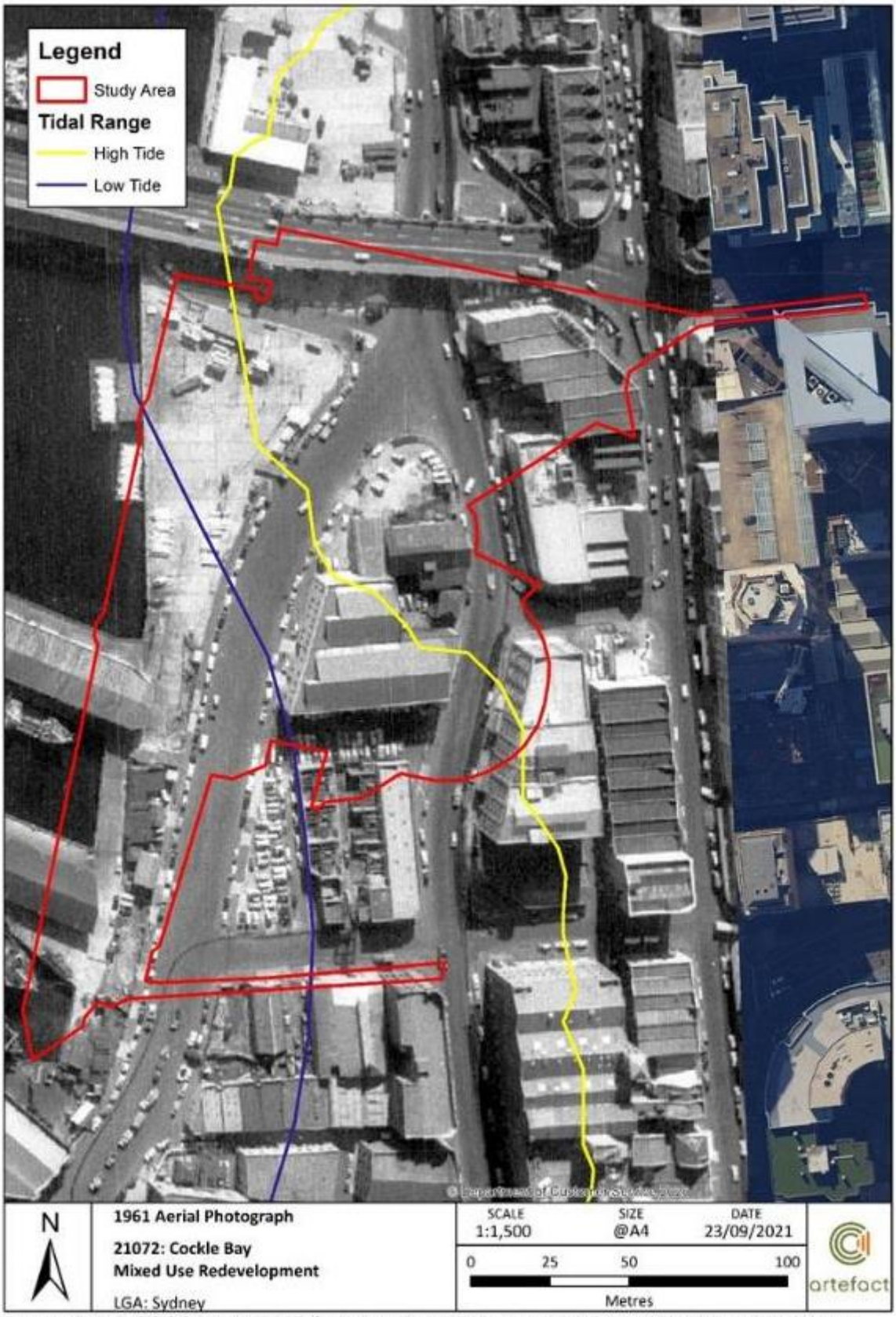


Figure 26: Aerial image of study area in 1961[111]

[111] NSW Historical Image Viewer.

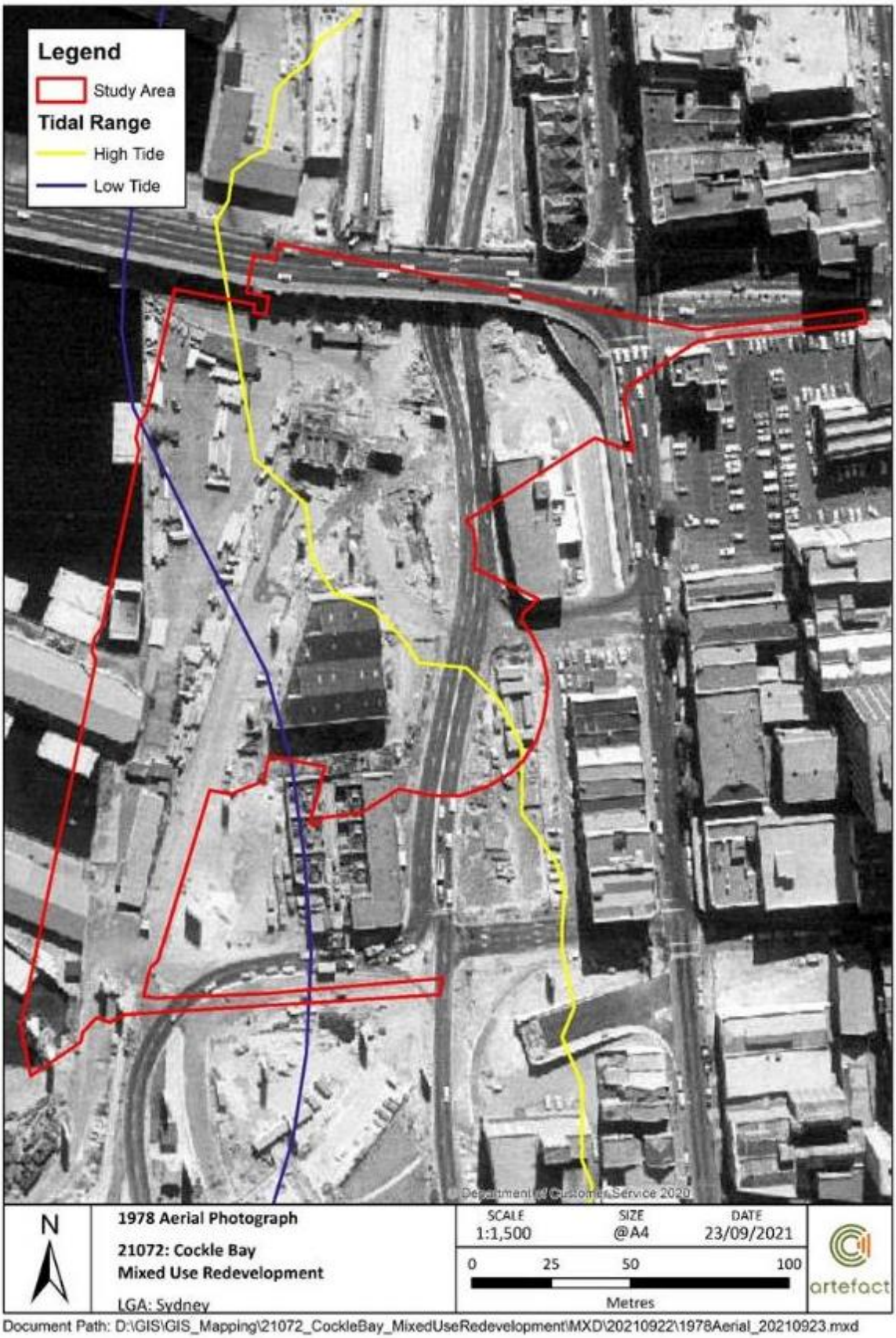


Figure 27: Aerial image of study area in 1978[112]

[112] NSW Historical Image Viewer

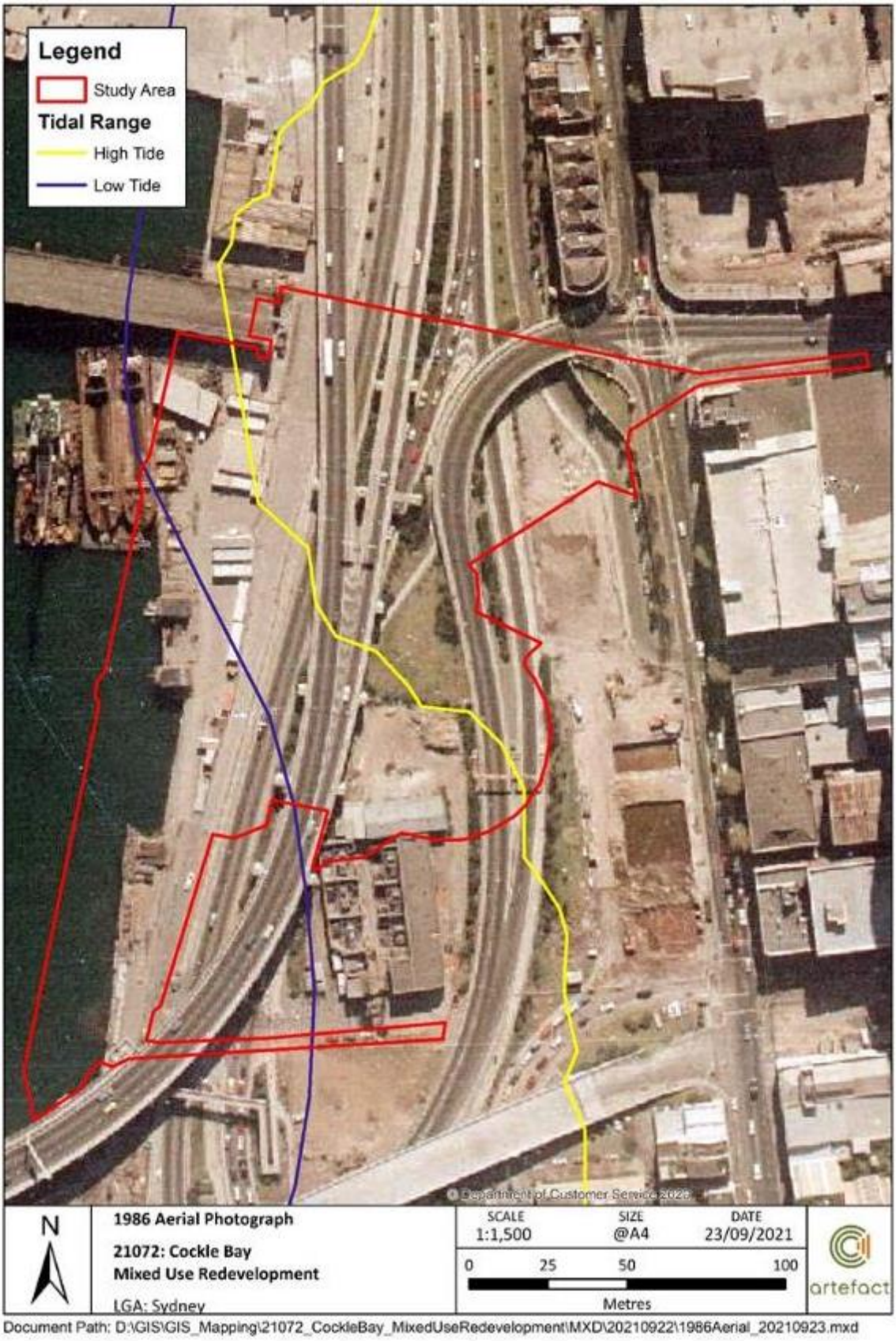


Figure 28: Aerial image of study area in 1986[113]

[113] NSW Historical Image Viewer.

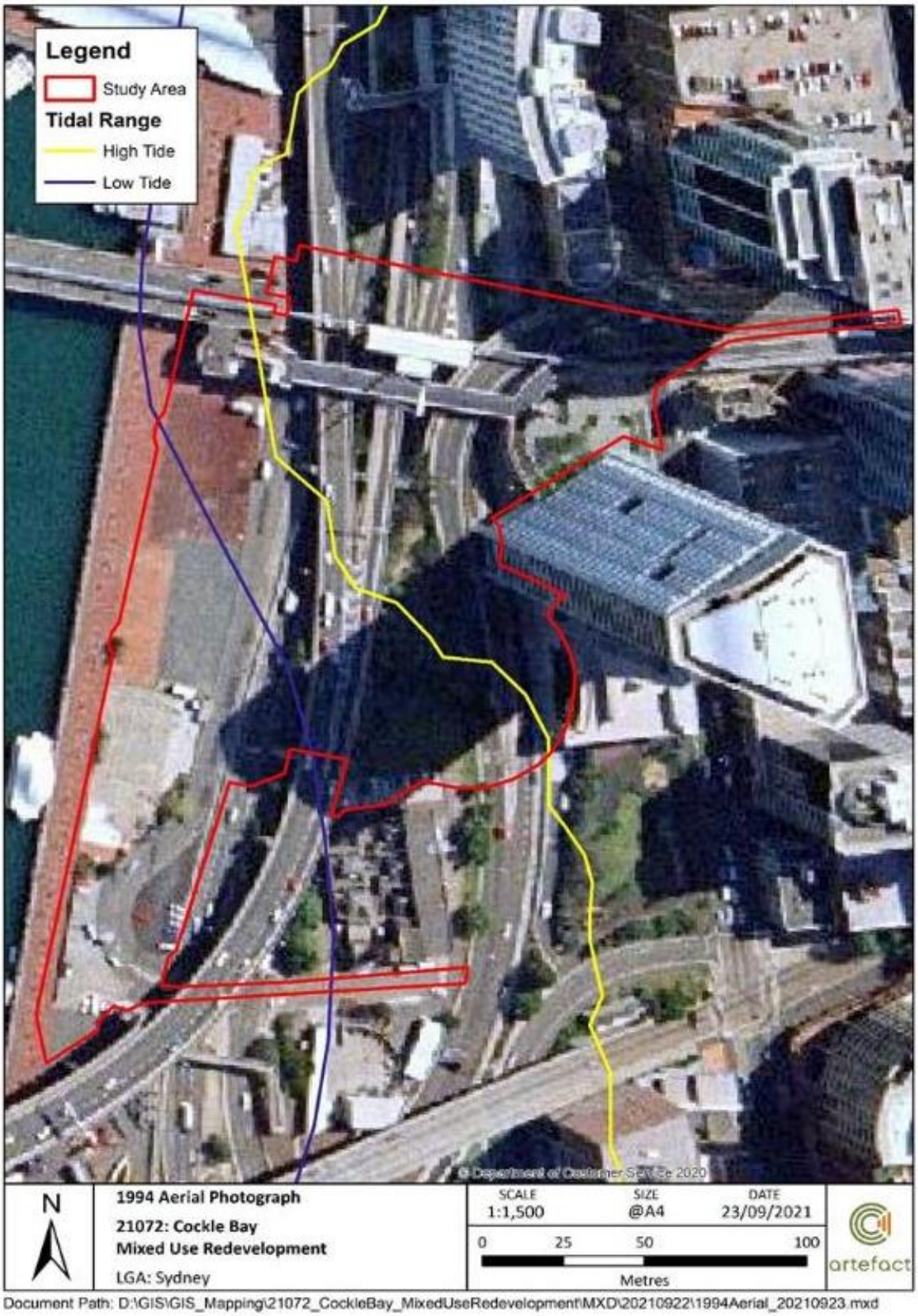


Figure 29: Aerial image of study area in 1994[114]

[114] NSW Historical Image Viewer.

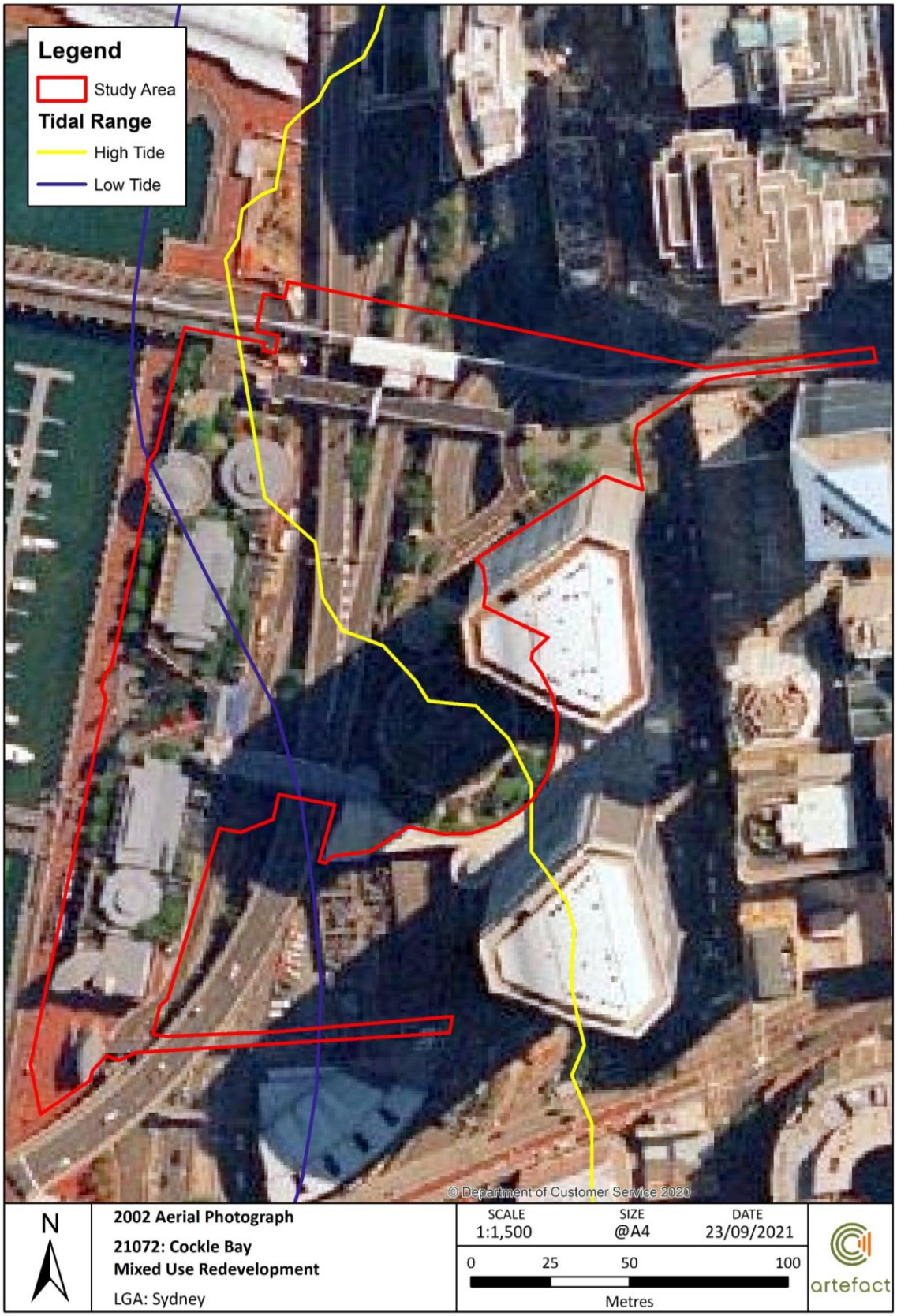


Figure 30: Aerial image of study area in 2002[115]

[115] NSW Historical Image Viewer.

5.4 Summary

During the first decades of the colonies' history, the location of the study area remained little developed, being situated between a major slaughterhouse to its south and Market Street to its north. With the construction of Market Wharf at the northern extremity of the study area in 1811, development started to coalesce around this wharf and other subsequent wharves. At first these wharves were, like Market Wharf, only constructed slightly beyond the intertidal zone of the study area. Indications from this are that such earlier wharves and associated early seawalls and reclamation fill will be relatively shallow. The history of the built nature of the study area as derived from mapping and research is briefly summarised in Table 4 below. A total of 114 built structures have been identified in the study area from historical mapping dating between 1800-1920. The largest representative mode of construction was timber or combinations of timber and other materials (47%, n=53), followed by brick (42%, n=48), and then iron (14%, n-14).

Table 4: Phased summary of study area use and development

Phase	Area	Tenants	Brick Structures	Timber Structures	Iron structures	Total
1800-1850	Market Wharf	NSW Government	Unknown	Unknown	Unknown	Unknown
1800-1850	Albion Wharf	Hughes & Hosking	1	Unknown	Unknown	1
1800-1850	Hynde's Wharf	Thomas Hynde	Unknown	Multiple sawmilling & timber facilities	Unknown	Undetermined
1800-1850	Street's Wharf	Street's Timber	Ship refitting facility. Nature unknown	Unknown	Unknown	Unknown
1850-1880	Market Wharf	Unknown	4 x 3 storey brick warehouses	Unknown	Unknown	4
1850-1880	Corporation Wharf	Unknown	Unknown	Unknown	Unknown	Unknown
1850-1880	Baltic Wharf	W Northwood; Buzacott & Armstrong	3	4	3	10
1850-1880	Albion Wharf	Miller & Harrison; Garrard and Booth	12 including part brick construction	25	4	41
1850-1880	Fagan's Wharf	Fagan Bros,	6	13	1	20
1850-1880	Street's Wharf	Street's Timber	2	2	3	7
1850-1880	Wentworth Wharf	Zahel's Steam Saw Mill; Burns Timber Store; Beverley Steam Saw Mill		4 Timber & Iron		4
1880-1920	Baltic Wharf	Multiple	9	2	1	12
1880-1920	Albion Wharf	Multiple	7	2		9
1880-1920	"Open Wharf"	Multiple	3	1	4	8
1880-1920	USS Co	USS Co	1			1

Phase	Area	Tenants	Brick Structures	Timber Structures	Iron structures	Total
Totals			**48**	**53**	**16**	**114**

By the time that larger wharves such as Albion and Hyndes' wharves were being constructed and expanded and certainly by the time of the City of Sydney 1855 map (Figure 14), significant portions of Darling Harbour had been reclaimed, including locations beyond the intertidal zone. This will almost certainly have required far more significant and deeper construction of retaining seawalls and fill. Earlier iterations of Hyndes' and Albion Wharves may have employed ad-hoc timber shoring for seawall construction as shown in Figure 16, however further development and reclamation in these locations will almost certainly have required far more robust construction methods of the nature identified during archaeological investigations at Barangaroo.[116]

The process of development at the study area generally moved from north east to south west, with the highest degree of development and land reclamation beyond the intertidal zone being found at the areas associated eventually with the Union Steam Ship Co Wharf and Federal Wharf. From the late nineteenth century until the mid-twentieth century the quantity of freight and size of vessels handled at the study area increased as the location became increasingly specialized as a freight handling precinct. From the mid twentieth century, and particularly with the implementation of container-handled freight, the study area diminished substantially in its role as a freight handling centre and it seems to have effectively ceased to function in such a role by the mid to late 1970s, being rendered a marginal area between major road infrastructure and Darling Harbour by 1986. Following the trend set by the development of the western shore of Darling Harbour, the study area has functioned for the past 20 years as an entertainment and tourist venue.

5.4.1 Persons and places of significance

A number of persons of varying degrees of historical significance have been identified as having associations with the study area, in addition to one location that is likely of significance in its own right. These are:

- **Market Street** This street was formed at the orders of Lachlan Macquarie as part of his expansion and reformation campaign for the colony. The street chiefly provided transit route to and from the Market Wharf
- **The Market Wharf** constructed at the orders of Lachlan Macquarie, this wharf greatly shaped the development of Darling Harbour and also influenced the utility and modes of business in the Sydney CBD. It is possible that elements of this wharf may remain in the north east of the study area
- **Albion Mill** – this was an ambitious but ultimately unsuccessful attempt to address the problem of grain milling in the young colony
- **Thomas Hyndes** was an individual who made his way upwards from convict status to wealth and a certain degree of respectability. His wharf and saw mill at Druitt Street played a central role in his business success

[116] Casey and Lowe PTY LTD. 2012. Archaeological Excavation. Barangaroo South. Preliminary Results. Report to Lend Lease

- **Andrew Bell (A.B.) Armstrong** owner of Buzacott & Armstrong Ship Chandlers was a very prominent philanthropist and businessman who first commenced activism as a pacifist and then turned to providing relief for the poor of Sydney
- **John Booth**, founder of Garrard and Booth was the founder of the NSW town of Milton and was elected an Alderman of the City of Sydney for two terms
- **Mr A.E. Rudder** of Sutton-Rudder Carrying Co was a pioneer of the early Australian air industry.

5.5 Previous impacts

The study area has been subject to numerous phases of development and redevelopment through the various stages of its use as a maritime, industrial and warehousing precinct. Throughout this time too, further stages of land reclamation have occurred with fill and soils deposited and seawalls constructed progressively westward. The implications of this is that while the construction of newer development may have impacted previous archaeological remains, it is equally possible that the deposition of land reclamation fill may have acted to protect and preserve previous archaeological remains.

Processes of modern demolition, widespread clearance and construction have been evidenced here as having taken place between 1961 (Figure 26) and 1978 (Figure 27). These processes will certainly have been carried out through mechanical means. It has not been possible to determine precisely here the extent to which foundations and footings of earlier structures were removed during this demolition process, or to what extent they were left in situ. It is proposed here that as the purpose of demolition at the time was largely to provide level ground (Figure 27), the demolition of previous structures may not have included removal of subsurface elements. The locations of footings for the Western Distributor however would be expected to have undergone more significant excavation.

The redevelopment of Cockle Bay in the 1980's saw impacts to both the foreshore, and locations further inland. A significant program of upgrade to the existing seawall saw the use of steel sheet piling, precast concrete sheet piling and timber piles with concrete facing panels. [117] Based on items viewed during marine inspection and comparison to sea wall elements viewed at the time, Cosmos Archaeology identified some 6m of landfill at the foreshore of Cockle Bay, and proposed that the development of Cockle Bay during the 1980's and 1990's would have entailed the driving of piles or excavation of foundations down through the 6m of fill and further through sands to sandstone bedrock.[118].

In the absence of detailed plans is uncertain whether the current structures at the study area contain large, excavated basements, or whether excavation for their construction was confined to their footings / piling. The majority of the study area however, where no current structures stand, would not appear to have been subject to the same levels of potential disturbance and soils within the study area may be relatively well preserved beneath modern capping surfaces and subgrade.

[117] Cosmos Archaeology (2017). Cockle Bay Park Development. Maritime Archaeological Assessment. Report to Thelem Consulting
[118] Cosmos Archaeology (2017), p52

5.6 Summary assessment of archaeological excavations

A brief summary of three of the most relevant archaeological excavations carried out nearby is provided here to substantiate the modelling of archaeological potential offered below. Excavations were carried out by Casey and Lowe over two phases, in 2010[119] and 2012,[120] at Barangaroo, some 500m north of the study area. Test trenching was carried out through the use of large (8 x 6m) mechanically and manually excavated test trenches and was focused along the Hickson Road (eastern) frontage, away from the foreshore. Extensive archaeological remains were identified. Depths at which archaeological remains including fill deposits were present varied significantly between test trenches. Test Trench 2 of Casey and Lowe's 2010 test excavation program provides an illustration of site results. In this trench, seventeen phases of archaeological surfaces and remains were identified at depths of between 960mm and 1910mm with the earliest phase comprised of early nineteenth century fill and the latest phase dating to the late twentieth century. Archaeological material retrieved included:

- Bulk and stratified landfills of clay and rubble
- Minor and thinly stratified development of working surfaces and inter-fill episode deposits
- Sandstone block seawalls
- Timber piles for wharves and jetties
- Wharf horizontal beams
- Remnant evidence of sheds / structures
- Underfloor deposits in sheds / structures
- Sandstone footing pads
- Sandstone cobbled paving
- Brick, sandstone and ceramic drains
- Remains of store contents including burned grain
- Subsurface infrastructure such as a weighbridge
- Concrete pad and footings from the early twentieth century.

GML carried out archaeological test and salvage excavation at the site of Paddy's Market.[121] This was once at the southern end of Cockle Bay and was also an area that had been subject to significant land reclamation and fill to elevate natural ground levels. The study area addressed by GML bore similarity to the current study area in that it had been developed from the mid nineteenth century onwards. Further similarity is evident in the specific built history of the two study areas. Structures in both the GML study area and in the current study area dating to this period included a steam powered mill and small terrace houses. In the GML study area these small terrace houses stood until the early twentieth century when they were demolished as part of slum clearance programs, and massive warehouses and eventually a large market was constructed over them. The accumulation of debris from demolition resulted in walls of former residences being left in situ to heights of 1.5m and at the mill, 3m in height. Subsequent excavation for the footings of Paddy's Market was relatively minimal

[119] Casey & Lowe Pty Ltd (2010) Non-Indigenous Archaeological Testing. Barangaroo South. Report to Lend Lease
[120] Casey and Lowe Pty Ltd. (2012). Archaeological Excavation. Barangaroo South. Preliminary Results. Report to Lend Lease
[121] Godden Mackay Pty Ltd & W Thorp. 1993. Market City Development Paddy's Market. Archaeological Excavation. Report for Rockvale Pty Ltd.

being limited to trenching for footings and bases for stanchions. As a result of this, the archaeological record was relatively well preserved and included:

- Engine and industrial remains
- Street (laneway) outline and kerbing
- Domestic fireplaces, ovens and hearths
- Domestic paving
- Cess pits
- Smithy
- Store / stable
- Box, open and rock cut drain.

The study area at Cockle Bay has been subject to high levels of historical construction. The footprints of buildings indicated on maps that have been reproduced here have been cumulatively mapped in Figure 31 below. Based on the density and nature of structures indicated and the nature of subsequent ground disturbance, a predictive model of archaeological potential has been produced in Section 5.6.1 below.

5.6.1 Predictive model

Based on the history of the study area at Cockle Bay, on the results of previous nearby archaeological excavations and taking into account the likely degree of disturbance and preservation to ground surfaces, it is considered likely that the potential exists for archaeological remains such as those listed above to be present in the study area. Archaeological excavations carried out nearby at Barangaroo identified historical sea walls extending three to four meters below current ground surface. This was in addition to significant levels of historical fill likely dating to the same period as these sea walls.[122]

Predicted archaeological potential is shown in Figure 32 which shows the study area overlain by a 50m x 50m grid reference system.

Nil-low archaeological potential is predicted within grid squares C5, C4, C3, D5, D4, D3. This includes locations that have been subject to significant disturbance in the construction of major subsurface parking facilities and footings for multistorey buildings fronting Sussex Street.

Moderate archaeological potential is predicted within grid squares B4, B3, C7, C6, C5, C4, C3, D7, D6, D5, D3, E6, F6. This includes locations that were largely within natural landform and are therefore unlikely to contain robust infrastructure such as seawalls and significant levels of fill. This is supported by the results of the geotechnical boreholes in these locations (SS1 and SS2) which showed that the depth of the upper fill layer was shallower compared to the boreholes to the west, and was located above the bedrock. These locations have been subject to disturbance through the formation of the Western Distributor and feeder roads.

High archaeological potential is predicted within grid squares B7, B6, B5, B4, B3, B2, C7, C6, C5, C4. Most of these locations are situated on reclaimed land and are highly likely to contain retaining walls, wharves, piers and jetties dating from a wide range of construction periods. The extent of historical impacts to underlying potential archaeology in these locations is uncertain and there is an elevated potential for archaeological remains to be preserved beneath modern structural or fill deposits. This is indicated by the results of the geotechnical investigations which identified deposits of historical

[122] Casey and Lowe 2012, 2016

material within the borehole logs. The historical material identified within this area was typically located within about 5m of the ground surface, but could extend in places to depths of up to about 9.5m.

A more detailed listing of the potential archaeological content of each location within the study area is provided in Table 5.

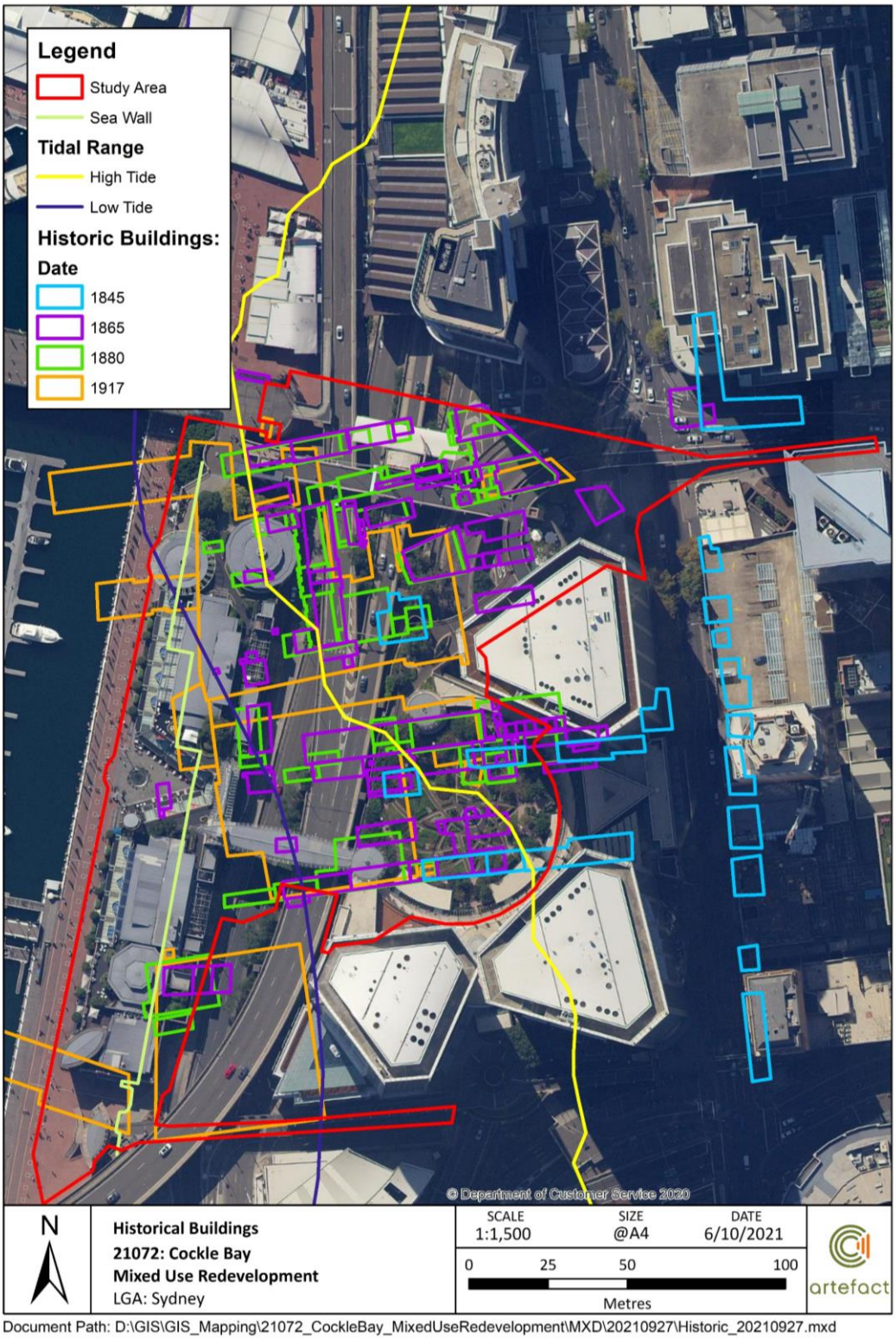


Figure 31: Cumulative representation of historical development in the study area

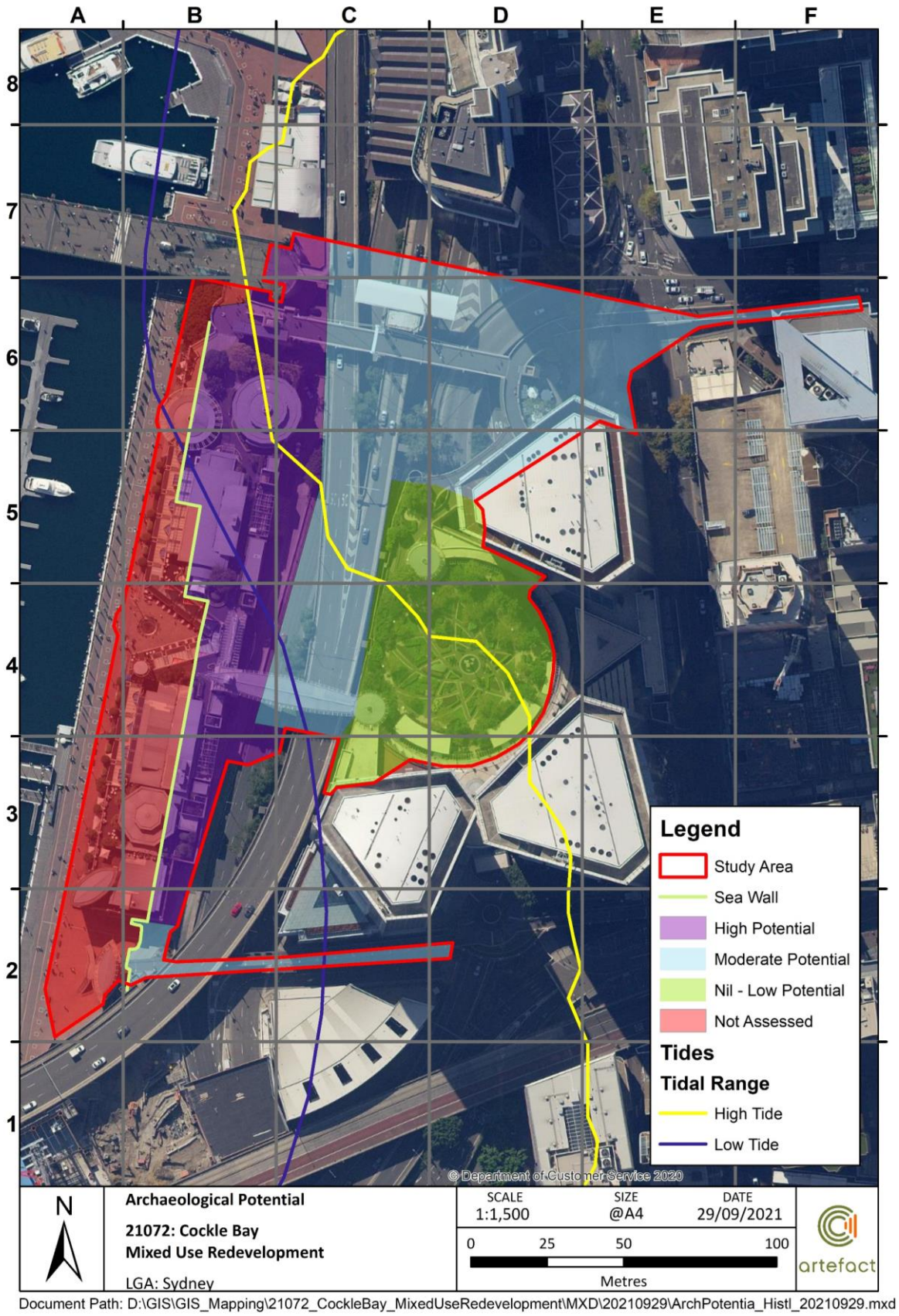


Figure 32: Predicted archaeological potential - 50m grid overlay

Table 5: Predicted archaeological remains and potential within the study area

Phase	Study area	Site feature	Potential archaeological remains	Potential per grid square
Phase 1 **1800-1850: Early land grants and development**	North	Market Street	Early road and kerb remains	**C7, C6, D6, E6=Moderate**
		Market Wharf	Early retaining & wharf sandstone & timber structures & landfill,	**B6, C6=High**
		Albion Wharf	Sandstone & timber retaining walls, piers, piles, relics of Albion Mill, yard deposits, footings and foundations	**B5, C5=High C5 =Moderate C5=Nil-Low D5=Moderate D5=Nil-Low**
	Mid	Streets Wharf	Sandstone & timber retaining walls, piers, piles, relics of ships chandlery, yard deposits, footings and foundations	**B4, B5=High C4, C5=High, C4, C5=Moderate C4, C5, D4, D5 = Nil-Low**
	South	Hyndes' Wharf	Sandstone & timber retaining walls, piers, piles, relics of timber yard and processing, yard deposits, footings and foundations	**B3, B2= High**
	Druitt Street	Druitt Street	Early road and kerb remains	**B3, C3, D3 = Moderate**
Phase 2 **1850-1870: Mixed use location**	North	Corporation Wharf	Sandstone & timber retaining walls, piers, piles, iron elements, yard deposits, landfill	**B6, C6, C7=High B6, D6= Moderate**
		Baltic Wharf	Sandstone & timber retaining walls, piers, piles, iron elements, yard deposits, landfill	**B5, B6, C5, C6=High C5, = Nil-Low**
		Albion Wharf	Sandstone & timber retaining walls, piers, piles, iron elements, yard deposits, landfill	**B5, C5=High C5=Moderate C5=Nil-Low D5=Nil-Low**
	North-east	Miller & Harrison Timber Yard	Shed remains, working surfaces, brick / stone footings and subfloor deposits, steam sawmill remains, cesspit remains, yard deposits, landfill	**All below are within C5, C6, D5, D6, E6, F6 = Moderate**
		Goddard Produce Agent	Brick / stone / timber footings & subfloor remains, cesspit remains, landfill	
		Paul Restaurant	Brick / stone / timber footings, subfloor remains, commercial and domestic diet-related waste, cesspit remains, landfill	
		Buzacott Chandlery	Brick / stone / timber footings, subfloor remains, machinery, cesspit remains, landfill	

Phase	Study area	Site feature	Potential archaeological remains	Potential per grid square
		Pyrmont Bridge Hotel	Brick / stone / timber footings, subfloor remains, hotel cellar, cesspit remains, landfill	
	Mid	Fagan Bros Timber yard & Wharf	Timber footings of sheds, sandstone & timber retaining walls, piers, piles, iron elements, landfill	**B4, B5, C5=High C4, C5 = Moderate C4, D4=Nil-Low**
		Streets Wharf	Brick / stone / timber footings of saw mill & sheds, sandstone & timber retaining walls, piers, piles, iron elements, landfill	**B4, B5, C5=High C4, C5= Moderate C4, C5 D4, D5=Nil-Low**
	South-west	Allen & Lamb Steam Saw Mill	Iron & timber footings & saw mill elements, landfill	**B3, B4 = High**
		Wentworth Wharf	Sandstone & timber retaining walls, piers, piles, iron elements, landfill	**B3, B4 = High**
		Vulcan Foundry	Iron & timber footings, slag & metalworking equipment & waste, landfill	**B3, B4 = High**
	Druitt Street	Druitt Street	Early road and kerb remains	**B3, C3, D3 = Moderate**
Phase 3 **1880-1920: Increased specialisation**	North	Baltic Wharf	Sandstone & timber retaining walls, piers, piles, iron elements, landfill	**B5, B6, B7, C5, C6, C7=High C5, D5 = Nil-Low**
	North	Sutton Rudder Carrying Co	Brick / stone / timber footings, subfloor remains, machinery, landfill	**B5=High, C5=Moderate**
	North-east	Sargeant Store	Brick / stone / timber footings, subfloor remains, machinery, yard deposits	**C6, D6 = Moderate**
	North-east	J.Jones Produce	Brick / stone / timber footings, subfloor remains, machinery, yard deposits	**C6, D6, E6 = Moderate**
	Mid	Albion Wharf	Sandstone & timber retaining walls, piers, piles, iron elements, landfill	**B5, C5=High C5=Moderate C5=Nil-Low D5=Nil-Low**
	Mid	Lyons Trading, Dickson & Primer, Federal warehouses	Brick / stone / timber footings, subfloor remains, machinery, yard deposits, landfill	**B4, B5 = High C4, C5= Moderate, C4, D4 = Nil-Low**
	South-west	Federal Warehouse	Brick / stone / timber footings, subfloor remains, machinery, yard deposits, landfill	**B4, B5 = High C4, C5= Moderate, C4, D4 = Nil-Low**
	South-west	Wharves	Sandstone & timber retaining walls, piers, piles, iron elements, landfill	**B3, B4 = High**
	South-west	U.S.S. Co warehouse	Brick / stone / timber footings, subfloor remains, machinery, yard deposits, landfill	**B3, B4 = High**

Phase	Study area	Site feature	Potential archaeological remains	Potential per grid square
	Druitt Street	Druitt Street	Early road and kerb remains	**B3, C3, D3 = Moderate**
	All reclaimed land	Sea walls, piers, wharves	Sea walls, piers, wharves,	**High**
Phase 5 **1950 to current Decline and repurpose**	All	Open wharf freight handling apron, roadway	1950's and later concrete slab and hardstand, road surface and kerbing, services and utilities.	**High**

5.7 Assessment of archaeological significance

Table 6 provides a discussion of the potential significance of archaeological remains that may be located within the study area. This significance assessment has been prepared based on the guidelines and methodology outlined in Section 3.0 of this report.

Only archaeological remains which have been predicted to be present (i.e. low potential or higher) are discussed in the following tables which assess significance by phase.

5.7.1 Phase 1 (1800-1850)

Table 6: Assessment of archaeological significance for Phase 1 (1800-1850): Early land grants and development

Criteria	Discussion
Technical / research significance (Criterion E): An item has potential to yield information that will contribute to an understanding of the local area's cultural or natural history	Potential archaeological remains associated with early to mid-19th century wharves, yards, warehouses and roads would provide avenue for research into the early development of shipping, trade and sale of produce in early Sydney. Potential archaeological remains associated with early to mid-19th century timber mills, chandlers and shipwrights could provide insight to the technical nature of development in this early industrial area.
Associative significance (Criterion B): An item has strong or special associations with the life or works of a person, or group of persons, of importance in the local area's cultural or natural history	The potential archaeological remains from this phase include those constructed at the orders of Lachlan Macquarie. They also include the Albion Mill, an ambitious attempt to address flour shortage in the colony. The study area includes the wharf, timber mill and yards of Thomas Hyndes, a prominent emancipist.
Aesthetic significance (Criterion C): An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in the local area	Potential archaeological remains associated with early to mid-19th century wharves, yards, roads and timber mills are likely to provide information on the nature and range of techniques used in what are some of the earliest colonial instances of mechanised timber milling, land reclamation and wharf construction.

Criteria	Discussion
Representativeness (Criterion G): An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places of cultural or natural environments (or the cultural or natural history of the local area)	Potential archaeological remains associated with early to mid-19th century timber mills, chandlers and shipwrights could provide insight to the technical nature of development in this early industrial area. Potential archaeological remains associated with land reclamation including seawalls and piling would together with evidence relating to wharf construction, provide illustration and demonstration of the past landscape in the study area
Statement of Significance	Archaeological remains related to the former use of the study area during the early -mid 19th century would meet the threshold of **local** significance. The potential exists for the presence of early remains associated with a building campaign by Lachlan Macquarie. These remains may meet the threshold of **state** significance. Well preserved elements of early mechanical infrastructure such as sawmills and boilers may meet the threshold of **state** significance

5.7.2 Phase 2 (1850-1870)

Table 7: Assessment of archaeological significance for Phase 2 (1850-1870): Mixed use location

Criteria	Discussion
Technical / research significance (Criterion E): An item has potential to yield information that will contribute to an understanding of the local area's cultural or natural history	Potential archaeological remains associated with mid to late-19th century wharves, yards, warehouses and roads would provide avenue for research into the early development of shipping, trade and sale of produce in early Sydney. Potential archaeological remains associated with mid to late-19th century timber mills, chandlers and shipwrights could provide insight to the technical nature of development in this early industrial area.
Associative significance (Criterion B): An item has strong or special associations with the life or works of a person, or group of persons, of importance in the local area's cultural or natural history	The potential archaeological remains from this phase include those associated with Andrew Bell and John Booth who were both prominent figures in Australian industry and commerce.
Aesthetic significance (Criterion C): An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in the local area	Potential archaeological remains associated with mid to late-19th century wharves, yards, roads and timber mills are likely to provide information on the nature and range of techniques used in mechanised timber milling, land reclamation and wharf construction of the time.
Representativeness (Criterion G): An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places of cultural or natural environments (or the	Potential archaeological remains associated with mid to late-19th century wharves timber mills, chandlers and shipwrights could provide insight to the technical nature of development in this early industrial area. Potential archaeological remains associated with land reclamation including seawalls and piling would together with evidence relating to wharf

Criteria	Discussion
cultural or natural history of the local area)	construction, provide illustration and demonstration of the past landscape in the study area
Statement of Significance	Archaeological remains related to the former use of the study area during the early -mid 19th century would meet the threshold of **local** significance.

5.7.3 Phase 3 (1880-1920)

Table 8: Assessment of archaeological significance for Phase 3 (1880-1920): Increased specialisation

Criteria	Discussion
Technical / research significance (Criterion E): An item has potential to yield information that will contribute to an understanding of the local area's cultural or natural history	Potential archaeological remains associated with late 19th century to early 20th century wharves, yards, warehouses and roads would provide avenue for research into the development of shipping, trade and sale of produce in Sydney. Potential archaeological remains associated with late 19th century to early 20th century chandlers and shipwrights could provide insight to the technical nature of development in this early industrial area.
Associative significance (Criterion B): An item has strong or special associations with the life or works of a person, or group of persons, of importance in the local area's cultural or natural history	The potential archaeological remains from this phase include those associated with A.E. Rudder who was a pioneering figure in the Australian air industry.
Aesthetic significance (Criterion C): An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in the local area	Potential archaeological remains associated with late 19th century to early 20th century wharves, roads and stores are likely to provide information on the nature and range of techniques used land reclamation, wharf construction and storage and shipping technology of the time.
Representativeness (Criterion G): An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places of cultural or natural environments (or the cultural or natural history of the local area)	Potential archaeological remains associated with late 19th century to early 20th century land reclamation, wharf construction, storage, shipping, chandlers and shipwrights could provide insight to the technical nature of development in this early industrial area. Potential archaeological remains associated with land reclamation including seawalls and piling would together with evidence relating to wharf construction, provide illustration and demonstration of the past landscape in the study area
Statement of Significance	Archaeological remains related to the former use of the study area during the late 19th century to early 20th century would meet the threshold of **local** significance.

5.7.4 Phase 4 (1920-1950)

Table 9: Assessment of archaeological significance for Phase 4 (1920-1950): Early to mid-twentieth century

Criteria	Discussion
Technical / research significance (Criterion E): An item has potential to yield information that will contribute to an understanding of the local area's cultural or natural history	Potential archaeological remains associated with early -mid 20th century construction would not provide avenue for research and would not meet the threshold for local significance.
Associative significance (Criterion B): An item has strong or special associations with the life or works of a person, or group of persons, of importance in the local area's cultural or natural history	The potential archaeological remains from this phase do not appear to be associated with a specific historical person or event of importance and would not meet the threshold for local significance.
Aesthetic significance (Criterion C): An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in the local area	The archaeological remains would not be of aesthetic or technical significance and would not meet the threshold for local significance.
Representativeness (Criterion G): An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places of cultural or natural environments (or the cultural or natural history of the local area)	Potential archaeological remains derived from construction in the early to mid-20th century are unlikely to demonstrate unknown aspects of the past and would not meet the threshold for local significance.
Statement of Significance	Archaeological remains related to the former use of the study area during the early -mid- 20th century **would not meet the threshold of local significance**.

5.7.5 Phase 5 (1950 to current)

Table 10: Assessment of archaeological significance for Phase 5 (1950 to current): Decline and repurpose

Criteria	Discussion
Technical / research significance (Criterion E): An item has potential to yield information that will contribute to an understanding of the local area's cultural or natural history	Potential archaeological remains associated with mid-late 20th century construction would not provide avenue for research and would not meet the threshold for local significance.
Associative significance (Criterion B): An item has strong or special associations with the life or works of a person, or group of persons, of importance in the local area's cultural or natural history	The potential archaeological remains from this phase do not appear to be associated with a specific historical person or event of importance and would not meet the threshold for local significance.
Aesthetic significance (Criterion C): An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in the local area	The archaeological remains would not be of aesthetic or technical significance and would not meet the threshold for local significance.
Representativeness (Criterion G): An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places of cultural or natural environments (or the cultural or natural history of the local area)	Potential archaeological remains derived from construction in the mid-late 20th century are unlikely to demonstrate unknown aspects of the past and would not meet the threshold for local significance.
Statement of Significance	Archaeological remains related to the former use of the study area during the mid-late 20th century would not meet the threshold of local significance.

6.0 ARCHAEOLOGICAL IMPACT ASSESSMENT

6.1 Proposed works

A broad outline of the proposed works in the study area has been received. This section assesses the likely impacts to archaeological potential as a result of these proposed works.

6.1.1 Bulk excavation

The location of proposed bulk excavation (client drawing DA 301) is shown in plan in Figure 33, and in section in Figure 34 (client drawing DA 301). The footprint of the proposed bulk excavation and indicative piling relative to the project study area is shown in Figure 36 and Figure 35. The locations of these works relative to the areas of archaeological potential are shown in Figure 37 and Figure 38. These excavations are to be chiefly associated with bulk excavation for foundations, footings, subsurface voids and tanks. Excavation of a piling core that will provide the main foundations for the multistorey tower will involve excavation of a large area in the south-central portion of the study area to a depth of RL -1.4, or an effective reduction of 3.75m below current ground level. To the south of the piling core a one million litre deluge tank is proposed to be formed, through excavation to RL -3.95, or an effective reduction of 6.3m below current ground level. Excavation will also be carried out for the demolition and ground restitution of the following infrastructure:

- The Cockle Bay Wharf main structure
- The footbridge between the Cockle Bay Wharf main structure and the Crescent Garden, including the escalator to and from this footbridge
- The existing Monorail Station
- Walkways and pedestrian access between the Crescent Garden and the Pyrmont Bridge Overpass
- The current alignment of Wheat Road and all joining kerbs, sidewalks and driveways
- Proposed realignment of a major Sydney Water sewer / watermain pipeline, to run east-west through the project area.

6.1.2 Minor excavation

Locations of lesser excavation are not yet fully defined. These will include but are not limited to excavation not yet available on plans, and the demolition and ground restitution of the following items:

- Road regrading and reforming
- The existing interface with the Crescent Garden
- The Crescent Garden central feature
- The existing interface between the Cockle Bay Wharf main structure and the Pyrmont Bridge.
- Part of the existing footbridge leading north from the terminus of the Pyrmont Bridge
- The existing Pyrmont Footbridge which adjoins the Pyrmont Bridge and crosses Sussex Street.

6.1.3 Piling

A piling core float is proposed for the footprint of the multistorey tower, entailing some 34 closely spaced driven piles (client drawing DA-1000U, Figure 35). The remainder of the proposed development, in particular the majority of proposed works in the eastern portion of the study area will be supported on a combination of footings and close to 200 driven piles at varying spacing. The exact location, extent and depth of the piling may be subject to change during detailed design and during construction in response to factors such as local constraints on the ground (including service and utility restrictions). It is assumed that piles will reach and penetrate bedrock, except where shallower piles/cores are specifically noted.

Figure 33: Plan drawing of bulk excavation within the study area

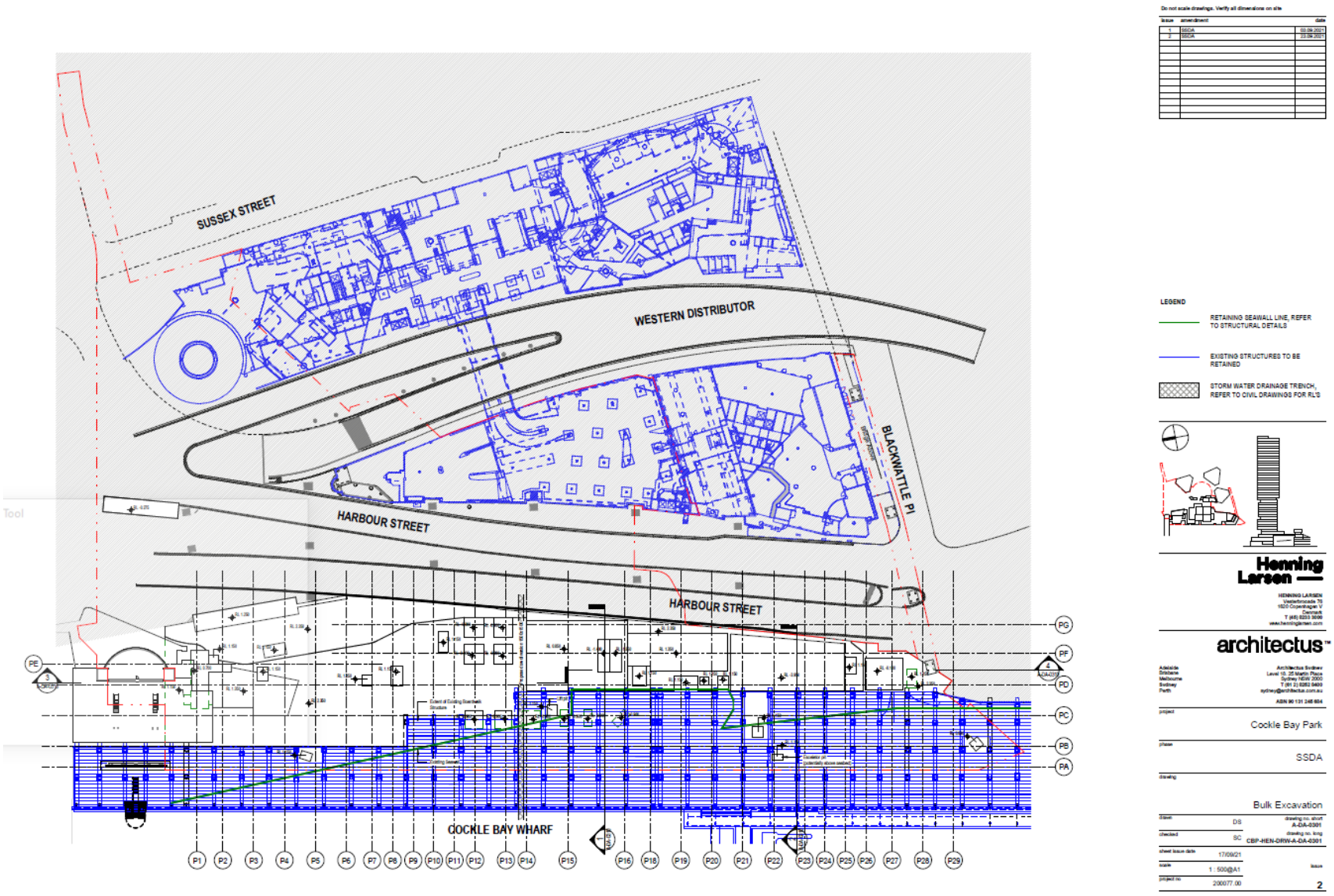


Figure 34: Section drawing of proposed bulk excavation

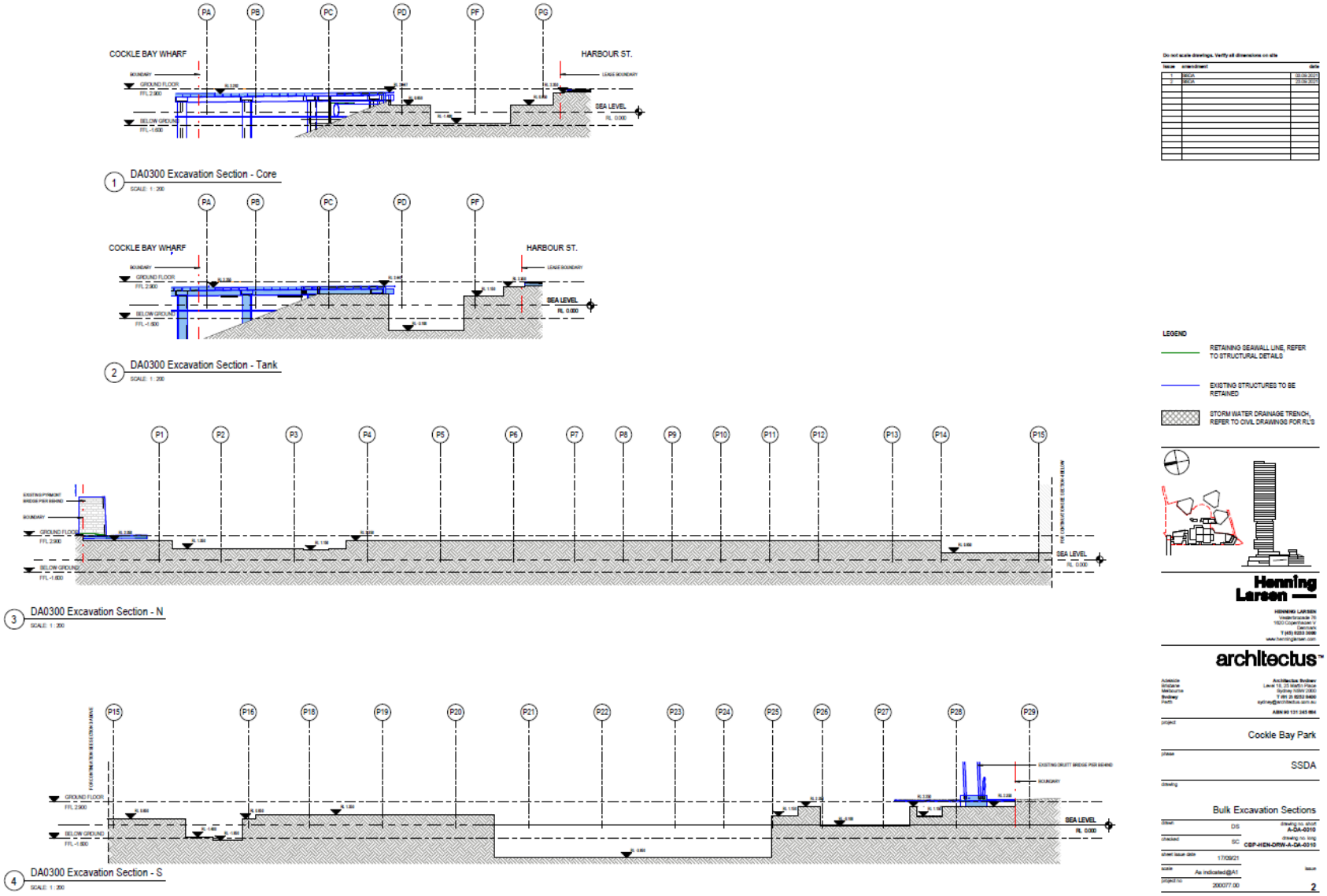


Figure 35: Proposed piling, footing and subsurface utility locations

Figure 36: Bulk excavation area relative to study area

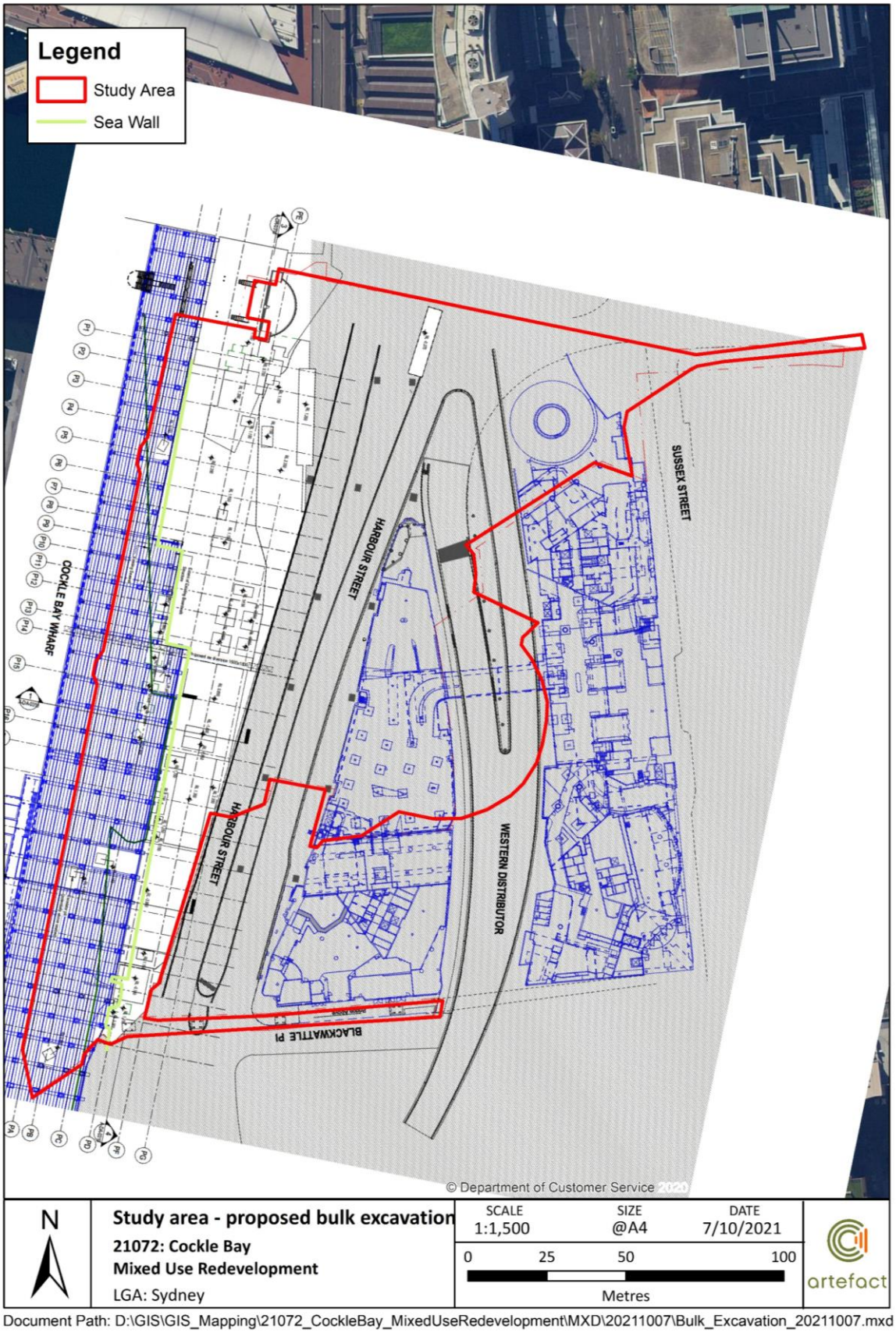


Figure 37: Bulk excavation relative to the areas of archaeological potential

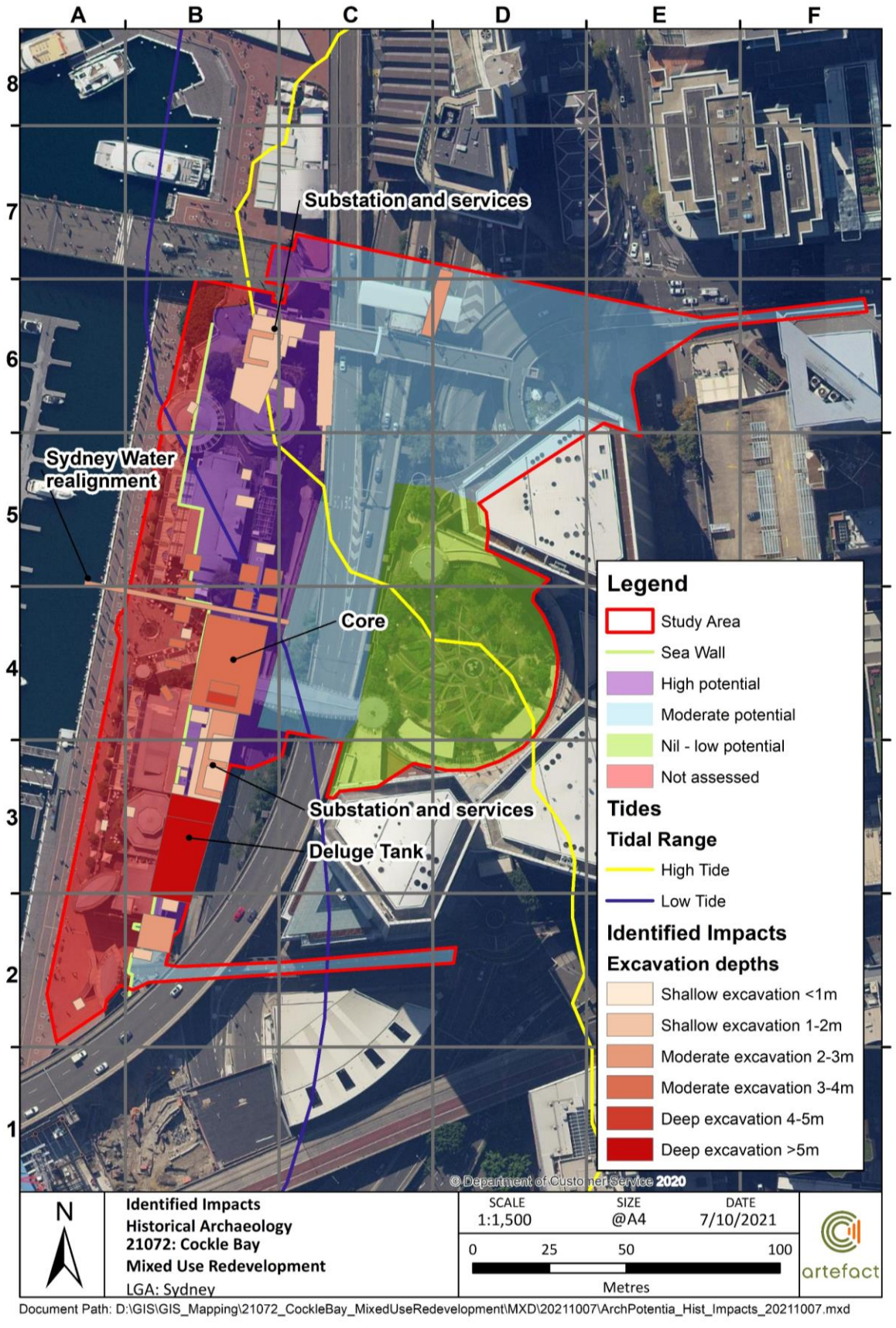
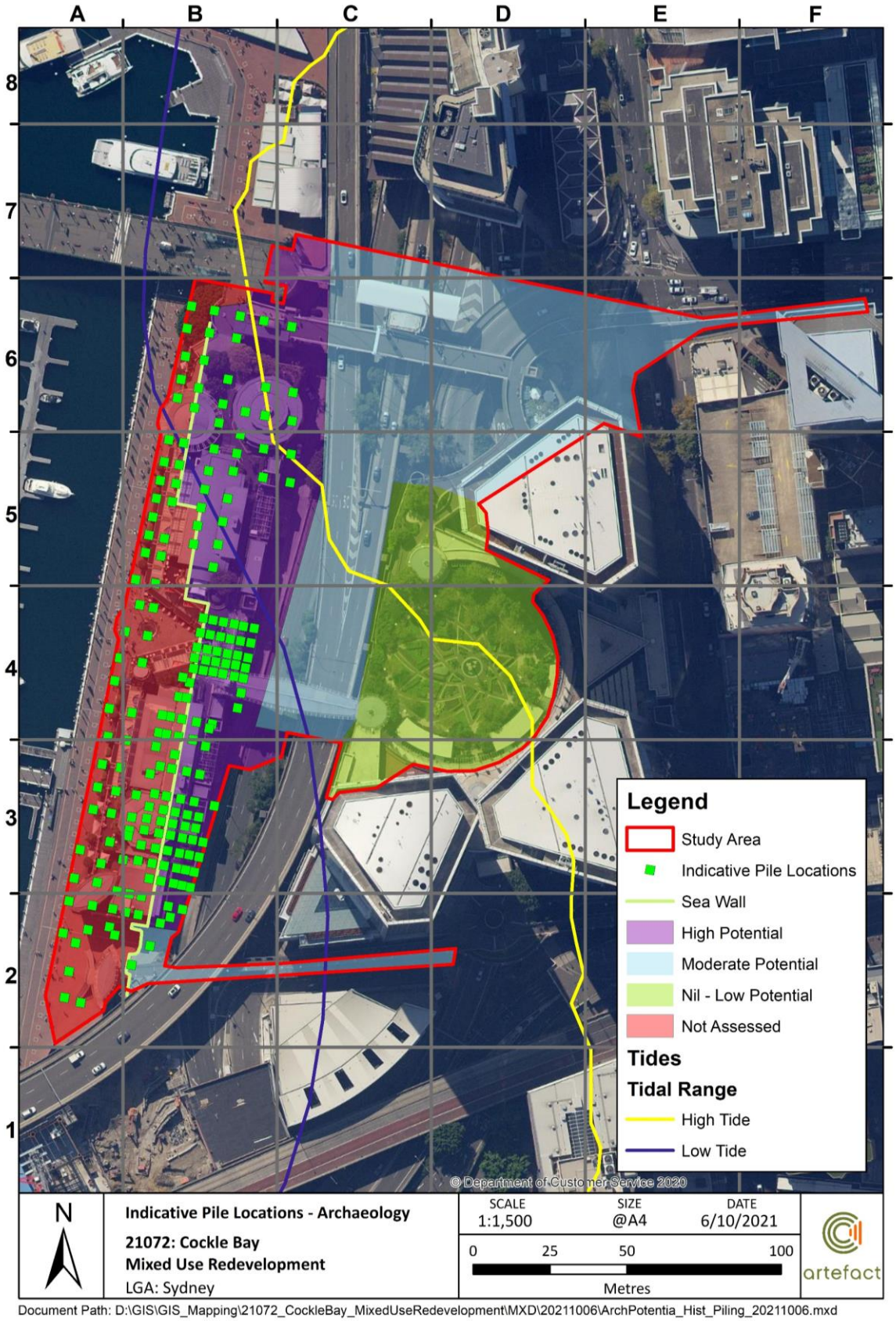


Figure 38: Indicative piling locations within the bulk excavation area relative to the areas of archaeological potential



6.2 Excavation works detail

6.2.1 Overall scope

Bulk excavation for the project is at present proposed to be almost wholly constrained to an area within the red line shown on Figure 33. This area is located between (inland / east of) the current seawall and west of Harbour Street. Eleven smaller excavation locations are proposed westwards of the current sea wall. The area westwards of the current sea wall is indicated in blue. The location of excavation for installation of High Voltage (HV) electricity mains has not yet been finally determined, however it is understood these would be placed along Harbour Street. Further excavations would be undertaken for the where Sydney Water require the current sewer main and water main in Wheat Road to be diverted. Although the depth of excavation for this utility diversion has not been confirmed, it is assumed that excavations of about 2m below the ground surface would be required.

Works outside of the bulk excavation area are expected to primarily consist of piling and column installation works. The exact location of the piles and would be subject to change as a result of detailed design and local constraints on the ground (including service and utility restrictions). However, it is expected that impacts associated with these activities would generally be limited to localised areas.

6.2.2 Bulk excavation scope

This section examines proposed bulk excavation locations, progressing from the north of the study area southwards and utilising the 'P' series locational identifiers provided in client mapping (Figure 33). Based on the site plans provided within the bulk excavation area, it is assumed that the ground surface elevation is generally RL +2.35m across the area (being the most frequently noted RL on the plans).

6.2.2.1 Locations P1-P5

Bulk excavation in this area is constrained to average depths of between RL 1.15 and RL 1.35, representing a reduction of 1.2m and 1m in depth. Excavation here will serve purposes of construction of items including grease traps, substation slabs, a switch room, lift pits and a filter chamber, and the installation of cables below the substation. The main impacts in this location would result from the installation of the substation earth rods that would need to be driven or bored to 6m depth (discussed separately as part of the piling works). One location along the northern extent off the study area and approaching Pyrmont Bridge will be reduced to RL 0.7, being a reduction of 1.65m below current ground levels. The results of the geotechnical investigation near this area (CW7) identified fill that contained brick and ceramic fragments to a depth of 4.9m. The upper portion of the stratigraphy in this area is likely to primarily consist of non-significant land reclamation fill, and therefore significant archaeological remains are unlikely to be impacted by excavations that are limited to a depth of 1.65m.

Conclusion: Proposed bulk excavations to the assessed depths between locations P1-P5 are unlikely to impact significant archaeological remains.

6.2.2.2 Locations P5-P11

Excavation in this area consists of three footings, all reaching RL 1.15 depth, or a reduction of 1.2m. No boreholes are located immediately in this location which is situated between boreholes CW4 and W2. CW4 recorded building rubble fill from a depth of about 1m to 5.2m. The recorded building rubble could potentially be associated with intact archaeological remains sealed beneath a concrete slab. Based on the geotechnical data the bulk excavations within this would reach the identified depth of historical material and could potentially result in archaeological impacts. However, the excavations would not extend far into the identified layer of material and therefore impacts would not be

substantial. Furthermore, considering the relatively shallow depth of the identified material it may still be limited to non-significant reclamation fill.

Conclusion: Proposed bulk excavations to the assessed depths between locations P5-P11 may impact significant archaeological remains.

6.2.2.3 Locations P11-P14

Six footings are located in this area, all to be excavated to RL 0.9m, or a reduction of 1.45m. To the immediate south of these footings is the proposed location of the sewer / watermain relocation. Potential depths of excavation for this sewer relocation are assumed to be about 2m below the ground surface. Boreholes CW2 and CW3 were drilled near these locations. Although no archaeological materials were encountered within CW3, CW2 contained sandy fill including concrete, sandstone, brick building rubble to a depth of 2.6m, and then further building rubble to a depth of 9.5m below the surface. The upper portion of the stratigraphy in this area is likely to primarily consist of non-significant land reclamation fill, and therefore significant archaeological remains are unlikely to be impacted by excavations that are limited to a depth of 1.45m. However, the slightly deeper excavations for the utility diversion may encounter intact archaeological remains buried underneath the fill which would be impacted.

Conclusion: Proposed bulk excavations to the assessed depths between locations P11-P14 may impact significant archaeological remains.

6.2.2.4 Locations P14-P20

This location will be almost completely excavated to provide the piling core for the main tower structure. Impacts in this location would include an intensive process of piling, however this is discussed separately as part of the piling works. The majority of this area will be excavated to depths of between RL 0.85m and RL 1.35m prior to piling. The location of the lift shafts to the south of the main tower will be excavated deeper to RL -1.4m and RL -1.85m. This represents a total reduction of 4.2m below current ground surface. To the south of the main tower are proposed excavations for goods lifts, substation, sewer and grease pits which are proposed to be excavated to RL 1.15, or a reduction of 1.2m. Boreholes CW1, CW2 and CW3 were drilled near these locations. CW1 and CW2 both encountered historical material within 5m of the ground surface which could potentially be associated with archaeological remains. Although the shallower excavations in this area would likely be limited to non-significant reclamation fill, deeper excavations are more likely to encounter intact archaeological remains buried underneath the fill which would be impacted.

Conclusion: Proposed bulk excavations in the tower core to the assessed depths between locations P14-P20 would likely impact archaeological remains.

6.2.2.5 Locations P20-P25

The deepest bulk excavation proposed for the proposal is proposed in this location. This consists of a large area intended for a one million litre deluge tank and pumping station. Excavation depths in this location would extend to RL -3.95, or a real reduction of 6.3m below ground surface. Borehole CW5 was drilled in this location, with historical material encountered to a depth of up to 5m. As a result, if archaeological remains survive within this fill layer, then they would be impacted by the excavations for the tank and pumping station.

Conclusion: Proposed bulk excavations for the tank and pumping station to the assessed depth between locations P20-P25 would likely impact archaeological remains.

6.2.2.6 Locations P25-P29

Footings for a lift pit, a diesel tank and a storm water filter chamber are proposed for this location. Maximum excavated depths are proposed to be RL 1.15, being a reduction of 1.2m, and RL -0.1, a reduction of 2.45m. CW5 was drilled near this location which encountered historical material to a

depth of about 5m below the ground surface. Although the shallower excavation to 1.2m is likely to be limited to non-significant reclamation fill, the deeper excavations to 2.45 may encounter intact archaeological remains that could be buried within the fill, which would be impacted by the works.

Conclusion: Proposed bulk excavations to the assessed depths between locations P25-P29 may impact significant archaeological remains.

6.2.2.7 Bulk excavation conclusions

Bulk excavation at the study area is primarily limited to the western portion of the study area. This area has been assessed as having high potential to contain archaeological remains of former wharves and wharfage infrastructure, warehouses, timber mills and numerous smaller commercial ventures dating from the early to mid-nineteenth century onwards. Geotechnical investigations undertaken in the area have identified the presence of historical material to depths of at least 5m and in some areas up to 9.5m below the ground level. The upper portion of the stratigraphy through this area is likely limited to non-significant reclamation fill, and as a result shallower bulk excavations to depths of about 1-1.5m are less likely to encounter intact archaeological remains. However, deep excavations associated with activities such as the main tower core and the deluge tank and pumping station would be more substantial, and are likely to impact potential archaeological remains that could survive within the fill layers.

6.2.3 Piling

A significant program of piling would be carried out in the bulk excavation area, which has been assessed as having high archaeological potential. Piling is proposed to be most densely carried out in the core raft of the multistorey development and underneath the deluge tank. A number of substation earth rods that would also need to be driven or bored to a depth of 6m in the location of the substations. In these areas the piling would be more closely clustered together, however, additional piles would also be undertaken across most of the bulk excavation area (Figure 38). Piling would proceed to considerable depth into bedrock and therefore would extend through the deposits of historical material encountered in the geotechnical boreholes, including the deeper deposits of historical material extending to depths of up to 9.5m below the ground surface. As a result, if intact archaeological remains survive within the study area they would likely be impacted to some degree by the piling activities. In areas of high density of piling such as underneath the building core and the deluge tank this would result in a greater degree of archaeological impacts. However, through the remainder of the area where the piling would mostly be limited to smaller localised areas compared to the bulk excavations, the impacts might not remove all archaeological features and in some locations impacts to archaeological features may be avoided.

Conclusion: The proposed piling works within the bulk excavation area would likely impact significant archaeological remains.

6.2.4 Areas outside the bulk excavation zone

It is expected that works outside of the bulk excavation zone (i.e. the eastern portion of the study area) would primarily consist of piling and column installation. Although the exact location of the piles and would be subject to change during detailed design, it is expected that impacts associated with these activities would generally be limited to localised areas. These works would be located within areas assessed as having moderate and nil to low archaeological sensitivity. Although geotechnical investigations within these areas were limited and no archaeological materials were identified, considering the depth of the boreholes if any archaeological remains were present, they would be within the impact depth of the works. Given the expected localised impacts of the works and the lower level of assessed archaeological potential however, if surviving archaeological remains within this area are more localised then the boreholes may avoid impacts.

Conclusion: There is reduced risk that the proposed localised excavations within this area would impact potential archaeological remains.

6.3 Impact assessment

The proposed bulk excavations and the highest density of piling activities would be located within the area assessed as having high archaeological potential. As a result, it has been assessed that the proposal would result in impacts to significant archaeological remains. In certain areas of substantial and deep bulk excavations associated with the substation, main tower core, and the deluge tank and pumping station, the proposed works would potentially substantially impact or remove all archaeological remains within the associated construction footprint. This would result in localised areas of major impacts. However, these deep excavations do not cover the entire portion of the bulk excavation area, and in some areas the bulk excavations are likely to be limited to non-significant reclamation fill. In addition, although the proposed piling works cover a wider portion of the bulk excavation area, the impact footprint associated with each one is smaller. Where the piles would be clustered together these locations are typically associated with deeper bulk excavations that are already likely to result in archaeological impacts. Cumulatively it is assessed that the piling within the bulk excavation area would result in moderate impacts to potential archaeological remains. As a result, it is assessed that the overall impact to potential archaeological resources within the bulk excavation area would be **moderate**.

Excavations outside of the bulk excavation area would be more limited and would primarily consist of localised piling. These activities would be undertaken within areas assessed as having moderate and nil to low archaeological potential. Although these works could still result in impacts to potential archaeological remains, given the more localised nature of the excavations and the lower level of archaeological potential, it is expected that impacts to potential archaeological remains would be reduced. As a result, it is assessed that the overall impact to potential archaeological resources outside of the bulk excavation area would be **minor**.

Overall, it is assessed that the proposed works would result in **moderate** impacts to the archaeological resources within the study area.

6.4 Cumulative impacts

The study area has been subject to several changes in nature and intensity of use through time These changes have impacted preceding archaeological resources. From its first historical purpose as the open surrounds of a mill and wharf, the study area rapidly developed as a shipping precinct with a particular presence of timber yards. The first major, synchronised and precinct-wide change to the study area came with the resumption of the foreshore and wharves by the Sydney Harbour Trust in the first years of the twentieth century. This saw widescale renovation to waterfront infrastructure and associated storage warehouses and will almost certainly have impacted previously constructed seawalls. During this process, small and numerous wharfage facilities were replaced by fewer and larger facilities such as the U.S.S.Co. This process may have impacted the archaeological record in a negative manner; however it is equally possible that archaeological remains of older structures may be preserved beneath remnant fill and floor levels of these early twentieth century structures.

The second major precinct-wide change came about following the decline and disrepair of the study area following the transfer of much shipping from it to Botany Bay after the introduction of containerised shipping. From the 1970's onwards all existing standing structures in the study area were demolished to make way for the Western Distributor, and also as part of a process of generalised demolition that saw the study area stand empty for over 20 years until its redevelopment in the late 1990s. Here too it is likely that the process of demolition in the 1970's did not set out to excavate and remove any remnant existing footings or other archaeological remains potentially

present in the study area. The construction of the currently standing buildings in the study area will have further impacted archaeological remains potentially present in the study area.

6.5 Consideration of alternatives and justification of impacts

Along with other elements of the Darling Harbour Precinct that were last redeveloped in the 1980's - 1990's, the current built structure in the study area is approaching the end of its useful life. The study area does not tie the Sydney CBD to the Darling Harbour Precinct, and represents an under-utilised area on the city fringe. Comprehensive redevelopment of the study area would not be possible without the proposed area-wide demolition and reconstruction of all structures currently within it.

7.0 ARCHAEOLOGICAL MANAGEMENT

7.1 General management measures

The overall guiding principle for cultural heritage management is that where possible archaeological sites should be conserved. If conservation is not practical, measures would be taken to mitigate impacts to archaeological sites. The nature of mitigation measures is primarily based on an assessment of archaeological potential and significance.

7.1.1 Management zones

The study area is divided into areas of nil-low, moderate and high archaeological potential (Figure 32).

- **Nil-low** archaeological potential refers to locations where significant modern excavation has removed the potential for survival of archaeological remains
- **Moderate** archaeological potential refers to locations within the historical high tide mark. Such locations are unlikely to contain deep fill and sea walls to the same extent as locations beyond the historical high water mark. These locations have also been subject to some level of disturbance chiefly associated with the construction of the Western Distributor
- **High** archaeological potential refers to locations beyond the historical high-water mark, where historical mapping has indicated the former presence of significant infrastructure, where geotechnical borehole data indicates the likely presence of buried structures and where the degree of disturbance to historical structures is not clearly evident.

7.2 Archaeological management

7.2.1 Archaeological Research Design (ARD)

The methodology to be used in archaeological management will be provided in a detailed ARD. This is a methodology that responds to the various levels of archaeological potential and likely nature of archaeology that may be encountered. This ARD will be provided as a separate document to this report. The ARD will provide guidelines and clarity for processes including but not limited to:

- Research questions and framing principles for investigation to be implemented throughout the process of archaeological investigation and reporting
- Management of potential Aboriginal archaeological finds
- Detailed archaeological excavation methodology
- Artefact management and analysis protocols
- Practicalities of site constraints, accessibility, and coordination with the general works program
- Contaminated soils procedures.

7.2.2 Archaeological test / salvage excavation

Archaeological test / salvage excavation is proposed for areas that have been assessed here as having high archaeological potential, or any location where monitoring has identified archaeological remains of significance. Due to the urban nature of the study area and likely time constraints on access to soil surfaces for archaeological testing, it is proposed that archaeological testing will be carried out in conjunction with the main works phase of the proposal, as ground surfaces become exposed and accessible to archaeological excavation.

7.2.3 Archaeological monitoring

Where a program of archaeological test excavation is not suitable, or where shallower works are unlikely to reach the depth of significant archaeological remains, works within the areas assessed as having moderate or high potential would be conducted under archaeological monitoring. Where potential archaeological remains are encountered, these would be investigated by the monitoring archaeologist. If archaeological remains are identified during monitoring that in the opinion of the Excavation Director may be of local or state heritage significance, a program of archaeological salvage excavation may be undertaken to investigate and record the archaeological remains prior to impact. Archaeological monitoring may transition to management through an Unexpected Finds Procedure once the Excavation Director has determined that archaeological remains are unlikely to be present.

7.2.4 Unexpected finds

Works within the area assessed as having nil to low potential would be managed through an unexpected finds procedure that would be developed for the project. Works within the areas assessed as having moderate or high archaeological potential would also be managed under the unexpected finds procedure once they have been archaeologically cleared by the Excavation Director.

The Construction Heritage Management Plan (CHMP) prepared for the project by the main contractor, would include a detailed unexpected finds procedure for the project.

7.2.5 Piling

A large proportion of the proposal will rest on piles rather than poured foundations. Due to the depth and restricted size of the piles, it may not be possible to safely access some of the archaeological remains that could be encountered during piling. This issue is highlighted by the geotechnical data which indicates that historical archaeological materials could be present at depths of up to 10.5m below the ground surface. In such locations standard archaeological excavation methodologies would not be feasible and detailed archaeological investigation and recording may not be possible. The ARD would provide further discussion on the archaeological management of the proposed piling.

8.0 CONCLUSIONS AND MITIGATION MEASURES

The main findings of this Technical Paper are presented below. Recommendations are then provided to help mitigate and manage the potential impacts to listed heritage items and archaeological sites.

8.1 Conclusions

The main findings of this Technical Paper are that:

- The study area is within the first industrial precinct in Australia
- The study area includes the location of what is among the earliest dedicated shipping and maritime infrastructure in Australia
- This shipping and maritime activity continued up to the second half of the twentieth century
- Significant land reclamation has taken place in the study area associated with this shipping and maritime industry
- Archaeological excavations carried out near the study area have recovered remains often deeply buried beneath land reclamation fill. Such remains have included:
    - Substantial stone seawalls
    - Stone footings and wharves
    - Timber wharf piles and retaining walls
    - Remnants of industrial machinery and infrastructure
    - Substantial footings and wall remnants of industrial
- Historical processes of demolition and reconstruction will have impacted the remains of these structures in the study area. It is uncertain to what extent archaeological evidence of these structures remain
- Assessment has been made of zones of relative archaeological potential and this has been cross referenced to the proposed impacts
- Archaeological potential is modelled as:
    - High in locations of known historical construction and significant land reclamation and fill events
    - Moderate in locations of known historical construction that have not been subject to land reclamation and fill and where modern construction/development has taken place
    - Nil-low in locations of known historical construction, not subject to land reclamation and fill, and where modern excavation such as for multistorey subsurface car parking has taken place
- Overall, it has been assessed that the proposal would result in moderate impacts to potential archaeological resources within the study area
- Management and mitigation measures have been formulated to appropriately address the potential impacts of the proposal on the modelled archaeological values.

8.2 Recommendations and mitigation measures

The table below outlines a series of mitigation and management measures that are recommended to minimise and manage the impacts resulting from the proposal.

Table 11: Summary of heritage mitigation measures

Ref.	Mitigation measure	Description
NAH1	Heritage Management Plan (HMP)	A HMP must be prepared for the project to provide heritage guidance for the project during the construction phase. The HMP should be incorporated into the project Construction Environmental Management Plan (CEMP) and/or prepared as a standalone Construction Heritage Management Plan (CHMP). The objectives of the HMP would include: • To identify the heritage constraints and requirements of the project including the CoA • Provide details on management and mitigation measures, such as those outlined in this Technical Paper, to be implanted to prevent or minimise impacts on heritage items • To outline the required archaeological management strategies.
NAH2	Heritage induction	All relevant construction staff, contractors and subcontractors must be made aware of their statutory obligations for heritage under the Heritage Act and best practice as outlined in *The Burra Charter* (Australia ICOMOS 2013) to ensure no archaeological remains or heritage fabric are impacted during the proposed works without appropriate mitigation measures in place. This will be implemented through a heritage induction carried out prior to works commencing and continued throughout the works program as staff are inducted to the work place
NAH3	General archaeological management	This Technical Paper, which has been informed by the results of archaeological background investigations, has determined that the project may result in impacts to archaeological objects at locations where projected depths of excavation or piling will impact locations in which identified or potential archaeological remains are likely to be present. **Monitoring, test excavation and salvage** Where proposed excavations may impact potential archaeological remains, programs of archaeological monitoring and test excavation would be undertaken to identify the presence of archaeological remains. If archaeological remains are identified, programs of archaeological salvage excavation would be undertaken to investigate and document the potential extent and significance of these archaeological remains. Artefacts retrieved during the archaeological investigations must be professionally cleaned, catalogued, analysed and reported on as part of final project reporting. Artefacts will remain the property of the proponent. The long-term management of these artefacts may include their incorporation to project heritage interpretation or other avenues as deemed suitable in consultation with Heritage NSW, DPC and heritage professionals. This process of archaeological investigation would be guided by an ARD that would be prepared for the project (discussed below) and would be managed by a suitably qualified Excavation Director

Ref.	Mitigation measure	Description
NAH4	Archaeological management: Piling	The ARD would also contain provisions for piling location management. These may vary with regard to the particular location of piles and the accessibility or feasibility of varied management methods ranging from programs of active archaeological investigation including monitoring, test excavation, and salvage excavation, to management through an Unexpected Finds Procedure
NAH5	Archaeological Research Design	An ARD would be prepared prior to the commencement of the construction phase to outline the required archaeological management within the construction boundaries. The ARD would confirm the areas requiring archaeological management (following the detailed design), outline the archaeological methodology to be implemented during archaeological investigations, and outline research questions that the archaeological investigations would aim to answer. The ARD may be supported by additional Archaeological Work Method Statements to be prepared during the construction phase as required
NAH6	Heritage Interpretation	The project design should incorporate appropriate heritage interpretation in accordance with the NSW *Heritage Manual*, the NSW Heritage Office's *Interpreting Heritage Places and Items: Guidelines* (August 2005), the NSW Heritage Council's *Heritage Interpretation Policy*. A Heritage Interpretation (HIS) has been prepared for the project EIS by Weir Phillips (2021, Appendix T) in accordance with CoA C11 and SEARs no. 13. The HIS has been prepared to guide the incorporation of heritage interpretation, such as displays and panels, into the project design. The heritage interpretation should consider the results of archaeological investigations undertaken as part of the project. Where appropriate, opportunities should be considered for visually or virtually representing archaeological remains and incorporating them into the visual landscape

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