Glebe Island Concrete Batch Plant

Statement of Heritage Impact

Revision D

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Statement of Heritage Impact

Client: Hanson

Prepared by

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Executive summary

Hanson is seeking development consent to develop a new concrete batching plant at Glebe Island. The Site has been selected so as to facilitate the co-location of the concrete plant with aggregate shipping facilities, which in proximity to the Sydney CBD and Bays Precinct, offers several logistical and environmental benefits. Hanson, and its subsidiary Hymix, already provide 30-35% of Sydney's concrete demand from the two nearby sites (Blackwattle Bay and Pyrmont).The proposed facility at Glebe Island will allow Hanson to continue its supply of concrete to a range of concrete intensive projects around Central Sydney in a way that is efficient, reduces overall environmental impact and that minimises regional road traffic impacts by securing ongoing aggregate shipping terminal capability.

The Project will be built on land identified under Schedule 2 of the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 as 'Bays Precinct Site' and meets the requirements to be considered a State Significant Development (SSD). A request for Secretary's Environmental Assessment Requirements (SEARs) were applied for on 8 June 2017 and SEARs were issued on 7 July 2017 (SSD 8544).

The Project would be constructed adjacent to Glebe Island Berth One (GLB1), located within Lot 10 in DP 1170710 (the Site) (Figure 1). The Site is located within the Inner West Council Local Government Area (LGA) (formerly within the Leichhardt Municipal Council area).

The Site is not registered on any statutory heritage registers, but is located adjacent to two items listed on the NSW State Heritage Register (SHR): the Glebe Island Bridge (SHR #01914), and the White Bay Power Station (SRH # 01015). The Project will not have a direct impact on either of these two heritage items, however, both heritage items have recognised view and vistas to and from each item from specific points around Sydney Harbour. This document assesses whether these identified views and vistas would be impacted as a result of the Project.

Glebe Island was not initially developed until the 1850s, when the Glebe Island Abattoir was established under an Act of Parliament. The abattoir was located to the south of the Project area with the exception of the construction of the first Glebe Island Bridge; there were no known developments near the proposed concrete batching plant location. Development in this area did not commence until the shutting down of the abattoir and reclamation works commenced associated with the construction of the Glebe Island grain silos in 1900. This was undertaken at the same the new Glebe Island Bridge was being constructed. With a raised ground level spread out into Johnstons Bay and a wharf frontage, the silos and grain handling storage equipment occupied the site until the 1984 where the Glebe Island area was cleared and used as part of the car export terminal.

This assessment has identified no direct impacts to any known heritage sites in the vicinity of the proposed concrete batching plant, including no impacts to the Glebe Island Bridge located immediately to the south. There would be some indirect impacts to the Glebe Island Bridge identified in the Conservation Management Plan (Department of Public Works and Services, 2000). These would be from Sommerville Road, located immediately to the west of the Bridge and some obscuring of views from the Balmain Area.

The assessment has also identified the potential for archaeological remains associated with the first Glebe Island Bridge to be present within the Project Site in the vicinity of the proposed silos, and these remains are likely to be of local significance. There is also minor obscuring of views from the southern end of Balmain, however, these are only from Birrung Park and not from any location further to the north.

The following mitigation measures are recommended for the Project:

- A historical archaeological monitoring program should be undertaken concurrently with any excavation works below the existing hardstand in the vicinity of the proposed silo area as shown in Figure 16. As the works are being undertaken as a State Significant Development, no permit from the Heritage Division is required, however, a Research Design and Methodology has been produced and is presented as Appendix B of this report. This document outlines the methodology for the archaeological monitoring, recording procedure of any remains or relics that are uncovered, and research questions and reporting requirements.

  The archaeological monitoring works must be undertaken by a suitably qualified historical archaeologist under the approved Research Design and Methodology document, and the document included in any Project detailed construction program.

  At the conclusion of the work a report of the findings from the monitoring works should be prepared and submitted to the Heritage Division for their records.

1.0 Introduction

1.1 Project Background

Hanson is seeking development consent to develop a new concrete batching plant at Glebe Island. The Site has been selected so as to facilitate the co-location of the concrete plant with aggregate shipping facilities, which in proximity to the Sydney CBD and Bays Precinct offers several logistical and environmental benefits. Hanson, and its subsidiary Hymix, already provide 30-35% of Sydney's concrete demand from the two nearby sites (Blackwattle Bay and Pyrmont).The proposed facility at Glebe Island will allow Hanson to continue its supply of concrete to a range of concrete intensive projects around Central Sydney in a way that is efficient, reduces overall environmental impact and that minimises regional road traffic impacts by securing ongoing aggregate shipping terminal capability.

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1.2 Site Identification

The Project will be constructed adjacent to Glebe Island Berth One (GLB1) located within Lot 10 in DP 1170710 (the Site) (Figure 1). The Site is located within the Inner West Council LGA (formerly within the Leichhardt Municipal Council area).

The Site is not registered on any statutory heritage registers but is located adjacent to two items listed on the NSW SHR: The Glebe Island Bridge (SHR #01914), and the White Bay Power Station (SHR # 01015). The Project will not have a direct impact on either of these two heritage items, however, both heritage items have recognised view and vistas to and from each item from specific points around Sydney Harbour.

1.3 Secretary's Environmental Assessment Requirements

The SEARs issued for the Project were issued on 7 July 2017 (SSD 8544) and had specific requirements relating to heritage. The SEARs requirements stated that:

- A Heritage Impact Assessment be prepared in accordance with the guidelines in the *Heritage Manual*. The assessment must consider the potential impacts of the proposal on any heritage items in the vicinity of the site including a view impact assessment and details of any mitigation and conservation measures.
- A Historical Archaeological Assessment be prepared in accordance with the relevant Office and Environment and Heritage (Heritage Division) Guidelines.

These requirements have formed the bases for the methodology for this assessment.

1.4 Project Methodology

This heritage assessment has been undertaken in accordance with the NSW Heritage Division *Heritage Manual (Department of Urban Affairs and Planning 1996); Assessing Heritage Significance* (NSW Heritage Office, 2001) and *Statements of Heritage Impact* (NSW Heritage Office, 2002) and includes:

- desktop searches of relevant heritage registers;
- review of Project drawings and concept design reports;
- review of the following key documents:
    - heritage register listings for the Glebe Island Bridge and White Bay Power Station;
    - Historical archaeological research relating to the history of Glebe Island; and,
    - previous reports including the *Glebe Island Bridge Conservation Management Plan* and the White Bay Power Station Conservation Management Plan documents and other recent heritage work;
- background research into the historical development of Glebe Island the historic plans, historical photographs, newspapers and other primary and secondary historical sources as relevant and referenced in Section 3.0; and,
- site inspection on 16 October 2017 by AECOM staff assessing the existing Glebe Island and the surround views and vistas associated with the Glebe Island Bridge and the White Bay Power Station. Note: all photographs within this report were taken during the site inspection unless otherwise stated.

1.5 Report Limitations

The purpose of this report is to identify and assess historic heritage and archaeological potential which might be impacted by the Project, including views to and from the Glebe Island Bridge and White Bay Power Station. Predictions have been made within this report about the probability of subsurface archaeological materials occurring within the site, based on surface indications and environmental contexts. However, it is possible that materials may occur in areas without surface indications and in any environmental context. This report is based on concept design for the Project. It is noted that during detailed design, details of the Project may change or be refined.

A summary of the statutory requirements regarding historical heritage is provided in Section 2.0. The summary is provided based on the experience of the authors with the heritage system in Australia and does not purport to be legal advice. It should be noted that legislation, regulations and guidelines change over time and users of the report should satisfy themselves that the statutory requirements have not changed since the report was written.

Figure 1 Location of the Glebe Island concrete bathing plant (Site). (Source: NearMap Copyright 2017)

1.6 Aboriginal Heritage

AECOM legacy data and a search of the Aboriginal Heritage Information Management System (AHIMS) register undertaken on 6 September 2017 (search number 300186) confirmed that there were no previously identified Aboriginal sites within the Project area. The search area was larger than the Project area (approximately 5 km by 3.2 km) and identified a total of 32 sites, including 13 areas of Potential Archaeological Deposit (PAD), six middens, four artefact scatters, one art site, one burial and one ceremony and dreaming site. There were also three destroyed sites and three sites listed as 'Not a Site'. This designation refers to a site registration that, following further investigation after its initial recording, has been determined to not be of Aboriginal origin.

The AHIMS data also contains multiple inaccuracies. It is possible that some of the artefact scatter sites may be isolated artefacts, as information on the number of artefacts located in site areas is not present for all of those identified in the search results. Coordinate inaccuracy for AHIMS data is also known from past assessments to be an issue, often the result of errors translating coordinates from one datum to another when updating the register. The given coordinates only represent a centroid, not the full extent of a site's area. Consideration of these limitations was kept in mind during this assessment. Site card recordings are the most accurate representation of the available site data and are treated as the primary source for any relevant AHIMS sites.

Of the identified sites the closest to the Project area was #45-6-3338, located approximately 260 m to the south-east, on the opposite side of Jones Bay. This site was a PAD recorded by Michael Lever in July 2017. It should be noted that a PAD is not strictly speaking an Aboriginal site, but rather an area that has the potential to contain cultural deposits, with further testing required to determine presence or absence. The AHIMS sites identified in the surrounding area are summarised in Table 1 below.

Table 1 AHIMS sites identified within the extensive search area

Site Type	Number of Sites	Percentage of Sites
Potential Archaeological Deposit (PAD)	13	40.6%
Midden	6	18.8%
Artefact Scatter	4	12.5%
Destroyed	3	9.4%
Not a Site	3	9.4%
Art Site	1	3.1%
Burial	1	3.1%
Ceremony and Dreaming	1	3.1%
TOTAL	32	100%

None of the sites identified in the AHIMS search results were within the Project area. The closest coordinate was for an area of potential located approximately 260 m to the south-east on the opposite side of Jones Bay. The closest actual site (ie – verified, not an area of potential) was a midden located 1.5 km to the north-east on Goat Island. No previously recorded Aboriginal sites will be impacted by the proposed works. Due to the level of past impacts that have occurred as a result of previous development in the Project area, it was assessed as unlikely that any previously unknown sites would occur within its bounds. No heritage constraints relating to Aboriginal archaeology were identified in relation to this Project.

1.7 Consultation

As no heritage constraints or potential sensitivity relating to Aboriginal heritage were identified, it was not relevant to undertake consultation with Metropolitan Local Aboriginal Land Council or other Aboriginal stakeholders.

Consultation was undertaken with local heritage groups through the provision of a letter summarising the findings of this assessment and requesting any comments or further information relevant to this assessment. Letters were sent on 27 February 2018 to the City of Sydney Historical Association, the Pyrmont History Group and the Glebe Society. Copies of these letters are included in Appendix A.

2.0 Statutory Context

2.1 Commonwealth Legislation

2.1.1 Environmental Protection and Biodiversity Conservation Act 1999

The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) defines 'environment' as both natural and cultural environments and therefore includes Aboriginal and non-Aboriginal historic cultural heritage items. Under the EPBC Act, protected heritage items are listed on the National Heritage List (NHL) (items of significance to the nation) or the Commonwealth Heritage List (CHL) (items belonging to the Commonwealth or its agencies). These two lists replaced the Register of the National Estate (RNE). The RNE has been suspended and is no longer a statutory list; however, it remains as an archive.

Under Part 9 of the EPBC Act, any action that is likely to have a significant impact on a matter of National Environmental Significance (known as a controlled action under the EPBC Act), may only progress with approval of the Commonwealth Minister for the Department of the Environment (DotE). An action is defined as a project, development, undertaking, activity (or series of activities), or alteration. An action would also require approval if:

- it is undertaken on Commonwealth land and would have or is likely to have a significant impact on the environment on Commonwealth land
- it is undertaken by the Commonwealth and would have or is likely to have a significant impact.

Glebe Island has not been identified on the NHL or CHL and therefore the Project would not require a referral under the EPBC Act with respect to heritage.

2.2 State Legislation

2.2.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act), administered by DP&E, requires that consideration be given to environmental impacts as part of the land use planning process in NSW. In NSW, environmental impacts are interpreted as including impacts to Aboriginal and non-Aboriginal (i.e., European) cultural heritage.

Upon repeal of Part 3A of the EP&A Act on 1 October 2011, the *Environmental Planning and Assessment Amendment (Part 3A Repeal) Act 2011* inserted a new Division 4.1 into Part 4 of the EP&A Act. Division 4.1 provides a determination regime for State Significant Development (SSD). Section 89C of the EP&A Act stipulates that a development will be considered SSD if it declared to be such by the new *State Environmental Planning Policy (State and Regional Development) 2011* (SEPP SRD).

Under Clause 8(1) of SEPP SRD, a development is declared to be State Significant Development if:

a. the development on the land concerned is, by the operation of an environmental planning instrument, permissible with development consent under Part 4 of the EP&A Act; and

b. the development is specified in Schedule 1 or 2 of SEPP SRD.

The Project is SSD as it meets both of these criteria, namely:

- it is permissible with development consent on the land on which it is located; and
- it is development that is specified in Schedule 1 of SEPP SRD.

Pursuant to Section 89J of the EP&A Act, approval under Part 4, or an excavation permit under section 139 of the *Heritage Act 1977* not required for projects approved under Division 4.1 of Part 4 of the EP&A Act. The requirement to undertake heritage assessments is determined in the preparation of the Secretary's Environmental Assessment Requirements (SEARs) as specified under Section 115Y of the EP&A Act.

2.2.2 Heritage Act 1977

The Heritage Act 1977 (as amended) was enacted to conserve the environmental heritage of NSW. Under Section 32, places, buildings, works, relics, movable objects or precincts of heritage significance are protected by means of either Interim Heritage Orders (IHO) or by listing on the NSW SHR Items that are assessed as having State heritage significance can be listed on the SHR by the Minister on the recommendation of the NSW Heritage Council.

Projects to alter, damage, move or destroy places, buildings, works, relics, movable objects or precincts protected by an IHO or listed on the SHR require an approval under Section 60. The 'relics provision' requires that no archaeological relics be disturbed or destroyed without prior consent from the Heritage Council of NSW. Therefore,

no ground disturbance works may proceed in areas identified as having archaeological potential without first obtaining an Excavation Permit pursuant to Section 60 of the *Heritage Act 1977*, or an Archaeological Exemption.

As this Project is being undertaken as a SSD project under the EP&A Act, the provision to apply for approvals under the *Heritage Act* are not required.

Under Section 170 of the Heritage Act 1977, NSW Government agencies are required to maintain a register of heritage assets to be known as a Section 170 Heritage and Conservation Register (hereafter Section 170 Register). The register places obligations on the agencies, but not on non-government proponents, beyond their responsibility to assess the impact on surrounding heritage items.

The Site is not identified on any statutory heritage registers.

There are two heritage items with dual listings on the State Heritage Register and Section 170 Register located in the vicinity of the Site. The Glebe Island Bridge is listed on the SHR (item number 5397) and on the Roads and Maritime Services Section 170 Register. The White Bay Power Station is also listed on the SHR (Item number 01015) and on the Sydney Harbour Foreshore Authority Section 170 Register. Additionally, the Glebe Silos, which are located 120 m from the Site, are listed on the Ports Authority Section 170 Register.

Archaeological features and deposits are afforded statutory protection by the 'relics provision'. Section 4(1) of the *Heritage Act 1977* (as amended 2009) defines 'relic' as follows:

> any deposit, artefact, object or material evidence that:
>
> (a) relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and
>
> (b) is of State or local heritage significance.

Under Section 139 (1) of the *Heritage Ac*t, it is an offence to disturb or excavate any land knowing or having reasonable cause to suspect that doing so would or is likely to result in relics being disturbed without a permit or exception.

2.2.3 Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005

The Site is located within the Sydney Regional Environmental Plan (SREP) 2005 designated area. Part 5, Section 53 of the SREP 2005 outlines the objectives of the heritage provisions as covered by this Plan. All heritage items that are located within the SREP designated area are listed on Schedule 4 of the Plan.

(1) The objectives of this clause are as follows:

a. to conserve the environmental heritage of the land to which this Part applies, and

b. to conserve the heritage significance of existing significant fabric, relics, settings and views associated with the heritage significance of heritage items, and,

c. to ensure that archaeological sites and places of Aboriginal heritage significance are conserved, and

d. to allow for the protection of places which have the potential to have heritage significance but are not identified as heritage items.

Part 5, Section 53, subsection 4 and 5 of the SREP 2005 provides the requirements for undertaking heritage assessments. The Plan states that:

> 4 Before granting development consent as required by this clause, the consent authority must assess the extent to which the carrying out of the proposed development would affect the heritage significance of the heritage item concerned.
>
> 5 The assessment must include consideration of a heritage impact statement that addresses at least the following issues (but is not to be limited to assessment of those issues, if the heritage significance concerned involves other issues):

a. the heritage significance of the item as part of the environmental heritage of the land to which this Part applies, and

b. the impact that the proposed development will have on the heritage significance of the item and its setting, including any landscape or horticultural features, and

c. the measures proposed to conserve the heritage significance of the item and its setting, and

d. whether any archaeological site or potential archaeological site would be adversely affected by the proposed development, and

e. the extent to which the carrying out of the proposed development would affect the form of any historic subdivision.

In regards to historical archaeological remains within the lands identified as part of the SREP 2005, Section 58 states that:

(1) Before granting development consent for development that will be carried out on an archaeological site or a potential archaeological site of a relic that has non-Aboriginal heritage significance (whether or not it is, or has the potential to be, also the site of a relic of Aboriginal heritage significance), the consent authority:

a. must consider a heritage impact statement explaining how the proposed development will affect the conservation of the site and any relic known or reasonably likely to be located at the site, and

b. must be satisfied that any necessary excavation permit required by the Heritage Act 1977 has been granted.

(2) (Repealed)

(3) This clause does not apply:

a. if the proposed development does not involve disturbance of below-ground deposits, and if the consent authority is of the opinion that the heritage significance of any above-ground relics would not be adversely affected by the proposed development, or

b. if the proposed development is integrated development by virtue of:

a. the requirement for consent under section 90 of the National Parks and Wildlife Act 1974, or

b. the requirement for approval under section 57 of the Heritage Act 1977.

2.3 Local Government

Glebe Island is located within the Inner West LGA, formerly known as Leichhardt Council.

2.3.1 Leichhardt Local Environmental Plan 2013

Part 5, Section 5.10 of the Leichhardt LEP addresses heritage conservation within the area covered by this LEP. All heritage items listed on the LEP are included in Schedule 5. The Leichhardt LEP states:

(1) The objectives of this clause are as follows:

e. to conserve the environmental heritage of Leichardt,

f. to conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings and views,

g. to conserve archaeological sites,

h. to conserve Aboriginal objects and Aboriginal places of heritage significance.

(2) Development consent is required for any of the following:

a. demolishing or moving any of the following or altering the exterior of any of the following (including, in the case of a building, making changes to its detail, fabric, finish or appearance):

i. a heritage item,

ii. an Aboriginal object,

iii. a building, work, relic or tree within a heritage conservation area,

b. altering a heritage item that is a building by making structural changes to its interior or by making changes to anything inside the item that is specified in Schedule 5 in relation to the item,

c. disturbing or excavating an archaeological site while knowing, or having reasonable cause to suspect, that the disturbance or excavation would or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed,

d. disturbing or excavating an Aboriginal place of heritage significance,

e. erecting a building on land:

i. on which a heritage item is located or that is within a heritage conservation area, or

ii. on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance,

f. subdividing land:

i. on which a heritage item is located or that is within a heritage conservation area, or

ii. on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance.

The Site on Glebe Island is not listed, or contains any heritage times listed on Schedule 5 of the Leichhardt LEP. The Glebe Silos, which are located 120 m from the Site are identified on the Leichhardt LEP.

2.4 Summary of Statutory Controls

There are three heritage items located adjacent to the Site. The Glebe Island Silos are located over 100 m away to the west of the Project area, and are therefore considered to be outside of the impact area associated with this Project. The Glebe Island Bridge and the White Bay Power Station are not likely to be impacted directly from the Project, however, there are associated view corridors to and from each item that the Project will have to consider. The summary of the listed heritage items are detailed below:

Table 2 Summary of listed heritage items within the Project Area

Heritage List	Items within the Project Area	Items located Adjacent to the Project area	Distance from the Site	Level of Significance
World Heritage List	Nil	Nil	n/a	n/a
National Heritage List	Nil	Nil	n/a	n/a
Commonwealth Heritage List	Nil	Nil	n/a	n/a
Register of the National Estate (non-statutory)	Nil	Nil	n/a	n/a
State Heritage Register	Nil	Glebe Island Bridge White Bay Power Station	20m 740m	State State
Sydney Harbour Foreshore Authority Section 170 Heritage and Conservation Register	Nil	White Bay Power Station	740m	State
Sydney Ports Corporation Section 170 Heritage and Conservation Register	Nil	Glebe Island Silos	120m	Local
Leichhardt LEP 2013	Nil	Glebe Island Silos	120m	Local

3.0 Historical Context

3.1 Preamble

In order to assess the historical archaeological potential that may be present on the Glebe Island Site the historical development of the Site first needs to be assessed. The following sections outline the development of the Glebe Island.

3.2 Early European Phase (1788 – 1850)

Glebe Island was a small island, connected by a small narrow causeway at Balmain that was only exposed at low tide (Simon Davies, 1984). The island was originally described as being irregular and as being 'precipitous and rocky'(Glebe Island Abattoir, Public Works Special Bundle. 1850-7, n.d.). The land was first granted to Reverend Richard Johnson, whose original 160 acres on the edge of Sydney was acquired for the establishment of a church and Glebe (real estate that supported the clergy).

Johnson began clearing parts of his land, but not Glebe Island. A new grant of land was given to the Church on which to establish a church and grounds near Canterbury, and the original 160 acre land grant was left vacant. With the formation of the Church and School Lands Corporation in 1826, lands that were not being used by the church were to be sold (J. Campbell, n.d.). Disposal of land began in 1828, but did not include Glebe Island at that time. The first allotment on Glebe Island, Allotment 1, was sold in 1839 to J. Hatfield who appears to have left the land vacant.

In 1841 plans were prepared to auction the south-western portion of the island. A scheme was devised whereby this land was subdivided into a neat grid system, the principal blocks separated by streets with names such as Johnsons, Mitchell, Glebe and Ferry Streets ("Plan of Part of Glebe Island for Sale by Auction 12.7.1841," n.d.). The auction, during April and May 1842, produced few sales.

Allotments 2 and 12 (a little over four acres combined) were bought by J. Marsh in April for a combined sum of approximately £249 and Allotments 5 and 6 (a little over three acres) were purchased by E. Buttenshaw in the following month for £180 (Glebe Island Abattoir, n.d.).

It is extremely unlikely that any of the new owners improved their new properties in any significant way, if at all. A later compensation case by one owner could only be based on the value of the stone within his land (Glebe Island Abattoir, n.d.).

A centralised abattoir was contemplated for the Island in 1849. Prior to 1849, the *Noxious Industries Act* had the effect of relocating various industries such as tanneries, slaughterhouses, boiling down works and the like away from the city limits, but not abattoirs. Glebe was one of the several inner suburbs that attracted the relocated businesses. The establishment of the principal city abattoir in this area was, therefore, in keeping with the developing industrial profile of the district. The Government Architect was asked to submit a plan for the new establishment as quickly as possible with consideration to be given to establishing both a permanent means of communication between the island and the mainland and a fresh water supply. Planning for the Project commenced in the following year.

3.3 Glebe Island Abattoir (1850 – 1916)

Glebe Island Abattoir was established by an Act of Parliament in 1850. The first steps towards realising the new facility were the resumption of the existing properties, in one case with a lengthy legal discussion and a compensation pay-out of £1500, and planning by the Colonial Architect. The latter noted that, although the island contained twenty-three acres, only a small portion was available in its existing state on which to build the new abattoir (Glebe Island Abattoir Public Works Special Bundle. 1850-7, n.d.).

The principal work carried out initially involved levelling the top of the island to form a platform for the buildings. This left a uniform surface of bare rock which was to be used for foundations. The excavated rock was to be used in the construction of the buildings, reuse for the dams and embankments and roadways. A platform bridge was to be built, together with twenty-four slaughter-houses for cattle and yards for sheep. It was found to be impossible to supply fresh water to the site except by means of reservoirs that stored water collected from the roofs. Salt water was to be pumped from the bay. The plan was devised with an expectation that it could be expanded as the need arose. The estimated cost was £12,000 (Glebe Island Abattoir Public Works Special Bundle. 1850-7, n.d.).

Work commenced on the site in 1852. A wharf was built and then a road from the wharf to the work site. There a platform was cleared and several buildings were erected to facilitate the construction programme. A causeway was constructed from the Glebe mainland to the island. Work continued over the next few years and by 1854 the Colonial Architect estimated that the final cost would be over four times the original estimate, approximately £54,000, due to rising costs of material and labour (Glebe Island Abattoir Public Works Special Bundle. 1850-7, n.d.).

In 1855, the site was connected to the mainland by means of Abattoir Road, later renamed Banks Road, which crossed to the island by means of a cable punt (Figure 2). Later this punt was replaced by a wooden toll bridge (in 1857); this was the first Glebe Island Bridge (Thorp, 1990) (Figure 3).

The first Glebe Island Bridge was a private venture that connected Pyrmont to Glebe Island at the narrowest point in Johnstons Bay. The bridge was constructed out of Tasmanian Blackbutt timbers, including the piles, and consisted of 24 bents spaning across Johnstons Bay. Each bent consisted of four vertical piles with an additional two racked piles on the outside. Each bent also included a double upper and lower waler (or headstock) with two long cross beams spanning all four piles (Figure 4 and Figure 5). The approach to the bridge on the western side appears to include an earthen embankment with potential stone abutments.

Figure 2 ***"A plan of part of Sydney and its environs: showing the bridges and roads to be constructed by the Pyrmont Bridge Company"*** **Allan & Wigley Litho 1857. Note: Glebe Island was connected via Abattoir Road only. The punt crossing was not depicted. (Source Inner West Council Online Library)**

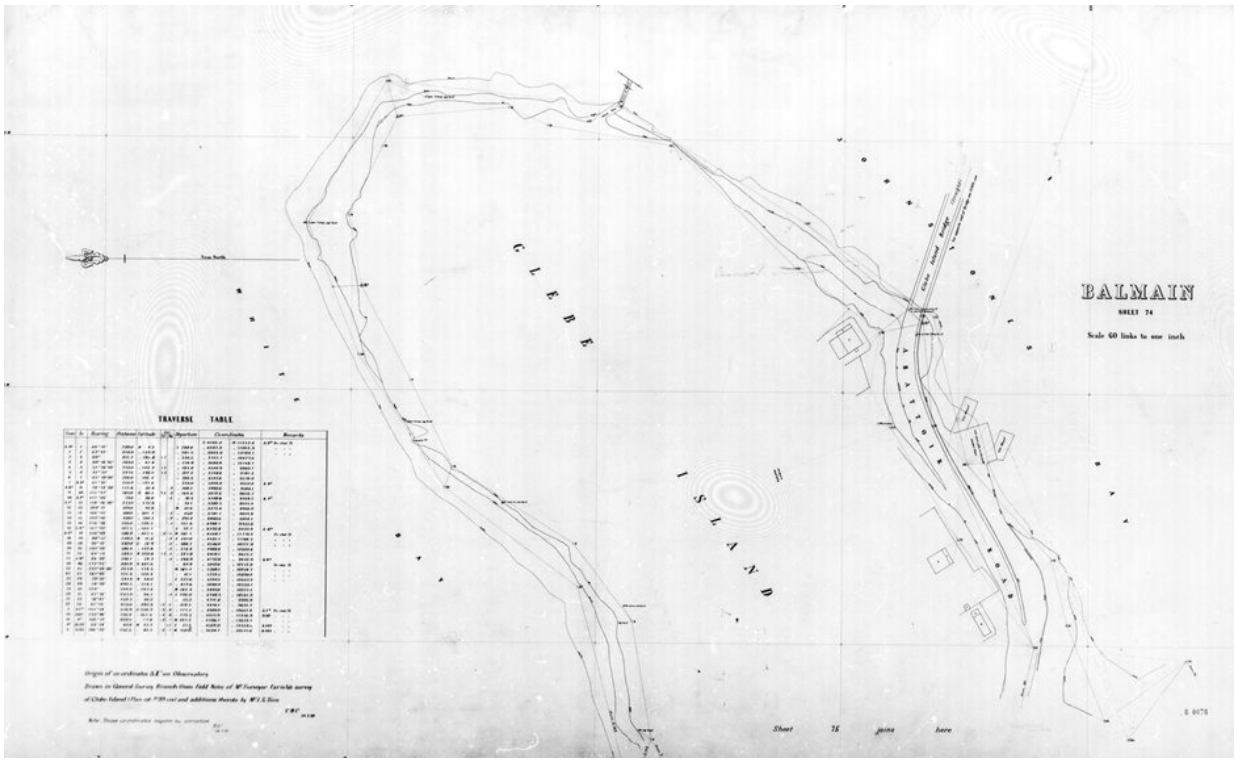

Figure 3 Municipality of Balmain Water Board plan Sheet No. 74. (Glebe Abattoir) Date c1885) (Source: http://trove.nla.gov.au/version/238100592)

Figure 4 First Glebe Island Bridge. Glebe (NSW) earlier than 1899 (Source: http://trove.nla.gov.au/version/48145927)

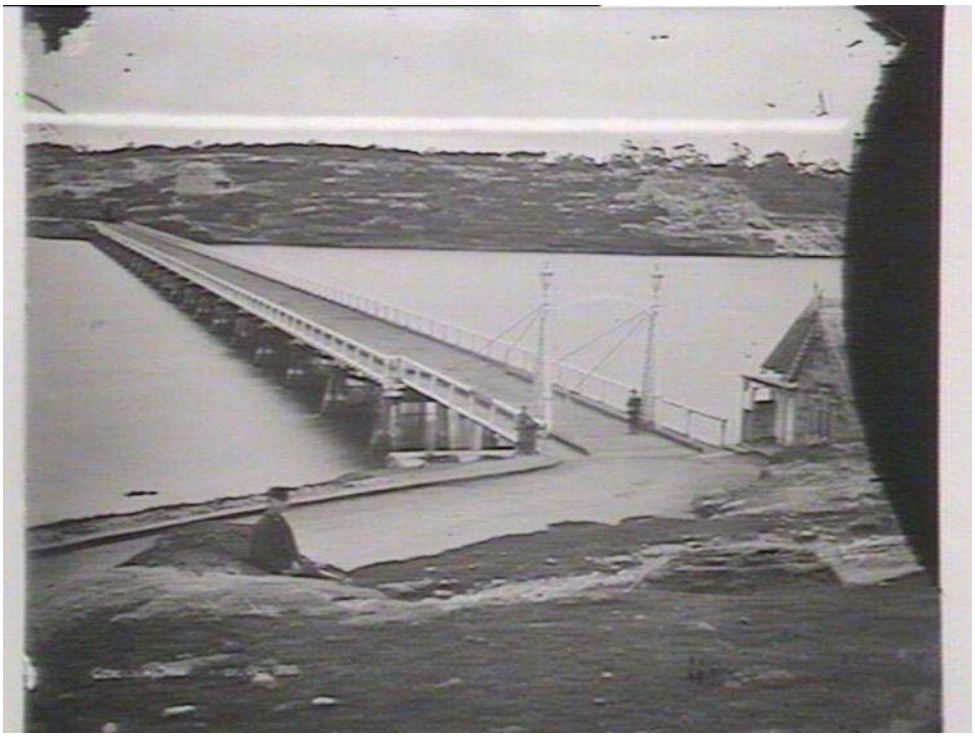

Figure 5 "Glebe Island Bridge – 10/1870" (source State Library of NSW Digital order no:d1_05719)

Later, Glebe Island was connected to Victoria Road. The abattoir was opened in 1860. From its inception considerable local protest was directed at the abattoir. Complaints were made with respect to the stench and filth emanating from it.

Despite improvements made to the abattoir site local opinion was still firmly against the continuing presence of the abattoir in the district. A petition was formed in 1887 to effect the removal of the establishment to Homebush (Thorp, 1990). Perhaps in response to this adverse local opinion, attempts were made to modernise the abattoir during the later 1880s and early 1890s ("Plan Showing Proposed Improvements at Darling Island and Glebe Island 1891," 1891). The principal component of the scheme was the complete enclosure of the island by a wharf. The work did not proceed at this time.

In 1895, Drummoyne Council joined with Five Dock Council to, "ask co-operation of the councils interested in an endeavour to urge the government to either abolish the abattoir at Glebe Island or provide carriage of stock to the Abattoir by rail or water to improve local amenities and roads (Simon Davies, 1984).

Throughout the early 1900s, other schemes were devised to improve the site. The only practical outcome, however, was the replacement of the old Glebe Island Bridge with a new steel swing bridge. An international design competition for a new 'Pyrmont Bridge' was called in 1891. The Department of Public Works submitted a non-conforming design based upon a much larger bridge than specified in the design brief (NSW Heritage Division, 2013). Design of the bridge was led by Percy Allan, who had been appointed Engineer-in-Chief for bridge design in 1896. His assistant engineer was E.M. De Burgh and the junior engineers were H. H. Dare, J. J. Bradfield and J. W. Roberts, all of whom went on to have distinguished careers in public works engineering. Bradfield had charge of the team responsible for the substructure, foundations, abutments and retaining walls for both bridges. Tenders for the construction of both bridges (separate contracts) were invited in March, 1899.

For both sites, Allan designed an electrically-operated swing bridge, the earliest use of electrical power for this purpose in Australia. The bridges were considered very innovative at the time of their construction and attracted international attention. For the Glebe Island Bridge, the large pivot pier was founded on a nest of timber piles capped by concrete, whereas the Pyrmont pivot pier was founded on rock (NSW Heritage Division, 2013).

Construction commenced on the Glebe Island Bridge and Pyrmont Bridge at the same time but Glebe Island involved more extensive (and time-consuming) land resumptions (Figure 6). Over 100,00 tons of mud was dredged to establish the causeway and the fill was obtained by cutting down what was left of the hillock of Glebe Island, producing 5.3 hectares (thirteen acres) of flat land for railway yards and 853 metres (2,800 feet) of deep water frontage for wharfage (NSW Heritage Division, 2013).

Construction of the trussed swing spans at each site was by simple cantilevering out from the steel pivot ring. Where timber trusses were used for the approaches of the Pyrmont Bridge, the Glebe Island Bridge used two steel deck trusses, then stone-faced embankments to reach each shore. The use of steel trusses for the approach spans had been part of Allan's original design for the Pyrmont Bridge but the Parliamentary Standing Committee on Public Works directed that this material be replaced with timber, presumably as a cost-cutting measure. When Glebe Island Bridge was built, Allan's original specification was reinstated (perhaps owing to the use of built-up embankments and shorter approach spans, providing a more economical outcome) (NSW Heritage Division, 2013) (Figure 7).

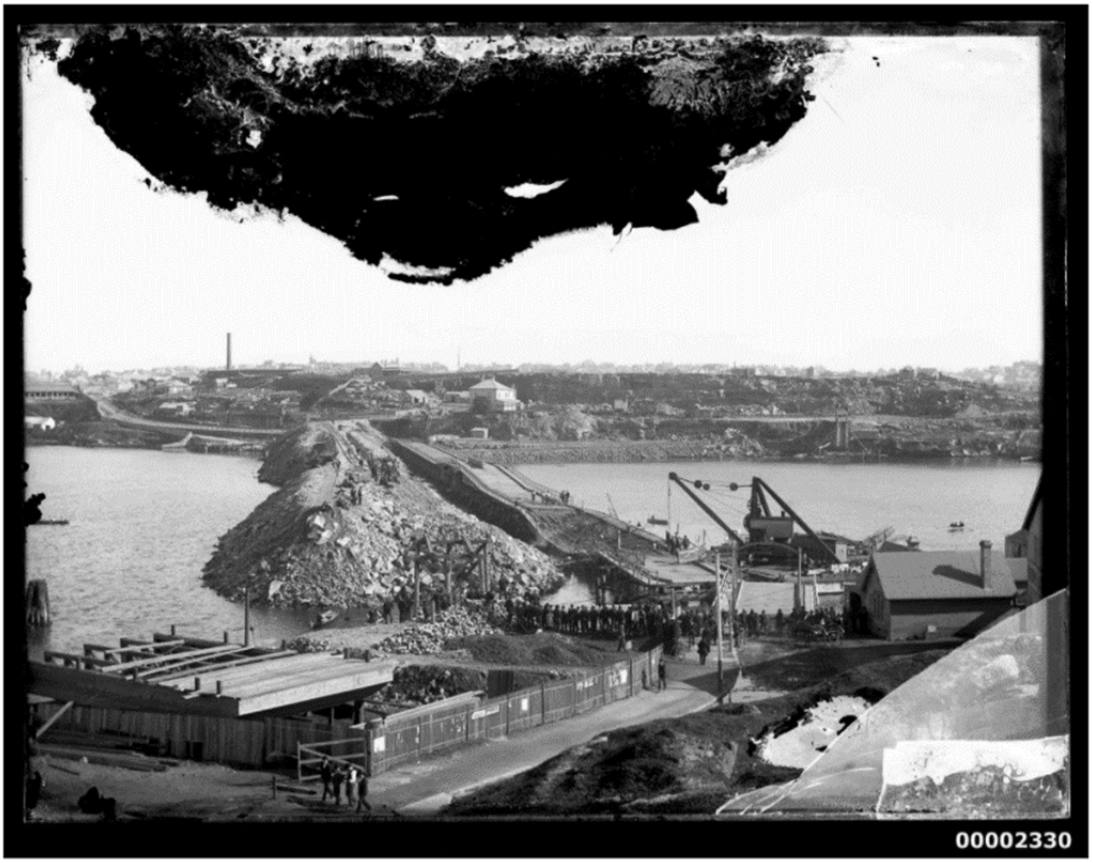

Figure 6 "Glebe Island Bridge collapse" August 1899 (Source ANMM Collection Gift from Bruce Stannard available online)

Figure 7 Glebe Island Bridge c.1910). Note: The pile remains of the first Glebe Island Bridge can be seen cut off near the water level on both sides of the timber fenders associated with the current Glebe Island Bridge. (Source Tyrrell Collection held online at the National Library)

Despite the works, by 1902 the Standing Committee had resolved that the best solution to the issue was the construction of a new abattoir at Homebush (Simon Davies, 1984).

Work on the new abattoir commenced in 1910. Glebe Island Abattoir was closed in 1916 (Spearritt, 1978). In 1917 a large fire broke out in some of the buildings that, by that time, were being used by Burns Philp for copra storage (dried coconut kernel, used to extract oil). The damage done was extensive and this, as well as the selection of the site for the new grain storage facilities, led to the demolition of the buildings.

Prior to the closure of the abattoir, a scheme was initiated at Glebe Island that may be viewed as a precursor to the later silo programme. In 1913 work commenced on an extensive reclamation and wharfage Project designed to facilitate wheat and coal handling at the island. The work was carried out on behalf of the City Rail Commissioners and was instigated as part of an overall goods railway scheme (Sydney Harbour Foreshore Authority Heritage, 1913). This Project had first been discussed and investigated at the turn of the century being the subject of a parliamentary investigation to determine the value of such improvements to the wharfage scheme of the port.

Work on the scheme continued through until early 1916. At that time, when 1170 feet of wharfage had been completed, the Chief Commissioner for Railways decided that, because of the plans then in hand for the bulk storage programme, work should cease on the railway scheme. With the acceptance of the silo proposal the wharfage scheme was adopted by the Department of Agriculture and became part of the site works necessary for the development of the bulk wheat handling facility (Sydney Harbour Foreshore Authority Heritage, 1913). Contracts which had been entered into as part of this scheme for cargo handling appliances were also cancelled at this time.

3.4 Silos (1916 – 1921)

In 1915, the American firm of Metcalfe and Co. Ltd offered their services to act as consulting and design engineers for the establishment of bulk facilities in four states. New South Wales was the only state to accept the invitation (Grain Elevators Board, 1972). In the following year, the State government entered into an agreement with that firm for the supply of full plans and specifications of six types of elevator (Grain Elevators Board, 1972) and an extra one, if required, for terminals at Sydney and Newcastle and four country types for 20,000 pounds as well as a supervision fee for the following five years.

Acceptance of this offer was partially due to the mouse plague that had hampered the storage of bagged wheat in New South Wales in 1916. Efforts were made to improve storage of bagged wheat, as well as procedures to stop shipping transporting mice around Sydney Harbour.

Initial work for the Sydney site commenced with quarrying work in 1917 designed to prepare it for the silos. The spoil from this work was used to extend the reclamation and wharfage work begun in the period 1913-1916 (“Sydney Harbour Trust Annual Report,” 1917).

Work on the terminal buildings commenced in 1918, after tenders were considered by the committee. The successful tenderer for the construction of the silos was Mr Teasdale Smith (Grain Elevators Board, 1972). The rock blasting was carried out by the Harbour Trust under the direction of the Engineer in Chief.

The silos designed by J.S. Metcalfe and Co. were shaped as large cylindrical bins capable of holding 6,382,000 bushels. On top of the bins were six steel galleries with conveying equipment to direct the wheat, unloaded from trucks, through a tripper into the bins.

By mid-1921 the first phase of the system was near to completion and was so by the end of that year. The final cost of the terminal at this stage was £1,681,392 (Figure 8).

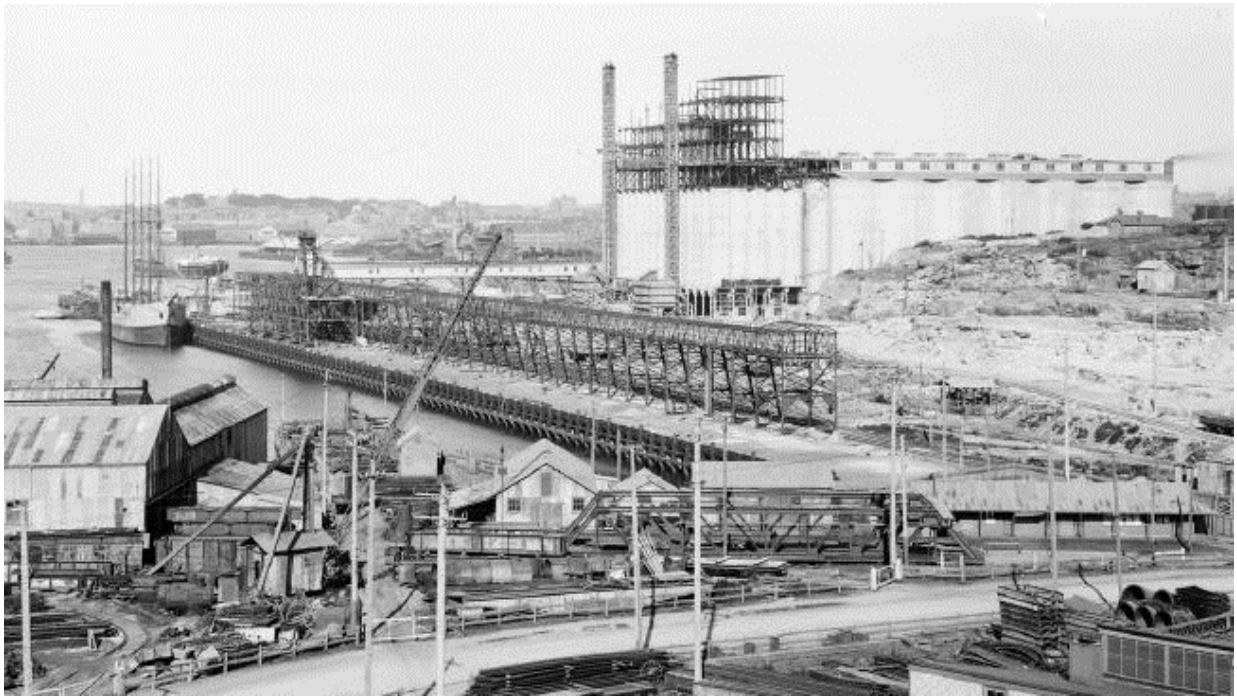

Figure 8 Glebe Island's wheat silos in a 1920 photo by Arthur Ernest Foster. Picture: State Library of NSW (Series 3 part 2 – file number FL412764)

3.5 Extension of the Facilities (1921 – 1932)

Bulk shipments had commenced at Glebe Island in 1922, but not in sufficient quantities to relinquish the old Darling Island wharves at Pyrmont which, from the 1890s onwards, had formed the focus for grain handling in New South Wales (Thorp, 1990). By 1925, a total of sixty-three country silos had been completed and, to facilitate the centralization of all wheat handling at Glebe Island, almost immediately after the completion of the silos further improvements were made to the site to provide more and better services.

Extensions had been made to the wharves in 1922 and much work to improve these facilities was carried out during 1924-25. By mid-1925 the broadside wharf on the west side of Island was complete as was the berth at the north end and work had begun on similar facilities to the east side. The latter was completed by June 1926 (Grain Elevators Board, 1972).

The principal additions to the site, however, were the provision of facilities to handle bagged wheat. By mid-1926 two large sheds, complete with conveyors, had nearly been completed and railway lines had been laid behind these sheds. Another shed was to be built at the western end of the wharf as well as an extension to the east and several smaller sheds were planned to be constructed behind the main sheds (Grain Elevators Board, 1972).

By mid-1927 these sheds for bagged wheat had been completed as well as a sub-station and control house. The arrangements were considered to be amongst the best systems in the world (Maritime Services Board, 1939). By this time another shed was under construction at the south-west point of the island and wharfage along the east side was again being extended in a southerly direction. The final completion of this work would provide 1000 feet of wharfage along this portion of the island (Maritime Services Board, 1939).

In 1928 additional works were added to Glebe Island. A new shed was added to the south-west corner of the island, twelve horizontal conveyors and four elevators. Additional sheds were proposed to the land to the west as well.

By mid-1929, a shed for bagged wheat had been completed on the east side of the Island and the wharf at the north-east corner had been extended a total of 180 feet. By this time total wharfage on the White Bay side of the island amounted to 2680 feet. Wharfage on the east side was extended nine hundred feet to give a total length of 1720 feet. A sea-wall was constructed behind the wharves and additional rail facilities were made to connect Glebe Island with the Rozelle system. By mid-1930, two new sheds had been constructed and it was considered, by that time, that there then sufficient facilities to deal with bagged wheat for some considerable period (Grain Elevators Board, 1972).

3.6 Depression through to post WW2 (1932- 1960)

During the depression years there were poor wheat exports and low shipments at the Glebe Island facilities. This did not improve until 1935 when there were large increases in the wheat production and storage, and a notable shift from bulk shipping exports and decrease in bagged wheat exports (Maritime Services Board, 1967). In 1937, the decision was made to transfer all bagged wheat loading operations to Glebe Island.

During the war years Glebe Island continued to store and export wheat and other cargoes, however, the facilities were taken over under the National Security Regulations and its principal function became as a major armament and engineer's supply depot for the US Army. It was also used to dis-embark and re-embark troops. The RAAF also used certain sheds for storage. Of immediate advantage in the post-war years was the opportunity to purchase, by the Maritime Services Board, buildings and services constructed on the island for military purposes. This occurred and several were converted for port purposes (Reynolds, 2008).

Following the war, though, several of the facilities at Glebe Island continued to be used for military purposes, in particular, the storage of supplies to be shipped to Japan.

3.7 Later use and development (1960 - 2000)

The increase in wheat production saw an excess in wheat that required storage. A new 700 foot long concrete decked berth was built at Glebe Island to accommodate the larger more modern grain loading facilities. The other existing berths at Glebe Island were also being re-constructed at the same time. Additional silos and associated elevators were constructed during the 1970s to facilitate the modernisation and increases needed in storage capacity.

The function of the site as a grain silo ceased in 1984. During the later 1980s and early 1990s activity at the terminal has scaled down and several other uses have been adopted for the site. In 1993, for example, berths were leased as a vehicle import terminal (Maritime Services Board, 1974).

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4.0 Physical Description

4.1 Introduction

This section provides a physical description of the Glebe Island Site where the Project will be developed. The Project does not include any modifications to the adjacent Glebe Island Bridge or to the White Bay Power Station and these were not included in the site inspection. A full description of both of these items can be found within the SHR listing at (NSW Heritage Division, 2013)

A survey of the recognised views to and from both the Glebe Island Bridge and the White Bay Power Station was included in the site inspection and has been included in Section 4.3 below.

4.2 Glebe Island

The Site consists of an asphalt and concrete hard stand associated with the former grain silos loading area and later car export wharves. The area is generally level and void of any structures, other than lighting towers and other associated electrical substation units (Figure 9, Figure 10 and Figure 11)

Figure 9 View of the Site on Glebe Island looking towards the western approach of the Glebe Island Bridge. (View to the southwest)

Figure 10 View of Glebe Island Site (View to West)

Figure 11 View of Glebe Island Site (View to southwest)

Of particular note along the boundaries of the Site are the Glebe Island Bridge approach to the south and wharves to the east. The southern boundary of the Site is bound by a cyclone fence that separates the wharf and hardstand area with the sandstone embankment associated with the approach of the Glebe Island Bridge. The stone faced embankment is covered in swamp foxtail grass and other low lying vegetation where the stone abutment face has separated or failed.

The eastern boundary of the Site is formed by the existing wharf frontages. The south eastern corner of the boundary consists of a rock armour. Further along the southern boundary are the existing wharves. These consist of a concrete apron with rubber fenders along the front face, mooring bollards along the top (Figure 12). The deck of the wharf section consists of a concrete surface. The surface of the wharf area has buckled along the top of the rows of longitudinal piles that support it below. At the point where the wharf connects back into where the land reclamation area is, the wharf area has subsided along the joint exposing the asphalt road surface.

There are no other features or structures present within the Site.

Figure 12 View of Glebe Island Site from the eastern side of Johnstons Bay (View to West)

4.3 Views to and from the Glebe Island Bridge and White Bay Power Station

4.3.1 Glebe Island Bridge

The Glebe Island Bridge CMP has identified views to and from the Bridge as part of the significance of the Bridge. The main set of views are from the Bridge and the approaches where “extensive view of Sydney Harbour are offered” (Department of Public Works and Services, 2000). Views to the Bridge from the surrounding area have also been identified from the foreshore area along Glebe Island, along Sommerville Road immediately above the cutting to the west of the Bridge, from East Balmain to the north above the White Bay cutting along Roberts Street; Pyrmont Point Park to the northeast and from the foreshore area in front of Bowman Street and Bank Street (Figure 13). These views are presented below and potential impacts from the new built structure are presented in Section 6.0.

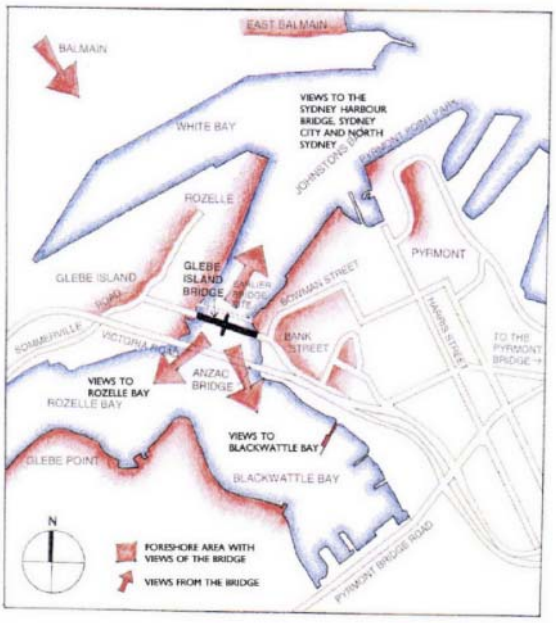

Figure 13 Identified views and vistas to and from the Glebe Island Bridge (Source:(Department of Public Works and Services, 2000)**)**

4.3.2 White Bay Power Station

The White Bay Power Station CMP (Design_5_Architects, 2013), has identified six significant views and vistas towards the Station remains from vantage points around Rozelle, Balmain, Annandale and Glebe (Figure 14). Of these significant views, View D (from the Anzac Bridge western approach) and View C from White Bay, are the closest views to Glebe Island and the Site. Neither of these views look across Glebe Island and would not obstruct these recognised views.

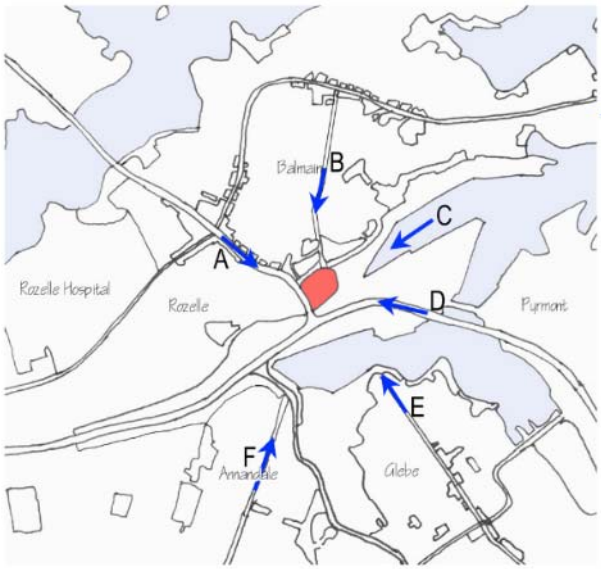

Figure 14 Views and vistas identified to and from the White Bay Power Station. (Source (Design_5_Architects, 2013)

4.4 Archaeological Potential

Based on the historic development of Glebe Island (Section 3.0), and the physical remains (Section 4.2), an understanding of the potential historical archaeological remains present within the Site can be made.

The major development phases and impacts to Glebe Island occurred to convert the Island for use as the Sydney Abattoir. In the lead up to this in the 1850s, Glebe Island was cleared and a series of wharves and roads were constructed. These were constructed largely to the southern side of the existing Glebe Island Bridge, and therefore not within the Site.

To the north of the Glebe Island Bridge during this period, a few structures are present on historical plans. A cottage was built to the east of the Site located in the area above the rock cutting along Sommerville Road. Two jetties are also shown on these early plans to the north of the Site. Both the cottage and the two jetties were located outside of the Project area.

The location of the first Glebe Island Bridge was located on the northern side of the existing Glebe Island Bridge. The bridge was a lower pile and timber decked bridge located immediately to the north of the approach embankments of the present Glebe Island Bridge and located within the Site. The original bridge was constructed out of Blackbutt timber piles. The approach to the bridge on the western side appears to have included an earthen embankment with potential stone abutments. It is common practice when former wharves and bridges are demolished, that piles and other remains associated with the former structures would be built over. After the construction of the current Glebe Island Bridge, the former bridge was removed to allow for safe navigation through the new swing bridge into Black Wattle Bay. There is no information relating to the specific removal of those piles, either within in water or on land. An early photograph from 1920s when the Glebe Island Bridge had been constructed shows the remains of some of the piles from the former bridge still present in the water (Figure 7). It is therefore considered likely that evidence of the Bridge remains *in situ.* Any excavation below the current hardstand adjacent to the Glebe Island Bridge would have the potential to expose archaeological remains associated with the first Glebe Island Bridge (Figure 15).

The reclamation works that took place from 1917 onwards for the construction of the grain storage development and ultimately, the construction of the grain silos, extended the land available to the east of the former Glebe Island foreshore. There is low potential for archaeological remains associated with the reclamation works to be present below the current hardstands on the Site behind the line of current wharves. The archaeological potential would be limited to fill material only and is not expected to have any archaeological research value.

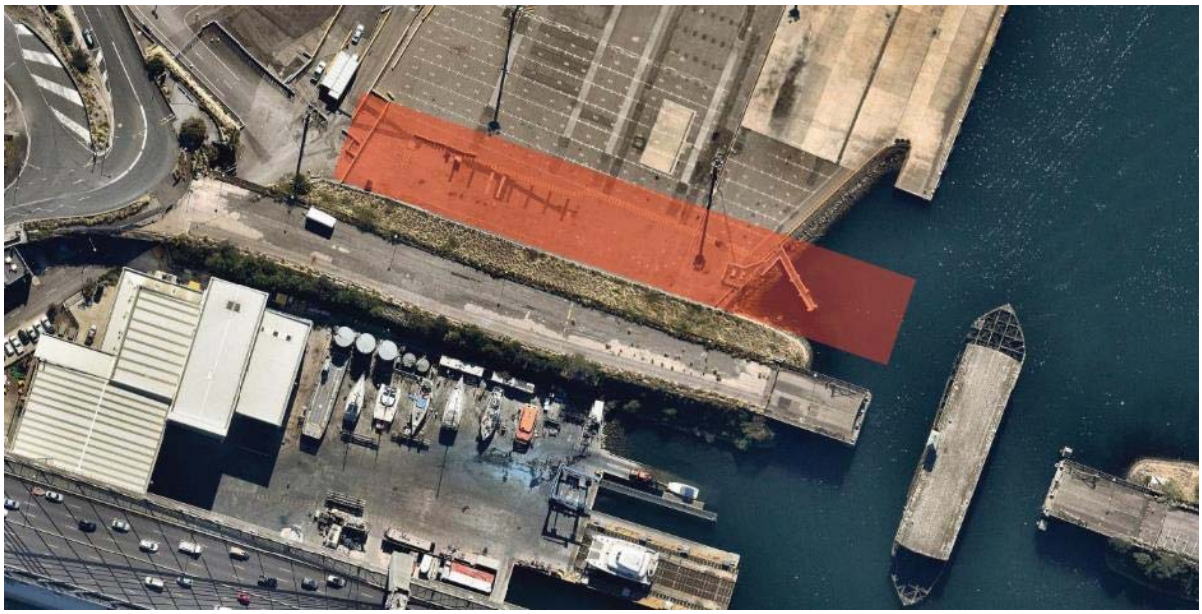

Figure 15 Area of identified archaeological potential (shown in red) associated with the alignment of the first Glebe Island Bridge

5.0 Significance Assessment

Based on the historical research, site inspection and assessment of the archaeological potential that exists within the Site, a significance assessment will be prepared for those items that will be directly and indirectly impacted from the Project. A significance assessment will be prepared for the archaeological potential that exists associated with the Glebe Island Bridge (1860 – 1902) and for the potential indirect impacts to views to the current Glebe Island Bridge (1902 – present) as identified in the CMP (Department of Public Works and Services, 2000).

A significance assessment will not be undertaken for the White Bay Power Station as the proposed construction of the concrete batching plant will not interrupt or obscure any views the power station as identified in the CMP (Design_5_Architects, 2013).

In order to understand how a development would impact on a heritage item, it is essential to understand why an item is significant. An assessment of significance is undertaken to explain why a particular item is important and to enable the appropriate site management and curtilage to be determined. Cultural significance is defined in The Australia ICOMOS Charter for Places of Cultural Significance 2013 (ICOMOS (Australia), 2013) as meaning "aesthetic, historic, scientific, social or spiritual value for past, present or future generations" (Article 1.2). Cultural significance may be derived from a place's fabric, association with a person or event, or for its research potential. The significance of a place is not fixed for all time, and what is of significance to us now may change as similar items are located, more historical research is undertaken and community tastes change.

The process of linking this assessment with an item's historical context has been developed through the NSW Heritage Management System and is outlined in the guideline Assessing Heritage Significance (NSW Heritage Office, 2001), part of the NSW Heritage Manual (Heritage Branch, Department of Planning). The Assessing Heritage Significance guidelines establish seven evaluation criteria (which reflect four categories of significance and whether a place is rare or representative) under which a place can be evaluated in the context of State or local historical themes. Similarly, a heritage item can be significant at a local level (i.e. to the people living in the vicinity of the site), at a State level (i.e. to all people living within NSW) or be significant to the country as a whole and be of National or Commonwealth significance.

In accordance with the guideline *Assessing Heritage Significance*, together with Section 33(3) of the *Heritage Act,* an item would be considered to be of State significance if it meets two or more criteria at a State level, or of local heritage significance if it meets one or more of the criteria outlined in Table 3. The Heritage Council require the summation of the significance assessment into a succinct paragraph, known as a Statement of Significance. The Statement of Significance is the foundation for future management and impact assessment.

Table 3 Significance assessment criteria

Criterion	Inclusions/Exclusions
Criterion (a) *– an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area).*	The site must show evidence of significant human activity or maintains or shows the continuity of historical process or activity. An item is excluded if it has been so altered that it can no longer provide evidence of association.
Criterion (b) – an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local to area).	The site must show evidence of significant human occupation. An item is excluded if it has been so altered that it can no longer provide evidence of association.
Criterion (c) *– an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area).*	An item can be excluded on the grounds that it has lost its design or technical integrity or its landmark qualities have been more than temporarily degraded.
Criterion (d) *– an item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons.*	This criterion does not cover importance for reasons of amenity or retention in preference to proposed alternative.
Criterion (e) *– an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area). Significance under this criterion must have the potential to yield new or further*	Under the guideline, an item can be excluded if the information would be irrelevant or only contains information available in other sources.

Criterion	Inclusions/Exclusions
substantial information.	
Criterion (f) – an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area).	An item is excluded if it is not rare or if it is numerous, but under threat. The item must demonstrate a process, custom or other human activity that is in danger of being lost, is the only example of its type or demonstrates designs or techniques of interest.
Criterion (g) *– an item is important in demonstrating the principal characteristics of a class of NSW's (or local area's):* - *cultural or natural places cultural; or natural environments.*	An item is excluded under this criterion if it is a poor example or has lost the range of characteristics of a type.

5.1 Glebe Island Bridge (1902 to present)

The SHR significance assessment for Glebe Island Bridge is included in Table 4.

Table 4 SHR significance assessment of the Glebe Island Bridge (Department of Public Works and Services, 2000)

Criterion	Assessment
Criterion (a) *– an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area).*	Glebe Island Bridge has historic significance at the state level as it demonstrates one of the earliest examples of an electrical powered bridge of its type in Australia. The Glebe Island Bridge, along with Pyrmont Bridge, both designed by Percy Allan at the turn of the century were innovative in their day and attracted world-wide engineering interest, with Allan invited to present a paper on the design of its older twin, the Pyrmont Bridge, to the Institution of Civil Engineers in London in 1907. The Glebe Island Bridge has been an important item of infrastructure in the history of Sydney, Australia's famous harbour city and the capital of New South Wales, for over 90 years. The bridge was a vital component of the 'five bridges' route from the city to the northern and western suburbs. The history of this crossing, going back to 1892, is closely associated with the economic and social development of Sydney at the end of the 19th century.
Criterion (b) – an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local to area).	Glebe Island Bridge is of state significance for its close associations with Percy Allan (1861-1930), a highly regarded Australian bridge designer of the late 19th and early 20th century. Percy Allan was responsible for the introduction of American timber bridge practice to NSW, and designed over 500 bridges in NSW. The bridge is also associated with JJC Bradfield (1867-1943), later known for his work on the Sydney Harbour Bridge. It is associated with the NSW Department of Public Works, a highly regarded, prolific and historically significant organisation in the history of NSW.
Criterion (c) *– an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area).*	Glebe Island Bridge is of state significance as its design and construction represented a significant technical achievement in the era that it was built. The bridge's innovative design included: the size of the swing span and speed of operation; development of steel bridge truss; caisson construction; design of the swing span bearing; and use of electric power. The design of the Glebe Island Bridge represents the pinnacle of nineteenth century engineering and material technology, prior to the development of locally produced modern steel. Aesthetically, the bridge is an impressive structure, sited in the middle of a wide and busy waterway, giving it landmark qualities that are apparent from numerous vantage points around Sydney Harbour.
Criterion (d) *– an item has strong or special association with a particular community or cultural*	The Glebe Island Bridge is valued by the Sydney community for its significant contribution to the social and commercial development of Sydney and the inner western suburbs, as demonstrated by the public statements and

Criterion	Assessment
group in NSW (or the local area) for social, cultural or spiritual reasons.	interest in its conservation demonstrated in the broad-ranging community consultation undertaken for the Bays Precinct by the NSW Government. (NT 2012).
***Criterion (e)** – an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area). Significance under this criterion must have the potential to yield new or further substantial information.*	The bridge is a fine example of late nineteenth and early twentieth century technology, and is almost completely in original condition. The combined structural, mechanical and electrical efficiency of the bridge established it as an epitome of well-designed bridge building of the time.(DPWS, Jan 1999, p72)
Criterion (f) – an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area).	Glebe Island Bridge is of state significance as it is one of only two examples of an electrically-operated steel swing bridge in New South Wales. It is the second oldest (after its older twin, the Pyrmont Bridge) surviving bridge across a Sydney Harbour waterway. The two bridges remain the only large, electrically-operated swing spans in Australia. The Bridge includes a rare surviving, operable Mercury-arc Rectifier, as well as some early silicon rectifiers, both of which were important early electrical technologies which have been superseded by solid-state technology. Mercury arc rectifiers are now rare outside of museum situations and only a very few remain in their original context in Australia. (NT, 2013)
***Criterion (g)** – an item is important in demonstrating the principal characteristics of a class of NSW's (or local area's):* - *cultural or natural places cultural; or* *natural environments.*	Glebe Island Bridge is of state significance as it features all the significant structural and technical features of a swing-span bridge. It is an excellent example of one of the various types of opening bridges, which are the economical solution to constructing road bridges across navigable waterways, where high-level bridges are possible but unaffordable. Opening bridges have been a crucial factor in the economic development of NSW since the late nineteenth century, with its high-level of industrialisation but relatively low population levels on an international scale. (NT, 2013)

The Statement of significance reads:

> The Glebe Island Bridge, across Johnstons Bay, is of state significance as it demonstrates one of the earliest examples of an electric-powered swing bridge in Australia. Technically, it is a complementary structure to the already acclaimed Pyrmont Swing Bridge, and has all the same significant features, including the electrically-driven swing span. Both bridges were designed by Percy Allan, a highly-regarded Australian bridge designer of the late 19th and early 20th century. Both represent the only examples of such types of bridges in New South Wales and are still operable.
>
> (NSW Heritage Division, 2013)

5.2 Archaeological potential associated with the first Glebe Island Bridge (1862 to 1902)

Table 5 provides an assessment of the significance for the archaeological remains associated with the first Glebe Island Bridge based on the historical context outlined in Section 3.0 and the physical evidence provided in Section 4.0.

Table 5 Significance assessment for the archaeological remains associated with the first Glebe Island Bridge (1862 - 1902)

Criterion	Assessment
***Criterion (a)** – an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area).*	The first Glebe Island Bridge has historical significance at a State level as it relates to the first crossing west of Pyrmont that assisted the expansion of the city of Sydney. The bridge was an important crossing heading west that allowed for a more direct route for produce to reach the markets in Sydney. The bridge was a private toll bridge completed in 1862 and

Criterion	Assessment
	replaced the earlier punt crossing. The Bridge contributes to a historical understanding of how private enterprise filled the gaps in public road infrastructure and influenced the shape of the city. The bridge was constructed of Tasmanian Blackbutt timbers and included a hand cranked swing span located at the Pyrmont side of the bridge.
Criterion (b) – an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local to area).	The first Glebe Island Bridge was a private Toll Road until the Government purchased the bridge in 1884 and abolished the tolls. The bridge is not likely to be associated with any one person in particular or associated with the life works of a group of people of cultural importance to the area.
Criterion (c) *– an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area).*	The first Glebe Island Bridge was designed to allow for watercraft to pass through it via a hand cracked swing span at the Pyrmont end of the bridge and represents a design that allows for both road and maritime traffic to operate, although not concurrently. The bridge was also constructed from Tasmanian Blackbutt, known to be a timber used in marine construction due to its natural resistance to marine borer attack. The use of this type of timber and importing large quantities from Tasmania for the bridge's construction required a high degree of technical knowledge and ingenuity. Archaeologically, the remains of the first bridge crossing are not considered to have aesthetic characteristics.
Criterion (d) *– an item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons.*	The first Glebe Island Bridge was a valuable asset to the Sydney Community. It was used by the local butchers and abattoir workers and other produce growers to be able to access markets in Sydney more directly and in less time. The bridge also allowed for domestic growth alongside the commercial development for the inner western suburbs. As the Bridge was demolished in 1902, it is considered that this social significance has attenuated and the Bridge does not meet the threshold for listing under this criterion.
Criterion (e) *– an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area). Significance under this criterion must have the potential to yield new or further substantial information.*	It is anticipated that archaeological remains associated with the first Glebe Island Bridge may be present within the reclamation area on Glebe Island. There is also the potential for the abutments and approach on the western side of the bridge to be present within the same reclamation area. It is also possible that cut down piles are extant within the seabed crossing. If present, the archaeological remains would have research potential to provide information relating to the construction and design of this bridge which is not available elsewhere as there are no known extant plans. If present, the archaeological remains associated with the first Glebe Island Bridge would meet this criterion at a State level.
Criterion (f) – an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area).	The archaeological remains associated with the first Glebe Island Bridge are considered to be rare as they relate to the only known Tasmanian Blackbutt bridge structure built in Sydney when it was constructed in 1862. The remains are limited to the piles and other structural remains that may not have been salvaged when it was removed in 1902. As such, the archaeological remains are considered to be rare as information relating to this bridge would only be available from the limited historical photographs and from the archaeological record.
Criterion (g) *– an item is important in demonstrating the principal characteristics of a class of NSW's (or local area's):* - *cultural or natural places cultural; or* - *natural environments.*	The Archaeological remains, if present, are not likely to demonstrate the principal characteristics of a class of NSW's natural or cultural places or environments. The Bridge does not meet this criterion at a State or local level.

The Statement of significance reads:

> The first Glebe Island Bridge is considered to be of State significance for its historical and scientific heritage values. The bridge was an important crossing heading west that allowed for a more direct route for produce to reach the markets in Sydney. The bridge was a private toll bridge completed in 1862 that replaced an earlier punt crossing. The bridge contributes to a historical understanding of how private enterprise filled the gaps in public road infrastructure and influenced the shape of the city. The bridge was constructed from Tasmanian Blackbutt timbers, likely sourced for the hardwood timber's natural abilities to resist marine borer attack. Archaeological remains associated with the first Glebe Island Bridge, if present, are likely to have high research value and yield information relating to the construction techniques associated with the construction of the bridge that is not available from any other sources. This would include information relating to the design and construction techniques used for its construction.

6.0 Impact Assessment

6.1 The Project

Hanson propose to develop a new intermodal aggregate storage facility and concrete plant to be located adjacent to Glebe Island Berth one (GLB1 - legally described as Lot 10 in DP 1170710) (the Site), as shown in Figure 1. The plant will be designed with a capacity to produce up to 1 million cubic metres of concrete per annum and will supply aggregate to other Hanson sites in the vicinity. The proposed plant will serve two purposes:

- To act as a shipping facility that will support a number of Hanson (and Hymix) concrete batching plants by improving the delivery of aggregates into the city centre; and
- To operate as a concrete batching plant that can supply concrete for infrastructure and buildings in the CBD and inner suburbs.

The concrete batching plant will be supported by new aggregate shipping terminal facilities at GLB1 with the capacity to manage up to 1 million cubic metres of concrete aggregates per annum delivered by ship from the Hanson Bass Point Quarry and other facilities if deemed viable.

The plant is proposed to adopt a low profile design sympathetic to its surrounding environs. The majority of the batching activities will be undertaken in an enclosed area in order to limit the noise and air quality impacts of the proposed plant. The highest structures will be the cement silos which will be up to 35m tall, half the height of the adjoining heritage listed Glebe Island Silos.

6.2 Potential Impacts to heritage and archaeological items

6.2.1 White Bay Power Station

There will be no direct or indirect impact to the remains of the White Bay Power Station. The identified views to the power station as outlined in the CMP (Design_5_Architects, 2013) include views from the ANZAC Bridge and from White Bay, however, there are no views from, or across, Glebe Island. As such, it is anticipated there will be no indirect impacts to the White Bay Power Station from the construction of the Glebe Island concrete batching plant.

6.2.2 Glebe Island Bridge (1902 – present)

There will be no direct physical impact the Glebe Island Bridge. The proposed works will be within the adjacent allotment boundary, but would not impact on the nearby sandstone embankment associated with the approach of the Glebe Island Bridge. The sandstone embankment is separated from the Site by a cyclone fence, which would provide protection during the proposed construction.

The proposed layout of the concrete bathing plant includes the placement of seven silos along the southern boundary of the Site, adjacent to the Glebe Island Bridge abutment. The total height of the silos is 35 metres and would be taller than the adjacent structures, including the Bridge at this point. There are several views to and from the Glebe Island Bridge identified in the Glebe Island Bridge CMP (Department of Public Works and Services, 2000) that have been considered important to the aesthetics of the Glebe Island Bridge. From the bridge, the views are:

- north across Johnstons Bay;
- from the bridge looking southeast into Blackwattle Bay; and
- From the bridge southwest into Rozelle Bay (Figure 13).

Views from on the bridge would not be interrupted as the Project would be to the north, on the western side of the approach, and therefore outside this field of view.

Views to the bridge include:

- from along the waterfront on Glebe Island;
- along Sommerville Road located to the west;
- along Grafton Street at East Balmain to the northwest,
- at Pyrmont Point Park to the northeast, including along the waterfront;
- from Banks Street to the east; and

- along the Glebe Point foreshore from Rozelle to Blackwattle Bay (Figure 13) (Department of Public Works and Services, 2000).

A series of photographic montages have been prepared to assess the visual impact the proposed concrete batching plant would have from specific locations around Johnstons, Rozelle and Blackwattle Bays. These montages include both the current views and impressions as to how the Site will look once the plant has been constructed. These visualisations include views from Peacock Point (Balmain East), Birrung Park (Balmain), Glebe Foreshore Walk (Blackwattle Bay) and Pirrama Park (Pyrmont Point) (Figure 17).

The views from Peacock Point (East Balmain) will not be interrupted as the Site is located to the west and do not block the view to the bridge. The view to the bridge is currently obscured from the existing waterfront infrastructure along the east side of Johnstons Bay, and is overshadows by the existing Anzac Bridge and apartment blocks on Refinery Drive (to the east of the bridge) (Figure 18).

The general view from Balmain was recorded from Birrung Park, Balmain. This view looks across the Glebe Island Births from above. The view to the bridge will be obscured slightly from the placement of the shipping containers along the eastern boundary of the Site that will act as a sound and visual barrier to the batching plant from the east. Moving further around to the east from this park, the view to the bridge would become less obscured from this shipping container wall. A view from Grafton Street, where the view outlined in the CMP was identified from, will not have this impact as the view looks directly down Johnstons Bay to the bridge (Figure 19).

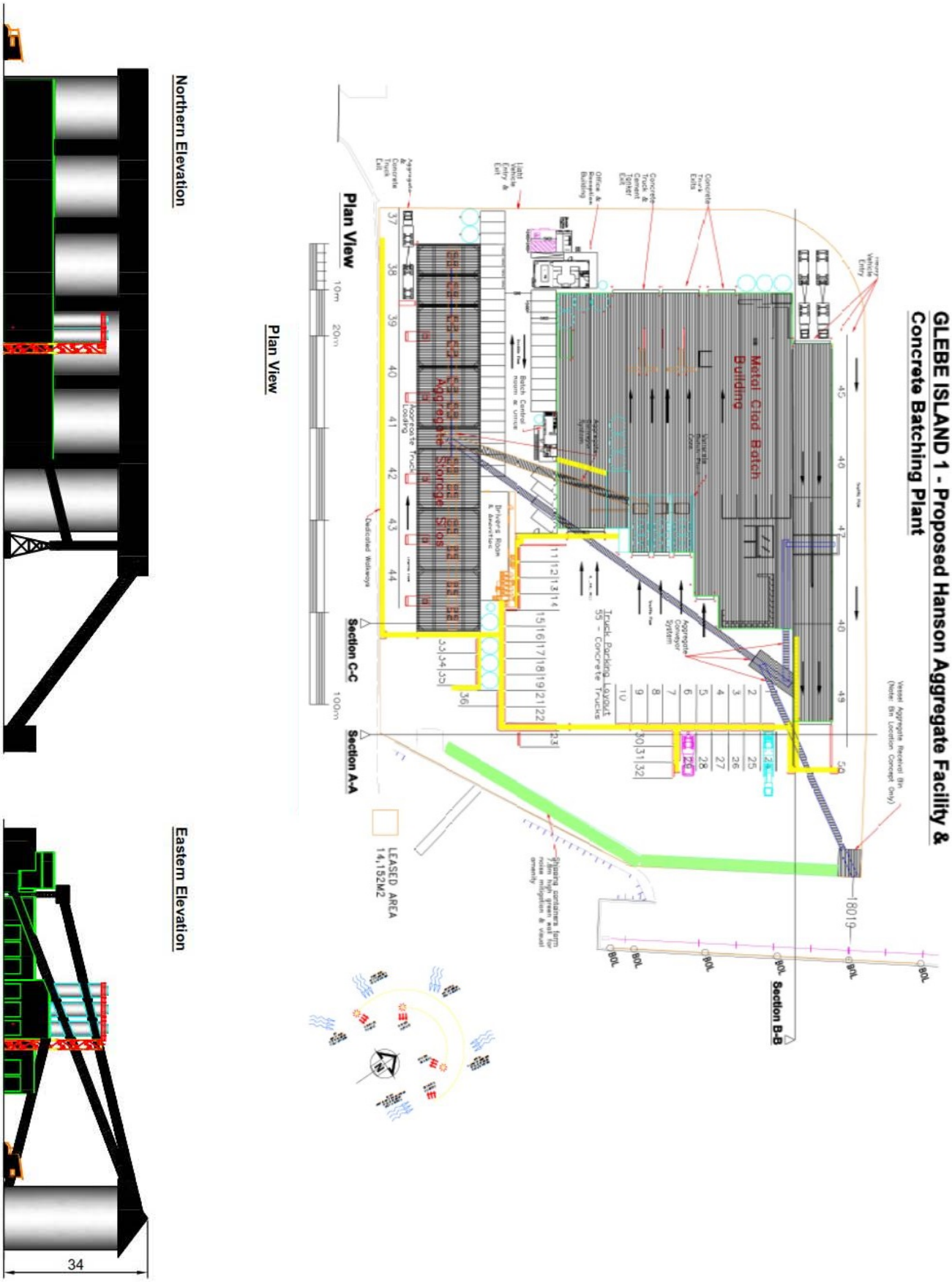

Figure 16 Proposed layout of the Glebe Island Concrete Batching Plant

From the south, the view from Glebe Foreshore Walk at Blackwattle Bay shows that the concrete batching plant will not impact views to the Glebe Island Bridge. From this view, the current marina does block some of the view to the western approach, and the Anzac Bridge can been seen to over shadow, but not block, the view to the Glebe Island Bridge (Figure 20).

The visualisation from Pirrama Park at Pyrmont Point, Pyrmont is similar to the view from Peacock Point, that is, the concrete batching plant will not obscure the view from Pirrama Park to the Glebe Island Bridge as the Site is located to the west of the bridge. The silos will, however, block the view to the western approach to the bridge. The presence of the new concrete batching plant will create a large scale structure immediately adjacent to the Glebe Island Bridge. This can be seen as having the potential to crowd the area and take the view away from the Glebe Island Bridge, however, the reality is that the presence of the Anzac Bridge and the Apartments on Regatta Wharf already crowd the view (Figure 21).

The last visualisation that was created was from the waterfront on the eastern side of Johnstons Bay from Regatta Wharf. The visualisations show the concrete batch plant will not hinder or obscure any part of the Glebe Island Bridge (Figure 22).

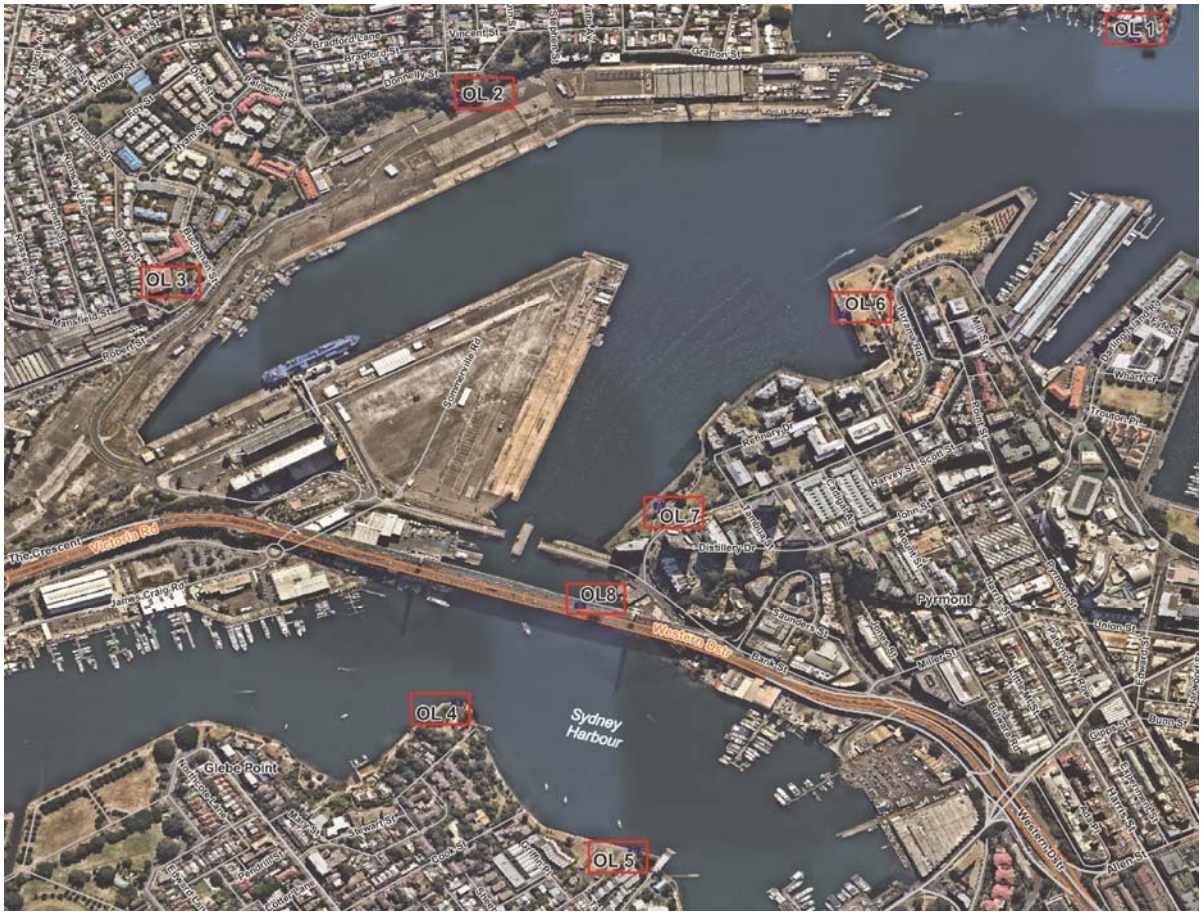

Figure 17 Glebe Island Concrete Bathing Plant Observer Locations. OL1: Peacock Point; OL2:Birrung Park, OL3 Mansfield Street; OL4 Glebe Foreshore Walk; OL5 Glebe Foreshore Walk; OL6 Pirrama Park; Waterfront Park; OL8 ANZAC Bridge

Keyplan

View of existing site

Close up of proposed development within visual simulation

Visual simulation of proposed development

Figure 18 Before and after construction visual impact assessment view from OL1 Peacock Point, Balmain East

Keyplan

View of existing site

Close up of proposed development within visual simulation

Visual simulation of proposed development

Figure 19 Before and after construction visual impact assessment view from OL2 Birrung Park, Balmain

Keyplan

View of existing site

Close up of proposed development within visual simulation

Visual simulation of proposed development

Figure 20 Before and after construction visual impact assessment view from OL4 Glebe Foreshore Walk, Blackwattle Bay

Keyplan

View of existing site

Close up of proposed development within visual simulation

Visual simulation of proposed development

Figure 21 Before and after construction visual impact assessment view from OL6 Pirrama Park, Pyrmont

Keyplan

View of existing site

Close up of proposed development within visual simulation

Visual simulation of proposed development

Figure 22 Before and after construction visual impact assessment view from OL7 Waterfront Park, Pyrmont

6.2.3 Additional Heritage View

Following exhibition of the EIS to the Department of Planning's major projects website, submissions from various agencies and stakeholders were received. The *Glebe Society* pointed out a potential additional view from the end of Glebe Point Road that takes in a view of the Anzac Bridge Glebe Island Bridge and the Sydney Harbour Bridge. An additional analysis was undertaken by AECOM's Landscape and Visual Impact Assessment team that considered this view (AECOM Australia Pty Ltd, 2018).

The view from the lookout / rest point at the end of Glebe Point Road along the Glebe Foreshore walk has uninterrupted views to Rozelle Bay north towards Johnstons Bay. This view comprises the following elements:

- The broad expanse of water within Rozelle Bay, including boating activity, Glebe foreshore (including landscaping and residential developments) in the foreground;
- The northern shore of Rozelle Bay with large moored boats along the edge, the existing concrete silos on Glebe Island, residential development at Pyrmont and Jacksons landing, and the ANZAC and Glebe Island bridges in the middle ground; and
- The Sydney and North Sydney CBD skylines and Sydney Harbour Bridge in the background.

Figure 23 A detailed photo showing the alignment of the three brides (ANZAC, Glebe Island, and the Sydney Harbour Bridges) from the rest area at the end of Glebe Point Road (View to North)

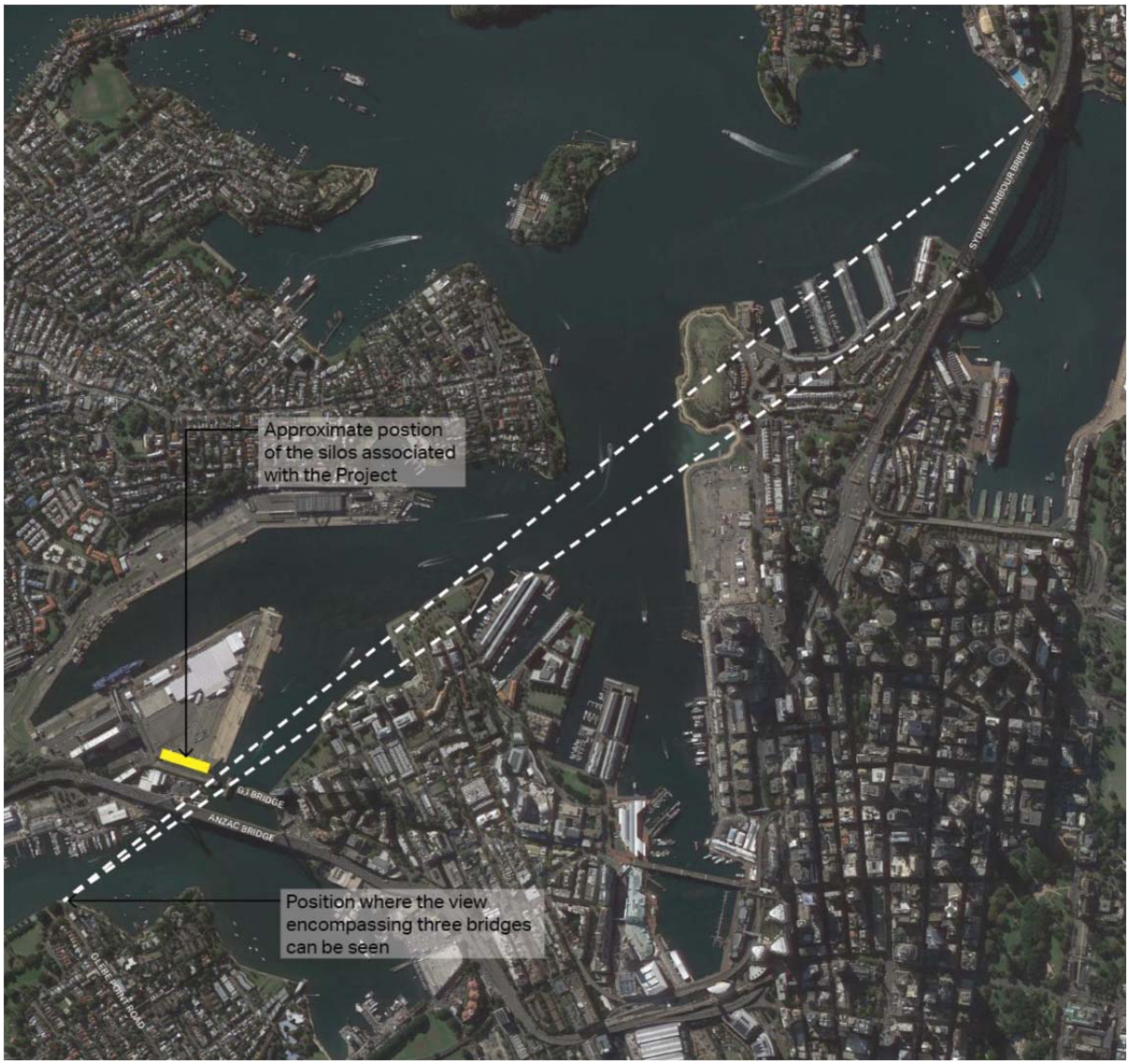

Figure 24 Angle of viewing from observer location, showing where the silos associated with the Project would be positioned in relation to the view of the three bridges. Note that the two lines radiating from the observer location show the position of the northern and southern pylons of the harbour bridge

From this location, the silos would be seen west of the western pylon of the ANZAC Bridge, and viewed under the deck of the bridge. They would be viewed as a similar element in character and scale within the view to the existing concrete silos to the west of the Project on Glebe Island. They would essentially increase the visibility of Glebe Island from this location towards the east.

The silos would not block views to the Sydney Harbour Bridge, nor the Glebe Island Bridge from this location.

It is not considered that any known heritage or potential heritage views would be impacted from the proposed development. The position of the silos adjacent to the Glebe Island Bridge is considered appropriate as it 'loads' the bulky structures against the bulk of the ANZAC Bridge, thereby avoiding taller structures on the relatively flat Glebe Island at the northern end of the Project Site (AECOM Australia Pty Ltd, 2018).

6.2.4 Former Glebe Island Bridge (1860 – 1902)

There is the potential for the Project to impact on archaeological remains associated with the first Glebe Island Bridge. Archaeological remains associated with the first bridge are likely to include former piles and other associated structural remains that may have been deposited onto the former foreshore or seabed area when it was

removed from the site. There is also the potential for archaeological remains associated with the former western approach to be present. The archaeological expression of this is likely to take the form of…Photographic evidence from the time of the first bridge's construction shows the bridge had sandstone approach and headwall.

Any archaeological remains that are present, are likely to provide information relating to the construction of this bridge, information that is not available in existing documented records. Section 5.2 identified the item as holding local significance.

Any excavation works below the current hardstand along the southern boundary of the property, in the vicinity of the silo location may impact on these archaeological remains if present. Mitigation measures have been provided in Section 7.0.

6.2.5 Glebe Island Bridge CMP conservation strategies

The CMP provides conservation policies for the Glebe Island Bridge. Section 8.8 of the CMP details policies relating to the "Context" of the bridge and the visual setting and potential impacts to the bridge. This includes visual form and setting of the bridge (section 8.81), the bridge's curtilage (section 8.8.2) and the views and vistas identified in the CMP (section 8.8.3). .

This later section of the CMP acknowledges the visual impact the Anzac Bridge does have to the setting of the Glebe Island Bridge, and states that a positive heritage outcome would be to include public access to the waterfront area at Glebe Island (Department of Public Works and Services, 2000). These statements were made when public access to the waterfront was not possible, and that any potential redevelopment of the area was likely to be residential in nature. The commercial/industrial re-use of the adjacent land (i.e. the Site) is not considered within the CMP and it is therefore difficult to apply the policies in the CMP to the present Project.

The following policies relate to potential impacts to the visual setting of the Glebe Island Bridge, and responds to each.

Table 6 Response to the Glebe Island Bridge CMP Policies replating to impacts to views to and from the bridge

Glebe Island CMP Policy	Response
Do not obscure the visual form and setting of the bridge with buildings or large plantings on the harbour foreshores of Pyrmont or Glebe Island near the abutments to the bridge.	The concrete batching plant will be built along the southern boundary of the Site, immediately adjacent to the western approach to the Glebe Island Bridge. The placement of the silos along this boundary will obscure the western approach when viewed from the north-west. Views to the bridge span itself, including to the sandstone abutments will not be obscured.
Open space provisions and council planting policies should take full consideration of the views and vistas to the harbour and associated structures.	View to the harbour from the Glebe Island Bridge, including up Johnstone Bay, Blackwattle Bay and Rozelle Bay, will not be obscured from the construction of the Glebe Island concrete batching plant. Open space and council plantings are not appropriate to the current Project for safety and operational reasons.
In future work, the area known as the Glebe Island Bridge should include all those areas and elements of the structure which have been constructed to serve as part of the bridge (i.e.: point of crossing) between Pyrmont and Glebe Island. By definition this includes bridge approaches and abutments, and sub-surface foundations and piers.	Construction of the concrete batching plant will not have a direct impact on any elements associated with the Glebe Island Bridge, including no impact to the western approach to the bridge.
The bridge approaches should remain accessible by the public as it provides a significant vantage point from which the harbour and urban landscape of Sydney can be appreciated.	The bridge approaches are not accessible to the public as the approaches are located within Sydney Ports controlled land. Once completed, views to the harbour and the urban landscape would still be possible from the eastern end of the western approach. View to the harbour and urban landscape would still be possible from the eastern approach. However, no public access would be instated as part of the Project for safety and operational reasons

6.3 Heritage Impact Assessment

The Project would result in direct impacts to the potential archaeological remains associated with the first Glebe Island Bridge, as well as, impacts to some of the identified views to the second Glebe Island Bridge. These impacts will be assessed against each significance criterion (as detailed in Section 5.0 above).

Table 7 Assessment of heritage impact of Project against SHR criterion for the Glebe Island Bridge

Criterion	Impact Assessment
Criterion A – Glebe Island Bridge has historic significance at the state level as it demonstrates one of the earliest examples of an electrical powered bridge of its type in Australia. The Glebe Island Bridge, along with Pyrmont Bridge, both designed by Percy Allan at the turn of the century were innovative in their day and attracted world-wide engineering interest, with Allan invited to present a paper on the design of its older twin, the Pyrmont Bridge, to the Institution of Civil Engineers in London in 1907. The Glebe Island Bridge has been an important item of infrastructure in the history of Sydney, Australia's famous harbour city and the capital of New South Wales, for over 90 years. The bridge was a vital component of the 'five bridges' route from the city to the northern and western suburbs. The history of this crossing, going back to 1892, is closely associated with the economic and social development of Sydney at the end of the 19th century.	The construction of the concrete batching plant will not have a physical impact to the Glebe Island Bridge and therefore will not have an impact to its significance under this criterion.
Criterion B – Glebe Island Bridge is of state significance for its close associations with Percy Allan (1861-1930), a highly regarded Australian bridge designer of the late 19th and early 20th century. Percy Allan was responsible for the introduction of American timber bridge practice to NSW, and designed over 500 bridges in NSW. The bridge is also associated with JJC Bradfield (1867-1943), later known for his work on the Sydney Harbour Bridge. It is associated with the NSW Department of Public Works, a highly regarded, prolific and historically significant organisation in the history of NSW.	The construction of the concrete batching plant will not have a physical impact to the Glebe Island Bridge and therefore will not have an impact to its significance under this criterion.
Criterion C – Glebe Island Bridge is of state significance as its design and construction represented a significant technical achievement in the era that it was built. The bridge's innovative design included: the size of the swing span and speed of operation; development of steel bridge truss; caisson construction; design of the swing span bearing; and use of electric power. The design of the Glebe Island Bridge represents the pinnacle of nineteenth century engineering and material technology, prior to the development of locally produced modern steel. Aesthetically, the bridge is an impressive structure, sited in the middle of a wide and busy waterway, giving it landmark qualities that are apparent from numerous vantage points around Sydney Harbour.	The construction of the concrete batching plant will not have a physical impact to the Glebe Island Bridge. The plant will obscure views to the western approach to the bridge, but not of the central swing span itself. As identified in the CMP, the existing landmark qualities and visual setting associated with the bridge have been lessened by the construction of the Anzac bridge that has created a new dominating focal point. The construction of the concrete plant will obscure some of the views that have been identified in the CMP, particularly from Sommerville Road, and partially from some general views from Balmain. Views from Sommerville Road are only present from the intersection with the Glebe Island Bridge approach as the road turns away from the bridge. Views from the intersection between Sommerville road and the former Glebe Island Bridge western approach will not be obscured as part of these works. Views from further to the north along Sommerville Road will be obscured from the new

Criterion	Impact Assessment
	concrete batching plant silos, however, there are limited views that can be gained from this vantage point. The remaining views from East Balmain, Pyrmont Point and from the foreshore area along both Glebe Island from the eastern side of the Johnstones Bay will not be impacted.
Criterion D – The Glebe Island Bridge is valued by the Sydney community for its significant contribution to the social and commercial development of Sydney and the inner western suburbs, as demonstrated by the public statements and interest in its conservation demonstrated in the broad-ranging community consultation undertaken for the Bays Precinct by the NSW Government. (NT 2012).	The construction of the concrete batching plant will not have a physical impact to the Glebe Island Bridge and therefore will not have an impact to its significance under to this criterion.
Criterion E – The bridge is a fine example of late nineteenth and early twentieth century technology, and is almost completely in original condition. The combined structural, mechanical and electrical efficiency of the bridge established it as an epitome of well-designed bridge building of the time.(DPWS, Jan 1999, p72)	The construction of the concrete batching plant will not have a physical impact to the Glebe Island Bridge and therefore will not have an impact on its significance under to this criterion.
Criterion F – Glebe Island Bridge is of state significance as it is one of only two examples of an electrically-operated steel swing bridge in New South Wales. It is the second oldest (after its older twin, the Pyrmont Bridge) surviving bridge across a Sydney Harbour waterway. The two bridges remain the only large, electrically-operated swing spans in Australia. The Bridge includes a rare surviving, operable Mercury-arc Rectifier, as well as some early silicon rectifiers, both of which were important early electrical technologies which have been superseded by solid-state technology. Mercury arc rectifiers are now rare outside of museum situations and only a very few remain in their original context in Australia. (NT, 2013)	The construction of the concrete batching plant will not have a physical impact to the Glebe Island Bridge and therefore will not have an impact on its significance under to this criterion.
Criterion G: Glebe Island Bridge is of state significance as it features all the significant structural and technical features of a swing-span bridge. It is an excellent example of one of the various types of opening bridges, which are the economical solution to constructing road bridges across navigable waterways, where high-level bridges are possible but unaffordable. Opening bridges have been a crucial factor in the economic development of NSW since the late nineteenth century, with its high-level of industrialisation but relatively low population levels on an international scale. (NT, 2013)	The construction of the concrete batching plant will not have a physical impact to the Glebe Island Bridge and therefore will not have an impact on its significance under to this criterion.

Table 8 Assessment of heritage impact of Project against the assessed heritage significance criterion for potential archaeological remains associated with the first Glebe Island Bridge (1860 – 1902)

Criterion	Impact Assessment
Criterion A – The first Glebe Island Bridge has historical significance at the local level as it relates to the need for expansion of the city of Sydney and the need for a shorter	The construction of the concrete batching plant will not have altered the history of the first Glebe Island Bridge, and therefore will not have an impact to its

Criterion	Impact Assessment
route to cater and allow for this expanse. The bridge was a private toll bridge completed in 1862 and replaced the earlier punt crossing. The bridge was constructed of Tasmanian Blackbutt timbers and included a hand cranked swing span located at the Pyrmont side of the bridge. The bridge was an important crossing heading west that allowed for a more direct route for produce to reach the markets in Sydney.	significance under this criterion.
Criterion B – The first Glebe Island Bridge was a private Toll Road until the Government purchased the bridge in 1884 and abolished the tolls. The bridge is not likely to be associated with any one person in particular or associated with the life works of a group of people of cultural importance to the area.	The Project would not impact on any association of first Glebe Island Bridge has had with the early operators or with the NSW Government when it took control of the bridge in 1884. This is an intangible value that cannot be removed by the Project.
Criterion C – The first Glebe Island Bridge was designed to allow for watercraft to pass through it via a hand cracked swing span at the Pyrmont end of the bridge and represents a design that allows for both road and maritime traffic to operate, although not concurrently. The bridge was also constructed from Tasmanian Blackbutt, known to be a timber used in marine construction due to its natural resistance to marine borer attack. The use of this type of timber and importing large quantities from Tasmania for the bridge's construction required a high degree of technical knowledge and ingenuity. Archaeologically, the remains of the first bridge crossing are not considered to have aesthetic characteristics.	There is potential for archaeological remains associated with this bridge to be present within the Site; however, the aesthetics associated the first Glebe Island Bridge is from a time when the bridge was still in use. Impacts the archaeological remains will not impact on the aesthetics associated with the former bridge.
Criterion D – The first Glebe Island Bridge was a valuable asset to the Sydney Community. It was used by the local butchers and abattoir workers and other produce growers to be able to access markets in Sydney more directly and in less time. The bridge also allowed for domestic grown alongside the commercial development for the inner western suburbs.	The community's value in the first Glebe Island Bridge is based on the historical association with the first bridge as there are no above ground sections that still exist. This is an intangible value that cannot be removed by the Project.
Criterion E – There are believed to be limited archaeological remains present associated with the first Glebe Island Bridge. Archaeological remains have the potential to be present within the reclamation area on Glebe Island. There is also the potential for the abutments and approach on the western side of the bridge to be present within the same reclamation area. There is also archaeological potential to be present along the seabed crossing, in the form of cut down piles. If present, the archaeological remains would have research potentially to provide information relating to the construction and design of this bridge.	Archaeological potential has been identified as being present in the vicinity of the proposed silos associated with the concrete batching plant. This archaeological potential is associated with sections along the bridge's former alignment across the harbour and the western abutments. The depth of the remains are unknown, however, any excavation below the current hardstand on Site has the potential to encounter the tops of former piles or other relics that were not removed as part of the later reclamation works. Mitigation measures to address this potential are provided in Section 7.0.
Criterion F – Archaeological remains associated with the first Glebe Island Bridge are limited to the pile and other structural remains that may be present. These archaeological remains are considered to be rare as there are no known timber bridges still in operation in NSW built in 1860. Information relating to these bridges is only available through the historical or archaeological record.	If present, remains associated with the first Glebe Island Bridge have the potential to be impacted from any excavation work undertaken in the vicinity of the concrete batching plant silos. If exposed, the remains would better inform the historical record about the construction used for this bridge. These archaeological remains would be limited and are considered rare. Archaeological recording of these

Criterion	Impact Assessment
	remains would be required prior to their removal.
Criterion G: Does not meet the State or local heritage listing requirements under this criterion.	N/A

6.4 Summary of Heritage Impacts

In summary, it is concluded that the proposed works would obscure one identified view associated with the Glebe Island Bridge from Sommerville Road, and partially obscure another general view from the Balmain Area. All remaining views, as outlined in the CMP would not be obscured.

There is also potential for archaeological remains associated with the first Glebe Island Bridge to be impacted from any excavation work that occurs in the vicinity of the proposed new silos. The silos located along the former alignment of the bridge, and any excavation below the current hardstand has the potential to expose piles or other structural remains from the bridge.

7.0 Conclusion and Recommendations

An assessment of the proposed works against the heritage significance of the SHR listed Glebe Island Bridge (1902 – present) has concluded that there will be no direct physical impact from the new concrete batching plant to the current Glebe Island Bridge. However, some of the views from Sommerville Road will be obscured by the proposed concrete batching plant, and that some general views from Balmain will be partially obscured. The impacts to these views has been assessed as being minor as views from Sommerville Road are only possible from the intersection with the approach to the Glebe Island Bridge, and not further along Sommerville Road. Also, the identified general views from the Balmain area would only be partially obscured from some view points from Balmain, specifically from Birrung Park. The views from Balmain are not obscured further to the north.

There is the potential for historical archaeological remains associated with the first Glebe Island Bridge to be present along its former alignment under the location of the proposed silos proposed for the concrete batching plant. It is anticipated that any excavation below the current hardstand in the vicinity of the current proposed silo area has the potential to expose timber pile and other structural remains associated with the first bridge that were not removed prior to the reclamation works.

The following mitigation measures are recommended for the Project:

- A historical archaeological monitoring program should be undertaken concurrently with any excavation works below the existing hardstand in the vicinity of the proposed silo area as shown in Figure 16. As the works are being undertaken as a State Significant Development, no permit from the Heritage Division is required, however, a Research Design and Methodology has been produced and is presented as Appendix B of this report. This document outlines the methodology for the archaeological monitoring, recording procedure of any remains or relics that are uncovered, and research questions and reporting requirements.

  The archaeological monitoring works must be undertaken by a suitably qualified historical archaeologist under the approved Research Design and Methodology document, and the document included in any Project detailed construction program.

  At the conclusion of the work a report of the findings from the monitoring works should be prepared and submitted to the Heritage Division for their records.

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Appendix A – Letters to Historical Groups

AECOM Imagine it. Delivered.

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27 February 2018

Pyrmont History Group
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Dear Donald Denoon

Glebe Island Concrete Batching Plant

This letter has been written to make you aware of a recent heritage assessment undertaken for Glebe Island and to request any input or further information you may have that may be relevant to this assessment.

AECOM has recently undertaken a heritage assessment of the Glebe Island area. This assessment was undertaken in relation to Hanson currently seeking consent to develop a new concrete batching plant at Glebe Island.

Glebe Island was not initially developed until the 1850s, when the Glebe Island Abattoir was established under an Act of Parliament. The abattoir was located to the south of the site. Development in this area did not commence until the shutting down of the abattoir and reclamation works commenced, associated with the construction of the Glebe Island grain silos in 1900. This was undertaken at the same time as the new Glebe Island Bridge was being constructed. A wharf frontage, silos and grain handling storage equipment occupied the site until 1984 when the Glebe Island area was cleared and used as part of the car export terminal.

The recent heritage assessment identified that the site is not registered on any statutory heritage registers, but is located adjacent to two items listed on the NSW State Heritage Register (SHR): the Glebe Island Bridge (SHR #01914), and the White Bay Power Station (SRH # 01015). This assessment has identified no direct impacts to any known heritage sites in the vicinity of the proposed concrete batching plant, including no impacts to the Glebe Island Bridge located immediately to the south. There would be some indirect impacts to the Glebe Island Bridge identified in the Conservation Management Plan, obscuring some views from Sommerville Road, located immediately to the west of the Bridge, and causing minor obscuring of views from the southern end of Balmain at Birrung Park.

The assessment has also identified the potential for archaeological remains associated with the first Glebe Island Bridge to be present in the vicinity of the proposed development, and these remains are likely to be of local significance.

The following mitigation measures have been recommended.

A historical archaeological monitoring program should be undertaken concurrently with any excavation works below the existing hardstand in the vicinity of areas of potential for archaeological remains associated with the first Glebe Island Bridge. The archaeological monitoring works are to be undertaken by a suitably qualified historical archaeologist under the approved Research Design and Methodology document.

At the conclusion of the work a report of the findings from the monitoring works will be prepared and submitted to the Heritage Division for their records.

Should you have any comments or further information relevant to this assessment could you please send it to the email address included below.

Yours faithfully

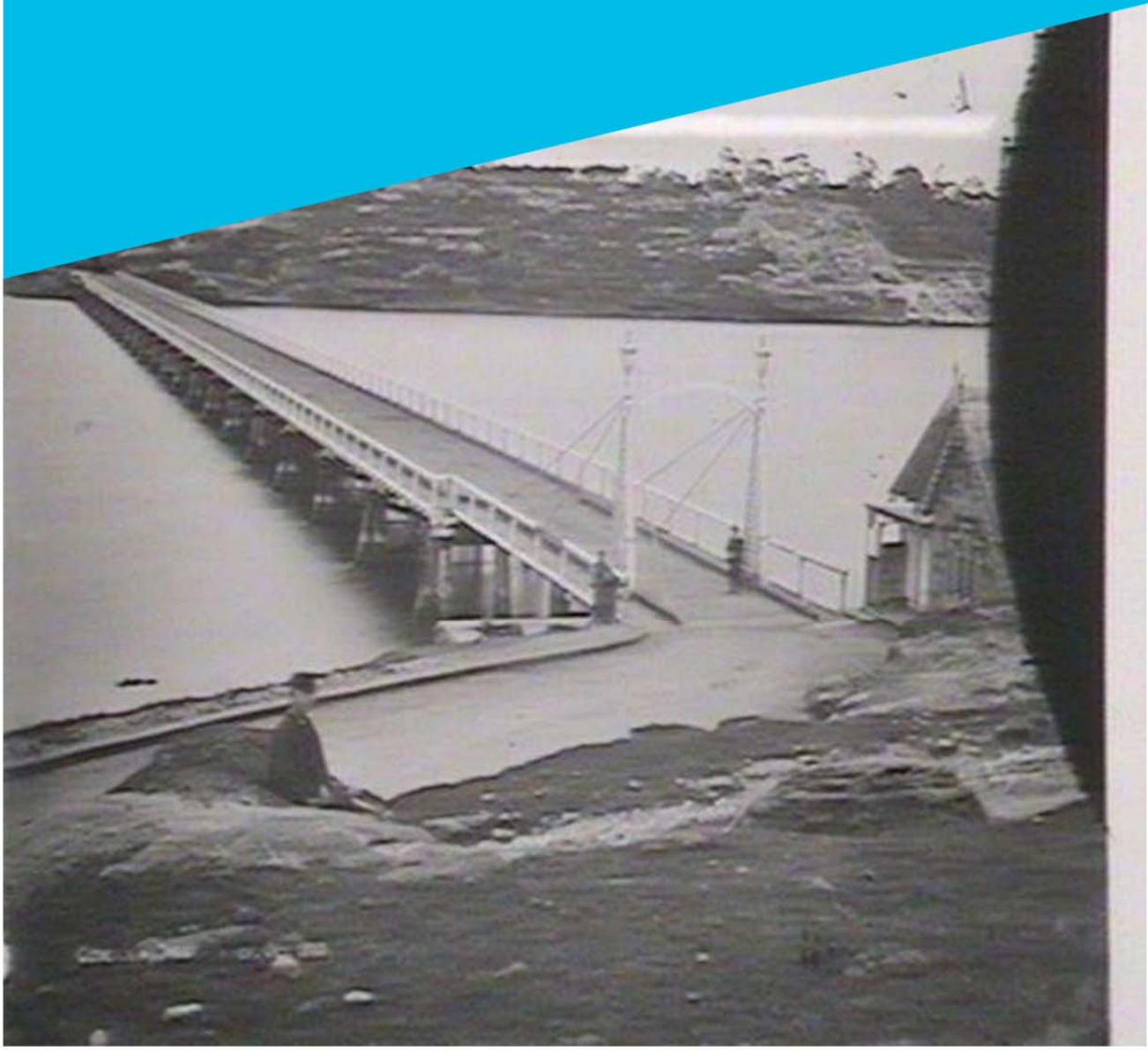
Chris Lewczak
Senior European Heritage Specialist
chris.lewczak@aecom.com

Appendix B – Archaeological Research Design and Methodology

AECOM Imagine it. Delivered.

Archaeological Research Design and Methodology

Glebe Island Concrete Batch Plan



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Revision – 20-Aug-2018
Prepared for – Hanson – ABN: 86 000 186 845

Archaeological Research Design and Methodology

Glebe Island Concrete Batch Plan

Client: Hanson

ABN: 86 000 186 845

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Job No.: 60555976

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Quality Information

Document Archaeological Research Design and Methodology

Ref 60555976

Date 20-Aug-2018

Prepared by Chris Lewczak

Reviewed by Dr Darran Jordan

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
A	20-Aug-2018	Internal Review	Darran Jordan Senior Heritage Consultant	

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1.0 Project Background

1.1 Introduction

Hanson is seeking development consent to develop a new concrete batching plant at Glebe Island. The Site has been selected so as to facilitate the co-location of the concrete plant with aggregate shipping facilities, which in proximity to the Sydney CBD and Bays Precinct offers several logistical and environmental benefits. Hanson, and its subsidiary Hymix, already provide 30-35% of Sydney's concrete demand from the two nearby sites (Blackwattle Bay and Pyrmont). The proposed facility at Glebe Island will allow Hanson to continue its supply of concrete to a range of concrete intensive projects around Central Sydney in a way that is efficient, reduces overall environmental impact and minimises regional road traffic impacts by securing ongoing aggregate shipping terminal capability.

The Project will be built on land identified under Schedule 2 of the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 as 'Bays Precinct Site' and meets the requirements for being considered a State Significant Development (SSD). A request for the Secretary's Environmental Assessment Requirements (SEARs) were applied for on 8 June 2017 and SEARs were issued on 7 July 2017 (SSD 8544).

A Statement of Heritage Impact (SoHI) was prepared by AECOM (2018) that addressed the proposed impact to known heritage items and potential archaeological deposits that are within the Project area. The SoHI identified that there is the potential for archaeological remains associated with the first Glebe Island Bridge crossing to be present within the Project area, and that proposed construction works may impact archaeological remains associated with the former first bridge crossing (AECOM Australia Pty Ltd, 2018). The SoHI included the following recommendation:

- A historical archaeological monitoring program should be undertaken concurrently with any excavation works below the existing hardstand in the vicinity of the proposed silo area... As the works are being undertaken as a State Significant Development, no permit from the Heritage Division is required, however, a Research Design and Methodology would need to be produced that outlines the methodology for the archaeological monitoring, recording procedure of any remains or relics that are uncovered, and research questions and reporting requirements.

  The archaeological monitoring works must be undertaken by a suitably qualified historical archaeologist under the approved Research Design and Methodology document, and the document included in any Project detailed construction program.

  At the conclusion of the work a report of the findings from the monitoring works should be prepared and submitted to the Heritage Division for their records.

The Office of Environment and Heritage, Heritage Division (OEH), have requested the Research Design and Methodology document, and that the detailed Archaeological Research Design and Methodology should be provided to the Heritage Council for review prior to any determination of the application.

1.2 Site Location

The Project will be constructed adjacent to Glebe Island Berth One (GLB1) located within Lot 10 in DP 1170710 (the Site) (see Figure 1). The Site is located within the Inner West Council LGA (formerly within the Leichhardt Municipal Council area).

The Site is not registered on any statutory heritage registers but is located adjacent to two items listed on the New South Wales (NSW) State Heritage Register (SHR): The Glebe Island Bridge (SHR #01914), and the White Bay Power Station (SHR #01015). The Project will not have a direct impact on either of these two heritage items, however both heritage items have recognised views and vistas to and from each item from specific points around Sydney Harbour.

Figure 1 **Location of the Glebe Island concrete bathing plant (Site) (Source: NearMap Copyright 2017)**

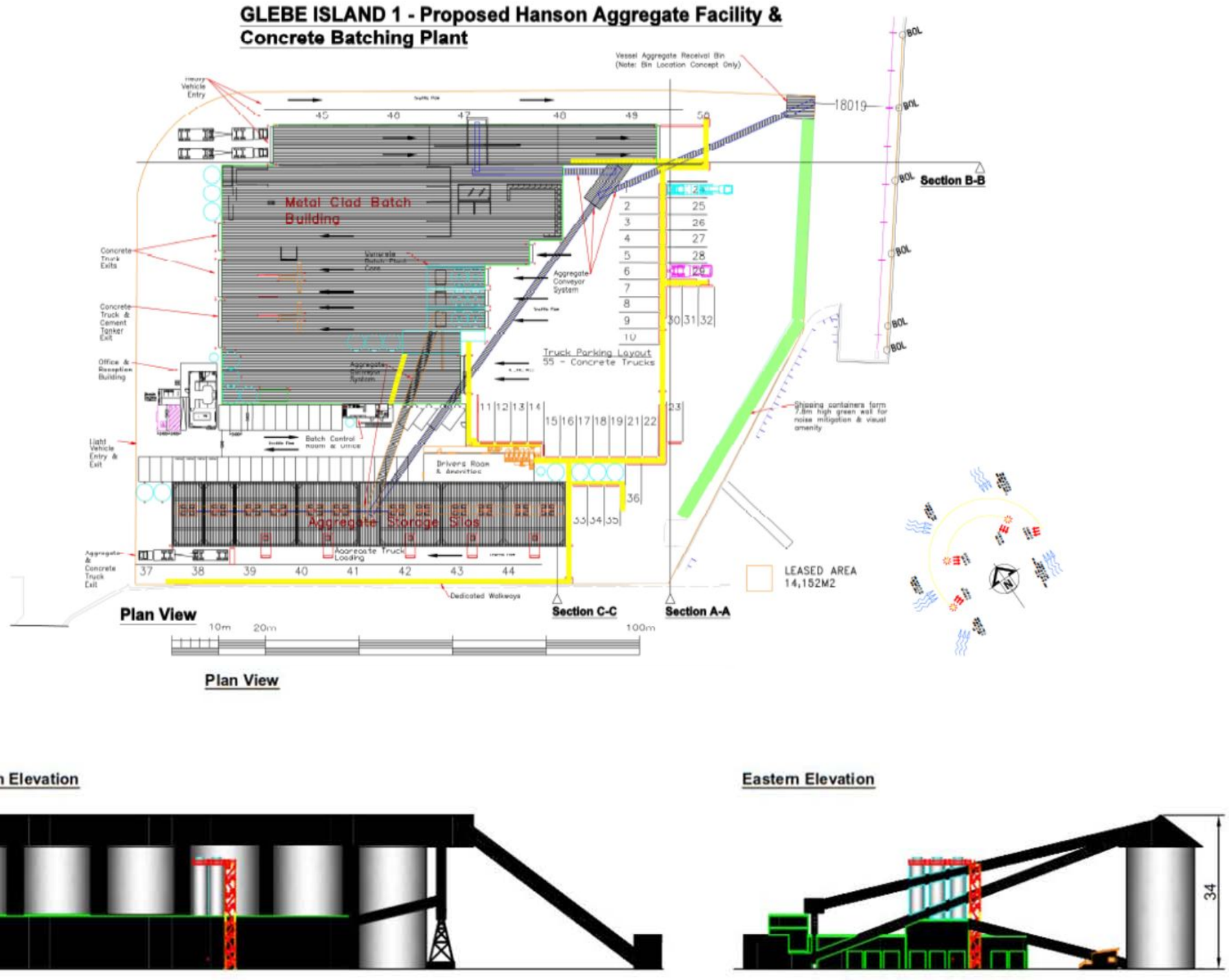

Figure 2 Proposed layout of the Glebe Island Concrete Batching Plant

2.0 Historical Context

2.1 Preamble

In order to assess the historical archaeological potential that may be present on the Glebe Island Site the historical development of the Site first needs to be assessed. The following sections outline the development of Glebe Island.

2.2 Early European Phase (1788 – 1850)

Glebe Island was a small island, connected by a small narrow causeway at Balmain that was only exposed at low tide (Simon Davies, 1984). The island was originally described as being irregular and as being 'precipitous and rocky'(Glebe Island Abattoir, Public Works Special Bundle. 1850-7, n.d.). The land was first granted to Reverend Richard Johnson, whose original 160 acres on the edge of Sydney were acquired for the establishment of a church and Glebe (real estate that supported the clergy).

Johnson began clearing parts of his land, but not Glebe Island. A new grant of land near Canterbury was given to the Catholic Church to establish a church and grounds, so the original 160 acre land grant was left vacant. With the formation of the Church and School Lands Corporation in 1826, lands that were not being used by the Catholic Church were to be sold (J. Campbell, n.d.). Disposal of land began in 1828, but did not include Glebe Island at that time. The first allotment on Glebe Island, Allotment 1, was sold in 1839 to J. Hatfield who appears to have left the land vacant.

In 1841 plans were prepared to auction the south-western portion of the island. A scheme was devised whereby this land was subdivided into a neat grid system, the principal blocks separated by streets with names such as Johnsons, Mitchell, Glebe and Ferry Streets ("Plan of Part of Glebe Island for Sale by Auction 12.7.1841," n.d.). The auction, held during April and May 1842, produced few sales.

Allotments 2 and 12 (a little over four acres combined) were bought by J. Marsh in April for a combined sum of approximately £249 and Allotments 5 and 6 (a little over three acres) were purchased by E. Buttenshaw in the following month for £180 (Glebe Island Abattoir, n.d.).

It is extremely unlikely that any of the new owners improved their new properties in any significant way, if at all. A later compensation case by one owner could only be based on the value of the stone within his land (Glebe Island Abattoir, n.d.).

A centralised abattoir was contemplated for the Island in 1849. Prior to 1849, the *Noxious Industries Act* had the effect of relocating various industries such as tanneries, slaughterhouses, boiling down works and the like away from the city limits, but not abattoirs. Glebe was one of the several inner suburbs that attracted the relocated businesses. The establishment of the principal city abattoir in this area was, therefore, in keeping with the developing industrial profile of the district. The Government Architect was asked to submit a plan for the new establishment as quickly as possible with consideration to be given to establishing both a permanent means of communication between the island and the mainland and a fresh water supply. Planning for the Project commenced in the following year.

2.3 Glebe Island Abattoir (1850 – 1916)

Glebe Island Abattoir was established by an Act of Parliament in 1850. The first steps towards realising the new facility were the resumption of the existing properties, in one case with a lengthy legal discussion and a compensation pay-out of £1500, and planning by the Colonial Architect. The latter noted that, although the island contained 23 acres, only a small portion was available in its existing state on which to build the new abattoir (Glebe Island Abattoir Public Works Special Bundle. 1850-7, n.d.).

The principal work carried out initially involved levelling the top of the island to form a platform for the buildings. This left a uniform surface of bare rock which was to be used for foundations. The excavated rock was to be used in the construction of the buildings, dams, embankments and roadways. A platform bridge was to be built, together with 24 slaughter-houses for cattle and yards for sheep. It was found to be impossible to supply fresh water to the site except by means of reservoirs

that stored water collected from the roofs. Salt water was to be pumped from the bay. The plan was devised with an expectation that it could be expanded as the need arose. The estimated cost was £12,000 (Glebe Island Abattoir Public Works Special Bundle. 1850-7, n.d.).

Work commenced on the site in 1852. A wharf was built and then a road from the wharf to the work site. A platform was cleared and several buildings were erected to facilitate the construction programme. A causeway was constructed from the Glebe mainland to the island. Work continued over the next few years and by 1854 the Colonial Architect estimated that the final cost would be over four times the original estimate, approximately £54,000, due to rising costs of material and labour (Glebe Island Abattoir Public Works Special Bundle. 1850-7, n.d.).

In 1855, the site was connected to the mainland by means of Abattoir Road, later renamed Banks Road, which crossed to the island by means of a cable punt (Figure 3). Later this punt was replaced by a wooden toll bridge (in 1857); this was the first Glebe Island Bridge (Thorp, 1990) (Figure 4).

The first Glebe Island Bridge was a private venture that connected Pyrmont to Glebe Island at the narrowest point in Johnstons Bay. The bridge was constructed out of Tasmanian Blackbutt timbers, including the piles, and consisted of 24 bents spaning across Johnstons Bay. Each bent consisted of four vertical piles with an additional two racked piles on the outside. Each bent also included a double upper and lower waler (or headstock) with two long cross beams spanning all four piles (Figure 5 and Figure 6). The approach to the bridge on the western side appears to have included an earthen embankment with potential stone abutments.

Figure 3 ***"A plan of part of Sydney and its environs: showing the bridges and roads to be constructed by the Pyrmont Bridge Company"*** **Allan & Wigley Litho 1857. Note: Glebe Island was connected via Abattoir Road only. The punt crossing was not depicted (Source Inner West Council Online Library)**

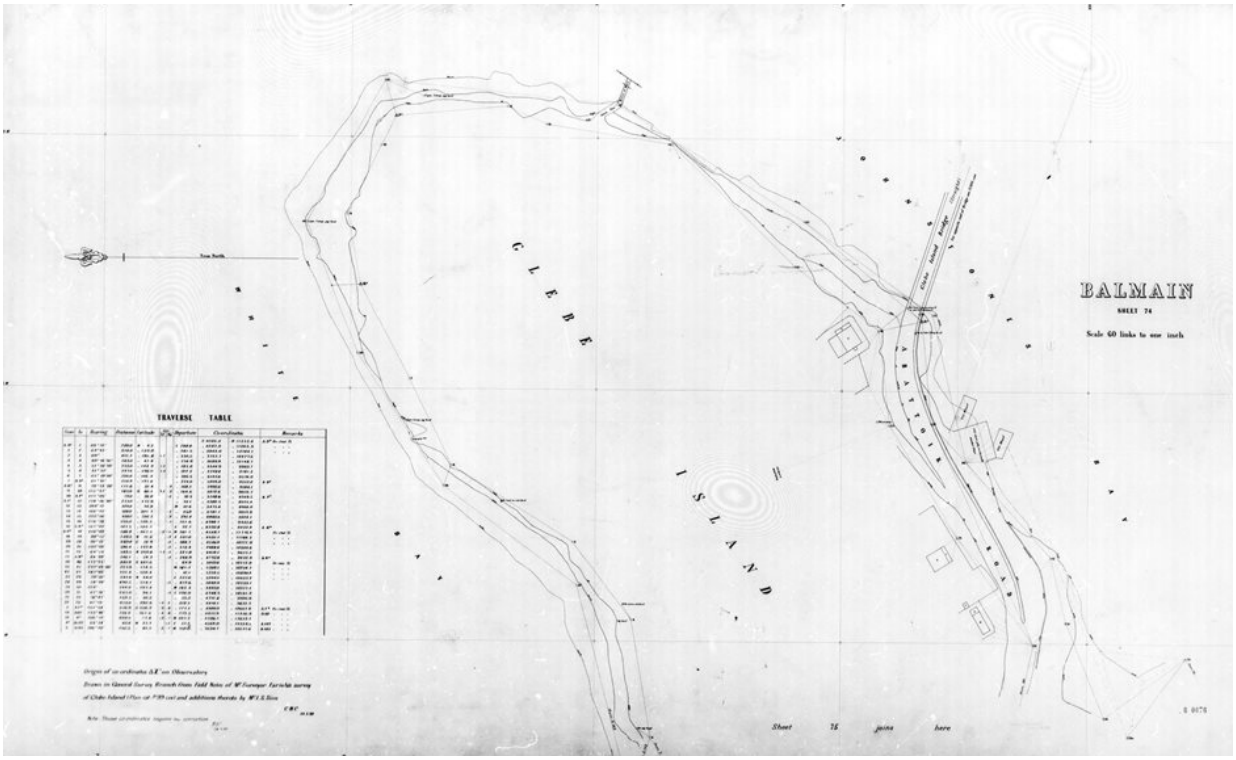

Figure 4 Municipality of Balmain Water Board plan Sheet No. 74 (Glebe Abattoir, date c1885) (Source: http://trove.nla.gov.au/version/238100592)

Figure 5 First Glebe Island Bridge. Glebe (NSW) earlier than 1899 (Source: http://trove.nla.gov.au/version/48145927)

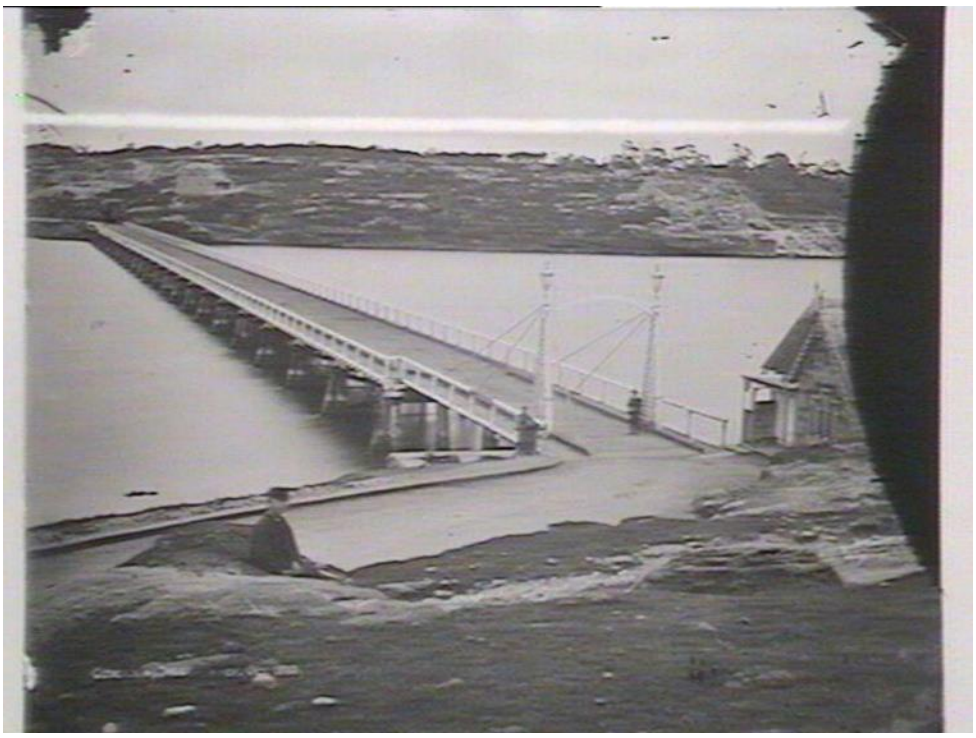

Figure 6 "Glebe Island Bridge – 10/1870" (source State Library of NSW Digital order no:d1_05719)

Later, Glebe Island was connected to Victoria Road. The abattoir was opened in 1860. From its inception considerable local protest was directed at the abattoir. Complaints were made with respect to the stench and filth emanating from it.

Despite improvements made to the abattoir site local opinion was still firmly against the continuing presence of the abattoir in the district. A petition was formed in 1887 to effect the removal of the establishment to Homebush (Thorp, 1990). Perhaps in response to this adverse local opinion, attempts were made to modernise the abattoir during the later 1880s and early 1890s ("Plan Showing Proposed Improvements at Darling Island and Glebe Island 1891," 1891). The principal component of the scheme was the complete enclosure of the island by a wharf. The work did not proceed at this time.

In 1895 Drummoyne Council joined with Five Dock Council to "ask co-operation of the councils interested in an endeavour to urge the government to either abolish the abattoir at Glebe Island or provide carriage of stock to the Abattoir by rail or water to improve local amenities and roads (Simon Davies, 1984).

Throughout the early 1900s, other schemes were devised to improve the site. The only practical outcome, however, was the replacement of the old Glebe Island Bridge with a new steel swing bridge. An international design competition for a new 'Pyrmont Bridge' was called in 1891. The Department of Public Works submitted a non-conforming design based upon a much larger bridge than specified in the design brief (NSW Heritage Division, 2013). Design of the bridge was led by Percy Allan, who had been appointed Engineer-in-Chief for bridge design in 1896. His assistant engineer was E. M. De Burgh and the junior engineers were H. H. Dare, J. J. Bradfield and J. W. Roberts, all of whom went on to have distinguished careers in public works engineering. Bradfield had charge of the team responsible for the substructure, foundations, abutments and retaining walls for both bridges. Tenders for the construction of both bridges (separate contracts) were invited in March 1899.

For both sites, Allan designed an electrically-operated swing bridge, the earliest use of electrical power for this purpose in Australia. The bridges were considered very innovative at the time of their construction and attracted international attention. For the Glebe Island Bridge, the large pivot pier was

founded on a nest of timber piles capped by concrete, whereas the Pyrmont pivot pier was founded on rock (NSW Heritage Division, 2013).

Construction commenced on the Glebe Island Bridge and Pyrmont Bridge at the same time but Glebe Island involved more extensive (and time-consuming) land resumptions (Figure 7). Over 100,000 tons of mud were dredged to establish the causeway and the fill was obtained by cutting down what was left of the hillock of Glebe Island, producing 5.3 hectares (thirteen acres) of flat land for railway yards and 853 metres (2,800 feet) of deep water frontage for wharfage (NSW Heritage Division, 2013).

Construction of the trussed swing spans at each site was by simple cantilevering out from the steel pivot ring. Where timber trusses were used for the approaches of the Pyrmont Bridge, the Glebe Island Bridge used two steel deck trusses, then stone-faced embankments to reach each shore. The use of steel trusses for the approach spans had been part of Allan's original design for the Pyrmont Bridge but the Parliamentary Standing Committee on Public Works directed that this material be replaced with timber, presumably as a cost-cutting measure. When Glebe Island Bridge was built, Allan's original specification was reinstated (perhaps owing to the use of built-up embankments and shorter approach spans, providing a more economical outcome) (NSW Heritage Division, 2013) (Figure 8).

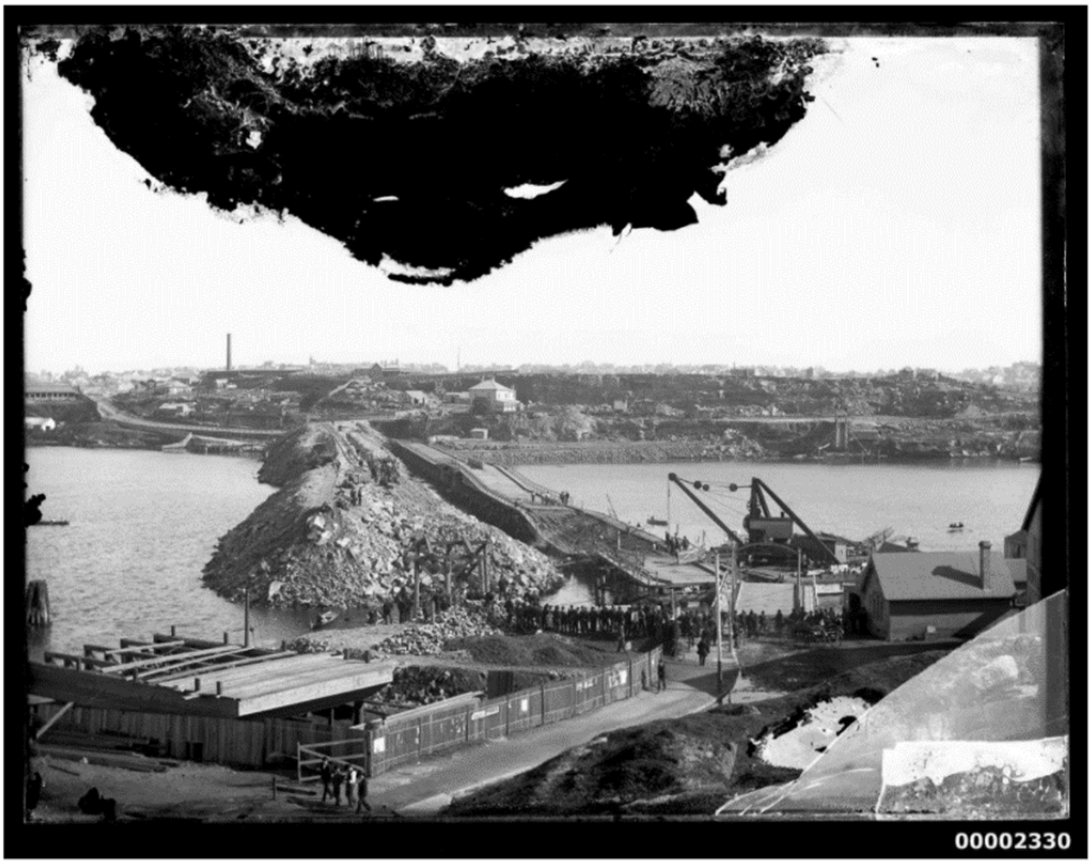

Figure 7 “Glebe Island Bridge collapse” August 1899 (Source ANMM Collection Gift from Bruce Stannard available online)

Figure 8 Glebe Island Bridge c.1910. Note: The pile remains of the first Glebe Island Bridge can be seen cut off near the water level on both sides of the timber fenders associated with the current Glebe Island Bridge (Source Tyrrell Collection held online at the National Library)

Despite the works, by 1902 the Standing Committee had resolved that the best solution to the issue was the construction of a new abattoir at Homebush (Simon Davies, 1984).

Work on the new abattoir commenced in 1910. Glebe Island Abattoir was closed in 1916 (Spearritt, 1978). In 1917 a large fire broke out in some of the buildings that, by that time, were being used by Australian shipping line and merchant Burns Philp for copra storage (dried coconut kernel, used to extract oil). The damage done was extensive and this, as well as the selection of the site for the new grain storage facilities, led to the demolition of the buildings.

Prior to the closure of the abattoir, a scheme was initiated at Glebe Island that may be viewed as a precursor to the later silo programme. In 1913 work commenced on an extensive reclamation and wharfage project designed to facilitate wheat and coal handling at the island. The work was carried out on behalf of the City Rail Commissioners and was instigated as part of an overall goods railway scheme (Sydney Harbour Foreshore Authority Heritage, 1913). This Project had first been discussed and investigated at the turn of the century, being the subject of a parliamentary investigation to determine the value of such improvements to the wharfage scheme of the port.

Work on the scheme continued through until early 1916. At that time, when 1,170 feet of wharfage had been completed, the Chief Commissioner for Railways decided that, because of the plans then in hand for the bulk storage programme, work should cease on the railway scheme. With the acceptance of the silo proposal the wharfage scheme was adopted by the Department of Agriculture and became part of the site works necessary for the development of the bulk wheat handling facility (Sydney Harbour Foreshore Authority Heritage, 1913). Contracts which had been entered into as part of this scheme for cargo handling appliances were also cancelled at this time.

2.4 Silos (1916 – 1921)

In 1915 the American firm of Metcalfe and Co. Ltd offered their services to act as consulting and design engineers for the establishment of bulk facilities in four states. NSW was the only state to accept the invitation (Grain Elevators Board, 1972). In the following year, the State government entered into an agreement with that firm for the supply of full plans and specifications of six types of elevator (Grain Elevators Board, 1972) and an extra one, if required, for terminals at Sydney and Newcastle and four country types for 20,000 pounds as well as a supervision fee for the following five years.

Acceptance of this offer was partially due to the mouse plague that had hampered the storage of bagged wheat in NSW in 1916. Efforts were made to improve storage of bagged wheat, as well as procedures to stop shipping transporting mice around Sydney Harbour.

Initial work for the Sydney site commenced with quarrying work in 1917 designed to prepare it for the silos. The spoil from this work was used to extend the reclamation and wharfage work begun in the period 1913-1916 (“Sydney Harbour Trust Annual Report,” 1917).

Work on the terminal buildings commenced in 1918, after tenders were considered by the committee. The successful tenderer for the construction of the silos was Mr Teasdale Smith (Grain Elevators Board, 1972). The rock blasting was carried out by the Harbour Trust under the direction of the Engineer in Chief.

The silos designed by J. S. Metcalfe and Co. were shaped as large cylindrical bins capable of holding 6,382,000 bushels. On top of the bins were six steel galleries with conveying equipment to direct the wheat, unloaded from trucks, through a tripper into the bins.

By mid-1921 the first phase of the system was near to completion and was so by the end of that year. The final cost of the terminal at this stage was £1,681,392 (Figure 9).

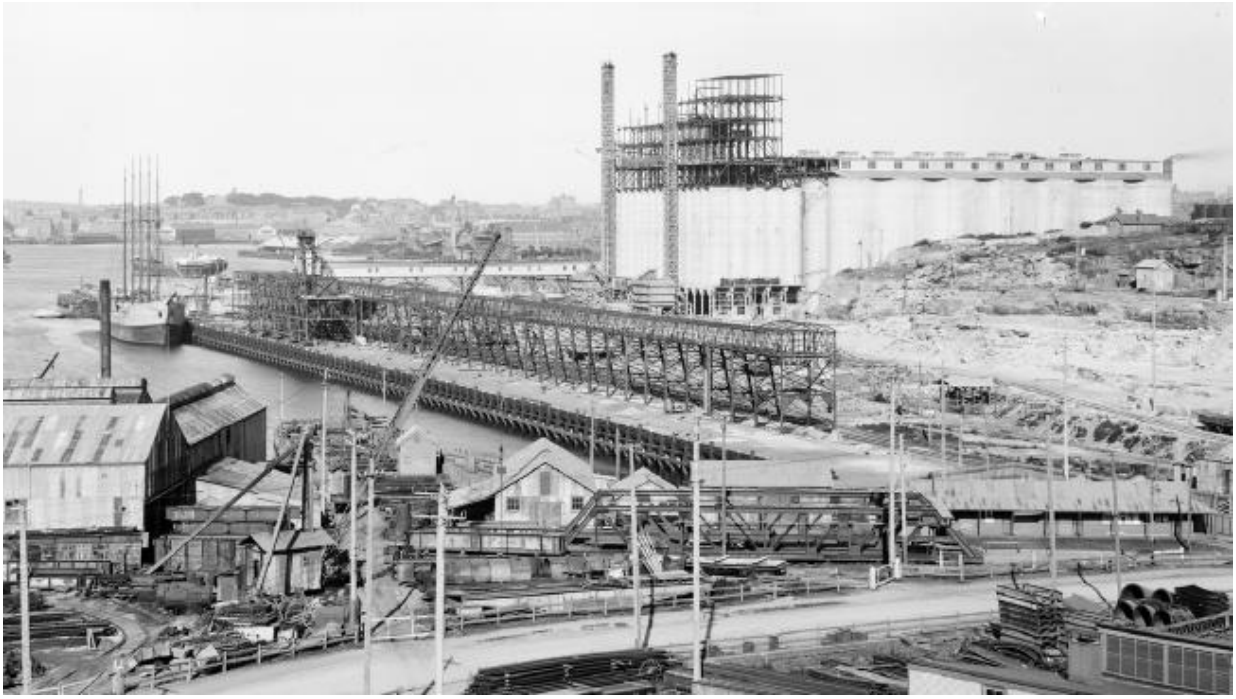

Figure 9 Glebe Island’s wheat silos in a 1920 photo by Arthur Ernest Foster. Picture: State Library of NSW (Series 3 part 2 – file number FL412764)

2.5 Extension of the Facilities (1921 – 1932)

Bulk shipments had commenced at Glebe Island in 1922, but not in sufficient quantities to relinquish the old Darling Island wharves at Pyrmont which, from the 1890s onwards, had formed the focus for grain handling in NSW (Thorp, 1990). By 1925, a total of 63 country silos had been completed and, to facilitate the centralization of all wheat handling at Glebe Island, almost immediately after the completion of the silos further improvements were made to the site to provide more and better services.

Extensions had been made to the wharves in 1922 and much work to improve these facilities was carried out during 1924-1925. By mid-1925 the broadside wharf on the west side of Glebe Island was complete, as was the berth at the north end, and work had begun on similar facilities to the east side. The latter was completed by June 1926 (Grain Elevators Board, 1972).

The principal additions to the site, however, were the provision of facilities to handle bagged wheat. By mid-1926 two large sheds, complete with conveyors, had nearly been completed and railway lines had been laid behind these sheds. Another shed was to be built at the western end of the wharf as well as

an extension to the east and several smaller sheds were planned to be constructed behind the main sheds (Grain Elevators Board, 1972).

By mid-1927 these sheds for bagged wheat had been completed as well as a sub-station and control house. The arrangements were considered to be amongst the best systems in the world (Maritime Services Board, 1939). By this time another shed was under construction at the south-west point of the island and wharfage along the east side was again being extended in a southerly direction. The final completion of this work would provide 1,000 feet of wharfage along this portion of the island (Maritime Services Board, 1939).

In 1928 additional works were added to Glebe Island. A new shed was added to the south-west corner of the island, twelve horizontal conveyors and four elevators. Additional sheds were proposed to the land to the west as well.

By mid-1929, a shed for bagged wheat had been completed on the east side of the Island and the wharf at the north-east corner had been extended a total of 180 feet. By this time total wharfage on the White Bay side of the island amounted to 2,680 feet. Wharfage on the east side was extended nine hundred feet to give a total length of 1,720 feet. A sea-wall was constructed behind the wharves and additional rail facilities were made to connect Glebe Island with the Rozelle system. By mid-1930, two new sheds had been constructed and it was considered, by that time, that there were sufficient facilities to deal with bagged wheat for some considerable period (Grain Elevators Board, 1972).

2.6 Depression through to post WW2 (1932 – 1960)

During the depression years there were poor wheat exports and low shipments at the Glebe Island facilities. This did not improve until 1935 when there were large increases in the wheat production and storage, and a notable shift from bulk shipping exports and decrease in bagged wheat exports (Maritime Services Board, 1967). In 1937 the decision was made to transfer all bagged wheat loading operations to Glebe Island.

During the war years Glebe Island continued to store and export wheat and other cargoes, however the facilities were taken over under the National Security Regulations and its principal function became as a major armament and engineer's supply depot for the US Army. It was also used to dis-embark and re-embark troops. The RAAF also used certain sheds for storage. Of immediate advantage in the post-war years was the opportunity to purchase, by the Maritime Services Board, buildings and services constructed on the island for military purposes. This occurred and several were converted for port purposes (Reynolds, 2008).

Following the war though, several of the facilities at Glebe Island continued to be used for military purposes, in particular the storage of supplies to be shipped to Japan.

2.7 Later use and development (1960 – 2000)

The increase in wheat production saw an excess in wheat that required storage. A new 700 foot long concrete decked berth was built at Glebe Island to accommodate the larger more modern grain loading facilities. The other existing berths at Glebe Island were also being re-constructed at the same time. Additional silos and associated elevators were constructed during the 1970s to facilitate the modernisation and increases needed in storage capacity.

The function of the site as a grain silo ceased in 1984. During the later 1980s and early 1990s activity at the terminal had scaled down and several other uses had been adopted for the site. In 1993, for example, berths were leased as a vehicle import terminal (Maritime Services Board, 1974).

3.0 Archaeological Potential and Significance

3.1 Archaeological Potential

Based on the historic development of Glebe Island and the physical remains, an understanding of the potential historical archaeological remains present within the Site can be made.

The major development phases and impacts to Glebe Island occurred to convert it for use as the Sydney Abattoir. In the lead up to this in the 1850s, Glebe Island was cleared and a series of wharves and roads were constructed. These were constructed largely to the southern side of the existing Glebe Island Bridge, and therefore not within the Site.

To the north of the Glebe Island Bridge during this period, a few structures are present on historical plans. A cottage was built to the east of the Site located in the area above the rock cutting along Sommerville Road. Two jetties are also shown on these early plans to the north of the Site. Both the cottage and the two jetties were located outside of the Project area.

The location of the first Glebe Island Bridge was located on the northern side of the existing Glebe Island Bridge. The bridge was a lower pile and timber decked bridge located immediately to the north of the approach embankments of the present Glebe Island Bridge and located within the Site. The original bridge was constructed out of Blackbutt timber piles. The approach to the bridge on the western side appears to have included an earthen embankment with potential stone abutments. It is common practice when former wharves and bridges are demolished, that piles and other remains associated with the former structures would be built over. After the construction of the current Glebe Island Bridge, the former bridge was removed to allow for safe navigation through the new swing bridge into Black Wattle Bay. There is no information relating to the specific removal of those piles, either within water or on land. An early photograph from the 1920s when the Glebe Island Bridge had been constructed shows the remains of some of the piles from the former bridge still present in the water (Figure 8). It is therefore considered likely that evidence of the Bridge remains *in situ.* Any excavation below the current hardstand adjacent to the Glebe Island Bridge would have the potential to expose archaeological remains associated with the first Glebe Island Bridge (Figure 10).

The reclamation works that took place from 1917 onwards for the construction of the grain storage development and ultimately the construction of the grain silos, extended the land available to the east of the former Glebe Island foreshore. There is low potential for archaeological remains associated with the reclamation works to be present below the current hardstands on the Site behind the line of current wharves. The archaeological potential would be limited to fill material only and is not expected to have any archaeological research value.

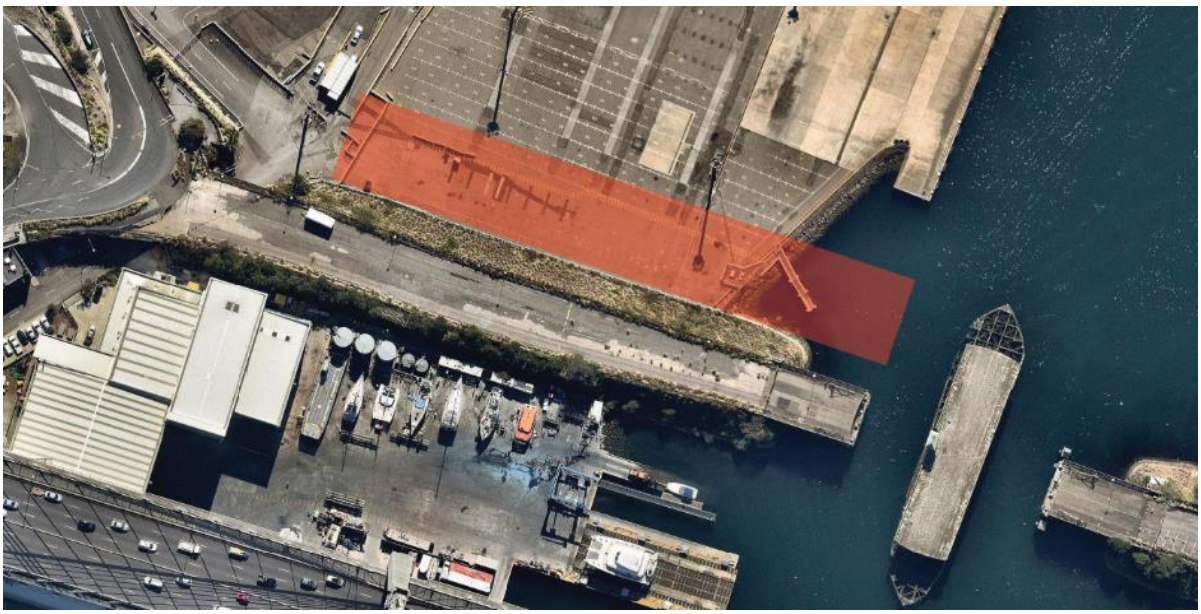

Figure 10 Area of identified archaeological potential (shown in red) associated with the alignment of the first Glebe Island Bridge

3.2 Archaeological Significance

The archaeological significance associated with the first Glebe Island Bridge has been assessed against the criterion outlined by the NSW Heritage Council (NSW Heritage Branch, 2009; NSW Heritage Office, 2001). Table 1 provides an assessment of the significance of the potential archaeological remains that may be present.

Table 1 Archaeological significance assessed against NSW criteria

Criterion	Assessment
Criterion (a) *– an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area).*	The first Glebe Island Bridge has historical significance at a State level as it relates to the first crossing west of Pyrmont that assisted the expansion of the city of Sydney. The bridge was an important crossing heading west that allowed for a more direct route for produce to reach the markets in Sydney. The bridge was a private toll bridge completed in 1862 and replaced the earlier punt crossing. The Bridge contributes to a historical understanding of how private enterprise filled the gaps in public road infrastructure and influenced the shape of the city. The bridge was constructed of Tasmanian Blackbutt timbers and included a hand cranked swing span located at the Pyrmont side of the bridge.
Criterion (b) – an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local to area).	The first Glebe Island Bridge was a private Toll Road until the Government purchased the bridge in 1884 and abolished the tolls. The bridge is not likely to be associated with any one person in particular or associated with the life works of a group of people of cultural importance to the area.
Criterion (c) *– an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local*	The first Glebe Island Bridge was designed to allow for watercraft to pass through it via a hand cracked swing span at the Pyrmont end of the bridge and represents a design that allows for both road and maritime traffic to operate, although not concurrently. The bridge was also constructed from Tasmanian Blackbutt, known to be

Criterion	Assessment
area).	a timber used in marine construction due to its natural resistance to marine borer attack. The use of this type of timber and importing large quantities from Tasmania for the bridge's construction required a high degree of technical knowledge and ingenuity. Archaeologically, the remains of the first bridge crossing are not considered to have aesthetic characteristics.
Criterion (d) *– an item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons.*	The first Glebe Island Bridge was a valuable asset to the Sydney Community. It was used by the local butchers and abattoir workers and other produce growers to be able to access markets in Sydney more directly and in less time. The bridge also allowed for domestic growth alongside the commercial development for the inner western suburbs. As the Bridge was demolished in 1902, it is considered that this social significance has attenuated and the Bridge does not meet the threshold for listing under this criterion.
Criterion (e) *– an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area). Significance under this criterion must have the potential to yield new or further substantial information.*	It is anticipated that archaeological remains associated with the first Glebe Island Bridge may be present within the reclamation area on Glebe Island. There is also the potential for the abutments and approach on the western side of the bridge to be present within the same reclamation area. It is also possible that cut down piles are extant within the seabed crossing. If present, the archaeological remains would have research potential to provide information relating to the construction and design of this bridge which is not available elsewhere as there are no known extant plans. If present, the archaeological remains associated with the first Glebe Island Bridge would meet this criterion at a State level.
Criterion (f) – an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area).	The archaeological remains associated with the first Glebe Island Bridge are considered to be rare as they relate to the only known Tasmanian Blackbutt bridge structure built in Sydney when it was constructed in 1862. The remains are limited to the piles and other structural remains that may not have been salvaged when it was removed in 1902. As such, the archaeological remains are considered to be rare as information relating to this bridge would only be available from the limited historical photographs and from the archaeological record.
Criterion (g) *– an item is important in demonstrating the principal characteristics of a class of NSW's (or local area's):* - *cultural or natural places cultural; or* - *natural environments.*	The Archaeological remains, if present, are not likely to demonstrate the principal characteristics of a class of NSW's natural or cultural places or environments. The Bridge does not meet this criterion at a State or local level.

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4.0 Archaeological Research Design

4.1 Historical Themes

The following table identifies the relevant State historical themes and how these themes are represented.

Table 2 Historical themes

National Theme	State Theme	Local Theme
3. Developing Local, Regional and National Economies	Technology - Activities and processes associated with the knowledge or use of mechanical arts and applied sciences	Technologies of bridge building Technologies for adapting road transport to maritime systems
3. Developing Local, Regional and National Economies	Transport - Activities associated with the moving of people and goods from one place to another, and systems for the provision of such movements	Road Bridge
8. Culture-Developing cultural institutions and ways of life	Creative endeavour - Activities associated with the production and performance of literary, artistic, architectural and other imaginative, interpretive or inventive works; and/or associated with the production and expression of cultural phenomena; and/or environments that have inspired such creative activities	Technological innovation and design solutions

The archaeological investigations have the potential to contribute to an understanding bridge design and technology associated with the early expansion of Sydney.

4.2 Research Framework

The investigation is aimed at undertaking archaeological monitoring of construction works in the vicinity of the expected alignment of the first Glebe Island Bridge. As the project is being undertaken as a SSD project under the EP&A Act, the provision to apply for approvals under the *Heritage Act* are not required. This does not, however, turn off the requirement to undertaken the necessary archaeological works that have been identified for the Project.

4.2.1 Research Questions

How was the first Glebe Island Bridge (1860-1900) constructed?

Is there any evidence of modifications and alterations present in the archaeological remains of this bridge?

What was the quality of the materials used in the bridge? Was copper sheathing used? Were pile shoes used to help drive in piles? What were the spacing of piles and the size and standard of fastenings? Does this say something about the choice to use Tasmanian Blackbutt and not a locally available material or the level of importance placed on the bridge by the private design and operators?

What can it tell us about the engineering skills available to the colony within the first few decades of European settlement?

What, if any, do the artefacts associated with the site tell us about the use of the bridge?

4.3 Archaeological Approach

The objective of this investigation is to archaeologically record remains associated with the first Glebe Island Bridge if present within the Project area. The archaeological works would be undertaken in conjunction with construction excavation works. Specifically, excavation required for the footings for the silos would be directly within the alignment for the former bridge (Figure 10). Archaeological monitoring is being proposed as the excavation for the silos will be deep and require shoring to prevent the excavation area from collapsing (Figure 11).

Archaeological monitoring will be undertaken until any remains of the former bridge are identified, such as piles or other associated timbers. If piles are exposed that are assessed as being *in situ,* mechanical excavation between the piles will continue under the direction of the archaeologist. When an appropriate section of piles have been exposed, the piles will be recorded as to their dimensions and any observations, such as construction method, shaping and condition.

In the event that relics are encountered, mechanical excavation will cease and manual excavation by the archaeological field team will commence where it is safe to do so. If depth of excavation and/or ground water does not make it safe to manually excavate, soil material will be excavated mechanically and will be placed adjacent to the Site where the material can be inspected by the archaeological team.

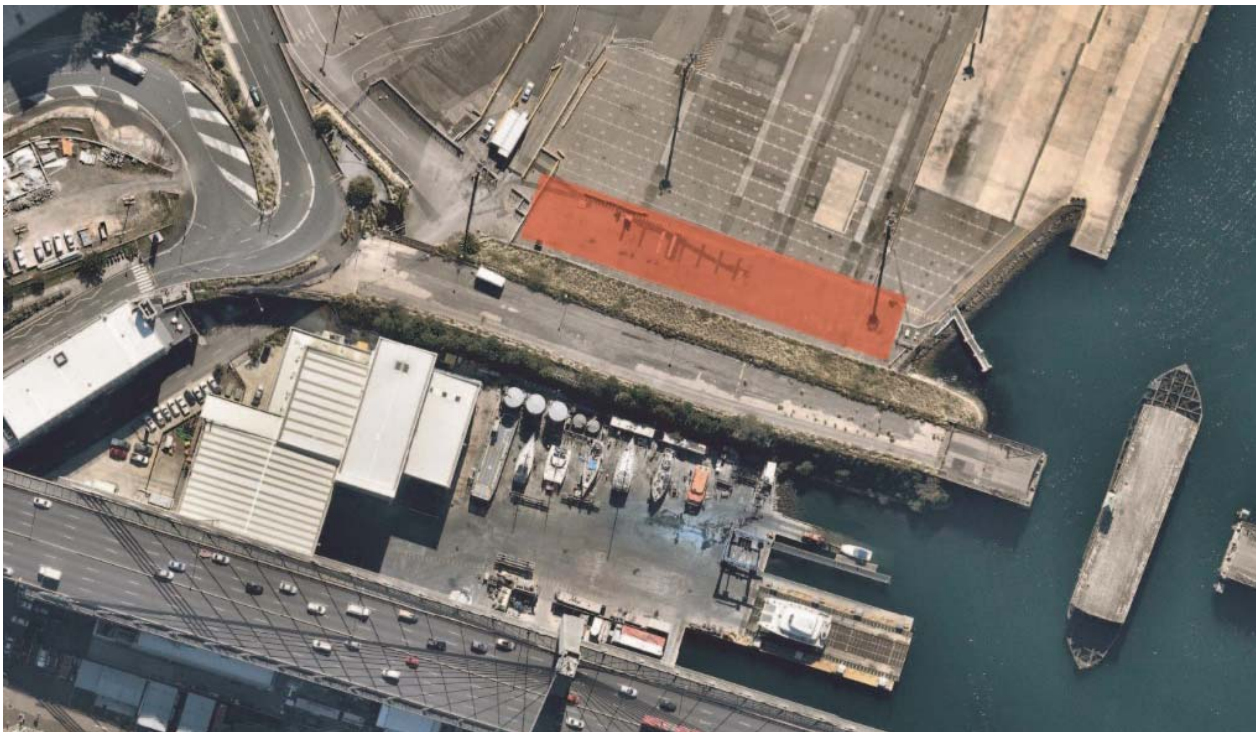

Figure 11 Approximate areas for archaeological monitoring and excavation (shown in red).

4.4 Methodology

The following methodology would be implemented by the nominated excavation director Chris Lewczak:

- Establish a survey datum to record the location of the features, deposits and/or relics;
- Existing hard stand will be removed as per the construction requirements;
- Excavation of the fill material below the hardstand will be undertaken under the supervision of the excavation director. The preferred method would be with the use of a batter bucket, however, if the fill material is too course or tightly packed, a toothed bucket may be used but only after consultation with the excavation director;

- If individual timbers, not including piles, are encountered, those timbers would be recorded to the depth and location where they were uncovered, and would be removed from the trench. Timbers would be placed in a safe area away from the immediate construction area where they can be recorded in detail;
- If *in situ* piles are uncovered, excavation around the piles will continue with the use of the mechanical excavator. When sections of the pile(s) are exposed, cleaning of the piles and recording will be undertaken by the archaeological team;
- Excavation around the piles will continue until the base of the excavation required for construction works is reached;
- Archaeological excavation and/or cleaning with hand tools would be undertaken, as required, in order to define the feature, deposits and/or relics that are encountered during excavation works;
- All features and bridge remains will be recording using Differential Global Positioning Systems (DGPS);
- Scaled plans and cross-sections will be prepared, as required;
- Photographically record all phases of the monitoring and recording with an appropriate photographic scale and photographic log;
- Complete a context recording form for each feature, which would be sequentially numbered and record the location, dimensions and characteristics of the feature, context and/or spit;
- Artefacts would be bagged according to the feature, context and/or spit from which they were retrieved. Artefacts would only be retrieved where leaving them in situ may endanger their integrity;
- Should substantial or intact deposits and/or relics of State or local significance be identified, they would not be removed or excavated. The deposits and/or relics would be protected with geo-fabric and temporary fencing while mitigation measures are discussed and determined by Heritage Division, OEH, Sydney City Council and excavation director Chris Lewczak; and
- A report would be produced detailing the monitoring, including the implementation of the methodology, the results of the monitoring and an assessment of the ability of the information to answer the research questions provided in Section 4.2, together with discussion of answers provided. The following headings will be used as a minimum and should include any additional requirements included in the Section 139 exception:

    1. Executive Summary
    2. Introduction
    3. Site History
    4. Research Design
    5. Methodology
    6. Monitoring results, including descriptions of features and artefacts identified (if any)
    7. Analysis
    8. Conclusion and future management recommendations (if required).

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