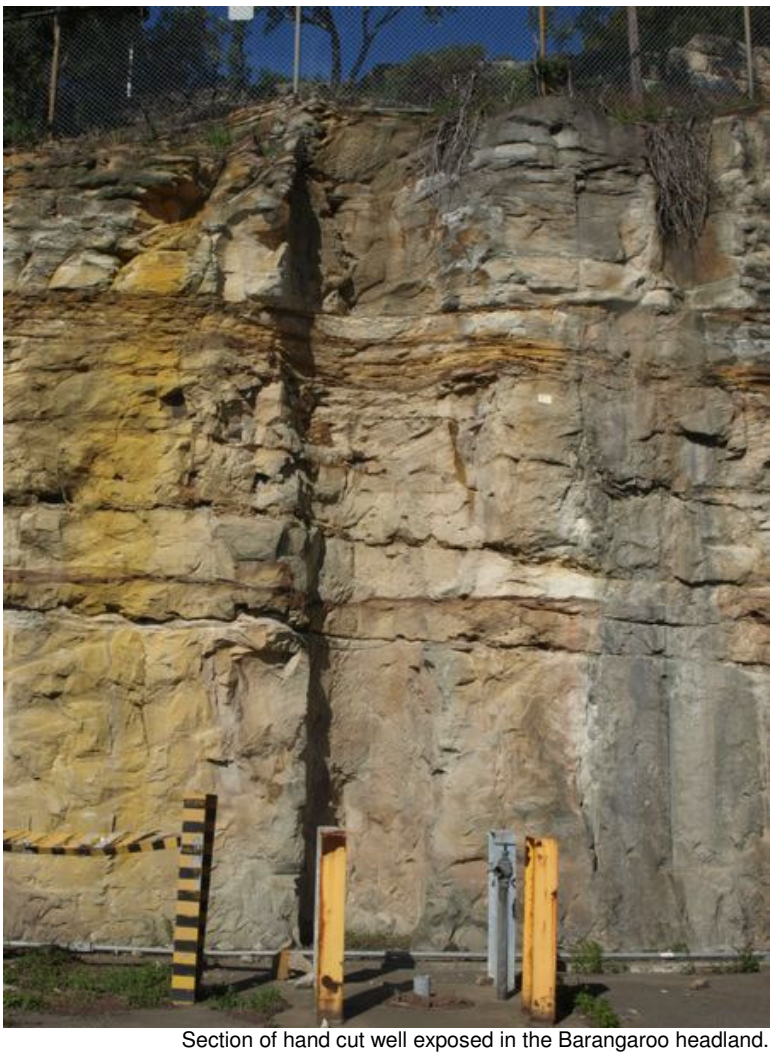
APPENDIX 22

Research Design and Archaeological Excavation Methodology

MAIN WORKS APPLICATION
HEADLAND PARK, BARANGAROO
Research Design & Archaeological Excavation Methodology

FINAL REPORT



Section of hand cut well exposed in the Barangaroo headland.

Prepared by

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Archaeological & Cultural Heritage Consultants

For

Barangaroo Delivery Authority

October 2010

Job No: 1023

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1.0 INTRODUCTION

1.1 BACKGROUND

The Concept Plan for the redevelopment of the harbour front Barangaroo site was approved by the Minister for Planning under Part 3A of the *Environmental Planning and Assessment Act 1979* in 2007. The Concept Plan dedicates the western and northern halves of Barangaroo to parkland and public open space, including a new major Headland Park and Northern Cove. Amendments to the Concept Plan for modifications to the Headland Park were approved in 2009. The Barangaroo Delivery Authority (BDA) will oversee and manage the project.

Matters for consideration set out in the Director-General's Environmental Assessment Requirements (DGR) include an assessment of the likely impacts of the proposal on heritage and archaeological items and proposed conservation. Section 60A of the Statement of Commitments requires the preparation of a Research Design and Archaeological Excavation Methodology for each site which is to be impacted by the proposal. The headland park will be created from materials excavated from the development blocks in the southern part of the site and from the excavation of the southern and northern cove. It will have a natural shape, based on the shoreline that existed in 1836, which will necessitate penetration of the current deck, the concrete caisson and the sandstone sea walls.

Austral Archaeology Pty Ltd has been engaged by the Barangaroo Delivery Authority to prepare a Research Design and Archaeological Excavation Methodology as part of the Headland Park and Northern Cove Main Works Project Application. An Archaeological Assessment and Management Plan (AAMP) was prepared earlier this year for the Barangaroo site (Austral Archaeology 2010) as well as a Statement of Heritage Impact (SoHI) for the program of early works being undertaken as part of the development of the Headland Park. The history and policy in the AAMP has been used to guide this report.

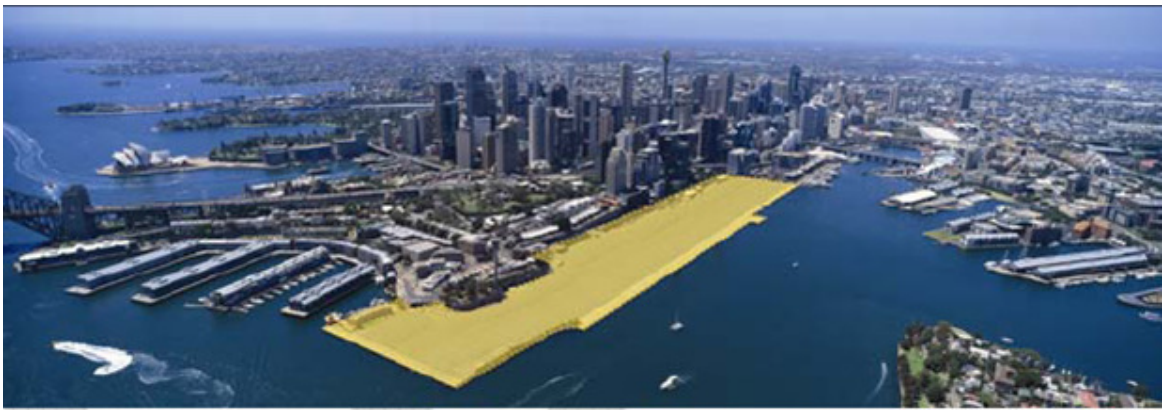

Figure 1.1 The location of the Barangaroo site in relation to the city and Darling Harbour (Source: BDA).

1.2 SITE LOCATION

Barangaroo is a 22 hectare area located in the City of Sydney Local Government Area on the north western edge of the Sydney Central Business District. Barangaroo lies between the precinct of Darling Harbour to the south, Hickson Road, Millers Point and The Rocks to the east and Walsh Bay to the north-east. The site consists predominantly of a flat concrete and bitumen deck of the former NSW Ports Authority container shipping wharf.

The approved Headland Park is located in the northern part of the site. It has been designed to complement the green headlands of Ball's Head and Goat Island and create open harbour-side space for public use. The Headland Park will allow connection to Millers Point and The Rocks through Merriman Street, Clyne Reserve and Munn Reserve.

Figure 1.2 Proposed Barangaroo Headland Park and Northern Cove (Source BDA).

1.3 OBJECTIVES OF THE REPORT

The aim of this research design is to provide archaeological guidance which is appropriate for the approved redevelopment of the Barangaroo headland. The objectives of this report are as follows:

- to identify the location and identity of potential archaeological features and relics;
- to define the likely impacts of the proposed works on the archaeological resource;
- to formulate a set of research questions relevant to the site and to Australian archaeology and history;
- to provide a methodology for undertaking the archaeological program;
- to provide management guidelines and recommendations based on Heritage Branch guidelines and best practice.

1.4 STATUTORY CONTEXT

The Barangaroo project has been assessed under Part 3A of the *Environmental Planning and Assessment Act* 1979. Part 3A of the Act applies to projects which generally have been declared major development or are located on a state significant site either by State Environmental Planning Policy (Major Development) 2005 (Major Development SEPP) or by order of the Minister. The redevelopment of Barangaroo is identified as state significant under SEPP (Major Projects) 2005 (Amendment No 18). The Minister for Planning is the consent authority for this project (BDA 2010). The proposed main works are consistent with the Concept Plan (as modified).

Under Part 3A of the Act, the proponent does not require the usual consents as per City of Sydney Local Environment Plan 2005 and S140 or S60 of the *Heritage Act* 1977 in relation to archaeology. However, the Director General has issued environmental assessment requirements for the project. An environmental assessment must then be prepared in accordance with these requirements. Matters for consideration set out in the Director-General's Environmental Assessment Requirements (DGRs) include an assessment of the likely impacts of the proposal on heritage and archaeological items as well as mitigation measures. The environmental assessment also included a statement of commitments. Section 60 concerns archaeology and states that all ground disturbance must be assessed prior to project application. Section 60A states;

A Research Design including an Archaeological Excavation Methodology will be prepared in accordance with Heritage Council guidelines for each site which is to be impacted by the proposal. Those documents will be prepared for the approval of the Director of the Heritage Branch, Department of Planning. The Archaeological Excavation Director will be a qualified

archaeologist, and will meet the current Excavation Director Criteria for State significance sites as published by the NSW Heritage Council.

This report conforms to the requirements of the various guidelines produced by the Heritage Council of NSW and is consistent with the DGRs the requirements of the Statement of Commitments and the policy and recommendations of the AAMP.

1.5 METHODOLOGY

In 2009 Austral Archaeology Pty Ltd was commissioned by the BDA to prepare an Archaeological Assessment and Management Plan (AAMP) for the Barangaroo site. This research design relies on the historical research and findings presented in the AAMP (2010) to assess the impact of the proposed works.

This report was prepared using the *Assessing Heritage Significance* guidelines in the *NSW Heritage Manual* (2001) published by the NSW Heritage Office. The terminology of the *Heritage Terms and* Abbreviations published on the Heritage Office website (n.d.) has been used to discuss the archaeological resource. In addition, the publication *Statements of Heritage Impact,* published by the Heritage Office, Department of Planning (n.d) has also been consulted. This report is generally underpinned by the philosophy of the ICOMOS *Burra Charter.*

1.6 AUTHOR IDENTIFICATION

This report was prepared by Karyn Mcleod, (Senior Archaeologist), while Alan Hay (Archaeologist) produced the historic overlays and Justin McCarthy (Managing Director) provided advice and reviewed the draft and final reports.

1.7 ACKNOWLEDGEMENTS & CONSULTATION

Austral Archaeology Pty Ltd acknowledges the assistance of Fleur Mellor of Barangaroo Delivery Authority, Michael Flynn of InfraSol and Helena Miller, Director of M/G Planning Urban Planners during the production of this report. Lynda Kelly, Monique Galloway and Wayne Johnson of SHFA generously provided their time as well as plans, reports and information relevant to this report.

1.8 ABBREVIATIONS

The following abbreviations are used within this report:

BDA	Barangaroo Delivery Authority
Burra Charter	The Australia ICOMOS Charter for Places of Cultural Significance
CHL	Commonwealth Heritage List
DoP	NSW Department of Planning
EPA Act	Environmental Planning and Assessment Act, 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act, 1999
EPI	Environmental Planning Instrument
Heritage Act	NSW Heritage Act, 1977
LEP	Local Environmental Plan
LGA	Local Government Area
NHL	National Heritage List
NPW Act	National Parks and Wildlife Act, 1974
NSW HC	NSW Heritage Council
RNE	Register of the National Estate
SEPP	State Environmental Planning Policy
SHFA	Sydney Harbour Foreshore Authority
SHI	State Heritage Inventory
SHR	State Heritage Register
SOHI	Statement of Heritage Impact

Refer also to the document *Heritage Terms and Abbreviations*, published by the Heritage Office and available on the website: www.heritage.nsw.gov.au

Figure 1.3 Aerial photograph of the northern part of the Barangaroo site with the proposed landscape plan overlay. There may be slight changes to the proposed above ground contours in the future, however they will have no effect on the outcome of the archaeological potential or the testing program (Source: Google and BDA)

2.0 THE POTENTIAL ARCHAEOLOGICAL RESEOURCE

2.1 HISTORICAL OVERVIEW

The steep and rugged sandstone ridges, open woodland and inter-tidal rock platforms of the Millers Point headland provided a wide range of resources and an ideal environment for the Aboriginal people who inhabited the area. The traditional owners of the Sydney City region are the Cadigal (or Gadigal) people who had occupied Port Jackson and its islands for thousands of years (Attenbrow 2002: 40).

After the arrival of the European colonisers, the rocky ridgeline to the west of Sydney Cove acted as a natural barrier to rapid occupation of Millers Point and the shores Darling Harbour at the northern end of the site. From the early 1800s the middens of shell in Cockle Bay were collected, crushed and burnt in kilns to produce quicklime, a necessary component of building mortar for Sydney's early brick and stone buildings (Fitzgerald & Keating 1991:17). Ship building was undertaken intermittently from 1809 and permanent settlement of the Millers Point area had commenced well before the 1820s.

The harbour fell sharply into deep water just off shore at the headland making Millers Point accessible to both large and small vessels. In order to overcome the steep foreshore terrain, owners filled and reclaimed the shallows of their waterfront allotments to create wharfs and building platforms. The earliest enduring ship building yard in the area was established by James Munn located at the foot of Munn and Clyde Streets in the mid to late 1820s. By 1832 Bettington's wharf on Cockle Bay was a busy centre, chiefly for colonial whalers and timber vessels while William Chapman, Thomas Moore and Robert Towns had individually set up wharves and storage facilities on the northern shore of the headland.

Wharves were constructed in the area by private enterprise on an as-need basis without consideration of future expansion. The wharves also generated the establishment of small firms of skilled tradesmen associated with the maritime industry. These wharfs became more numerous over time, with rapid construction taking place in the 1850s and 60s. By 1870 almost the entire foreshore from Dawes Point to the head of Darling Harbour was modified by quarrying, reclamation and the construction of a series of seawalls as well as entirely occupied by wharves, stores and commercial premises (Broomham 2007: 33). By the last decades of the 19th century, apart from being unsuitable for modern shipping, most of the wharves and jetties in Darling Harbour were old, dilapidated and constructed in a haphazard manner. The outbreak of bubonic plague in 1901 was the impetus for the Government to begin resumption of the waterfront and the demolition of substandard housing and wharfage (Davies 2007: 55).

The consolidation of free hold land allowed the Government to redevelop on a massive scale without the constraints of original property boundaries. The formation of the Sydney Harbour Trust initiated the redevelopment of wharfage and housing in Darling Harbour and Millers Point. Five new finger wharves constructed to accommodate new large berth ships and the headland was squared off to provide long berths at Dalgety's Wharf (Walsh 1910:83). Road and rail began to replace coastal shipping in the post war period and large container shipping became more prevalent. The finger wharfs became redundant and during the 1950s progressive infilling between the finger wharfs in the central and the southern part of the Barangaroo site created a large broadside wharf to service container ships.

During the 1970s the area to the west of Merriman Street was demolished including Dalgety's wool store and Maritime Services Board buildings on the headland. The northern headland was dramatically cut back, and the Port Operations Communications tower was constructed adjacent to Clyne reserve (Davies 2007:196). Long berths were constructed by creating a new sea wall made of large concrete caissons linking the ends of the finger wharfs and infilling. Moore's Wharf was removed and reconstructed in a different location nearby in the early 1980s. The site has been vacant since 2006 .

The Barangaroo headland has been the location of wharves, warehouses and foreshore modification for some 190 years. It has undergone a number of phases of development that have contributed to the current configuration of the site and that has resulted in the potential for earlier structures to survive. An Archaeological Assessment and Management Plan (Austral 2010) has identified a moderate to high degree of sensitivity for archaeological resources in a number of locations within the northern part of the site that are likely to possess a high level of research potential.

Archaeological features and deposits that are likely to survive either beneath the current deck or incorporated into it include the remains of 19th and 20th century wharves and associated buildings, sheds and stores, shoreline modification such as sea walls and reclamation as well as evidence of material culture, trade and industry.

For the purposes of historical analysis, a phased timeline was developed based on the available mapping and the broad activities being undertaken on the site at the time. It was considered unnecessary to break the phasing of the site into smaller time frames prior to 1870 as building techniques, materials and technologies did not change significantly during this time. Rapid industrialisation, the introduction of new building techniques and materials post 1870s also coincided with the consolidation of properties, wharf reconstruction and rebuilding of stores to accommodate larger steam ships and their cargoes. These changes are likely to be observable in the archaeological record. Likewise the reconstruction of the wharfage in the 20th century coincided with the large scale use of concrete and addition of specialised machinery to assist loading and unloading the increasingly large cargo vessels.

The phases identified for the Headland Park and Northern Cove are;

Phase 1 - Pre-European environment and Aboriginal occupation (possibly as late as the 1820s)

Phase 2 - Private ownership and development 1799-1870

Phase 3 - Intensive development and decline 1870-1901

Phase 4 - Clearance, Renewal and Adaptation 1902-2006.

The proposed new headland has a form that will require penetration and reduction of the size of the current deck. The caisson wall that forms the northern edge of the deck will be cut and a water insertion will be created adjacent to the western edge of Moore's Wharf. The caisson wall on the western edge of the deck will be modified to form a naturalised shape and the sandstone sea wall will be removed. The creation of the northern cove at the south west of Munn Reserve and Dalgety Stores will be a large water insertion to mimic the shape of the 1830s headland and allow for boats to dock (Figure 1.3).

2.2 NORTHERN COVE

2.2.1 Phase 1- Pre European Environment and Aboriginal Occupation

The original topography of Millers Point consisted of a promontory headland jutting westward into the harbour with steeply sloping foreshore and a gently rounded plateau. The landscape consisted of exposed outcropping sandstone, open eucalypt woodland and heathland plants. Exposed outcrops of rock on the headland are commonly depicted in paintings and photographs until the late 1880s when virtually all the open ground in the area had been built on.

The top of Observatory Hill is higher than Millers Point and was therefore reserved for government use. The two high points of Millers Point headland and Observatory Hill were separated by a shallow saddle to the north, but fell down steeply to Darling Harbour to the west and south of the headland. The southern shore of the headland was the only location where shallow water was located and possibly contained a small sandy beach that fell away to deep water. The original high water mark was approximately along the alignment of the present Hickson Road.

Aboriginal occupation of the harbour headlands and bays is well documented and a number of archaeological sites have been excavated in the vicinity of the Barangaroo headland. Excavations of Moore's Wharf (Lampert & Truscott 1980) on the northern edge of the Barangaroo site, revealed a shell midden beneath the rubble floor of the building. Shells, fish bone and stone tools were recovered in association with shards of blue and white transfer printed ceramic indicating Aboriginal people continued to live at least a semi-traditional lifestyle around the harbour following European occupation. A number of other sites in the vicinity have retained evidence of Aboriginal occupation (Austral 2010:12) but these sites are usually highly disturbed or located in areas with a different topographic profile.

Early colonial chroniclers noted the large piles of shell on the shores of Darling Harbour which may have been Aboriginal middens. These shells were collected by convict gangs and burned in kilns to produce lime. Kilns appear to have been located specifically for the proximity to shell resources and the southern shore of the headland contained an operating kiln from approximately 1814 (http://www.law.mq.edu.au/scnsw/Cases1833-34/html/martinvmunn1833.htm).

It is considered that there is low potential for the survival of subsurface archaeological deposits containing evidence of Aboriginal occupation in the Barangaroo headland area due to a number of factors. It is not expected that Aboriginal sites would have survived the combination of processes that have taken place there including lime burning, land reclamation, large scale quarrying and multiple phases of wharf and warehouse construction. Additionally, a vast majority of the headland was cut back in two stages during the 20th century. Considering much of the Barangaroo site south of the headland was originally below the high tide line (which was not the case for other artefact bearing sites in the vicinity), the potential for Aboriginal artefacts to survive in the location of the northern cove is considered extremely low.

There is also low potential for the survival of a pre-European environment as all native vegetation was removed from the site long ago and the original topography has been extensively modified. Material may survive in intertidal zones where land reclamation was undertaken early. Archaeological excavations at both Moore's Wharf and Towns Place at the north east of the headland retained evidence of the location of the original shoreline. Reclamation activities buried intertidal zones and sea walls pushed the shoreline back toward the harbour. Remnant shoreline has also been located at other archaeological sites in the vicinity such as the KENS site and Darling Walk.

In the unlikely event evidence of Aboriginal occupation or material associated with the pre-European environment were uncovered, it would be in a highly disturbed context and/or in areas where remnant shore line has survived due to reclamation. Consultation with the Metropolitan Local Aboriginal Land Council (MLALC) would be required.

2.2.2 Phase 2 - Private ownership and development 1799-1870

It appears that Governor Macquarie granted land on the headland to Patrick Marmount and Arthur Martin as early as 1815. Marmount sold his land to Jack Leighton who may have already owned land in the vicinity. By 1815 Martin was producing lime in kilns on his property that had been built into the escarpment close to the shore on the southern cove of the headland. At the same time, Leighton was producing flour from one of three windmills he owned on the top of the point. The track giving access to the windmill became the boundary of Martin's and Leighton's properties and later became Bettington Street.

Millers Point was not settled as early or as quickly as The Rocks or the area south of Sydney Cove, as the rocky ridges made access difficult. By the 1830s the entire Millers Point headland had been allocated in fairly large allotments and structures had been built on them. Ship building was being undertaken sporadically in Cockle Bay as early as January 1809, however James Munn established a ship yard on the southern shores of the headland adjacent to Martin's property by the mid to late 1820s. Munn bought out his neighbour and demolished the kilns.

This phase is characterised by large scale reclamation, expansion of wharf and storage facilities, the creation of new streets, subdivision and rapid development of working class accommodation on the northern and eastern boundaries of Munn's original property. The shipyard expanded under the ownership of a number of boat builders and by the 1860s John Cuthbert had purchased most of the land from Munn's original grant south to the gas works, of which a good proportion had been reclaimed. This was probably the largest ship building and refitting business in the country and upward of 250 men were employed by Cuthbert. The yard contained slipways, a jetty, blacksmiths' shops, carpenters' sheds, sail lofts, a steam saw mill and large store of timbers. Photographs from this period show a sea wall supporting an extensive flat platform which had been reclaimed from the southern shore of the headland.

The 1865 Trig Plan shows that Munn's original property had been overlaid by Munn, Unwin, Wentworth and Clyde streets. Land on either side of these streets had been subdivided into small residential allotments. All of Munn's former buildings had been demolished, but the cottage appears to have either been extended to form stores or rebuilt at a larger scale in the same location. The 1865 plan also shows the formalisation of the harbour edge, probably with a sea wall, and the location of slipways.

The steep escarpment close to the original shore line, that had initially hindered the occupation of the area, remains visible on this plan and reclamation has pushed the shoreline further to the west and south. The escarpment appears to dictate the extent of the streets and the residential properties.

Bettington's property on the south western point of the headland was acquired by Charles Smith who rapidly purchased adjacent properties expanding his wharfage around the headland to the

north. By 1865, Smith had also subdivided Merriman, Bettington and Munn Streets for small residential allotments but many of Bettington's former buildings remained on the property.

Figure 2.2. 1833 headland and allotments with proposed new headland overlaid (red). (Source http://www3.photosau.com/CoSMaps/scripts/home.asp)

Figure 2.3. Detail *Map of the City of Sydney, 1843* by William Henry Wells, Land Surveyor showing wharves and location of buildings with proposed new headland overlaid (red) (Source: Ashton and Waterson 2000:25)

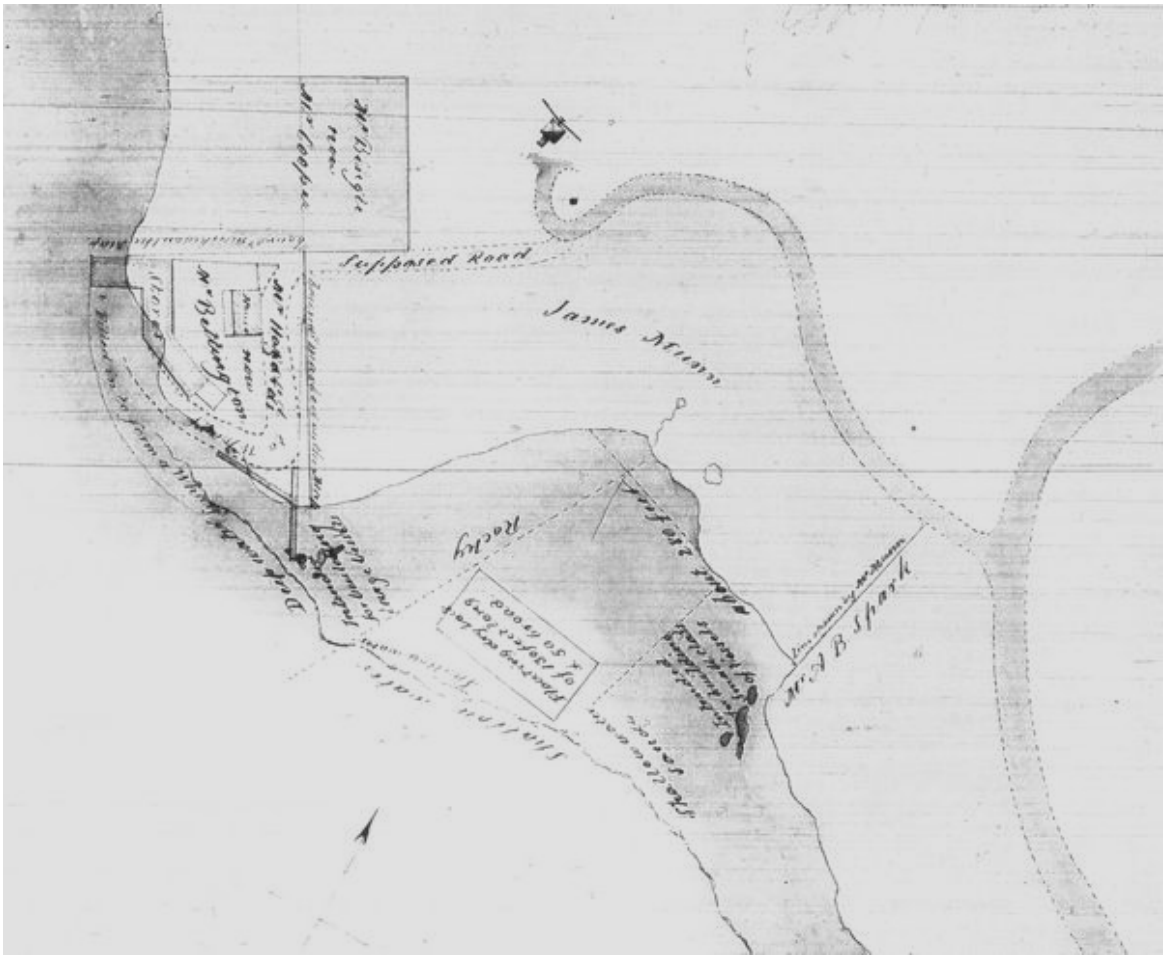

Figure 2.4. Drawing of Munn and Bettington's properties from October 1831. The majority of the waterfront of Munn's property is 'shallow and rocky'. The western side of Munn's property is annotated 'Intended for the building of large vessels'. In the bay is a 'floating dry dock 130 ft long and 50 ft broad'. The eastern side of the property is 'intended for building small class of vessels'. Munn also had a slipway and shed adjacent to the boundary with Bettington, (not indicated on this plan) as well as a house and garden just south of the windmill and the remains of lime kilns close to the water's edge marked by the circle. Bettington has constructed stores and a wharf at the north western edge of his property and reclaimed land beyond the shoreline; it has been 'filled in to create a wharf'. Bettington has constructed a boundary wall and wharf on the most southern part of the point and extending out into the harbour, obscuring Munn's access to deep water (Source: State Records maps and plans Parish of St Philip vo1 folios 1-50 reel 2746).

Reclamation to create level areas on the shoreline for the construction of maritime associated infrastructure appears to have occurred from the 1820s, possibly earlier, and it is feasible that evidence of the original shoreline might remain buried under early fill. On the southern shore of the headland the shallows were filled rather than cut back and there was little impact around the shoreline apart from reclamation and the addition of sea walls. There is moderate potential for evidence of natural features such as buried landform, early modifications such as sea walls and slip ways, reclamation, wharf piles, cultural deposits and the foundations of earlier buildings. Machine sawn timber was not available in Sydney until the mid 1840s (http://mileslewis.net/australian-building/pdf/timber-frame/timber-frame-processing.pdf) and therefore the differentiation between early timbers or structures associated with Munn's boat building business and the later Cuthbert shipyard might be possible.

The construction of roads and housing necessitated terracing and levelling and possibly filling parts of the headland. It is unlikely that evidence of this nature will have survived the cutting back of the headland in the 20th century. An early hand cut well has survived in section on the north western edge of what remains of the headland (see front cover).

This phase ends when Cuthbert's yard closed after his death and the site was acquired by T.A. Dibbs, Cuthbert's neighbour to the north. The adjoining properties were redeveloped for wharfage and storage in the 1870s and some of the ship yard structures were demolished.

Figure 2.5 1865 Trig plan showing the allotments and location of buildings with the proposed new headland overlaid (Source http://www3.photosau.com/CoSMaps/scripts/home.asp)

Figure 2.6 View of Darling Harbour over Kent Street from the Observatory, c1873. This image shows the sea wall and extensive reclamation (red arrow) at Cuthbert's shipyard a few years prior to redevelopment by Dibbs. The edge of the escarpment can also be seen as well as the wharf road that ran below Munn Street. Kent Street is in the foreground with Millers Road veering off to the left and Hart Street running steeply down to the harbour behind the houses in the foreground. The area has clearly been modified and levelled for the construction of houses and roads (Source: ML, Holtermann Collection Box 55).

2.2.3 Phase 3 - Intensive development and decline 1870-1901

This phase is marked by rapid changes in technology which encompassed construction materials, shipping and cargo. Percy Dove's 1880 plans show the headland no longer has a rounded form and five large timber jetties on piles extend south west into Darling Harbour from Smith's and Dibb's properties. It appears that this has been achieved through further reclamation and extension into the harbour beyond the sea wall. Despite these works, a number of sheds and structures have been retained on both properties from the previous phase. The 1900 Resumption Plans list these jetties as constructed on piles and unauthorised.

By 1880 Smith and Dibbs owned approximately half the headland, however the original property boundaries are still clear and the configuration of streets and many of the buildings did not change until the government resumptions in 1901. Between 1880 and 1900 the main change to the southern part of the headland was the addition of sheds or storehouses and the extension of Smiths wharf on the south western point of the headland. It does not appear that any structures have been demolished.

Archaeological excavation of the nearby Town's Place site and Darling Walk revealed substantial evidence of buildings, slipways, wharf piles, sea walls, cultural deposits and reclamation. There is moderate potential for the survival of similar features and deposits relating to the post 1870 redevelopment of the wharfage, further reclamation, cultural deposits, construction of stores and other buildings as well as jetties and sea walls. Machine made brick, sawn stone, cement and concrete, tongue in groove floorboards and the wide spread use of corrugated iron was common from the 1870s and might be identified in structural remains on the site. The long jetties date to this phase and evidence of piles and the sea wall to which the jetties were anchored may be present within reclamation fill.

2.2.4 Phase 4 - Clearance, Renewal and Adaptation 1902-2006

By the last decades of the 19th century, apart from being unsuitable for modern shipping, most of the wharves and jetties in Darling Harbour were old, dilapidated and constructed in a haphazard manner. The outbreak of bubonic plague in 1901 was the impetus for the Government to begin resumption and demolition of substandard housing and wharfage. The consolidation of freehold land allowed the Government to redevelop on a massive scale without the constraints of the original property boundaries (Davies 2007: 55).

After the resumptions of the early 20th century, the first major work to be completed was the new Dalgety's wharf on the western side of the headland. The Sydney Harbour Trust constructed a large long shore berth squared off the headland and provided a wool store with modern mechanical handling devices.

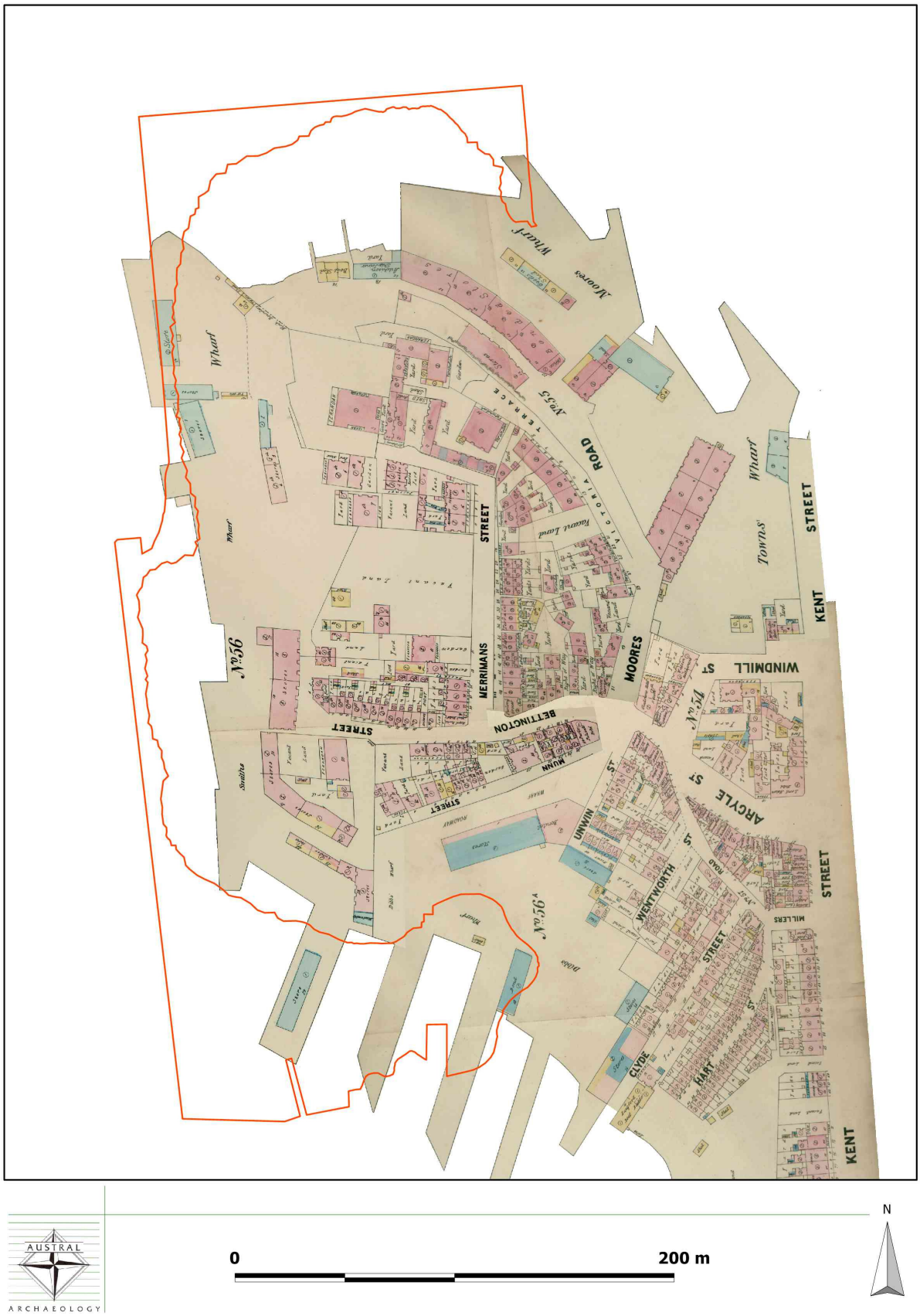

Figure 2.7. 1880 Dove Plan showing the configuration of the shoreline and the location of buildings with the proposed new headland overlaid (Source http://www3.photosau.com/CoSMaps/scripts/home.asp).

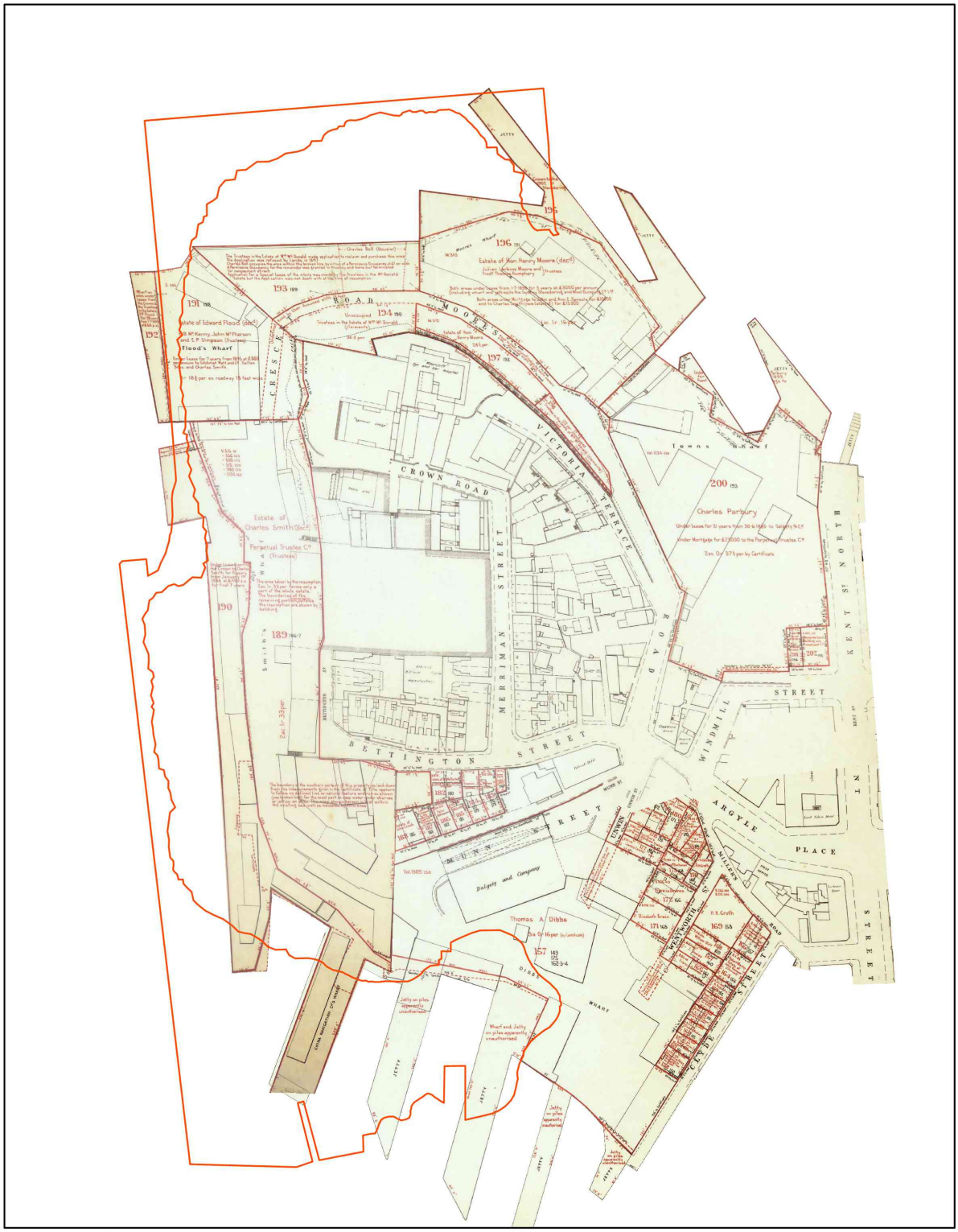

Figure 2.8 1900 Darling Harbour Resumption Plans showing the configuration of the shoreline and the location of buildings with the proposed new headland overlaid (Source: SHFA Historic Maps collection).

Works during this phase resulted in reconfiguration of the entire headland including demolition of streets and houses, demolition of the majority of the wharves, construction of new stores and construction of five new finger wharves to the south of the headland. In 1909, the major work of constructing Hickson Road began, further impacting the configuration of roads and buildings in the area and requiring the construction of overhead bridges to access the upper level of the headland (Broomham 2007: 33). Munn Street was reconfigured to form a loop connecting the top of the headland with Hickson Road and a new Dalgety store was built between the two levels of Munn Street.

During the removal of the old wharves, engineer Henry Walsh found that the majority had been constructed of turpentine piles of 200-300 mm (9-12 inches) diameter and most were at least 40 years old. These timbers were found to be in sound condition as turpentine was resistant to borers and were reused in the new wharves (Walsh 1910:80). Walsh states that not all the piles were removed, some were cut off below the waterline and some were reused. It may not have been necessary to remove all the previous wharves, sea walls and standing structures back to the original shore line as the creation of a new wharf edge seems to have consolidated what was already there by the addition of a precast reinforced concrete trestle sea wall and massive backfilling.

The purpose-built reconstruction of the wharfs and subsequent associated bond stores, warehousing and road access saw whole streets disappear in Millers Point as the cliff was cut back for the construction of Hickson Road Broomham (2007:3). The western edge of the headland was terraced to accommodate the new Dalgety buildings which were subsequently removed in the 1970s when the headland was further cut back. The 1970s also saw the construction of a concrete caisson sea wall that linked all the finger wharves and allowed filling between the wharves creating a massive deck suitable for container vessels.

The construction of Hickson Road and Wharf No 2 resulted in the loss of Hart, Clyde, Wentworth and Unwin Streets while successive stages of cutting back the headland saw the removal of Bettington and Munn Streets. Further removal of archaeological features and deposits would have occurred with dredging and bulk excavation for the construction of wharves No 2 and 3. It is likely that most of the western and northern edges of the deck have also been considerably impacted by dredging and that there is little opportunity for archaeological evidence in this area.

It is considered that there is moderate potential for the survival of archaeological features such as jetties and wharf piles, sea walls, reclamation and structures such as stores associated with the wharves incorporated into the current deck and around the successive edges of the headland. The historical documentation indicates that the continuous process of renewal, land reclamation and wharf construction appears to have consolidated the previous structures and pushed the wharves surrounding the headland further into the harbour.

2.3 MOORE'S WHARF INLET

2.3.1 Phase 1- Pre European Environment and Aboriginal occupation

Excavations of Moore's Wharf (Lampert & Truscott 1980) on the northern edge of the Barangaroo site, revealed a shell midden beneath the rubble floor of the building. Shells, fish bone and stone tools were recovered in association with shards of blue and white transfer printed ceramic indicating Aboriginal people continued to live at least a semi-traditional lifestyle around the harbour following European occupation. An excavation in 1994 at Cumberland Street on the ridge overlooking The Rocks and Darling Harbour uncovered a campfire (radiocarbon dated to about 1500 AD) with the remains of a meal consisting of snapper and rock oysters.

Evidence of Aboriginal occupation at other sites in the vicinity includes Darling Walk where 10 artefacts were recovered from an extremely disturbed context and 952 artefacts from the KENS site (Casey and Lowe 2009). Both of these sites however, have very different profiles to the Barangaroo headland.

Moore's Wharf was originally located on the northern edge of the headland and was relocated in the 1980s. The landform was considerably cut back in the 1970s (Figure 2.10) and it is expected that any evidence of Aboriginal occupation will have been disturbed or destroyed.

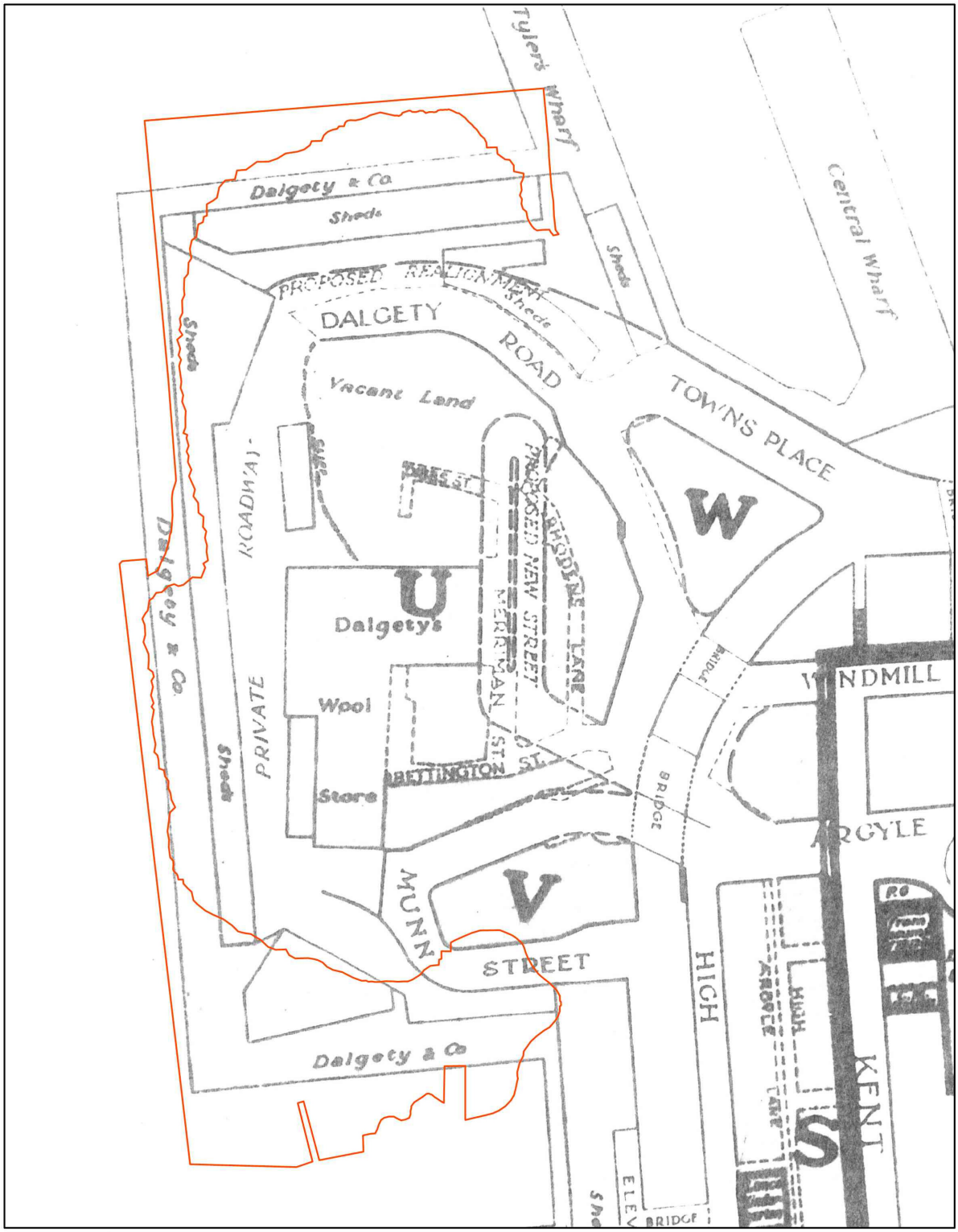

Figure 2.9 1913 plan showing the redevelopment of the headland, streets and wharfage with proposed new headland overlaid. The existing Dalgety Stores buildings adjacent to the headland are located in section V on this plan (Source: SHFA Historic Maps collection).

2.3.2 Phase 2 - Private ownership and development 1799-1870

William Long and James Wright consolidated property on the north eastern part of the headland from property originally granted to Jack Leighton and Richard Siddons. Henry Moore purchased the property in the late 1830s and established Moore's Wharf which consisted of long-shore berths and a range of stores including a series of sandstone stores as well as a number of less substantial iron, timber and brick buildings. Moore's impressive residence Moorecliff (1839), was built on the east side of the Point (http://www.nationaltrust.com.au/barangaroo). Moore provided berth facilities for passenger and cargo vessel as well as acting as the first Australian P&O Agent. The wharfage was reconfigured and extended throughout the 1860s and additional store houses were established on the boundary of Town's property to the east and on reclaimed land to the north of the stone warehouse.

The available mapping for this phase is not particularly reliable. It is considered however, that there is moderate to high potential for the survival of a range of maritime associated activities and land modification dating from the 1840s until the end of this phase as large scale reclamation and wharf construction appears to have been undertaken at both Moore's and Town's properties. Archaeological excavation of the adjacent Town's Place site revealed substantial evidence of early buildings, a slipway, wharf piles, sea walls, cultural deposits and reclamation as well as the walls and foundations of Town's bond store that were up to three meters in height. The repeated modification of the shore line through reclamation and construction of sea walls at Moore's Wharf is likely to retain similar evidence of maritime activity throughout this phase.

2.3.3 Phase 3 - Intensive development and decline 1870-1901

By 1880 two large timber jetties on piles extend north west into the harbour. It appears that this had been achieved through further reclamation and extension into the harbour beyond the sea wall. Moore's Road was established providing access from Argyle Place and the stores buildings in front of the stone warehouse were extended or rebuilt. New jetties also extended from the adjacent Town's Wharf and store buildings had been enlarged. The 1900 Resumption Plans list these jetties as constructed on piles and unauthorised.

It is considered that there is moderate to high potential for an archaeological resource to survive from this phase despite the major modifications of the 20th century. The archaeological excavation of Town's Place uncovered substantial structural features and cultural deposits from a number of phases. The proximity of Moore's Wharf and Town's Place and the similarity of activities conducted at these properties is indicative of the potential archaeological resource likely to be present beneath or incorporated into the deck.

2.3.4 Phase 4 - Clearance, Renewal and Adaptation 1902-2006

Despite the extensive redevelopment of Walsh Bay in the early 20th century and the clearance of all the buildings on the top of the headland for the construction of the Dalgety wool stores, Moore's Wharf stone warehouse and the road remained without alteration. One of the jetties was demolished and the other was widened and extended to become Wharf 10 Walsh Bay. Demolition, cutting back and filling was undertaken on the northern edge of the property so that a long broadside wharf was created. It appears that the stone sea wall was created during this phase and the northern edge of the sea wall is likely to survive approximately 20m inside the current caisson wall. Photos from the 1970s works (Figure 2.10 below) show the location of the sea wall, the addition of the concrete caisson and backfilling behind it, the store houses following the shape of the natural topography and the cutting down of the headland. Moore's Wharf stone warehouses were relocated in the 1980s to Wharf 10 Walsh Bay that was originally constructed in the 1870s.

2.4 SANDSTONE SEA WALL AND CONCRETE CAISSON

2.4.1 Phase 1- Pre European Environment and Aboriginal occupation

There is no potential for evidence of Aboriginal occupation or the pre-European environment behind the sandstone sea wall or the caisson as the proposed headland extends beyond the original shoreline and is located in deep water.

2.4.2 Phase 2 - Private ownership and development 1799-1870

The western edge of the headland was divided into at least seven properties by 1830 and the majority of buildings on these properties were set back from the waterfront and located above the shoreline escarpment. It is considered that there is low potential for evidence of maritime activity,

occupation or modification of the western edge of the headland predating 1870 as the proposed headland extends beyond the original shoreline and is located in deep water. Creation of the caisson wall will also have destroyed any archaeological resource that may have been present on the western edge of the deck.

2.4.3 Phase 3 - Intensive development and decline 1870-1901

The potential archaeological resource for this phase includes wharves, jetties, sea walls, reclamation and structures behind the southern half of the sandstone sea wall. The photograph below (Figure 2.10) shows no archaeological resource present in the north west corner apart from the sandstone sea wall.

2.4.4 Phase 4 - Clearance, Renewal and Adaptation 1902-2006

The potential archaeological resource for this phase includes consolidation of the structures around the headland and filling to create the long shore berth on the western and northern edges. The sandstone sea wall was constructed during this phase and wall is likely to survive approximately 20m inside the current caisson wall on the northern edge of the deck. The photograph above shows no archaeological resource present in the north west corner apart from the sandstone sea wall.

Figure 2.10 Reconstruction of the headland 1970s. Moore's Wharf is in its original position and the shape of the headland can be discerned by the location of the buildings. (Source: Maritime Services Board Annual Report 1977-78, p 8)

2.5 SUMMARY

The proposed headland park is larger than the original headland, however land reclamation over time has pushed sea walls, wharves and jetties well beyond the original shore line.

The Barangaroo site is likely to contain a combination of archaeological site types that are representative of the uses of the place dating from the 1820s to the 1970s. This resource is likely to consist of elements of built landscape, archaeological and topographical features created by cutting through the bedrock, the manipulation of the wharf edge by the protrusion of finger wharves and jetties, a succession of sea walls dating from the 1830's to 1900 and the subsequent formalization of a new edge by reclamation and infill in the 1970's.

- There is low potential for archaeological evidence of Aboriginal occupation in the Northern Cove and Moore's Wharf inlet due to the impact of European activity.

- There is moderate potential for evidence of the pre-European environment in the form of remnant shoreline, marine sediments and escarpment that was buried during reclamation.
- There is moderate to high potential for archaeological evidence from all phases of European activity to survive in the location of the northern edge of the Northern Cove. The southern half of the cove was likely to have been subject to dredging for the construction of Wharf No 2 and the archaeological resource is unlikely to survive.
- There is moderate to high potential for the survival of an archaeological resource to survive in the Moore's Wharf inlet from all phases of European activity.
- There is low potential for evidence of maritime activity, occupation or modification of the western edge of the headland predating 1870. There is moderate to high potential for the survival of an archaeological resource associated with the last two phases behind the southern half of the current sandstone sea wall.
- A section of hand cut well is visible on the north western edge of the remaining headland.

The history of the site is diverse, layered and authentic. The site is of significance for its numerous historical associations with prominent people and important historical events. The potential archaeological resource of the Barangaroo site is of local and State significance for its ability to reveal information about land uses and technologies from the Colonial period as well as the lives of the inhabitants that are not, or never were, documented. The site has a long maritime history and has the potential to provide valuable evidence about the development of the site over time and the importance of maritime industry to Sydney and Australia.

3.0 PROPOSED WORKS

The Barangaroo Port facilities have been progressively decommissioned since 2008. The NSW Government's objective for the Barangaroo project is to deliver a mixed use development consisting of commercial, residential, retail and recreational facilities. The site will be renewed as an extension of the Sydney CBD with a significant new foreshore park providing 11 hectares of recreational area.

The originally approved Concept Plan for the development of the Barangaroo site contemplated an urban structure comprising 11 hectares of foreshore promenade and public domain, street patterns and development blocks. The public domain includes a new Headland Park at the northern end of Barangaroo, new Northern Cove and Southern Cove water insertions and car parking under the Headland Park to ensure community access to the park (BDA 2010b).

On 11 November 2009 the Minister for Planning approved a modification to the Concept Plan which was primarily aimed at achieving a more naturalised design for the northern headland. The modification was prepared in response to the requirement in the Minister's Terms of Approval requiring further detailed design for the northern headland and northern cove including reinstatement of a headland at the northern end of the site with a naturalised shape and form that provided connection to Clyne Reserve and allow direct pedestrian access from Argyle Place. Appreciation of the landform of the former headland would be achieved by an enlarged northern cove and a greater naturalised shape, form and edges.

The creation of the Barangaroo Headland Park will be initially achieved by receiving fill material from Stage 1 (development blocks 1-4) of the project. Up to 150,000m^3 of fill will be added to the site requiring site preparation that will enable the commencement of the main works program. These processes have been described in the *Draft Preliminary Environmental & Construction Management Plan Early Works – Headland Park* prepared by the Barangaroo Delivery Authority 2010. A SoHI prepared as part of the environmental assessment found that the early works activities will not impact on the potential archaeological resource. The *Draft Preliminary Environmental & Construction Management Plan Early Works – Headland Park* is currently in the approval process.

4.0 ARCHAEOLOGICAL IMPACT

The creation of a naturalised shape and form for the headland will require the penetration of the caisson wall at the north and west of the deck, as well as removal of the current sandstone sea wall. The main impacts on the identified potential archaeological resource of the Northern Headland is from the bulk excavation to create the water insertions of the Northern Cove and the Moore's Wharf inlet.

Figure 4.1. Proposed Headland Park and Northern Cove overlaid onto the current wharf configuration. The area striped red is the area to be removed/impacted.

4.1 NORTHERN COVE

The excavation of the Northern Cove will involve the bulk excavation of part of the existing deck inside the caisson wall to accentuate the shape of the headland and to allow for boats to dock within the cove. Approximately half of this area is likely to have been excavated or dredged in the early 20th century for the construction of Wharf 2. This removed the archaeological resource in the southern part of the cove, while the northern part has moderate to high potential for remains of all phases of post-European activities. Bulk excavation of the Northern Cove is likely to impact on the old foreshore and reclaimed land, timber piling, cultural deposits, seawalls and infilling as well as the remains of stores and early features cut into the rocky shoreline and escarpment.

4.2 MOORE'S WHARF INLET

The excavation of the inlet to the west of Moore's Wharf will partially separate Moore's Wharf from the northern deck of Barangaroo and accentuate the shape of the north eastern part of the headland. Creation of the inlet will involve the bulk excavation of part of the existing deck inside the caisson wall. This part of the site is likely to include archaeological remains associated with changing wharfage during the 19th and 20th centuries, reclaimed land, remnant timber piling, a number of sea walls and cultural deposits.

4.3 SANDSTONE SEA WALL AND CONCRETE CAISSON

The current sea wall and concrete caisson on the western side of the deck will be penetrated in part to provide the natural shoreline reminiscent of the 1830s headland. Removal of the current sandstone sea wall on the north western edge of the deck and excavation to create a new shoreline is likely to impact on archaeological evidence of land reclamation, wharves, jetties, and sea walls dating from approximately the 1840s. Previous land reclamation on the southern half of the western foreshore did not extend to the current location of the caisson wall and therefore penetration of the caisson is unlikely to impact on an archaeological resource. It is likely that the area north and west of the caisson and sandstone sea wall has been considerably impacted by dredging and there is little likelihood for archaeological evidence in this area.

The existing caisson walls are precast mass concrete gravity retaining structures 15 m in height. The existing sandstone sea wall is 120m long and consists of sandstone blocks founded on a sloping basalt ballast bank 13m high. Both structures are permeable to water and it is unlikely it would be possible to carry out excavation behind the sea wall and caisson without large scale dewatering (Hyder 2010:14-15). It has been proposed that the caissons are left in place during the bulk excavation and would be demolished as the last phase of the works. The concept plan requires the complete dismantling of the sandstone sea wall and the salvaged stone will be used elsewhere on site.

4.4 GEOTECHNICAL INFORMATION

Successive phases of reclamation, wharf, jetty and sea wall construction and consolidation have pushed the shoreline further into the harbour. The resulting current northern and western edges of the deck are anchored in very deep water. The original headland shoreline is up to 30m inside the current edge of the deck.

Geotechnical testing of the site (ERM 2006) found that the current deck at the northern end of the site consists of a layer of pavement (bitumen and concrete) of variable thickness overlying fill and alluvial/marine deposits which in turn rest on predominantly sandstone bedrock. Unfortunately the geotechnical information regarding the composition of the fill and the location of natural deposits is reasonably general and has not clarified the exact nature of the deposits. The fill encountered below the pavement was approximately 0.5m deep overlying bedrock near the cut back headland and up to 8m deep overlying sediment and bedrock on the outer limits of the deck. The current deck level is around RL 2m to 2.5m. Bedrock is located at a depth of RL 2m adjacent to the tower and RL -10m to -12m at the northern and western edge of the deck, however there is likely to be several meters of fill and marine sediments overlying the bedrock (Douglas Partners 2010).

The groundwater table was detected at RL 0.3m to 0.65m. Similar levels were noted at Darling Walk (Casey & Lowe 2008) and Towns Place (Austral 2005) and both sites were inundated with water at high tide and during periods of rain. Mean sea level is -0.035 (Hyder 2010:14).

The geotechnical sampling program encountered timber, stone, brick, concrete and steel obstructions in the fill which is indicative of demolition material and structural remains that may still

be present. Fill behind the caisson wall consists of crushed sandstone, brick and rubble from CBD building sites from the 1970s (Hyder 2010:14).

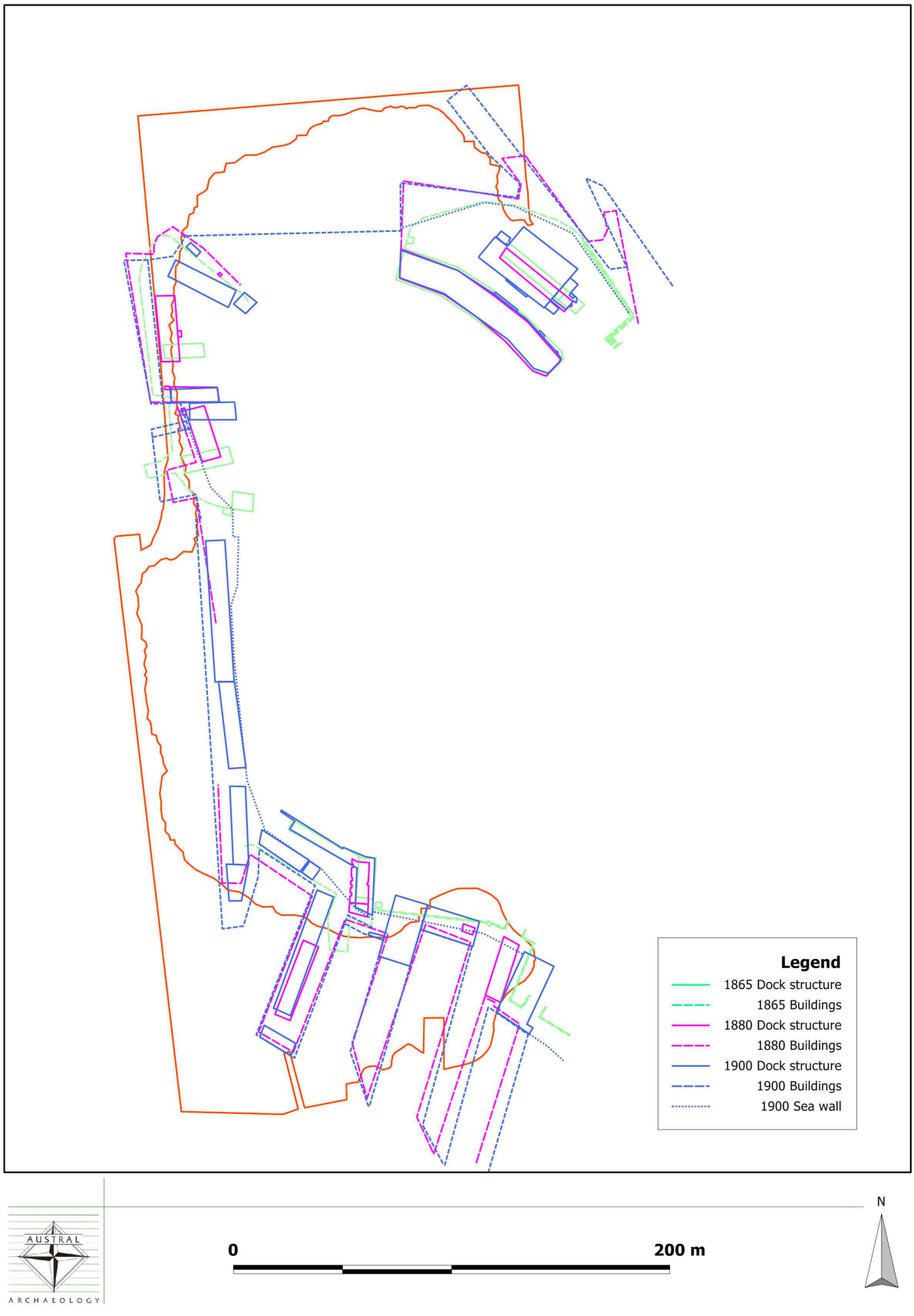

Figure 4.2. Overlay of the 1865, 1880 and 1900 plans showing the location of buildings that were extant during this period. A number of these buildings are known to have been constructed well before the 1860s, some as early as the 1830s, and were still present in 1900.

4.5 CONTAMINATION

Contamination has also been identified in the headland area however it has not been assessed as being a concern for groundwater contamination or containment (Hyder 2010:3). A number of hot spots were located containing PAH,TPH and BTEX which are the result of waste dumped from the gas works. Contamination levels should be tested to ensure safe exposure for any personnel working in those areas.

An Occupational Hygienist's report or risk assessment would be recommended prior to physical investigation and excavation due to known contamination.

Archaeological investigation and recording of the site may be limited to monitoring and photographing the machine excavation if contamination is considered too high.

5.0 ARCHAEOLOGICAL METHODOLOGY

5.1 INTRODUCTION

Approval for the Headland Park and Northern Cove early works program is currently in progress. These works will involve the removal of above ground structures, decommissioning of redundant services, sandstone extraction and site establishment. A SoHI (Austral 2010) for the early works program determined that there would be no impact to the archaeological resource during these works.

An archaeological excavation is generally recommended following an archaeological assessment of a site that finds, as in this case, that the site has medium to high level of archaeological potential and significance and is likely to be substantially impacted or destroyed by a new development. This research design describes the impacts on the archaeological resource, details how the archaeological program will be managed and formulates a set of research questions relevant to the site. The archaeological investigation of the northern headland must be able to answer current research questions relevant to Australian archaeology and history.

5.2 ARCHAEOLOGICAL INVESTIGATION

The aim of the archaeological excavation is to carry out comprehensive recording of the archaeological resource prior to its removal and destruction by the proposed development. Recording of the site includes written description, drawings, photographs, measured plans, collection and analysis of artefacts and a response to the research questions (see Section 5.3 for details).

Given the potential impact on the archaeological remains, a staged program of archaeological investigation is recommended following the early works stage, but prior to the bulk excavation of the Northern Cove and Moore's Wharf inlet. The program of archaeological works would commence with a first stage of targeted test excavations of areas to be impacted by the development to ensure that any *in situ* archaeological material is assessed, recorded and analysed; to confirm the accuracy of the site's predicted archaeological potential and enable evaluation and management of any significant archaeological resource. If significant and intact structures and deposits are present, a second stage of open area excavation should be undertaken. Investigation will be consistent with following documents and guidelines;

- *NSW Heritage Manual*, Heritage Office and Department of Urban Affairs & Planning 1996
- *The Burra Charter,* Australia ICOMOS 1999
- *Archaeological Assessment Guidelines,* Heritage Office and Department of Urban Affairs & Planning 1996.
- *Historical Archaeological Sites: Investigation and Conservation Guidelines*, NSW Department of Planning, Heritage Council of NSW 1993
- *Historical Archaeological Excavations: Code of Practice*, NSW Department of Planning, Heritage Council of NSW 2006.
- *Photographic recording of heritage items using film and digital capture*, Heritage Branch Department of Planning 2006.
- *How to prepare archival records of heritage items*, Heritage Office and Department of Urban Affairs & Planning 1998.

Testing will clarify the nature and depth of the potential archaeological resource particularly in the Northern Cove and the Moore's Wharf inlet. It will confirm or refute the survival of evidence from all European phases of activity and verify ground water levels. Testing is also useful for determining the depth and composition of the sub-deck deposits for future engineering and earth moving assessments. It will provide a basis for making decisions concerning the future management of the potential archaeological resource across the site such as comprehensive open area excavation, monitoring or no further archaeological investigation.

5.2.1 Test Trench Locations

Four archaeological test trenches are proposed to be located within areas to be impacted by the development of the Headland Park, specifically in the Northern Cove, Moore's Wharf inlet and behind the sandstone sea wall. All these areas are assessed to be of moderate to high archaeological potential and are likely to contain features and deposits of both local and State

significance. The test trenches will be located as closely as possible (given the accuracy of the available historic mapping) to intersect with historic structures or landforms present on the plans from 1833, 1865, 1880 and 1900. It is understood that existing services will have been decommissioned as part of the early works program and prior to the archaeological testing works.

Figure 5.1 Location of four proposed archaeological test trenches.

Due to the size of the site and the large scale of features such as jetties, store houses and sea walls, the test trenches will necessarily be large in order to expose the nature of the resource. The following trenches are proposed:

Trench 1 - Located in the Moore's Wharf inlet measuring 20m x 6m and positioned to test for shoreline and reclamation features associated with Moore's Wharf (that are evident on the 1833 and1865 plans) as well as sea walls and finger wharves of 1880 and 1900.

Trench 2 - Located behind the southern half of sandstone sea wall measuring 20m x 6m and positioned to test for evidence of one of Smith's jetties that may have been constructed before 1843 but certainly by 1865. Plans from 1880 and 1900 also show a number of wharves, jetties, stores and a sea wall in this area.

Trench 3 – Located on the northern shore of the Northern Cove measuring 20m x 6m and positioned to test for the south western edge of Munn's property and features such as a wharf or slipway dating to the 1830s, a wharf and stores at the south western edge of Smith's property in 1865, as well as additional wharves, stores and the sea wall dating to 1880 and 1900.

Trench 4 – Located on the eastern edge of the Northern Cove measuring 20m x 6m and positioned to test for Munn's floating dock of the 1830s, reclamation, sea wall, slipway and wharf edges of the 1860s phase of Cuthbert's ship yard as well as finger wharves, stores and the sea wall dating to 1880 and 1900.

5.2.2 Testing Methodology

- A Safe Work Method Statement will be prepared for the work;
- Position of trenches will be marked out with spray paint and secured by temporary fencing;
- Trenches will be cut into the concrete/asphalt surface of the deck. A concrete cutting contractor will be utilised for this process. Due to the unconsolidated nature of the fill, the concrete surface will aid the stability of the trench;
- Excavation will take the form of both machine and manual excavation. A small excavator of approximately 5-7 tonnes will be used. Excavation of fill will be undertaken by controlled mechanical removal under the supervision of the archaeologist. If structural and cultural deposits related to the presence of any occupation phase are encountered, mechanical excavation will cease and the resource would be cleaned back by hand and recorded. Where possible, State significant archaeology should be retained *in situ,* however it is likely at this stage that the archaeological resource will be completely removed from the trench;
- Excavation will stop once the water table is reached. This is expected to be between 2m to 2.5m below current deck level;
- At a depth of 1.5 m the trenches will be benched according to OH&S requirements. This will reduce the working area in the base of the trench to 18m by 4m;
- Recording methodology will include the use of GIS surveying techniques, recording on pro-forma data sheets, production of scale plans and photographic documentation;
- Artefacts will be washed, bagged, tagged and sorted according to fabric type on site prior to cataloguing;
- At the completion of testing and recording, the trench will be backfilled;
- Investigation by a marine archaeologist of adjacent underwater areas is unlikely to be necessary as the majority of the deck has been filled and the redevelopment of the headland will not extend beyond the position of the current deck;
- Assuming that the test excavations reveal a substantial intact archaeological resource, large scale archaeological salvage works could commence once the main works project approval has been received. The archaeological investigations could then be completed prior to bulk excavation of the Northern Cove (scheduled to commence in 2012);
- If Aboriginal cultural material is encountered work will cease and the Department of Environment, Climate Change and Water will be notified. Consultation with the Metropolitan Local Aboriginal Land Council (MLALC) would be required. A Research Design and Management Strategy for any potential Aboriginal archaeological resource is not considered necessary at this stage and was not specifically a requirement of the Statement of Commitments.

5.2.3 Limitations

- Geotechnical investigation of the site noted large obstructions within the fill including concrete, steel and timber which are likely to impede testing to some degree.
- Ground water inundation may hinder the testing phase especially during high tide or periods of rain. Shoring and dewatering systems may be required.
- Soil contamination consisting of PAH,TPH, and BTEX was detected in the north west portion of the site. Levels should be tested to ensure safe exposure for any personnel working in those areas. An Occupational Hygienist's report or risk assessment is required to set safe working parameters prior to any physical investigation. Archaeological investigation and recording of the site may be limited to monitoring and photographing the machine excavation if contamination is considered too high.

5.2.4 Public Interpretation of the Archaeological Program

It is important that the history of the site and information from archaeological programs is disseminated to the public both during and after archaeological investigations. There are indications that some remnant building fabric may survive in a relatively good state of preservation. As the archaeological resource is likely to be of local and State significance, the general public should be given the opportunity to view and learn about the remains. It is recommended that;

- An open day is held at the site where visitors are able to tour the site or view the works in close proximity. OH&S issues will need to be considered and consultation with the Heritage Branch, Department of Planning is advised;
- Public information in the form of a brochure or leaflet be available at the site;
- Signage is placed around the site in areas that are publicly accessible that describe the background and aims of the archaeological program and contact details for further information;
- The progress and results of the archaeological program could be posted on the BDA web site;
- A media release should be made during the archaeological program to inform the public of the archaeological program. Further updates could be undertaken during the works to advise of progress on the site.

5.3 RESEARCH QUESTIONS

The Natural Environment

The steep and rugged sandstone ridges, open woodland and inter-tidal rock platforms of the Millers Point headland provided a resource rich environment for the Aboriginal population but proved difficult for the Europeans to occupy. In order to overcome the steep foreshore terrain, owners filled and reclaimed the shallows of their waterfront allotments to create wharfs and building platforms.

- Is there any evidence of the pre-European landscape, including the location of the original shoreline, evidence of the shells that were present in the area or preserved timbers or vegetation?;
- Was the natural escarpment that is recorded on early plans of Munn's property buried or cut down and is here any evidence of the lime kilns that were present?
- Evidence of change over time to the roads, footpaths and laneways that provided access across the site.

Shipyards and Ship Building

James Munn was one of a number of ship builders who had established their trade in Darling Harbour in the 1830s and 1840s. By the time Cuthbert had taken over and expanded the business during the 1860s and 1870s, it was probably the largest shipyard in the country and employed over 250 men. The yard operated for 50 years in the same location (1825 to1875), and was supported by a number of trades associated with the shipping industry. Numerous small businesses such as ship smiths, sail makers, anchor smiths, block and mast makers, rope makers and later engine mechanics, boiler makers and coal suppliers for the steam ships were also located in Darling Harbour. Does the archaeological resource provide insight into;

- Evidence of early activities such as lime burning;
- The rapid and extensive reclamation of the shallow water in front of Munn's property;
- Early buildings that were reused rather than demolished ie reuse of materials;
- Evidence of stages of reclamation and use of landform;
- Types of timbers, tools and fittings used during the Munn phase as opposed to those available later to Cuthbert;
- Evidence of rebuilding and change over time, from saw pits to machined timbers, handmade and machine made bricks, use of corrugated iron;
- Variety and quality of boat production;
- Evidence of the layout of the yard and whether it corresponds to plans of the site during various phases and evidence of use of buildings such as blacksmith, storage or accommodation;
- Where was water sourced from?

Private Enterprise

The harbour fell sharply into deep water just off shore at the headland making Millers Point accessible to both large and small vessels. There was no government regulation concerning wharf location and maritime infrastructure such as wharves and jetties were constructed by private enterprise on an as-need basis without consideration of future expansion. These wharfs became more numerous over time, with rapid construction taking place in the 1850s and 60s. The wharves served a number of purposes including immigration and trade. Does the archaeological resource provide insight into;

- Evidence of change over time of size, quality, means of construction, industrialisation/ mechanisation or condition and maintenance;
- Function, passenger or goods trade, public or private;
- Evidence of cargo and storage;
- Does the archaeological resource correspond with the maps from various phases?

Residential, Commercial and Industrial Premises

There were a range of structures present on and around the Millers Point Headland including large mansions, terrace houses, workers cottages, large and small manufactures providing for the shipping industry, shops, pubs, schools, warehouses, commercial premises and the services required such as water, sewage, power and garbage collection.

- The majority of the former buildings on the point were removed during the cutting back of the headland. Evidence of past structures is likely to only survive around the foreshore. Is it possible to identify evidence of size, quality, means of construction and change over time as well as correlation between the quality and function of structures?
- Evidence of individual functions within a structure such as domestic or commercial activities.

5.4 POST-EXCAVATION ANALYSIS AND REPORTING

At the completion of the archaeological program the results of the excavation and analysis of the artefacts will need to be completed. The final report will require a synthesis of the plans, field notes and descriptions of the archaeological features and deposits for each trench and overview of the site as a whole. Interpretation of the results will be used to respond to the research questions to produce a meaningful outcome.

Specialists will analyse the artefacts and produce a catalogue consistent with, or comparable to, current data systems and according to best practice methodologies. The artefacts will be catalogued according to location, context number, catalogue number, and stored in zip lock polypropylene bags in labelled archive boxes. Lodgment of the collection in a repository with appropriate accompanying documentation will be required. The land owner is usually responsible for the storage of artefacts.

6.0 RECOMMENDATIONS

- Archaeological test excavation of the previously described trenches (section 5.2.1) will ensure comprehensive recording of the archaeological resource is carried out prior to its removal and destruction by the proposed development. The archaeological resource is highly significant and will contribute to our knowledge of the development of Sydney.
- Contamination levels should be tested to ensure safe exposure for any personnel working in those areas.
- A section of hand cut well is visible on the north western edge of the remaining headland. This should remain *in situ* and visible as a remaining feature of the headland which once supported a large population.
- It is important that the history of the site and information from the archaeological program is disseminated to the public during the excavation. The results of the testing should be directed toward the interpretation of the site.

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