

Parramatta Wharf Interchange Upgrade

Review of Environmental Factors

Roads and Maritime Services | April 2018



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Prepared by WSP Australia Pty Ltd and Roads and Maritime Services



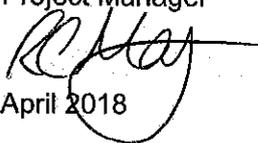
RMS.18.808

ISBN: 978-1-925797-20-6

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Document controls

Approval and authorisation

Title	Parramatta Wharf Interchange Upgrade Review of environmental factors
Accepted on behalf of Roads and Maritime NSW by	Rosie Majer Project Manager
Signed	
Dated	April 2018

Document status

Document status	Date	Prepared by	Reviewed by
Draft (C1-C3)	February 2018	Phil Burns/ Chris Serrano/ Ellie Horner	Emma Dean
Draft (C1-C6)	March 2018	Phil Burns/ Chris Serrano/ Ellie Horner	Andrew Cook
Draft	April 2018	Phil Burns/ Chris Serrano/ Ellie Horner	Andrew Cook
Final	April 2018	Phil Burns/ Chris Serrano/	Emma Dean

Executive summary

The proposal

Roads and Maritime Services (Roads and Maritime) proposes to upgrade the existing wharf interchange at Parramatta (the proposal). The proposal includes both land and waterside upgrades of the wharf interchange.

The waterside features of the proposal would include:

- Removal of the existing gangway, pontoon and associated wharf structures, including existing piles and gangway
- Installation of a new three-metre wide by 18-metre long gangway
- Installation of a 7.5-metre wide by 27-metre long floating covered and glazed pontoon, held in position by four new piles
- Minor excavation to provide sufficient depth for the new pontoon
- Installation of five new protection piles.

The landside features of the proposal would include:

- Modification of the existing seawall and excavation to underlying sandstone to accommodate the new pontoon, permanently removing 30 square metres and replacing 70 linear metres of the existing gabion construction with a contiguous pre-cast concrete wall solution
- Removal of existing Roads and Maritime communications equipment and signage under the existing shelter
- Removal of an existing raised stormwater drain within the shelter
- Installation of new wayfinding signage around the interchange.

An overview of the proposal is shown in Figure ES-1.

Construction of the proposal is anticipated to start in mid-2018 and it would take about six months to complete the work. Construction work would not be continuous as it would rely on delivery schedules. Prefabricated wharf components, equipment and materials would be delivered to site on barges. The construction program would also be coordinated with the upgrade of Rydalmere Wharf Interchange, which would be constructed simultaneously due to access constraints within the Parramatta River.

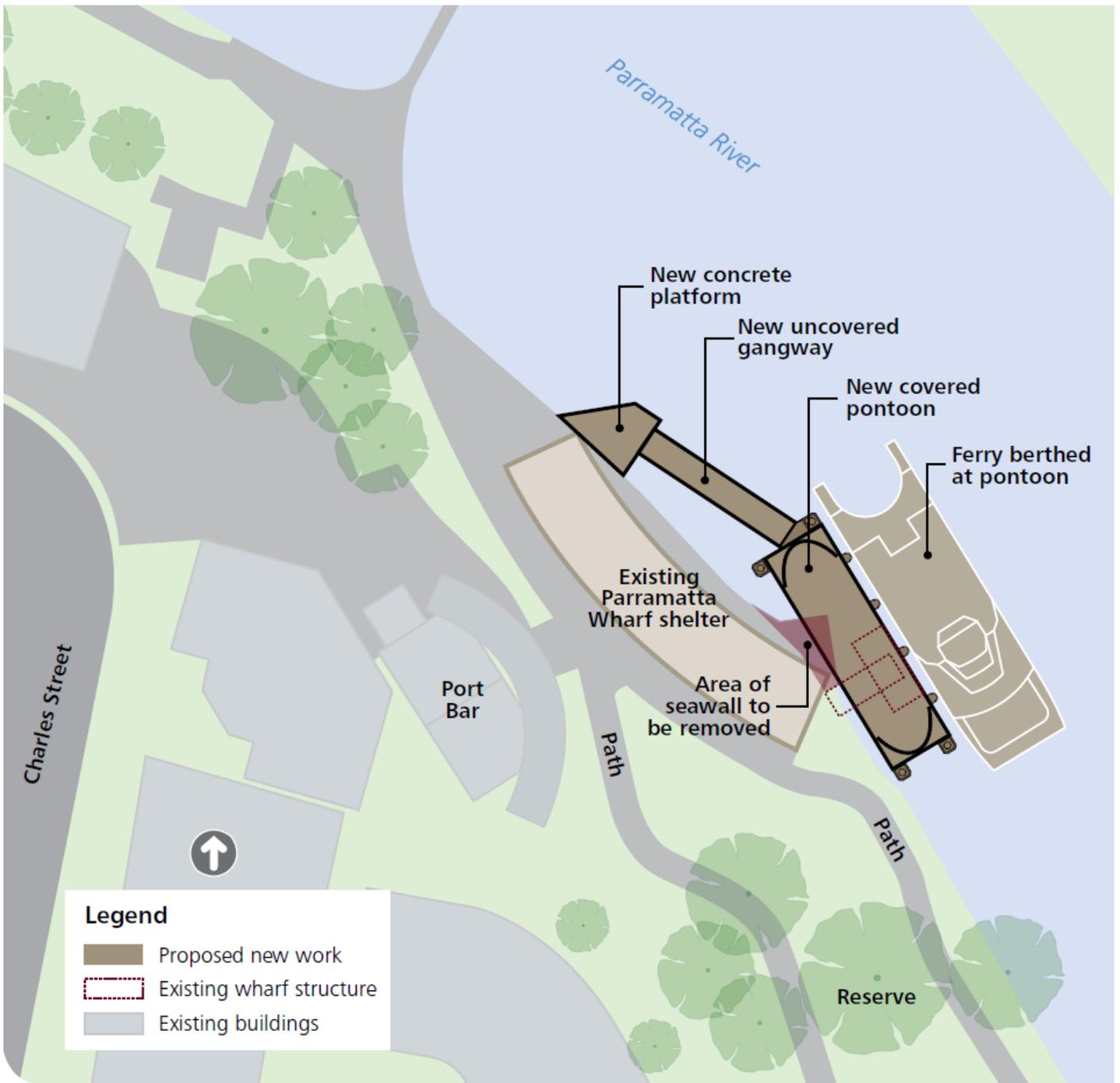


Figure ES-1: Overview of the proposal

Need for the proposal

The need for the proposal was identified in response to Transport for NSW's Transport Access Program; an initiative to deliver accessible, modern, secure and integrated transport infrastructure.

The Disability Standards for Accessible Public Transport 2002 (DSAPT) and Disability (Access to Premises – Buildings) Standards (2010) (Disability Standards 2010) made under the *Disability Discrimination Act 1992* (DDA), require all public transport infrastructure, including wharves, to have fully compliant disabled access by 2022.

It was concluded that the Parramatta Wharf Interchange needed upgrading due to the lack of an accessible pathway for less mobile passengers.

Proposal objectives and development criteria

Objectives were developed to respond to the proposal's need. They included improving access, and passenger amenity, maintaining customer safety, reducing maintenance frequency and cost, and preventing unnecessary environmental and social impacts.

Options considered

Two options to upgrade the wharf interchange were considered in addition to the strategic option of 'do-nothing'. The do-nothing option was discounted as it would not meet the objectives of the proposal to provide an accessible pathway for less mobile passengers. The preferred option is to replace the wharf in its existing location, rather than relocate. The replacement option was considered to have the least social and environmental impacts while complying with the operational requirements of Harbour City Ferries, who operate the ferry network. It would also provide improved access for less mobile passengers.

Roads and Maritime first announced the proposed upgrade of Parramatta Wharf Interchange in May 2015, providing information and inviting the community to an information session that was held on 24 May 2015 at the Parramatta Wharf. Roads and Maritime have also been consulting with key stakeholders including the City of Parramatta Council since 2015 to develop a design which is acceptable to Council as owners and operators of the landside elements of the proposal. Consultation with City of Parramatta Council on the preferred concept design was carried out in early 2018. This resulted in refinements to the design and construction of the seawall, which is detailed in section 2.7 of this REF.

Statutory and planning framework

State Environmental Planning Policy (Infrastructure) 2007 permits development on any land for the purpose of a wharf or boating facilities to be carried out by or on behalf of a public authority without consent.

As the proposal is for the purpose of a wharf or boating facility and is to be carried out by Roads and Maritime, it can be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). As such, development consent from Council is not required. The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974*.

Community and stakeholder consultation

Consultation with the Foreshore and Waterways Planning and Development Advisory Committee, relevant utility authorities and the City of Parramatta Council has been carried out. Additionally, a community information session was held on 24 May 2015 to inform the concept design, which is described further in section 5.2.

Stakeholder consultation would continue during the public display of this document, with a community information session planned for 10 May 2018 to capture feedback during the public display period. Should the proposal proceed to construction, consultation with the community and stakeholders would continue throughout the construction phase.

Benefits

The proposal is expected to deliver the following benefits:

- Provision of a modernised accessible wharf that is consistent in its design with the recent upgrade of the wharves on the network
- Improved passenger comfort and security through weather protection, ample seating, customer information, CCTV and lighting
- A resilient wharf design that includes tolerances to allow for future sea level rise and more extreme weather events.

Environmental impacts

The main environmental impacts of the proposal and the safeguards and management measures to address the impacts are summarised below.

Land surface, hydrology and water quality

The proposal would require excavation of filled materials to the underlying sandstone as part of the seawall modification and to provide sufficient depth for the new pontoon during all tidal conditions. There would also be localised sediment disturbance during construction from installing and removing piles. This disturbance would be limited to a small area around each pile.

Sediments within the proposal footprint are known to contain elevated concentrations of selected heavy metals and pesticides. Acid sulfate soils may also be encountered.

Safeguards have been proposed to prevent potential sediment dispersion including installing a silt boom and curtain around the construction area for the duration of the work. Additional activity-specific management measures and procedures would be developed by the contractor to prevent sediment and sediment laden water entering any watercourse, drainage line or drain inlet.

Water quality within the upper Parramatta River is known to be generally poor, due to impacts from stormwater discharge and altered flow regimes further upstream. With the inclusion of the proposed safeguards, existing water quality is not anticipated to be significantly impacted during construction and operation of the proposal.

The proposal, potentially including construction compounds, is located on flood prone land. Weather forecasts and warnings issued by the Bureau of Meteorology would be monitored during construction, with an Emergency Response Plan prepared to detail specific actions such as minimising stockpiles through construction to be undertaken to prevent potential impacts in the event of a flood or major storm event.

During operation, there would be negligible impacts to the land surface or hydrology as the operation of the proposal would be consistent with current ferry wharf operations, with the existing position of the berthing face maintained by the proposal. No further disturbance of the land based environment would occur during operation of the proposal.

Biodiversity

The proposal would include reprofiling of the riverbed to provide sufficient depth for the pontoon, defined as dredging under the provisions of the *Fisheries Management Act 1994* (FM Act). Further consultation would be undertaken with the NSW Department of Primary Industries prior to construction, following the determination of this REF. This would include confirming the detail design and undertaking notification requirements of the FM Act prior to construction.

There would be direct impacts to about 110 square-metres of type 3 (minimally sensitive) key fish habitat from the installation and removal of piles and modification to the seawall. This includes habitat formed on existing piles and seawall, although habitat would re-establish over time on the upgraded wharf.

An indirect loss of 249 square-metres of type 3 key fish habitat through shading would also occur. The total loss of 359 square-metres would be partly offset by 324 square-metres of hard substrate habitat created by the proposal. Given much of impact is partial shading of unvegetated substrate, no habitat compensation or offsets are required.

The main safeguards to minimise the impact of construction on aquatic biodiversity include:

- Maintaining fish passage to the Charles Street Weir fish ladder for *Macquaria novemaculeata* (Australian Bass) and other fish species
- Reducing vessel speeds in the construction area to minimise wash and disturbance to aquatic vegetation
- No anchoring or mooring of construction vessels in intertidal rock habitat areas
- Avoiding impacts to aquatic habitat located near the proposal, including mangroves.

Noise and vibration

A Noise and Vibration Impact Assessment report concluded there would be exceedances of the noise criteria during certain construction activities. These exceedances and the mitigation proposed include:

- Up to 14 dB(A) for up to 65 private residential buildings in Parramatta, south of the Parramatta River, during modification of the seawall. This work would be undertaken during standard hours between 7am and 6pm, with the noisiest activity of jackhammering to be undertaken intermittently over a period of three months
- Up to 9 dB(A) for up to 65 private residential buildings in Parramatta, south of the Parramatta River, during lifting in pre-fabricated units from a barge mounted crane which would be undertaken intermittently during standard hours between 7am and 6pm, over a period of three months
- Up to 11 dB(A) for up to 65 private residential buildings in Parramatta, south of the Parramatta River, during pile installation (drilling) and hammering of the drilled piles which would be undertaken during standard hours between 7am and 6pm. Pile installation would be undertaken intermittently, with two weeks work required in total
- Fifteen piles would be installed over a period of about two weeks, and work would occur intermittently during this period, with short periods of high noise followed by longer periods where no activity would occur. During pile hammering, it is anticipated that each pile would be hammered for one minute (about 10 hits with the hammer within one minute). For each pile this activity is likely to occur about five times over a period of one hour
- The community would be kept informed of construction activities at least five days before they are undertaken, with a community information email and phone line provided to take enquiries and follow up on complaints. About 2,000 residences would be individually informed of construction activities via a letterbox drop, and 65 of these would be contacted directly prior to noisy activities, such as piling, commencing.

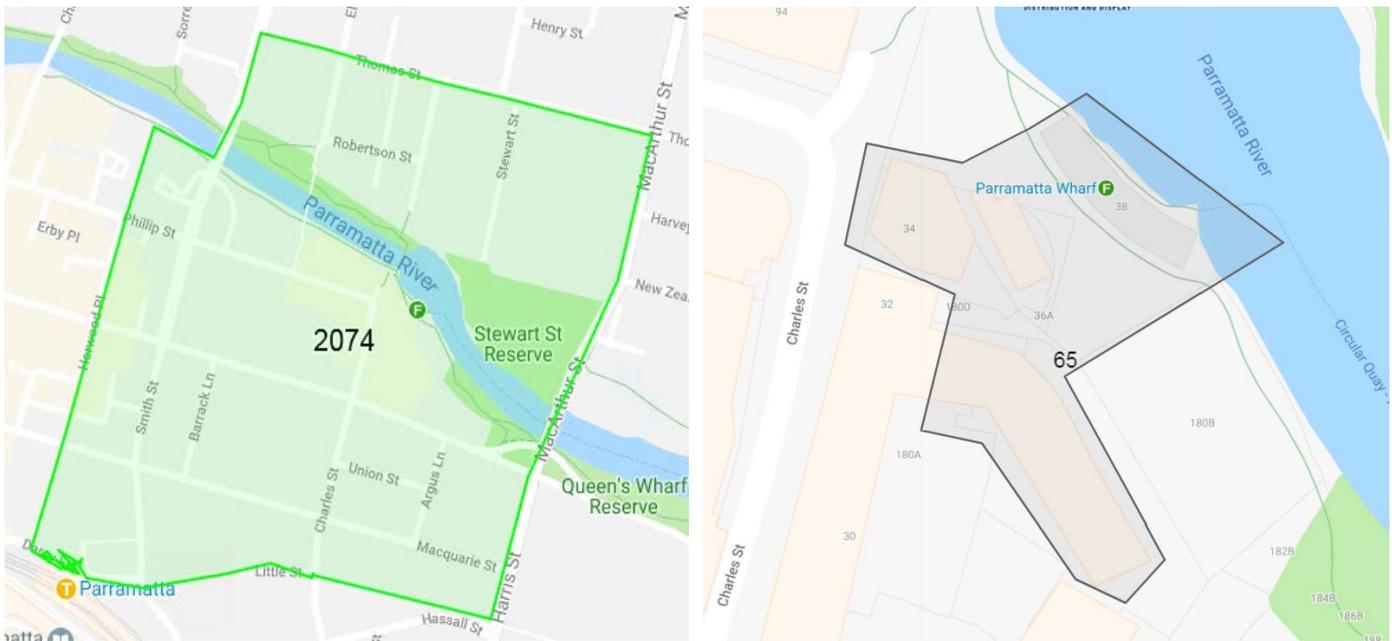


Figure ES-2: Proposed notification areas

Landscape character and visual amenity

The proposal would have a low to moderate impact on landscape character, with long-term impact minimised through retaining the wharf within its existing location.

The proposal's design would have a low visual impact due to the new larger structure which would provide additional capacity. However, the open design of the pontoon and gangway aim to reduce the impact of the proposal on existing views.

The visual impact of the proposal would be minimised further through safeguards proposed in the Landscape and Character Visual Impact Assessment included as Appendix F.

Aboriginal heritage

Stage 1 of the Roads and Maritime Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) was completed for the proposal, which concluded the proposal was unlikely to have an impact on Aboriginal cultural heritage and did not require further investigations or assessment.

The Standard Management Procedure – Unexpected Heritage Items (Roads and Maritime, 2015) would be followed in the event that unrecorded Aboriginal object(s) are identified during construction.

Non-Aboriginal heritage

The proposal is not expected to impact on non-Aboriginal heritage items, with no heritage items identified within the vicinity of the proposal footprint.

A former wharf identified as the 'Charles Street Wharf' was historically located within or near the proposal footprint, however was likely removed during construction of the existing seawall and Parramatta Wharf in 1993. If remnants of the wharf are identified during construction the 'unexpected heritage items procedure' in the *Standard Management Procedure: Unexpected Heritage Items* would be followed.

Further heritage safeguards would be implemented as described in the Statement of Heritage Impact report included as Appendix G.

Socioeconomic, traffic and transport

Surrounding businesses and ferry users would be impacted for up to six months during construction. It is anticipated that alternative transport would operate for the duration of construction. In addition, the section of the Parramatta River between Sydney Olympic Park Wharf, Rydalmere Wharf and Parramatta Wharf would be closed, which would prevent ferries accessing this part of the river.

Alternative transport would operate for the duration of the closure between Parramatta Wharf and Sydney Olympic Park Wharf via South Street Rydalmere. Ferry users that would typically use Parramatta Wharf would be able to catch a temporary bus service, route 535, to Sydney Olympic Park Wharf, which would connect with F3 Parramatta River ferry services. Ferry users travelling to or from the city could also catch existing train services on the T1 Western Line or existing bus services on route M52 from Parramatta to Circular Quay via Victoria Road.

Pedestrian access around the interchange during construction would be maintained, although this would be impacted with some accesses narrowed or closed and pedestrians redirected.

Safeguards would be implemented to manage vehicle and pedestrian movement throughout construction. However, it is anticipated that the majority of plant and materials would be delivered via water.

Indirect impacts to local businesses in the broader area would occur from closure of the wharf and during noisy construction activities. Further consultation would be undertaken with the community to identify sensitive periods, and where possible the noisiest activities would be scheduled outside of these.

Delivering plant and materials via barge would increase waterside vessel movements around and within the proposal footprint; however, the impact of this would be minimised through the preparation of a Marine Traffic Management Plan.

Cumulative impacts

Cumulative impacts relate to any combined impact resulting from multiple individual sources. The proposal is part of a broader program of work to upgrade the commuter ferry wharves in Sydney, referred to as the Ferry Wharf Upgrade Program. The upgrade of Parramatta Wharf Interchange would be coordinated with the upgrade of Rydalmere Wharf Interchange, constructed simultaneously due to access constraints within the Parramatta River. Coordinating the wharf upgrades would reduce the duration of river closure, compared with a progressive sequential construction program.

The proposed Parramatta River Escarpment Boardwalk and the Sydney Metro – Clyde Barging Facility were identified as external projects with potential cumulative impacts. These may include a minor increase in construction related traffic, noise and socioeconomic impacts. Roads and Maritime would consult with the relevant proponents prior to the commencement of construction to minimise potential cumulative impacts.

Further consideration of potential cumulative impacts and safeguards associated with the proposal is provided in section 6.13 of this REF.

Justification and conclusion

The need for the proposal was justified under the Transport Access Program as the existing structure does not provide access which complies with DDA and DSAPT standards. The assessment of the environmental and social impacts has determined the proposal is not likely to have a significant impact and therefore assessment under Division 5.2 of the EP&A Act is not required.

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Appendix G	Statement of heritage impact
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1 Introduction

This Chapter introduces the proposal and provides the context of the environmental assessment. The proposal objectives and development history are outlined and the purpose of the report provided.

1.1 Proposal identification

Roads and Maritime Services (Roads and Maritime) proposes to upgrade the existing wharf interchange at Parramatta (the proposal) as part of the NSW Government's Transport Access Program (TAP, <https://www.transport.nsw.gov.au/projects/tap>, refer to section 2.1).

The proposal is located within the local government area (LGA) of the City of Parramatta Council. The Parramatta Wharf Interchange is located on the southern side of the Parramatta River, adjacent to the Charles Street Weir, at the end of the navigable channel between Parramatta River and Sydney Harbour.

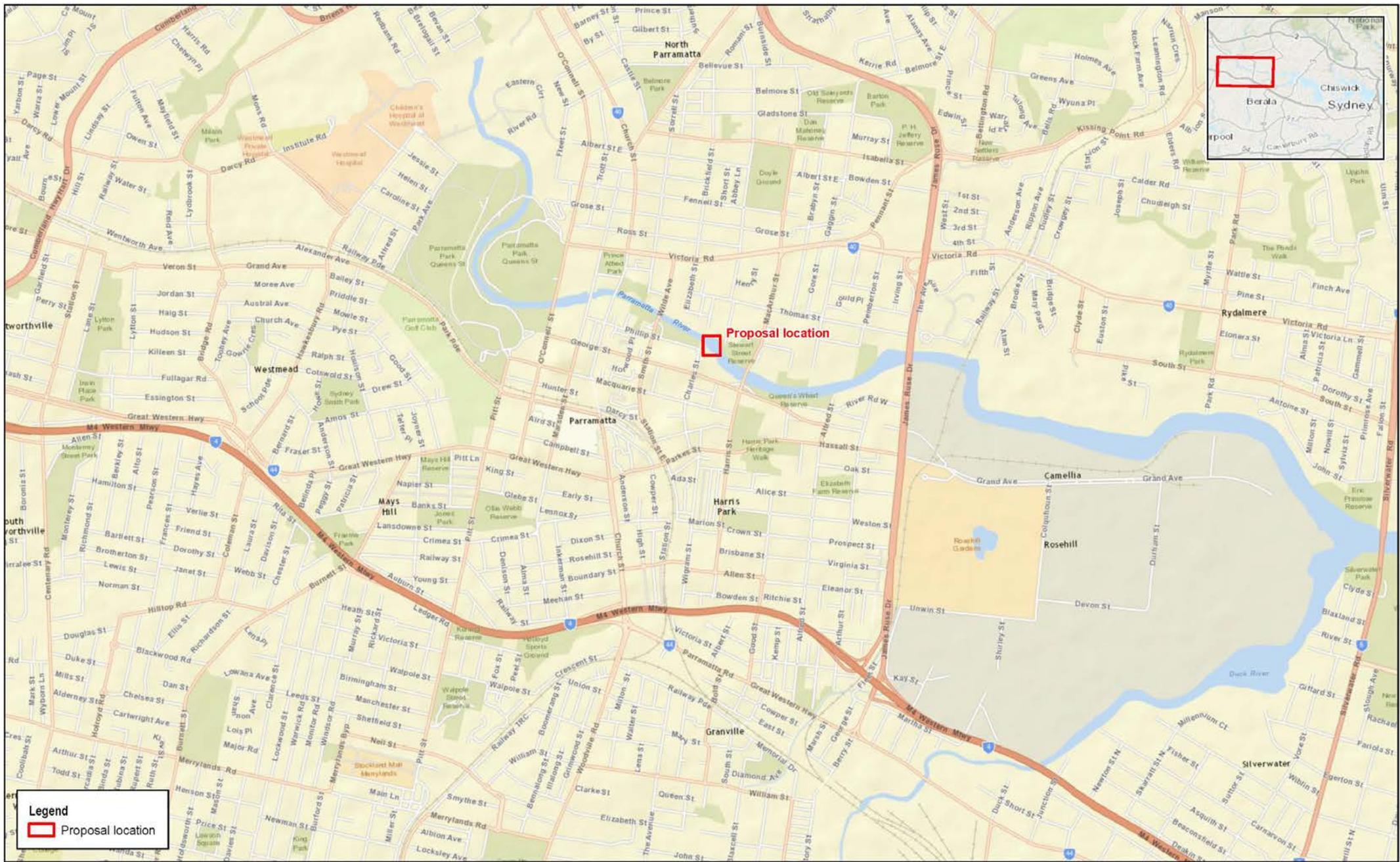
Figure 1-1 and Figure 1-2 show the regional and local setting respectively. The wharf is part of the F3 Ferry Service that operates between Circular Quay and Parramatta. The proposal is to improve access to the wharf, and upgrade and install a gangway and floating pontoon to allow for more efficient passenger services. The key features of the proposal are shown in Figure 1-3.

The waterside features of the proposal would include:

- Removal of the existing gangway, pontoon and associated wharf structures, including existing piles and gangway
- Installation of a new three-metre wide by 18-metre long gangway
- Installation of a 7.5-metre wide by 27-metre long floating covered and glazed pontoon, held in position by four new piles
- Minor excavation to provide sufficient depth for the new pontoon
- Installation of five new protection piles.

The landside features of the proposal would include:

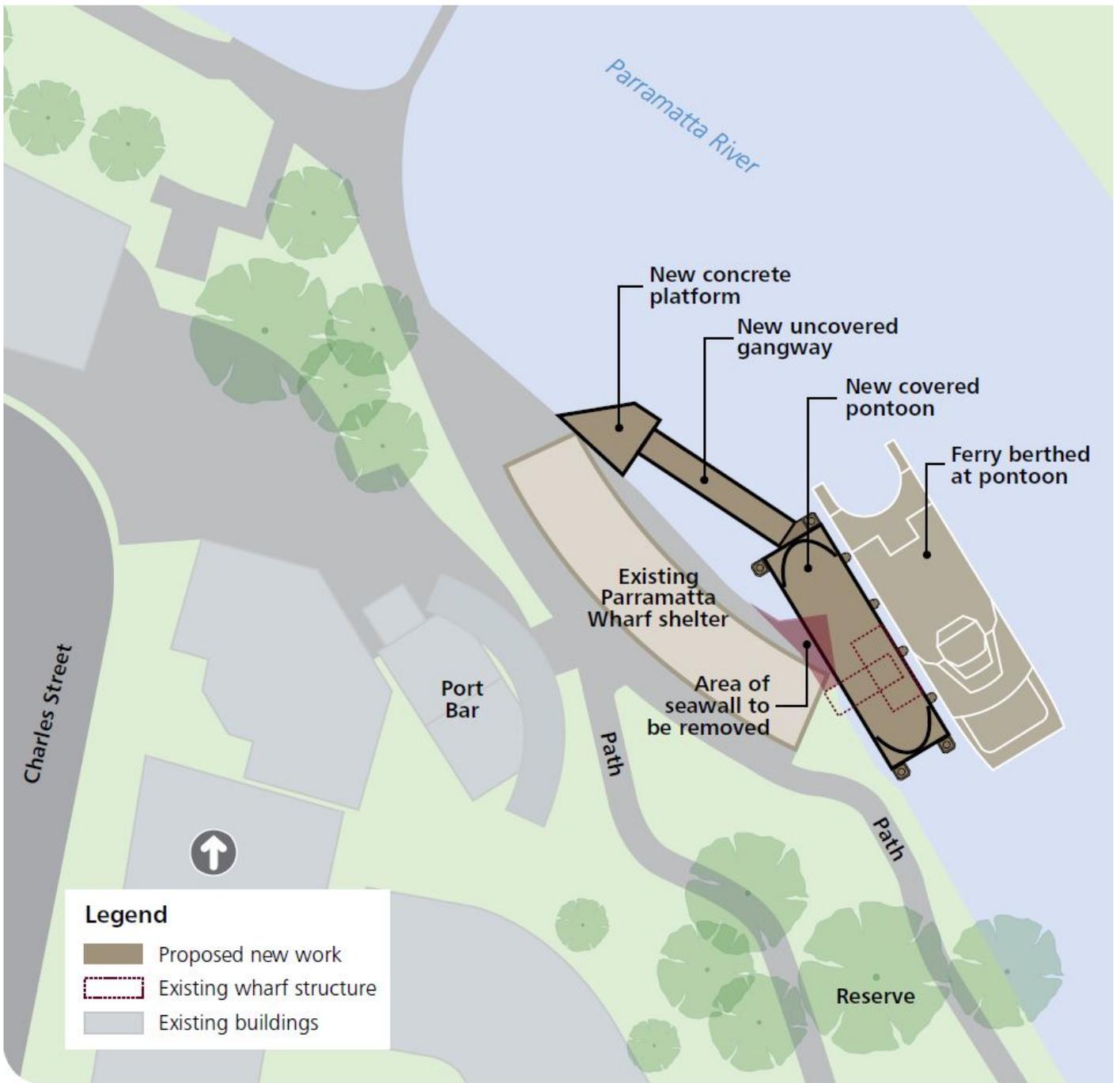
- Modification of the existing seawall and excavation to accommodate the new pontoon, permanently removing 30 square metres and replacing 70 linear metres of the existing gabion construction with a contiguous pre-cast concrete solution
- Removal of existing Roads and Maritime communications equipment and signage under the existing shelter
- Removal of an existing raised stormwater drain within the shelter
- Installation of new wayfinding signage around the interchange.



Map: PS106920_GIS_F004_A2	Author: MitchellEm		 1:20,000
Date: 26/04/2018	Approved by: -		
<small>Data source: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, Geobase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), Swisstopo, Mapbox Contributors, and the GIS User Community Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Swisstopo</small>			
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Figure 1-1
Regional setting



Source: Roads and Maritime

Figure 1-3: Key features of the proposal

1.2 Purpose of the report

This review of environmental factors (REF) has been prepared by WSP Australia Pty Ltd on behalf of Roads and Maritime. For the purposes of these works, Roads and Maritime is the proponent and the determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of the REF is to describe the proposal, to document the likely impacts of the proposal on the environment, and to detail mitigation and management measures to be implemented.

The description of the proposed work and assessment of associated environmental impacts has been undertaken in the context of clause 228 of the Environmental Planning and Assessment Regulation 2000, the factors in *Is an EIS Required? Best Practice Guidelines for Part 5 of the Environmental Planning and Assessment Act 1979* (Is an EIS required? guidelines) (DUAP, 1995/1996), and the *Marinas and Related Facilities EIS Guideline* (DUAP, 1996), the *Biodiversity Conservation Act 2016 (BC Act)*, the *Fisheries Management Act 1994 (FM Act)*, and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*.

In doing so, the REF helps to fulfil the requirements of Section 5.5 of the EP&A Act including that Roads and Maritime examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning under Division 5.2 of the EP&A Act
- The significance of any impact on threatened species as defined by the BC Act and/or FM Act, in section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report
- The potential for the proposal to significantly impact any matter of national environmental significance or Commonwealth land and the need to make a referral to the Australian Government Department of the Environment and Energy for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.

2 Need and options considered

This chapter describes the need for the proposal in terms of its strategic setting and operational need. It identifies the various options considered and the selection of the preferred option for the proposal.

2.1 Strategic need for the proposal

The Transport Access Program (TAP) is an ongoing “initiative to deliver modern, safe and accessible transport infrastructure” in NSW (Transport for NSW, 2015). The focus of the program is improving access to the transport network for less mobile passengers. Thus, Roads and Maritime assessed the condition of all ferry wharves across the transport network in 2009 in terms of:

- Safety and structural integrity
- Access for less mobile and disabled passengers
- Existing and predicted future patronage and use.

The Disability Standards for Accessible Public Transport 2002 (DSAPT) and Disability (Access to Premises – Buildings) Standards (2010) (Disability Standards 2010) made under the *Disability Discrimination Act 1992* (DDA), require all public transport infrastructure, including wharves, to have fully compliant disabled access by 2022.

It was concluded that the Parramatta Wharf Interchange needed upgrading or relocating due to its non-DDA compliant gangway.

The proposal was also developed to respond to the objectives of various Government policies as described below.

2.1.1 Transport Access Program (TAP)

The aims behind the above objective of the TAP are to:

- Improve the accessibility for passengers who use wheelchairs and prams by removing stairs and supplying ramps
- Build facilities for all transport modes to meet the needs of a growing population
- Provide an effective and seamless interchange that supports an integrated transport network
- Deliver safety and signage improvements to help with the customer user experience
- Provide other aesthetic improvements.

Ferry Wharf Upgrade Program

The Ferry Wharf Upgrade Program forms part of the TAP. Its objectives are to:

- Improve access for less mobile people
- Improve passenger amenity
- Improve passenger embarking/disembarking times
- Develop an iconic design across the commuting wharf network
- Cater for current and future passenger numbers
- Minimise customer and wharf operator impacts during any refurbishment and upgrade work
- Minimise ownership and maintenance costs
- Ensure the design complies with current safety laws
- Discourage inappropriate activities on public wharves
- Aim to comply with the DDA by 2022.

This proposal has been developed to respond to, and comply with, these objectives.

2.1.2 Future Transport Strategy 2056

The Future Transport Strategy 2056 (Transport for NSW, 2018) is an update of the Long Term Transport Master Plan for NSW (Transport for NSW, 2012). It is a 40 year strategy, supported by plans for Greater Sydney and Regional NSW, which sets the vision, directions and outcomes for customer mobility. The Future Transport Strategy sets six state-wide outcomes to guide investment, policy and reform and service provision, which includes:

- A customer focus
- Successful places
- Growing the economy
- Safety and performance
- Accessible services
- Financial and environmental sustainability.

The upgrading and expanding the ferry wharf network, as part of the ferry wharf upgrade program, would support meeting the above objectives of this Strategy.

2.1.3 Supporting NSW strategies and policies

The proposal is also supported under the policies, goals, objectives and targets of several other strategic planning documents as summarised in Table 2-1.

Table 2-1: Supporting NSW strategies and policies

State Infrastructure Strategy 2018-2038

The strategy identifies the NSW Government's infrastructure vision for the state over the next 20 years, across all sectors. It is supported by the Future Transport Strategy 2056. As passenger numbers are expected to notably increase in the future, this proposal responds to the above by improving the wharf infrastructure and access provisions at Parramatta.

Disability Inclusion Action Plan 2018-2022

The Disability Inclusion Action Plan 2018–2022 is Transport for NSW's plan for delivering high quality services to all customers including those with disability, including compliance with the disability standards outlined below.

Disability standards

The Disability Standards for Accessible Public Transport (DSAPT, 2002) and Disability (Access to Premises – Buildings) Standards (2010) form part of the DDA. Each prescribe the minimum accessibility standards for disabled access to public transport services and infrastructure, including a timetable for implementation. The proposal meets the above requirements within the timeframes specified in both standards by providing suitable access for people with a disability.

State Priorities: Making it Happen 2015

The proposal would:

- Improve the existing transport infrastructure, consistent with the *building infrastructure* priority
- Be built and would operate under environmental safeguards and management measures to avoid and minimise environmental impacts consistent with the *keeping our environment clean* priority.

2.2 Existing infrastructure

The existing infrastructure at Parramatta includes the wharf and landside interchange infrastructure.

The existing Parramatta Wharf Interchange does not currently meet the DSAPT or DDA requirements, as it does not allow for equitable access to the wharf or for boarding the ferry. The wharf currently enables Harbour City Ferries to operate a ferry service for passengers between Circular Quay and Parramatta.

Table 2-2 summarises the existing wharf elements and descriptions of current infrastructure.

Table 2-2: Existing wharf infrastructure

Element	Description
Existing infrastructure	<p>Existing wharf, comprising:</p> <ul style="list-style-type: none"> • A gangway about two-metres wide by six-metres long • A pontoon about four-metres wide by six-metres long. <p>Landside infrastructure appears to be located on previously reclaimed land, including:</p> <ul style="list-style-type: none"> • A seawall, constructed in 1993 with the existing wharf (refer to section 6.8). Consisting of a front row of gabions and concrete surface. A small triangular section of seawall extends out on the western side of the existing wharf • Waiting shelter with seating, and Aboriginal art installations (refer to section 6.9) • Pedestrian access from Charles Street and Phillip Street via a series of ramps and stairs • Shared cycle and pedestrian path running along the foreshore via the Parramatta Valley Cycleway • Eight secure bicycle lockers • Five bicycle racks.
Operation	<ul style="list-style-type: none"> • Parramatta Wharf Interchange operates as part of the F3 Parramatta River ferry route between Sydney and Parramatta • Ferry services typically operate every 60 minutes towards the city and every 60 minutes towards Parramatta. Supplementary ferry services also operate on Sundays to support higher customer demand on this day • Shuttle buses replace ferry services between Parramatta and Rydalmere wharves during low tide due to the shallow depth of the Parramatta River • Used by about 500 passengers per day each weekday on average.
Land Ownership	<p>Land owned by Roads and Maritime:</p> <ul style="list-style-type: none"> • Waterside elements of the wharf, including the gangway and pontoon (partially unincorporated land, and partially within Lot 2 of deposited plan (DP) 869816). <p>Land owned by the City of Parramatta Council:</p> <ul style="list-style-type: none"> • Landside ancillary services, including existing shelter (Lot 2 DP 869816).

Existing infrastructure is displayed in Figure 2-1.



Source: Roads and Maritime

Figure 2-1: Existing infrastructure of the Parramatta Wharf Interchange

2.2.1 Future patronage

The ferry patronage data indicates that the Parramatta Wharf Interchange is primarily utilised by recreational users during off-peak periods, with much lower patronage during weekday peak hours. Parramatta is well serviced by rail, with comparative journey times indicating journeys from Parramatta to Sydney's central business district (CBD) are significantly faster via rail versus ferry. As such, ferry travel forms a secondary travel option for commuters from Parramatta.

2.3 Proposal objectives and development criteria

This section lists the proposal's objectives and development criteria.

2.3.1 Proposal objectives

The objectives for the Parramatta Wharf Interchange upgrade are to:

- Improve:
 - Its operation as an effective transport interchange
 - Access for passengers with a disability
 - Passenger safety
 - Passenger comfort and shelter from the wind, rain and sun
 - Seating and waiting areas on the wharf
 - Boarding, disembarking times, and queuing
- Maintain:
 - Passenger amenity, enjoyment, and harbour views
 - Pedestrian and cycleways

- Reduce:
 - Maintenance frequency and cost through materials selection that allows for easy cleaning and limited repair
 - Vandalism through the appropriate use of materials, surfaces and designs
- Prevent:
 - Unnecessary environmental and social impacts.

2.3.2 Development criteria

The proposal has been developed against the following themes and principles for transport interchange design (Making Interchange Places, Transport for NSW, 2012).

Table 2-3 outlines the relevant development criteria used to help design the proposed wharf and select a preferred option.

Table 2-3: Development criteria for this proposal

Theme	Relevant principles
Meet customer needs and improve the transport experience	Provide: <ul style="list-style-type: none"> • Safe, efficient and convenient passenger access • A comfortable, enjoyable and positive customer experience.
Optimise public transport access	Provide: <ul style="list-style-type: none"> • Access to employment, services, recreation and education • Seamless interchange • Connection into existing and future transport networks.
Integrate with interchange investment and land use plans	Embrace heritage and cultural values.
Anticipate growth and changes in demand	Safeguard future extension and property development opportunities based on predicted growth.
Ensure sustainability and future public transport network performance	Deliver sustainable solutions that minimise environmental and community impacts that are adaptable to climate change and include new technologies.

The proposal has also been developed against the following priorities (Ferry Wharf Upgrade Program: Business Requirements Specification, TAP, 2014):

- Pedestrian access
- Bicycle access and storage
- Bus access
- Taxi access
- Private car
 - Drop off and pick-up
 - Park and ride, with accessibility priority.

2.3.3 Urban design objectives

The proposal's urban design objectives include:

- Minimising:
 - Clutter and visual impacts through careful material selection that responds to the local setting
 - Interruption to views and impacts on the public domain and realm
- Retaining and enhancing:
 - Pedestrian infrastructure and access
 - Connectivity with active transport (walking and cycling) and public transport modes and provisions
 - Setting and relationship to the foreshore and surrounds in terms of the public domain and the integration into landscape.

2.4 Alternatives and options considered

This section describes the alternatives and options considered to deliver the proposal.

2.4.1 Methodology for selection of preferred option

The method by which Roads and Maritime developed options for the proposal considered:

- Existing and future:
 - Passenger use and accessibility
- Existing:
 - Engineering design requirements and current structural integrity
 - Passenger safety
 - Environmental and social constraints
 - Build cost
 - Stakeholder feedback.

2.4.2 Identified options

Potential options to upgrade the Parramatta Wharf Interchange were identified through consideration of:

- 'Do nothing', which involves no upgrade. However, regular maintenance of the existing wharf infrastructure would continue'
- Demolishing the existing wharf and building a new wharf in an alternate location (relocation)
- Demolishing the existing wharf and building a new wharf in its existing location (replacement).

The suitability of these options was determined through an analysis of existing wharf infrastructure, potential constraints and performance against the proposal objectives against the proposal objectives outlined in section 2.3.1.

A key constraint for the proposal is the shallow depth (bathymetry) of the Parramatta River between Parramatta and Rydalmere, ferries are currently restricted to operating within a narrow channel to the wharf, with the surrounding area too shallow to allow ferries to operate. Due to the shallow depths of the Parramatta River, it was identified that alteration of the current ferry route would require dredging.

2.4.3 Analysis of options

Analysis of the identified options is provided in the sections below.

Do nothing

The option of 'do nothing' would be to limit the scope of work to carrying out activities consistent with those required to maintain operation of the existing wharf, including undertaking regular maintenance. As this option would include minimal change, it would present the lowest capital cost and environmental impact. The wharf currently operates with a gangway and pontoon that is not DDA compliant at low tides, and the proposal objective of improving access for passengers with a disability would not be achieved.

Although it would present minimal capital cost and environmental impact, the 'do nothing option' was discounted as it would not meet the objectives of the proposal to improve accessibility, passenger safety and comfort for future patronage over the long-term.

Relocation of the wharf

The Parramatta Wharf is also located adjacent to the Charles Street Weir, which acts as a barrier for ferry movements to the west. Any relocation of the wharf would likely occur further to the east, away from the Parramatta CBD and associated services.

The Parramatta Wharf Interchange is located close to the Parramatta Central Business District (CBD) and is close to other public transport services providing an effective interchange.

Potential options to relocate were considered, however the section of river between Parramatta and Rydalmere was identified to be highly constrained by environmentally sensitive areas such as mangroves. Access to services and infrastructure was also limited.

Relocation of the wharf further east would also likely require a significant amount of dredging of river sediments to build a new wharf and create a navigable channel for ferries. A suitable location with similar landside infrastructure was not identified during development, and therefore relocating the wharf would not provide any additional benefit compared to other options.

Replacement of the wharf

Replacement of the wharf would include demolishing the existing waterside structure, and construction of a new DDA compliant wharf to maintain the existing berthing face whilst providing a larger gangway and pontoon, enabling users to wait close to the berthing face and improving the efficiency of boarding and disembarking.

Due to the existing depths of the Parramatta River in this section, in order to maintain the existing berthing face whilst replacing the existing structure, modification of the existing seawall, including localised reprofiling of the riverbed would be required. The excavation would largely be limited to soils within the seawall, with less disturbance of river sediments compared to relocating the wharf, which would require a significant amount of dredging. The excavation could also be undertaken mostly from land, allowing environmental controls to be implemented to prevent potential release of sediments to the river (discussed further in section 6.1) to avoid unnecessary environmental impacts.

As the berthing face would be orientated to match the existing, the option to replace of the wharf in its existing location would also avoid any requirements for dredging a new navigable channel, as no change in current ferry operations would be required.

2.5 Preferred wharf option

The options considered above would equally achieve a number of the proposal objectives in section 2.3.1.

The option of 'do nothing' would not achieve DDA compliance and/or sustain the long-term operation of the wharf and were discounted.

Further, the environmental and social impacts of relocating wharf are considered unnecessary as the Parramatta Wharf Interchange currently operates in a suitable location. The option to relocate the wharf also did not provide any benefits over replacing the wharf in its existing location. The option to relocate the wharf was subsequently discounted.

Overall, the option to replace the wharf in its existing location was identified to best meet the proposal objectives including:

- Improve; its operation as an effective transport interchange, access for passengers with a disability passenger safety and comfort, seating, and boarding and disembarking times
- Maintain; passenger amenity, and pedestrian and cycleways
- Reduce; maintenance frequency and cost compared to the 'do nothing' option
- Prevent unnecessary environmental and social impacts, when compared with relocating the wharf.

After selection of the concept design, sub-options for orientation of the new gangway and pontoon were considered. As discussed above, the sub-options considered included maintaining the berthing face of the pontoon in its existing location to avoid impact to existing ferry operations. The gangway orientated to the west was selected as it maintains links to the bus stop and Charles Street and Phillip Street.

Whilst this option would require modification of the seawall, the potential environmental impacts would be less than the option to relocate the wharf, and would be able to be mitigated with the safeguards detailed in Chapter 6.

2.6 Preferred landside options

Following selection of the preferred wharf option, consideration was then given to potential options for upgrade of the interchange. During discussions with the City of Parramatta Council, it was identified that Council planned to upgrade parts of the interchange and surrounds, which is identified in the Charles Street Square Strategy (Hassel, 2017), discussed further in section 4.1.2.

As such, the landside elements were limited to minor upgrades required to complete the wharf upgrade, including:

- Modification to the existing seawall and stormwater drainage to facilitate the new wharf
- Removal of existing Roads and Maritime communications equipment and signage under existing shelter for relocation to the new pontoon
- Installation of new wayfinding signage around the interchange.

Figure 2-2 shows the preferred concept design.



Source: Hansen Yuncken

Figure 2-2: Preferred concept design

2.7 Design refinements

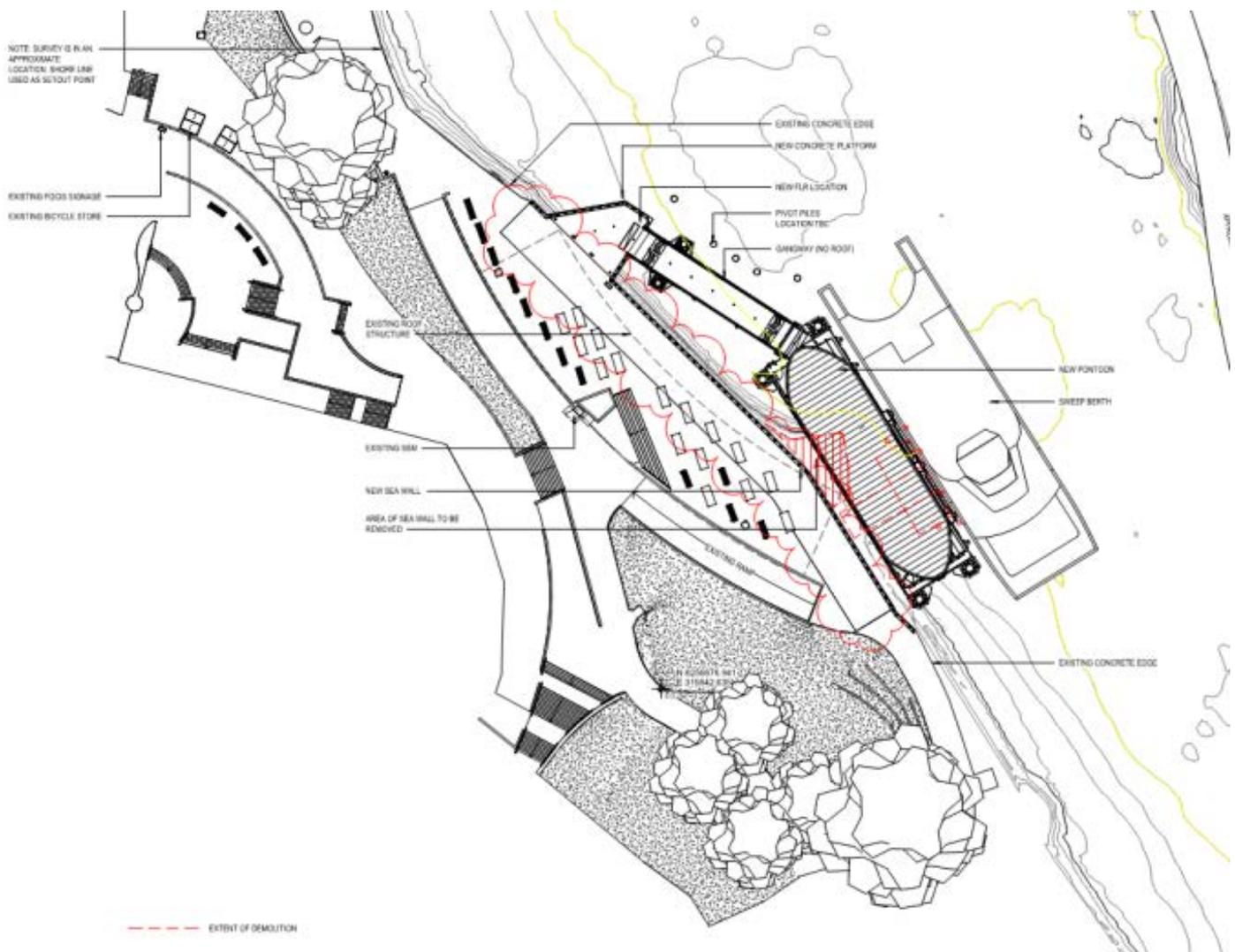
Once the preferred option was selected, the concept design was presented to key stakeholders. The design was subsequently refined as a result of feedback from the City of Parramatta Council.

Consultation on the preferred concept was carried out in February and March 2018 and resulted in the following refinements:

2.7.1 Seawall modification

Once the preferred option was selected, the concept design was presented to key stakeholders for feedback in early 2018. Feedback received from City of Parramatta Council included changing the design of the seawall to provide a contiguous pre-cast concrete facing. Council also requested increasing the extent of the seawall modification through the length of the proposal to reduce future maintenance requirements in areas where access to the seawall would be reduced as a result of the proposal. The preferred concept design was modified to address this feedback.

Figure 2-3 shows the revised wharf concept design.



Source: Hansen Yuncken

Figure 2-3: Final concept design

3 Description of the proposal

This Chapter describes the proposal, its design and the construction methods that would be used to build it.

3.1 The proposal

The proposal is to upgrade the Parramatta Wharf Interchange as part of the TAP.

The waterside features of the proposal would include:

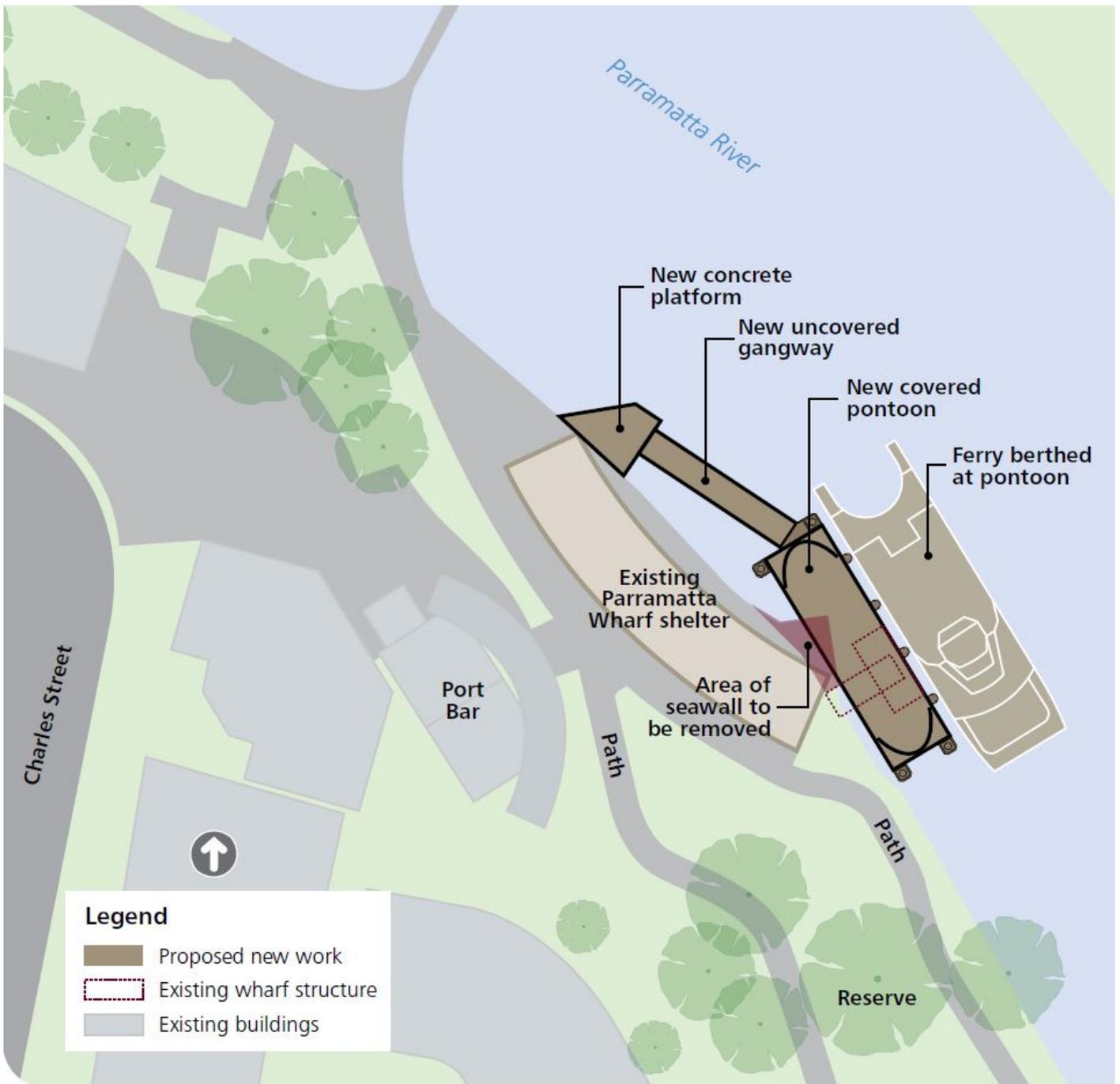
- Removal of the existing gangway, pontoon and associated wharf structures including existing piles and gangway
- Installation of a new three-metre wide by 18-metre long gangway
- Installation of a 7.5-metre wide by 27-metre long floating covered and glazed pontoon, held in position by four new piles
- Minor reprofiling of the riverbed to provide sufficient depth for the new pontoon
- Installation of five new protection piles.

The landside features of the proposal would include:

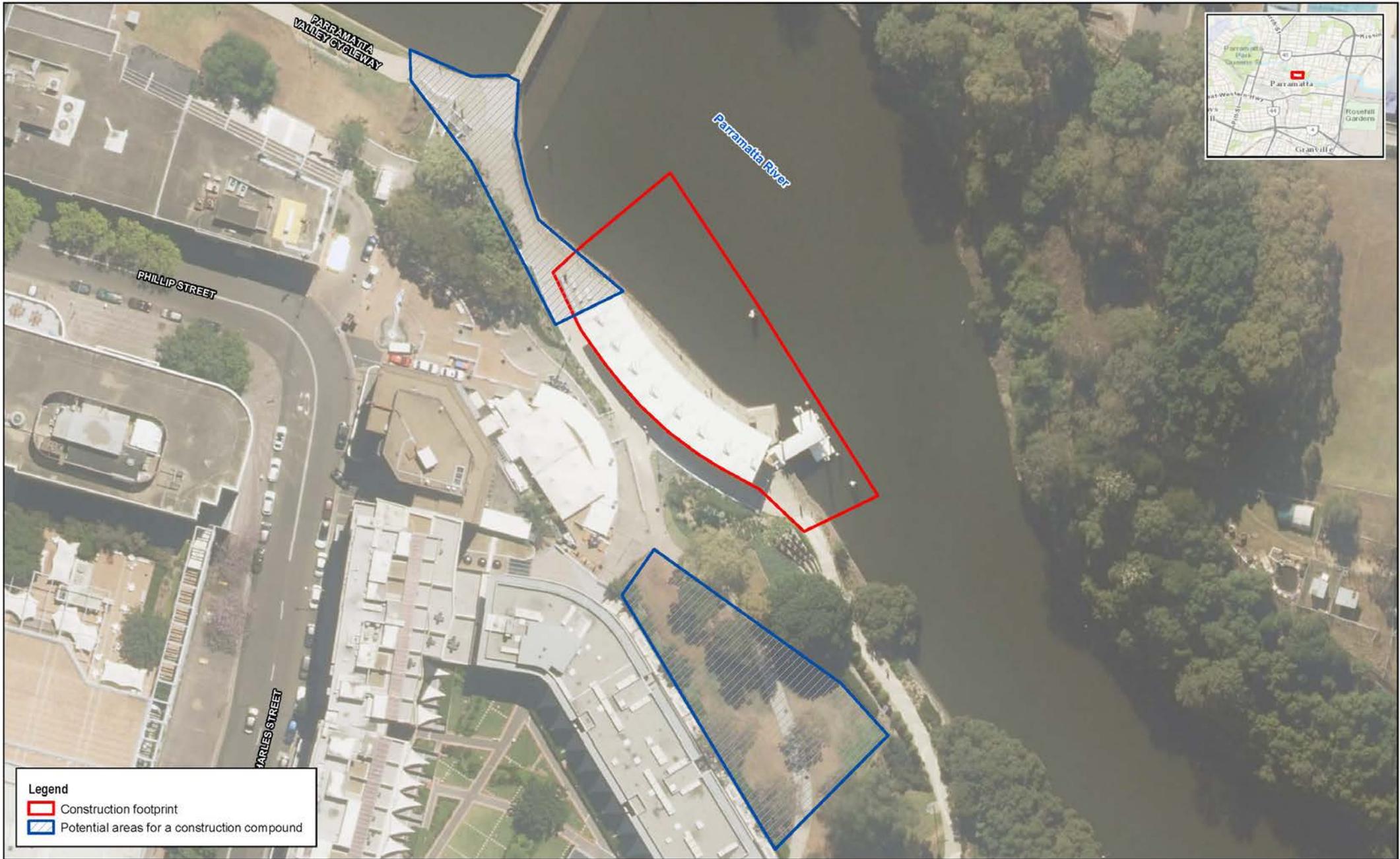
- Modification of the existing seawall and excavation to accommodate the new pontoon, permanently removing 30 square metres and replacing 70 linear metres of the existing gabion construction with a contiguous pre-cast concrete solution
- Removal of existing Roads and Maritime communications equipment and signage under the existing shelter
- Removal of an existing raised stormwater drain within the shelter
- Installation of new wayfinding signage around the interchange.

Figure 3-1 shows the proposals waterside and landside elements respectively.

Figure 3-2 shows the proposal's construction footprint, and the location of the supporting ancillary facilities (ie site compounds, refer to section 3.4), which comprises the indicative assessment area.



Source: Roads and Maritime
 Figure 3-1: The proposal



Legend

- Construction footprint
- Potential areas for a construction compound

Map: PS106920_GIS_F006_A3	Author: MitchellEm
Date: 26/04/2018	Approved by: -




1:650

Coordinate system: GDA 1994 MGA Zone 56
 Scale ratio correct when printed at A3

Data source: Sources: Esri, HERE, DeLorme, Intermap, iPCorp, SwBCO, USGS, FAO, NPS, NRCAN, EsriBNA, IGN, Intermap, Inc., Swisstopo, Esri, Japan, METI, Esri China (Hong Kong), Swisstopo, Mapbox, © OpenStreetMap contributors, and the GIS User Community
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NSW Roads and Maritime Services

Parramatta Wharf Upgrade Review of Environmental Factors

Figure 3-2
Construction footprint

3.2 Design

This section describes the proposal's concept design.

3.2.1 Design criteria

The proposal has been designed to NSW and Australian maritime engineering and safety standards, including:

- Roads and Maritime: Guidelines for the Assessment of Public Ferry Wharf Safety 2016
- Building Code of Australia (BCA): landside and superstructure
- Australian Maritime Safety Authority (ASMA): navigation and safety
- Standards Australia: AS4997: 2005 Guidelines for the Design of Maritime Structures
- Disability Discrimination Act 1992 (DDA).

These standards describe a summary of the key standards that should be adopted when building specific maritime structures by providing detail on:

- Overall height above the water to allow operation during extreme low and high tide, while additionally allowing for flooding and climate change adaptation in the future
- Access and safety requirements
- Operation and stability during extreme storms, accounting for wind, wave and current conditions
- Sufficient water depths at extreme low tide to allow ferries to safely berth without the risk of either grounding or causing notable sediment disturbance and scour from propeller wash
- Appropriate materials selection and durability to support the operational design life of the wharf
- Additional safety and security measures consistent with the provisions of Crime Prevention through Environmental Design (DP&E, 2001).

Overall, the wharf has been designed:

- With a 50-year design life
- To cater for low mobility passengers and expected passenger growth in the future
- To operate in all states of the tide over its life
- To be regarded as an attractive, safe and secure piece of public transport infrastructure.

Figure 3-3 shows an artist's impression of the proposal.



Source: Roads and Maritime

Figure 3-3: Artist's impression

3.2.2 Engineering constraints

Table 3-1 lists the main constraints to development and discusses how they have been addressed in the concept design.

Table 3-1: Engineering and development constraints

Constraint	Concept design provision
Bathymetry of the Parramatta River and requirement for reprofiling	<ul style="list-style-type: none"> The design includes a new single berth wharf in the existing position to minimise impacts to ferry movements due to the depth of the Parramatta River The proposal has been developed to minimise the amount of sediment disturbance within the Parramatta River. However, about 2.5 cubic metres of sediment would be moved from beneath the area of the pontoon to allow sufficient freeboard.
Seawall modification	<ul style="list-style-type: none"> The proposal would require about 400 cubic metres of material to be removed from within and beneath the seawall. This volume would be confirmed during detailed design.

Constraint	Concept design provision
Wind, wave, current, flooding and climate change	<ul style="list-style-type: none"> The design allows the wharf to be used in all tidal 'states' (ie Highest Astronomical Tide (HAT) and Lowest Astronomical Tide LAT, with an additional allowance for flooding and climate change adaptation) The design has been developed to be resilient to flooding by including pile height designed to enable the structure to remain in position. During flood events the structure would detach from the landside until water levels reduced to a safe level for operation.

3.2.3 Major design features

This section describes the proposal's main design features.

Major water based features

Pontoon

The pontoon would be built in the same location as the existing pontoon. It would comprise a 27-metre long and 7.5-metre wide steel floating pontoon with canopy shelter, which would include a waiting area, seating and information kiosk. The wharf would have one berthing face on the northern (river) side. The new pontoon would be larger than the existing pontoon, and require modification to the existing seawall to accommodate the structure (discussed further in the landside features section below).

The pontoon would be built from pre-fabricated units delivered to site. A curved zinc canopy roof would be built over the pontoon and supported on steel columns. The pontoon would be surrounded by a mixture of glass and stainless-steel balustrades.

The pontoon would be held in place by four steel piles, drilled and subsequently hammered into the underlying sandstone bedrock. The pontoon height would vary relative to the landfall depending on the state of the tide, with pile heights installed to enable the pontoon to float up and down during flood conditions.

Gangway and jetty

The pontoon would be accessed by an 18-metre long and three-metre wide uncovered gangway. The gangway would be built parallel to the shore, and be held in place by two piles enabling the gangway to float up and down during flood conditions. The gangway would be attached to a new small section of jetty which would extend from the seawall and be supported by piers. The gradient of the gangway would vary according to tides. It would allow for disabled and low mobility users for most of the time except during extreme high and low tide, which is consistent with the Transport for NSW Guideline for the Assessment of Public Ferry Wharf Safety (Transport for NSW, 2016). The gangway would be built off site and delivered as one unit to site.

Major land based features

Seawall modification

Modification of the existing seawall is required to accommodate the new gangway and pontoon, as shown in Figure 3-1. The seawall would be modified through removal of the existing triangular section and replacement of the existing face of the seawall.

About 30 square metres of seawall would be modified through removal of concrete topping, progressive excavation of underlying soils/fill and removal of the gabions which currently form the seawall face. The work would be undertaken in sections, to limit the area of open excavation. Controls would be installed around the work area to prevent erosion and sedimentation. This may include retaining the front row of gabions as long as possible to provide a barrier for sediments, discussed further in section 6.1.

Suitable material would be reused where possible, with excess or unsuitable materials transferred to a barge for disposal off-site at an appropriately licensed landfill. The face of the new seawall would be formed using pre-cast panels, which would support a new concrete topping.

Seating and art monument within the interchange would be removed during the work and replaced at completion. The existing waiting shelter would not be impacted by the proposal.

Interchange upgrades

Minor modifications to the existing interchange would occur as part of the proposal including:

- Removal of existing Roads and Maritime communications equipment and signage under existing roofed structure
- Installation of new wayfinding signage around the interchange.

Supporting infrastructure

While the details of the supporting infrastructure, lighting, signage, and furniture would be confirmed during the detailed design, they would be consistent with the provisions included on the other wharves on the network. It would therefore include:

- Safety and security lighting on the approaches and throughout the wharf
- Opal Fixed Location Readers (FLRSs) to be installed at the entrance to the wharf at the top of the gangway to enable users to tap on and off
- Safety ladders around the walkway and wharf pontoon
- Life ring on the pontoon
- Closed circuit television (CCTV)
- Glass weather screen
- Tactile flooring.

The above would be developed in accordance with relevant Roads and Maritime design specifications.

3.3 Construction activities

The appointed contractor would confirm the final construction activities in discussion with Roads and Maritime. As such, this section only indicates a likely method and work plan as it may vary due to the identification of additional constraints before work starts, detailed design refinements, community and stakeholder consultation feedback, and contractor requirements/limitations. Should the work method differ from what is proposed in this REF, the contractor would consult Roads and Maritime to determine if additional assessment is needed. Some additional land would be needed temporarily to support construction, as described in section 3.4.

3.3.1 Work methodology

The proposal would be built under Roads and Maritime specifications as managed by a contractor under a construction environmental management plan (CEMP). These specifications cover environmental performance and management supplemented by aspects such as materials storage and management, and erosion and sediment control. The proposal would likely comprise a sequence of work activities like that summarised in Table 3-2.

Table 3-2: Construction activities

Activity	Associated work
1 Site establishment and wharf closure	<ul style="list-style-type: none"> • Obtain leases and licences (refer to section 7.3) • Notify the public, public transport companies, local council and other stakeholders before work starts (refer to section 5.7) • Carry out pre-work inspections, pre-condition noise surveys (refer to Chapter 0), and other investigation work • Set out, mark and establish a maritime navigation exclusion zone and no-go zones on land • Establish the site compound and temporary access route(s) • Provide public notices of the wharf closure and the nearest alternatives • Install temporary drainage controls (where needed).
2 Demolition and removal of components of the existing ferry wharf	<ul style="list-style-type: none"> • Dismantle and demolish the existing structure (pontoon, gangway and piles).
3 Pile removal	<ul style="list-style-type: none"> • Remove (either fully or cut and cap) the existing piles.
4 Modification to the existing seawall	<ul style="list-style-type: none"> • Install a silt boom and curtain and other sedimentation controls to prevent sediment from dispersing from the work area (refer to Chapter 0) • Removal of the existing seating, and Aboriginal art monument • Removal of gabions and sediment from the existing seawall via an excavator, including about 400 cubic metres within the seawall • Reconstruct the seawall using pre-cast 'L' panels • Backfill using suitable materials from the site, or imported materials • Reinstall stormwater drainage • Install a new concrete topping • Reinstall the seating and Aboriginal art monument.
5 Build the new wharf structure	<p>5a: substructure work:</p> <ul style="list-style-type: none"> • Install piles for the gangway and pontoon • Reprofilling of about 2.5 cubic metres of sediment within the riverbed to provide sufficient depth for the pontoon <p>5b: superstructure work:</p> <ul style="list-style-type: none"> • Install the build out the prefabricated sections of gangway • Install the prefabricated pontoon, using a barge mounted crane • Install the supporting infrastructure including barriers and handrails, safety and security facilities, cabling and ducting, lighting, CCTV, ladders, lifebuoys, glass shelter weather screens, and tactile flooring • Install relocated Opal readers, screens and related equipment.

Activity	Associated work
6 Landside infrastructure (concurrent with building the new wharf structure)	<ul style="list-style-type: none"> • Removal of existing Roads and Maritime communications equipment and signage under existing roofed structure • New wayfinding signage around the interchange.
7 Site clean-up and opening the upgraded wharf	<p>6a: testing and commissioning</p> <ul style="list-style-type: none"> • Connect power and communications • Test and commission all infrastructure. <p>6b: demobilisation</p> <ul style="list-style-type: none"> • Demobilise the site compounds and remove temporary: <ul style="list-style-type: none"> – Maritime navigation exclusion and no-go zones – Footpath restrictions/closures – Environmental and safety controls (refer to Chapter 0).

3.3.2 Construction hours and duration

This section describes the time it would take to build the proposal and the working hours.

Start date and length of construction

The proposal would be built over about six months starting in mid-2018. Construction may not be continuous as it would rely on materials delivery and the manufacture of the prefabricated components. The construction program would be coordinated with the upgrade of the Rydalmere Wharf, due to constraints in the Parramatta River (discussed further in section 6.13).

The construction program would also be affected by the need to coordinate with Port Authority of NSW, City of Parramatta Council, residents, and other key stakeholders (refer to Chapter 5).

Working hours

The work would take place within standard working hours:

- Monday to Friday, 7am to 6pm
- Saturday, 8am to 1pm.

Pile drilling or hammering, and lifting would take place intermittently during the above periods. On average, a pile would be drilled or hammered for about 10 minutes followed by a relatively quiet period for the next 30 minutes or more before the next stage is progressed.

It would take about two weeks to carry out the drilling and hammering of piles. For safety reasons, piling would need to take place when the water is calm and still. Parramatta Wharf would be closed during construction, and it is anticipated piling would be able to be undertaken during standard hours.

The duration of piling may be affected by weather and difficult ground conditions. If delays are experienced for the proposal, the piling work may be extended beyond standard hours. Any work extension would require approval in accordance with the Roads and Maritime Construction Noise and Vibration Guideline (2016), where surrounding residential receivers would be notified prior to the work occurring.

Whilst not considered during concept design development, out of hours work (OOHW) may be required during detailed design development. If OOHW is required, an OOHW Procedure would be developed by Roads and Maritime and would include notification to nearby impacted residents.

3.3.3 Workforce

While about 25 people would be needed to carry out the main construction activities, it is expected that there would be about 10–15 people onsite at any time on average.

3.3.4 Plant and equipment

The plant and equipment needed to build the proposal would be typical to any construction site. It would vary depending on the construction activity. The largest and most complex equipment needed would be to lift and install the prefabricated units and undertake the piling work. Table 3-3 indicates the plant and equipment that would be likely used to build the proposal, however this would be confirmed by the contractor.

Table 3-3: Indicative plant and equipment

Plant and equipment	
Waterside construction	
Angle grinder	Generator
Barge mounted crane	Hand tools (electric)
Barge	Light vehicles
Boat	Piling rig (drilling)
Concrete trucks (barge mounted)	Piling rig (hammering)
Landside Construction	
Backhoe/small excavator (10–20 tonne)	Concrete saw
Concrete pump	Concrete trucks (barge mounted)
Hand tools (electric)	Jackhammer

3.3.5 Earthworks

Earthworks proposed include the removal of about 70 linear metres of seawall and excavation of sediment, removal of gabion baskets/ballast and installation of backfill behind the new seawall face. In addition, about 2.5 cubic metres of riverbed sediment would be reprofiled to facilitate the pontoon installation.

Up to 400 cubic metres of material comprising concrete, backfilled rock, gabion ballast rock would be removed to complete the seawall modification. Where suitable, material may be reused within the seawall, or removed for disposal offsite.

Where possible, the materials would be reused under an exception, unless they classify as a non-exempt waste, in which case they would be shipped (barged) offsite for collection and disposal at a licenced waste management facility. Any materials transported offsite would be tested for waste classification.

3.3.6 Source and quantity of materials

Various standard construction materials that are readily available across the Sydney Metropolitan region would be needed to build the proposal. They would be shipped (barged) to site as prefabricated units ready for installation, or delivered in small quantities for use as needed (refer to section 3.3.7). The main materials needed to build the proposal would comprise:

- Marine-grade steel, aluminium and zinc for the superstructure (floating pontoon and wharf, barriers and roof), substructure (piles) and land side work (stairs)
- Precast concrete
- Suitable backfill material for the seawall (up to 200 cubic metres), comprising coarse and fine soils and rock
- Prefabricated signage, light fittings, barriers and fencing
- Prefabricated glazing units
- Electrical cabling and other electronic infrastructure
- Additional materials such as relatively small quantities of paint, oils, fuels and other materials.

3.3.7 Traffic management and access

Maritime and road traffic management would be required while certain elements of the proposal are being built and installed. This would include pedestrian and cyclist access to and from the wharf during construction.

No private property access would be impacted during construction.

Construction traffic

All materials and equipment for waterside elements of the proposal would be shipped (barged) into and out of the area to limit any impact on Charles/Phillip Street and surrounds. This would provide the best method to build the marine components. It would also be the best method to deliver materials to the land side areas providing there is adequate access for loading and unloading, as no parking is available for vehicles at the proposal. It is anticipated that only site personnel would travel to the site by road and park. Table 3-4 summarises the expected construction traffic associated with building the proposal.

Table 3-4: Construction traffic (daily average)

Vehicle type and association	Vehicle (daily average)		Typical travel patterns and limitations
	Average	Maximum	
Construction traffic: heavy vehicles	1	2	Regular movements throughout the day
Deliveries: light and heavy vehicles	1	2	
Shipped materials	1	2	

3.4 Ancillary facilities

For construction of the wharf, any major machinery, equipment and prefabricated units would be shipped to site on an offshore storage barge. However, it is also likely that a small 75 square-metre site compound (to be confirmed by the contractor) would be needed within the proposal footprint to store equipment, machinery and some limited materials.

While the specific requirements for this site would be confirmed by the contractor(s), it would most likely comprise a shipping container with a supporting site office and toilet. Small amounts of material would also be required to be stored on site, as discussed in section 3.3.6 above. Excavated material would be immediately transferred to barges and not stored on site, unless planned to be reused.

Potential locations for the construction compound have been identified in consultation with City of Parramatta Council. Potential areas are shown in Figure 3-2. The selection of the final location would be subject to further discussions with the City of Parramatta Council and private landowners, and other locations which may be identified. Access for pedestrians and cyclists would be maintained.

Any additional or revised compound and/or stockpile sites proposed by the contractor would be discussed with Roads and Maritime's Environment Manager, Greater Sydney Project Office, to determine if any additional environmental assessment or safeguards are required. Any additional or revised compound and/or stockpile sites would ideally meet the following criteria:

- On previously disturbed areas
- Away from biodiversity and significant heritage values, including outside the drip line of trees
- On relatively level ground and up-slope of sediment control barriers
- Outside of flood prone land
- Have ready access to the road network or direct access to the construction area
- At least five metres clear of all areas of possible concentrated water flow or as far as practicable with additional controls, such as primary and secondary erosion and sediment controls, in place
- More than 100 metres from any residential property or as far as practicable with additional controls, such as additional consultation and hoarding, in place.

It is noted that the potential locations identified are located on flood prone land, and additional environmental safeguards have been identified in Chapter 6 to mitigate potential impacts.

3.5 Public utility adjustment

No utilities would need adjusting, relocating or installing under the proposal. Final protection requirements would be confirmed during the detailed design.

3.6 Property acquisition

Acquisition of a small section of the seawall would be required from City of Parramatta Council for the proposal, as it would be permanently removed to accommodate for the new pontoon. The section of seawall to be permanently removed is shown in Figure 2-3.

4 Statutory and planning framework

This Chapter provides the statutory and planning framework for the proposal and considers the provisions of relevant state environmental planning policies, local environmental plans and other legislation.

4.1 *Environmental Planning and Assessment Act 1979*

4.1.1 State environmental planning policies

State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) aims to facilitate the effective delivery

Clause 68(4A) of ISEPP permits development on any land for the purposes of associated public transport facilities for a public ferry wharf to be carried out on any land may be carried out by or on behalf of a public authority without consent. However, such development may only be carried out on land reserved under the *National Parks and Wildlife Act 1974* if the development is authorised by or under that Act.

As the proposal is for the purpose of a wharf or boating facility and is to be carried out by Roads and Maritime, it can be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Development consent from Council is not required. The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974*.

The proposal does not affect land or development affected by *State Environmental Planning Policy (Major Development) 2005*.

State Environmental Planning Policy (State and Regional Development) 2011

State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP) identifies State significant infrastructure and critical State significant infrastructure.

Clause 14(1) of the SRD SEPP declares a development to be State significant infrastructure if the development is, by the operation of a State environmental planning policy, permissible without development consent and the development is specified in schedule 3 of the SEPP.

Schedule 3 specifies that development for the purpose of port and wharf facilities or boating facilities (not including marinas) delivered by or on behalf of a public authority that has a capital investment value of more than \$30 million is State significant infrastructure.

The proposal has a capital investment value of less than \$30 million so does not become State significant infrastructure as declared by the SRD SEPP.

State Environmental Planning Policy (Coastal Management) 2018

The Coastal Management SEPP aims to update and consolidate into one integrated policy, a series of previous SEPPs including *State Environmental Planning Policy 14 (Coastal Wetlands)*, *State Environmental Planning Policy 26 (Littoral Rainforests)* and *State Environmental Planning Policy 71 (Coastal Protection)*. The Coastal Management SEPP gives effect to the objectives of the new *Coastal Management Act 2016* from a land use planning perspective, specifying how development proposals are to be assessed if they fall within the coastal zone.

The proposal falls within land identified as coastal wetlands under clause 10 of the Coastal Management SEPP. However, under clause 21(2) of the Coastal Management SEPP, clause 10 does not apply to:

(b) the carrying out of an activity after the commencement of this Policy, but only if:

(i) any approval that is required for carrying out the activity is granted by the determining authority under Part 5 of the Act within 12 months after that commencement

As such, the provisions of the Coastal Management SEPP have not been considered further.

Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005

The proposal is located within the Sydney Harbour Catchment and is subject to the *Sydney Regional Environmental Plan 2005* (Sydney Harbour SREP), which is a deemed SEPP. The aims of the Sydney Harbour SREP from clause 2 are considered in Table 4-1 below.

Table 4-1: Aims of the Sydney Harbour SREP

Aim	Comment
(a) To ensure that the catchment, foreshores, waterways and islands of Sydney Harbour are recognised, protected, enhanced and maintained: (i) As an outstanding natural asset (ii) As a public asset of national and heritage significance, for existing and future generations.	Chapter 0 of this REF includes safeguards to protect and maintain the area's natural and heritage values, including those associated with the existing wharf (refer to section 6.8). This would ensure the values of Sydney Harbour are recognised, protected, enhanced and maintained.
(b) To ensure a healthy, sustainable environment on land and water.	Providing relevant standard controls are implemented and monitored, as set out in Roads and Maritime guidelines (refer to section 0), the proposal's environmental impact is expected to be minimised.
(c) To achieve a high quality and ecologically sustainable urban environment.	The proposal's urban design includes high quality, durable and low impact materials to minimise ongoing maintenance requirements. The design also provides thematic consistency across the entire network (refer to section 3). Both factors provide for a sustainable urban environment over its 50-year design life.
(d) To ensure a prosperous working harbour and an effective transport corridor.	With a 50-year design life, the proposal would allow for the operation of a ferry wharf at Parramatta for future generations. The work also forms part of a network-wide upgrade program to help sustain the ferry service in its role as part of an effective and integrated transport corridor and system. The wharf would be closed for six months, during the demolition of the old wharf and construction of the new wharf. It is anticipated that alternative transport would be provided, with the details of this to be provided prior to construction. This would provide ferry users with continued access to the F3 Ferry service during construction. Users would be notified of the proposed closure ahead of time as detailed in Chapter 5.

Aim	Comment
(e) To encourage a culturally rich and vibrant place for people.	The upgrade would continue to provide Parramatta residents and businesses with access to the ferry network and interchange with other public transport provisions. This would sustain Parramatta as a vibrant place to live and work.
(f) To ensure accessibility to and along Sydney Harbour and its foreshores.	The upgrade would ensure that Parramatta residents and other users are provided with ongoing access to Sydney Harbour and its foreshore areas over the next 50 years. It would also improve access for low mobility passengers. Ferry transport would be suspended through this wharf for six months during construction. It is anticipated that alternative transport would be provided, with the details of this to be provided prior to construction.
(g) To ensure the protection, maintenance and rehabilitation of watercourses, wetlands, riparian lands, remnant vegetation and ecological connectivity.	The proposal would have no significant impact on notable terrestrial or marine environments or values in the area. Additional standard controls would be implemented to prevent any indirect impact on the wider ecological environment from spills and sediment disturbance, mobilisation and smothering.
(h) To provide a consolidated, simplified and updated legislative framework for future planning.	The proposal is being delivered under the relevant planning provisions covering waterfront and marine development set at a State and Commonwealth level.

The proposal has been considered in respect of the objectives from clause 17 of the Sydney Harbour SREP zone W1 (Maritime Waters) in which the proposal is located, in Table 4-2.

Table 4-2: Zone W1 Maritime Waters objectives

Objective	Comment
(a) To give preference to and protect waters required for the effective and efficient movement of commercial shipping, public water transport and maritime industrial operations generally.	Navigational exclusion zones would be installed while the work is taking place, and the wharf would close for six months during construction. It is anticipated that alternative transport would be provided, with the details of this to be provided prior to construction. No commercial shipping or other boat movements occur within the Parramatta River between Rydalmere and Parramatta, and no significant impacts are anticipated. The Harbour Master and Ports Authority would be consulted during the works.
(b) To allow development only where it is demonstrated that it is compatible with, and will not adversely affect the effective and efficient movement of, commercial shipping, public water transport and maritime industry operations,	Navigational exclusion zones would be installed while the work is taking place. The wharf would close for six months during construction, which would prevent Harbour City Ferries from accessing the Parramatta and Rydalmere Wharf. The Harbour Master and Ports Authority would be consulted during the works.
(c) To promote the equitable use of the waterway, including use by passive recreation craft.	Minor disruption would be caused during construction, which would be communicated to water users before starting work. The proposal would upgrade the existing wharf at Parramatta allowing for more effective and efficient public water transport for its 50-year design life.

Under clause 18 of the Sydney Harbour SREP, the proposal is permissible as a public water transport facility, with consent in the W1 zone. In any case, the development is permissible without development consent pursuant to the provisions of the ISEPP which override the zoning provisions of the Sydney Harbour SREP (see clause 7(5) of the Sydney Harbour SREP).

The matters for consideration

The matters for consideration listed in Division 2 at clauses 21-27 of the Sydney Harbour SREP are provided in Table 4-3.

Table 4-3: Clause 21 to Clause 27 matters

Division 2 matter	Comment
Clause 21: biodiversity, ecology and environment protection	Chapter 6 describes the terrestrial and aquatic environmental impacts associated with the proposal. With the implementation of the environmental management measures, impacts would be minimised and/or managed.
Clause 22: public access to, and use of, foreshores and waterways	The wharf would close for six months during the construction period. Additionally, access to the foreshore would be impeded by the modification of the seawall over this period (refer to section 6.7). The local community and ferry passengers would be notified ahead of work starting that would affect the above areas.
Clause 23: maintenance of a working harbour	The upgrade would ensure that Parramatta residents and other users would be provided with access to a ferry service (and public transport) over the next 50 years.
Clause 24: interrelationship of waterway and foreshore uses	The upgrade would retain the social and cultural association of a wharf in this location.
Clause 25: foreshores and waterways scenic quality	Upgrading the wharf in its existing position would prevent the visual impact of introducing infrastructure in a new location, including any impact on areas zoned as 'scenic waters'. However, there would be a minor adverse visual impact from increasing the mass, scale, form, composition, design and structure of the wharf, as discussed in section 6.5.
Clause 26: maintenance, protection and enhancement of views	Section 6.5 describes the landscape character and visual impacts associated with the proposal. As described above, the upgrade would have a minor visual impact for the surrounding properties that overlook this part of the river. However, the overall impact is likely to be less compared to building a new structure in a different location.
Clause 27: boat storage facilities	There is no boat storage work associated with, or impacted by, the proposal.

Clause 31 of the Sydney Harbour SREP requires consultation for certain development proposals not requiring development consent. Consultation, including under the Sydney Harbour SREP, is discussed in chapter 5 of this REF.

Heritage provisions

Part 5 of the Sydney Harbour SREP contains heritage provisions that are to be taken into account in respect of Division 5.1 activities. Heritage items near the proposal include 'Harrisford', 'Newlands Gates and Trees', 'Charles Street Weir' and 'Wetlands'. Heritage items are discussed further in section 6.8. The heritage objectives from the Sydney Harbour SREP in clauses 53(1) and (2) are considered in Table 4-4 below.

Table 4-4: Heritage objectives

Objective	Comment
1(a): to conserve the environmental heritage of the land to which this Part applies.	A statement of heritage impact (SOHI) prepared to support this REF concludes that the proposal would have no impact on the recorded heritage items (refer to section 6.8).
1(b): to conserve the heritage significance of existing significant fabric, relics, settings and views associated with the heritage significance of heritage items.	As above, the proposal has been designed to preserve the heritage and conservation values of surrounding heritage items.
1(c): to ensure that that archaeological sites and places of Aboriginal heritage significance are conserved.	As described in section 6.8 the proposal would avoid impact on known archaeological sites or places of Aboriginal heritage. The Aboriginal archaeological potential of the proposal footprint is considered to be low.
1(d): to allow for the protection of places which have the potential to have heritage significance but are not identified as heritage items.	The SoHI prepared to support this REF did not identify the existing Parramatta Wharf to contain significant heritage potential. A search of heritage registers did not identify any heritage items within the proposal footprint (refer to section 6.8). However, the archaeological potential of the proposal footprint was determined to be low-moderate due to the potential historical presence of a former wharf structure, identified as the Charles Street Wharf. Additional safeguards in Chapter 0 include provisions to protect the potential heritage values of proposal footprint.
2(a) To establish a buffer zone around the Sydney Opera House so as to give added protection to its world heritage value	The proposal is not located within the Sydney Opera House buffer zone.
2(b) To recognise that views and vistas between the Sydney Opera House and other public places within that zone contribute to its world heritage value.	The proposal would not impact on the views and vistas from the Sydney Opera House.

Clause 54 to Clause 60 of the Sydney Harbour SREP provide for the protection of heritage items and places, including requirements for development consent. The Stage 1 Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) for the proposal was prepared in accordance with Clause 54 to Clause 60 of the Sydney Harbour SREP. As noted above, the proposal would have neutral or lesser impact on heritage items and it would not impact on known archaeological sites or places of Aboriginal heritage. As such, there is no need to either seek permission or secure development consent for the work on heritage-related grounds.

Wetland protection

Part 6 of the Sydney Harbour SREP relates to wetlands protection. The site is not identified as being located within a Wetland Protection Area under the SREP, and no impact to these areas is anticipated. The wetlands objectives from the Sydney Harbour SREP have not been considered further.

4.1.2 Local Environmental Plans

Parramatta Local Environmental Plan 2011

The landside component of the proposal is located within the City of Parramatta local government area (LGA). Local development control and land use zoning and planning in this LGA is currently governed under the City of Parramatta local environmental plan 2011 (LEP).

The Charles Street Square Strategy (Hassell, 2017) was prepared by the City of Parramatta Council for the Charles Street Square, encompassing the Parramatta Wharf Interchange. A key objective of the Charles Street Square Strategy is to support sustainability by promoting public and active transport. The upgrade of the Parramatta Wharf Interchange by Roads and Maritime is identified as part of the strategy. As such the proposal is consistent with the aims and objectives of the Charles Street Square Strategy.

Under the provisions of the Parramatta LEP, the Parramatta Wharf Interchange is located within a flood prone area, as it is below the 1:100 average recurrent interval (ARI) flood event plus 0.5-metre freeboard. Potential impacts from flooding are considered in section 6.1.

As stated above, Clause 68(4A) of ISEPP permits the development of public ferry wharves to be carried out by or on behalf of a public authority without consent. As development without consent, the proposal is not subject to local environmental planning policy or development control. However, the LEP is useful in identifying the proposal's consistency with its land use and planning policy as described in Table 4-5.

Table 4-5: Relevant City of Parramatta LEP land use zoning policies

Objectives	Proposal consistency
RE1 - public recreation: covering the wharf interchange	
<ul style="list-style-type: none">To enable land to be used for public open space or recreational purposesTo provide a range of recreational settings and activities and compatible land usesTo protect and enhance the natural environment for recreational purposesTo conserve, enhance and promote the natural assets of Eric Primrose ReserveTo create a riverfront recreational opportunity that enables a high quality relationship between the built and natural environment.	<ul style="list-style-type: none">No significant loss of recreational landShort-term closure when the wharf is being builtIntroduction of new wharf infrastructure within the setting of Eric Primrose Reserve, leading to a change in visual amenity (refer to section 6.4).

Objectives	Proposal consistency
W2 - environmental conservation: covering the wharf	
<ul style="list-style-type: none"> To protect the ecological, scientific and recreation values of recreational waterways. To allow for water-based recreation and related uses. To provide for sustainable fishing industries and recreational fishing. To enable works associated with the rehabilitation of land towards its natural use. 	<ul style="list-style-type: none"> No loss of areas of high ecological, scenic or recreational values. Improvements to the wharf will increase water-based recreation and related uses.

4.2 Other relevant NSW legislation

Table 4-6 lists the NSW legislation relevant to the proposal or the land on which the proposal would be built.

Table 4-6: Other relevant NSW legislation

Legislation and application	Relevance to the proposal and further requirements
National Parks and Wildlife Act 1974: provides for the protection of Aboriginal heritage values, national parks and ecological values. Makes it an offence to harm Aboriginal objects, places or sites without permission	<p>A Stage 1 PACHCI assessment (refer to Appendix H) confirmed that the proposal would have low potential to impact upon Aboriginal heritage items.</p> <p>The Roads and Maritime Aboriginal Cultural Heritage Advisor (ACHA) has issued Stage 1 clearance letter for the proposal, included with Appendix H.</p> <p>An Aboriginal heritage impact permit (AHIP) from OEH under Part 6 of this Act is not required for the proposal.</p> <p>Section 6.9 provides further discussion.</p>
Heritage Act 1977: provides for the protection of conservation of buildings, works, maritime heritage (wrecks), archaeological relics and places of heritage value through their listing on various State and local registers. Makes it an offence to harm any non-Aboriginal heritage values without permission	<p>The proposal would:</p> <ul style="list-style-type: none"> Have no significant impacts on an item of local heritage value (refer to section 6.8) Not take place close to any recorded shipwreck sites Have a low potential of impacting on undiscovered archaeology. <p>Approval for the proposal under the <i>Heritage Act 1977</i> is not required.</p>
Roads Act 1993: provides for the construction and maintenance of public roads. Requires consent to dig up, erect a structure or carry out work in, on or over a road	<p>The proposal would not undertake roadwork and would not require a (road occupancy) licence from City of Parramatta Council.</p>

Legislation and application	Relevance to the proposal and further requirements
<p>Fisheries Management Act 1994: provides for the protection of fishery resources and values for current and future generations. Makes it an offence to harm fisheries and resources without an appropriate assessment, inclusion of safeguards and/or the appropriate permissions to carry out certain work.</p>	<p>The aquatic ecology assessment (refer to section 6.3) carried out to support the REF, concluded that proposal would not directly or indirectly harm marine vegetation. Thus, a permit to harm marine vegetation under s205 of the FM Act would not be required.</p> <p>The proposal would undertake activities classed as dredging to realign the seawall and provide sufficient depth for the pontoon. Therefore, notification with the Minister for Primary Industries under section 199 of the FM Act is required.</p>
<p>Biodiversity Conservation Act 2016: replaced the <i>Threatened Species Conservation Act 1995</i>, <i>Native Vegetation Act 2003</i> and part of the <i>National Parks and Wildlife Act 1974</i> from 25 August 2017.</p> <p>The Act provides for a strategic approach to conservation in NSW. It includes provisions risk-based assessment of native plant and animal impacts, including a Biodiversity Assessment Method (BAM) to assess the impact of actions on threatened species, threatened ecological communities and their habitats.</p>	<p>Under the BC Act, an assessment of significance must be completed to determine the significance of impacts to threatened species, populations and/or communities or their habitat. There are unlikely to be any threatened species, populations or communities within the proposal, therefore, no impact is expected and an assessment of significance has not been triggered.</p> <p>As no native terrestrial vegetation would be cleared, or harmed, the proposal does not require further assessment under the BAM.</p>
<p>Protection of the Environment Operations Act 1997: focuses on environmental protection and provisions for the reduction of water, noise and air pollution and the storage, treatment and disposal of waste. Introduces licencing provisions for scheduled activities that are of a nature and scale that have a potential to cause environmental pollution. Also, includes measures to limit pollution and manage waste.</p>	<p>The proposal would not involve undertaking or carrying out a scheduled activity.</p> <p>If the controls set out in Roads and Maritime guidelines and quality assurance specification, and additional controls detailed in Chapter 7, are implemented and monitored, there is unlikely to be any material water, noise or air pollution impact. Appropriate waste management controls would be introduced to classify, store, transport, and dispose of all construction and work-generated waste.</p> <p>Roads and Maritime would undertake further consultation with the NSW Environmental Protection Agency (EPA) to determine if additional measures are required for the proposal.</p>
<p>Marine Pollution Act 2012: sets out provisions to prevent pollution in the marine environment.</p>	<p>The proposal is unlikely to result in any oil, noxious liquid, pollutant, sewage or garbage discharge as controlled under this Act, providing relevant standard controls are implemented and monitored (refer to Chapter 0).</p>
<p>Ports and Maritime Administration Regulations 2012: requires Harbour Master permission to alter any structure or disturb the harbour floor within Sydney Port.</p>	<p>Parramatta Wharf does not fall within the definition of Sydney Harbour under the <i>Ports and Maritime Administration Regulations 2012</i> as it is not within four nautical miles from the Hornsby Lighthouse.</p>

Legislation and application	Relevance to the proposal and further requirements
<p>Marine Safety Act 1998 and Marine Safety Regulation 2016: sets out the requirements for marine safety and the roles of the Harbour Master and marine pilots. Includes provisions relating to marine and navigational safety including: collision prevention, spill limits, no-wash zones, shipping operation restrictions, and controls on reckless, dangerous or negligent navigation.</p>	<p>A navigational exclusion zone would be installed while the work is taking place. This would include updating the Harbour Master and Ports Authority.</p>

4.3 Commonwealth legislation

The following Commonwealth legislation is relevant to this proposal.

4.3.1 *Environment Protection and Biodiversity Conservation Act 1999*

Under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) a referral is required to the Australian Government for proposed “actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land”. These are considered in Appendix B and Chapter 6 of the REF.

The assessment of the proposal’s impact on matters of national environmental significance and the environment of Commonwealth land found that there is unlikely to be a significant impact on relevant matters of national environmental significance or on Commonwealth land. Accordingly, the proposal has not been referred to the Australian Government Department of the Environment and Energy under the EPBC Act.

4.3.2 *Disability Discrimination Act 1992*

The above Act includes provisions to prevent discrimination based on ability, while also providing equal rights and access for all people. This was supplemented in 2002 by the Disabled Standards for Accessible Public Transport, which were introduced to allow public transport operators and providers to “remove discrimination from public transport services”. The standards provide detailed information on how transport infrastructure should be designed and built to provide disabled access. In NSW, this has been adopted as the Transport Access Program, with the proposal being designed to comply with the provisions of the above Act.

The proposal includes upgrading of the wharf and interchange to be DDA compliant.

4.4 Confirmation of statutory position

The proposal is categorised as development for the purpose of a wharf and is being carried out by or on behalf of a public authority. Under Clause 68(4A) of the ISEPP, the proposal is permissible without consent. Accordingly, Roads and Maritime is the determining authority for the proposal, with this REF fulfilling the obligation under Section 5.5 of the EP&A Act to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason.

5 Consultation

This Chapter discusses the consultation carried out to date and any future proposed consultation.

5.1 Consultation strategy

Roads and Maritime has prepared a community consultation and stakeholder engagement plan for the proposal in accordance with the International Association for Public Participation Spectrum (IAP2, 2007) and the Stakeholder Engagement Toolkit (Roads and Maritime, 2015). The plan's objectives are to:

- Advise directly-affected stakeholders and the community about the proposal, its potential impacts, and how they can obtain further information
- Brief parties (passengers, pedestrians, cyclists, road users, businesses, residents and other key user groups) affected by any temporary traffic management controls, navigation restrictions, and ferry service disruption
- Ensure issues relating to the proposal are identified and effectively managed
- Identify local issues to ensure the proposal aligns with community needs
- Inform and consult impacted and interested stakeholder groups
- Involve key Government agencies and stakeholders
- Receive comments from affected parties
- Record and respond to enquiries and concerns in an open, transparent and timely manner
- Seek community ideas for inclusion in the development of the detailed design.

This REF would be placed on public display for comment by Government agencies, stakeholders and the community as part of the consultation strategy.

5.2 Community involvement

In May 2015, Roads and Maritime first announced the proposed upgrade of Parramatta Wharf Interchange, providing a community update and inviting the community to an information session that was held on 24 May 2015 at the Parramatta Wharf.

The purpose of the information session was to gain community feedback to help Roads and Maritime understand views about the existing facilities and priorities for improvement. It also allowed Roads and Maritime to explain the possible options for upgrading the existing facilities at Parramatta. This process helped Roads and Maritime develop options, select a preferred option, and progress with the concept design. A total of 10 submissions/feedback forms were received. A summary of issues raised by the community is provided in Table 5-1 below.

Table 5-1: Summary of issues raised by the community: identification of issues

Issue raised	Response and where addressed in the REF/concept design
Lack of parking for commuters and recreational users	<ul style="list-style-type: none"> • There are no areas within the current interchange which could be used to facilitate commuter parking • Existing parking is available on Charles Street consisting of 2hr peak and four hour off-peak ticketed spaces • Parking is addressed in section 6.7 of the REF.
Poor accessibility for prams and older people	<ul style="list-style-type: none"> • The proposal would improve accessibility of the interchange by providing a DDA compliant wharf including pontoon, gangway and jetty which can be accessed via existing accessible pathways • The design features of the proposal are addressed in Chapter 3 of the REF.
Changes in pathways levels for access into and around the wharf must be coordinated with Parramatta City River Strategy	<ul style="list-style-type: none"> • The proposal does not include significant changes to the levels of pathways • Roads and Maritime have consulted with the City of Parramatta Council (as the owners of the landside area) on the proposal, discussed further in section 5.6.
TfNSW's Wayfinding programme should promote access to the wharf from surrounding streets and the Parramatta bus/rail interchange	<ul style="list-style-type: none"> • The proposal includes new wayfinding signage around the interchange • Wayfinding signage is discussed further in Chapter 3 of the REF.
Need for high quality and contemporary design of outstanding architectural merit	<ul style="list-style-type: none"> • The proposal includes a contemporary design which is consistent with other recently upgraded wharves across the network • The design of the wharf is discussed further in Chapter 2 and Chapter 3 of the REF.
Early consideration of stormwater disposal, landscaping, DDA, and CPTED	<ul style="list-style-type: none"> • Consideration of stormwater impacts is provided in Chapter 3 and section 6.2 of the REF • The proposal would have a moderate to low impact on landscape character, discussed further in section 6.3.
Power the wharf with renewable energy	<ul style="list-style-type: none"> • The proposal includes connection to the existing electrical supply provided to the existing wharf. Provision of a renewable energy supply to the wharf the scope of the proposal, as no significant change to electrical use is proposed. Energy use (and impacts on climate change and greenhouse gas emissions) is addressed in Chapter 0.
Improved embarking and disembarking times by providing two gangways	<ul style="list-style-type: none"> • During development of the concept design, consideration was given to how the wharf would be used. Assessment of customer flow identified that customers waiting on the pontoon with a single gangway provides the most efficient way to manage customer flow. The existing waiting shelter may also be used by passengers • Dual gangways would not improve embarking and disembarking times for a single berth wharf • The design features and options assessment of the proposal are addressed in Chapter 2 and 3 of the REF.

5.3 Aboriginal community involvement

Aboriginal heritage impacts have been considered under the four-stage PACHCI process. The PACHCI is outlined in Table 5-2 below.

Table 5-2: Summary of Roads and Maritime PACHCI stages

Stage and description	Consultation
Stage 1: initial assessment	An internal Roads and Maritime assessment to determine whether a project is likely to affect Aboriginal cultural heritage.
Stage 2: a preliminary external assessment	Including a site survey and further assessment to determine whether a project requires Part 6 approval from the NSW Office of Environment and Heritage under the <i>National Parks and Wildlife Act 1974</i> .
Stage 3	If a Part 6 approval is required, Aboriginal community consultation and investigation is required. Preparation of cultural and archaeological assessments to be completed with the involvement of the Aboriginal community.
Stage 4	Implementation of the assessment recommendations.

Stage 1 of the PACHCI process was completed for the proposal, which confirmed that there is unlikely to be any effect on Aboriginal cultural heritage (refer to section 6.9).

Impacts to items of Aboriginal significance are not anticipated for the proposal (refer to section 6.9).

The Roads and Maritime Aboriginal Cultural Heritage Advisor (ACHA) has issued Stage 1 clearance letter for the proposal completed in March 2018 in accordance with PACHCI, included with Appendix H. An AHIP under the *National Parks and Wildlife Act 1974* is not required for the proposal.

5.4 ISEPP consultation

Under the provisions of Part 2 of ISEPP, Roads and Maritime is required to notify local councils and other relevant Government agencies where development has the potential to impact on assets or environmental values managed by these authorities. These issues are identified through the checklist included as Appendix C. In the case of the proposal, it triggers the notification requirements under Clause 13 and Clause 14 of ISEPP as it:

- Would involve the installation of a temporary structure in the form of the construction compound
- Would involve the permanent realignment of a small area of land currently owned by City of Parramatta Council.

Roads and Maritime has been consulting with the City of Parramatta Council since 2015 to develop a design which is acceptable to Council as owners and operators of the landside elements of the proposal. A formal ISEPP letter was issued for the proposal in April 2018. No response from City of Parramatta Council has been received at the time of publication.

5.5 Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 notification

The Foreshores and Waterways Planning and Development Advisory Committee and relevant utility authorities have been consulted about the proposal as per the requirements of clause 31 of the Sydney Harbour SREP. Appendix C contains a Sydney Harbour SREP consultation checklist that documents how the SREP consultation requirements have been considered.

No issues have been raised as a result of this consultation at the time of publication.

5.6 Government agency and stakeholder involvement

Key Government agency and public authority consultation was used to develop the options and concept design. It was also used to scope the environmental assessment. This involved written correspondence, meetings and workshops. The following key stakeholders were consulted through this process:

- Transport for NSW
- Harbour City Ferries
- City of Parramatta Council
- Emergency services
- Community groups, detailed at the end of this document
- Port Authority of NSW.

5.7 Ongoing or future consultation

5.7.1 Response to submissions

This REF would be placed on public display for comment by Government agencies, stakeholders and the community. Following the public display period, Roads and Maritime would collate and consider the submissions received then determine whether the proposal should proceed as described or whether any changes are needed are required. It would also decide if any additional environmental assessment, safeguards or management measures are needed.

A submissions report would be published, which would respond to the comments received. Roads and Maritime would notify those who made submissions and distribute a community update. The update would summarise the submissions report process and the actions Roads and Maritime took to address these comments. Roads and Maritime would also meet with affected residents, businesses and other stakeholders.

5.7.2 Detailed design and pre-construction consultation

If the proposal is built, the community consultation and stakeholder engagement plan would be updated to support the detailed design and pre-construction stages to ensure:

- There would be provision for emergency vehicle access while the proposal is being built
- Any necessary traffic management and maritime navigation controls would be developed to reduce impacts
- Suitable and appropriate environmental safeguards and management measures are made to account for design changes and refinements
- The work is scheduled to avoid conflicts with other projects that are being developed in the area at the same time (refer to section 6.13).

5.7.3 Construction consultation

The appointed work contractor(s) would also be required to consult with the local community before and while the proposal is being built. This process would be managed through the construction environmental management plan (CEMP, refer to section 3.3.1). It would include:

- Issuing notices before starting work and relaying information on traffic management and maritime navigation controls, night work (if required), temporary access restrictions, and planned noisy activities
- Undertaking door-knocking with affected residents
- Undertaking ongoing consultation with affected parties comprising meetings, letter-drops, posters and notifications.

In addition, Roads and Maritime would:

- Provide regular website updates
- Make a 24-hour project information line available while implementing its complaints handling and management process (refer to Chapter 7).

6 Environmental assessment

This Chapter provides a detailed description of the potential environmental impacts associated with the proposal's construction and operation. All aspects of the environment potentially impacted upon by the proposal are considered. This includes consideration of the factors specified in the guidelines *Is an EIS required?* (DUAP 1995/1996) as required under clause 228(1) of the Environmental Planning and Assessment Regulation 2000 and the *Marinas and Related Facilities EIS Guideline* (DUAP 1996). The factors specified in clause 228(2) of the Environmental Planning and Assessment Regulation 2000 are also considered in Appendix B.

Site-specific safeguards and management measures are provided to mitigate against identified potential impacts.

6.1 Land surface and hydrology

This section describes the hydrodynamic and physical environmental impacts on the aquatic and terrestrial environment associated with the proposal.

6.1.1 Methodology

Water based

Published mapping and data were used to define the hydrodynamic and physical characteristics of the aquatic environment. This included:

- Hydrographic and bathymetric mapping and data, including navigational charts
- Bottom, middle and surface water current data (hydrodynamic modelling, Sydney Harbour Hydrodynamic Model, 2013)
- Water and surface temperature data (University of Sydney, 2013)
- Water salinity and chemistry (University of Sydney, 2013)
- Parramatta River Estuary Data Compilation and Review Study (Cardno, 2008).

Land based

Published mapping and data were used to define physical characteristics of the terrestrial environment. This included review of:

- Sydney 1:100,000 Geological Series Sheet 9130 (NSW Department of Mineral Resources, 1983)
- City of Parramatta local environmental plan acid sulfate soils mapping
- NSW EPA online contaminated land register
- Environmental Protection Licences (EPL) under the *Protection of the Environment Operations Act 1997*.
- Lower Parramatta River Floodplain Risk Management Study and Plan (SKM, 2005).

Construction assessment

The assessment considered how the proposed construction activities, work methods, and required management controls (refer to section 3.3) would temporarily affect the physical characteristics of the aquatic environment including localised sediment and pollutant disturbance and dispersion.

Operational assessment

The operational assessment considered how the final aquatic infrastructure would potentially result in hydrodynamic changes in terms of erosion and scour, water quality changes.

6.1.2 Existing environment

Water based

Tides

The proposal is located in the upper reaches of the Parramatta River. Conditions within the Parramatta River are tidally influenced to the Charles Street Weir, adjacent to the proposal. Tidal cycles are semi-diurnal, meaning there is 12.5 hours between high tides. The closest location to the proposal footprint where the tidal heights are measured is at Fort Denison where the conditions are as follows:

- Mean spring tide is 1.23 metres above Australian Height Datum (AHD, which represents the measured average sea level between 1966 and 1968)
- Mean neap tide is 0.75 metres above AHD
- Mean high water is about 0.5 metres above AHD
- Mean low tide can be about one metre below AHD
- The highest-high tide that would occur once every 50 years is about 1.6 metres above AHD.

While there is likely to be variation between the tidal conditions at Fort Denison and the proposal footprint due to masking from river inflow, the above conditions are indicative and suitable for this assessment. The tidal range around the ferry wharf would be typically less than one metre over each cycle because of the riverine/tidal interface at this location. The tidal range affects how quickly the waters flow into and out of the area including around the proposal footprint. Given the relatively small tidal range, this means that the water flow in the area is typically low.

Flooding

The Parramatta Wharf Interchange and adjacent areas are flood prone. The Lower Parramatta River Floodplain Risk Management Study and Plan (SKM, 2005) identifies the proposal footprint is within a high-risk flood risk precinct, and potentially subject to significant erosion risk to foundations of buildings and potential collapse of building structures.

The existing wharf is routinely closed during periods of high water due to water levels and debris along the Parramatta River making it unsafe for ferries to access the wharf. Sydney Ferries undertake inspections of the wharf and surrounds after flood events prior to recommencing operations, and no significant damage to the wharf from flooding is known to have occurred to date.

Water depth (bathymetry)

The natural riverbed has been heavily modified in locations through historical dredging of navigation channels, and regular vessel movements. The Parramatta River was last dredged in 1993, during construction of the existing ferry wharf at Parramatta. Despite prior dredging, the Parramatta River remains shallow, and ferries are unable to operate past Rydalmere during some low tides.

The riverbed close to the seawall at the proposal footprint is intertidal, and exposed at low tide and periods when there is reduced river inflow. Water depth gradually increases to about two metres at the limit of the wharf (as shown on the contours in Figure 6-2).

Sedimentation

Sedimentation of the river occurs through natural processes of weathering and erosion, which deposit sediments in the river through alluvial processes. The rate of sedimentation is also influenced by storm events and flooding. During such events, the rate of sedimentation would typically increase and result in deposition due to increased sediment loads.

The Parramatta River Estuary Data Compilation and Review Study (Cardno, 2008) provides an overview of the main findings of previous studies for the Parramatta River estuary which extends from Charles Street Weir to Yurulbin Point, Birchgrove. The study included details on the catchment characteristics, hydrodynamics, water quality, bathymetry and estuary sediments.

As identified in the above study, marine sediments can enter coastal estuaries and embankments due to oceanographic processes such as tidal currents or wave action. Sources of sediment within the Parramatta River include bank or bed erosion within tributaries, or catchment erosion, whereby sediments are mobilised via overland flow across sparsely vegetated lands.

Estimates of infilling or sedimentation along the Parramatta River vary greatly due to the various records from eyewitness accounts and documented analysis. Overall, there appears to be conflicting and inadequate information on the existing and potential rate of sedimentation within the estuary and its tributaries. Where data is available, it is complicated by dredging and reclamation works undertaken over the years. In addition, the turbulence and wake generated by the ferry service would limit this accumulation of sediment and it is inferred that the ferry movements contribute to the maintenance of the existing channel, particularly in the shallower parts of the Parramatta River between Rydalmere and Parramatta. This section of the Parramatta River was last known to be dredged in circa 1993 during construction of the existing Parramatta wharf, and ferries have operated continuously since that time.

Currents and circulation

Two separate processes provide the main influence on water movement within the proposal footprint.

Tidally influenced water movement occurs in the main channel. Closer to the edge of the river, tidal generated current speeds reduce due to the shallower waters, and this gives way to greater influence from river inflow. As such, the water circulation and currents around the proposal footprint are very low (ie the waters are typically calm).

The second influence on water movement locally is the mixing of the freshwaters from the Parramatta River and the saline waters from Sydney Harbour. This can create localised water movement and disturbance at the surface. This is distinct from the regional tidal current patterns and river inflows described above. Water flow from the Parramatta River is regulated by the Charles Street Weir, which impacts natural flow characteristics within the proposal footprint. Water levels overtop the weir during flooding events, discussed further above.

The above conditions offer a degree of surface mixing in the local environment. However, the exchange of water due to tidal movement is limited. The result is that the river waters are likely to be locally mixed however, unlikely to be regularly replaced.

Wind conditions

Three dominant wind patterns affect the Sydney Harbour region. While the strongest winds come from the south, the proposal footprint is not considered to be exposed to these due to its location. The most common wind direction is from the north-east. These winds occur for about 22 per cent of the time and are responsible for generating waves in the local area. The next most common wind direction is from the west, which occurs for about 17 per cent of the time mainly during the winter. Although there are prevalent winds, the wharf's location at the end of the navigable channel and the surrounding topography, means that it is in a relatively sheltered location not significantly exposed to wind waves.

Geology and soils

A review of the Sydney 1:100,000 Geological Series Sheet 9130 (NSW Department of Mineral Resources, 1983) indicates the proposal is underlain by the Ashfield Shale of the Wianamatta Group, described as black to dark grey shale and laminate, and sandstone.

Soils within the proposal footprint are likely to comprise localised alluvial deposits (comprising sands, sandy clays and clayey sands) of variable depths overlying weathered sandstone.

A geotechnical assessment, completed as part of the concept design for the proposal (Coffey, 2015), confirmed the sub-surface profile within the proposal footprint comprises marine sediments to a depth of 0.2 metres below ground level (mbgl), underlain by siltstone and sandstone bedrock.

Historical dredging and ferry movements may have removed some of the upper alluvial soil profile. In addition, alluvial deposits are generally found to be highly variable in thickness and nature due to the profile of the riverbed and predominant water currents.

Acid sulfate soils

Acid sulfate soil (ASS) is widespread in estuarine environments such as mangroves tidal flats and low-lying swamp areas in NSW (Naylor et al., 1998). The mapping in the City of Parramatta LEP identifies there being a medium-high risk of encountering ASS (Class 1,3,5).

A contamination assessment completed as part of the concept design for the proposal (Coffey, 2015), identified a high probability of the occurrence of acid sulfate soils within the proposal footprint.

Contaminated land

There are no notices issued by the NSW EPA under the *Contaminated Land Management Act 1997* within the proposal footprint or within a one-kilometre radius of the surrounds.

A search of licenses held under the Protection of the Environment (Operations) Act 1997 revealed that there are no sites located within a one-kilometre radius of the proposal currently operating under a POEO license.

Limited sediment sampling was undertaken as part of the contamination assessment completed as part of the concept design for the proposal (Coffey, 2015), which indicated sediments in the vicinity of the proposal may contain elevated concentrations of selected heavy metals and pesticides. Previous studies of sediment quality in Sydney Harbour (McCready et al., 2006) have identified similar concentrations in sediments throughout Sydney Harbour, and these results are considered to be indicative of the surrounding industrial uses and history of the area.

Land based

As above, a review of the Sydney 1: 100,000 Geological Series Sheet 9130 (NSW Department of Mineral Resources, 1983) indicates the proposal footprint is underlain by the Ashfield Shale of the Wianamatta Group, comprising black to dark grey shale and laminate, and sandstone.

The topography of the area varies between to the south and north of the Parramatta River surrounding the proposal. This area has been subject to modification associated with the construction of the existing Parramatta Wharf structure and interchange in 1993. The topography steps down towards the waterfront and wharf entrance, separated by areas of landscaping. Historical photos indicate the area was subject to extensive disturbance, including infilling to extend and raise the level of the southern riverbank and construct the seawall, with further information provided in section 6.8. The lower areas of the interchange, adjacent to the wharf, are subject to flooding. The interchange and immediate surrounds are predominantly surfaced with concrete, with no information on the underlying materials available at the time of writing.

An escarpment rises steeply from the northern bank of the Parramatta River, with trees on the upper reaches lining the edge of the Stewart Street Reserve.

6.1.3 Potential impacts

Construction – water based

The consideration of aquatic impacts during construction has included waterside infrastructure, including the removal and replacement of the existing wharf. Modification of the seawall would include excavation below the waterline, however as the work would be undertaken from the landside, this has been considered under the land based section below.

Flooding

Should flooding occur during construction, there would be increased risk of plant, equipment and materials used during construction entering the river and be swept downstream, potentially resulting in pollution from diesel or other potentially hazardous materials.

Flooding, and severe weather warnings, would be monitored during construction, with appropriate measures implemented in the event of a flood warning such as monitoring the Bureau of Meteorology website for weather forecasts and flood warnings, including the safeguards detailed in section 6.1.4.

Hydrodynamic effects

The proposal involves activities that would cause physical disturbance to the aquatic environment. These include removal of the existing wharf structure, piling and the installation of the prefabricated superstructure elements using a barge mounted crane. If it is not possible to pull out piles, then they would be cut-off at the riverbed. The scale of the disturbance would be minimal and insufficient to cause any dynamic changes in current speed, wave characteristics, saline/freshwater mixing or flushing.

Localised sediment disturbance and smothering

The proposal footprint is within an area of subtidal sand and sub-benthic sediment. As such, the proposed pile removal, pile installation and use of temporary jack-ups/anchor moorings would cause limited sediment disturbance over a small area and this would only occur where work takes place over the sub-benthic sediment. As such, there is expected to be a moderate risk of turbidity during these activities. Potential impacts would be limited by the requirement to undertake the piling work during calm conditions, when there would be the least water movement in the harbour (refer to section 3.3.2).

Additional disturbance of sediments would occur during modification of the seawall and reprofiling of sediment beneath the pontoon. Locally, the finer sediments could mobilise over a greater area as they would remain buoyant in the water column. Disturbance of sediments would be minimised through the work methodology, including progressing the work in sections.

A silt boom and curtain would also be utilised during construction, with further additional safeguards to be detailed environmental work method statement (EWMS) and implemented during the work, discussed further in section 6.1.4.

Erosion and scour

Any work taking place in the aquatic environment has the potential to cause erosion and scour impacts. This is caused from introducing new structures typically on, or close to, the riverbed, as this may alter sediment transport patterns.

Under construction of the proposal, the temporary use of jack-ups/anchors during lifting and piling work would be the only equipment that would impact on the riverbed. However, the associated equipment would typically only be in place for a few weeks. Some localised impacts are expected within a few metres of where jack and/or anchor point would be temporarily installed, however this would be an insufficient amount of time to cause any material scour or erosional impacts. The number of jack-ups/anchors would be

reduced to the minimum required, with the placement of these locations selected to avoid any areas of sensitive habitat. With the introduction of this safeguard and the other standard safeguards described in section 6.1.4, it is concluded that any impacts can be avoided and/or minimised.

Sedimentation

Due to the construction works and maritime exclusion zone, the section of Parramatta River between Rydalmere Wharf and Parramatta Wharf would not be navigated by ferry services for up to six months whilst the proposal is built. This may allow for the accumulation of sediment within the designated ferry channel due to the lack of turbulence and wake associated with ferry movements. The accumulation of sediment, if significant enough, could potentially result in ferries not being able to navigate the channel due to the raised river bed.

However, barge(s) and other boats would operate along this section of the river during the closure. While this could potentially limit sediment accumulation, it would generate less turbulence and wake at a much lower frequency compared to the current ferry service. As discussed in section 6.1.3, there is inadequate information on the existing and potential rate of sedimentation. However, it is not anticipated that a significant amount of sediment would accumulate within the channel over the six-month closure period.

It should be noted that sedimentation rates have also been modified by human activities along the Parramatta River and the potential for a flood event to mobilise a significant amount of sediment cannot be discounted. However, previous flooding of the Parramatta River is not known to have resulted in the disruption of ferry operations due to sedimentation of the channel.

Mitigation measures for sedimentation have been included in section 6.1.4, with no significant impacts anticipated.

Acid sulfate soils

While there is the risk of acid sulfate soil there are no plans to remove any sediments, or bring them to the surface. Any sediment attached to the extracted piles would be removed in the water. As such, there is no possibility for these sediments to dry and oxidise.

Localised pollutant disturbance

Sediments containing elevated concentrations of selected heavy metals and pesticides have been identified within the proposal footprint (Coffey, 2015). This is likely due to current and former industrial use (including nearby registered contaminated sites) and runoff from the surrounding land. Other pollutants which may be encountered include:

- Surfactants, oils, fuels, diesels and metals due to stormwater runoff
- Pesticides and heavy metals from stormwater runoff from the surrounding areas
- Residual tributyltin (as described below).

Tributyltin forms a group of tin-derivatives that were used extensively in antifouling paint in the shipping industry until an international ban in 2003 prevented their application on vessels less than 25 metres in length. However, tributyltin has an exceptionally long residence time in the aquatic environment, and if disturbed, can still have water quality and ecotoxicology effects over many years.

Notwithstanding the potential presence of contaminated sediments at the proposal, any impact would be minor due to the limited disturbance of the riverbed sediments from piling and the limited sediment depth on the riverbed across the proposal footprint. No sediment would be removed from the river as a result of reprofiling for the new pontoon. Therefore, disposal and treatment would not be required.

Also, the extent of disturbance would be consistent with the small-scale activities that routinely take place in the harbour, even including the propeller wash from the many ships in the area. As such, the scale of disturbance would mean that any additional impacts would be negligible with the implementation of safeguards in section 6.1.4.

Construction – land based

Erosion and sedimentation

The proposed modification of the seawall would include removal of about 70 linear metres of seawall and excavation of about 400 cubic metres of existing fill. There is potential for causing soil erosion or sediment laden runoff which can enter the river, causing pollution. The type of material underlying the seawall is not known at the time of writing. Given the documented construction of the wharf in 1993, the potential for encountering contamination from infilling is considered low, however cannot be discounted.

Potential impacts from erosion and sediment control would be prevented with the implementation of safeguards in section 6.1.4.

Accidental spills within the site compound may occur from storing, handling and/or transferring the required small volumes of welding materials, lubricants, solvents, fuels, oils and diesels. However, potential impacts would be mitigated through the appropriate management of the storage of such materials, and inclusion of spill kits as noted in section 6.1.4.

No operational impacts to terrestrial soils are anticipated, as no significant change to existing operations is proposed.

Acid sulfate soils

Excavations undertaken as part of the modification of the seawall may encounter ASS at depths below the water level.

The disturbance of potential ASS should be kept to a minimum to lower the risk of exposing these sediments to oxygen. If ASS are to be exposed to oxidation or spoil is to be generated during construction activities requiring disposal, further assessment for ASS and waste classification should be undertaken.

ASS would be managed in accordance with the safeguards detailed in section 6.1.4 to mitigate potential impacts.

Contamination

Given construction of the seawall in 1993, the presence of contaminated soils is considered low. However, contamination testing of materials within the seawall would be undertaken prior to construction.

Should contamination be identified, the safeguards detailed in section 6.1.4 would ensure these materials are appropriately managed, and the risk of releasing contaminants during construction is minimised.

Flooding

Flooding in the area may result in additional impacts such as increased risk of erosion and sedimentation from the land work. As discussed above, any plant, equipment and materials used during construction may enter the river and be swept downstream, potentially resulting in pollution from diesel or other potentially hazardous materials. Modification of the seawall would require open excavations that could result in increased erosion and sedimentation, potentially including contaminated sediments, during a flood event. However, as discussed in section 6.1.4, flooding risks would be managed with the implementation of safeguards in Table 6-1 to prevent any additional impacts.

Operation – water based

Erosion and scour

Under the proposal, additional piles and piers for the jetty would be installed. As water flows around these structures there is the potential to create local scour and erosion. In this location, the only expected impacts would be limited to within a few metres of each pile given that:

- There is an existing wharf at the proposal
- The low dynamic character close to the riverbed around the piles located within the sub-benthic sediments
- The limited amount of sediment substrate locally.

The proposal would also remove a small section of seawall. This section of the seawall currently extends beyond the surrounding line of seawall, and its removal would not significantly impact water flows, with no impacts from erosion and scour anticipated.

Any potential impact would be temporary, with local sediment conditions adjusting over time.

Sedimentation

Ferry services would resume during operation, with no change in ferry movements required to service the new wharf. It is not anticipated that significant impacts from sedimentation during construction would occur.

Flooding

The proposal has been designed to withstand a 1:100 year ARI flood event, and ensure the safe closure of the wharf in higher flood conditions. The height of piles enables the pontoon to rise and fall with flood levels, and safely disconnect from the shore bridge.

As discussed in section 6.1.2, Roads and Maritime inspect wharves after flooding events, and this would continue during operation of the proposal. No significant impacts from flooding are anticipated during operation of the proposal.

Operation – land based

No significant change to the existing landside infrastructure is proposed, and no significant impacts to the terrestrial land surface are anticipated.

6.1.4 Safeguards and management measures

Table 6-1 lists the safeguards and management measures that would be implemented to protect the land surface and hydrology to account for the impacts identified in section 6.1.3.

Table 6-1: Aquatic and terrestrial environment safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Soil and water	<p>A Soil and Water Management Plan (SWMP) would be prepared and implemented as part of the CEMP. The SWMP would identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks would be addressed during construction.</p> <p>Erosion and sediment control measures are to be implemented and maintained (in accordance with the Landcom/Department of Housing Managing Urban Stormwater, Soils and Construction Guidelines (the Blue Book)) to:</p> <ul style="list-style-type: none"> • Prevent sediment moving off-site and sediment laden water entering any water course, drainage lines, or drain inlets • Reduce water velocity and capture sediment on site • Minimise the amount of material transported from site to surrounding pavement surfaces • Divert clean water around the site. 	Contractor	Detailed design/ pre-construction	Core standard safeguard LS1
Flooding	<p>The SWMP would include measures to address potential flood threats and evacuation requirements. The measures would include:</p> <ul style="list-style-type: none"> • Regular consultation of the Bureau of Meteorology website for weather forecasts and flood warnings • Scheduling of activities on land (including compound site) and water subject to flooding to avoid high flow periods. • A process for removing equipment and materials off site and out of flood risk areas quickly. • Storing and use of fuels and chemicals away from the flood zone, in bunded areas. 	Contractor	Construction	Additional safeguard LS2

Impact	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Contaminated land	<p>A Contaminated Land Management Plan will be prepared in accordance with the Guideline for the Management of Contamination (Roads and Maritime, 2013) and implemented as part of the CEMP. The plan will include, but not be limited to:</p> <ul style="list-style-type: none"> • Capture and management of any surface runoff contaminated by exposure to the contaminated land • Further investigations required to determine the extent, concentration and type of contamination, as identified in the detailed site investigation (Phase 2) • Management of the remediation and subsequent validation of the contaminated land, including any certification required • Measures to ensure the safety of site personnel and local communities during construction. 	Contractor	Detailed design/pre-construction	Additional safeguard LS3
Acid sulfate soils	<p>An Acid Sulfate Soil Management Plan (ASSMP) would be prepared as part of the Contaminated Land Management Plan to address the potential for acidity to be generated from ASS and PASS disturbed during the construction phase. Potential or actual acid sulphate soils are to be managed in accordance with the Roads and Maritime Services Guidelines for the Management of Acid Sulphate Materials 2005.</p>	Contractor	Detailed design/pre-construction	Additional safeguard LS4
Contaminated land	<p>If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other works that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Roads and Maritime Environment Manager and/or EPA.</p>	Contractor	Detailed design/pre-construction	Additional safeguard LS5
Accidental spill	<p>An emergency spill kit is to be kept on site at all times and maintained throughout the construction work. The spill kit must be appropriately sized for the volume of substances at the work site.</p>	Contractor	Construction	Additional safeguard LS6

Impact	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Accidental spill	If an incident (eg spill) occurs, the Roads and Maritime Services Environmental Incident Classification and Reporting Procedure is to be followed and the Roads and Maritime Services Contract Manager notified as soon as practicable.	Contractor	Construction	Additional safeguard LS7
Accidental spill	Emergency contacts will be kept in an easily accessible location on vehicles, vessels, plant and site office. All workers will be advised of these contact details and procedures.	Contractor	Construction	Additional safeguard LS8
Accidental spill	Spill kits for construction barges must be specific for working within the marine environment.	Contractor	Construction	Additional safeguard LS9
Accidental spill	All workers will be advised of the location of the spill kit and trained in its use.	Contractor	Construction	Additional safeguard LS10
Accidental spill	Vehicles, vessels and plant must be properly maintained and regularly inspected for fluid leaks.	Contractor	Construction	Additional safeguard LS11
Accidental spill	No vehicle or vessel wash-down or re-fuelling would occur on-site.	Contractor	Construction	Additional safeguard LS12
Accidental spill	In the event of a maritime spill, the incident emergency plan would be implemented in accordance with Sydney Ports Corporation's response to shipping incidents and emergencies outlined in the 'NSW State Waters Marine Oil and Chemical Spill Contingency Plan' (Maritime, 2012).	Contractor	Construction	Additional safeguard LS13
Accidental spill	Refuelling of plant and equipment and storage of hazardous materials on barges is to occur within a double-bunded area.	Contractor	Construction	Additional safeguard LS14

Impact	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Soil and water	<p>A detailed environmental work method statement (EWMS) will be prepared and implemented for the following high-risk activities:</p> <ul style="list-style-type: none"> • Modification of the seawall • Reprofiling of sediment • Dewatering. <p>The content of the EWMS would include, but not limited to:</p> <ul style="list-style-type: none"> • Description of the works/activities including machinery to be used • Outline of the sequence of the work/activities, including interfaces with other construction activities • Identification of potential environmental risks/impacts due to the works/activities and associated with wet weather events • Evaluation of methods to eliminate/reduce the environmental risk • Mitigation measures to reduce environmental risk • Any safeguards resulting from consultation with public authorities and other stakeholders, when appropriate • A map indicating the locations of sensitive locations (such as threatened species or heritage items), likely potential environmental impacts, and work areas • Identification of work area and exclusion areas • A process for progressive review, eg monitoring processes and methods to eliminate/reduce environmental risks/impacts. 	Contractor	Detailed design/ pre-construction	Additional safeguard LS15
Erosion and sedimentation	Silt curtains are to be installed prior to and around the area of works that may disturb the seabed. The silt boom and curtain would extend from a minimum of 100 millimetres above the water line to a minimum of 2.5 metres below the water line before starting work.	Contractor	Construction	Additional safeguard LS16
Erosion and sedimentation	Silt curtains are to be installed, monitored and maintained as needed to contain any sediment.	Contractor	Construction	Additional safeguard LS17

Impact	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Erosion and sedimentation	<p>Visual monitoring of local water quality (ie turbidity, hydrocarbon spills/slicks) is to be undertaken on a regular basis to identify any potential spills or deficient silt curtains or erosion and sediment controls.</p> <p>Results of the observations of the integrity of the silt curtain are required to be recorded and maintained specifically for the purpose. Records are required to be kept on the site and to be made available for inspection by persons authorised by Roads and Maritime.</p>	Contractor	Construction	Additional safeguard LS18
Erosion and scour	The number of jack-ups/anchor points would be minimised where possible. The locations would be selected to avoid areas of sensitive habitat, as discussed further in section 6.1.4.	Contractor	Construction	Additional safeguard LS19
Erosion and scour	Work positioning barges, drilling and pile driving should occur during calm conditions to prevent excessive scouring and other impacts.	Contractor	Construction	Additional Safeguard LS20

6.2 Water quality

This section describes the existing water quality and potential impacts associated with the proposal.

6.2.1 Methodology

Published mapping and data were used to define the existing water quality. This included:

- Parramatta River Estuary Data Compilation and Review Study (Cardno, 2008)
- Parramatta River Estuary Coastal Zone Management Plan (Cardno, 2012)
- Sydney Harbour Catchment Water Quality Improvement Plan: Data Compilation and Review. (Water Research Laboratory (WRL), 2011).

6.2.2 Existing environment

The Parramatta River catchment extends from Blacktown Creek in the west, approximately to 22 kilometres to Sydney Harbour in the east. Much of the catchment has been developed for urban and agricultural purposes, with the existing water quality impacted by stormwater discharge and altered flow regimes.

Pollutants commonly associated with stormwater discharge include:

- Sediment from erosion and stormwater inflows, impacting turbidity
- Pathogens such as faecal coliforms from
- Litter and other wastes
- Pesticides from agricultural land uses
- Nutrients and pathogens from fertilizers and sewage overflows
- Heavy metals (in river sediments)
- Other contaminants such as hydrocarbons from oil and fuel leaks.

The proposal is located within the upper estuary, and is influenced by a mix of freshwater and saline waters from rainfall and freshwater inflows.

A review of the available information on water quality in the Parramatta River was undertaken by Cardno (2008) and WRL (2011). This data indicates water quality parameters often exceed aquatic ecosystem health guidelines. Based on this information, water quality within the proposal footprint is inferred to be of poor quality.

Stormwater from the area surrounding the Parramatta Wharf Interchange discharges directly to the Parramatta River, including a stormwater drain within the interchange.

6.2.3 Potential impacts

Construction

Pollutants

The main to water quality would be from the disturbance from sediments during piling, reprofiling of sediments and modification to the seawall. As discussed, in section 6.1.3, works associated with modification of the seawall have the potential to result in the release of sediments, and pollutants, to water.

Sediments would generally settle out of suspension within the work area, however finer sediments could mobilise over a greater area as they would remain buoyant in the water column. A silt boom and curtain would be installed around the work area to collect any sediments, in addition to other safeguards detailed in section 6.2.4.

Further mitigation would be implemented through the safeguards details in section 6.1.4 and section 6.2.4. Notwithstanding, the construction of the proposal has the potential result in minor impacts to water quality from encountering contaminants or ASS and the release of river water which would enter the construction area below the water line.

Water quality within the Parramatta River is known to be generally poor within highly urbanised areas such as surrounding the proposal, and the residual impacts are not considered significant in the context of the receiving waters. Contamination testing of soils within the seawall would be undertaken prior to construction.

Dewatering

Dewatering of excavations below the water level may be required for the proposal. As discussed in section 6.1.4, best practice procedures for excavation to prevent the release of sediment would be implemented during construction of the proposal. In addition, the safeguards detailed in section 6.2.4, such as the silt curtain, would be implemented to mitigate potential impacts from dewatering. Notwithstanding, the construction of the proposal has the potential to result in minor impacts to water quality from the release of river water which would enter excavations below the water line.

Accidental spills

The materials required to upgrade the wharf would be generally inert and harmless except for the small quantities of welding materials, lubricants, solvents, fuels and oils. As such, there would be some potential for:

- Accidental spills, including:
 - Accidents during loading, unloading and installation work
 - Leaks and drips from poorly maintained machinery and equipment
 - The mismanaged storage of waste materials, including potential for debris to enter the water
- These risks would be greater when undertaking work over, or in, the river namely:
 - Removing the existing structure
 - Demolition of the seawall
 - Drilling/hammering the piles
 - Transferring equipment and machinery
 - Installing the substructures and superstructures.

The primary impact from spills would be a decline in water quality which would have an impact upon the aquatic environment. The impact would depend on the quantity and type of material spilt. However, providing relevant standard controls, such as those identified in section 6.1.4 and 6.2.4, are implemented the impacts are expected to be minimised.

Accidental material spill within the ancillary facility may occur from storing, handing and/or transferring the required small volumes of welding materials, lubricants, solvents, fuels, oils and diesels. Potential impacts would be mitigated through the appropriate management of the storage of such materials, and inclusion of spill kits as noted in section 6.1.4.

Operation

No significant impacts to water quality are anticipated for operation of the proposal, as ferries would operate consistently with the current movements, and no additional sediment disturbance is anticipated.

Any impacted stormwater drainage would be reinstalled within the interchange to maintain the existing drainage regime, with no impact to stormwater quality is anticipated.

There is always the potential for an accidental spill or discharge during operation. This would be most likely during berthing at the wharf. While this is the case, the same potential exists from the current operational wharf and would be managed under the standard controls already in place across the ferry network. As such, the impacts are expected to be safeguarded against and therefore minimised.

6.2.4 Safeguards and management measures

Table 6-2 lists the safeguards and management measures that would be implemented to protect water quality to account for the impacts identified in section 6.2.3.

Table 6-2: Water quality safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Water quality	<p>A spill management plan would be developed and communicated to all staff working on site.</p> <p>Any aquatic spill (whether spill occurs on water on land and subsequently enters the water) is to be immediately reported to Roads and Maritime and Sydney Ports VTS and VHF Channel 13.</p> <p>Aquatic spill kits are to be kept on site during construction.</p>	Contractor	Construction	Additional safeguard WQ1
Water quality	All machinery and equipment would be maintained in good working order and regularly visually inspected for leaks.	Contractor	Construction	Additional safeguard WQ2
Stormwater	Stormwater infrastructure would reinstated within the seawall.	Contractor	Construction	Additional safeguard WQ3

6.3 Biodiversity

This section summarises the proposal's aquatic and terrestrial biodiversity. Appendix D contains a supporting paper prepared by Eco Logical Australia and threatened species searches.

6.3.1 Methodology

The assessment included a desktop review of published State and Commonwealth records, data and literature to confirm the likely presence of threatened flora, fauna and endangered communities in the local aquatic environment. This was followed by a site walkover and aquatic survey of the marine environment covering an area extending to about 20 metres from the seawall.

The following published records were reviewed:

- NSW Fisheries species profiles, 'Primefact' publications and expected distribution maps
- Protected Matters Search Tool: containing information on Commonwealth protected species
- PlantNet Database: containing information on sensitive and rare plants
- BioNet Atlas of Wildlife: containing information on threatened and protected species
- List of Noxious Weeds: containing information on non-native plant species that are listed as noxious weeds
- Zoological Collections of Australian Museums: to search individual species and determine the potential for threatened species to be present locally.

The impact assessment was prepared in accordance with Environmental Impact Assessment Practice Note: Biodiversity Assessment (EIA-N06, Roads and Maritime Services, 2016 (c)) with consideration of the:

- Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects (Roads and Maritime, 2011)
- Guidelines for Biodiversity Offset (Roads and Maritime, 2011).

6.3.2 Existing environment

Water based

Protected areas

The Sydney Harbour – Foreshores and Waterways Area Development Control Plan 2005: Ecological Communities and Landscape Characters, identifies the proposal footprint as 'Water', with riparian land mapped as 'Grassland' (refer to Appendix D). There are no records of saltmarsh or seagrass within the site and no local records of the threatened *Posidonia* seagrass population.

Wetlands

The proposal is not located close to any nationally protected areas such as Ramsar wetlands. In addition, the proposal footprint is not identified as a 'Wetland Protection Area' under the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005: Wetlands Protection Area.

Mangroves

The State-wide mapping of estuarine macrophytes (mangroves, saltmarsh and seagrass) by NSW DPI Fisheries identifies the nearest patch of mangroves about 150 metres downstream from the wharf (Figure 6-1).



Source: <http://www.dpi.nsw.gov.au/content/research/areas/aquatic-ecosystems/estuarine-habitats-maps>. Aerial image SIX Maps.

Figure 6-1: Mapping of mangroves at the proposal

Important fish habitat

Aquatic habitat in the study area has been modified by land reclamation, a vertical seawall, the existing wharf structure and piles, and disturbance by regular ferry traffic.

NSW DPI Fisheries identify three types of key fish habitat (KFH) in their Policy and Guidelines for Fish Habitat Conservation and Management comprising:

- Type 1 (highly sensitive key fish habitat) – none present within the study area
- Type 2 (moderately sensitive key fish habitat) – habitat is represented by mangroves.
- Type 3 (minimally sensitive key fish habitat) – habitat is represented as unvegetated subtidal sediment, intertidal mudflat with sparse infauna and intertidal seawall.

The proposal footprint is also known to be utilised by fish species migrating upstream for during breeding cycles. The Charles Street Weir fish ladder was constructed to assist fish species such as *Percalates novemaculeata* (Australian Bass) move upstream to access breeding and feeding areas (eg Australian Bass).

Aquatic habitat with proximity to the proposal is shown in Figure 6-2.

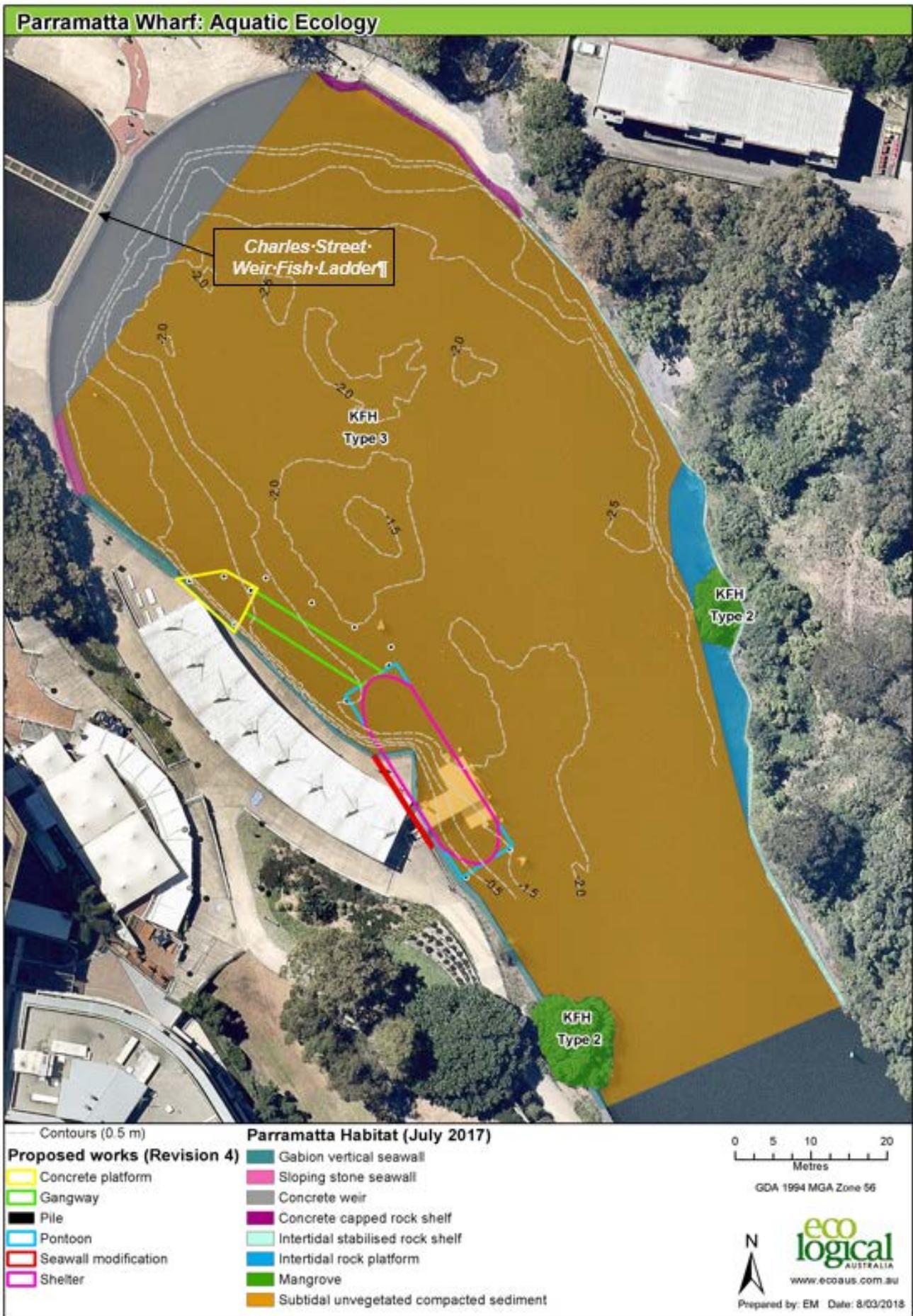


Figure 6-2: Aquatic habitat map and key fish habitats within proximity of the proposal

Four distinct zones were mapped during the field survey:

- Man-made structures (Type 3 KFH) – The reclaimed foreshore was characterised by a vertical stone (gabion basket) seawall and sloping concrete wall susceptible to regular ferry wash. A large weir and single fish ladder was present upstream. There were no encrusting organisms or macroalgae present on the walls, but some filamentous algae. The existing piles and pontoon had a moderate cover of encrusting organisms, such as filamentous algae and barnacles, but no macroalgae species. No saltmarsh was present due to the seawall blocking intertidal movement
- Intertidal rock (Type 3 KFH) – The intertidal rock platform occurred on the opposite bank. Oysters and small encrusting organisms were present on the rock. Some areas were stabilised by concrete bags
- Compact subtidal sediment (Type 3 KFH) – The benthic habitat surrounding the current wharf structure was unvegetated compacted sediment. There was no bioturbation from infauna evident. Water depth was up to 2.5 meters in the survey area
- Mangroves (Type 2 KFH) – *Avicennia marina* (Grey Mangrove) occurred adjacent to the proposal, downstream and on the opposite bank. These were single trees that appeared healthy, but growing amongst rocky habitat with limited room for expansion.

Threatened biota

From database records, there are 106 aquatic-related threatened species within Sydney Harbour, including tidal areas of Parramatta River and Lane Cove River.

No threatened species, populations or communities were observed in the study area. Consideration of suitable habitat is provided below, and in Appendix D.

Flora

No threatened species were identified within the study area. Coastal saltmarsh, which occurs in the high intertidal zone, is not considered likely to occur within the study area due to the presence of steep areas and artificial structures, which would prevent plants establishing.

Other threatened plant species recorded in the harbour were not recorded within the study area and are not considered likely to occur locally due to the lack of supporting habitat as described in section 4.3 of Appendix D.

Fauna

A number of threatened fauna species have been recorded in the harbour, with a full list provided in Appendix D.

Certain species of fish and other fauna may pass through the study area on occasion. Nonetheless, it can be concluded that these species do not rely on the area for: primary habitat purposes, spawning, use as nursery grounds, and/or predatory/foraging purposes (ie providing a source of food).

No suitable habitat for any recorded threatened fauna species was identified within the study area, and are considered unlikely to occur.

Underwater noise sensitivity

Marine fauna and fish are sensitive to the impacts of underwater noise. While they can perceive piling generated noise up to 400 metres from its source, they typically avoid coming within 30 metres (Engell-Sorensen, 2000). If they do come within 30 metres of any piling work then they could be injured or harmed through hearing loss or in extreme instances they can be killed (a term known as acoustic shock).

Pests

Pests are not known to occur within the local area, however vessels may also be a vector for movement of marine pests, especially if ships are not from the local area. For example, machinery and vessels used on other sites where the noxious alga *Caulerpa taxifolia* (Caulerpa) was present could introduce the weed if hygiene procedures are not followed. To prevent the spread of this weed, barges moving from areas where Caulerpa is present should be inspected before entering the site. If Caulerpa becomes established around the new wharf, then ferries using the wharf in the future would potentially become vectors for the further spread of this weed.

Land based

The area surrounding the proposal contains numerous semi-mature and mature trees. These likely include a variety of locally-indigenous, non-local native and exotic (introduced) species, such as Brush Box, figs and various eucalypt trees, all of which appear to have been planted within the site.

Habitat trees are within the proposal footprint are limited to planted species that would be of some benefit to native wildlife. Local trees and vegetation may provide a limited foraging resource. However, the fragmented habitat is only likely to provide for native and introduced fauna species that are adapted to open environments and tolerant of major human disturbance.

Threatened species

A search of the NSW Wildlife Atlas identified records of 48 threatened species listed under the BC Act within a 10-kilometre radius of the proposal. However, no records were identified within the proposal footprint, or immediate surrounds.

A search of the EPBC Act Protected Matters Search Tool identified 76 threatened species, 52 migratory species and nine threatened ecological communities within a 10-kilometre radius of the proposal. However, no records were identified within the proposal footprint, or immediate surrounds.

As discussed above, the proposal footprint and immediate surrounds are not considered likely to provide suitable habitat for any of the species identified.

6.3.3 Potential impacts

Construction – water based

Protected areas

The proposed works would not harm protected marine vegetation (saltmarsh, macroalgae or seagrass) as they do not occur on site. In addition, protected fauna are unlikely to occur in the study area as discussed in section 6.3.1.

Direct loss of aquatic vegetation and habitat

Direct impact from construction of the proposal would result from the installation of 13 new piles that would be drilled and hammered to refusal into the bedrock, and reprofiling of sediments beneath the pontoon. The pile footprint would impact an area less than 5 square metres of subtidal sediment (Type 3 – minimally sensitive KFH). This is a negligible impact given the modified conditions and amount of similar habitat nearby.

Realignment of the seawall would result in a direct loss of marine biota (filamentous algae) attached to the gabion baskets. These species would re-establish on the new wall. As such, any impact would be short-term and negligible.

Reprofiling of the river bed is required to give the new pontoon additional clearance at low tide, which would directly impact benthic habitat and infauna. However, the existing conditions are poor, with no evidence of bioturbation (infauna burrows). The sediment appears compacted, or flushed free of fines due to turbulence from weir spills and ferry berthing/turning. The loss of this habitat is minor and would be substituted by similar habitat post-dredging.

The work associated with realigning the seawall and reprofiling of sediment to provide sufficient depth for the pontoon is classed as dredging under the FM Act. The Minister for Primary Industries would be notified of the proposal in accordance with section 199 of the FM Act.

The proposal would result in a total impact to 359 square-metres of Type 3 KFH (see breakdown in Table 1 of Appendix D). This impact includes direct damage from pile installation, partial to absolute shading beneath the pontoon and removal of existing habitat. No additional impact from reprofiling of sediment beneath the pontoon would occur, as this area would be impacted by shading. The removal of Type 3 KFH is generally not considered to be a significant impact, however, it has been conservatively estimated in Table 6-3.

Table 6-3: Direct habitat loss

Habitat	Direct Loss
Existing piles (10 removed) <i>Minimally sensitive Type 3 KFH</i>	36.00
New piles (13 piles) <i>Minimally sensitive Type 3 KFH</i>	0
Existing pontoon <i>Minimally sensitive Type 3 KFH</i>	62.00
New pontoon <i>Minimally sensitive Type 3 KFH</i>	0
Intertidal rock <i>Minimally sensitive Type 3 KFH</i>	0
Intertidal and subtidal seawall <i>Minimally sensitive Type 3 KFH</i>	7.50
Subtidal sediment <i>Minimally sensitive Type 3 KFH</i>	253.71
Mangroves <i>Moderately sensitive Type 2 KFH</i>	0
Total	359.21

This impact would be partially offset by the creation of about 324 square-metres new hard surfaces provided by the new piles and pontoon. This would result in a habitat loss of about 35 square-metres of minimally sensitive (Type 3) KFH. This small area would be insufficient to affect the survival of any fish species in the area as they would still be able to inhabit the remaining areas.

In the case of impact from the removal of the piles and pontoon, this habitat would re-establish over time during operation of the wharf, this is discussed further below.

Injury and mortality

The absence of any threatened flora or fauna local to the proposal footprint reduces the potential for associated impacts on ecologically significant species.

There is potential for immobile or semi-mobile species that occur locally to be killed as a result of the piling work and/or use of jack-ups and anchors. However, the potential for injury and mortality during construction would be minimal and managed through safeguards and management detailed in section 6.3.4. Providing these safeguards and the other standard measures are implemented and remain effective, then any associated impacts would be avoided or minimised.

Entrapment and impingement

A silt curtain would be used to prevent sediment dispersion. As such, there is the potential for aquatic/marine mammals and fish to become entrapped in the curtain. However, providing standard measures are introduced, any impacts are expected to be minimised. In addition, the proposal would not block fish passage. However, as discussed in section 6.13 there may be cumulative impacts if the proposal is constructed at the same time as the proposed boardwalk.

Fish passage, including access to the Charles Street Weir fish ladder for *Perca latipes novemaculeata* (Australian Bass) and other species, would be maintained with the safeguards in section 6.2.4.

Underwater noise

Underwater noise from hammering piles has the potential to cause disturbance or physical impact to marine fauna in the area. Fish in the vicinity would be affected by excessive underwater noise, ranging from mortality to interruption of communication, depending on species anatomy (eg fish with swim bladders closer to the ear are more sensitive to acoustic impact than species with swim bladders further from the ear). If water depth allows, fish would be able to escape under the silt curtain as hammering starts, otherwise some impact is expected.

Indirect and secondary impacts

As described in section 6.1.3 there is the potential for sediment discharge, accidental spills and/or localised scour and erosion to occur while the proposal is being built. However, by including standard safeguards it is concluded that such impacts could be minimised to the point of having no material indirect impact on aquatic or inter-tidal habitat.

Pest species

The introduction of pest species could occur through ship movements into and out of the local area. However, providing relevant standard controls are implemented and monitored, the impacts are expected to be minimised.

Construction – land based

Loss of vegetation and habitat

It is not proposed to remove or trim any trees for construction of the proposal. As such, there is expected to be no terrestrial habitat loss or impact under the proposal.

Injury and mortality

The avoidance of any vegetation or habitat removal would avoid any significant risk of direct injury or mortality impacts. This extends to the loss of any foraging habitat in the area.

Noise, vibration and lighting

Adverse noise and temporary vibration would be introduced while the proposal is being built (refer to section 6.3). However, this is unlikely to affect any native species due to the highly disturbed nature of the existing environment. Standard safeguards and management measures would be implemented to reduce impacts from noise and vibration. Providing these are implemented and remain effective then impacts would be avoided and/or minimised.

The proposal would be constructed during standard hours, with no significant impacts from lighting anticipated.

Threatened biota

As there is no proposed vegetation loss or tree removal then there are not expected impacts on threatened species listed under the BC Act and/or EPBC Act.

Weed invasion

There is minimal potential for the proposal to introduce weeds into the area, as there are no significant landside earthworks planned and/or vegetation clearance work.

Operation – water based

The following impacts may occur once the proposal is operational:

- Habitat loss, loss of habitat quality, and/or impacts on community and species health from accidental spills, litter and/or engine leaks
- Localised sediment disturbance from propeller wash affecting the subtidal shallow rocky reef and coarse bare sediment habitat and its supporting values and species.

The current wharf operates with the potential for the above impacts to occur. Once the wharf is upgraded, these potential impacts could still occur. No significant change to operations is proposed with standard operational controls to remain in place.

As described above, the replacement piles would allow an artificial habitat to re-establish that would be likely characteristic of the existing habitat described in section 6.3.1.

The only potential impacts expected from the proposal would be a change in shadowing impacts on the riverbed from the new wharf structure.

The proposal would result in up to 249 square-metres of indirect shading impact on subtidal habitat beneath the pontoon. However, as no significant habitat was observed in or around this area, the impacts from shading on vegetation growth would not occur.

In consultation with NSW DPI Fisheries, this type of impact (partial shading of unvegetated substrate) for community infrastructure is very minor and does not warrant the need for further offsets or compensation. Furthermore, in accordance with the Roads and Maritime's Biodiversity Offset Guideline which refers to the NSW DPI Fisheries' policy, the proposed indirect shading impact to type 3 key fish habitat would not need to be offset.

Operation – land based

As there is not expected to be any change to operational activities around the wharf there is limited potential for any operational terrestrial ecology impacts.

Conclusion on significance of impacts

The proposal is not likely to significantly impact threatened terrestrial or aquatic species, populations or ecological communities or their habitats, within the meaning of the BC Act or the FM Act and therefore a species impact statement (SIS) is not needed.

The proposal is also not likely to significantly impact threatened terrestrial or aquatic species, populations, ecological communities or migratory species, within the meaning of the EPBC Act. A referral to the Australian Department of the Environment and Energy is therefore not required for biodiversity matters.

6.3.4 Safeguards and management measures

Table 6-4 lists the terrestrial and aquatic biodiversity safeguards and management measures that would be implemented to account for the impacts identified in section 6.3.2.

Table 6-4: Biodiversity safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Aquatic biodiversity	<p>A Marine Ecology Management Plan would be prepared as part of the CEMP. This would include, but not be limited to, measures relating to the following activities to minimise the risk for pollution:</p> <ul style="list-style-type: none"> • Sediment and rock debris control • Spills from concrete pour • Oil/fuel/chemical storage and spill management • Machinery and engine maintenance schedule to reduce oil/fuel leakage • Low impact barge positioning to prevent propeller scouring and thrust wash onto sensitive habitats such as the mangroves • Minimise footprint and establish no-go zones in sensitive habitats • Accidental waste/material overboard response (eg construction materials dropped into the harbour) • Biological hygiene (eg prevent spread of noxious species on and off the site) • Aquatic fauna management. 	Contractor	Pre-construction	Additional Safeguard B1
Biodiversity	<p>No-go zones would be established to avoid damage to all terrestrial and nearby aquatic habitats. No-go zones should be marked on a map and displayed inside the construction barge and office. All staff responsible for manoeuvring the barge should check the map before selecting a new position.</p> <p>Establish no-go zones to avoid damage to nearby habitats, particularly mangroves for the construction period.</p>	Contractor	Pre-construction	Additional Safeguard B2

Impact	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Aquatic Biodiversity	No anchors or mooring blocks/lines should be placed on the intertidal rock habitat. All lines should be suspended off the riverbed to minimise drag across benthic communities.	Contractor	Pre-construction	Additional Safeguard B3
Aquatic Biodiversity	Install a floating boom with silt curtain or equivalent to contain sediment plumes during dredging, drilling, pile hammering and reprofiling. The silt curtain should encompass the aquatic construction zone fully, rather than being anchored to the shore and regularly inspected for entrainment and impingement of aquatic/marine wildlife. The silt curtain must not block the entire channel, land must leave at least half the channel width available for fish passage.	Contractor	Construction	Additional Safeguard B5
Aquatic Biodiversity	Vessel speeds would be minimised within the construction area to minimise wash and risk of injury to aquatic/marine fauna. All staff working on the proposal would be advised of the location of habitats within and near the proposal footprint. Care should be taken in the placement of jack-ups and/or anchors to avoid areas of aquatic habitat.	Contractor	Construction	Additional Safeguard B6
Aquatic Biodiversity	Work positioning barges, drilling and pile driving should occur during calm conditions to prevent excessive scouring and other impacts.	Contractor	Construction	Additional Safeguard B7
Aquatic Biodiversity	Gentle start-up of piling hammering would be completed to allow undetected aquatic fauna to leave the area.	Contractor	Construction	Additional Safeguard B8
Fish passage	Fish passage, including access to the Charles Street Weir fish ladder for <i>Percalates novemaculeata</i> (Australian Bass) and other species, would be maintained.	Contractor	Construction	Additional Safeguard B9
Pest species	Regular inspections of all equipment, machinery and materials would be completed to prevent the importation of pests and weeds to the area, including the noxious marine alga <i>Caulerpa taxifolia</i> . Good housekeeping of the aquatic construction area would be maintained.	Contractor	Construction	Additional Safeguard B10

Impact	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Dredging	The Minister for Primary Industries would be notified of the proposal in accordance with section 199 of the FM Act.	Roads and Maritime	Pre-construction	Additional Safeguard B11

6.4 Noise and vibration

This section summarises the proposal's noise and vibration impacts. Appendix E contains a supporting technical paper prepared by WSP in March 2018.

6.4.1 Methodology

Construction assessment

The construction assessment reviewed how the proposed activities, methods and scheduling described in Chapter 3 would affect noise and vibration sensitive receivers in the local area. The assessment was completed in accordance with the Construction Noise and Vibration Guideline (CNVG, Roads and Maritime, 2016a). Noise levels from construction works were predicted using 3D noise modelling software (SoundPLAN) and calculated using CONCAWEtm prediction algorithm.

Operational assessment

The operational assessment was limited to a qualified consideration of any amenity noise change from using the upgraded wharf in its current location.

6.4.2 Existing environment

Topography

The topography of the area varies between to the south and north of the Parramatta River surrounding the proposal. To the south of the proposal, the topography is predominantly flat steps down towards the waterfront and wharf entrance. An escarpment rises steeply from the northern bank of the Parramatta River, with trees on the upper reaches lining the edge of the Stewart Street Reserve.

Ambient noise levels

The proposal is located in an area of relatively moderate ambient noise. The main activities and sources that contribute to the ambient noise in the area are:

- Traffic and restaurant operations, surrounding the proposal
- Wider and intermittent sources such as helicopters and planes passing overhead.

Table 6-5 reflects the above by showing background noise levels within Parramatta and the noise monitoring locations, discussed further in Appendix E.

Table 6-5: Ambient noise levels

Monitoring location	Measured noise levels dBA Rated background level RBL (L ₉₀) ¹		
	Day ²	Evening ²	Night ²
34 Charles Street, Parramatta (NM01)	48	44	44
4-6 Queens Avenue, Parramatta (NM02a) & 3 Stewart Street, Parramatta (NM02b) ³	49	43	42
Macarthur Street, Parramatta (NM03)	46	46	39

Notes:

1. Reference noise levels: 30 dB: whisper, 40 dB: computer, 50 dB: light traffic/refrigerator, 60 dB: conversation/air conditioning unit, 70 dB: shower/dishwasher.
2. Time periods defined as – Day: 7am to 6pm Monday to Saturday, 8am to 6pm Sunday; Evening: 6pm to 10pm; Night: 10pm to 7am Monday to Saturday, 10pm to 8am Sunday.
3. Two monitoring locations representative of NM02 due to construction work interrupting background noise measurement at NM02b during the day period.

Sensitive receivers

The proposal would be built within proximity to residential receivers in Parramatta. As the sensitive receivers are confined to several distinct areas, they have been split into catchments. These noise catchment areas (NCAs) contain similar key receivers as summarised in Table 6-6. As shown in the table, there are also specific single non-residential receivers that are located within, however do not form part of, each NCA. Figure 6-3 shows the NCAs.

Table 6-6: Noise catchment areas and receivers

NCA	NCAs and individual receivers	Minimum distance from the proposal footprint
NCA01	Residential	250
	Educational institution	350
NCA02	Active recreation	265
	Commercial	375
	Place of worship	465
NCA03	Residential	490
	Active recreation	85
	Residential	78
NCA04	Educational institution	110
	Commercial	10 (or 22 metres from the nearest pile)
	Residential	35
NCA05	Residential	375
	Commercial	630
	Active recreation	800

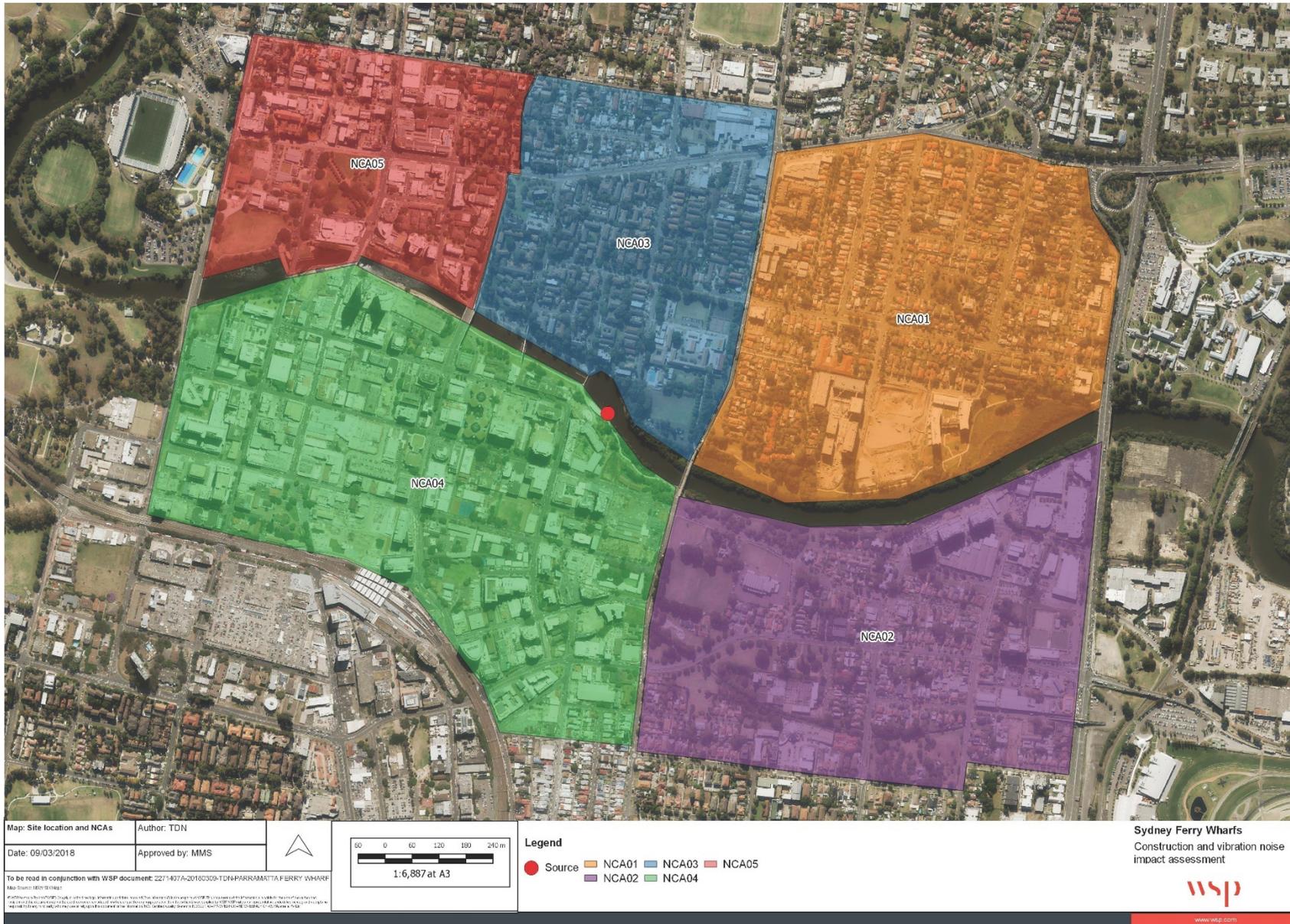


Figure 6-3: Noise catchment areas

6.4.3 Criteria

Construction noise assessment criteria

Noise and vibration assessment criteria used in this assessment comprise threshold exceedance levels and residential NMLs adopted from the RBL for each NCA. Table 6-7 details the criteria used for derivation of the residential NMLs and threshold exceedance levels. Table 6-8 summarises residential NMLs.

Table 6-7: Construction noise assessment criteria

Aspect	Criteria	Standard	
Work activity noise Note: measured externally	Relative increase criteria (noise management levels)		
	Residents: standard hours	Rating background level (RBL) + 10 dB $L_{eq(15\text{ min})}$	Note 1 and 2
	Residents: out of hours	RBL + 5 dB $L_{eq(15\text{ min})}$	
	Residents: sleep disturbance	L_{max} 65 dBA (external)	
	Threshold exceedance limits		
	Residents: standard hours (highly noise affected)	75 dBA $L_{eq(15\text{ min})}$	Note 1 and 2
	Active recreation	65 dBA $L_{eq(15\text{ min})}$	
	Education institutions	55 dBA $L_{eq(15\text{ min})}$	
	Commercial	70 dBA $L_{eq(15\text{ min})}$	
	Industrial	75 dBA $L_{eq(15\text{ min})}$	
	Place of worship	55 dBA $L_{eq(15\text{ min})}$	

Notes:

1: Construction Noise and Vibration Guidelines (CNVG, Roads and Maritime, 2016)

2: Interim Construction Noise Guidelines (ICNG, EPA, 2009).

Table 6-8: Residential noise management levels

NCA	RBL	NML dBA $L_{eq(15\text{ min})}$
		Standard hours
NCA01	46	56
NCA02	46	56
NCA03	49	59
NCA04	48	58
NCA05	49	59

Construction vibration assessment criteria

The construction vibration assessment criteria comprise minimum safe working distances determined from an assessment of peak vibration velocities in Appendix E. Table 6-9 outlines the construction vibration assessment criteria.

Table 6-9: Construction vibration assessment criteria

Aspect	Criteria (metres)				Standard
Cosmetic building damage	Vibration velocities translated into safe working distances (see below)				Note 1
Amenity (human comfort)	Vibration dose values translated into safe working distances (see below)				Note 2
Safe working distances (metres)	Equipment	Cosmetic damage ^{1,3}	Amenity impacts ²	Heritage structures	
Note: more stringent conditions may apply to heritage and sensitive structures (as defined under reference 2)	Pile drilling	2	4	10	
	Pile hammering ⁴	20	30–50	25	

Notes:

1: BS 7385-2: 1993: Evaluation and Measurement of Vibration in Buildings (British Standard, 1993)

2: Assessing Vibration: A Technical Guideline (NSW DEC, 2006)

3: Referred to 15mm/s vibration limit

4: Reference driven piling taken from FTA Noise and vibration manual.

6.4.4 Potential impacts

Construction

Activity based noise

While the construction staging would be confirmed during detailed design, each of the main design features would involve the use of different types of equipment in each area at various times of the day. Table 6-10 lists the types of equipment and relevant sound power levels that would be used during construction.

Table 6-10: Construction equipment and sound power levels

Equipment	Sound Power Level dB(A)
Angle grinders ^{1,3}	114
Barge ²	95
Boat ²	100
Compressor ³	109
Crane ³	104
Generator ²	103
Hand tools (electric) ³	110
Piling rig (drilling) ³	112
Piling rig (hammering) ^{1,2}	115

Equipment	Sound Power Level dB(A)
Concrete saw ^{1,3}	118
Concrete truck ³	109
Light vehicle ³	88
Concrete pump ³	102
Jack hammer ^{1,3}	115
Small excavator ³	110

Notes:

1: To account for the annoying characteristics of the plant, a +5 dB correction has been added to the overall scenario noise level in accordance with the ICNG.

2: Noise levels provided based on a previous study of the proposal Roads and Maritime

3: Noise level extracted from Noise estimator calculator provided by Roads and Maritime.

This information has been used to define the combined noise output (sound power level) generated in each location at a given time. Table 6-11 lists these scenarios with further detail provided in Appendix E.

Table 6-11: Construction activities and periods

Scenario	Activity	Equipment	Period
S01	General wharf construction, including removal and reinstallation of landside infrastructure	Barge, Boat, compressor, crane, generator, hand tools (electric), light vehicle	Six months Standard hours
S02	Demolition and removal of piles	Angle grinders, barge, boat, crane, generator, hand tools (electric)	Four weeks Standard hours
S03	Modification of existing seawall, including cutting concrete, excavation, backfilling and concrete pouring	Barge, boat, crane, generator, hand tools (electric), concrete saw, concrete truck, concrete pump, jack hammer, small excavator	Three months Standard hours
S04	Lifting pre-fabricated units including the pontoon, gangway and prefabricated sections of the seawall (after pile installation)	Boat, compressor, crane, generator, hand tools (electric)	Periodically over three months Standard hours
S05	Pile installation (drilling)	Boat, crane, generator, piling rig (drilling)	Two weeks Standard hours
S06	Pile installation (hammering)	Boat, crane, generator, piling rig (hammering)	

Each scenario is based on a combination of various equipment operating at the same time, at its maximum output, at the nearest location to the closest sensitive receiver(s) in the NCA. As such, they provide a worst-case view of potential noise impacts as there would be no real probability of these conditions happening onsite. Nonetheless, it adopts the precautionary principle to account for variability in modelling predictions and uncertainty in the construction staging.

Activity based noise impact

Table 6-12 summarises the exceedances detailed in the assessment in Chapter 6 of Appendix E. The table shows the impacts from undertaking construction activities during the day. Positive numbers shown in Table 6-12 (red text) are above the noise management level (NML). No highly noise affected exceedances (exceedances of the 75 dBA limit) were identified.

Table 6-12: Noise impact summary

Construction activities as per Table 6-11	Receiver	Noise catchment area	Exceedance of NML (dBA $L_{eq(15min)}$ (Standard hours)) ¹
S01: General wharf construction, including removal and reinstallation of landside infrastructure	Residential	NCA04	10
	Commercial	NCA04	6
S02: Demolition and removal of piles	Residential	NCA04	10
	Commercial	NCA04	6
S03: Modification of existing seawall, including cutting concrete, excavation, backfilling and concrete pouring	Residential	NCA03	4
		NCA04	14
	Commercial	NCA04	10
	Educational institution	NCA03	2
S04: Lifting pre-fabricated units including the pontoon, gangway and prefabricated sections of the seawall	Residential	NCA04	9
	Commercial	NCA04	6
S05: Pile installation (drilling)	Residential	NCA03	2
		NCA04	11
	Commercial	NCA04	4
S06: Pile installation (hammering)	Residential	NCA03	2
		NCA04	11
	Commercial	NCA04	4

Notes:

1: Standard hours - Monday to Friday – 7am to 6pm, Saturday – 8am to 1pm, Sunday/Public Holiday – Nil

The construction scenario with the highest predicted exceedances is for the modification of the seawall scenario (S03). This is due to the use of high noise level plant being operated in proximity to commercial and residential receivers.

Noise mitigation and management measures have been outlined in section 6.4.5 to reduce the noise impact. These include standard mitigation measures, including using quieter plant and equipment and other measures to reduce noise impacts, and additional mitigation such as notifying impacted receiver. The standard CNVG construction noise and vibration management measures and additional mitigation measures are recommended for the receivers within NCAs with predicted exceedances.

Activity based vibration impact

Construction vibration assessment criteria are outlined in Table 6-9. The minimum safe working distances vary based on the activity undertaken. Piling (hammering) is the activity with the highest vibration levels.

For this activity, a minimum safe working distance of 20 metres has been applied for cosmetic building damage. No receivers have been identified at distances less than 20 metres from the proposal (inclusive of the nearest pile).

A minimum safe working distance of 30 to 50 metres has been applied for impacts to amenity (human comfort). Residential and non-residential receivers within NCA04 have been identified to be located at distances less than the safe working distance for amenity (human response).

As a result of the predicted exceedances, vibration mitigation and management measures have been outlined in section 6.4.5 to reduce the potential vibration impact.

Vibration impacts are not anticipated for the waiting shelter located directly adjacent to the ferry wharf.

Out of hours construction

It is anticipated that the proposal would be constructed during standard hours. However, the duration of construction may be affected by weather and difficult ground conditions. If delays are experienced for the proposal, construction may be extended beyond standard hours. Any work extension would require approval in accordance with the CNVG (Roads and Maritime, 2016), where surrounding residential receivers would be notified prior to the work occurring. An OOHW procedure would be developed by Roads and Maritime and would include notification to nearby impacted residents

Mitigation summary

Mitigation for construction noise and vibration includes mitigation incorporated into the design of the proposal and construction methodology, as well as additional mitigation for both noise and vibration where exceedances of criteria are predicted.

Potential noise impacts have been minimised through the design of the proposal which involves undertaking as much construction work as possible at a contractors off-site facility rather than at site, including assemblage of pre-fabricated components, and constructing the wharf during standard hours.

Piling work for the proposal has an estimated duration of about two weeks to complete. Installation of the piles would require calm environmental conditions (still water and minimal wind) so that the floating barge used for the piling can remain still for the piles to be installed accurately. Calm conditions are also required to provide safe conditions for the construction crew. The waterway is usually calmer early in the morning, with wind and wind chop increasing throughout the day.

It is anticipated that piling would occur during standard hours, as discussed above, out of hours work may be undertaken if required. Further consultation with the community would be undertaken to identify and avoid piling during sensitive hours to reduce the impacts for the surrounding receivers. It is anticipated that

sensitive hours may include school hours, and peak hours of operation for nearby commercial receivers such as cafes.

Further minimisation of noise is provided through reviewing plant and equipment to be used on site, to ensure everything is in good working order and not emitting excessive noise levels. Quieter plant and equipment would be selected for noisy tasks wherever possible, reviewing the optimal power and size required to most efficiently perform the required task.

Additional noise mitigation measures

To further minimise the noise impact of construction activities, the additional mitigation measures are taken from the Construction Noise and Vibration Guideline (Roads and Maritime 2016b), and detailed in the following sections.

Notification (N)

Notification, in the form a letter to all potentially affected receivers, would be undertaken at least five days prior to the each of the proposed activities detailed above. The notification area is shown in purple in Figure 6-4.

Verification (V)

Verification would include measurements of the background noise level already captured as part of the Noise and Vibration Impact Assessment report (Appendix E), and actual construction noise levels monitored using hand-held devices during periods associated with high noise impacts.

Application of additional noise mitigation

The mitigation measures required during the construction scenarios for the proposal are detailed in Table 6-13 below.

Table 6-13: Additional noise mitigation measures

NCA	S01	S02	S03	S04	S05	S06
NCA01	–	–	–	–	–	–
NCA02	–	–	–	–	–	–
NCA03	–	–	–	–	–	–
NCA04	–	–	N, V	–	N, V	N, V
NCA05	–	–	–	–	–	–

Notes:

1: No additional mitigation is required for exceedances within the standard hours below 10 dB of the NMLs

2: N – notification, V – verification.

As notification of the proposed construction activities would be undertaken prior to activities commencing, this advance warning would provide opportunity for residences to undertake precautions to further reduce noise such as closing windows.

Application of additional vibration mitigation

Vibration mitigation would be required to mitigate impacts to surrounding residential receivers (human response) and ensure the works are completed without the risk for cosmetic building damage to the surrounding commercial receivers. In addition to mitigation included in the construction methodology detailed above, the mitigation outlined in Table 6-14 would be implemented.

Table 6-14: Additional vibration mitigation measures

NCA	Additional mitigation measures (vibration)
	S06
NCA04	N, V, RP

Notes:

1: N – notification, V – verification, RP - Respite period

Methodology for notification (N) and verification (V) is detailed in the additional noise mitigation sections above. Respite periods (RP) would also be undertaken and is discussed further below.

Respite period (RP)

To accommodate the usage of and amenity of nearby receivers within the human response safe working distance for S06 piling (hammering), an appropriate respite period would be agreed upon through consultation with receivers located within 50 metres of the site.

Whilst mitigation specific to each construction scenario has been considered above, mitigation would be implemented based on the worst-case construction scenarios. These are included in Table 6-15.

Building condition surveys

Whilst not required, a building condition survey of structures within 40 metres of the proposal footprint would be completed prior to construction to identify the sensitivity of these structures and existing damage. A subsequent building condition survey should also be completed after the completion of construction of the proposal to validate the implementation of mitigation measures.

Operation

The upgraded wharf would continue to enable the operation of the F3 Ferry Service between Circular Quay and Parramatta. Ferry services typically operate every 60 minutes per direction.

As such, there is not expected to be any change in amenity noise under the proposal. Also, no noise-generating equipment would be installed under the upgrade. Further, no change in operational traffic is anticipated.

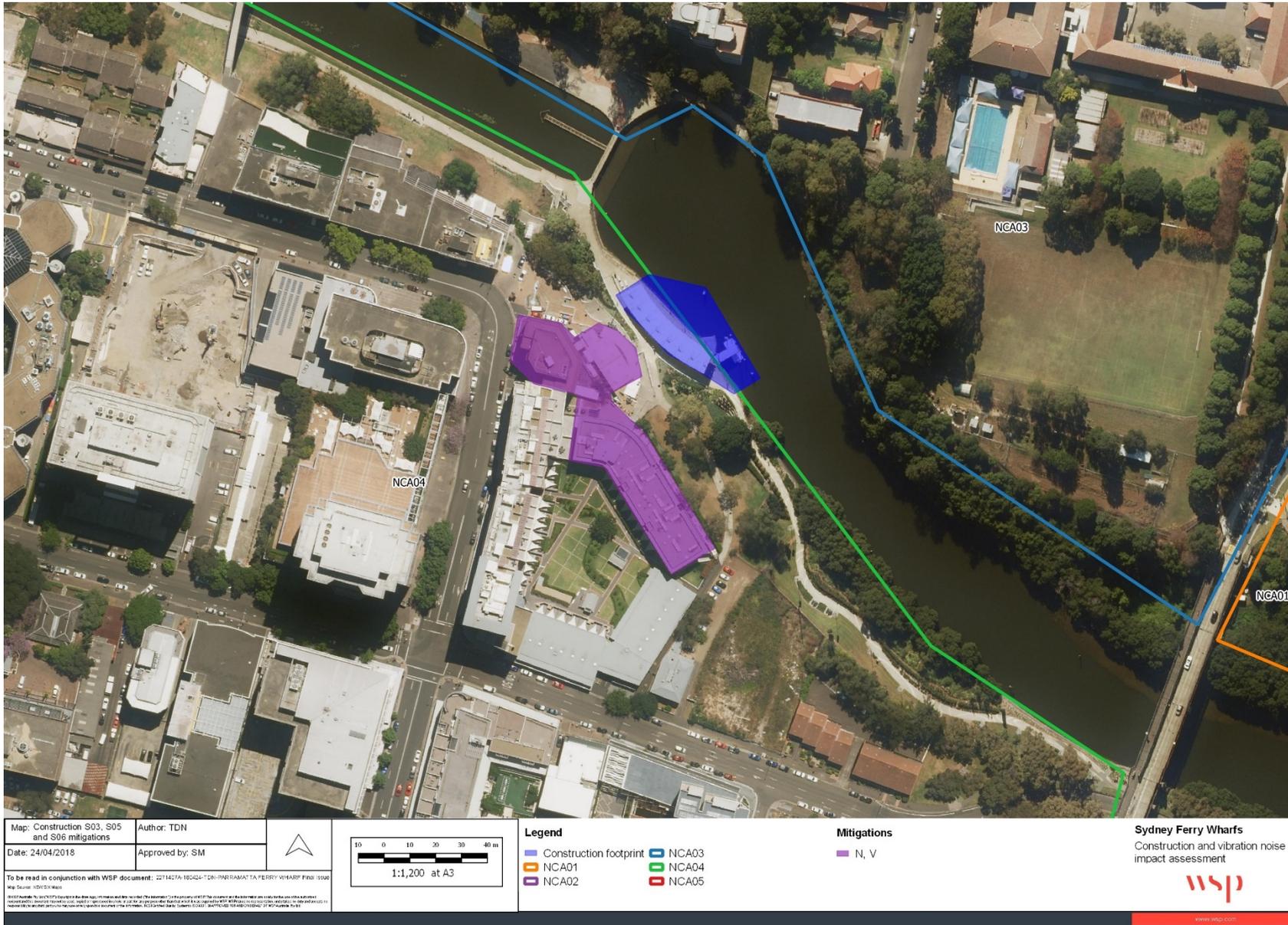


Figure 6-4: Proposed notification area

6.4.5 Safeguards and management measures

Table 6-15 lists the noise and vibration safeguards and management measures that would be implemented to account for the impacts identified in section 6.4.4.

Table 6-15: Noise and vibration safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Noise and vibration	<p>A Noise and Vibration Management Plan (NVMP) would be prepared and implemented as part of the CEMP. The NVMP would generally follow the approach in the <i>Interim Construction Noise Guideline</i> (ICNG) (DECC, 2009) and identify:</p> <ul style="list-style-type: none"> • All potential significant noise and vibration generating activities associated with the activity • Feasible and reasonable mitigation measures to be implemented • A monitoring program to assess performance against relevant noise and vibration criteria. <p>Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.</p>	Contactor	Pre-construction	Core standard safeguard NV1
Noise and vibration	<p>All sensitive receivers (eg schools, residents) likely to be affected would be notified at least five days before starting any work with an associated activity that may have an adverse noise or vibration impact (refer to Table 6-13). The notification would provide details of:</p> <ul style="list-style-type: none"> • The proposal • The construction period and construction hours • Contact information for project management staff • Details of complaint and incident reporting • How to obtain further information. <p>Receivers where noise management levels may be exceeded would receive letter notification. Highly noise affected receivers would receive direct notification through a door knock.</p>	Roads and Maritime	Pre-construction	Core standard safeguard NV2

Impact	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Noise and vibration	All work would be carried out during standard construction hours identified in the Interim Construction Noise Guideline (DECC, 2009) unless Roads and Maritime approval has been granted. An OOHW Procedure would be developed for proposed work outside of standard hours.	Contactor	Pre-construction	Additional safeguard NV3
Noise and vibration	All construction personnel would be notified of the location of sensitive receivers, and the need to minimise noise and vibration from the work, during the site induction.	Contactor	Pre-construction	Additional safeguard NV4
Noise and vibration	Plant and equipment would be in good working order to prevent excess noise generation.	Contactor	Pre-construction	Additional safeguard NV5
Noise and vibration	Verification measures would be carried out to confirm background noise levels already captured as part of the Noise and Vibration Impact Assessment report, and actual construction noise levels monitored using hand-held devices during periods associated with high noise impacts. This would apply to the following NCAs and scenarios described in Table 6-13: <ul style="list-style-type: none"> NCA04: S03, S05, S06. 	Contractor	Pre-construction/ construction	Additional safeguard NV6
Noise and vibration	Verification measures would be carried out to confirm construction vibration levels during periods associated with high vibration impacts. This would apply to the following NCAs and scenarios described in Table 6-14: <ul style="list-style-type: none"> NCA04: S06. 	Contractor	Pre-construction/ construction	Additional safeguard NV7
Noise and vibration	Where feasible, limited number of noise intensive plant (eg chainsaw, concrete saw, jackhammer) to no more than one item of equipment operating at any one time.	Contractor	Construction	Additional safeguard NV8

Impact	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Noise and vibration	Where feasible and practicable, any site hording or fences erected should be constructed with thick plywood or fitted with temporary acoustic barriers.	Contractor	Construction	Additional safeguard NV9
Noise and vibration	Where feasible and reasonable, implementation of temporary barriers around stationary sources of noise (paving, road cutting, jackhammering, compressor and generator) will be considered, including the use of alternative quieter equipment.	Contractor	Construction	Additional safeguard NV10
Vibration	No work with the potential to cause cosmetic damage to property (due to vibration or otherwise) will be undertaken.	Contractor	Construction	Additional safeguard NV10
Vibration	A structural condition survey of receivers within 40 metres of the proposal footprint would be completed both before and after the construction work.	Contractor	Pre and post-construction	Additional safeguard NV11
Vibration	An appropriate respite period during S06 piling (hammering) would be agreed upon through consultation with receivers located within 50 metres of the site.	Contractor / Roads and Maritime	Construction	Additional safeguard NV12

6.5 Landscape character and visual impact

This section summarises the proposal’s landscape character and visual impacts. Appendix F contains a supporting paper (landscape and visual impact assessment, LCVIA) prepared by Jane Irwin Landscape Architecture (JILA).

6.5.1 Methodology

Environmental Impact Assessment Practice Note: Guidelines for Landscape Character and Visual Impact Assessment (EIA-N04, Roads and Maritime, 2013) guided preparing the LCVIA. This included:

- Establishing/clarifying the existing character and sensitivity of the landscape/streetscape within and surrounding the proposal footprint
- Defining the theoretical area where it would be possible to see the proposal; termed the visual envelope (VE) or zone of visual influence (ZVI), which was also taken as the study area
- Considering how building and operating the proposal would impact on the area’s sensitive landscape values, residents, workers and other sensitive users in the ZVI and other sensitive locations around the harbour.

The LCVIA used the impact ratings outlined in the above guidance to determine:

- The sensitivity of each landscape character zone (LCZ) and representative viewpoint to changes in the form, setting, composition of the landscape through the introduction or removal of components (ie removal of trees or introduction of buildings)
- The scale of change in the landscape and to people’s views that would be introduced in building and operating the proposal.

The grading matrix from EIA-N04 is shown in Figure 6-5 below.

		Magnitude			
		High	Moderate	Low	Negligible
Sensitivity	High	High Impact	High-Moderate	Moderate	Negligible
	Moderate	High-Moderate	Moderate	Moderate-low	Negligible
	Low	Moderate	Moderate-Low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Source: Roads and Maritime

Figure 6-5: Landscape character and visual impact grading matrix

6.5.2 Existing environment

Landscape character and context

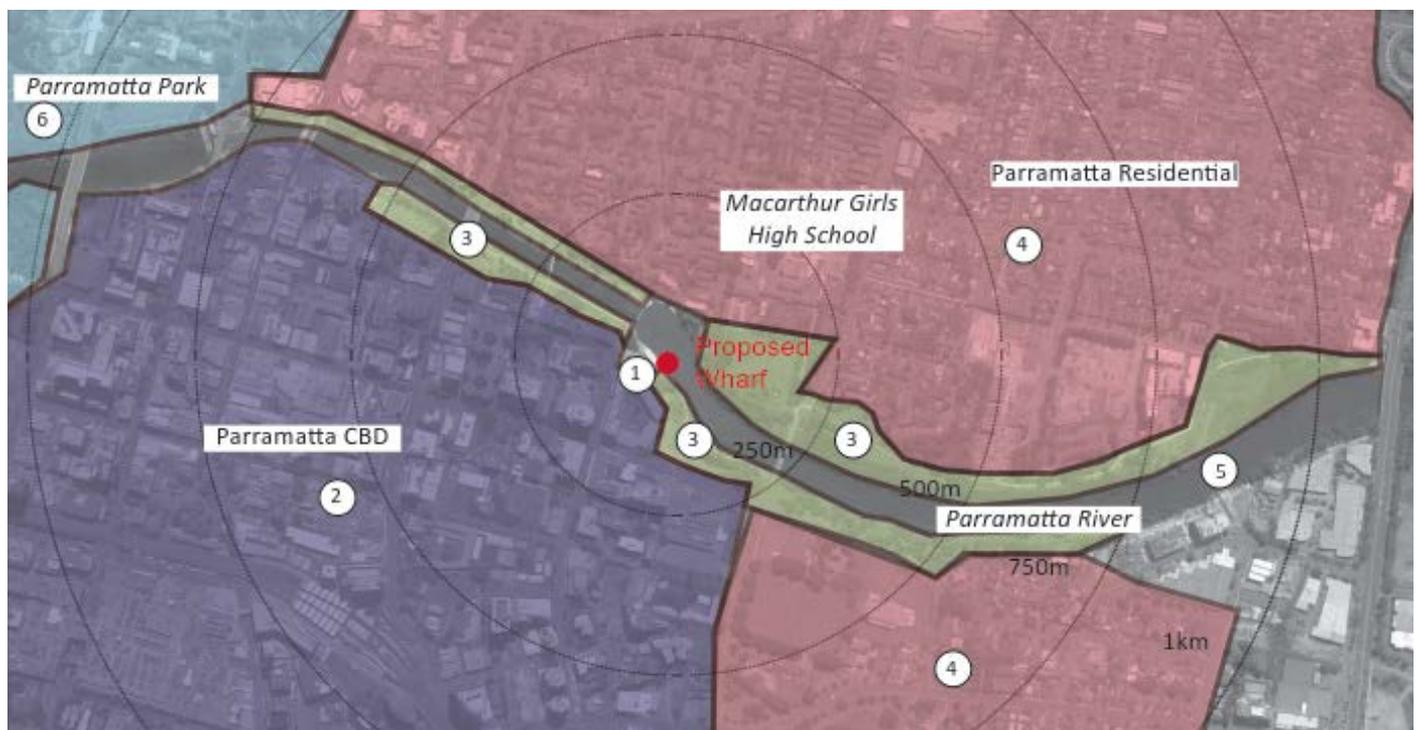
Parramatta Wharf Interchange is located on the south bank of a wide hollow in the river where Sydney Ferries are able to turnaround and return to the city. The topography rises steeply to the south, where a series of ramps and stairs connects pedestrians to Charles Street and the Parramatta CBD. Outdoor eating areas and restaurants form the backdrop for the wharf in its current setting. There is also pedestrian access from here to the east to the Queens Wharf waterfront reserve. Across the relatively narrow stretch of water, a sheer cliff face encloses the study area. Sitting atop this cliff are multi-unit residential dwellings and some existing vegetation. The proposal would be accessed from Charles and Philip Street to the west, the River

Foreshore Reserve to the north west and the Queen Wharf Reserve to the south east. Parking and bus stops are provided along Philip Street.

Parramatta Wharf Interchange and low lying adjacent spaces, are predominantly viewed in elevation from the water and at close proximity. The wharf is also clearly visible on approach from the River Foreshore Reserve walk to the west which continues to the wharf itself. Landside, topography and the built elements of the outdoor dining areas of the wharf precinct restricts views to the wharf, and views from the river are contained by the opposing cliff face and narrow waterways. The existing Parramatta Wharf makes up a limited element in the wider context.

The surrounding landscape has been divided in to six landscape character zones (LCZ) (refer to Figure 6-6):

- LCZ1: Parramatta City Foreshore
- LCZ2: Parramatta City
- LCZ3: Foreshore Reserves
- LCZ4: Parramatta Residential
- LCZ5: Parramatta River
- LCZ6: Parramatta Park.



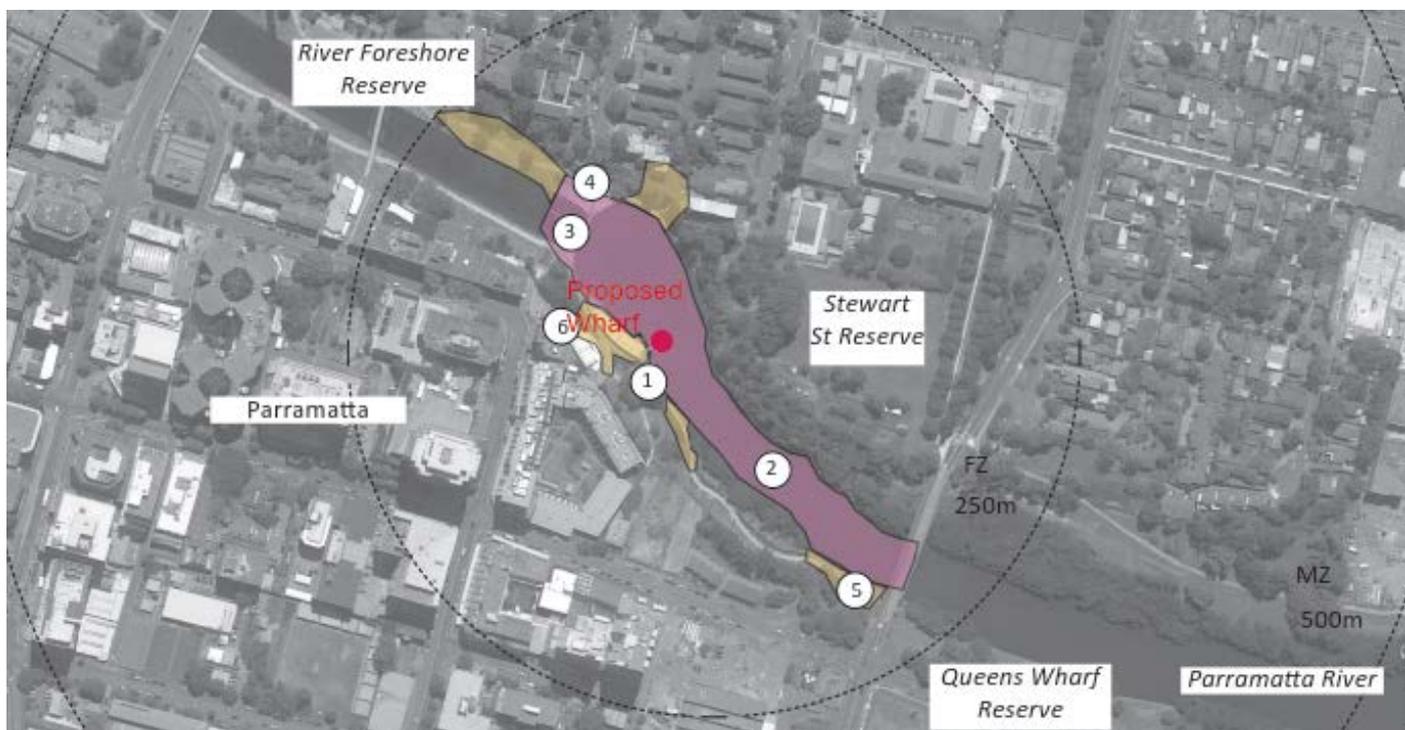
Source: JILA

Figure 6-6: Landscape character zones

Viewpoints and receivers

Figure 6-7 shows the zone of visual influence (ZVI) around the proposal footprint, which is defined by the area's topography and the barrier effects of other natural and artificial features, as described further in Appendix F.

The proposal would see the replacement of the existing wharf in its landscape setting, which while similar in character, would involve the introduction of new land and waterside components (refer to Chapter 3).



Source: JILA

Figure 6-7: Zone of visual influence and key view points

Six viewpoints were selected to represent the above receivers as shown in Figure 6-7, and shown in the following figures below. Appendix F provides additional detail on each viewpoint.



Figure 6-8: Viewpoint 1 – Parramatta Foreshore – view north



Figure 6-9: Viewpoint 2 – Parramatta River – view west



Figure 6-10: Viewpoint 3 – Charles Street Weir – view south east

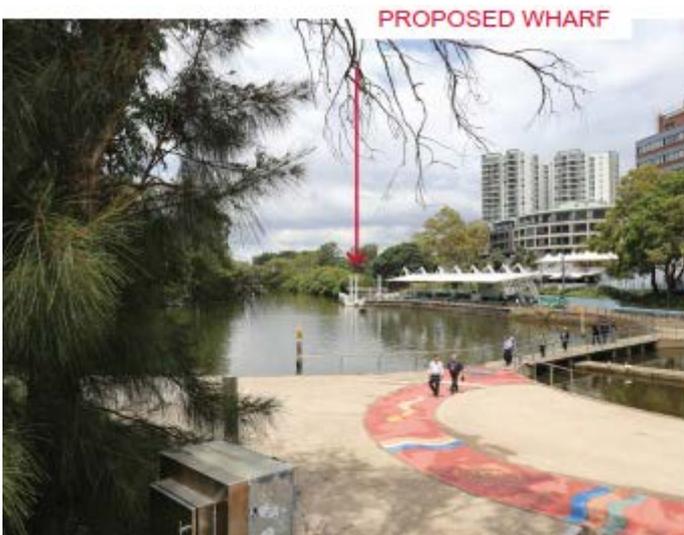


Figure 6-11: Viewpoint 4 – Parramatta River northern shore – view south east



Figure 6-12: Viewpoint 5 – Queens Wharf Reserve – view west



Figure 6-13: Viewpoint 6 – Charles Street – view east

6.5.3 Potential impacts

Construction

Landscape character and visual amenity

Certain landscape character and visual impacts would initially take place when the proposal is built as a result of the introduction and use of:

- Equipment, barges and piling equipment around the wharf
- Removal of the existing wharf structure
- Excavation required for the seawall modification.

This work would have the greatest impact on the values associated with Parramatta Foreshore (LCZ1) where the effects would be:

- Change in the composition and setting of the wharf by its removal
- Temporary introduction of equipment into the landscape, affecting overall amenity and setting.

It would also affect the visual amenity of recreational users of the Parramatta Foreshore, Parramatta River and Charles Street Weir (VP1, VP2 and VP3).

The scale of the impact on river users would be contained and localised due to the topography of this narrow section of the Parramatta River.

Light spill and night time work

It is not proposed that construction of the proposal would occur outside of standard hours. However, as discussed in section 3.3.2, OOHW may be considered if delays to the project occur. Additional controls would be implemented for OOHW, as detailed in section 6.5.4.

Operation

Landscape character

Table 6-16 summarises the landscape impact assessment on the landscape character zones identified in section 6.5.2. Appendix F provides additional detail on the landscape character zones.

Table 6-16: Landscape character impacts

Zone	Sensitivity	Magnitude	Impact
<p>LCZ1: Parramatta City Foreshore</p> <p>The relatively narrow section of the Parramatta River creates an enclosed character where a larger pontoon has the potential to impact upon the character of the immediate foreshore. However, the design includes use of neutral colours and material palette would help to mitigate any imposition that the upgrade would create.</p> <p>In order to maintain adequate width for ferry access along the waterway, the realignment of the seawall would also have some impact on the character of the immediate foreshore, as shown in Figure 6-14.</p>	Moderate	Moderate	Moderate
<p>LCZ2: Parramatta City</p> <p>Parramatta is undergoing significant change through urban renewal and other new public development. Work is underway to revitalise the Parramatta waterfront, including the Lennox Street portal which has allowed for better access along the river to the wharf and plans for a river boardwalk which would also help to create better amenity and connection to the river.</p> <p>As such, the city has a great capacity to absorb change. An upgrade to the river public transport option would be consistent with other work evident in the city.</p> <p>The contemporary steel structures making up the covered gangway and pontoon are consistent with the family of wharves that make up this part of Parramatta River and provide greater commuter amenity and familiarity (refer to Figure 6-14). As such the waterside upgrade should not impact the existing character of the city.</p>	Low	Negligible	Negligible
<p>LCZ3: Foreshore Reserves</p> <p>The increase in size of the pontoon would have little impact on the character of the greater foreshore zones. The built edges of the canal running through the city brings a significant element of human intervention to this section of the river, as such the upgrade of an existing built element should not impact on this already existing character.</p> <p>The reserves to the east act as a transition landscape to the character of the river edge further downstream. These areas experience frequent pedestrian activity. The upgrade of the wharf would not significantly impact the character of these areas.</p>	Moderate	Low	Moderate-Low

Zone	Sensitivity	Magnitude	Impact
<p>LCZ4: Parramatta Residential</p> <p>Pockets of the residential areas of Parramatta, especially close to the city, are undergoing significant change as a result of population increase and urban renewal. As a result, they have the capacity to absorb a degree of change. The wharf upgrade would result in an increase in capacity and commuter amenity to the waterfront, however should not impact on the existing residential character of this zone as it is further removed from the waterfront.</p>	Moderate	Negligible	Negligible
<p>LCZ5: Parramatta River</p> <p>Parramatta Wharf is part of a collection of wharves located along the river to Sydney City. The proposed upgrade removes the current pontoon and constructs a slightly larger pontoon in its place. Access to the wharf would be moved further along the west of the current shelter, and the seawall modified to accommodate the increase in pontoon size.</p> <p>The waterfront at Parramatta is already largely constructed and urbanised, the introduction of a new element would not alter the existing character of this section of the river. Plans for a foreshore boardwalk on the opposite shore would also provide additional built character to this section of the river.</p> <p>The significance of the wharf in the broader landscape character of Sydney Harbour is the continuity it provides to commuting by water and its role in linking the waterside suburbs to a greater experience of the harbour.</p>	Low	Low	Low
<p>LCZ6: Parramatta Park</p> <p>Parramatta Park is well used as an event destination and for daily activity. It is large and has a variety of spaces and attractions. It's significance in Australia's recent convict history gives it a high degree of sensitivity, although the distance between the park and the upgrade serves to negate any impact the upgrade may have on the character of the park.</p>	High	Negligible	Negligible

The LCZ around the proposal would undergo some change due to wharf works and increased commuter capacity. Within the immediate character zone, the impact is considered moderate-low. In the wider context, the proposed upgrade of the wharf would be read as part of a family of wharves along the length of the river.

Landside works to accommodate for the increased pontoon size have been sensitively integrated with the current foreshore, with minimal works planned. The adjustment to the seawall would have some impact on the character of the landside wharf zone, due to the removal of a portion of the existing seawall and installation of a new concrete facing.

Additionally, the proposal also has a positive impact on character and amenity for ferry commuters and foreshore users. Allowing for a greater capacity and more integrated water arrival gateway to the city of Parramatta.

Visual impacts

Visual impact from each key viewpoint is established through an assessment of the sensitivity of the view combined with the magnitude of the proposal within that viewpoint. Table 6-17 summarises the visual impact assessment, with more detail provided in Appendix F.

Table 6-17: Visual impact assessment

Viewpoint	Sensitivity	Magnitude	Impact
Viewpoint 1 – Parramatta Foreshore – view north	Moderate	Moderate	Moderate
Viewpoint 2 – Parramatta River – view west	Moderate	Moderate	Moderate
Viewpoint 3 – Charles Street Weir – view south east	Moderate	Low	Moderate-Low
Viewpoint 4 – Parramatta River northern shore – view south east	Low	Low	Low
Viewpoint 5 – Queens Wharf Reserve – view west	Low	Negligible	Negligible
Viewpoint 6 – Charles Street – view east	Low	Negligible	Negligible

The overall visual impact of the proposal at Parramatta is considered low. The greatest impact will be on views within the foreground zone where the proposed upgrade of the wharf to accommodate greater commuter capacity will result in a larger structure on the water, as shown in Figure 6-14. Longer distance views are largely obscured by topography and the built environment. The open structure of the wharf and gangway aim to further reduce the impact of the proposal on views.



Source: Roads and Maritime

Figure 6-14: Artist's impression

6.5.4 Safeguards and management measures

Table 6-18 lists the Landscape character and visual amenity safeguards and management measures that would be implemented to account for the impacts identified in section 6.5.3.

Table 6-18: Landscape character and visual amenity safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Landscape and visual impact	<p>Urban design principles would be integrated throughout the detailed design and construction of the proposal. The urban design principles would include:</p> <ul style="list-style-type: none"> • Material selection location of services, and a standardised family of elements • Covered pontoon and protection screens include transparent elements • Existing landscape elements are retained • Colour of paint and materials would be consistent with other recently upgraded wharves within Sydney Harbour. 	Roads and Maritime	Detailed design and pre-construction	Additional safeguard UD1
Visual impacts	Hoarding would be erected around the construction compound where possible, to reduce visibility.	Contractor	Construction	Additional safeguard UD2
Landscape and Visual impacts	The construction area would be kept clean and clear of rubbish.	Contractor	Construction	Additional safeguard UD3
Out of hours work	In the event that OOHW is required, lighting would be directionally controlled to limit impacts from light spill from surrounding receivers, including residential properties. Lighting direction would also include consideration of any reflective impacts from the river.	Contractor	Construction	Additional safeguard UD4

6.6 Socioeconomic

This section describes the proposal's socioeconomic impacts.

6.6.1 Methodology

The assessment considered the community, business and industry impacts and benefits from building and operating the proposal. Specifically, it considered impacts on:

- The local community in terms of its adoption or opposition to the proposal based on its characteristics and profile
- Social amenity and infrastructure in the area
- The community's values such as amenity, character, health and safety, cohesion, environment, sense of place, fears and aspirations
- Local and regional business, including the aquatic based companies that use the harbour and ferry passenger services.

This involved reviewing published Census data, council information and records, literature, as well as community and stakeholder feedback received for the proposal (refer to Chapter 5). The output from other assessments included in the REF containing relevant socioeconomic themes was also reviewed, namely:

- Noise and vibration
- Non-Aboriginal heritage
- Landscape character and visual impacts.

A basic level of assessment was carried out in accordance with Environmental Impact Assessment Practice Note: Socio-Economic Assessment (EIA-N05, Roads and Maritime, 2014). Unless otherwise stated, the referenced Census data covered is based on the Parramatta State Suburb.

6.6.2 Existing environment

Demographic and socioeconomic profile

The proposal is situated within the state suburb of Parramatta. Table 6-19 summarises the key social and economic characteristics of the people that live in Parramatta, and how this has changed over the past five years.

Table 6-19: Statistical data for Parramatta State Suburb

Demographic Indicator	2011		2016		% Change
Population		19744		25793	+31
Population by age bracket	0-19	3556	0-19	4937	+39
	20-34	8923	20-34	11004	+23
	35-49	3719	35-49	5430	+46
	50-64	2137	50-64	2673	+25
	65+	1409	65+	1749	+24

Demographic Indicator	2011		2016		% Change
Method of travel to work	Car	4014	Car	4377	+9
	Train	2461	Train	3761	+53
	Walk	1024	Walk	1243	+21
	Bus	590	Bus	878	+49
	Ferry	0	Ferry	0	0
Median weekly household income		\$1979		\$1739	-12
Home ownership/ rentals	Home owners	1555	Home owners	2514	+62
	Home renters	4389	Home renters	6101	+39
	Other	177	Other	305	+72

It was concluded from the above information that:

- Weekly household incomes are \$300 higher than the national average for 2016 (\$1,438), indicating Parramatta is a middle-class suburb
- Each population bracket increased between 2011 and 2016, with the highest increase in population within the 35-49 age bracket (46 per cent)
- Residents of the area are predominantly home renters (68 per cent), with 28 per cent of the area renting. Percentage of home ownership increased more than percentage of home renters between 2011 and 2016
- Most people in Parramatta drive (32 per cent) or take the train (29 per cent) to work. The ferry wharf does not appear to be readily used by people living in Parramatta for commuting based on the census data.

Community values

Community values are those socioeconomic aspects that people hold important to their quality of life and wellbeing. They include physical assets, such as parks and recreational areas, as well as social factors such as a sense of safety and wellbeing, belonging and community diversity.

There is limited recreational area around the existing wharf, but there is a cycleway that connects 15 kilometres along the Parramatta River. There is landscaping around the wharf that provides some green space and shade at the river front.

Community values are likely dominated by people who live in the area. These values likely include:

- Retained local character defined by the ease of access from the residential area north of the Parramatta River, to the commercial area south of the Parramatta River, adjacent to the wharf
- Local amenity and a sense of place, as provided by the River Foreshore Reserve opposite the wharf, and the setting along the Parramatta River
- Liveability due to river and harbour access and waterfront living and working.

Social infrastructure

Social infrastructure refers to the community facilities, services and networks that help individuals, families, groups and communities meet their social needs, maximise their potential for development, and enhance their community well-being. It includes such things as: educational facilities; health, emergency and aged-care services; sports, recreational and cultural facilities; community support services; and transport facilities.

The social infrastructure within 500 metres of the proposal includes:

- The existing ferry wharf, which provides a means for passengers to travel between key locations in Sydney Harbour and along the Parramatta River
- Parks and reserves including, Queens Wharf Reserve, Stewart Street Reserve and River Foreshore Reserve
- The Parramatta Valley Cycleway, which provides a shared use path for cyclists and pedestrians which is generally aligned along the foreshore of the Parramatta River
- Places of worship include Parramatta Central Seventh-Day Adventist, Maximize Church, St John Greek Orthodox Church and St Ioannis Greek Orthodox Church located on Phillip Street and George Street
- Educational institution and outdoor passive recreation associated with Macarthur Girls High School, Arthur Phillip High School and Parramatta Public School.

Local businesses

Local businesses and services adjacent to the proposal are primarily commercial zones. Local businesses within 500 metres of the wharf include:

- Cafes and restaurants, including Courtney's Brasserie, Saravanaa Bhavan, Subway, Jai, Thai Kitchen
- A variety of services, including Commonwealth Bank, Better Brakes, Better Carwash, Hays Recruitment Agency, Western Sydney Community Legal Centre, Raine & Horne Parramatta, Plus Fitness.

6.6.3 Potential impacts

Construction

Parramatta Wharf would be closed throughout the construction period in conjunction with Rydalmere Wharf as described in Chapter 3.

Alternative transport would operate for the duration of the closure between Parramatta Wharf and Sydney Olympic Park Wharf via South Street Rydalmere. Ferry users that would typically use Parramatta Wharf would be able to catch a temporary bus service, route 535, to Sydney Olympic Park Wharf, which would connect with F3 Parramatta River ferry services. Ferry users travelling to or from the city could also catch existing train services on the T1 Western Line or existing bus services on route M52 from Parramatta to Circular Quay via Victoria Road.

Patronage data for the wharf indicates it is primarily used for recreational purposes, therefore the wharf closure is not expected to significantly disrupt commuters. Ferry passengers would be notified ahead of construction and updated whilst the proposal is built.

Ferry services would not operate in the upper Parramatta River during the construction of the new wharf. However, the closure of the wharf would not result in a significant impact to local businesses as patronage data indicates they would not significantly rely directly on the operation of the wharf for passing trade.

Access to the interchange, including seating within the waiting shelter, would be prevented during construction. This area may be utilised as a resting area for recreational users and workers from surrounding businesses, and closure during construction may cause disruption to these users. However, Parramatta is well serviced by other seating and foreshore areas, and the temporary loss of use of the interchange is not considered to be significant, as alternative locations in close vicinity would be able to be utilised.

Indirect impacts to local businesses in the broader area may occur due to noise and visual impacts. As such, there would be temporary loss of amenity in the area surrounding the wharf due to the construction works and presence of barge mounted cranes and other plant and equipment. Landside construction would result in a temporary loss of amenity along the Parramatta River. The temporary loss of amenity may discourage use of these areas in the vicinity of the wharf during construction. As discussed in section 6.4, further consultation with the community would be undertaken to determine sensitive periods for surrounding businesses and other receivers. This may include peak hours for the surrounding cafés and businesses. The noisiest activities would be scheduled outside of these sensitive periods, wherever practical. Management measures described below and elsewhere in Chapter 6 would aim to minimise these impacts.

Operation

Benefits to passenger experience would be provided by the proposal through design of the wharf that includes:

- Improved amenity at the wharf
- Quicker and more effective embarking and disembarking
- Improved access to the ferry network for passengers, including low mobility passengers through a wharf design that provides disabled and low-mobility access
- A covered pontoon, enabling passengers to wait close to ferries in an area with weather protection, ample seating and customer information.

The above benefits would be in context of the limited loss in character and sense of place at the wharf from introducing new infrastructure. Visual impacts during operation of the proposal are considered to be low, as discussed in section 6.5, and low impact on the landscape character. The design of the wharf is also consistent with other recently upgraded wharves across the network. The minor visual impact is not anticipated to result in any socioeconomic impacts.

During operation, the extra lighting and security cameras at the Parramatta Wharf Interchange would deter antisocial behaviour from occurring and provide a safer night-time environment.

Other indirect socioeconomic benefit may be provided by the improved services and amenity at the Parramatta Wharf Interchange, such as inducing more passengers to utilise the service for access to the area and businesses.

6.6.4 Safeguards and management measures

Table 6-20 lists the socioeconomic safeguards and management measures that would be implemented to account for the impacts identified in section 6.6.3.

Table 6-20: Socioeconomic safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
General socio-economic impacts	<p>A Communication Plan (CP) would be prepared and implemented as part of the CEMP to help provide timely and accurate information to stakeholders during construction. The CP would include (as a minimum):</p> <ul style="list-style-type: none"> • Mechanisms to provide details and timing of proposed activities to affected residents and local businesses, including changed traffic and access conditions • Contact name and number for complaints. <p>The CP would be prepared in accordance with the <i>Community Involvement and Communications Resource Manual</i> (RTA, 2008).</p>	Contractor	Pre-construction	Core standard safeguard SE1
General socio-economic impacts	<p>An internet site and free-call number would be established for enquiries regarding the proposal for the entirety of construction.</p> <p>Contact details would be clearly displayed at the entrance to the site.</p> <p>All enquiries and complaints would be tracked through a tracking system, and acknowledged within 24 hours of being received.</p>	Roads and Maritime	Pre-construction	Additional safeguard SE2
Social impacts	The construction area would be secured at all times.	Contractor	Construction	Additional safeguard SE3

6.7 Transport, traffic and access

This section describes the land and maritime based traffic, transport and access impacts associated with the proposal.

6.7.1 Existing environment

The proposal is located within Parramatta, which can be accessed from Charles Street. No designated commuter parking is provided at Parramatta Wharf. Existing parking is available on Charles Street consisting of two hour peak and four hour off-peak ticketed spaces as well as secure parking on Phillip Street and George Street about 150 metres from the wharf.

The road network within the vicinity of the wharf is characterised by local roads with limited on-street and off-street parking. Speed limits in the area are generally 50 kilometres per hour in the vicinity of the proposal.

The nearest bus stop is for the Parramatta loop free shuttle bus, located about 80 metres away from Parramatta Wharf. The Parramatta loop free shuttle bus service (route number 900) operates at a high frequency, with services every 10-15 minutes from 7am to 7pm. Parramatta train station is approximately 950 metres (12-minute walk) from Parramatta Wharf. A number of bus services also operate at Parramatta interchange, located adjacent to Parramatta train station. As such there is some integration between the ferry and other public transport at Parramatta Wharf Interchange, but does not form an integral part for the wharf's operation as it is mainly used for recreational purposes.

Shuttle buses replace ferry services between Rydalmere and Parramatta wharves during low tide (usually two hours either side of low tide), due to the shallow depth of this section of the Parramatta River.

Pedestrians can access the wharf via a footpath connection from Charles and Phillip Street to the west and Queens Avenue via stair access to the Charles Street weir to the north. In addition, cyclists and pedestrians can access Parramatta Wharf Interchange using the adjacent three metre wide shared path known as the Parramatta Valley Cycleway, that also forms part of the Parramatta River Walk. The Parramatta Valley Cycleway is a regional bicycle route which generally runs along the Parramatta River, providing a connection between Parramatta Park to Morrison Bay Park in Putney. The Parramatta River Walk commences on the northern side of the river at Woolwich Wharf or on the southern side at Birchgrove Wharf and ends in Parramatta at the junction of Toongabbie Creek and Darling Mills Creek.

Maritime transport

Ferry service and frequency

Parramatta Wharf Interchange is serviced by the F3 Parramatta River route, which operates between Circular Quay and Parramatta. The ferry route also services wharves at Rydalmere, Sydney Olympic Park, Meadowbank, Kissing Point, Cabarita, Abbotsford Point, Chiswick, Huntleys Point, Drummoyne, Barangaroo, Cockatoo Island, Balmain, McMahons Point, Milsons Point, Barangaroo and Circular Quay.

The F3 Parramatta River ferry route operates at Parramatta between about 6am and 7pm daily. Ferry services typically operate every 60 minutes towards the city and every 60 minutes towards Parramatta. At other times, the ferry service operates every 60 minutes in both directions. Supplementary ferry services also operate on Sundays to support higher customer demand on this day.

A review of wharf statistics completed during the concept design stage indicated the average weekday patronage for Parramatta is about 530 passengers. Patronage data indicates that the use of the wharf is highest during weekday off-peak and weekend patronage periods.

Commercial and recreational activity

Private water taxi services, commercial recreational vessels and other recreational activities are not permitted within the upper Parramatta River or utilise Parramatta Wharf, which is exclusively operated by the Harbour City Ferries.

6.7.2 Potential impacts

Construction

Land transport

It is anticipated that construction vehicles would access the proposal via Charles and Phillip Street. As detailed in section 3.3.7, up to two light and heavy vehicles would access the site each day, which assumes that a majority of materials and equipment are shipped to site. The addition of light and heavy vehicles required throughout construction would not place any additional strain on the surrounding road due to the minimal construction related traffic movements.

As described above, limited on-street and off-street parking is available and the ancillary facilities identified in section 3.4 do not include provision for light vehicle parking. It is anticipated that any parking requirements during construction would utilise the existing parking arrangements available locally. No parking would occur within or adjacent to the proposal footprint. Alternatively, the construction contractor may seek Council approval to implement a work zone to provide parking. Typically, this process would also involve consultation with adjacent properties and commercial premises. Final access and parking arrangements would be confirmed by the construction contractor.

Closure of Parramatta Wharf Interchange may result in additional commuter traffic as it is anticipated that alternative transport would be provided and users may choose to use private vehicles for six months during construction. Based on patronage data for the wharf, this could include up to 530 vehicles over an average weekday. This traffic would be spaced over the day, and from different locations within the wharf catchment, and is not considered to be a significant impact over that absorbed by the existing road network.

Pedestrian and cyclist access to the wharf and shelter area would be prevented. However, an alternate route around the construction area would be maintained for pedestrian and cyclists.

Maritime transport

Parramatta Wharf Interchange would be closed for six months throughout the construction period. As the wharf is exclusively used by the Harbour City Ferries it would not impact any recreational or commercial users of the river.

Construction of the proposal would result in up to four vessels travelling between an off-site facility and the wharf each day. The minor increase in vessel movements is not considered to be significant in the context of the harbour and Parramatta River. Vessel movements may need to be coordinated to avoid conflict with other vessels operating in the river during construction. Cumulative impacts are discussed further in section 6.13.

There would be disruption to up to 530 passengers per day due to closure of the wharf. Alternative transport would operate for the duration of the closure between Parramatta Wharf and Sydney Olympic Park Wharf via South Street Rydalmere. Ferry users that would typically use Parramatta Wharf would be able to catch a temporary bus service, route 535, to Sydney Olympic Park Wharf, which would connect with F3 Parramatta River ferry services. Ferry users travelling to or from the city could also catch existing train services on the T1 Western Line or existing bus services on route M52 from Parramatta to Circular Quay via Victoria Road.

Operation

No impacts to traffic and transport are anticipated for operation of the proposal. The potential benefits of the proposal are outlined in the sections below.

Land transport

Ferry services would recommence once the new wharf is operational. The proposal would result in the improvement of efficiency and user experience of ferry services from the wharf. This may result in an increase to patronage of the wharf and ferry service, and additional commuter traffic travelling to and from the wharf. However, this is not considered to be significant based on the existing patronage of the wharf.

Maritime transport

Ferry operations to Parramatta would resume after the proposal is built, and no change in the movement of ferries would be required to access the new wharf.

The proposal would enable the continuation of a ferry service for the period of its 50-year operation life, and would also improve the efficiency and user experience of the wharf.

6.7.3 Safeguards and management measures

Table 6-21 lists the traffic, transport and access safeguards and management measures that would be implemented to account for the impacts identified in section 6.7.2.

Table 6-21: Traffic, transport and access safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Land and water transport	Transport of equipment and materials to site via boat and barge would be utilised over land transport to limit impacts to the local road network.	Contractor	Construction	Additional safeguard: TT1
Water transport	<p>A Maritime Traffic Management Plan would be prepared and implemented during the water based construction work. The Maritime Traffic Management Plan would be prepared consultation with NSW Maritime and approved by the Harbourmaster.</p> <p>In addition, the proposal would:</p> <ul style="list-style-type: none"> • Fit all buoys with lights • Prepare Response Plans for emergencies and spills for all construction vessels • Fit at least one vessel with an Automatic Identification System (AIS) • Retrieve any material associated with the construction of the development that enters the water to prevent the obstruction of vessel movements • Prepare a Communications Plan for implementation during the work which must include 24/7 contact details, protocols for enquiries, complaints and emergencies. <p>Any variation to the above would be agreed in advance with the Harbourmaster.</p>	Contractor	Pre-construction/ construction	Additional safeguard: TT2

Impact	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Pedestrian and cycle access	Pedestrian and cycle access through the Parramatta Valley Cycleway around the construction area would be maintained during construction. Appropriate warning signage would be installed on the path, either side of the construction area.	Contractor	Construction	Additional safeguard: TT3
Water transport	Passengers would be notified of the alternative transport ahead of construction.	Roads and Maritime	Pre-construction/ construction	Additional safeguard: TT4
Construction access and parking	Final access and parking arrangements would be included a Traffic Management Plan. The Traffic Management Plan would also include measures to ensure light vehicle parking is strictly in accordance with Parramatta City Council requirements and prevents parking on footpaths and grassed areas adjacent the site.	Construction	Pre-construction/ construction	Additional safeguard: TT5

6.8 Non-Aboriginal heritage

This section summarises the proposal's non-Aboriginal heritage impacts. Appendix G contains a supporting technical paper (statement of heritage impact, SOHI) prepared by City Plan Services in March 2018.

6.8.1 Methodology

The assessment included a desktop review of published records, data and literature, in the form of local, State, national and world heritage registers, to confirm the likely presence of non-Aboriginal heritage values in the local area.

The assessment also referred to: *Assessing Heritage Significance* (NSW Heritage Office, 2001), *Statements of Heritage Impact* (NSW Heritage Office and DUAP, 2002), *Assessing Significance for Historical Archaeological Sites and Relics* (NSW Heritage Division, 2009) and the *NSW Heritage Manual* (Heritage Office and DUAP, 1996).

6.8.2 Existing environment

European history

In 1788, the first Europeans arrived in Rose Hill (now known as Parramatta). Governor Arthur Philip established Parramatta as a farming settlement to ensure the colony's survival. By the early 1800s, hospitals, schools, churches and other public buildings had all been established and Parramatta prospered as a convict town and centre of regional government. The winding up of convict transportation in the 1840s saw Parramatta expand as a hub for the surrounding agricultural industries. Primary among these were the orange, lemon and apple growers who ferried their goods to the Sydney markets.

The arrival of gas and electricity in the 1880s freed business from wind and steam driven technologies, allowing them to develop new sites for their businesses and by 1900 two new industrial suburbs, Camellia on the low flat area of land to the east of Parramatta and Clyde, at the intersection of the western and southern rail lines.

By the 1930s the first flats were built in the streets around the central part of the town signifying its movement from an agricultural township to a new city. This also spurred the introduction of the first large chain stores, including Grace Brothers on the corner of Argyll and Church Street in 1933.

The outbreak of the Second World War and the demand for industrial goods for the war effort resulted in new factories springing up or expanding across the Parramatta district.

By the 1960s it was clear that the centre of Sydney's population was shifting westwards and that Parramatta's role as a second hub for industry and commerce was increasing in importance.

Maritime history

A search of the maritime heritage register (NSW OEH, 2018) did not reveal any previous shipwrecks, wharves or other maritime heritage features within proximity to the proposal.

A number of ferry wharves were established along the Parramatta River to accommodate the importation of a larger number of goods. Table 6-22 provides lists the earlier wharf structures which are known to have existed in Parramatta and Figure 6-15 indicates their approximate location. Additional discussion on the history of each of the wharves identified in Table 6-22 is provided in Appendix G.

Table 6-22: Historical wharves located within Parramatta

No.	Wharf name	Date	Location	Description	Status
1	First landing wharf	c. 1790	Queens Wharf Reserve	Short timber structure, later enlarged in 1804	Lower component of timber posts may still exist
2	Stone (granary) wharf	c.1808	East of the First landing wharf	–	Footings may survive behind the Lennox sea wall
3	Queen’s Wharf	c. 1834	Queens Wharf Reserve, east of Gasworks bridge	Stone sea wall and steps	Survives today as the Lennox sea wall and steps
4	Redbank Wharf	c. 1846	Redbank, at confluence of Parramatta River and Duck Creek	–	–
5	Parramatta River Steam Co. Wharf	c.1867	Queens Wharf Reserve	Timber structure	Timber piers and some submerged timbers still exist
6	Charles Street Wharf	c.1877	Charles Street	Small timber structure	Regular breaks in seawall suggest former location of timber wharf
7	Parramatta Wharf	1993	Charles Street	Concrete and timber structure	Currently in operation



Source: City Plan Services, 2018

Figure 6-15: Location of historical wharves along Parramatta River.

Note: Redbank Wharf is not indicated as it is located further up stream

Built heritage

The existing wharf at Parramatta was established for the RiverCat service in 1993. Its location at the corner of Charles and Phillip Street meant that it did not impact any of the earlier wharf structures, with the possible exception of the 1877 timber Charles Street wharf, which appeared to be located within the immediate vicinity of the current structure.

A number of heritage listed items are located within the vicinity of the wharf which are identified in Table 6-23 and shown in Figure 6-16.

Table 6-23: Non-Aboriginal heritage items in the vicinity of the proposal

Name	Description	Heritage significance
Harrisford (SHR no. 100248)	Harrisford, which is located between George Street and the river, is one of the oldest houses remaining in the township of Parramatta. It is an important element at the head of the river, representing the early years of settlement.	State
Newlands Gates and Trees (Parramatta LEP 2011 no. I544)	Newlands House site and Gates are of significance for the local area for historical and aesthetic reasons and as a representative example of a Colonial Georgian gate. The remnant fabric continues to make a major contribution to the Parramatta townscape.	Local
Charles Street Weir (Parramatta LEP 2011 no. I733)	Charles Street Weir has historical, aesthetic, social and scientific significance. The heritage significance of the Charles Street Weir is enhanced by its place within a recreational reserve.	Local
Wetlands (Parramatta LEP 2011 no. I735)	The wetlands along Parramatta River are of significance for Parramatta area as remnant representative areas of mangroves and salt marshes which once extensively lined the foreshores and tidal water flats of the region.	Local

As Parramatta contains the World Heritage site 'Old Government House and Domain' (Ref.1306), the proposed works must be considered in terms of their potential impact on the views and curtilage of the site. Upon review of the *Development in Parramatta City and the Impact on Old Government House and Domain's World and National Heritage Listed Values: Technical Report* (Planisphere, 2012), the proposal does not impact any areas of potential sensitivity.

Archaeology

The Charles Street Wharf was constructed in 1877 and may have been located in proximity the existing wharf. Analysis of the historical evidence was undertaken to establish whether the proposed footprint could contain historical archaeological resources. Site phasing analysis did not indicate the presence of any earlier landside structures or wharf structures within the vicinity of the subject site. It has, however, indicated the presence of timber pylons adjacent to the existing wharf structure in 1993, which appear to have been installed at an earlier date. Earlier research and archaeological assessments identify the location of the subject site within an area of high archaeological sensitivity.

The current wharf structure has largely remained unchanged since its construction in 1993, although the large landside waiting shelter, today present on the site, replaced a much smaller waiting shelter structure. The archaeological potential of the existing Parramatta Wharf structure is assessed as low, given its modern construction.



- Legend**
-  State Heritage Act
 -  Item - General
 -  Construction footprint

Map: PS106920_GIS_F012_A2	Author: MitchellEm		 1:750
Date: 26/04/2018	Approved by: -		

Data source: NSW Department of Planning and Environment. Sources: Esri, HERE, DeLorme, Intermap, Inetecm P Corp., GEBCO, USGS, FAO, NPS, NRCAN, Esri, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), Swisstopo, Mapbox India, © OpenStreetMap contributors, and the GIS User Community

Coordinate system: GOA 1994 MGA Zone 58
Scale ratio correct when printed at A3



Parramatta Wharf Upgrade Review of Environmental Factors

Figure 6-16
Non-Aboriginal heritage items

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6.8.3 Potential impacts

Construction

The proposal would not impact upon any heritage items within the vicinity, including 'Harrisford (and potential archaeological site)' (SHR no.100248), 'Newlands gates and trees' (item no. I544), 'Charles Street Weir' (item no. I733) and 'Wetlands' (item no. I735).

Although the current Parramatta Wharf structure is not heritage listed, its potential heritage value is not associated with its fabric or composition, as a relatively modern structure, but with its function. The proposal will therefore ensure its ongoing viability within this context.

Archaeology

The former 1877 'Charles Street Wharf' may have been located in the vicinity of the proposal footprint. Site phasing analysis has indicated the presence of timber pylons adjacent to the existing wharf structure in 1993, which appear to have been installed at an earlier date. Earlier research and archaeological assessments have also identified the location of the subject site within an area of high archaeological sensitivity.

However, the subject site is located within heavily disturbed land, which was modified during construction of the existing wharf and seawall in 1993, and any potential remnants of the wharf would likely have been removed or destroyed. The proposal was assessed to have low-medium potential to impact historical archaeological resources. If remnants of the wharf are identified during construction, works in the area would stop, and the 'unexpected heritage items procedure' in the *Standard Management Procedure: Unexpected Heritage Items* would be followed.

Operation

No impacts to non-Aboriginal heritage items are anticipated during operation of the proposal as no significant change to the existing operation is proposed.

6.8.4 Safeguards and management measures

Table 6-24 lists the non-Aboriginal heritage safeguards and management measures that would be implemented to account for the impacts identified in section 6.8.3.

Table 6-24: Non-Aboriginal heritage safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Non-Aboriginal heritage	The <i>Standard Management Procedure - Unexpected Heritage Items</i> (Roads and Maritime, 2015) would be followed in the event that any unexpected heritage items, archaeological remains or potential relics of Non-Aboriginal origin are encountered. Work would only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Detailed design/ pre-construction	Core standard safeguard H1
Non-Aboriginal heritage	Interpretation in the form of signage to indicate the location and historical context of the area, including the 'Charles Street' timber wharf and other historical and current wharf structures within the Parramatta area would be installed.	Roads and Maritime	Operation	Additional safeguard H2

6.9 Aboriginal heritage

This section summarises the proposal's Aboriginal heritage impacts. Appendix G contains a preliminary assessment report (as reported under the statement of heritage impact, SOHI) prepared under stage one of the PACHCI by City Plan in March 2018. The Roads and Maritime Aboriginal Cultural Heritage Advisor (ACHA) has issued a Stage 1 clearance letter for the proposal in accordance with PACHCI, included with Appendix H.

6.9.1 Methodology

The assessment included a desk review of published records, data and literature, including a records search of the Aboriginal heritage information management system (AHIMS) to confirm the unlikely presence of values in the local area.

The PACHCI assessment also referred to *the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011), the *Code of Practice for the Protection of Aboriginal Objects* (DECCW, 2010), and the *Code of Practice of Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010).

6.9.2 Existing environment

Aboriginal history

Aboriginal peoples have been active in the local area for the past 60,000 years as evidenced through radiocarbon dating (refer to Appendix G). The peoples that lived on the Cumberland Plain (the landform of Sydney Harbour) spoke the Darug dialect and used the land for its resources. There were 29 clan groups in total across the metropolitan area, collectively known as the Eora Nation. The Eora was the name given to the coastal Aboriginal peoples around Sydney. More specifically, the Burramattagal clan inhabited the Parramatta area at the time of initial European contact.

Recorded items and artefacts

A basic search of the AHIMS database was undertaken for sites recorded within a zero metre, 50-metre, 200-metre and 1,000-metre buffer of the landfall portion of Parramatta Wharf. No Aboriginal sites were recorded within a zero-metre buffer of the proposal. However, two sites are recorded within a 50-metre buffer, six sites within a 200-metre buffer and 45 sites within a 1,000-metre buffer (refer to Appendix G). An extensive search of the AHIMS database established that both Aboriginal sites are located approximately 280 metres to the south-west of the subject site; a significant distance from the project footprint.

As with the majority of the shoreline along the Parramatta River, the proposal footprint appears to be reclaimed land and has been extensively modified and landscaped. A seawall, bridge, waiting shelter and weir have been constructed within its immediate vicinity and the surrounding area is characterised by commercial and residential development. Therefore, these areas are considered to constitute heavily disturbed land. Aboriginal sites which once existed in the immediate vicinity of the subject site would likely have been removed through the human activities that have occurred on the site. However, the presence of Aboriginal objects beneath the intrusive landside infill or within the waterway itself cannot be discounted.

Whilst not recorded as a heritage item, the concrete surface adjacent to the wharf is decorated with a number of Aboriginal artworks and monuments, commissioned by the City of Parramatta Council.

6.9.3 Potential impacts

Construction

The proposed works are limited to the existing wharf structure and seawall, both of which are of relatively modern construction within heavily disturbed land.

Stage 1 of the Roads and Maritime Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) was completed for the proposal, which concluded the proposal was unlikely to have an impact on Aboriginal cultural heritage and did not require further investigations or assessment. The assessment indicated that while the surrounding area contains landscape features that indicate the presence of Aboriginal objects, the cultural heritage potential appears to be reduced due to past disturbances in the form of the construction of the existing wharf. The assessment concluded that no further Aboriginal heritage assessment is required and the Roads and Maritime's *Unexpected Heritage Items (2015)* procedure should be strictly adhered to during construction.

The Aboriginal art monument would be relocated within the Parramatta Wharf Interchange, as such it would remain within its intended context. Impacts to the Aboriginal artwork adjacent to the proposal would be avoided, as discussed in section 6.9.4.

An AHIP under the *National Parks and Wildlife Act 1974* is not required for the proposal.

Operation

No impacts to Aboriginal heritage items are anticipated during operation of the proposal as no significant change to the existing operation is proposed.

6.9.4 Safeguards and management measures

Table 6-25 lists the Aboriginal heritage safeguards and management measures that would be implemented to account for the impacts identified in section 6.9.3.

Table 6-25: Aboriginal heritage safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Unexpected heritage finds	The Standard Management Procedure – Unexpected Heritage Items (Roads and Maritime, 2015) would be followed in the event that (an) unknown or potential Aboriginal object(s), including skeletal remains, is/are found during construction. This applies where Roads and Maritime does not have approval to disturb the object(s) or where a specific safeguard for managing the disturbance (apart from the procedure) is not in place. Work would only restart once the requirements of that procedure have been satisfied.	Contractor	Construction	Core standard safeguard AH1
Aboriginal art installations	The Aboriginal art monument would be reinstated within the Parramatta Wharf Interchange.	Contractor	Construction	Additional safeguard AH2
Aboriginal art installations	Existing Aboriginal art installations (excluding the Aboriginal art monument) adjacent to the wharf would be communicated as a 'no-go zone' and avoided.	Contractor	Construction	Additional safeguard AH3

6.10 Waste management and resource use

This section describes the proposal's waste management and resource use impacts.

6.10.1 Methodology

The assessment considered the impacts associated with:

- Resource use and materials management during construction
- Waste generation, management and disposal during construction
- The proposal's ability to respond to waste management and resource conservation plans, policies and guidelines.

The basis of assessment was to consider the hierarchy of avoiding waste generation and primary resource use in favour of reduction, reuse and recycling, consistent with the NSW *Waste Avoidance and Resource Recovery Act 2001*.

6.10.2 Existing environment

Existing waste management measures in the local area include:

- Rubbish is collected from the wharf by Roads and Maritime as part of the maintenance and operation of the existing structure
- Cleaning of the wharf is undertaken by Roads and Maritime on a weekly basis.

No other waste generating activities are associated with the wharf or ferry service.

In terms of resource use, the wharf has required ongoing maintenance, repair and upgrade over time. This has required the use of small quantities of replacement materials such as timber and metal.

6.10.3 Potential impacts

Construction

Resource use

Roads and Maritime adopts a resource reduction strategy based on using:

- Alternative low-energy, high recycled content materials where they are cost and performance competitive and comparable in environmental performance
- Locally sourced materials, noting that most of the materials needed to build the proposal are widely available and typically in abundant supply in the local market
- Alternative forms of material sourcing to reduce the distances or methods travelled to supply materials.

Waste generation and management

The proposal would generate about 400 cubic metres of waste material associated with the seawall modification, as identified in Chapter 3. Any excavated material including any seawall material would be reused where suitable or classified before being disposed to an appropriately licenced facility in accordance with *Waste Classification Guidelines: Part 1 Classifying Waste* (EPA 2014). Where necessary, this would include sampling and analysis. Sediment from reprofiling the riverbed would not be removed. The main waste sources would come from decommissioning and dismantling the existing wharf and the seawall modification, which would include:

- Concrete and scrap metal – this would be reused where possible depending on its condition
- Backfilled rock, gabion ballast rock and other material from the seawall which is not suitable for reuse
- Ancillary equipment such as signs, lighting, notice boards, and electronic display boards – some of which may be reusable either on the upgraded wharf or elsewhere depending on its age and condition.

The other wastes generated in building the proposal would be typical to any construction site. They would include:

- Material offcuts (eg glass, wood and metal) that could be reused or recycled
- Inert unrestricted packaging waste (eg plastic, paper, wood) that could be recycled
- Potential restricted wastes (eg oily rags, empty paint tins, used lubricant tube) that would need collecting and transferring offsite to a licenced facility
- Food waste, which would be collected.

Landside ancillary facilities would be contained within the site compound(s), and include a portable toilet and small shipping container/shed. Minimal storage of materials is anticipated, but may include precast materials and some plant and equipment. Where feasible, materials would be barged, including fuels, oils and other required liquids which would be stored in bunded containers. All waste removed from the proposal footprint would be transferred by a licenced contractor to a licenced receiving facility.

Operation

The waste generation and resource use associated with the operational wharf would be broadly consistent with the current wharf including small amounts of passenger litter and maintenance materials.

As noted in the previous section, the expectation is that the amount of ongoing resources needed to maintain the wharf would reduce due to its more durable design.

6.10.4 Safeguards and management measures

Table 6-26 lists the waste management and resource use safeguards and management measures that would be implemented to account for the potential impacts identified in section 6.9.3.

Table 6-26: Waste and resource safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Waste	Waste management, littering and general tidiness would be monitored during routine site inspections.	Contractor	Construction	Additional safeguard: W1
Waste	Appropriate measures to avoid and minimise waste associated with the project should be investigated and implemented where possible.	Contractor	Construction	Additional safeguard: W2
Waste	Waste would be classified before being disposed to an appropriately licenced facility in accordance with Waste Classification Guidelines: Part 1 Classifying Waste (EPA 2014). Where necessary, this would include sampling and analysis.	Contractor	Construction	Additional safeguard: W3
Resource minimisation	Recycled, durable, and low embodied energy products would be considered to reduce primary resource demand in instances where the materials are cost and performance competitive and comparable in environmental performance (eg where quality control specifications allow).	Contractor	Detailed design	Additional safeguard: W4

6.11 Hazards and risks

This section describes the proposal's impacts to hazards and risks.

6.11.1 Methodology

The assessment considered the impacts associated with potential hazards and risks during construction and operation of the proposal.

6.11.2 Existing environment

The existing wharf presents a safety risk during flooding as the current structure has limited ability to accommodate higher water levels. The area surrounding the proposal has previously been closed during periods of flooding and low tide, making it unsafe for ferries to access the wharf, as discussed in section 6.1.

Potentially hazardous and contaminated has been identified within the proposal footprint, as discussed in section 6.1.

6.11.3 Potential impacts

Construction

The following hazards and risks would be associated with the proposal during construction:

- Construction materials, wastes and/or other objects have the potential to fall from the landside construction area into the Parramatta River causing water pollution and risk to human health
- Construction materials, waste and/or objects have the potential to fall from the construction barge or other construction vessels into the Parramatta River causing water pollution and risk to human health
- Construction plant, materials, waste and/or objects have the potential to enter the Parramatta River during a flood event causing water pollution and risk to human health
- Physical injury to construction workers due to various hazards and risks associated with the construction activities
- Physical injury to public due to various hazards and risks associated with the construction activities
- Risk to human health or the environment from spillage of materials and/or wastes into the water
- Risk to human health or the environment from the dispersion of potentially contaminated sediments, discussed further in section 6.1
- Risk to human health or the environment from air quality related impacts from dust generated during construction activities
- Risk to human health or the environment during flooding, discussed further in section 6.1.

Operation

The new wharf has been designed to comply with relevant standards, minimising risks to passenger welfare during operation of the wharf, and improving accessibility.

The installation of protection and manoeuvring piles, and a debris deflector adjacent to the wharf, would reduce the potential risks associated with the berthing of ferries and other vessels at the wharf.

Vessel movements to the wharf would continue to be managed through standard maritime procedures.

The wharf has been designed to accommodate a 1:100-year annual recurrence interval (ARI) flood event, Roads and Maritime inspect wharves after flood events prior to recommencing ferry operations, and this would continue for operation of the proposal.

6.11.4 Safeguards and management measures

Table 6-27 lists the hazard and risk safeguards and management measures that would be implemented to account for the potential impacts identified in section 6.11.3.

Table 6-27: Hazard and risk safeguards and management measures

Environmental factor	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Hazards and risks	Marine spill kits would be kept within the construction area.	Contractor	Construction	Additional safeguard HAZ1
Hazards and risks	Appropriate emergency equipment such as flotation devices and first aid kits would be kept within the construction area.	Contractor	Construction	Additional safeguard HAZ2
Hazards and risks	All utilities within and adjacent to the proposal footprint would be located prior to the start of the works.	Contractor	Construction	Additional safeguard HAZ3
Hazards and risks	Safe work method statements or similar would be implemented to manage health and safety risks for the works.	Contractor	Construction	Additional safeguard HAZ4
Hazard and risks	Weather forecasts and flood warnings would be monitored during construction. In the event of a major flood event, equipment and materials would be temporarily removed from the site, where possible.	Contractor	Construction	Additional safeguard HAZ5

6.12 Other impacts

The proposal is expected to have a negligible to minor impact in relation to:

- Air quality
- Greenhouse gas
- Climate change adaptation.

6.12.1 Existing environment and potential impacts

This section describes existing environment and potential impacts associated with the other environmental aspects where there is expected to be a negligible to minor impact. These are outlined in Table 6-28 below.

Table 6-28: Other impacts

Environmental factor	Existing environment	Potential impacts
Air quality	The nearest OEH air monitoring site to the proposal is Parramatta North, which forms part of the Sydney north-west monitoring network. A review of air quality data for the month of February 2018 indicates air quality is generally categorised as fair-to-good based on an Air Quality Index (AQI) of 20-140 (OEH, 2018).	<ul style="list-style-type: none"> • Temporary impacts may occur during construction, including minor amounts of construction generated dust, and plant, equipment and construction vehicle emissions • No additional impacts are anticipated for operation of the proposal with the management of storage and inclusion of spill kits as noted in the safeguards below.
Greenhouse gas	Operation of the existing wharf would contribute in a continuation in the emission of greenhouse gasses such as carbon dioxide, due to ongoing maintenance and operation of the wharf.	<ul style="list-style-type: none"> • Building the proposal would result in minor greenhouse gas emissions through material consumption (including embodied emissions in the production of materials), and using associated plant and equipment • The ferry wharf is designed to operate for 50 years by adopting a low maintenance design. As such, the greenhouse gas emissions expected during maintenance would be lower due to the greater maintenance requirements associated with the wharf in its current condition • No additional mitigation is required.
Climate change adaptation	Operation of the wharf would continue for its 50-year design life, during periods of predicted sea level rise.	<p>The wharf includes climate change adaptation in its design including:</p> <ul style="list-style-type: none"> • Enough clearance above the water to allow for a nominated sea level rise of 500 millimetres over 50 years • Shading and shelter provisions to protect passengers during extreme weather events • A streamlined design, enabling the wharf to withstand high winds during extreme weather events • No additional mitigation is required.

6.12.2 Safeguards and management measures

Table 6-29 lists the additional safeguards and management measures that would be implemented to account for the impacts identified in section 6.12.1.

Table 6-29: Other safeguards and management measures

Environmental factor	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Air quality	Air quality during construction would be considered and addressed within the CEMP and would include methods to manage work during strong winds or other adverse weather conditions as required.	Contractor	Detailed design/ pre-construction	Core standard safeguard AQ1

6.13 Cumulative impacts

Cumulative impact relates to any combined impact resulting from multiple individual sources. These sources can occur in the past, present or future in comparison to the construction and operation of the proposal. The consideration of cumulative impacts is required to assess this combined impact in the context of the region.

The proposal is part of a broader program of work to upgrade the commuter ferry wharves in Sydney, referred to as the Ferry Wharf Upgrade Program. Further consideration of potential cumulative impacts associated with the proposal and upgrade of other wharves as part of the ferry wharf upgrade program is provided in Table 6-30.

6.13.1 Study area

The Parramatta CBD and Greater Parramatta region is set to undergo a major transformation over the next 5 years, underpinned by several new residential and infrastructure developments planned for the area.

A search of the following databases was completed to identify any projects which might result in a cumulative impact with the proposal:

- Department of Planning and Environment – major project register
- Sydney West Central Planning Panel Development and Planning Register
- City of Parramatta Council Development Application Register.

Projects identified on the above registers that would impact the proposal have been identified in Table 6-30.

6.13.2 Past, present and future projects

Potential impacts from the construction and operation of identified past, present and future projects are summarised in Table 6-30.

In addition, other minor residential alterations and development applications have been identified. No significant construction related traffic would be generated for these projects outside of light vehicles travelling to the site and minor deliveries of equipment and materials.

Table 6-30: Past, present and future projects

Project	Construction impacts	Operational impacts
<p>Ferry wharf upgrade program</p> <p>The Ferry Wharf Upgrade Program includes upgrades to wharves across Sydney. The proposal is located at Parramatta, which is part of the F3 Parramatta River ferry route.</p> <p>The Ferry Wharf Upgrade Program includes planned upgrades to multiple wharves which service the F3 Parramatta River ferry route, including Abbotsford, Cabarita, Cockatoo Island, Chiswick, Birchgrove, Meadowbank, and Rydalmere.</p> <p>At the time of writing, the planned schedule for construction of Rydalmere and Cabarita Wharf Upgrade may occur at the same time as the proposal. The proposed upgrade of Rydalmere Wharf would require closure of the wharf during construction. While Cabarita Wharf would remain operational throughout the construction period.</p> <p>Rydalmere Wharf Upgrade is anticipated to commence in mid-2018 and require four months to complete.</p> <p>Cabarita Wharf Upgrade commenced in February 2018 and will require six months to complete.</p>	<p>Temporary impacts to passengers utilising Parramatta and Rydalmere wharves are anticipated due to the closure. As a result, it may lead to a decrease in passengers and vehicles travelling to this wharf.</p> <p>Minor disruption to patrons who use the ferry service to travel between these two locations would occur, however this is not considered to be significant based on patronage data for both wharves.</p> <p>There may be some minor increased pressure on the respective local road networks during this time from the operation of potential alternative transport routes and use of the road network by passengers who would otherwise use the ferry service. However, this would be a temporary and minor impact on the existing road network and alternative public transport options would be sufficient in supporting the shift in passengers during construction.</p>	<p>Parramatta Wharf is anticipated to remain closed for an additional two months compared to Rydalmere. This would result in a temporary impact as passengers would not be able to travel between Rydalmere and Parramatta.</p> <p>However, the Ferry Wharf Upgrade Program would have a beneficial cumulative impact through improved passenger amenity and consistent ferry wharf design across the network.</p>

Project	Construction impacts	Operational impacts
<p>Parramatta River Escarpment Boardwalk</p> <p>A new boardwalk is proposed by Parramatta City Council along the Parramatta River foreshore between the Charles Street Weir and Rangihou Reserve. The boardwalk would require excavation of the cliff face and removal of mangrove trees.</p> <p>The boardwalk is proposed to commence construction in mid-2018.</p>	<p>Based on consultation with Council, it is understood that the river closure would be coordinated with Roads and Maritime so the work can occur concurrently. This has a positive implication on minimising ferry closures and would reduce the total period machinery is operating in the river. The risk of a cumulative impact would occur from increased boat/barge traffic and temporarily constricting habitat with silt curtains along both banks. If there is not a coordinated approach to moving vessels or placement of silt curtains, the potential impacts include:</p> <ul style="list-style-type: none"> • Obstruction of fish passage – especially to Australian Bass migrating from fresh to salt water in late autumn-winter and back again in spring-summer via the weir’s fish ladder (ie from May to February the following year), plus other fish that tend to congregate at the base of weirs • Increased turbidity – from boat wash, excavation and piling • Risk of collision resulting in spills – either between vessels, cranes or rockfall • Increased underwater noise – from hammering piles and cliff face excavation. <p>These impacts have the potential to temporarily degrade a small area of habitat (eg wash on downstream mangroves, sediment plumes inside silt curtain zone) or decrease success of fish movement and spawning requirements (eg if the river is blocked entirely by a silt curtain). Overall, without correct timing and coordination, this impact could be moderate in severity. The proposal does not intend to block fish passage, so with collaboration with the construction of the boardwalk, this impact would be reduced.</p>	<p>The addition of both structures is unlikely to change the aquatic habitat value significantly in this area.</p>

Project	Construction impacts	Operational impacts
<p>Sydney Metro - Clyde barging facility</p> <p>The Clyde barging facility would receive barges carrying crushed rock excavated from the new Sydney Metro Barangaroo Station and underground structures. The barging facility would be located next to the Parramatta River, near Clyde within Viva Energy Australia's Clyde Terminal on Durham Street.</p> <p>Crushed rock excavated from Blues Point would also be barged to the facility. This material would be loaded onto trucks and trailers at the facility using excavators and transported off site.</p> <p>This would include:</p> <ul style="list-style-type: none"> • Two barges per day delivering crushed rock • 10–15 barges during the life of the project transferring plant and equipment • The Clyde barging facility would be established in early 2018 and operate until early 2020. 	<p>Site establishment works and operation of the barging facility would require additional movements along the Parramatta River. These activities may occur concurrently with the construction of Parramatta Wharf which would generate additional maritime traffic.</p>	<p>The barging operation along the Parramatta River may also impact ferry movements during operation. However, John Holland CPB Contractors Ghella, Roads and Maritime and Sydney Ferries would work closely to plan the works and to minimise the impact on ferry operations.</p>

6.13.3 Potential impacts

Table 6-31 outlines the possible cumulative impacts.

Table 6-31: Potential cumulative impacts

Environmental factor	Construction impacts	Operational impacts
Biodiversity	<p>Potential cumulative impacts would include:</p> <ul style="list-style-type: none"> • Obstruction of fish passage – especially to Australian Bass migrating from fresh to salt water in late autumn-winter and back again in spring-summer via the weir’s fish ladder (ie from May to February the following year), plus other fish that tend to congregate at the base of weirs • Increased turbidity – from boat wash, excavation and piling • Risk of collision resulting in spills – either between vessels, cranes or rockfall • Increased underwater noise – from hammering piles and cliff face excavation. 	No operational impacts are anticipated.
Socioeconomic	Cumulative impacts to patrons of the F3 Parramatta River ferry service due to closure of Parramatta and Rydalmere ferry wharves concurrently.	No operational impacts are anticipated.
Traffic and transport	Minor increase in construction related traffic, and commuters.	No operational impacts are anticipated.

6.13.4 Safeguards and management measures

Table 6-32 lists the cumulative impact safeguards and management measures that would be implemented to account for the impacts identified in section 6.13.3. Other safeguards and management measures that would address cumulative impacts are identified in section 7.2.

Table 6-32: Cumulative impact safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing	Standard/additional safeguard
Cumulative construction impacts	<ul style="list-style-type: none"> • Consultation would include notification prior to the start of the works • Updates on any delays or changes to the construction period would also be communicated. 	Roads and Maritime	Pre-construction/ construction	Additional safeguard C1
Cumulative construction impacts	<ul style="list-style-type: none"> • Consultation with City of Parramatta Council to avoid cumulative impacts from construction of the Parramatta River Escarpment Boardwalk. 	Roads and Maritime	Pre-construction/ construction	Additional safeguard C2
Cumulative construction impacts	<ul style="list-style-type: none"> • Prior to the commencement of construction, consultation shall occur with the Clyde barging facility. 	Roads and Maritime	Pre-construction/ construction	Additional safeguard C3

7 Environmental management

This Chapter describes how the proposal would be managed to reduce potential environmental impacts throughout detailed design, construction and operation. A framework for managing the potential impacts is provided. A summary of site-specific environmental safeguards is provided and the licence and/or approval requirements required prior to construction are also listed.

7.1 Environmental management plans

A number of safeguards and management measures have been identified in the REF in order to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the proposal. Should the proposal proceed, these safeguards and management measures would be incorporated into the detailed design and applied during the construction and operation of the proposal.

A Construction Environmental Management Plan (CEMP) will be prepared to describe the safeguards and management measures identified. The CEMP will provide a framework for establishing how these measures will be implemented and who would be responsible for their implementation.

The CEMP will be prepared prior to construction of the proposal and must be reviewed and certified by the Roads and Maritime Environment Officer, Greater Sydney Program Office prior to the commencement of any on-site work. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements.

7.2 Summary of safeguards and management measures

Environmental safeguards and management measures outlined in this REF would be incorporated into the detailed design phase of the proposal and during construction and operation of the proposal, should it proceed. These safeguards and management measures will minimise any potential adverse impacts arising from the proposed work on the surrounding environment. The safeguards and management measures are summarised in Table 7-1.

Table 7-1: Summary of site specific environmental safeguards

No	Impact	Environmental safeguards	Responsibility	Timing
1	Soil and water	<p>A Soil and Water Management Plan (SWMP) would be prepared and implemented as part of the CEMP. The SWMP would identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks would be addressed during construction.</p> <p>Erosion and sediment control measures are to be implemented and maintained (in accordance with the Landcom/Department of Housing Managing Urban Stormwater, Soils and Construction Guidelines (the Blue Book)) to:</p> <ul style="list-style-type: none"> • Prevent sediment moving off-site and sediment laden water entering any water course, drainage lines, or drain inlets • Reduce water velocity and capture sediment on site • Minimise the amount of material transported from site to surrounding pavement surfaces • Divert clean water around the site. 	Contractor	Detailed design/ pre-construction
2	Flooding	<p>The SWMP would include measures to address potential flood threats and evacuation requirements. The measures would include:</p> <ul style="list-style-type: none"> • Regular consultation of the Bureau of Meteorology website for weather forecasts and flood warnings • Scheduling of activities on land (including compound site) and water subject to flooding to avoid high flow periods. • A process for removing equipment and materials off site and out of flood risk areas quickly. • Storing and use of fuels and chemicals away from the flood zone, in bunded areas. 	Contractor	Construction

No	Impact	Environmental safeguards	Responsibility	Timing
3	Contaminated land	<p>A Contaminated Land Management Plan will be prepared in accordance with the Guideline for the Management of Contamination (Roads and Maritime, 2013) and implemented as part of the CEMP. The plan will include, but not be limited to:</p> <ul style="list-style-type: none"> • Capture and management of any surface runoff contaminated by exposure to the contaminated land • Further investigations required to determine the extent, concentration and type of contamination, as identified in the detailed site investigation (Phase 2) • Management of the remediation and subsequent validation of the contaminated land, including any certification required • Measures to ensure the safety of site personnel and local communities during construction. 	Contractor	Detailed design/ Pre-construction
4	Acid sulfate soils	An Acid Sulfate Soil Management Plan (ASSMP) would be prepared as part of the Contaminated Land Management Plan to address the potential for acidity to be generated from ASS and PASS disturbed during the construction phase. Potential or actual acid sulphate soils are to be managed in accordance with the Roads and Maritime Services Guidelines for the Management of Acid Sulphate Materials 2005.	Contractor	Detailed design/ pre-construction
5	Contaminated land	If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other works that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Roads and Maritime Environment Manager and/or EPA.	Contractor	Detailed design/ Pre-construction
6	Accidental spill	An emergency spill kit is to be kept on site at all times and maintained throughout the construction work. The spill kit must be appropriately sized for the volume of substances at the work site.	Contractor	Construction
7	Accidental spill	If an incident (eg spill) occurs, the Roads and Maritime Services Environmental Incident Classification and Reporting Procedure is to be followed and the Roads and Maritime Services Contract Manager notified as soon as practicable.	Contractor	Construction
8	Accidental spill	Emergency contacts will be kept in an easily accessible location on vehicles, vessels, plant and site office. All workers will be advised of these contact details and procedures.	Contractor	Construction

No	Impact	Environmental safeguards	Responsibility	Timing
9	Accidental spill	Spill kits for construction barges must be specific for working within the marine environment.	Contractor	Construction
10	Accidental spill	All workers will be advised of the location of the spill kit and trained in its use.	Contractor	Construction
11	Accidental spill	Vehicles, vessels and plant must be properly maintained and regularly inspected for fluid leaks.	Contractor	Construction
12	Accidental spill	No vehicle or vessel wash-down or re-fuelling would occur on-site.	Contractor	Construction
13	Accidental spill	In the event of a maritime spill, the incident emergency plan would be implemented in accordance with Sydney Ports Corporation's response to shipping incidents and emergencies outlined in the 'NSW State Waters Marine Oil and Chemical Spill Contingency Plan' (Maritime, 2012).	Contractor	Construction
14	Accidental spill	Refuelling of plant and equipment and storage of hazardous materials on barges is to occur within a double-bunded area.	Contractor	Construction

No	Impact	Environmental safeguards	Responsibility	Timing
15	Soil and water	<p>A detailed environmental work method statement (EWMS) will be prepared and implemented for the following high-risk activities:</p> <ul style="list-style-type: none"> • Modification of the seawall • Reprofiling of sediment • Dewatering. <p>The content of the EWMS would include, but not limited to:</p> <ul style="list-style-type: none"> • Description of the works/activities including machinery to be used • Outline of the sequence of the work/activities, including interfaces with other construction activities • Identification of potential environmental risks/impacts due to the works/activities and associated with wet weather events • Evaluation of methods to eliminate/reduce the environmental risk • Mitigation measures to reduce environmental risk • Any safeguards resulting from consultation with public authorities and other stakeholders, when appropriate • A map indicating the locations of sensitive locations (such as threatened species or heritage items), likely potential environmental impacts, and work areas • Identification of work area and exclusion areas • A process for progressive review, eg monitoring processes and methods to eliminate/reduce environmental risks/impacts. 	Contractor	Detailed design/ pre-construction
16	Erosion and sedimentation	Silt curtains are to be installed prior to and around the area of works that may disturb the seabed. The silt boom and curtain would extend from a minimum of 100 millimetres above the water line to a minimum of 2.5 metres below the water line before starting work.	Contractor	Construction
17	Erosion and sedimentation	Silt curtains are to be installed, monitored and maintained as needed to contain any sediment.	Contractor	Construction

No	Impact	Environmental safeguards	Responsibility	Timing
18	Erosion and sedimentation	<p>Visual monitoring of local water quality (ie turbidity, hydrocarbon spills/slicks) is to be undertaken on a regular basis to identify any potential spills or deficient silt curtains or erosion and sediment controls.</p> <p>Results of the observations of the integrity of the silt curtain are required to be recorded and maintained specifically for the purpose. Records are required to be kept on the site and to be made available for inspection by persons authorised by Roads and Maritime.</p>	Contractor	Construction
19	Erosion and scour	The number of jack-ups/anchor points would be minimised where possible. The locations would be selected to avoid areas of sensitive habitat, as discussed further in section 6.1.4.	Contractor	Construction
20	Erosion and scour	Work positioning barges, drilling and pile driving should occur during calm conditions to prevent excessive scouring and other impacts.	Contractor	Construction
21	Water quality	<p>A spill management plan would be developed and communicated to all staff working on site.</p> <p>Any aquatic spill (whether spill occurs on water on land and subsequently enters the water) is to be immediately reported to Roads and Maritime and Sydney Ports VTS and VHF Channel 13.</p> <p>Aquatic spill kits are to be kept on site during construction.</p>	Contractor	Construction
22	Water quality	All machinery and equipment would be maintained in good working order and regularly visually inspected for leaks.	Contractor	Construction
23	Stormwater	Stormwater infrastructure would reinstated within the seawall.	Contractor	Construction

No	Impact	Environmental safeguards	Responsibility	Timing
24	Aquatic biodiversity	<p>A Marine Ecology Management Plan would be prepared as part of the CEMP. This would include, but not be limited to, measures relating to the following activities to minimise the risk for pollution:</p> <ul style="list-style-type: none"> • Sediment and rock debris control • Spills from concrete pour • Oil/fuel/chemical storage and spill management • Machinery and engine maintenance schedule to reduce oil/fuel leakage • Low impact barge positioning to prevent propeller scouring and thrust wash onto sensitive habitats such as the mangroves • Minimise footprint and establish no-go zones in sensitive habitats • Accidental waste/material overboard response (eg construction materials dropped into the harbour) • Biological hygiene (eg prevent spread of noxious species on and off the site) • Aquatic fauna management. 	Contractor	Pre-construction
25	Biodiversity	<p>No-go zones would be established to avoid damage to all terrestrial and nearby aquatic habitats. No-go zones should be marked on a map and displayed inside the construction barge and office. All staff responsible for manoeuvring the barge should check the map before selecting a new position.</p> <p>Establish no-go zones to avoid damage to nearby habitats, particularly mangroves for the construction period.</p>	Contractor	Pre-construction
26	Aquatic Biodiversity	<p>No anchors or mooring blocks/lines should be placed on the intertidal rock habitat. All lines should be suspended off the riverbed to minimise drag across benthic communities.</p>	Contractor	Pre-construction
27	Aquatic Biodiversity	<p>Install a floating boom with silt curtain or equivalent to contain sediment plumes during dredging, drilling, pile hammering and reprofiling. The silt curtain should encompass the aquatic construction zone fully, rather than being anchored to the shore and regularly inspected for entrainment and impingement of aquatic/marine wildlife.</p> <p>The silt curtain must not block the entire channel, land must leave at least half the channel width available for fish passage.</p>	Contractor	Construction

No	Impact	Environmental safeguards	Responsibility	Timing
28	Aquatic Biodiversity	Vessel speeds would be minimised within the construction area to minimise wash and risk of injury to aquatic/marine fauna. All staff working on the proposal would be advised of the location of habitats within and near the proposal footprint. Care should be taken in the placement of jack-ups and/or anchors to avoid areas of aquatic habitat.	Contractor	Construction
29	Aquatic Biodiversity	Work positioning barges, drilling and pile driving should occur during calm conditions to prevent excessive scouring and other impacts.	Contractor	Construction
30	Aquatic Biodiversity	Gentle start-up of piling hammering would be completed to allow undetected aquatic fauna to leave the area.	Contractor	Construction
31	Fish passage	Fish passage, including access to the Charles Street Weir fish ladder for <i>Percalates novemaculeata</i> (Australian Bass) and other species, would be maintained.	Contractor	Construction
32	Pest species	Regular inspections of all equipment, machinery and materials would be completed to prevent the importation of pests and weeds to the area, including the noxious marine alga <i>Caulerpa taxifolia</i> . Good housekeeping of the aquatic construction area would be maintained.	Contractor	Construction
33	Dredging	The Minister for Primary Industries would be notified of the proposal in accordance with section 199 of the FM Act.	Roads and Maritime	Pre-construction
34	Noise and vibration	A Noise and Vibration Management Plan (NVMP) would be prepared and implemented as part of the CEMP. The NVMP would generally follow the approach in the <i>Interim Construction Noise Guideline</i> (ICNG) (DECC, 2009) and identify: <ul style="list-style-type: none"> All potential significant noise and vibration generating activities associated with the activity Feasible and reasonable mitigation measures to be implemented A monitoring program to assess performance against relevant noise and vibration criteria Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures contingency measures to be implemented in the event of non-compliance with noise and vibration criteria. 	Contacto	Pre-construction

No	Impact	Environmental safeguards	Responsibility	Timing
35	Noise and vibration	<p>All sensitive receivers (eg schools, residents) likely to be affected would be notified at least five days before starting any work with an associated activity that may have an adverse noise or vibration impact (refer to Table 6-13). The notification would provide details of:</p> <ul style="list-style-type: none"> • The proposal • The construction period and construction hours • Contact information for project management staff • Details of complaint and incident reporting • How to obtain further information. <p>Receivers where noise management levels may be exceeded would receive letter notification. Highly noise affected receivers would receive direct notification through a door knock.</p>	Roads and Maritime	Pre-construction
36	Noise and vibration	All work would be carried out during standard construction hours identified in the Interim Construction Noise Guideline (DECC, 2009) unless Roads and Maritime approval has been granted. An OOHW Procedure would be developed for proposed work outside of standard hours.	Contactora	Pre-construction
37	Noise and vibration	All construction personnel would be notified of the location of sensitive receivers, and the need to minimise noise and vibration from the work, during the site induction.	Contactora	Pre-construction
38	Noise and vibration	Plant and equipment would be in good working order to prevent excess noise generation.	Contactora	Pre-construction
39	Noise and vibration	<p>Verification measures would be carried out to confirm background noise levels already captured as part of the Noise and Vibration Impact Assessment report, and actual construction noise levels monitored using hand-held devices during periods associated with high noise impacts.</p> <p>This would apply to the following NCAs and scenarios described in Table 6-13:</p> <ul style="list-style-type: none"> • NCA04: S03, S05, S06. 	Contractora	Pre-construction/ construction

No	Impact	Environmental safeguards	Responsibility	Timing
40	Noise and vibration	Verification measures would be carried out to confirm construction vibration levels during periods associated with high vibration impacts. This would apply to the following NCAs and scenarios described in Table 6-14: <ul style="list-style-type: none"> NCA04: S06. 	Contractor	Pre-construction/ construction
41	Noise and vibration	Where feasible, limited number of noise intensive plant (eg chainsaw, concrete saw, jackhammer) to no more than one item of equipment operating at any one time.	Contractor	Construction
42	Noise and vibration	Where feasible and practicable, any site hoarding or fences erected should be constructed with thick plywood or fitted with temporary acoustic barriers.	Contractor	Construction
43	Noise and vibration	Where feasible and reasonable, implementation of temporary barriers around stationary sources of noise (paving, road cutting, jackhammering, compressor and generator) will be considered, including the use of alternative quieter equipment.	Contractor	Construction
44	Vibration	No work with the potential to cause cosmetic damage to property (due to vibration or otherwise) will be undertaken.	Contractor	Construction
45	Vibration	A structural condition survey of receivers within 40 metres of the proposal footprint would be completed both before and after the construction work.	Contractor	Pre and post-construction
46	Vibration	An appropriate respite period during S06 piling (hammering) would be agreed upon through consultation with receivers located within 50 metres of the site.	Contractor/ Roads and Maritime	Construction
47	Landscape and visual impact	Urban design principles would be integrated throughout the detailed design and construction of the proposal. The urban design principles would include: <ul style="list-style-type: none"> Material selection location of services, and a standardised family of elements. Covered pontoon and protection screens include transparent elements Existing landscape elements are retained. Colour of paint and materials would be consistent with other recently upgraded wharves within Sydney Harbour.	Roads and Maritime	Detailed design and pre-construction
48	Visual impacts	Hoarding would be erected around the construction compound where possible, to reduce visibility.	Contractor	Construction

No	Impact	Environmental safeguards	Responsibility	Timing
49	Landscape and Visual impacts	The construction area would be kept clean and clear of rubbish.	Contractor	Construction
50	Out of hours work	In the event that OOHW is required, lighting would be directionally controlled to limit impacts from light spill from surrounding receivers, including residential properties. Lighting direction would also include consideration of any reflective impacts from the river.	Contractor	Construction
51	General socio-economic impacts	<p>A Communication Plan (CP) would be prepared and implemented as part of the CEMP to help provide timely and accurate information to stakeholders during construction. The CP would include (as a minimum):</p> <ul style="list-style-type: none"> • Mechanisms to provide details and timing of proposed activities to affected residents and local businesses, including changed traffic and access conditions • Contact name and number for complaints. <p>The CP would be prepared in accordance with the <i>Community Involvement and Communications Resource Manual</i> (RTA, 2008).</p>	Contractor	Pre-construction
52	General socio-economic impacts	<p>An internet site and free-call number would be established for enquiries regarding the proposal for the entirety of construction.</p> <p>Contact details would be clearly displayed at the entrance to the site.</p> <p>All enquiries and complaints would be tracked through a tracking system, and acknowledged within 24 hours of being received.</p>	Roads and Maritime	Pre-construction
53	Social impacts	The construction area would be secured at all times.	Contractor	Construction
54	Land and water transport	Transport of equipment and materials to site via boat and barge would be utilised over land transport to limit impacts to the local road network.	Contractor	Construction

No	Impact	Environmental safeguards	Responsibility	Timing
55	Water transport	<p>A Maritime Traffic Management Plan would be prepared and implemented during the water based construction work. The Maritime Traffic Management Plan would be prepared consultation with NSW Maritime and approved by the Harbourmaster.</p> <p>In addition, the proposal would:</p> <ul style="list-style-type: none"> • Fit all buoys with lights • Prepare Response Plans for emergencies and spills for all construction vessels • Fit at least one vessel with an Automatic Identification System (AIS) • Retrieve any material associated with the construction of the development that enters the water to prevent the obstruction of vessel movements • Prepare a Communications Plan for implementation during the work which must include 24/7 contact details, protocols for enquiries, complaints and emergencies. <p>Any variation to the above would be agreed in advance with the Harbourmaster.</p>	Contractor	Pre-construction / construction
56	Pedestrian and cycle access	Pedestrian and cycle access through the Parramatta Valley Cycleway around the construction area would be maintained during construction. Appropriate warning signage would be installed on the path, either side of the construction area.	Contractor	Construction
57	Water transport	Passengers would be notified of the alternative transport ahead of construction.	Roads and Maritime	Pre-construction / construction
58	Construction access and parking	Final access and parking arrangements would be included a Traffic Management Plan. The Traffic Management Plan would also include measures to ensure light vehicle parking is strictly in accordance with Parramatta City Council requirements and prevents parking on footpaths and grassed areas adjacent the site.	Construction	Pre-construction / construction
59	Non-Aboriginal heritage	<p>The <i>Standard Management Procedure - Unexpected Heritage Items</i> (Roads and Maritime, 2015) would be followed in the event that any unexpected heritage items, archaeological remains or potential relics of Non-Aboriginal origin are encountered.</p> <p>Work would only re-commence once the requirements of that Procedure have been satisfied.</p>	Contractor	Detailed design/ pre-construction
60	Non-Aboriginal heritage	Interpretation in the form of signage to indicate the location and historical context of the area, including the 'Charles Street' timber wharf and other historical and current wharf structures within the Parramatta area would be installed.	Roads and Maritime	Operation

No	Impact	Environmental safeguards	Responsibility	Timing
61	Unexpected heritage finds	The Standard Management Procedure – Unexpected Heritage Items (Roads and Maritime, 2015) would be followed in the event that (an) unknown or potential Aboriginal object(s), including skeletal remains, is/are found during construction. This applies where Roads and Maritime does not have approval to disturb the object(s) or where a specific safeguard for managing the disturbance (apart from the procedure) is not in place. Work would only restart once the requirements of that procedure have been satisfied.	Contractor	Construction
62	Aboriginal art installations	The Aboriginal art monument would be reinstated within the Parramatta Wharf Interchange.	Contractor	Construction
63	Aboriginal art installations	Existing Aboriginal art installations (excluding the Aboriginal art monument) adjacent to the wharf would be communicated as a 'no-go zone' and avoided.	Contractor	Construction
64	Waste	Waste management, littering and general tidiness would be monitored during routine site inspections.	Contractor	Construction
65	Waste	Appropriate measures to avoid and minimise waste associated with the project should be investigated and implemented where possible	Contractor	Construction
66	Waste	Waste would be classified before being disposed to an appropriately licenced facility in accordance with Waste Classification Guidelines: Part 1 Classifying Waste (EPA 2014). Where necessary, this would include sampling and analysis.	Contractor	Construction
67	Resource minimisation	Recycled, durable, and low embodied energy products would be considered to reduce primary resource demand in instances where the materials are cost and performance competitive and comparable in environmental performance (eg where quality control specifications allow).	Contractor	Detailed design
68	Hazards and risks	Marine spill kits would be kept within the construction area.	Contractor	Construction
69	Hazards and risks	Appropriate emergency equipment such as flotation devices and first aid kits would be kept within the construction area.	Contractor	Construction
70	Hazards and risks	All utilities within and adjacent to the proposal footprint would be located prior to the start of the works.	Contractor	Construction

No	Impact	Environmental safeguards	Responsibility	Timing
71	Hazards and risks	Safe work method statements or similar would be implemented to manage health and safety risks for the works.	Contractor	Construction
72	Hazard and risks	Weather forecasts and flood warnings would be monitored during construction. In the event of a major flood event, equipment and materials would be temporarily removed from the site, where possible.	Contractor	Construction
73	Air quality	Air quality during construction would be considered and addressed within the CEMP and would include methods to manage work during strong winds or other adverse weather conditions as required	Contractor	Detailed design/ pre-construction
74	Cumulative construction impacts	<ul style="list-style-type: none"> • Consultation would include notification prior to the start of the works • Updates on any delays or changes to the construction period would also be communicated. 	Roads and Maritime	Pre-construction/ construction
75	Cumulative construction impacts	Consultation with City of Parramatta Council to avoid cumulative impacts from construction of the Parramatta River Escarpment Boardwalk	Roads and Maritime	Pre-construction/ construction
76	Cumulative construction impacts	Prior to the commencement of construction, consultation shall occur with the Clyde barging facility.	Roads and Maritime	Pre-construction/ construction

7.3 Licensing and approvals

A summary of licenses and approvals required (or to be obtained) is provided in Table 7-2.

Table 7-2: Summary of licensing and approvals required

Instrument	Requirement	Timing
<i>Fisheries Management Act 1994</i> (s199)	Notification to the Minister for Primary Industries prior to any dredging or reclamation works.	A minimum of 28 days prior to the start of work.

8 Justification and conclusion

This chapter provides the justification for the proposal taking into account its biophysical, social and economic impacts, the suitability of the site and whether or not the proposal is in the public interest. The proposal is also considered in the context of the objectives of the EP&A Act, including the principles of ecologically sustainable development as defined in Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*.

8.1 Justification

The proposal forms part of the TAP, which is an ongoing “initiative to deliver modern, safe and accessible transport infrastructure” in New South Wales (NSW, Transport for NSW, 2015). As part of the TAP, Roads and Maritime assessed the condition of all ferry wharves across the transport network in 2009 in terms of:

- Safety and structural integrity
- Access for less mobile and disabled passengers
- Existing and predicted future patronage and use.

Initial justification for the proposal was provided through an assessment of the existing wharf, which was identified as needing upgrading due to its lack of accessible pathway throughout the interchange and non-DDA compliant wharf.

Consideration of alternatives and options was then carried out. The preferred design of the proposal selected to best achieve the objectives outlined in section 2.7, which included providing improvements in access, user experience including passenger comfort and amenity, and safety through meeting the objectives. This was compared to the option of doing nothing and other options to relocate the wharf.

Potential environmental and social impacts resulting from construction and operation of the proposal have been minimised through the safeguards and management measures outlined in Chapter 7.

The following sub-headings provide justification through considering the impacts and benefits of the proposal.

8.1.1 Social factors

The proposal would result in temporary social impacts whilst being built such as noise and visual impacts. However, all construction related impacts would be appropriately managed prior to and during construction.

Operation of the proposal provides justification over the above temporary impacts, as it would benefit the community through improving passenger amenity, safety and overall user experience. It is anticipated that the proposal would also have indirect wider community benefits, through ensuring continuation of the wharf for its expected lifespan (50 years). This extends to the cultural and amenity benefit of continuing to operate a wharf in this location.

8.1.2 Biophysical factors

As discussed in Chapter 6, no significant impacts have been identified. Minor impacts would be managed through the safeguards and management measures outlined in these sections.

The design of the proposal includes tolerances to allow for sea level rise and extreme weather events, which would ensure the wharf continues to be operational throughout its 50-year design life.

8.1.3 Economic factors

Upgrade of the wharf would generate economic benefits over the next 50 years, with the wharf being an attractor for people to live in the area due to the recreational value of the ferry service and ability to access the city centre.

Design of the wharf has also incorporated measures to decrease the maintenance required for operation which are standardised across all newly constructed wharves. The implementation of these measures would result in cost savings for the ongoing operation of the ferry network.

8.2 Objects of the EP&A Act

Table 8-1: Objects of the EP&A Act

Object	Comment
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	Through the assessment in Chapter 6, it has been identified that the proposal would not significantly impact on any natural or artificial resources. The proposal would result in community benefits through facilitation of a safe and reliable ferry service to Parramatta for the next 50 years.
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	Ecologically sustainable development is considered in sections 8.2.1 to 8.2.4 below.
1.3(c) To promote the orderly and economic use and development of land.	The proposal includes continuation of the use of the proposal location as a ferry wharf.
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the project.
1.3(e) To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	An aquatic ecology assessment has been prepared for the project, which is summarised in section 6.3. The assessment concluded that no significant impact to aquatic ecology would be caused by the proposal. In addition, tree removal would not be required for the proposal.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The proposal would have minimal impact upon Aboriginal and non-Aboriginal heritage items.
1.3(g) To promote good design and amenity of the built environment.	The proposal has been designed to be consistent with the urban design objectives identified in section 2.4.3.
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	The proposal would benefit the community through improving passenger amenity, safety and overall user experience. It is anticipated that the proposal would also have indirect wider community benefits, through ensuring continuation of the wharf for its expected lifespan (50 years).

Object	Comment
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	Not relevant to the project.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	<p>Stakeholder consultation would continue during the public display of this document, with a community information session planned during the public display period to capture feedback. Should the proposal proceed to construction, consultation with the community and stakeholders would continue throughout the work.</p> <p>Additionally, a community information session was held on 24 May 2015 to inform the concept design, which is described further in section 5.2.</p>

8.2.1 The precautionary principle

The precautionary principle includes the premise that full scientific certainty should not be used as a reason for postponing a measure to prevent degradation of the environment where there are threats of serious or irreversible environmental damage.

Through the assessment of the potential impacts of the proposal in Chapter 6, it has been demonstrated that threats of serious or irreversible environmental damage do not exist for the proposal.

Notwithstanding, to account for the subjectivity of professional judgement applied in environmental assessment and modelling uncertainty, worst-case assumptions have been incorporated into the assessment, including the following:

- Specialist assessments of noise and vibration, aquatic ecology, landscape character and visual impact have been completed
- The worst-case assumption of all noise generating construction equipment operating at the same time, at its maximum output, at a location closest to the nearest of the sensitive receivers
- Assessing impacts and including safeguards for impacts which are exceptionally unlikely to happen such as major spills
- Undertaking verification monitoring to validate results and allow modification of safeguards and mitigation controls accordingly.

8.2.2 Intergenerational equity

To achieve intergenerational equity, the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

The proposal would result in benefit to the community through improvements to passenger amenity, safety and overall user experience of the ferry wharf for the next 50 years.

No potential impacts to future generations would be generated by the proposal.

8.2.3 Conservation of biological diversity and ecological integrity

Conservation of biological diversity and ecological integrity has been considered through the assessment of aquatic ecology provided in section 6.3, and Appendix D.

Providing the safeguard measures are implemented, the proposal would not have a material or significant impact on biological diversity and ecological integrity within the proposal footprint or surrounds.

8.2.4 Improved valuation, pricing and incentive mechanisms

This principle includes integrating long-term and short-term economic, environmental, social and fairness considerations into decision-making. This principle requires that environmental resources should be appropriately valued.

Environmental, economic and social issues were considered in the rationale for the proposal and design options. Construction planning for the proposal would also be progressed in the most cost-effective way.

Safeguards and management measures detailed in Chapter 6, including avoiding, reusing, recycling, managing waste during construction and operation, would be implemented.

8.3 Conclusion

The proposed Parramatta Wharf Interchange Upgrade is subject to assessment under Division 5.1 of the EP&A Act. The REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

This has included consideration (where relevant) of conservation agreements and plans of management under the NPW Act, stewardship sites under the BC Act, wilderness areas, areas of outstanding value, impacts on threatened species, populations and ecological communities and their habitats and other protected fauna and native plants. It has also considered potential impacts to matters of national environmental significance listed under the Federal EPBC Act.

A number of potential environmental impacts from the proposal have been avoided or reduced during the concept design development and options assessment. The proposal as described in the REF best meets the project objectives but would still result in some impacts on noise, water quality, aquatic ecology, traffic and transport and landscape character and visual impact. Safeguards and management measures as detailed in this REF would ameliorate or minimise these expected impacts. The proposal would provide better commuter experience through improvements to passenger amenity, safety, access for people with a disability and overall user experience of the ferry wharf for the next 50 years, as well as contributing to unifying and standardising wharves in Sydney Harbour and Parramatta River. On balance the proposal is considered justified and the following conclusions are made.

8.3.1 Significance of impact under NSW legislation

The proposal would be unlikely to cause a significant impact on the environment. Therefore, it is not necessary for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning under Division 5.2 of the EP&A Act. A Biodiversity Development Assessment Report or Species Impact Statement is not required. The proposal is subject to assessment under Division 5.1 of the EP&A Act. Consent from Council is not required.

8.3.2 Significance of impact under Australian legislation

The proposal is not likely to have a significant impact on matters of national environmental significance or the environment of Commonwealth land within the meaning of the *Environment Protection and Biodiversity Conservation Act 1999*. A referral to the Australian Department of the Environment and Energy is not required.

9 Certification

This review of environmental factors provides a true and fair review of the proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposal.



Emma Dean
Principal Environmental Planner
WSP

Date: 27 April 2018

I have examined this review of environmental factors and accept it on behalf of Roads and Maritime Services.



Rosie Majer
Project Manager
Greater Sydney Program Office, Roads and Maritime Services

Date: 27 April 2018

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Terms and acronyms

Term/Acronym	Description
ABS	Australian Bureau of Statistics
AHD	Australian Height Datum
AHIMS	Aboriginal heritage information management service
AS	Australian Standard
ASS	Acid sulfate soil
ASMA	Australian Maritime Safety Authority
BCA	Building Code of Australia
Berthing	A place for a vessel to dock
CCTV	Close circuit television
CEMP	Construction environmental management plan
DDA	Disability Discrimination Act 1992
DPE	NSW Department of Planning and Environment
DSAPT	Disability Standards for Accessible Public Transport 2002
EIS	Environmental impact statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process
ESD	Ecologically sustainable development. Development that uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased
Fetch	An area where ocean waves are being generated by the wind
FM Act	Fisheries Management Act 1994 (NSW)
FWUP	Ferry Wharf Upgrade Program
Gangway	A landing used by passengers to board or exit ships/vessels
Heritage Act	Heritage Act 1977 (NSW)
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
Jetty	A structure extending into the harbour as part of a wharf
KFH	Key Fish Habitat types as defined by NSW Fisheries
LALC	Local Aboriginal Land Council

Term/Acronym	Description
LCVIA	Landscape Character and Visual Impact Assessment
LGA	Local Government Area
LEP	Local Environmental Plan. A type of planning instrument made under the EP&A Act
LoS	Level of Service. A qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers
MHWM	Mean high water mark
MNES	Matters of national environmental significance under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
Noxious Weeds Act	Noxious Weeds Act 1993 (NSW)
NPW Act	National Parks and Wildlife Act 1974 (NSW)
OEH	NSW Office of Environment and Heritage
PACHCI	Roads and Maritime procedure for Aboriginal Heritage Cultural Heritage Consultation and Investigation
Piles	Foundations used to support marine structures and offshore platforms
Pontoon	A floating structure serving as a dock
QA Specifications	Specifications developed by Roads and Maritime Services for use with roadworks and bridgeworks contracts let by Roads and Maritime Services
REF	Review of Environmental Factors
SEPP	State Environmental Planning Policy. A type of planning instrument made under the EP&A Act
SIS	Species impact statement
SOHI	Statement of Heritage Impact
SRD SEPP	State Environmental Planning Policy (State and Regional Development) 2011
Sydney Harbour SREP	Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005
Transport for NSW	Transport for New South Wales
TAP	NSW Government's Transport Access Program
Wharf	A landing place or pier where ships may tie up and load or unload
ZFDTG	Zero of Fort Denison Tide Gauge
ZVI	Zone of visual influence

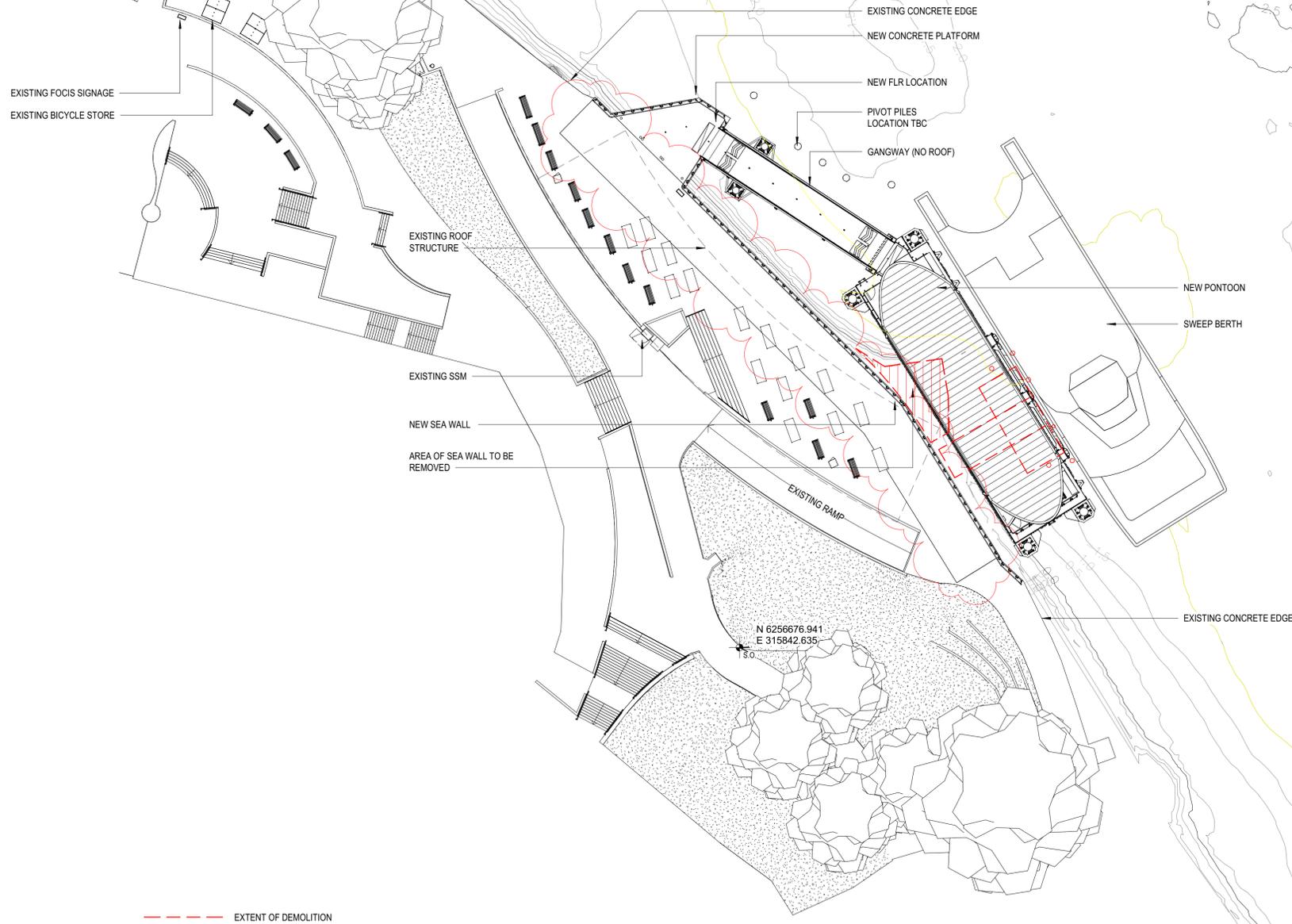
Appendix A

Proposal drawings



2 Site Plan - Existing
02-4310 1 : 1000

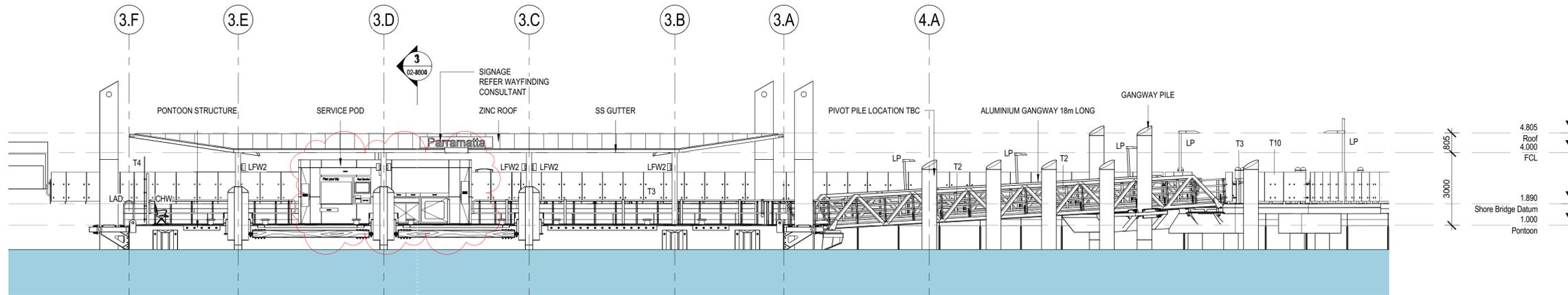
NOTE: SURVEY IS IN AN APPROXIMATE LOCATION. SHORE LINE USED AS SETOUT POINT



1 Site Plan - Proposed
02-4310 1 : 250

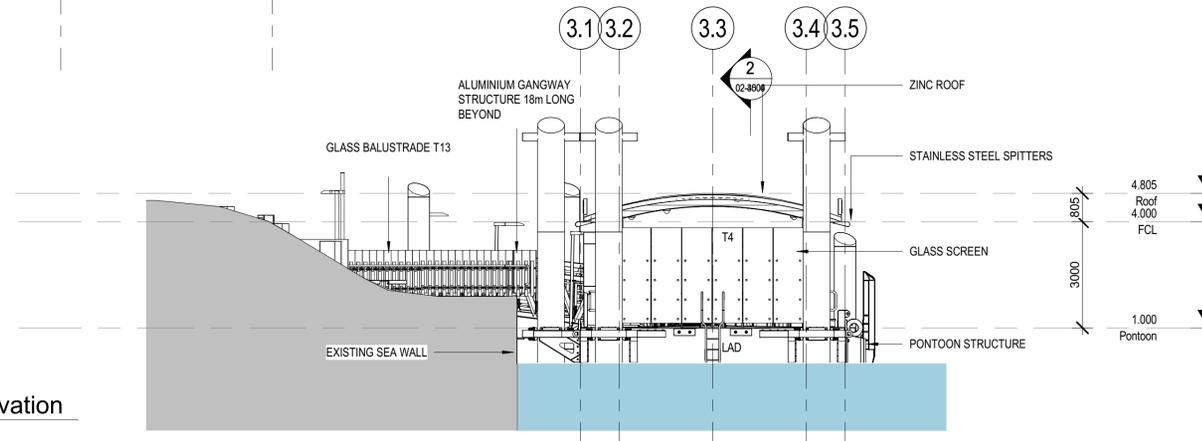
--- EXTENT OF DEMOLITION

ISSUE	REVISION DESCRIPTION	DATE	APD
1	CDR Issue	07.09.2017	
2	Site Plan Revised (27x7.5)	06.12.17	
3	Coordination Issue	14.02.18	
4	90% Coordination Issue	19.02.18	

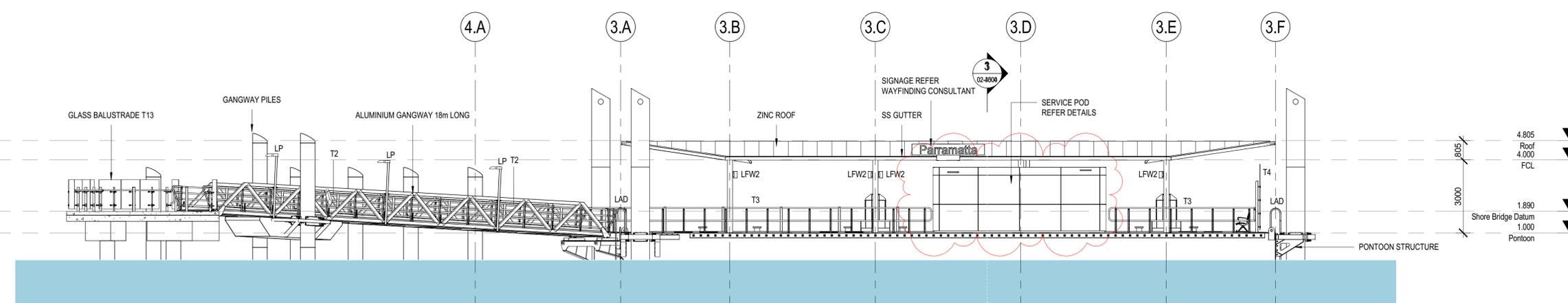


2 North Elevation
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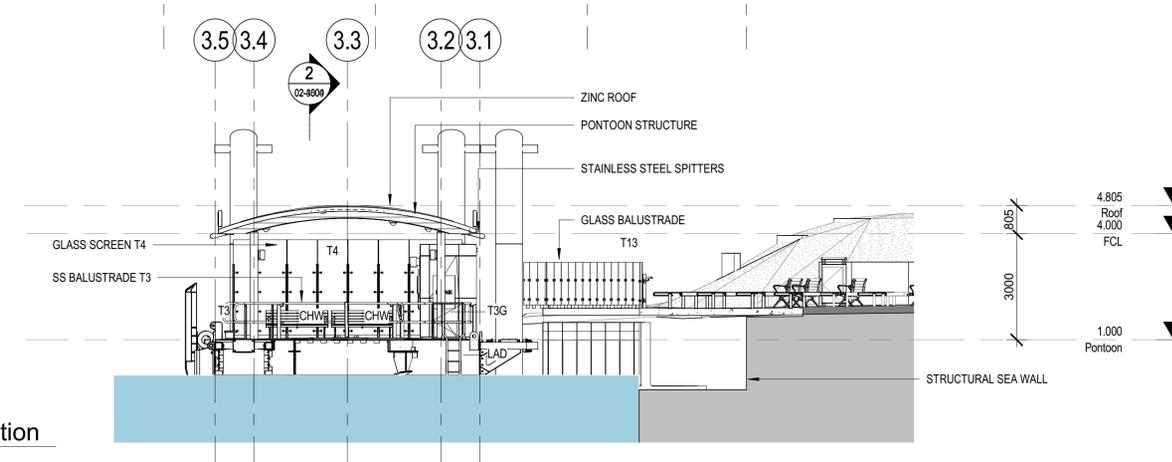
Legend - Keynote	
CHW	CHAIR, WAITING - REFER SCHEDULE
LAD	LADDER
LFW2	LIGHT FITTING, WALL/POST TYPE 2 - REFER ELECTRICAL
LP	LIGHT POST - REFER STRUCTURAL & ELECTRICAL DWGS
T2	BALUSTRADE TYPE 2 - REFER DETAILS
T3	BALUSTRADE TYPE 3 - REFER DETAILS
T3G	BALUSTRADE TYPE 3 GATE - REFER DETAILS
T4	BALUSTRADE TYPE 4 - REFER DETAILS
T10	BALUSTRADE TYPE 10 - REFER DETAILS
T13	BALUSTRADE TYPE 13 - REFER DETAILS



1 East Elevation
02-0101 1:100



3 South Elevation
02-0101 1:100

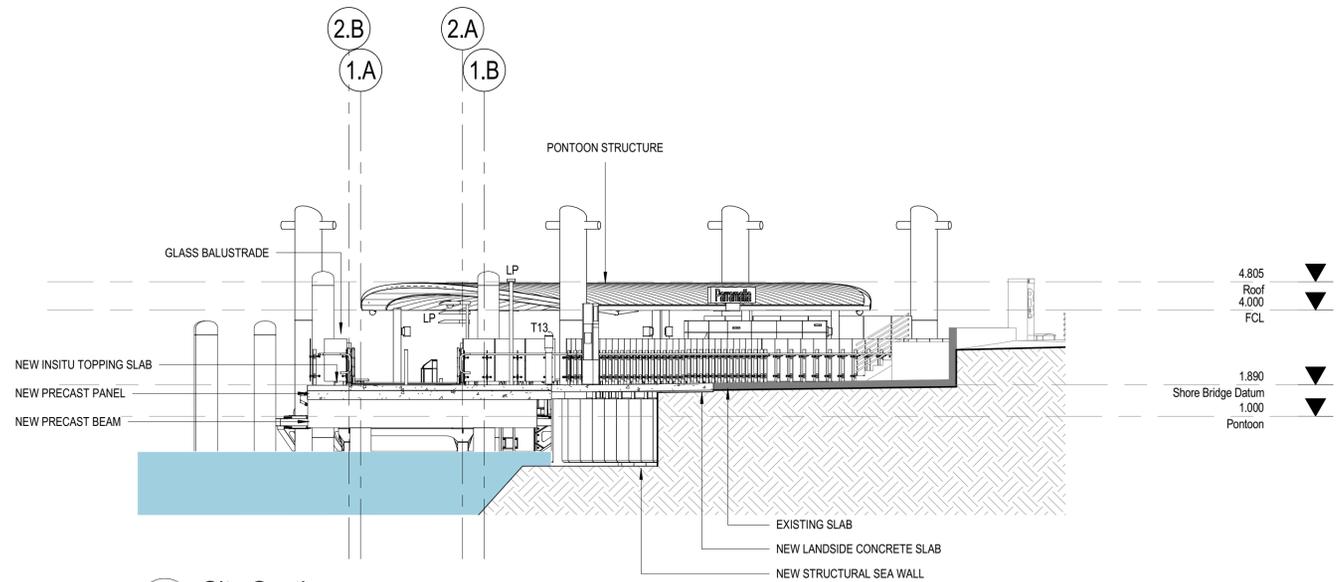


4 West Elevation
02-0101 1:100

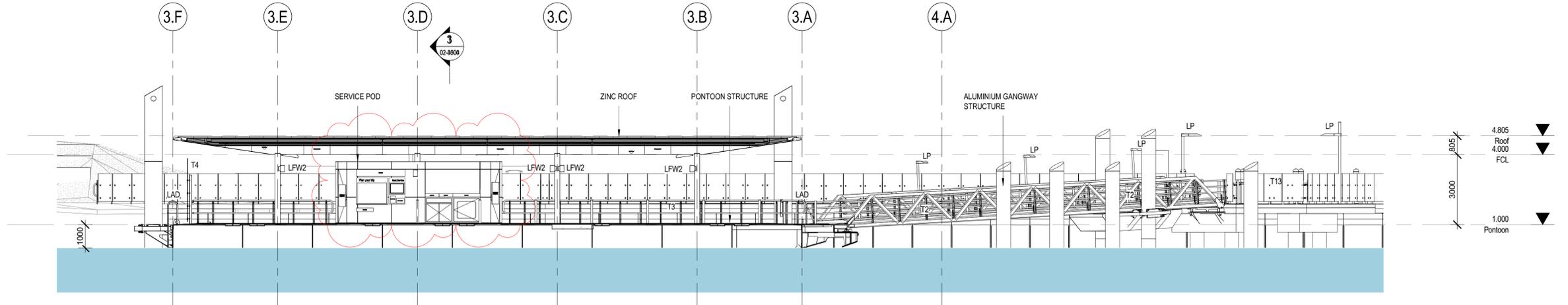
PRELIMINARY



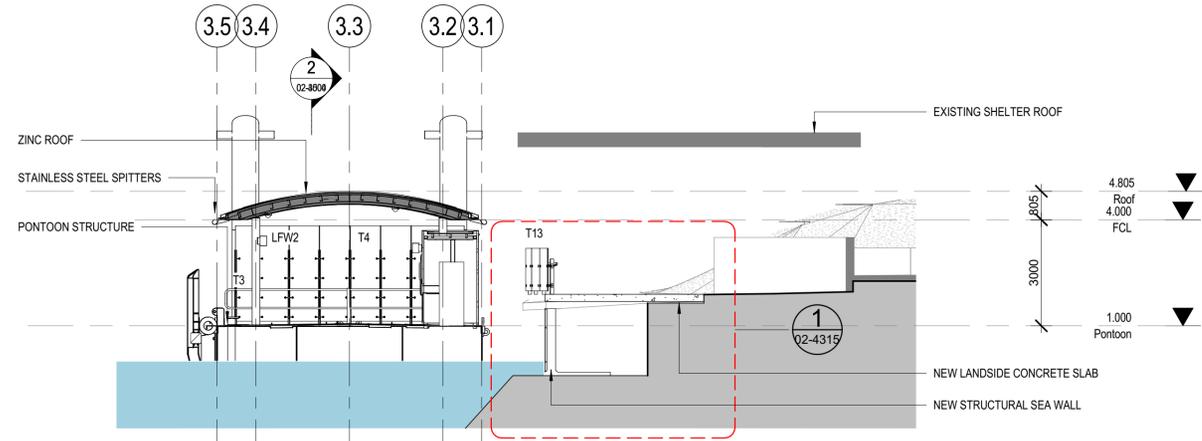
Legend - Keynote	
LAD	LADDER
LFW2	LIGHT FITTING, WALL/POST TYPE 2 - REFER ELECTRICAL
LP	LIGHT POST - REFER STRUCTURAL & ELECTRICAL DWGS
T2	BALUSTRADE TYPE 2 - REFER DETAILS
T3	BALUSTRADE TYPE 3 - REFER DETAILS
T4	BALUSTRADE TYPE 4 - REFER DETAILS
T13	BALUSTRADE TYPE 13 - REFER DETAILS



1 Site Section
02-2100 1:100



2 Long Section
02-2100 1:100



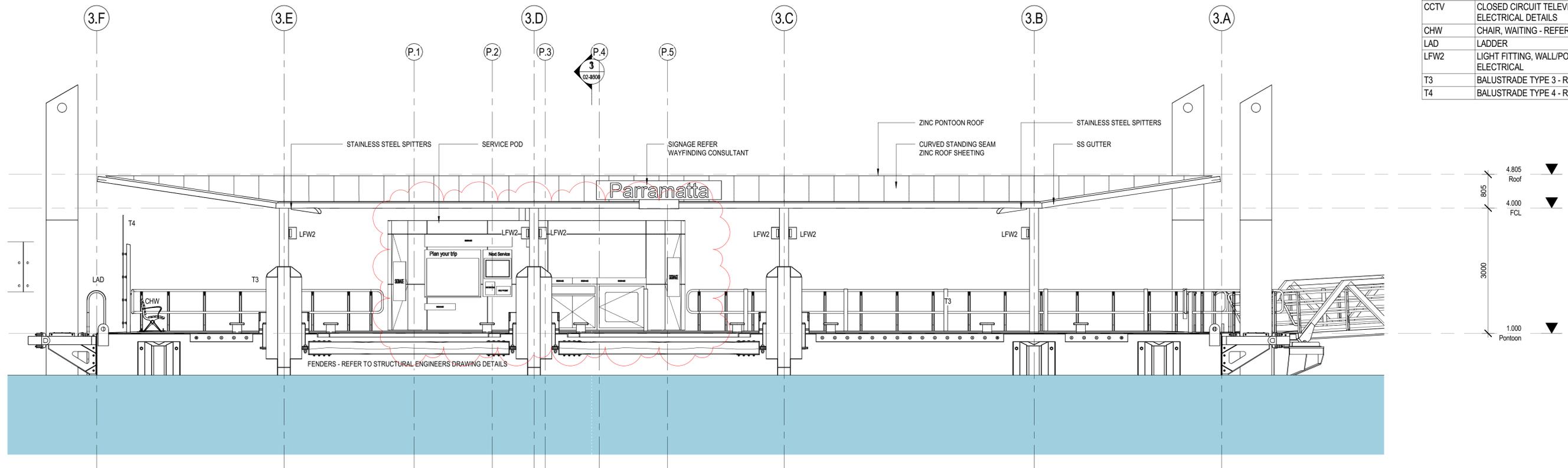
3 Cross Section
02-2100 1:100

PRELIMINARY

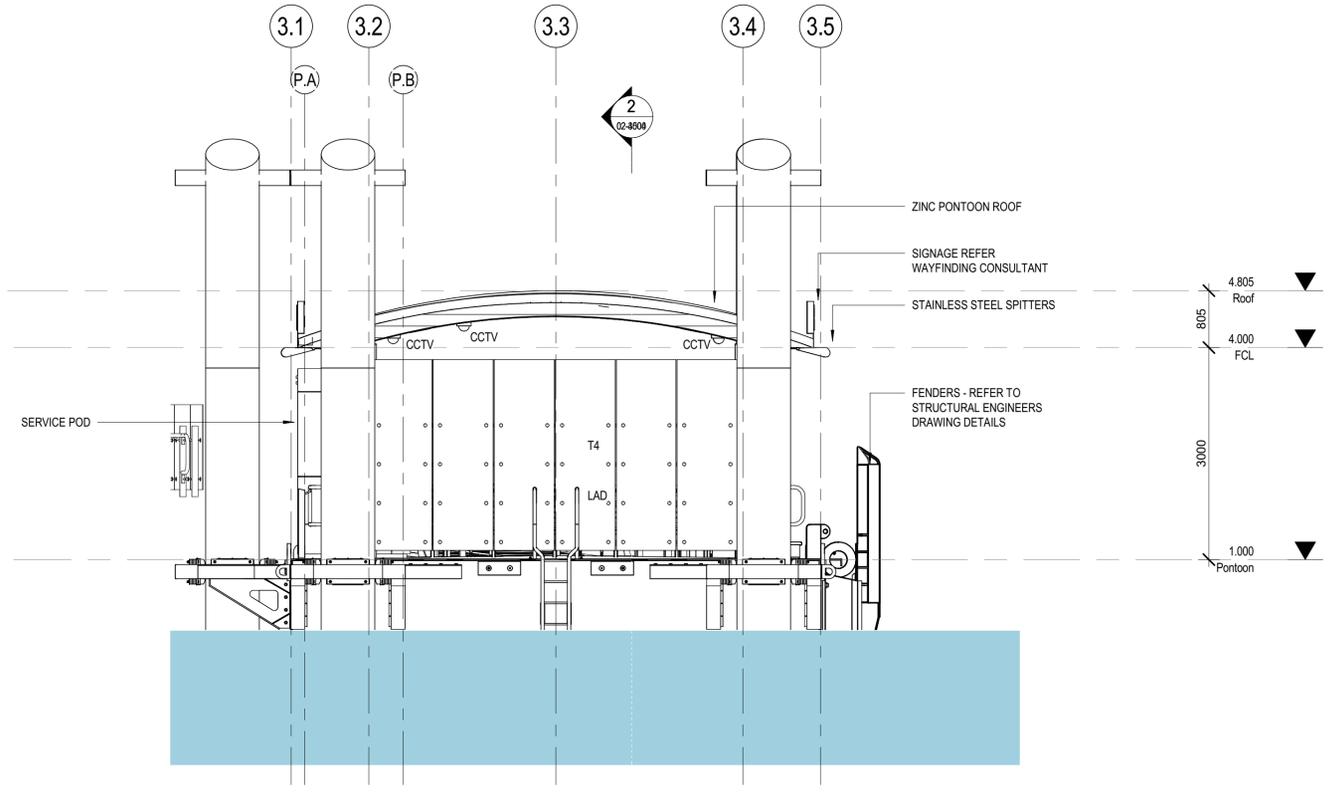


ISSUE	REVISION DESCRIPTION	DATE	APD
1	CDR Issue	07.09.2017	
2	Preliminary Issue	19.01.18	
3	Council Review	30.01.18	
4	Coordination Issue	14.02.18	
5	90% Coordination Issue	19.02.18	
6	Pod and Landside Update	20.03.18	

Legend - Keynote	
CCTV	CLOSED CIRCUIT TELEVISION, REFER ELECTRICAL DETAILS
CHW	CHAIR, WAITING - REFER SCHEDULE
LAD	LADDER
LFW2	LIGHT FITTING, WALL/POST TYPE 2 - REFER ELECTRICAL
T3	BALUSTRADE TYPE 3 - REFER DETAILS
T4	BALUSTRADE TYPE 4 - REFER DETAILS



1 Pontoon North Elevation
02-0101 1:50

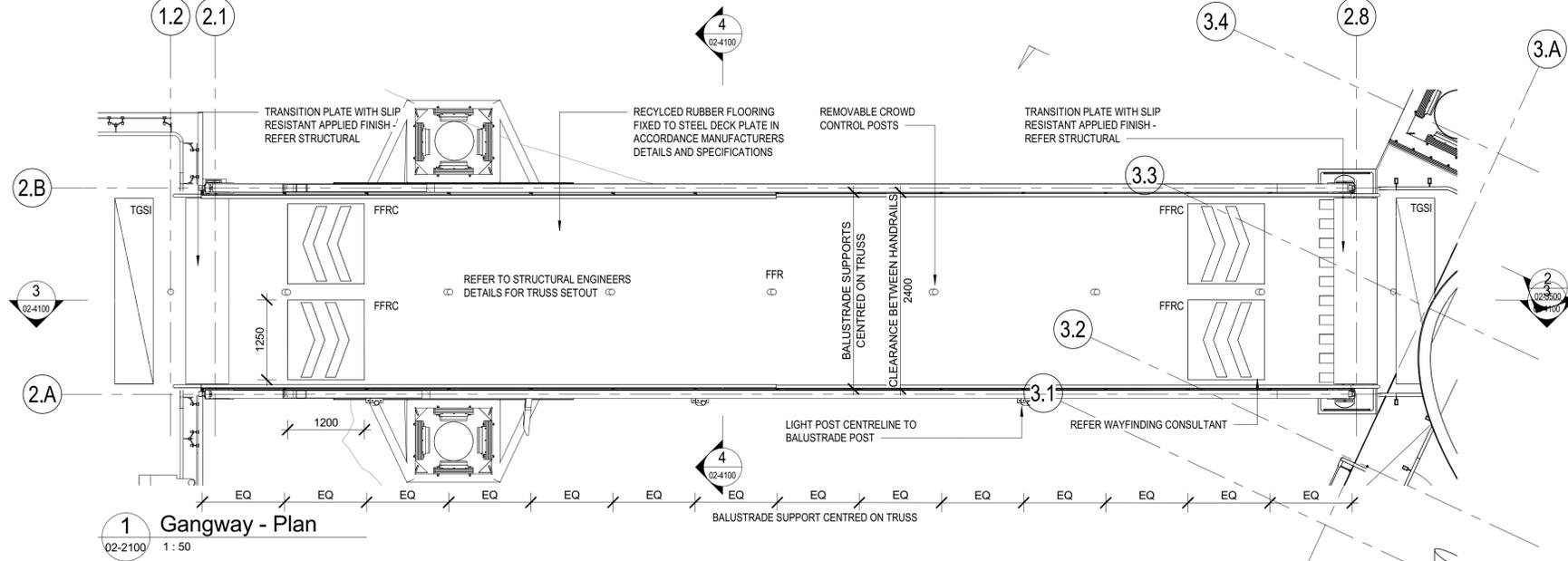


2 Pontoon East Elevation
02-0101 1:50

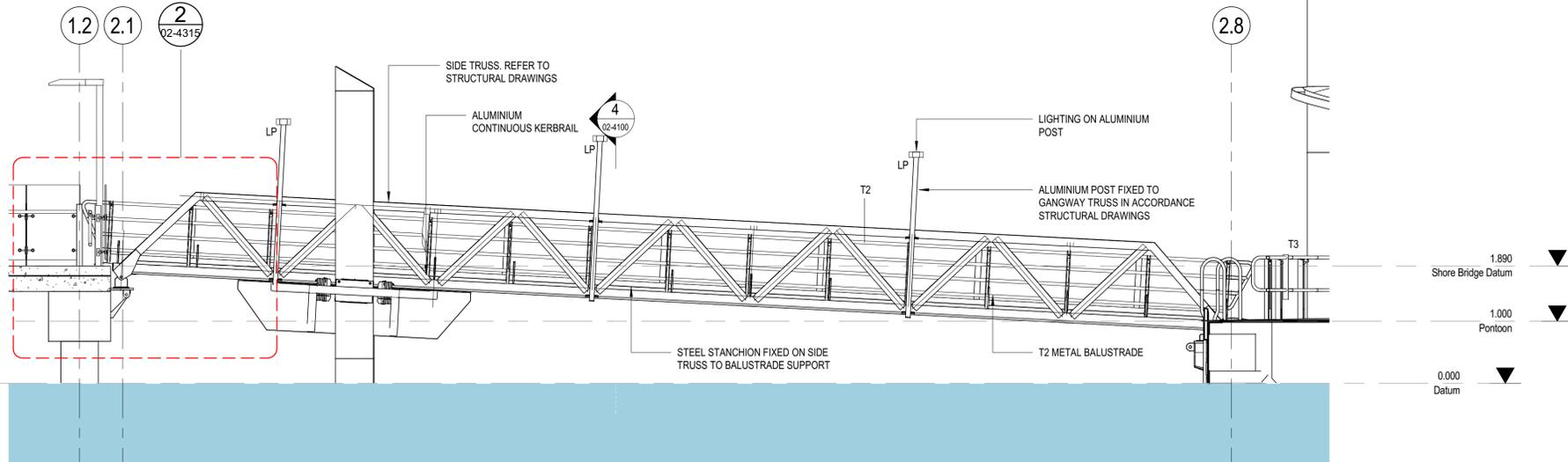
PRELIMINARY



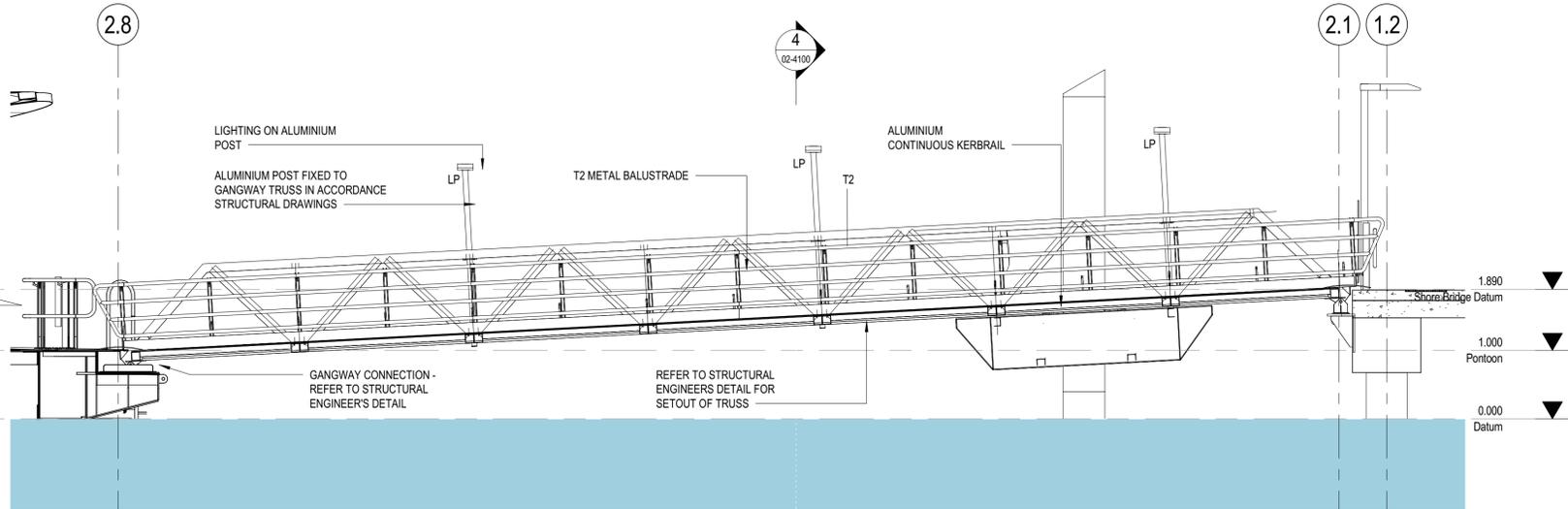
Legend - Keynote	
FFR	FLOOR FINISH, RUBBER
FFRC	FLOOR FINISH, RUBBER, CHEVRON
LP	LIGHT POST - REFER STRUCTURAL & ELECTRICAL DWGS
T2	BALUSTRADE TYPE 2 - REFER DETAILS
T3	BALUSTRADE TYPE 3 - REFER DETAILS
TGSI	TACTILE GROUND SURFACE INDICATOR - REFER SCHEDULE



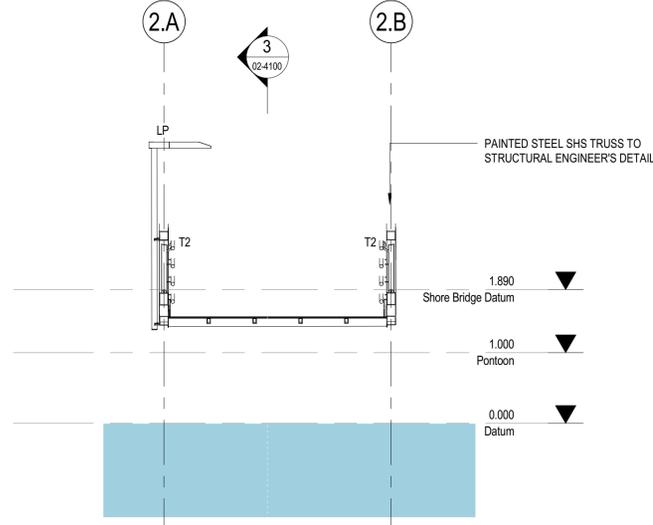
1 Gangway - Plan
02-2100 1:50



2 Gangway - Elevation
02-0101 1:50



3 Gangway - Long Section
02-4100 1:50



4 Gangway - Cross Section
02-2100 1:50

PRELIMINARY

Appendix B

Consideration of clause 228(2) factors

Consideration of matters of national environmental significance

Clause 228(2) checklist

In addition to the requirements of the *Is an EIS required?* (DUAP 1995/1996) guideline and the *Marinas and Related Facilities EIS Guideline* (DUAP 1996) as detailed in the REF, the following factors, listed in Clause 228(2) of the Environmental Planning and Assessment Regulation 2000, have also been considered to assess the likely impacts of the proposal on the natural and built environment.

a. Any environmental impact on a community?

Impact	Level of impact
<p>During construction of the proposal, the following impacts are anticipated:</p> <ul style="list-style-type: none"> Impact from construction related noise to surrounding receivers. Impacts to traffic and transport due to temporary closure of the wharf. <p>Operation of the wharf would have improved public transport facilities at Parramatta.</p> <p>Impacts would be minimised through implementing the safeguards and management measures identified in section 7.1 of the REF</p>	<p>High, short-term negative impact.</p> <p>Moderate, short-term negative impact.</p> <p>Long-term, positive impact.</p>

b. Any transformation of a locality?

Impact	Level of impact
<p>The proposal would have a low to moderate impact to visual and landscape character.</p> <p>Impacts have been reduced through design of the wharf, including retention of the wharf in its location.</p>	<p>Minor to moderate, long-term negative impact.</p>

c. Any environmental impact on the ecosystems of the locality?

Impact	Level of impact
<p>The assessment of aquatic ecology indicates there would be a minor impact to marine biodiversity during construction.</p> <p>This would be offset by hard-substratum habitat generated by the installation of piles.</p> <p>Further impact to aquatic ecology would be mitigated through implementing the safeguards and management measures identified in section 7.1 of the REF.</p>	<p>Moderate, short-term negative impact.</p>

d. Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?

Impact	Level of impact
There would be temporary aesthetic impacts during construction of the proposal.	Moderate, short-term impact.
Landscape character and visual impacts have been assessed as low to moderate. Impacts have been reduced through design of the wharf, including retention of the wharf in its location.	Minor to moderate, long-term impact.
Impacts to environmental quality and value have been assessed as low to moderate, and would be limited to short-term impacts during construction of the proposal. No long-term impacts to environmental quality and value are anticipated.	Minor to moderate, short-term impact.

e. Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations?

Impact	Level of impact
No non-Aboriginal heritage items would be impacted by the proposal.	No impact.
It is not anticipated that listed Aboriginal sites would be impacted by the proposal.	

f. Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act 1974*)?

Impact	Level of impact
The results of the biodiversity assessment in section 6.3 indicate there would be no impacts to any habitat of protected fauna as a result of the proposal.	No impact.

g. Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?

Impact	Level of impact
The proposal would not endanger any species of animal, plant or other form of life, whether living on land, in water or in the air.	No impact.

h. Any long-term effects on the environment?

Impact	Level of impact
The proposal would not result in any long-term negative effects on the environment.	No impact.
The proposal would result in improvements in user amenity for the wharf.	Long-term, positive impact.

i. Any degradation of the quality of the environment?

Impact	Level of impact
<p>The proposal would result in localised sediment disturbance during piling activities and seawall modification works, which would result in temporary impacts to water quality.</p>	<p>Minor, short-term negative impact.</p>
<p>There is potential for accidental spills / leaks of fuel, oil or other chemicals to impact water quality during construction.</p>	<p>Minor, short-term negative impact.</p>
<p>Impacts would be minor with implementation of the safeguards and management measures identified in section 7.1 of the REF.</p>	

j. Any risk to the safety of the environment?

Impact	Level of impact
<p>Construction related activities pose potential risks to the safety of the environment through spills / leaks of fuel, oil or other chemicals.</p>	<p>Minor, short-term negative impact.</p>
<p>Impacts would be minor with implementation of the safeguards and management measures identified in section 7.1 of the REF.</p>	

k. Any reduction in the range of beneficial uses of the environment?

Impact	Level of impact
<p>The proposal would not reduce the range of beneficial uses of the environment.</p>	<p>No impact.</p>

l. Any pollution of the environment?

Impact	Level of impact
<p>Construction related activities may result in pollution of the environment through spills / leaks of fuel, oil or other chemicals.</p>	<p>Minor, short-term negative impact.</p>
<p>Impacts would be minor with implementation of the safeguards and management measures identified in section 7.1 of the REF.</p>	

m. Any environmental problems associated with the disposal of waste?

Impact	Level of impact
<p>All wastes generated by the proposal would be disposed of at an off-site facility which is licenced to receive such waste.</p>	<p>Minor, short-term negative impact.</p>
<p>There would be no significant environmental problems associated with waste disposal.</p>	

n. Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply?

Impact	Level of impact
All resources required by the proposal are readily available and are not likely to become in short supply.	No impact.

o. Any cumulative environmental effect with other existing or likely future activities?

Impact	Level of impact
Assessment of cumulative impacts for the proposal is provided in section 6.12. No significant cumulative impacts have been identified for the proposal. The proposal design includes an allowance for sea level rise.	No impact.

p. Any impact on coastal processes and coastal hazards, including those under projected climate change conditions?

Impact	Level of impact
Consideration of coastal processes and coastal hazards is detailed in section 6.1. No impacts to these issues are anticipated for the proposal.	No impact.

Matters of national environmental significance

Under the environmental assessment provisions of the *Environment Protection and Biodiversity Conservation Act 1999*, the following matters of national environmental significance and impacts on Commonwealth land are required to be considered to assist in determining whether the proposal should be referred to the Australian Government Department of the Environment.

a. Any impact on a World Heritage property?

Impact	Level of impact
There would be no impact on World Heritage property.	No impact.

b. Any impact on a National Heritage place?

Impact	Level of impact
There would be no impact on National Heritage place	No impact.

c. Any impact on a wetland of international importance?

Impact	Level of impact
There would be no impact on wetlands of international importance	No impact.

d. Any impact on a listed threatened species or ecological communities?

Impact	Level of impact
There would be no impact on listed threatened species or ecological communities	No impact.

e. Any impacts on listed migratory species?

Impact	Level of impact
There would be no impact on listed migratory species.	No impact.

f. Any impact on a Commonwealth marine area?

Impact	Level of impact
There would be no impact on Commonwealth marine area.	No impact.

g. Does the proposal involve a nuclear action (including uranium mining)?

Impact	Level of impact
The proposal does not involve a nuclear action.	No impact.

Additionally, any impact (direct or indirect) on Commonwealth land?

Impact	Level of impact
There would be no impact (direct or indirect) on Commonwealth land.	No impact.

Appendix C

Statutory consultation checklists and published community updates

ISEPP consultation

Council related infrastructure or services

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
Stormwater	Are the works likely to have a <i>substantial</i> impact on the stormwater management services which are provided by council?	No	–	ISEPP cl.13(1)(a)
Traffic	Are the works likely to generate traffic to an extent that will <i>strain</i> the existing road system in a local government area?	No	–	ISEPP cl.13(1)(b)
Sewerage system	Will the works involve connection to a council owned sewerage system? If so, will this connection have a <i>substantial</i> impact on the capacity of any part of the system?	No	–	ISEPP cl.13(1)(c)
Water usage	Will the works involve connection to a council owned water supply system? If so, will this require the use of a <i>substantial</i> volume of water?	No	–	ISEPP cl.13(1)(d)
Temporary structures	Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a <i>minor or inconsequential</i> disruption to pedestrian or vehicular flow?	Yes	City of Parramatta Council	ISEPP cl.13(1)(e)
Road & footpath excavation	Will the works involve more than <i>minor or inconsequential</i> excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	Yes	City of Parramatta Council	ISEPP cl.13(1)(f)

Local heritage items

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
Local heritage	Is there is a local heritage item (that is not also a State heritage item) or a heritage conservation area in the study area for the works? If yes, does a heritage assessment indicate that the potential impacts to the item/area are more than <i>minor or inconsequential</i> ?	Yes	City of Parramatta Council	ISEPP cl.14

Flood liable land

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
Flood liable land	Are the works located on flood liable land? If so, will the works change flood patterns to more than a <i>minor</i> extent?	Yes	City of Parramatta Council	ISEPP cl. 15

Public authorities other than councils

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
National parks and reserves	Are the works adjacent to a national park or nature reserve, or other area reserved under the <i>National Parks and Wildlife Act 1974</i> ?	No	–	ISEPP cl.16(2)(a)
Marine parks	Are the works adjacent to a declared marine park under the <i>Marine Parks Act 1997</i> ?	No	–	ISEPP cl.16(2)(b)
Aquatic reserves	Are the works adjacent to a declared aquatic reserve under the <i>Fisheries Management Act 1994</i> ?	No	–	ISEPP cl.16(2)(c)
Sydney Harbour foreshore	Are the works in the Sydney Harbour Foreshore Area as defined by the <i>Sydney Harbour Foreshore Authority Act 1998</i> ?	Yes	Department of Planning and Environment	ISEPP cl.16(2)(d)
Bush fire prone land	Are the works for the purpose of residential development, an educational establishment, a health services facility, a correctional centre or group home in bush fire prone land?	No	–	ISEPP cl.16(2)(f)

Sydney Harbour SREP consultation

Issue	Potential impact	Yes / No	If 'yes' consult with	SREP clause
Provision of services	Do the works require the provision of services (including water, sewerage or stormwater systems)?	No	–	SREP cl.31(2)(a)(ii)
Advertising	Do the works include advertisements or advertising structures?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Aviation	Do the works include aviation facilities?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Boat launching	Do the works include boat launching facilities?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Boat lifts	Do the works include boat lifts?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Boat repair	Do the works include boat repair facilities?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Boat sheds	Do the works include a boat shed or sheds?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Charter and tourism boating facilities	Do the works include charter and tourism boating facilities?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Marinas	Do the works include a commercial or private marina?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Commercial port facilities	Do the works include commercial port facilities?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Commercial or retail use of land	Do the works include the commercial or retail use of land below or partly below mean high water mark?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Dredging	Do the works involve any dredging?	Yes	NSW DPI Fisheries	SREP cl.31(2)(a)(i) & Schedule 2
Flora and fauna enclosures	Do the works include any flora and/or fauna enclosures?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Houseboats	Do the works include a houseboat or houseboats?	No	–	SREP cl.31(2)(a)(i) & Schedule 2

Issue	Potential impact	Yes / No	If 'yes' consult with	SREP clause
Inclinators	Do the works include an inclinators?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Private landing facilities	Do the works include private landing facilities (including jetties, wharves and pontoons)?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Public boardwalks	Do the works include a public boardwalk?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Public water recreational facilities	Do the works include any public water recreational facilities?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Public water transport facilities	Do the works include public water transport facilities?	Yes	Foreshores and Waterways Development Advisory Committee	SREP cl.31(2)(a)(i) & Schedule 2
Reclamation works	Do the works require any reclamation?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Recreational or club facilities	Do the works include any recreational or club facilities?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Residential	Do the works include any residential use of land below or partly below mean high water mark?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Retaining walls	Do the works include retaining walls?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Seawalls	Do the works include sea walls?	Yes	Foreshores and Waterways Development Advisory Committee	SREP cl.31(2)(a)(i) & Schedule 2
Skids	Do the works include skids (ie an inclined ramp used for the manual launching of small craft but not including a slipway)?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Swimming enclosures	Do the works include a swimming enclosure?	No	–	SREP cl.31(2)(a)(i) & Schedule 2

Issue	Potential impact	Yes / No	If 'yes' consult with	SREP clause
Water based restaurants and entertainment facilities	Do the works include water-based restaurants and/or entertainment facilities? (ie a vessel or structure that floats on, or is fixed in, the waterway, that is used as a club or restaurant or for entertainment (on a commercial basis) and that has a direct structural connection between the foreshore and the waterway).	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Stairs	Do the works include waterfront access stairs?	No	–	SREP cl.31(2)(a)(i) & Schedule 2
Demolition	Do the works include demolition – including demolition in relation to heritage items?	Yes	Foreshores and Waterways Development Advisory Committee	SREP cl.31(2)(a)(i) & Schedule 2

Appendix D

Aquatic ecology assessment



Parramatta Wharf Upgrade

Aquatic Ecology Assessment

Prepared for
Hansen Yuncken Pty Ltd

23 April 2018



DOCUMENT TRACKING

Item	Detail
Project Name	Parramatta Wharf Upgrade - Aquatic Ecology Assessment
Project Number	15WOL-1718
Project Manager	Ian Dixon 02 4201 2208 Suite 204, Level 2, 62 Moore Street, Austinmer NSW 2515
Prepared by	Emily Messer
Reviewed by	Ian Dixon
Approved by	Ian Dixon
Status	FINAL
Version Control	1 – Draft for comment 2 – Addresses WSP comments 3 – Addresses RMS comments 4 – Minor spatial edits
Last saved on	23 April 2018
Cover photo	Parramatta Wharf. Photo Ian Dixon, July 2017

This report should be cited as ‘Eco Logical Australia 2018 *Parramatta Wharf Upgrade - Aquatic Ecology Assessment*. Prepared for Hansen Yuncken.’

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from Hansen Yuncken and WSP.

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Abbreviations

Abbreviation	Description
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
CM Act	NSW <i>Coastal Management Act 2016</i>
DDA	Disability Discrimination Act
DPI	NSW Department of Primary Industries
ELA	Eco Logical Australia Pty Ltd
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
FM Act	NSW <i>Fisheries Management Act 1994</i>
KFH	Key fish habitat
WM Act	NSW <i>Water Management Act 2000</i>

Executive summary

The New South Wales Government has proposed to upgrade the Parramatta Wharf to improve passenger access and amenity, and accommodate expected increases in demand. NSW Roads and Maritime Services has engaged Hansen Yuncken Pty Ltd to prepare detailed construction design and an associated Review of Environmental Factors (REF). Eco Logical Australia Pty Ltd has prepared this Aquatic Ecology Assessment as a technical appendix to the REF.

The aim of this aquatic assessment is to understand the biota and habitat occurring near the proposed work. With this understanding, we assessed the significance of impacts to threatened species, communities and populations as a result of the proposed wharf upgrade, as defined in Section 5A of the NSW *Environmental Planning and Assessment Act 1979*. We also reviewed development plans to determine if a permit to *Harm Marine Vegetation* is required under s.205 of the NSW *Fisheries Management Act 1994*.

The proposed wharf upgrade (the proposal) includes:

- Installation of a concrete platform supported by four piles
- Installation of a 3 m wide by 18 m long gangway
- Installation of a 7.5 m wide by 27 m long floating covered and glazed pontoon, held in place by four new piles
- Installation of five new protection piles
- Removal and modification of an existing seawall
- Removal of existing structures and piles
- Minor reprofiling of the riverbed to provide sufficient depth for the pontoon at low tide, requiring up to 200 mm of sediment to be moved immediately downstream.

A desktop search using online databases was conducted prior to the field survey to compile a list of likely threatened species, communities and populations present in Sydney Harbour and Parramatta River, plus a 10 km buffer from shore. These were further assessed for the immediate area surrounding the wharf. An underwater survey was completed within at least 20 m of the proposed works.

The proposal would directly and indirectly impact a small area of intertidal seawall and subtidal compacted sediment classed as type 3 key fish habitat by DPI Fisheries' Policy and Guidelines for Fish Conservation and Management (2013 update). Direct impact would result from dredging and installation of piles on unvegetated sediment, and indirect impact would occur as a result of shading from the wharf structure. As no marine vegetation is present both direct and indirect impacts would be minor.

The proposal would not harm marine vegetation, but requires dredging to realign the seawall and provide sufficient depth for the pontoon, therefore, consultation with the Minister for Primary Industries under Section 199 of the FM Act is required. No other permits under Part 7 of the FM Act would be required. There would be no impact to type 1 or type 2 KFH. A maximum impact to 359 m² of type 3 KFH would be compensated by the creation of 324 m² of mostly hard substrate (type 3 KFH). Overall, there would be a small 'net loss' of type 3 KFH. In accordance with the Roads and Maritime's Biodiversity Offset Guideline, offsetting is only required where a proposal causes a net loss of type 1 or type 2 KFH, therefore, no further offsets are required. There would be no significant impacts to threatened species, populations or ecological communities or their habitat, as these are unlikely to depend on or use the site.

Recommendations to mitigate impact to broader habitats have been outlined in this report, including suggestions to mitigate pollution, contamination and unnecessary disturbance during construction. Other measures include establishing no-go zones around nearby mangroves and providing fish passage during construction.

1 Introduction

The New South Wales (NSW) Government is progressively upgrading ferry wharves across Sydney to improve ferry services for customers. The wharf upgrades are being delivered as part of the NSW Governments' Transport Access Program – an initiative to deliver modern, safe and accessible transport infrastructure. The proposed upgrade of Parramatta Wharf aims to improve passenger access for less mobile and disabled passengers and allow ferry services to meet expected future demand.

NSW Roads and Maritime Services (Roads and Maritime) has engaged Hansen Yuncken Pty Ltd to prepare detailed construction design and an associated review of environmental factors (REF, prepared by WSP). Eco Logical Australia (ELA) Pty Ltd has prepared this Aquatic Ecology Assessment as a technical appendix to the REF.

The aim of the Aquatic Ecology Assessment is to increase knowledge of the biota and habitats occurring near the proposed work. With this understanding, we determine if any significant impact would occur to threatened species, communities or populations from the proposed development as defined in Section 5A of the NSW *Environmental Planning and Assessment Act 1979*; and if a permit to *Harm Marine Vegetation* is required under s.205 of the NSW *Fisheries Management Act 1994* (FM Act). The following tasks were undertaken to address these aims:

- A desktop review of existing literature and site data to confirm the presence of known and likely species and habitats in a given study area
- Aquatic survey during optimum conditions (calm wind and best water clarity)
- Mapping, photography and the identification of aquatic flora and key fish habitat (eg seagrasses, mangroves, saltmarsh, macroalgae beds)
- Assessment of the density and condition of aquatic flora and key fish habitat, including verification of any threatened or protected species, populations or ecological communities, pest species or presence of 'critical habitat' that may occur locally in the marine environment
- Provide recommendations to mitigate impact and assist management of construction and operational outcomes.

This assessment acts as a standalone report for review by the NSW Department of Primary Industries (DPI) Fisheries. Consideration has been given to their Policy and Guidelines for Fish Habitat Conservation and Management (2013 update, Fairfull 2013).

1.1 The Parramatta Wharf proposal

Roads and Maritime proposes to upgrade the existing wharf interchange at Parramatta (the proposal). The proposal includes both land and waterside upgrades of the wharf interchange (**Figure 1** and **Figure 2**).

The waterside features of the proposal would include:

- Removal of the existing gangway, pontoon and associated wharf structures, including existing piles and gangway
- Installation of a new 3 m wide by 18 m long gangway
- Installation of a 7.5 m wide by 27 m long floating covered and glazed pontoon, held in position by four new piles
- Minor excavation to provide sufficient depth for the new pontoon
- Installation of five new protection piles.

The landside features of the proposal would include:

- Modification of the existing seawall to accommodate the new pontoon, permanently removing 30 square metres and replacing 70 linear metres of the existing gabion construction with a contiguous pre-cast concrete solution
- Removal of existing Roads and Maritime communications equipment and signage under the existing shelter
- Removal of an existing raised stormwater drain within the shelter
- Installation of new wayfinding signage around the interchange, in accordance with the Transport for NSW Wayfinding Kit of Parts (KOP).

Construction is expected to start in mid-2018 and take about six months to complete. Additional construction details are provided in **Section 5**.

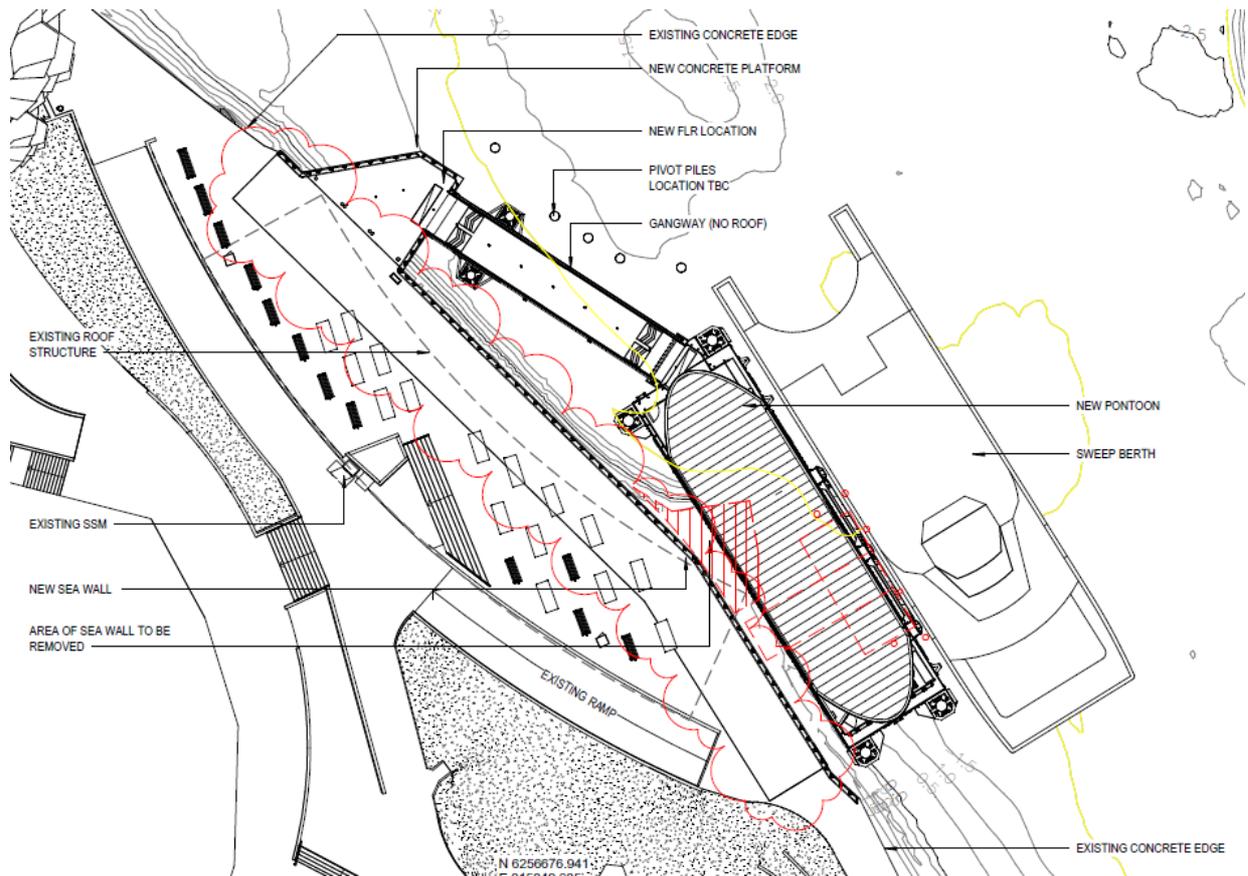


Figure 1: Proposed Parramatta Wharf design (Drawing AR-02-1000, Revision 4)



Figure 2: 3D representation for Parramatta Wharf (Drawing AR-02-0000, Revision 1)

Source: Hansen Yuncken

2 Legislative context

2.1 Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

Under the EPBC Act, the Commonwealth Environment Minister needs to approve any development that is likely to have a significant impact on Matters of National Environmental Significance (MNES). Should such an impact, as defined in the EPBC Act Policy Statement 1.1 – Significant Impact Guidelines (DEWHA 2009), be likely, the preparation and submission of a Referral is required. MNES relevant to this study includes threatened ecological communities, flora and fauna species and migratory species that are listed under the Act. The proposed work would not cause a significant impact, and therefore a Referral would not be required.

2.2 NSW Environmental Planning and Assessment Act 1979 (EP&A Act)

All developments in NSW are assessed in accordance with the provisions of the EP&A Act and the EP&A Regulation. The EP&A Act provides a system for environmental planning and assessment, including approvals and environmental impact assessment requirements for proposed developments. Implementation of the EP&A Act is the responsibility of the Minister for Planning, statutory authorities and local councils.

2.3 NSW Biodiversity Conservation Act 2016 (BC Act)

Under the BC Act, an assessment of significance must be completed to determine the significance of impacts to threatened species, populations and/or communities or their habitat. There are unlikely to be any threatened species, populations or communities within the study area, therefore, no impact is expected and an assessment of significance has not been triggered. As no native terrestrial vegetation would be cleared or harmed, and the site is not located within the 'Biodiversity Value Map', the proposal does not trigger a test of significance or require further assessment under The Biodiversity Assessment Method.

2.4 NSW Fisheries Management Act 1994 (FM Act)

The FM Act is the principal piece of legislation protecting aquatic habitat in NSW. The act aims to conserve fish stocks, key fish habitat, aquatic vegetation, and threatened species, populations and communities. Threatened aquatic species, populations and communities are listed under Schedules 4, 4A and 5 of the FM Act, while key threatening processes are listed under Schedule 6. As a public authority, Roads and Maritime must give the Minister written notice of the proposed work under Section 199 if they occur in areas mapped as key fish habitat (KFH) and have:

- a direct or indirect impact to marine vegetation
- require dredging or excavation of the bed or bank
- block fish passage
- involve land reclamation.

The area around Parramatta Wharf is mapped as KFH and the work requires dredging of the bed and excavation of the bank, therefore, s.199 consultation is required. There would be no impact to marine vegetation, so a permit to *Harm Marine Vegetation* under Part 7 of the FM Act is not required.

There are unlikely to be any threatened species, populations or communities listed under the FM Act that use the site, or depend on it for habitat. Therefore, no impact is expected as a result of the proposal and an assessment of significance is not required.

2.5 NSW Water Management Act 2000 (WM Act)

The WM Act aims to provide for the sustainable and integrated management of water sources for NSW. The Act requires developments on waterfront land to be ecologically sustainable, and recognises the benefits of aquatic ecosystems to agriculture, fisheries and recreation.

Approvals under Section 91 are required for controlled activities on waterfront land. Under the WM Act, a controlled activity means:

- (a) *the erection of a building or the carrying out of a work (within the meaning of the Environmental Planning and Assessment Act 1979),*
- (b) *the removal of material (whether or not extractive material) or vegetation from land, whether by way of excavation or otherwise,*
- (c) *the deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise, or*
- (d) *the carrying out of any other activity that affects the quantity or flow of water in a water source.*

Section 91E(1) of the WM Act identifies that it is an offence to carry out a controlled activity in, on or under waterfront land without gaining a controlled activity approval. However, under Clause 38 of the *Water Management (General) Regulation 2011* public authorities are exempt from Section 91E(1) of the WM Act, and therefore do not require any approvals for controlled activities on waterfront land.

2.6 Sydney Regional Environmental Plan (SREP, Sydney Harbour Catchment) 2005

The proposal is located within the Sydney Harbour Catchment and is subject to the SREP (Sydney Harbour Catchment) 2005. The SREP lists matters that Roads and Maritime is to consider before carrying out any activity determined under Part 5 of the EP&A Act. The relevant clause to this aquatic ecology assessment is Clause 21: biodiversity, ecology and environment protection.

2.7 NSW Coastal Management Act 2016 (CM Act) and State Environmental Planning Policy (Coastal Management) 2018 (Coastal Management SEPP)

The CM Act came into effect 3 April 2018, replacing the *Coastal Protection Act 1979*. The objects of this Act are to manage the coastal environment of NSW in a manner consistent with the principles of ecologically sustainable development for the social, cultural and economic well-being of the people of the State. Part 2 of the CM Act identifies objectives related to four coastal management areas of the 'coastal zone':

- Coastal wetlands and littoral rainforests area
- Coastal vulnerability area
- Coastal environment area
- Coastal use area.

Parramatta Wharf falls under the 'coastal environment area' and 'coastal use area'. However, under s.21(2b) of the Coastal Management SEPP, development under Part 5 of the EP&A Act will continue to be assessed under the former provisions if the environmental impact assessment commenced prior to

the commencement of the Policy (3 April 2018) and approval for the development will be granted within 12 months after that commencement. Provided the project is undertaken within the timeframes stated in the Transitional clause (21.2b), the Coastal Management SEPP is not applicable to the project. Previous SEPPs (14, 26 and 71) do not apply to the study area.

3 Methods

3.1 Desktop assessment

Online database searches were used to compile known or expected species in the region prior to the field survey. Species habitat requirements were then used to infer what was likely to be present in the study area. The desktop search covered Port Jackson (Sydney Harbour including tidal areas of Parramatta River and Lane Cove River) plus a 10 km buffer. The desktop search grid is about 50 x 30 km using the coordinates:

- Latitude: -33.6974792526866, Longitude: 150.915584274089
- Latitude: -33.6974792526866, Longitude: 151.474105513707
- Latitude: -33.9762150862402, Longitude: 151.474105513707
- Latitude: -33.9762150862402, Longitude: 150.915584274089

Only species known to use estuarine/marine water or intertidal foreshores were considered in this aquatic assessment. Databases accessed include:

- EPBC Act – Protected Matters Search Tool
- BC Act – Threatened Species Search Tool (BioNet)
- FM Act – Listed protected and threatened species and populations, including species profiles, ‘Primefact’ publications and expected distribution maps (Riches et al 2016)
- Online Zoological Collections of Australian Museums (OZCAM) – individual species searches to determine likelihood of occurrence of threatened species.

3.2 Field survey

The site was visited between 9 am and 3 pm on 13 July 2017 by three ELA ecologists, including one senior aquatic ecologist. The survey area covered at least twenty meters from the edge of proposed work, plus farther areas where necessary to validate habitat extent (see extent in **Section 4.2**). Weather conditions were calm and there was minimal swell. Underwater visibility was poor and less than half a meter. The maximum depth was approximately 2.5 meters.

The survey was undertaken by lowering a boat-mounted video camera to the seafloor and around piles. A triple camera setup (Sea-View, Go-Pro and Kaiser Baas brands) angled down, front and left, allowed for live streaming of habitat features to an on-board monitor (colour/infrared). Video was recorded to allow post-field examination of high definition footage. GPS mapping of transects ensured all habitat types were adequately surveyed. Habitat types were mapped in the field using a Getac Windows tablet running ArcPad. Georeferenced high definition footage was later reviewed to check habitat extent and condition. Aquatic flora and key fish habitat mapped in the field were merged into a final map using ArcMap Version 10.2.

4 Aquatic habitats and ecology

4.1 Previous aquatic habitat mapping

Map 1 of the ‘Sydney Harbour – Foreshores and Waterways Area Development Control Plan 2005: Ecological Communities and Landscape Characters’, identifies the study area as ‘Water’, with riparian land mapped as ‘Grassland’ (**Figure 3**).

Sheet 1 of the ‘Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005: Wetlands Protection Area’, does not identify the site as a ‘Wetlands Protection Area’ (**Figure 4**). Clause 61 of the SREP (Sydney Harbour Catchment) 2005 has not been triggered, and further assessment is not required.

The State-wide mapping of estuarine macrophytes (mangroves, saltmarsh and seagrass) by DPI Fisheries identifies the nearest patch of mangroves approximately 150 m downstream from the wharf (Creese et al 2009, **Figure 5**). There are no records of saltmarsh or seagrass within the site and no local records of the threatened *Posidonia* seagrass population.

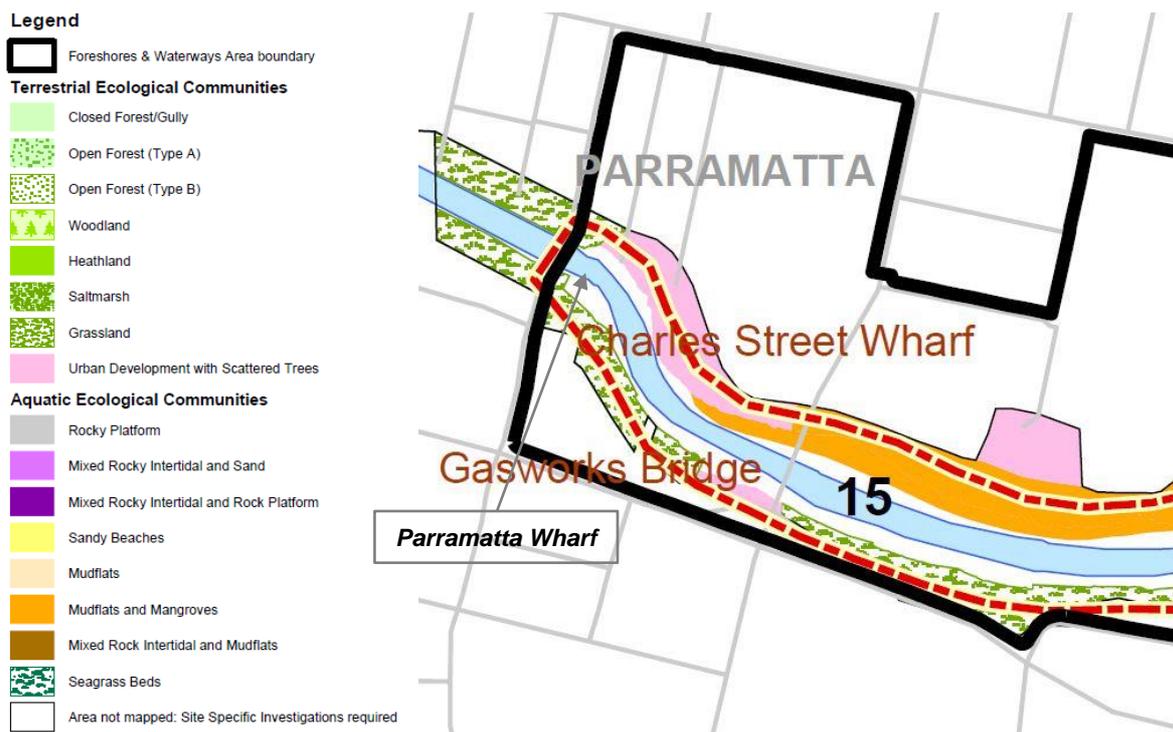


Figure 3: Sydney Harbour – Foreshores and Waterways Area Development Control Plan: Ecological Communities and Landscape Characters (map sheet 1)

Source: <http://www.planning.nsw.gov.au/Policy-and-Legislation/Environment-and-Heritage/Sharing-Sydney-Harbour>

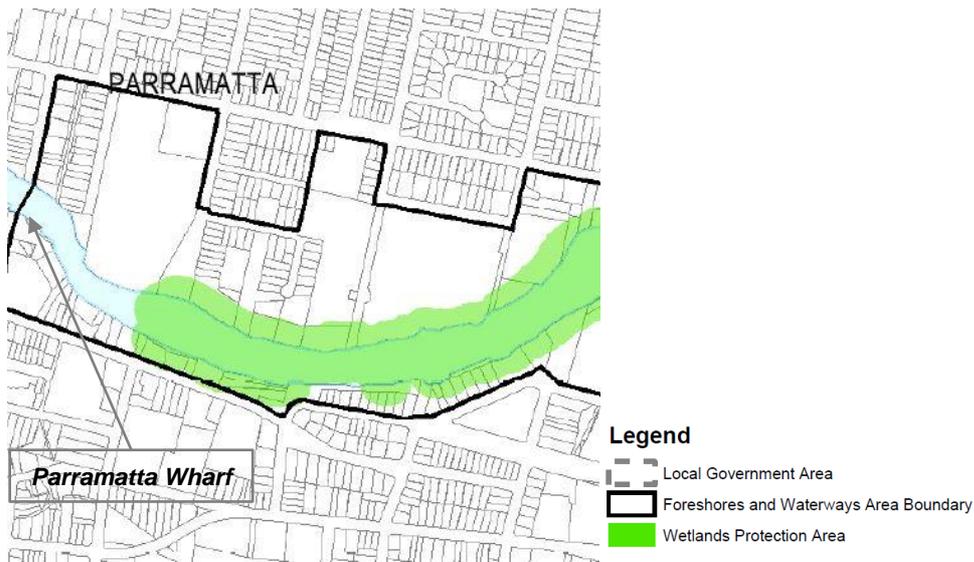


Figure 4: Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005: Wetlands Protection Area (map sheet 1)

Source: <http://www.planning.nsw.gov.au/Policy-and-Legislation/Environment-and-Heritage/Sharing-Sydney-Harbour>



Figure 5: DPI Fisheries mapping of estuarine macrophytes (Creese et al 2009)

Source: <http://www.dpi.nsw.gov.au/content/research/areas/aquatic-ecosystems/estuarine-habitats-maps>. Aerial image SIX Maps.

4.2 Aquatic habitats at Parramatta Wharf

Aquatic habitat in the study area has been modified by land reclamation, a vertical seawall, the existing wharf structure and piles, and disturbance by regular ferry traffic. Four distinct zones were mapped during the field survey (**Figure 6**):

- *Man-made structures (Figure 7)* – The reclaimed foreshore was characterised by a vertical stone (gabion basket) seawall and sloping concrete wall susceptible to regular ferry wash. A large weir and single fish ladder was present upstream. There were no encrusting organisms or macroalgae present on the walls, but some filamentous algae. The existing piles and pontoon had a moderate cover of encrusting organisms, such as filamentous algae and barnacles, but no macroalgae species. No saltmarsh was present due to the seawall blocking intertidal movement.
- *Intertidal rock (Figure 8)* – The intertidal rock platform occurred on the opposite bank. Oysters and small encrusting organisms were present on the rock. Some areas were stabilised by concrete bags.
- *Compact subtidal sediment (water turbidity prevented capture of decent high-definition photographs, so the assessment was from live footage)* – The benthic habitat surrounding the current wharf structure was unvegetated compacted sediment. There was no bioturbation from infauna evident. Water depth was up to 2.5 meters in the survey area.
- *Mangroves (Figure 8)* – *Avicennia marina* (Grey Mangrove) occurred within the study area, downstream and on the opposite bank. These were single trees that appeared healthy, but growing amongst rocky habitat with limited room for expansion.

DPI Fisheries identify three types of key fish habitat (KFH) in their Policy and Guidelines for Fish Habitat Conservation and Management (Fairfull 2013, **Appendix B**). KFH types are mapped on **Figure 6**, comprising:

- Type 1 (highly sensitive key fish habitat) – none present within the study area
- Type 2 (moderately sensitive key fish habitat) – habitat is represented by mangroves
- Type 3 (minimally sensitive key fish habitat) – habitat is represented by unvegetated subtidal sediment, intertidal rock and seawall.

No threatened species, populations or communities were observed in the study area, or are expected to use the site (see **Section 4.4** and likelihood of occurrence assessment in **Appendix A**). Seahorses and their relatives (syngnathiformes) were not observed, and are unlikely to occur this far up the Parramatta River estuary.

4.3 Charles Street Weir fish ladder

As part of their Healthy Waterways program, Parramatta City Council is working to restore native fish populations to the Parramatta River by installing fish ladders. Ladders have been installed in the Charles Street Weir, immediately upstream of Parramatta Wharf, and at two other weirs upstream. A campaign with affiliates Bass Sydney and Addventagous to install a fourth fish ladder at Asylum Weir, aims to open up 19 km of habitat to help native fish move upstream over weirs so they can access breeding and feeding areas (eg Australian Bass).

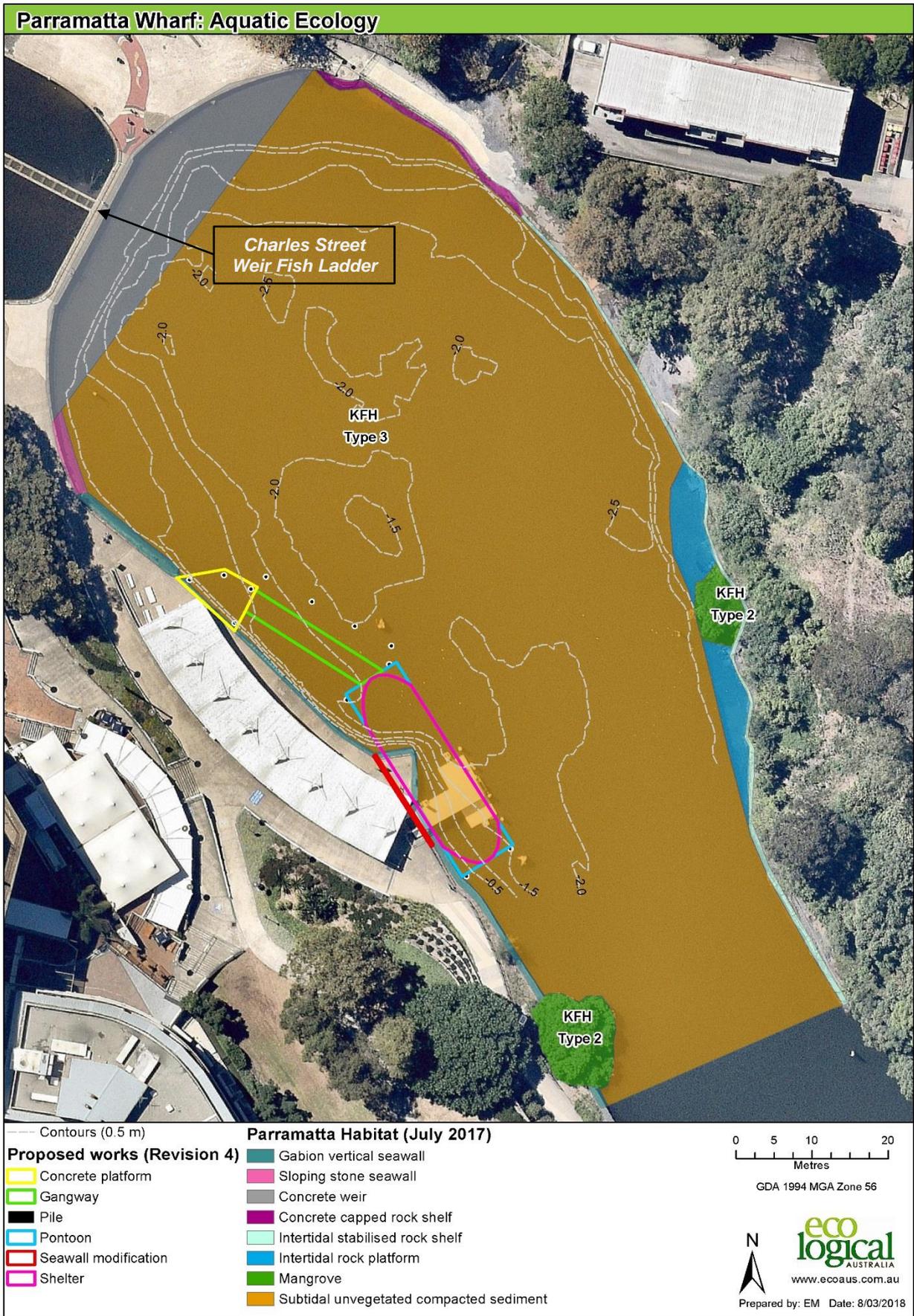


Figure 6: Field validated habitat (July 2017)



Wharf to be replaced



Seawall to be partially modified

Seawall to be modified



Barnacle and algae growth on piles and pontoon

Figure 7: Man-made structures



Mangrove opposite wharf

Intertidal rock platform on opposite bank

Figure 8: Intertidal zone

4.4 Presence or likelihood of threatened and protected species, populations and communities

Threatened species, populations or communities listed under the FM Act, BC Act and EPBC Act that are known or expected to occur in the region are listed in **Appendix A**. Within the study area, there is no valuable or specific habitat capable of supporting threatened aquatic/estuarine species, populations or communities. It is possible, although unlikely, some species may venture into the area given the connectivity to the broader harbour and coastal habitats, but they are unlikely to stay for long periods or depend on habitat within the site for their survival, especially as the weir is effectively a dead-end for marine species. Diadromous species (those moving between salt and fresh water) may use the fish ladder at the weir to pass through (eg Australian Bass).

4.4.1 Fish, sharks and marine vegetation

Protected fauna listed under the FM Act were assessed for their likelihood of occurrence. Listed marine or estuarine species include one shark, six fishes and a taxonomic order of syngnathiformes (seahorses, seadragons, pipefish, pipehorses, ghostpipefish and seamoths). The species assessed included:

- The Herbst's Nurse Shark – only occurs in deep water (150–600 m) and would not be present in the study area.
- Listed fishes – known to occur around offshore rocky reefs which are absent in the study area.
- Estuary Cod – occurs in a range of habitats, from turbid shallow estuarine waters (juveniles) to the base of drop-offs and deeper water (adults). Sydney is the southern extent of Estuary Cod, with no records in the harbour or similar habitats nearby.
- Syngnathiformes – known to occur in the harbour and use a variety of habitats, such as macroalgae attached to wharf/jetty piles, seagrass beds and unvegetated shallows. Since 1980, no records occur upstream of a line between Birchgrove and Greenwich, possibly due to poor water quality, habitat degradation or the freshwater influence from Parramatta and Lane Cove Rivers driving the salinity gradient lower than 17.5 parts per thousand (modelled by Lee et al 2011). Suitable habitat does not occur in the study area and no seahorses were observed, therefore, management of syngnathids is not required.

Threatened fish are unlikely to occur in the study area because there is no suitable habitat. The species identified in our desktop assessment as possibly occurring within the search grid either require freshwater, rocky reefs, caves, rocky overhangs or deep water. None of these habitat features occur around the wharf at Parramatta, so these species would not occur here.

Threatened sharks are unlikely in the area, as their expected distribution does not extend west beyond Rocky Point. Threatened rays are unlikely in the area, and they have not been recorded west of Sydney Harbour Bridge. If rays or sharks were to venture up the Parramatta River it is unlikely they would stay around the wharf for any a prolonged period due to a lack of structural, sheltering or foraging habitat. Regular ferry activity may deter large fauna from regularly using the area.

The threatened seagrass population, *Posidonia australis*, occurs in the harbour and is known to grow on subtidal sand up to 10 m deep. However, there are no records of *P. australis* upstream of Darling Point. This is possibly due to increased sediment and eutrophication reducing the plants photosynthetic capacity.

The threatened ecological community, coastal saltmarsh, was not observed in the study area, due to lack of suitable intertidal grade and soft substrate. The high intertidal zone, where saltmarsh is usually found, is too steep on site and contains large areas of artificial structures, so no plants have established.

Marine vegetation is protected under the FM Act and includes seagrass, mangroves and macroalgae (seaweeds). Seagrass requires soft sediments and adequate light penetration through the water column. In Sydney Harbour, this zone is usually less than three metres deep, however, there is no soft sediment on site, and light penetration is not adequate for growth due to highly turbid water. No seagrass was observed on site. Macroalgae occurs in the harbour along rocky fringes and deeper hard substrate reefs. No macroalgae was present on site, as there was poor light available to submerged hard structures and hard substrate.

Mangroves occur in the harbour in protected bays and tidal waterways with soft intertidal sediment, including the Parramatta River downstream of Charles Street Weir. Individual mangrove trees were observed within the study area (**Figure 6**), but growing in isolated pockets of suitable soft habitat, surrounded by unsuitable hard substrate. These trees are the upstream extent of the larger community in the tidal portion of the river.

4.4.2 Other listed or protected species

Threatened aquatic mammals (whales, dolphins, dugongs and seals) have not been observed, nor are modelled to occur west of Millers Point. It is unlikely aquatic mammals would travel this far up the Parramatta River, considering the poor habitat availability, high turbidity and better habitat in coastal waters. If they did venture up the river, large mammals are unlikely to use habitat this close to shore or stay for a prolonged period. Dugongs are more typical in tropical and subtropical waters and forage on seagrass beds, which are absent at the site. There are no records of dugongs in the harbour, suggesting that if they do venture down the east coast they may prefer more expansive beds such as those in Botany Bay. Seals have not been sighted west of Birchgrove Point and are unlikely to visit the area. It is likely that most aquatic mammals avoid human activities and would be deterred by vessels which frequently berth at the wharf.

Threatened aquatic reptiles (turtles) are more common along coastal waters than in the harbour, or its estuaries. It is possible, although unlikely, they would venture up the Parramatta River, but would not depend on the site for feeding habitat or nesting.

Threatened shore, wetland, migratory and pelagic birds may use intertidal zone to forage but are unlikely to occur in the study area, as they avoid areas with concentrated human activities. Aerial foragers may follow a coastal route, fly over open water or hunt over decomposing wrack. Given the enormous scale of better habitat nearby, the proposal would have a negligible effect on food resources or obstacles to flight.

5 Impact assessment and mitigation

This section considers the impact from building and operating the new Parramatta Wharf based on the work described in **Section 1.1**.

Demolition of existing piles, pontoon and gangway

- The pontoon and gangway would be dismantled and removed using a barge or land-mounted crane and transported to land.
- The existing piles would be removed, either fully pulled or cut and capped.

Dredging of bed and bank

- The existing seawall would be realigned to provide a straight edge to accommodate the larger pontoon.
- Modification of the existing seawall would permanently remove 30 square metres of land and replace 70 linear metres of the existing gabion construction with a contiguous pre-cast concrete solution.
- Minor reprofiling of the riverbed would provide sufficient depth for the pontoon. There is currently a 500 mm clearance for the pontoon, requiring 200 mm of sediment from under the pontoon to be scraped downstream to create a 700 mm clearance. Exact methods would be developed by the contractor.

Installation of steel piles within the waterway

- Marine-grade steel piles, would be installed into the bedrock. These piles would be transported to site by barge or road. The installation of piles would take place when the water is calm.
- Constructing pile foundation systems in bedrock consists of three components:
 - **Phase 1 – drilling piles into rock in calm water**
Drilling would take three to four hours per pile plus setup time and pack up time. Each pile would be lifted from the barge and put into place using a barge-mounted crane. A drill rig mounted onto a barge would attach to the pile using a helmet fitting. The drill rig would screw the pile into the bedrock.
 - **Phase 2 – hammering piles to refusal in calm water**
The piles hammered (using a weight of about 30 tonnes) to the stage where five or more blows would not move the pile. Hammering of piles would take place at least one day after drilling of piles. It is anticipated that each pile would be hammered for one minute (about 10 hits with the hammer within one minute). For each pile, this activity is likely to occur five times over a period of one hour.
 - **Phase 3 – cutting, welding and plugging of piles with concrete**
The steel piles would then be cut, welded and plugged with concrete.
- Piling is expected to take three weeks to complete. This would allow for respite from noise and contingency for unfavourable weather.

Construction of new gangway, pontoon and concrete platform

- The pontoon would be constructed from marine-grade steel and a zinc shelter

- The pontoon would be constructed offsite, towed to site and lifted into position using the barge-mounted crane.
- Install the pivot point and then attach and build out the prefabricate sections of gangway. This would likely be via barge crane.
- Install the supporting infrastructure including barriers and handrails, safety and security facilities, cabling and ducting, lighting, CCTV, ladders, lifebuoys, glass shelter weather screens and tactile flooring.

5.1 Assessment of construction impact

Three impact types are likely to occur during wharf installation:

- Noise generation and disturbance from piling
- Reprofiling of bed and bank for realignment of seawall and pontoon clearance
- Disturbance from construction vessels such as boat/propeller wash, temporary mooring, accidental spills and change in vessel frequency along river during construction.
- Cumulative impact or increased risk with the concurrent construction of a boardwalk by Council.

Pile impact

A total of eight new piles would be drilled and hammered to refusal into the bedrock. Pile size would be typical to other wharf upgrades, with four 0.76 m diameter piles supporting the pontoon, and the remaining piles 0.61 m in diameter. The pile footprint would impact an area less than 5 m² on subtidal sediment (type 3 – minimally sensitive KFH). This is a negligible impact given the modified conditions and amount of similar habitat nearby.

Any potential sediment pluming that occurs during pile removal and installation would be contained by a silt curtain. As the piling would be performed during calm conditions, drill cuttings and suspended sediments are likely to settle locally in a similar habitat type. Finer sediments could disperse further, depending on tidal dynamics, but would be contained within a silt curtain surrounding the work site. Hammering of piles is unlikely to create significant sediment plumes, with sediment being pushed downwards and outwards.

Underwater noise from hammering piles has the potential to cause disturbance or physical impact to marine fauna if they are in the area. Fish in the vicinity would be affected by excessive underwater noise. Impacts range from mortality to interruption of communication, depending on species anatomy (eg fish with swim bladders closer to the ear are more sensitive to acoustic impact than species with swim bladders further from the ear). If water depth allows, fish would be able to escape under the silt curtain as hammering starts, otherwise some impact is expected. Estimates on number or species of fish potentially impacted is not part of this assessment.

Seawall work impact

Realignment of the seawall would result in a direct loss of marine biota (filamentous algae) attached to the gabion baskets. These species would re-establish on the new wall, therefore the impact is temporary. Removal of the gabion baskets and fill (approximately 17 m² surface area or 50 m³) would increase the risk of material entering the waterway, potentially resulting in sedimentation of nearby habitat and potentially releasing contaminants, if present, from the fill. Best practise construction methods would reduce this risk and the potential impact would be minor.

Transport of spoil from the seawall realignment would be via barge for disposal at a licenced waste facility. Best practise construction methods would reduce this risk and the potential impact to other waterways.

Dredging of the channel is required to give the new pontoon 700 mm clearance at low tide (ie 200 mm beneath the 500 mm submerged pontoon height). A small area of the pontoon footprint is currently too shallow. The required dredge depth would be about 200 mm past existing level and extend slightly further than the pontoon footprint to give a buffer and gentle grade to the surrounding substrate. Roads and Maritime estimate the dredge surface area as about 15 m² (4 m³ volume) which is no more than the shading created by the new pontoon. Dredging would directly impact benthic habitat and infauna in both the excavation and deposition zone, however, the existing conditions are poor, with no evidence of bioturbation (infauna burrows). The sediment appears compacted, or flushed free of fines due to turbulence from weir spills and ferry berthing/turning. The loss of this habitat is minor and would be substituted by similar habitat post-dredging.

Indirect impact may arise if bed sediment particles become entrained in the water, increasing turbidity and potentially releasing contaminants. Sediment contamination occurs on site, typical of the highly disturbed catchment and land use of the Parramatta River. A Stage 2 Contamination Assessment of the top 20 cm of sediment was undertaken by Coffey Geotechnics (18 May 2016). Based on the analytical results, the sediments reported elevated contamination, with three chemicals of potential concern above low trigger values. Potential acid sulfate soils (ASS) were also detected in the shallow sediment samples. Coffey conclude that contamination risk arising from proposed ferry wharf construction works is considered to be low and sediment appears to have sufficient acid neutralising capacity. Coffey recommend that the disturbance of sediment and/or the underlying soils should be kept to a minimum to lower the risk of exposing these sediments to oxygen. If ASS are to be exposed to oxidation or spoil is to be generated during construction activities requiring disposal, further assessment for ASS and waste classification should be undertaken. Best practice construction methods, such as an Acid Sulfate Soil Management Plan, surrounding silt curtain, and keeping sediment submerged during reprofiling, would reduce this risk and the potential impact would be minor, especially as the benthic habitat is classed as type 3 – minimally sensitive key fish habitat.

Construction vessel impact

There would be little direct or indirect impact caused by construction vessels if best practice environmental management procedures are in place and effective. However, potential impact may include chemical/material spills from machinery, propeller scouring in shallow water, and anchor/mooring impact from barges. Such risks would increase with unfavourable swell or river flow and weather conditions.

Scouring of benthic sediments, either from propeller operation, dragging anchor or mooring chain, or water movement from shallow barge operation, could cause bed sediment particles to become entrained in the water, increasing turbidity. The increased sediment load would reduce light penetration through the water column, and sediment particles may settle on aquatic plants. However, any reduction in photosynthesis would be minor, as the amount of sediment that is moved would be small and there is minimal aquatic flora in the immediate area.

Sediment movement could also smother infauna burrows. Again, it is unlikely that large volumes of sediment would be moved, and that the thin layer of sediment that does settle on infauna burrows would not cause significant damage, especially as no burrows were observed.

Chemical spills are unlikely, but may occur during refuelling or if there is a hydraulic fluid leak. Spilt petrochemicals have the potential to wash up on shore or disperse in the water. This could kill or impair fish and infauna.

Vessels may also be a vector for movement of marine pests, especially if ships are not from the local area. For example, machinery and vessels used on other sites where the noxious alga *Caulerpa taxifolia* was present could introduce the weed if hygiene procedures are not followed. To prevent the spread of this weed, barges moving from areas where *Caulerpa* is present should be inspected before travelling the river and entering the site. If *Caulerpa* becomes established around the new wharf, then ferries using the wharf in the future would potentially become vectors for the further spread of this weed.

The proposal would result in closure of this section of the Parramatta River for about six months. This would temporarily eliminate 11 return ferry trips per day (weekday timetable), substituted with infrequent construction vessel journeys (barges and punts). During this time, the routine boat wash from 'Sydney RiverCat' catamarans would shift to on-demand journeys using flat-bottomed, squared-nosed vessels; This would change wave characteristics (height, length, duration, frequency), resulting in decreased turbulence and aeration of surface water, and decreased wash along banks and mangrove forests. The temporary ecological impact could range from repositioning of sediment deposition zones, reduced habitat (lower dissolved oxygen concentration), but increased opportunities for mangrove seedlings (less physical disturbance). Any temporary impact over this short period would likely be minor, given the complex influence of tidal movement, freshwater inflows and catchment water quality that would overwhelmingly drive these processes.

Cumulative impacts

There may be a cumulative impact due to other foreshore developments occurring on the river. The City of Parramatta Council proposes to construct a boardwalk along the bank opposite to the wharf, which would require excavation of the cliff face and removal of two mangrove trees. Although the addition of both structures is unlikely to change the aquatic habitat value significantly in this area, impact during construction may increase. Roads and Maritime would aim to coordinate river closure with City of Parramatta Council so the work can occur concurrently. This has a positive implication on minimising ferry closures and it reduces the total period machinery is operating in the river. The risk of a cumulative impact would occur from increased boat/barge traffic and temporarily constricting habitat with silt curtains along both banks. If there is not a coordinated approach to moving vessels or placement of silt curtains, the potential impacts include:

- Obstruction of fish passage – especially to Australian Bass migrating from fresh to salt water in late autumn-winter and back again in spring-summer via the weir's fish ladder (ie from May to February the following year), plus other fish that tend to congregate at the base of weirs
- Increased turbidity – from boat wash, excavation and piling
- Risk of collision resulting in spills – either between vessels, cranes or rockfall
- Increased underwater noise – from hammering piles and cliff face excavation.

These impacts have the potential to temporarily degrade a small area of habitat (eg wash on downstream mangroves, sediment plumes inside silt curtain zone) or decrease success of fish movement and spawning requirements (eg if the river is blocked entirely by a silt curtain). Overall, without correct timing and coordination, this impact could be moderate in severity. The proposal does not intend to block fish passage, so with collaboration with the other construction, this impact would be reduced.

5.2 Assessment of operational impact

Three impact types are likely to occur during wharf operation:

- Ferry traffic using the facility
- Shading impact on benthic habitat
- Creation of new aquatic habitat.

Ferry traffic impact

The impacts which could occur in marine habitats during operation are typically those associated with ferry wash, disturbance of sediments and an increase in pollutants and litter. Given the location and frequency of ferry movements would remain consistent with the existing wharf, the following impacts are considered minor:

- Ferry wash would not impact the foreshore which is stabilised by a seawall and intertidal rock.
- Propeller/thrust disturbance to sediments is unlikely to increase given current frequent use by ferries.
- Pollutants expelled from ferries would be the same as existing conditions throughout the river. The site is exposed to tidal exchange that would disperse marine paint and engine oils from the immediate source location, thus helping with dilution.
- Litter from wharf patrons would be reduced through increased bins, signage, fencing and glazed screens.

Shading impact

Partial shading from the new pontoon, gangway and concrete platform would have an indirect impact on subtidal unvegetated sediment (type 3 KFH). The new structure would shade 249 m² of subtidal habitat in addition to what is currently shaded. No marine vegetation would be shaded, and benthic organisms (ie infauna) would not be significantly impacted as they were not observed on site and can tolerate shaded areas. New areas of subtidal sediment would be exposed to sunlight (7 m²) as a result of the proposed works, which would provide a positive impact to those areas.

Creation of hard substrates

Once installed, the piles would create 39 m² of new vertical hard substrate, which would provide areas for sessile marine organisms to attach and structural habitat for small fish (type 3 KFH). The number of new piles is greater than the number of existing piles, so there would be increase in this type of habitat. The new pontoon would create 272 m² of new hard substrate (type 3 KFH). The new pontoon is larger than the existing pontoon and, therefore, would provide additional habitat. In total the new pontoon and piles would create more type 3 habitat than the existing piles and pontoon (see **Table 1** for a breakdown).

5.3 Fisheries Management Act habitat protection and permit requirements

DPI Fisheries' Policy and Guidelines for Fish Habitat Conservation and Management (Fairfull 2013) outline requirements for assessing impact of waterfront development to ensure the sustainable management, and 'no net loss', of key fish habitats in NSW. Part 7 of the FM Act addresses the protection of aquatic habitats and works that requires a permit.

Threatened species, populations or communities

No threatened species, populations or communities listed under the FM Act are likely to occur in the study area or be directly or indirectly harmed by the proposed work (see **Section 4.4** and **Appendix A**). As such, an assessment of significance is not required.

Protected vegetation

The proposed works would not harm marine vegetation (saltmarsh, macroalgae or seagrass) as they do not occur on site. The works are unlikely to harm mangroves close to the site or have any significant ecological impact if mitigation measures (no-go zones) are effectively implemented.

Protected fauna

As discussed in **Section 4.4.1** protected fauna is unlikely to occur in the study area. Syngnathiformes (seahorses and their relatives) were not observed and are unlikely to reside in the study area due to freshwater influence from the Parramatta River and poor habitat. This was also confirmed by a lack of records west of Cockatoo Island.

Critical habitat

The study area does not have habitat that is critical to any threatened species, and is not within or near the critical habitats for Grey Nurse Shark (Part 7A of the FM Act), so would have no impact on the species.

Commercial Fisheries

No aquaculture (oyster) leases are located in Port Jackson. Commercial fishing is not permitted in Port Jackson. As such, the proposal would not impact commercial fisheries.

Key threatening processes

Key threatening processes have the potential to adversely affect threatened species, populations or ecological communities, or could cause species, populations or ecological communities that are not threatened to become threatened. The following processes listed under Part 7A of the FM Act are relevant to an aquatic impact assessment, but the wharf upgrade would not trigger these processes:

- current shark meshing program in NSW waters
- hook and line fishing in areas important for the survival of threatened fish species
- human-caused climate change
- instream structures and other mechanisms that alter natural flow
- introduction of non-indigenous fish and marine vegetation to the coastal waters of NSW
- the introduction of fish to fresh waters within a river catchment outside their natural range
- the removal of large woody debris from NSW rivers and streams
- the degradation of native riparian vegetation along NSW water courses.

Part 7 permits or consultation

The proposal would not directly or indirectly harm marine vegetation (such as mangroves nearby) if mitigation measures are implemented (eg no-go zones). Therefore, a permit to *Harm Marine Vegetation* would not be required. No other protected marine vegetation (saltmarsh, seagrass or macroalgae) occurs onsite.

The proposal requires dredging for the seawall realignment and pontoon clearance, therefore, consultation between the proponent and the Minister for Primary Industries under s.199 of the FM Act is required.

During construction, a small number of fish may be temporarily trapped by the silt curtain within the works area, especially as the area is very shallow. However, DPI Fisheries advise that an s.219 permit to *Obstruct Fish Passage* would not be required for this type of situation (pers comm Carla Ganassin, Fisheries Manager, 9 June 2017). The silt curtain would not block the entire channel.

No seahorses are expected to occur, therefore, no handling, relocation or s.37 permit is required.

No net loss of key fish habitat

Significant environmental impacts (direct and indirect) are to be offset by environmental compensation. Compensation to offset fisheries resource or habitat losses is considered only after it is demonstrated that the proposed loss is unavoidable, in the best interests of the community in general and is in accordance with the FM Act, Regulations and Fisheries policies and guidelines. Habitat replacement (as a compensation measure) needs to account for indirect and direct impact of development to ensure that there is 'no net loss' of KFH.

In accordance with the Roads and Maritime's Biodiversity Offset Guideline, offsetting is only required where a proposal causes a net loss of type 1 or type 2 KFH (as defined by DPI Fisheries).

The proposal would result in a total impact to 359 m² of type 3 KFH (see breakdown in **Table 1**). This impact includes direct damage from pile installation, partial to absolute shading beneath the pontoon and removal of existing habitat (substrate, seawall, pontoon and piles).

This habitat impact would be compensated by the creation of 324 m² of type 3 KFH. This would come from the addition of hard surfaces. Using wetted pile heights ranging between 0.5–2.0 m, the habitat created by piles is calculated to be 39 m². The wetted sides of the new pontoon (approximately 1 m in height) and shaded underside would create 272 m² of habitat (although upside-down pontoon habitat in Sydney Harbour may aid dispersal of exotic species, Glasby and Connell 2001). Also, newly exposed benthic habitat from the removal of the existing pontoon and piles would improve 7 m² of habitat.

The maximum impact (mostly shading) would be to 359 m² of type 3 KFH which would be offset by 324 m² of mostly hard surfaces. This does not meet the Fisheries Policy of 'no net loss' of KFH, but as no type 1 or type 2 KFH would be impacted the project meets the Roads and Maritime offset guideline for impacts to KFH.

Table 1: Impact to key fish habitat

Aquatic habitat (KFH Type)	Available in study area (m ²)	Impact type	Loss (m ²)	Gain (m ²)
Existing piles (wetted surface area) (type 3)	36.00	10 removed	36.00	-
New piles (wetted surface area) (type 3)	-	12 gained	-	39.02
Existing pontoon (wetted surface area) (type 3)	62.00	1 removed	62.00	-
New pontoon (wetted surface area) (type 3)	-	1 gained	-	271.50
Intertidal rock (type 3)	195.80	No impact	-	-
Intertidal and subtidal seawall (type 3)	106.86	Realignment	7.50	3.75
Concrete weir and stabilised rock shelf (type 3)	540.48	No impact	-	-
Subtidal sediment (type 3)	6516.39	Dredging and indirect shading	249.19*	6.63**
		Direct piling	4.52	3.30
Mangrove (type 2)	157.10	No impact	-	-
Total	7614.62		359.21	324.20

*Excludes existing shaded areas that would remain shaded

**Existing shading that would be exposed to full light

5.4 Sydney Regional Environmental Plan (SREP, Sydney Harbour Catchment) 2005

Clause 21 of the SREP provides nine matters to be taken into consideration in relation to biodiversity, ecology and environment protection:

21(a) Development should have a neutral or beneficial effect on the quality of water entering the waterways.

During construction, potential impact to water quality would be controlled by implementation of a Construction Environmental Management Plan (CEMP). During operation, the proposed wharf would not alter the water quality of Parramatta River.

21(b) Development should protect and enhance terrestrial and aquatic species, populations and ecological communities and, in particular, should avoid physical damage and shading of aquatic vegetation (such as seagrass, saltmarsh and algal and mangrove communities).

No seagrass, saltmarsh or macroalgae communities occur on site. Mangroves occur near the site, but if no-go zones are established and silt curtains are effectively implemented during construction there would be no impact to these plants or the wider community.

21(c) Development should promote ecological connectivity between neighbouring areas of aquatic vegetation (such as seagrass, saltmarsh and algal and mangrove communities).

No seagrass, saltmarsh or macroalgae communities occur on site, or are likely to establish here. Harm to mangroves will be avoided through establishing no-go zones during construction. The wharf would not affect future connectivity of marine vegetation because it is located at the tidal extent of the river.

21(d) Development should avoid indirect impacts on aquatic vegetation (such as changes to flow, current and wave action and changes to water quality) as a result of increased access.

The proposed piles and ferry activity would influence localised hydrology by creating back-eddies, wash and turbulence. As the area is already subject to tidal movement, high energy boat wash and wave reflection from the seawall it is unlikely the proposed works would alter the local hydrology to the extent that would impact the survival of vegetation near the site (two mangroves).

21(e) Development should protect and reinstate natural intertidal foreshore areas, natural landforms and native vegetation.

An existing seawall prevents establishment of any natural intertidal foreshore, landforms or vegetation beyond the existing mangroves. The proposal would not alter this situation due to onshore land use.

21(f) Development should retain, rehabilitate and restore riparian land.

Riparian land is heavily modified by concrete open space and landscaping. The proposal would not interfere with this vegetation.

21(g) Development on land adjoining wetlands should maintain and enhance the ecological integrity of the wetlands and, where possible, should provide a vegetative buffer to protect the wetlands.

The proposal is not within a designated wetland identified on the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 – Wetlands Protection Map. The proposal does not alter the net amount of habitat in the nearest wetland downstream. There would be no impact to marine vegetation.

21(h) The cumulative environmental impact of development.

The foreshore and aquatic habitat is highly modified due to a seawall and commuter wharf. The proposal would replace the existing wharf, which would result in similar impact as the existing wharf. The proposal would increase shading of unvegetated sediment, but the cumulative environmental impact is low given the existing conditions and small area of additional impact on minimally sensitive key fish habitat. The new structure and layout would provide new habitat to offset the impact.

21(i) Whether sediments in the waterway adjacent to the development are contaminated, and what means will minimise their disturbance.

Sediment contamination occurs on site, typical of the highly disturbed catchment and land use of the Parramatta River. A Stage 2 Contamination Assessment of the top 20 cm of sediment was undertaken by Coffey Geotechnics (18 May 2016). Based on the analytical results, the sediments reported elevated contamination, with three chemicals of potential concern above

low trigger values. Potential acid sulfate soils (ASS) were also detected in the shallow sediment samples. Coffey conclude that contamination risk arising from proposed ferry wharf construction works is considered to be low and sediment appears to have sufficient acid neutralising capacity. Coffey recommend that the disturbance of sediment and/or the underlying soils should be kept to a minimum to lower the risk of exposing these sediments to oxygen. If ASS are to be exposed to oxidation or spoil is to be generated during construction activities requiring disposal, further assessment for ASS and waste classification should be undertaken.

A silt curtain would contain disturbed sediment during scraping of 200 mm of substrate.

The design maintains the existing berthing face, so during ferry operation, craft would dock in the same location, resulting in repeated upwelling of sediments deposited in this area.

5.5 Recommended mitigation measures

The following mitigation measures are recommended to minimise the risk of impact during construction and operation at the Parramatta Wharf. These are adapted from DPI Fisheries document 'Policy and Guidelines for Fish Habitat Conservation and Management'. At a minimum, the construction contractor or representative should:

- Develop a Construction Environmental Management Plan (CEMP) to address pollution, contamination and unnecessary disturbance which could arise during construction such as:
 - sediment and rock debris control
 - spoil transfer, treatment and disposal management
 - spill from concrete pour
 - oil/fuel/chemical storage and spill management
 - machinery and engine maintenance schedule to reduce oil/fuel leakage
 - low impact barge positioning to prevent propeller scouring and thrust wash onto benthic habitats
 - minimise footprint and establish no-go zones in sensitive habitats (eg mangroves)
 - accidental waste/material overboard response (eg construction materials dropped into the river)
 - biological hygiene (eg prevent spread of noxious species on and off the site)
 - aquatic fauna management (see below)
 - other measures listed below.

- Develop an Environmental Work Method Statement (EWMS) for the following high-risk activities:
 - modification of the seawall
 - reprofiling of sediment
 - dewatering (if required).

- Establish no-go zones to avoid damage to nearby habitats (particularly mangroves and their pneumatophores). No-go zones should be marked on a map and displayed inside the construction barge and office. All staff responsible for manoeuvring the barge should check the map before selecting a new position.

- Work positioning barges, drilling and pile driving should occur during calm conditions.

- All lines should be suspended off the seafloor to minimise drag across benthic habitat.
- Use a floating boom with silt curtain to contain sediment plumes during dredging, drilling and pile hammering. This should contain all site activity and should not be removed until the risk of sedimentation is negligible. The silt curtain must not block the entire channel, and must leave at least half the channel width available for fish passage.
- Earthworks required to realign the seawall should be constructed and stabilised without debris falling into the waterway.
- All waste material should be disposed of on land and not reused in the construction.
- Contaminated material (eg tyres or demolition material) should not be used as fill as they can leech and affect the surrounding aquatic environment.
- The noxious marine alga *Caulerpa taxifolia* was not observed in the study area, and there are no records of the weed nearby. Care should be taken not to introduce this species to the area by using contaminated vessels and machinery. For example, a drill head or anchor used at another site with *Caulerpa* should be thoroughly cleaned of plant propagules and sediment before being used at this location. Fragments of *Caulerpa* can remain alive for up to three days out of the water. Best hygiene practices are outlined in the NSW Control Plan for the Noxious Marine Alga *Caulerpa taxifolia* (NSW I&I 2009).
- Although large marine mammals are not expected to occur, gentle start-up hammering is recommended to allow undetected aquatic fauna to leave the area and avoid hearing damage. Work should be stopped if large fauna is observed nearby.
- Construction should be co-ordinated with Council to minimise the risk of blockage of fish passage, and collision or excessive boat wash during construction of their boardwalk on the opposite bank.

6 Conclusions

No clearing of native vegetation is required and there is not likely to be a significant impact on threatened species, populations, ecological communities or their habitats. Therefore, the proposal does **NOT** trigger the need for a Species Impact Statement (SIS), nor further appraisal using the Biodiversity Assessment Method (BAM), nor referral to a Commonwealth body. The assessment in this report demonstrates that there would be no direct or indirect impacts to marine vegetation, so a permit under Part 7 of the FM Act to *Harm Marine Vegetation* is **NOT** required. The proposal requires dredging to realign the seawall and provide sufficient depth for the pontoon, therefore, consultation with the Minister for Primary Industries under Section 199 of the FM Act is required.

Syngnathids (seahorses and their relatives) are unlikely to occur and do not need specific management.

In regard to the DPI Fisheries Policy and Guidelines for Fish Habitat Conservation and Management (2013 update) the maximum impact (mostly shading) of 359 m² of type 3 KFH would be compensated by 324 m² of mostly hard substrate habitat. This equates to a 'net loss' of type 3 KFH. No type 1 or type 2 KFH would be impacted. In accordance with the Roads and Maritime's Biodiversity Offset Guideline, offsetting is only required where a proposal causes a net loss of type 1 or type 2 KFH, therefore, no further offsets are required.

In regard to the biodiversity, ecology and environmental protection requirements of the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005, the proposal would not significantly alter marine vegetation or ecology. The proposed works are not in or near wetland habitat. The proposed wharf would be in a similar location to the existing wharf, therefore, there would be not be a significant increase in impacts to aquatic habitat.

7 References

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- Creese, R.G., Glasby, T.M., West, G. and Galen, C. 2009. *Mapping the habitats of NSW estuaries. Industry & Investment NSW Fisheries Final Report Series 113*. Port Stephens, NSW, Australia.
- Fairfull, S. 2013. *Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management (2013 update)*. NSW Department of Primary Industries.
- Glasby, T.M. and Connell, S.D. 2001. Orientation and position of substrata have large effects on epibiotic assemblages. In *Marine Ecology Progress Series*. Volume 214: 127-135.
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- NSW I&I 2009. *NSW Control Plan for the Noxious Marine Alga *Caulerpa taxifolia**. NSW Industry and Investment.

Appendix A: Threatened species likelihood of occurrence and impact

If a species has suitable habitat present on site **AND** is likely to use this habitat **AND** the species or its habitat would be directly or indirect impacted, **THEN** an Assessment of Significance is required. Such species, if any, are highlighted in the table below. This list excludes terrestrial species that do not use estuarine/marine water or tidal foreshores.

Type	Species name	Common name	BC/FM Act Status	EPBC Status	Use of site	Is an impact assessment required?
Fish	<i>Epinephelus daemeli</i>	Black Rockcod	V	V	No suitable habitat present, eg rock overhangs, crevices or caves	No
	<i>Macquaria australasica</i>	Macquarie Perch	E1	E	No records in catchment	No
	<i>Prototroctes maraena</i>	Australian Grayling	E	V		No
Shark	<i>Carcharias taurus</i>	Grey Nurse Shark	E4A	CE	No records in river, no suitable habitat	No
	<i>Carcharodon carcharias</i>	Great White Shark	V	V		No
	<i>Lamna nasus</i>	Porbeagle, Mackerel Shark		Bonn		No
	<i>Rhincodon typus</i>	Whale Shark		V,Bonn		No
Ray	<i>Manta alfredi</i>	Reef Manta Ray		Bonn	No records in river, no suitable habitat	No
	<i>Manta birostris</i>	Giant Manta Ray		Bonn		No
	<i>Pristis zijsron</i>	Green Sawfish	E4	V	Presumed extinct in NSW	No
Turtle	<i>Caretta caretta</i>	Loggerhead Turtle	E1	E	No records in river, no suitable habitat	No
	<i>Chelonia mydas</i>	Green Turtle	V	V		No
	<i>Dermochelys coriacea</i>	Leatherback Turtle	E1	E		No
	<i>Eretmochelys imbricata</i>	Hawksbill Turtle		V,Bonn		No
	<i>Natator depressus</i>	Flatback Turtle		V,Bonn		No
Whale	<i>Balaenoptera bonaerensis</i>	Antarctic Minke Whale		Bonn	No records in river, no suitable habitat	No
	<i>Balaenoptera edeni</i>	Bryde's Whale		Bonn		No
	<i>Balaenoptera musculus</i>	Blue Whale	E1	E		No
	<i>Caperea marginata</i>	Pygmy Right Whale		Bonn		No
	<i>Eubalaena australis</i>	Southern Right Whale	E1	E		No
	<i>Megaptera novaeangliae</i>	Humpback Whale	V	V		No

Type	Species name	Common name	BC/FM Act Status	EPBC Status	Use of site	Is an impact assessment required?
	<i>Physeter macrocephalus</i>	Sperm Whale	V			No
Dolphin	<i>Lagenorhynchus obscurus</i>	Dusky Dolphin		Bonn	No records in river, unlikely close to shore	No
	<i>Orcinus orca</i>	Killer Whale, Orca		Bonn		No
	<i>Sousa chinensis</i>	Indo-Pacific Humpback Dolphin		Bonn		No
Marine mammal	<i>Dugong dugon</i>	Dugong	E1	Bonn	No habitat on site	No
Seal	<i>Arctocephalus forsteri</i>	New Zealand Fur-seal	V		No records in river, unlikely this far upstream	No
	<i>Arctocephalus pusillus doriferus</i>	Australian Fur-seal	V			No
Frog	<i>Litoria aurea</i>	Green and Golden Bell Frog	E1	V	No habitat	No
Bird	<i>Actitis hypoleucos</i>	Common Sandpiper		C,J,K	Poor and/or only small amount of habitat available for foraging or roosting. Some species only occur offshore. Site is exposed to humans. Larger, better habitat in region. Unlikely to use the site.	No
	<i>Anseranas semipalmata</i>	Magpie Goose	V			No
	<i>Apus pacificus</i>	Fork-tailed Swift		C,J,K		No
	<i>Arenaria interpres</i>	Ruddy Turnstone		C,J,K		No
	<i>Botaurus poiciloptilus</i>	Australasian Bittern	E1	E		No
	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		C,J,K		No
	<i>Calidris alba</i>	Sanderling	V	C,J,K		No
	<i>Calidris canutus</i>	Red Knot		C,J,K		No
	<i>Calidris ferruginea</i>	Curlew Sandpiper	E1	CE,C,J,K		No
	<i>Calidris melanotos</i>	Pectoral Sandpiper		J,K		No
	<i>Calidris ruficollis</i>	Red-necked Stint		C,J,K		No
	<i>Calidris subminuta</i>	Long-toed Stint		C,J,K		No
	<i>Calidris tenuirostris</i>	Great Knot	V	C,J,K		No
	<i>Calonectris leucomelas</i>	Streaked Shearwater		C,J,K		No
	<i>Charadrius bicinctus</i>	Double-banded Plover		Bonn		No
	<i>Charadrius leschenaultii</i>	Greater Sand-plover	V	C,J,K		No
	<i>Charadrius mongolus</i>	Lesser Sand-plover	V	C,J,K		No
	<i>Charadrius veredus</i>	Oriental Plover		J,K		No
	<i>Diomedea antipodensis</i>	Antipodean Albatross	V	V		No
<i>Diomedea dabbenena</i>	Tristan Albatross		Bonn	No		

Type	Species name	Common name	BC/FM Act Status	EPBC Status	Use of site	Is an impact assessment required?
	<i>Diomedea exulans</i>	Wandering Albatross	E1	V,J		No
	<i>Diomedea gibsoni</i>	Gibson's Albatross	V	V		No
	<i>Diomedea sanfordi</i>	Northern Royal Albatross		E,Bonn		No
	<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E1			No
	<i>Epthianura albifrons</i>	White-fronted Chat	E2,V			No
	<i>Esacus magnirostris</i>	Beach Stone-curlew	E4A			No
	<i>Eudyptula minor</i>	Little Penguin in the Manly Point Area	E2			No
	<i>Fregatta grallaria grallaria</i>	White-bellied Storm-Petrel		V		No
	<i>Gallinago hardwickii</i>	Latham's Snipe		C,J,K		No
	<i>Gallinago megala</i>	Swinhoe's Snipe		Bonn,C		No
	<i>Gallinago stenura</i>	Pin-tailed Snipe		Bonn,C		No
	<i>Gygis alba</i>	White Tern	V			No
	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V			No
	<i>Haematopus longirostris</i>	Pied Oystercatcher	E1			No
	<i>Heteroscelus brevipes</i>	Grey-tailed Tattler		J		No
	<i>Heteroscelus incanus</i>	Wandering Tattler		J		No
	<i>Hirundapus caudacutus</i>	White-throated Needletail		C,J,K		No
	<i>Ixobrychus flavicollis</i>	Black Bittern	V			No
	<i>Limicola falcinellus</i>	Broad-billed Sandpiper	V	C,J,K		No
	<i>Limosa lapponica</i>	Bar-tailed Godwit		C,J,K		No
	<i>Limosa limosa</i>	Black-tailed Godwit	V	C,J,K		No
	<i>Macronectes giganteus</i>	Southern Giant Petrel	E1	E		No
	<i>Macronectes halli</i>	Northern Giant-Petrel	V	V		No
	<i>Monarcha melanopsis</i>	Black-faced Monarch		Bonn		No
	<i>Monarcha trivirgatus</i>	Spectacled Monarch		Bonn		No
	<i>Numenius madagascariensis</i>	Eastern Curlew		CE,C,J,K		No
	<i>Numenius minutus</i>	Little Curlew		C,J,K		No
	<i>Numenius phaeopus</i>	Whimbrel		C,J,K		No

Type	Species name	Common name	BC/FM Act Status	EPBC Status	Use of site	Is an impact assessment required?
	<i>Onychoprion fuscata</i>	Sooty Tern	V			No
	<i>Pachyptila turtur subantarctica</i>	Fairy Prion (southern)		V		No
	<i>Pandion cristatus</i>	Eastern Osprey	V			No
	<i>Pandion haliaetus</i>	Eastern Osprey		Bonn		No
	<i>Philomachus pugnax</i>	Ruff		C,J,K		No
	<i>Phoebastria fusca</i>	Sooty Albatross	V	V		No
	<i>Pluvialis fulva</i>	Pacific Golden Plover		C,J,K		No
	<i>Pluvialis squatarola</i>	Grey Plover		C,J,K		No
	<i>Pterodroma leucoptera leucoptera</i>	Gould's Petrel	V	E		No
	<i>Pterodroma neglecta neglecta</i>	Kermadec Petrel	V	V		No
	<i>Pterodroma solandri</i>	Providence Petrel	V	J		No
	<i>Puffinus carneipes</i>	Flesh-footed Shearwater		J,K		No
	<i>Rostratula australis</i>	Australian Painted Snipe	E1	E		No
	<i>Sternula albifrons</i>	Little Tern	E1	Bonn,C,J,K		No
	<i>Sternula nereis nereis</i>	Australian Fairy Tern		V		No
	<i>Thalassarche bulleri</i>	Buller's Albatross		V,Bonn		No
	<i>Thalassarche cauta</i>	Shy Albatross	V	V		No
	<i>Thalassarche cauta steadi</i>	White-capped Albatross		V		No
	<i>Thalassarche eremita</i>	Chatham Albatross		E,Bonn		No
	<i>Thalassarche impavida</i>	Campbell Albatross		E,Bonn		No
	<i>Thalassarche melanophris</i>	Black-browed Albatross	V	V		No
	<i>Thalassarche salvini</i>	Salvin's Albatross		V,Bonn		No
	<i>Tringa nebularia</i>	Common Greenshank		C,J,K		No
	<i>Tringa stagnatilis</i>	Marsh Sandpiper		C,J,K		No
	<i>Xenus cinereus</i>	Terek Sandpiper	V	C,J,K		No
Seagrass	Posidonia australis - Port Hacking, Botany Bay, Sydney Harbour, Pittwater, Brisbane Waters and Lake Macquarie populations	Posidonia australis	E2		No plants observed	No
	Posidonia australis seagrass meadows of the Manning-Hawkesbury ecoregion	Posidonia australis		E		No

Type	Species name	Common name	BC/FM Act Status	EPBC Status	Use of site	Is an impact assessment required?
Saltmarsh	Subtropical and Temperate Coastal Saltmarsh	Coastal Saltmarsh	E1	V	No plants observed	No
	<i>Wilsonia backhousei</i>	Narrow-leafed Wilsonia	V			No

BC Act: E1 = Endangered, E2 = Endangered Population, E4 = Extinct, E4A = Critically Endangered, V = Vulnerable

FM Act: E1 = Endangered, E2 = Endangered Population, E4 = Extinct, E4A = Critically Endangered, V = Vulnerable

EPBC Act: Bonn = Listed migratory species under Bonn Convention, CD = Conservation Dependent, CE = Critically Endangered, E = Endangered, V = Vulnerable, X = Extinct

Appendix B: Key fish habitat types

NSW key fish habitat types and associated sensitivity classification (from Fairfull 2013).

<p>TYPE 1 - Highly sensitive key fish habitat:</p> <ul style="list-style-type: none"> ▪ <i>Posidonia australis</i> (strapweed) ▪ <i>Zostera</i>, <i>Heterozostera</i>, <i>Halophila</i> and <i>Ruppia</i> species of seagrass beds >5m² in area ▪ Coastal saltmarsh >5m² in area ▪ Coral communities ▪ Coastal lakes and lagoons that have a natural opening and closing regime (i.e. are not permanently open or artificially opened or are subject to one off unauthorised openings) ▪ Marine park, an aquatic reserve or intertidal protected area ▪ SEPP 14 coastal wetlands, wetlands recognised under international agreements (e.g. Ramsar, JAMBA, CAMBA, ROKAMBA wetlands), wetlands listed in the Directory of Important Wetlands of Australia² ▪ Freshwater habitats that contain in-stream gravel beds, rocks greater than 500 mm in two dimensions, snags greater than 300 mm in diameter or 3 metres in length, or native aquatic plants ▪ Any known or expected protected or threatened species habitat or area of declared 'critical habitat' under the FM Act ▪ Mound springs 	<p>TYPE 2 – Moderately sensitive key fish habitat:</p> <ul style="list-style-type: none"> ▪ <i>Zostera</i>, <i>Heterozostera</i>, <i>Halophila</i> and <i>Ruppia</i> species of seagrass beds <5m² in area ▪ Mangroves ▪ Coastal saltmarsh <5m² in area ▪ Marine macroalgae such as <i>Ecklonia</i> and <i>Sargassum</i> species ▪ Estuarine and marine rocky reefs ▪ Coastal lakes and lagoons that are permanently open or subject to artificial opening via agreed management arrangements (e.g. managed in line with an entrance management plan) ▪ Aquatic habitat within 100 m of a marine park, an aquatic reserve or intertidal protected area ▪ Stable intertidal sand/mud flats, coastal and estuarine sandy beaches with large populations of in-fauna ▪ Freshwater habitats and brackish wetlands, lakes and lagoons other than those defined in TYPE 1 ▪ Weir pools and dams up to full supply level where the weir or dam is across a natural waterway <hr/> <p>TYPE 3 – Minimally sensitive key fish habitat may include:</p> <ul style="list-style-type: none"> ▪ Unstable or unvegetated sand or mud substrate, coastal and estuarine sandy beaches with minimal or no in-fauna ▪ Coastal and freshwater habitats not included in TYPES 1 or 2 ▪ Ephemeral aquatic habitat not supporting native aquatic or wetland vegetation
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Appendix E

Noise and vibration assessment

HANSEN YUNCKEN

SYDNEY WHARF UPGRADE PARRAMATTA

CONSTRUCTION NOISE AND VIBRATION IMPACT STATEMENT

APRIL 2018



Question today *Imagine tomorrow* Create for the future

Sydney Wharf Upgrade Parramatta Construction noise and vibration impact statement

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REV	DATE	DETAILS
Final	24/04/2018	Construction noise and vibration impact statement final issue

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Reviewed by:	S Moore	24/04/2018	
Approved by:	S Moore	24/04/2018	

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EXECUTIVE SUMMARY

WSP Australia Pty Ltd (WSP) has been engaged by Hansen Yuncken Pty Ltd (Hansen Yuncken) to undertake a construction noise and vibration impact assessment for the proposed Parramatta Wharf Interchange upgrade.

The assessment was based on modelling the construction noise and vibration impacts at sensitive receivers as a result of the construction of the proposed wharf upgrade. Potentially sensitive receivers for both noise and vibration have been categorised as residential, commercial, educational institutions, places of worship and active recreational areas. No potentially sensitive heritage structures have been identified close to the proposal. The receivers surrounding the proposal have been categorised into five Noise Catchment Areas (NCAs) based on a similar noise environment within these areas.

A total of six construction scenarios have been proposed (scenarios S01 to S06), with all works to be undertaken during standard construction working hours as defined in the NSW Roads and Maritime's Construction Noise and Vibration Guideline (CNVG). Construction work is expected to take about six months to complete.

The report outlines the noise and vibration impacts that may occur as a result of construction of the proposal. There would be no significant noise impacts from construction traffic due to the proposal and therefore these aspects have not been assessed.

3D computer noise modelling indicates that the Noise Management Levels are exceeded for:

- Modification of seawall (S03) and pile installation (S05 and S06) for the residential receivers north of the site (NCA03)
- All scenarios for the residential receivers south of the site (NCA04)
- All scenarios for the commercial receivers south of the site (NCA04)
- Modification of seawall (S03) for the educational institution receivers north of the site (NCA03)

Potential impulsive vibration impacts for driven piles have been calculated based on the methodology outlined in the FTA Noise and Vibration manual to determine vibration levels. The predicted vibration levels are then compared against the limits outlined in the NSW Assessing Vibration: A Technical Guideline and British Standard BS 7358-2: *Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration* as per the CNVG guidance. Potential vibration impacts are anticipated from the proposal for receivers within in NCA04 human response.

Site specific mitigation measures have been provided to reduce potential noise and vibration impacts in addition to the standard mitigation measures contained within the Construction Noise and Vibration Guideline. With these noise management measures implemented, additional mitigation measures are required for Scenario S03, S05 and S06 for noise control and Scenario S06 for vibration control at NCA04 (catchment area immediately adjacent to the site).

To address any residual impacts after the implementation of the standard and specific mitigation measures, the CNVG additional mitigation measures have been identified. Additional mitigation measures include:

- N: Notification (letterbox drop or equivalent)
- V: Verification
- RP: Respite period

1 INTRODUCTION

WSP Australia Pty Ltd (WSP) has been engaged by Hansen Yuncken Pty Ltd (Hansen Yuncken) on behalf of Roads and Maritime Services (Roads and Maritime) to carry out a construction noise and vibration impact assessment for the proposed Parramatta Wharf Interchange upgrade.

This document assesses noise and vibration impacts associated with the upgrade construction work with reference to the Construction Noise and Vibration Guideline (CNVG, Roads and Maritime, 2016). It is noted that operational noise associated with the proposed works is not part of the scope and as such has not been assessed in this report.

1.1 PROJECT DESCRIPTION

The proposal will involve improving access to Parramatta ferry wharf by replacing the existing structure with a gangway and pontoon. The proposal is needed to allow for more efficient passenger services.

The waterside features of the proposal would include:

- Removal of the existing gangway, pontoon and associated wharf structures, including existing piles and gangway
- Installation of a new three-metre wide by 18-metre long gangway
- Installation of a 7.5-metre wide by 27-metre long floating covered and glazed pontoon, held in position by four new piles
- Minor excavation to provide sufficient depth for the new pontoon
- Installation of five new protection piles.

The landside features of the proposal would include:

- Modification of the existing seawall to accommodate the new pontoon, permanently removing 30 square metres and replacing 70 linear metres of the existing gabion construction with a contiguous pre-cast concrete solution
- Removal of existing Roads and Maritime communications equipment and signage under the existing shelter
- Removal of an existing raised stormwater drain within the shelter
- Installation of new wayfinding signage around the interchange, in accordance with the Transport for NSW Wayfinding Kit of Parts (KOP).

Construction work is expected to commence in mid-2018 and take about six months to complete.

Roads and Maritime propose to carry out all other work associated with the proposal during the standard construction working hours of:

- Monday to Friday, 7am to 6pm
- Saturday, 8am to 1pm.

Seawall excavation and lifting in pre-cast panels would take place periodically over two months within standard construction hours. Piling works would take place intermittently during standard construction working hours over two weeks when water is calmest. Lifting and installation of the pontoon and gangway would be undertaken for one week following piling works.

1.2 PROJECT LOCATION

The proposal site is located at the southern side of Parramatta River, adjacent to the Charles Street Weir, at the end of the navigable channel between Parramatta River and Sydney Harbour. The wharf forms part of the F3 Ferry Service that operates between Circular Quay and Parramatta. The proposed site and background noise monitoring locations are presented in Figure 1.1. The site topography has also been included for context. The topography to the south of the proposal is generally flat, and steps down towards the waterfront and wharf entrance. An escarpment rises steeply from the northern bank of the Parramatta River, with trees on the upper reaches lining the edge of the Stewart Street Reserve.

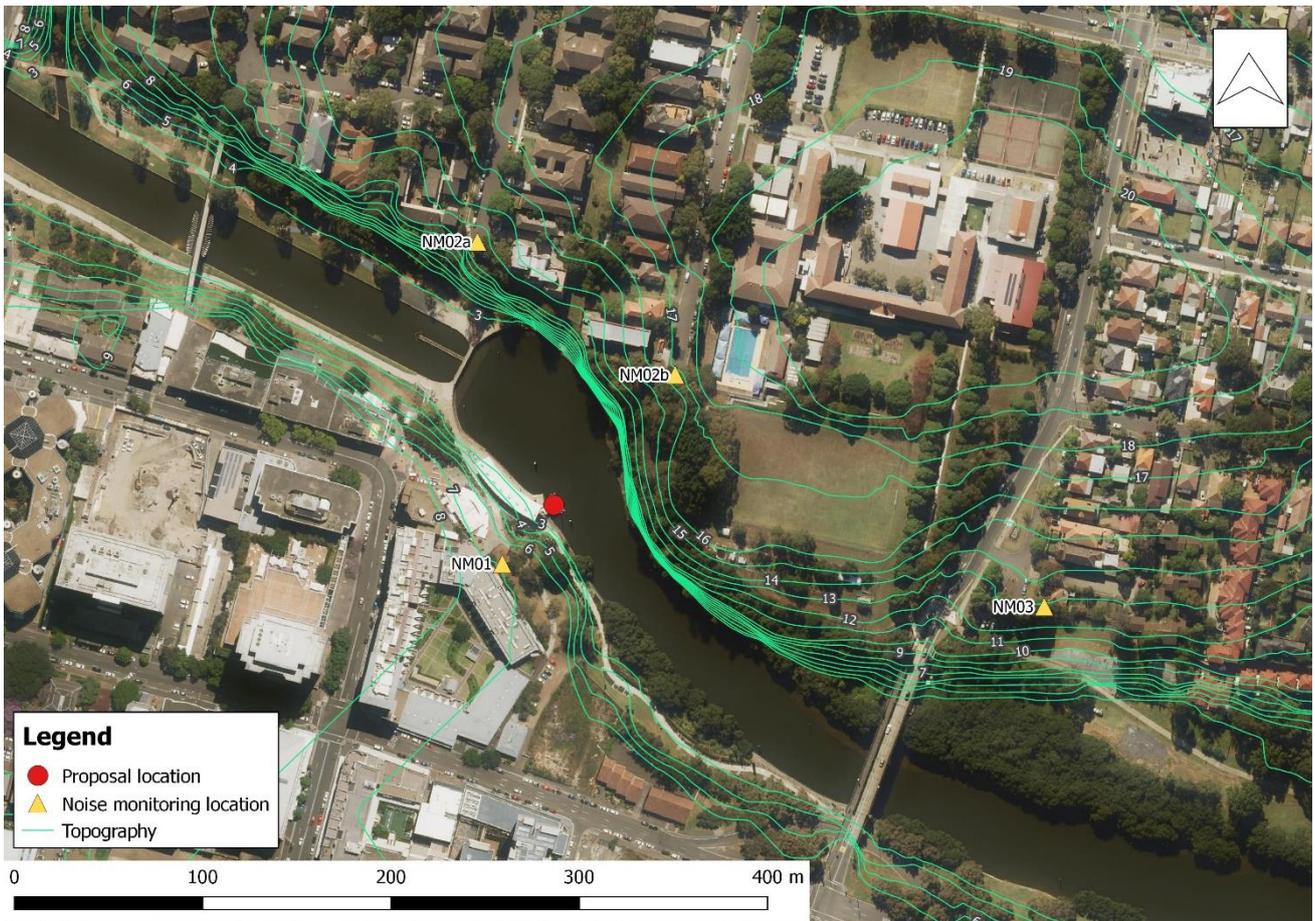


Figure 1.1 Proposed site location and noise monitoring location (Source: NSW SIX maps)

2 SENSITIVE RECEIVERS

The proposal has the potential to adversely impact properties that are considered sensitive to construction noise and vibration. A land use survey and description of noise sensitive receivers have been obtained from desktop review and onsite observations by WSP. The identification of sensitive receivers next to the proposal depends on the occupancy type and nature of usage within the affected properties.

Identified sensitive receivers surrounding the proposal were categorised as follows:

- Residential.
- Non-residential sensitive receivers:
 - Commercial.
 - Active recreational areas.
 - Educational institution.
 - Place of worship.

The receivers surrounding the proposal were organised into Noise Catchment Areas (NCAs) geographically based on similar noise environments within these areas. The NCAs are described in Table 2.1 and a map of the NCAs and receiver locations are presented in Figure 2.1.

Table 2.1 Noise catchment areas

NCA	DESCRIPTION
NCA01	Multi-storey, medium density residential receivers east of the proposed project boundary at MacArthur St.
NCA02	Multi-storey, medium density residential receivers south east of the proposal boundary along Hassal St. Outdoor active recreation area; Queen’s Wharf Reserve and Granville Waratah SFC. Eric Primrose Reserve along John Street.
NCA03	Multi-storey, residential apartment receivers north of the proposed project boundary. Including Macarthur Girls High School. Swimming pool, Soccer field and Stewart St reserve recreational receivers north east of the proposal.
NCA04	Multi-storey, residential apartment receivers immediately south and south west of the proposed project boundary. Commercial and hospitality receivers are immediately south of the proposal.
NCA05	Multi-storey, residential apartment receivers north west of the proposed project boundary along Wilde Ave. The riverside Theatre classified as commercial receiver located along Church Street

1: Minimum distance of the sensitive receiver buildings to the limits of the construction footprint (i.e. the nearest point to works at either landside or waterside works).

Table 2.2 provides the minimum distance of the sensitive receiver buildings to the limits of the footprint (the nearest point to the construction work).

Table 2.2 Distances of receiver within NCA to the approximate work area.

NCA	MINIMUM DISTANCE TO PROPOSAL LOCATION ¹	MINIMUM DISTANCES FROM WATERSIDE WORKS		MINIMUM DISTANCES FROM LANDSIDE WORKS	
		RESIDENTIAL	NON-RESIDENTIAL RECEIVERS ¹	RESIDENTIAL	NON-RESIDENTIAL RECEIVERS ¹
NCA01	260 m to residential 350 m to educational	260 m	350 m	250 m	340 m
NCA02	490 m to residential 265 m to active recreation 375 m to commercial 465 m to place of worship	500 m	385 m	490 m	375 m
NCA03	88 m to residential 85 m to active recreation 120 m to educational	88 m	120 m	78 m	110 m
NCA04	35 m to residential 10 m to commercial	47 m	22 m	35 m	10 m
NCA05	385 m to residential 640 m to commercial 800 m to active recreation	385 m	640 m	375 m	630 m

1: Vibration sensitive non-residential receivers including commercial, educational institution and place of worship

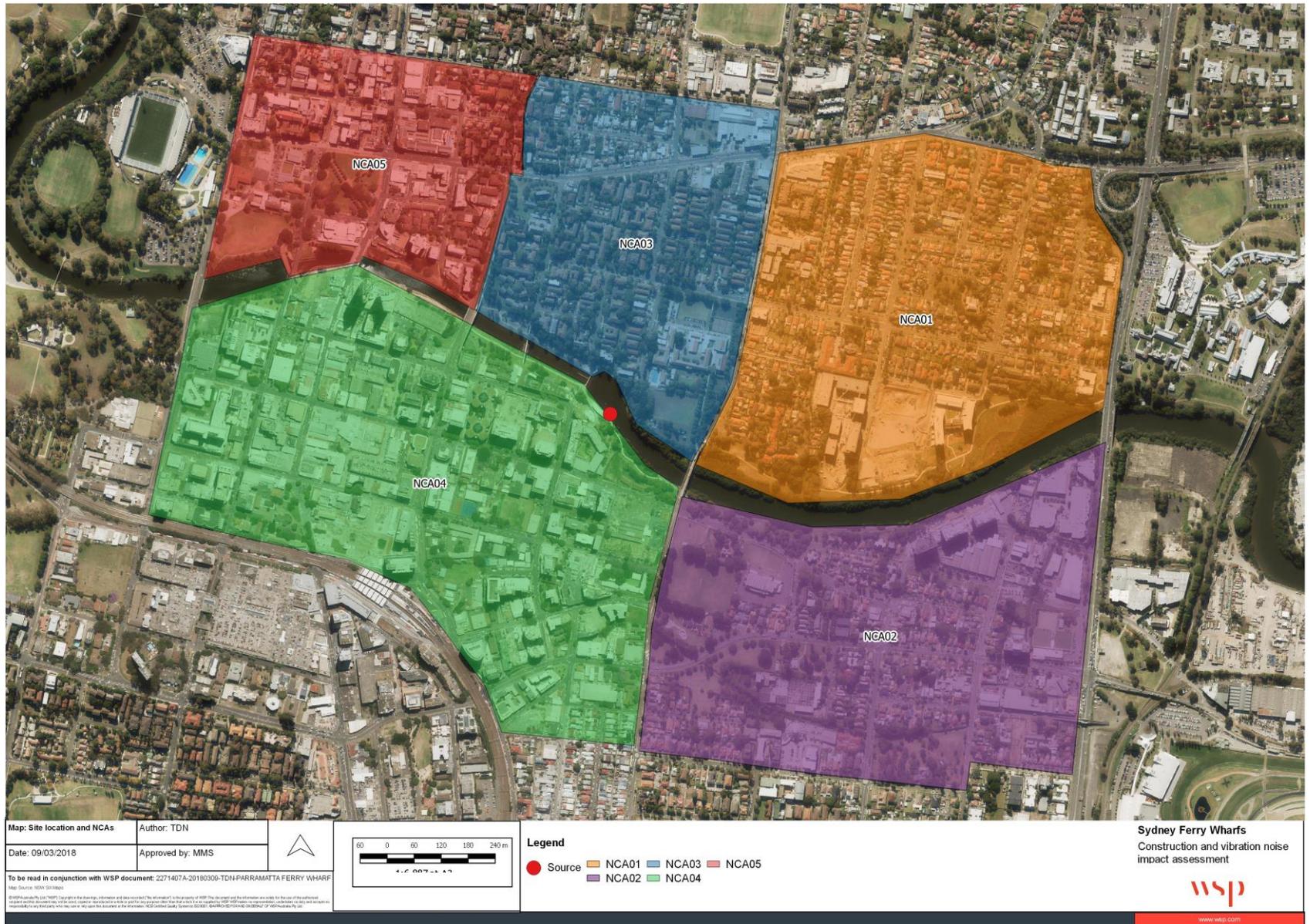


Figure 2.1 Site overview and NCA locations

3 NOISE MONITORING

This section provides an overview of the existing noise environment surrounding the site. The prevailing background and ambient noise levels surrounding the proposed site were determined through a combination of unattended and operator attended noise surveys in accordance with the Australian Standard 1055-1997- *Acoustics-Description and Measurement of Environmental Noise* (AS 1055) and NSW Noise Policy for Industry (NPfI, EPA 2017).

WSP have carried out attended and unattended noise surveys during the daytime, evening and night-time periods.

3.1 NOISE MONITORING LOCATIONS

The noise monitoring locations relevant to this assessment are detailed in Table 3.1 and are shown in Figure 1.1.

Table 3.1 Noise monitoring locations

NOISE MONITORING LOCATION		SURVEY METHOD	ADDRESS
NM01		Attended measurement	34 Charles Street, Parramatta
NM02 ¹	NM02a	Attended measurement	4-6 Queens Avenue, Parramatta
	NM02b	Attended measurement	3 Stewart Street, Parramatta
NM03		Unattended measurement & Attended measurement	Macarthur Street, Parramatta

1: Two monitoring locations representative of NM02 due to construction work interrupting background noise measurement at NM02b during the day period.

3.2 INSTRUMENTATION AND QUALITY CONTROL

The monitoring equipment was fitted with windshields and were field calibrated before and after monitoring. No significant drifts in calibration (± 1.0 dB) were noted. The weather conditions at the time of monitoring were recorded at Sydney Olympic Park (Bureau of Meteorology station number 066212), which is located approximately six kilometres east of the proposal.

Monitoring data were excluded during periods of weather that may have adversely affected the monitoring data; where wind speeds were greater than 5 metres per second and during significant rainfall (>5mm).

All the monitoring equipment has a current certified calibration certificate (National Association of Testing Authorities, NATA) at the time of use. Details of all equipment used to conduct the noise survey are presented in Table 3.2. Copies of the calibration certificates can be provided upon request.

Table 3.2 Noise monitoring equipment

LOCATION	SURVEY METHOD	MANUFACTURER AND MODEL NO.	SERIAL NO.
NM01, NM02a, NM02b and NM03	Attended measurement	Norsonic 140	1404791
NM03	Unattended measurement	Svan 958	36693

3.3 UNATTENDED NOISE SURVEY

Unattended noise monitoring for background noise levels in the vicinity of the Parramatta wharf site were carried out by WSP between 6th and 13th February 2018 for NM03.

The results are detailed in Table 3.3, and a detailed daily plot of data are presented for NM03 in Appendix A.

Table 3.3 Summary of unattended noise monitoring results

LOCATION	BACKGROUND NOISE LEVEL (dBA RBL ¹)		
	DAY ²	EVENING ²	NIGHT ²
NM03	46	46	39

1: RBL – rating background level. The overall single-figure background level representing each assessment period (daytime/evening/night-time) as defined in the NPfI.

2: Time periods defined in the NPfI – Day: 7am to 6pm Monday to Saturday, 8am to 6pm Sunday; Evening: 6pm to 10pm; Night: the remaining periods.

3.4 OPERATOR ATTENDED NOISE SURVEY

WSP carried out operator attended measurements to characterise the noise environment and identify the contributors to the acoustic environment. During the surveys, the weather was noted as being dry with light wind and suitable for noise monitoring.

The results of the attended noise surveys and observations are detailed in Table 3.4.

Table 3.4 Summary of attended noise logging results

LOCATION	TIME AND DATE	dBA Leq(15min)	dBA L90(15min)	OBSERVATIONS
NM01	Day 1:00pm-1:15pm 13/02/2018	51	48	Helicopter: up to 60dBA Cicadas: up to 55dBA Ferry pass by: up to 55dBA Restaurant operation: up to 56dBA
	Evening 8:50pm-9:05pm 12/02/2018	48	44	Vehicles on Macarthur Street: up to 59dBA Restaurant operation: up to 46dBA Aeroplane pass by: up to 58dBA
	Night 11:25pm-11:40pm 12/02/2018	46	44	Vehicles on Macarthur Street: up to 53dBA Aeroplane pass by: up to 48dBA Insects: up to 45dBA
NM02a	Day 2:00pm-2:15pm 13/02/2018	53	49	Aeroplane: up to 65dBA Birds: up to 60dBA Ferry pass by: up to 56dBA Mechanical plant from buildings across river: up to 49dBA
NM02b	Evening 9:25pm-9:40pm 12/02/2018	46	43	Vehicles on Macathur Street: up to 50dBA Aeroplane pass by: up to 60dBA Insects: up to 45dBA

LOCATION	TIME AND DATE	dBA L _{eq} (15min)	dBA L ₉₀ (15min)	OBSERVATIONS
NM02b	Night 10:40pm-10:55pm 12/02/2018	44	42	Vehicles on Macathur Street: up to 49dBA Aeroplane pass by: up to 53dBA Insects: up to 46dBA
NM03	Day 4:45pm-5:00pm 06/02/2018	57	48	Birds: up to 57dBA Aeroplane pass by: up to 73dBA Car horn: 57dBA Motorbike pass by: 55dBA Truck pass by: 53dBA

3.5 SUMMARY OF AMBIENT NOISE LEVELS

The representative background noise levels from the monitoring locations have been taken from a combination of the attended noise measurements at NM01, NM02a, NM02b and unattended noise measurement at NM03. The adopted background noise levels are summarised in Table 3.5.

Table 3.5 Summary of ambient noise level

LOCATION	BACKGROUND NOISE LEVEL (dBA RBL ¹)		
	DAY ²	EVENING ²	NIGHT ²
NM01	48	44	44
NM02	49	43	42
NM03	46	46	39

1: RBL – rating background level. The overall single-figure background level representing each assessment period (daytime/evening/night-time) as defined in the NPfI.

2: Time periods defined in the NPfI – Day: 7am to 6pm Monday to Saturday, 8am to 6pm Sunday; Evening: 6pm to 10pm; Night: the remaining periods.

4 CONSTRUCTION NOISE AND VIBRATION ASSESSMENT CRITERIA

The CNVG defines the assessment method and suggests noise management measures based on the length of the work, number of people affected and the time the works occur.

As the project duration would be greater than six weeks and there are likely to be many receivers above the NML (as defined in the CNVG), a detailed assessment method has been used within this section in line with the CNVG.

It is expected that during construction, equipment and material deliveries are carried out by waterside transportation and a small number of light and heavy vehicles to limit any traffic impacts to Charles Street, Phillip Street and surrounds. As traffic noise generation is not considered to be acoustically significant, construction traffic noise has not been assessed further.

4.1 CONSTRUCTION NOISE ASSESSMENT PERIODS

The CNVG assessment time periods applicable to the proposal are presented in Table 4.1.

Table 4.1 CNVG assessment periods

NAME	TIME PERIODS
Standard Hours (SH)	Monday to Friday – 7am to 6pm Saturday – 8am to 1pm Sunday/Public Holiday – Nil

4.2 CONSTRUCTION NOISE MANAGEMENT LEVELS

The CNVG specifies that construction NMLs are defined using the method specified in the Interim Construction Noise Guideline (ICNG, EPA 2009). They are based on the measured rating background level (RBL) as defined in the NPfI plus an additional allowance of 10 dB during standard hours. The ICNG also states that where construction noise levels are above 75 dBA at residential receivers during standard hours, they are considered ‘highly noise affected’ and require additional considerations to mitigate potential impacts.

Table 4.2 presents the construction NMLs for each assessment period for residential receivers in each NCA. The NMLs have been calculated from the measured RBL in each NCA as shown in Table 3.3.

Table 4.2 Noise Management Levels (NML) at residential receivers

NCA	NOISE MONITORING LOCATION	dBA RBL	NML dBA $L_{eq(15min)}$ ¹	
			STANDARD HOURS	HIGHLY NOISE AFFECTED
NCA01	NM03	46	56	75
NCA02	NM03	46	56	75
NCA03	NM02	49	59	75
NCA04	NM01	48	58	75
NCA05	NM02	49	59	75

1: Time periods as defined in Table 4.1.

Table 4.3 lists the NMLs that have been adopted for non-residential sensitive receivers. The NMLs apply when the premises are in use during any assessment period.

Table 4.3 Noise Management Levels (NML) at non-residential receivers

LAND USE	NML dBA $L_{eq(15 min)}$
Commercial ¹	70
Education institutions	55 ²
Active recreation	65
Place of worship	55 ²

1: The external noise levels should be assessed at the most affected occupied point on the premises

2: A 10 dB correction has been applied to the internal noise levels to reflect external noise levels as indicated in the ICNG

4.3 CONSTRUCTION VIBRATION CRITERIA

Construction vibration can lead to:

- Cosmetic and structural building damage.
- Loss of amenity due to perceptible vibration, termed human comfort.

Importantly, cosmetic damage is regarded as minor in nature; it is readily repairable and does not affect a building's structural integrity. Damage of this nature is typically described as hairline cracks on drywall surfaces, hairline cracks in mortar joints and cement render, enlargement of existing cracks, and separation of partitions or intermediate walls from load bearing walls. If there is no significant risk of cosmetic damage, then structural damage is not considered a significant risk and is not further assessed.

4.3.1 COSMETIC BUILDING DAMAGE

The CNVG presents safe working distances based on the British Standard BS 7358-2: *Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration*. This provides guidance on the 'evaluation and measurement of vibration in buildings' and defines guidance for categorising building damage in terms of 'cosmetic', 'minor' and 'major'; providing limits for each. The cosmetic damage criteria are presented in Table 4.4.

Table 4.4 BS 7385 Cosmetic damage criteria

GROUP	TYPE OF STRUCTURE	PEAK COMPONENT PARTICLE VELOCITY, (mm/s) ¹		
		4–15 Hz	15–40 Hz	40 Hz and above
1	Reinforced or framed structures Industrial or heavy commercial buildings	50		
2	Un-reinforced or light framed structures Residential or light commercial buildings	15 – 20 ²	20 – 50	50

1: Values referred to are at the base of the building, on the side of the building facing the source of vibration (where feasible).

2: At frequencies below 4Hz, a maximum displacement of 0.6mm (zero to peak) should not be exceeded.

These peak vibration limits are set so that the risk of cosmetic damage is minimal. They have been set at the lowest level above which damage has been credibly demonstrated. The limits also assume that the equipment causing the vibration is only used intermittently. For ‘minor’ or ‘major’ vibrational damage to occur, the standard states that vibration need to be two times and four times (respectively for group 1 and group 2) the values shown in Table 4.4.

4.3.2 HUMAN COMFORT (AMENITY)

Vibration generated by impact piling construction work is generally classified as impulsive and has the potential to affect human comfort.

The criteria for impulsive vibration for applicable receiver groups are shown in Table 4.5 as peak velocity (mm/s), with the proposed construction vibration limits highlighted.

Table 4.5 Vibration limits for human exposure from impulsive vibration

LOCATION	ASSESSMENT PERIOD	PEAK VELOCITY (mm/s)	
		PREFERRED VALUES	MAXIMUM VALUES
Residences	Daytime	8.6	17.0
Offices, schools, educational institutions, and places of worship	Anytime	18.0	36.0
Workshops	Anytime	18.0	36.0

4.3.3 HERITAGE STRUCTURE

One heritage structure has been identified located approximately 50m to the proposal, comprising the Charles Street Weir (City of Parramatta Council Local Environmental Plan item #I733).

Building structures classified as being of heritage significance are assessed based on their potential sensitivity to vibration impacts. A heritage listed structure may not necessarily be sensitive to vibration and it would typically require a detailed survey to confirm its structural integrity (whether it can be classified as structurally unsound) should potential impacts are identified by the assessment. Where a historic structure is identified as potentially impacted and deemed to be sensitive following inspection by qualified structural and / or civil engineer, more conservative superficial cosmetic damage criterion based on peak component particle velocity (PPV) (German Standard DIN 4150-3: 1999 *Structural Vibration – Part 3: Effects of vibration on structures* or equivalent) should be considered.

A conservative vibration damage screening (trigger) PPV level of 7.5 mm/s is recommended for the heritage item listed in the proposal and has been established with reference to the minor cosmetic damage criteria in British Standard BS 7385 Part 2-1993. The vibration levels specified in this standard are designed to minimise the risk of threshold or cosmetic surface cracks, and are set well below the levels that have potential to cause damage to the main structure.

5 PROPOSED CONSTRUCTION METHOD

The following section provides the proposed construction working hours, nominated equipment and corresponding Sound Power Level (SWL).

5.1 CONSTRUCTION STAGES AND DURATION

The proposal would be constructed in stages with the stages occurring at different times of the day depending on the activity. Table 5.1 presents the assessed construction scenarios, the working times and durations as supplied by the client.

Table 5.1 Construction stages and duration

SCENARIO REFERENCE	CONSTRUCTION STAGE	PERIOD	DURATION
S01	General wharf construction, including removal and reinstallation of landside infrastructure.	Standard hours	6 months
S02	Demolition and removal of piles	Standard hours	4 weeks
S03	Modification of existing seawall, including cutting concrete, excavation, backfilling and concrete pouring.	Standard hours	3 months
S04	Lifting pre-fabricated sections of the seawall and other units including the pontoon and gangway after pile installation	Standard hours	Periodically over 3 months
S05	Pile installation (drilling)	Standard hours	2 weeks
S06	Pile installation (hammering)	Standard hours	

5.2 CONSTRUCTION WORK SCENARIOS AND EQUIPMENT

The construction scenarios and equipment noise levels provided are based on discussion and supplied material from Roads and Maritime. The nominated equipment of the associated construction work scenarios and the activity SWLs are detailed in Table 5.2.

Table 5.2 Construction equipment and sound power levels

EQUIPMENT	SOUND POWER LEVEL, dBA	TYPICAL USAGE PER 15 MINUTE	NO. OF EQUIPMENT PER SCENARIO					
			S01	S02	S03	S04	S05	S06
Angle grinders ^{1,3}	114	25%		1				
Barge ²	95	50%	1	1	1			
Boat ²	100	100%	1	1	1	1	1	1
Compressor ³	109	100%	1			1		
Crane ³	104	100%	1	1	1	1	1	1
Generator ²	103	100%	1	1	1	1	1	1
Hand tools (electric) ³	110	25%	1	1	1	1		
Piling rig (boring) ³	112	100%					1	
Piling rig (impact) ^{1,2}	115	50%						1
Light vehicle ³	88	4 movements	1					
Concrete saw ^{1,3}	118	25%			1			
Concrete truck ³	109	1 movement			1			
Concrete pump ³	102	100%			1			
Jack hammer ^{1,3}	115	50%			1			
Small excavator ³	110	100%			1			
Scenario sum sound power level, dBA			112	112	118	112	113	113

1: To account for the annoying characteristics of the plant, a +5 dB correction has been added to the overall scenario noise level in accordance with the ICNG.

2: Noise levels provided based on a previous study of the proposal and approved by Roads and Maritime

3: Noise level extracted from Noise estimator calculator provided by Roads and Maritime

6 ASSESSMENT OF CONSTRUCTION NOISE IMPACTS

6.1 METHODOLOGY

A noise model was prepared using the SoundPLAN 7.4 Industrial Module. The software allows the use of various internationally recognised noise modelling algorithms. Following discussions between Roads and Maritime and WSP it was determined that the CONCAWE modelling method was most suitable for this assessment (Aconex NSW-CA-002403, dated 23 February 2018)

A three-dimensional representation of the physical environment within the project area was simulated. Modelling inputs for each scenario included ground contours, locations of sensitive receivers, noise-generating equipment as well as any other inputs which have an effect on the noise environment, such as the buildings surrounding the proposed site.

The following assumptions were used in the modelling:

- All noise sources in each scenario operating simultaneously unless otherwise stated.
 - The sound levels in this report represent the $L_{Aeq(15\text{ min})}$ emission level.
 - Topography for the area provided by Geosciences Australia.
 - Receiver heights 1.5 m above ground level.
-

6.2 MODELLED CONSTRUCTION NOISE LEVELS

The modelled noise levels for each scenario are presented in Table 6.1 outlining the noise level within each NCA and receiver types. The modelled noise levels have been assessed at the closest affected receiver within each NCA.

The formatting within the table indicates the following:

- The **orange shaded cells** show exceedances of the daytime period.

Table 6.1 Modelled construction noise levels

NOISE CATCHMENT AREA (NCA)	NML dBA		MODELLED HIGHEST NOISE LEVEL PER SCENARIO (dBA L _{eq} (15MIN))					
	HNA ¹	SH ¹	S01	S02	S03	S04	S05	S06
Residential receivers								
NCA01	75	56	36	36	39	36	35	35
NCA02	75	56	40	39	44	40	41	41
NCA03	75	59	59	58	63	59	61	61
NCA04	75	58	68	68	72	67	69	69
NCA05	75	59	43	42	47	43	45	45
Commercial receivers								
NCA01	N/A	70	< 30	< 30	< 30	< 30	< 30	< 30
NCA02	N/A	70	42	42	47	42	44	44
NCA03	N/A	70	< 30	< 30	< 30	< 30	< 30	< 30
NCA04	N/A	70	76	76	80	76	74	74
NCA05	N/A	70	39	38	44	39	40	40
Active recreational receivers								
NCA02	N/A	65	44	43	48	43	45	45
NCA03	N/A	65	52	52	57	52	54	54
NCA05	N/A	65	< 30	< 30	< 30	< 30	< 30	< 30
Educational institution								
NCA01	N/A	55	< 30	< 30	< 30	< 30	< 30	< 30
NCA02	N/A	55	44	43	48	43	45	45
NCA03	N/A	55	53	53	57	53	54	54
NCA04	N/A	55	< 30	< 30	< 30	< 30	< 30	< 30
NCA05	N/A	55	< 30	< 30	< 30	< 30	< 30	< 30
Place of worship								
NCA01	N/A	55	37	37	43	37	39	39
NCA02	N/A	55	< 30	< 30	< 30	< 30	< 30	< 30
NCA03	N/A	55	< 30	< 30	< 30	< 30	< 30	< 30
NCA04	N/A	55	< 30	< 30	< 30	< 30	< 30	< 30
NCA05	N/A	55	37	37	43	37	39	39

1: HNA – Highly noise affected; SH – Standard Hours

6.2.1 RESIDENTIAL RECEIVERS

The assessment of construction noise impacts at the residential receivers indicate that:

- No exceedances of NML are predicted at NCA01, NCA02 and NCA05
- Exceedances of NML are predicted at NCA03 during:
 - Scenario S03 by up to 4 dB.
 - Scenarios S05 and S06 by up to 2 dB,
 - No exceedances of NML are predicted at S01, S02 and S04
- Exceedances of NML are predicted at NCA04 during:
 - Scenarios S01, S02 and S04 by up to 10 dB,
 - Scenario S03, S05 and S06 by up to 14 dB.
- No exceedances of the HNA criteria were identified.

The construction scenario with the highest predicted exceedances is for the modification of seawall and landside infrastructure scenario (S03).

As a result of the predicted exceedances, noise mitigation and management measures have been outlined in Section 8 to reduce the potential noise impacts.

6.2.2 NON-RESIDENTIAL RECEIVERS

The assessment of construction noise impacts at the non-residential receivers indicate that:

- Exceedances of NML are predicted at NCA03:
 - For the education receiver immediately north of the proposal site by up to 2 dB
- Exceedances of NML are predicted at NCA04:
 - For the commercial receiver, immediately south of the proposal site by up to 10 dB
- No exceedances of NML are predicted at for other receivers

As a result of the predicted exceedances, noise mitigation and management measures have been outlined in Section 8 to reduce the potential noise impact.

7 ASSESSMENT OF CONSTRUCTION VIBRATION IMPACTS

Certain construction activities would require the use of vibration intensive equipment that may affect the nearest sensitive receivers. The vibration intensive plant nominated as part of the work are jackhammer, pile boring and pile hammering equipment (S03, S05 and S06 respectively).

7.1 SAFE WORKING DISTANCES FOR VIBRATION INTENSIVE PLANT

Table 7.1 presents the indicative safe working distances for the nominated construction plant to minimise the risk of structural damage and human comfort for sensitive receivers.

The distances are primarily based on the safe working distance provided in the CNVG. For driven piles (hammering, S04), the distance was calculated based on meeting the most stringent cosmetic damage criteria in BS 7358-2 for residential properties and Assessing Vibration: A Technical Guideline.

The safe working distances are based on the typical distance from receivers' work permitted to be carried out to meet the limits set out in Section 4.3. The distances are indicative only and results may vary depending on the activity, equipment, local ground, and receiver conditions.

The compliance safe working distance for cosmetic damage for reinforced heritage structure (with the nominated screening limit of 7.5mm/s PPV as per Section 4.3.3) was calculated based on assumed source vibration level compliant with 15mm/s PPV vibration limit of cosmetic damage nominated within the CNVG.

Table 7.1 Recommended safe working distances for vibration intensive plant

PLANT ITEM	RATING/ DESCRIPTION	SAFE WORKING DISTANCE		
		COSMETIC DAMAGE ¹	COSMETIC DAMAGE FOR REINFORCED HERITAGE STRUCTURE ²	HUMAN RESPONSE ¹
Pile boring	≤ 800mm	2 m (nominal)	4 m	4 m
Driven piles	Typical driven pile ³	20 m	25 m	30-50 m
Jackhammer	Hand held	1m (nominal)	3 m	Avoid contact with structure

1: Referenced from Roads and Maritime's CNVG

2: The compliance safe working distance with the nominated screening limit of 7.5mm/s PPV as per Section 4.3.3 for reinforced / well maintained structure was calculated based on assumed source vibration level compliant with 15mm/s PPV vibration limit of cosmetic damage nominated within the CNVG.

3: Vibration levels for driven piling modelled in line with FTA Noise and Vibration manual. Driven piles plant item to represent impact piling rig.

7.2 MODELLED CONSTRUCTION VIBRATION LEVELS

A prediction of vibration levels has been undertaken to provide an indication of the vibration levels due to hammer piling (S06) at the nearest receivers from the footprints based on the given the distances to the identified sensitive receivers and the piling equipment. Distances of nearest receivers to landside and waterside works have been provided in Table 2.2. Residential and non-residential receivers within NCA04 have been identified to be located at distances less than the safe working distance for human response when driven piling (impact piling rig) equipment is in use.

As a result of the predicted exceedances, vibration mitigation and management measures have been outlined in Section 8 to reduce the potential vibration impact.

Cosmetic damage to reinforced heritage structures is not anticipated as all identified heritage structure are located at distances greater than the minimum safe working distances.

Vibration impacts are not anticipated for the waiting shelter located directly adjacent to the ferry wharf as a result of the equipment proposed based on the construction activities to be undertaken.

8 CONSTRUCTION SAFEGUARDS AND MANAGEMENT MEASURES

This section describes the noise and vibration safeguards and management measures that should be considered as part of Road and Maritime’s commitments for the construction of the proposal. The construction noise and vibration impact assessment and mitigation should be reviewed in more detail as the project progresses and more information regarding the construction program becomes available.

This section describes the required noise and vibration safeguards and management measures as per the CNVG that should be considered as part of Road and Maritime’s commitments for the construction of the proposal. The measures provided in this section would be dependent upon the final equipment selected for use, to be determined by the construction contractor.

As part of the preparation for commencing the construction work, a construction noise and vibration management plan (CNVMP) should be prepared.

8.1 STANDARD MITIGATION MEASURES

As a result of the modelled exceedance of the NMLs, reasonable and feasible mitigation measures to minimise noise levels from the construction work have been investigated. The CNVG provides standard actions and mitigation measures for implementation on road construction projects, which is also considered to be applicable here. A copy of the relevant measures is provided in Appendix B.

It is understood that pile installation would occur in respite periods outside of sensitive hours (e.g. out of school hours and peak hour of operation for nearby commercial receivers such as cafes), subject to further communication. This is to reduce the impacts during sensitive hours for the surrounding receivers.

8.1.1 NOISE MITIGATION MEASURES

The following measures outlined in Table 8.1 have been developed for this specific site and should be considered to minimise the predicted noise impacts from building the proposal.

Table 8.1 Recommended site specific controls

EQUIPMENT / PROCESS	DESCRIPTION	POTENTIAL BENEFITS
All plant	Limiting number of plant and use of alternative equipment and /or using a different, quieter method to carry out the work. For this project: Where feasible, limited number of plant (like the chainsaw, concrete saw, jackhammer) to no more than 1 item of equipment operating at any one time.	Up to 3 dB or more reduction of scenario S03 noise level.
Site design	Where feasible and practicable, any site hording or fences erected should be constructed with thick plywood or fitted with temporary acoustic barriers to provide additional noise reduction at the immediate receivers. Note that acoustic barriers are effective where there is no line of sight between the noise sources and receivers. Therefore, this mitigation method is not beneficial for receivers within high rise buildings with direct line of sight to the project site.	Reduction of up to 5 dB to 10 dB at the nearest receivers to the project site.

EQUIPMENT / PROCESS	DESCRIPTION	POTENTIAL BENEFITS
Stationary plant, equipment and activities i.e. Concrete saw, Jack hammer, Concrete pump, Compressor, Generator, Hand tools	Considered implementation of temporary barriers around the stationary sources or use of alternative quieter equipment. Where temporary noise barriers are used to block line of sight between stationary works and equipment (paving, road cutting, jackhammering, compressor and generator) and the receivers, a reduction of around 5 dB to 10 dB could be expected.	Reduction of up to 5 dB to 10 dB at the nearest receivers to the project site
Material pre-fabrication	Potential noise impacts have been minimised through the design of the proposal which involves undertaking as much construction work as possible at a contractor's off-site facility rather than at site, including assemblage of pre-fabricated components.	Lower likelihood of construction noise to be higher than modelled levels.

As required by the CNVG, after feasible and reasonable mitigation measures have been implemented, additional mitigation measures as outlined in Section 8.2 should be considered.

8.1.2 VIBRATION MITIGATION MEASURES

Feasible and reasonable safeguards should be introduced when using piling equipment (hammering) is used for areas located within less than the safe working distances identified for sensitive receivers. To minimise the potential for impacts on the surrounding sensitive receivers on-site specific vibration monitoring should be carried out to confirm vibration levels and safe working distances for the vibration intensive plant and equipment.

8.2 ADDITIONAL MITIGATION MEASURES

Additional mitigation measures should be considered after the application of reasonable and feasible noise mitigation measures. Definitions of the abbreviations of the additional mitigation measures for noise and vibration are provided in Table 8.2.

The following additional mitigation measures (as detailed in Appendix C of CNVG) should be considered where an exceedance of construction noise and vibration levels would be present after implementation of the standard measures outlined in Appendix B and to be included as part of the above noise management plan.

Table 8.2 Applicable CNVG Abbreviation measures

ABBREVIATION	MEASURES
N	<p>Notification (letterbox drop or equivalent)</p> <p>Advanced warning of works and potential disruptions can assist in reducing the impact on the community. The notification may consist of a letterbox drop (or equivalent) detailing work activities, time periods over which these will occur, impacts and mitigation measures. Notification should be a minimum of 5 working days prior to the start of works. The approval conditions for projects may also specify requirements for notification to the community about works that may impact on them.</p>
V	<p>Verification</p> <p>Refer to Appendix F of the RMS CNVG for more details about verification of Noise and Vibration levels as part of routine checks of noise levels or following reasonable complaints. This verification should include measurement of the background noise level and construction noise. Note this is not required for projects less than three weeks duration unless to assist in managing complaints.</p>
RP	<p>Respite period</p> <p>Respite periods should be considered made where there are high noise and vibration generating activities near receivers. As a guide work should be carried out in continuous blocks that do not exceed 3 hours each, with a minimum respite period of one hour between each block. The actual duration of each block of work and respite should be flexible to accommodate the usage of and amenity at nearby receivers.</p>

8.2.1 ADDITIONAL NOISE MITIGATION MEASURES

The most onerous additional noise mitigation measures that apply for each NCA and construction scenario are presented in Table 8.3. Appendix C provides a map of NCAs with the area that require additional noise mitigation measures due to worst case exceedances of the proposed construction activities. The presented maps of affected areas and associated additional mitigation measures are calculated based on modelled exceedances of the nominated NMLs.

Definitions of the abbreviations of the additional mitigation measures are provided in Table 8.2.

Table 8.3 Additional mitigation measures - Airborne

NCA	ADDITIONAL MITIGATION MEASURES (AIRBORNE)					
	S01	S02	S03	S04	S05	S06
NCA03	-	-	See note 1	-	See note 1	See note 1
NCA04	See note 1	See note 1	N, V	See note 1	N, V	N, V

1: No additional mitigation is required for exceedances within the standard hours below 10 dB of the NMLs.

8.2.2 ADDITIONAL VIBRATION MITIGATION MEASURES

The predicted vibration levels in Section 7 indicate that the nearest residential and commercial receivers located within 50m from the site may perceive some vibration levels (human response) from S06 piling (hammering) during the period it is operating. As such, additional vibration mitigation measures should be considered after the application of reasonable and feasible mitigation measures as provided in Table 8.4.

Definitions of the abbreviations of the additional mitigation measures are provided in Table 8.2.

Table 8.4 Additional mitigation measures - Vibration

NCA	ADDITIONAL MITIGATION MEASURES (VIBRATION)
	S06
NCA04	N, V, RP

It should be noted that the respite period has been considered by the project and is subject to further communication with the stakeholders.

To accommodate the usage of and amenity of nearby receivers within the human response safe working distance for S06 piling (hammering), appropriate respite period would be agreed upon through consultation with receivers located within 50m of the site.

9 CONCLUSION

WSP has undertaken a construction noise and vibration assessment for the proposed Parramatta Wharf Interchange upgrade.

Six construction scenarios have been assessed for five noise catchment areas surrounding the proposal site. The key findings of this assessment include:

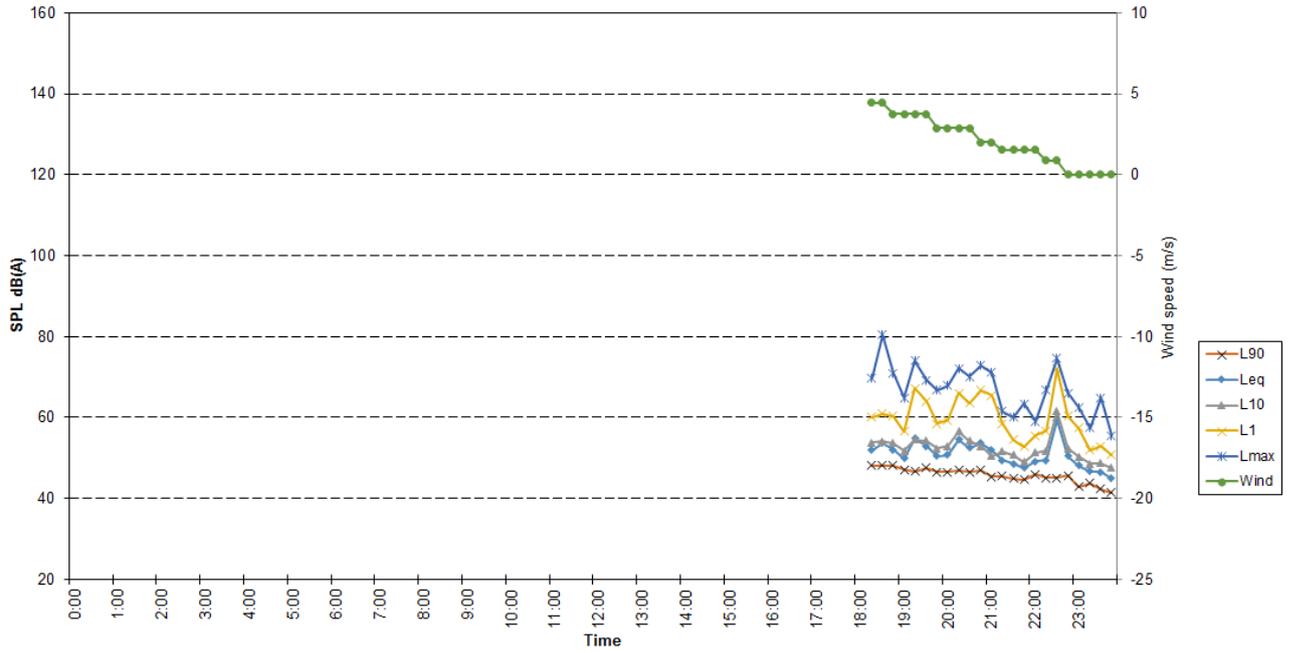
- NMLs were derived for residential and non-residential sensitive land uses using the ICNG in accordance with the CNVG based on background noise monitoring.
- NML exceedances predicted at residential receivers for:
 - All scenarios at NCA04
 - Scenario S03, S05 and S06 at NCA03
- Additional noise mitigation measures are required for Scenario S03, S05 and S06 at NCA04.
- Potential vibration impacts predicted for residential and non-residential receivers in NCA04 for human exposure when driven piles equipment is in use.
- Additional vibration mitigation measures are required for S06 at NCA04.
- No cosmetic damage is anticipated for the identified heritage structure (Charles Street Weir).
- The standard CNVG construction noise and vibration management measures and additional mitigation measures are recommended for the receivers within NCAs with predicted exceedances.

APPENDIX A

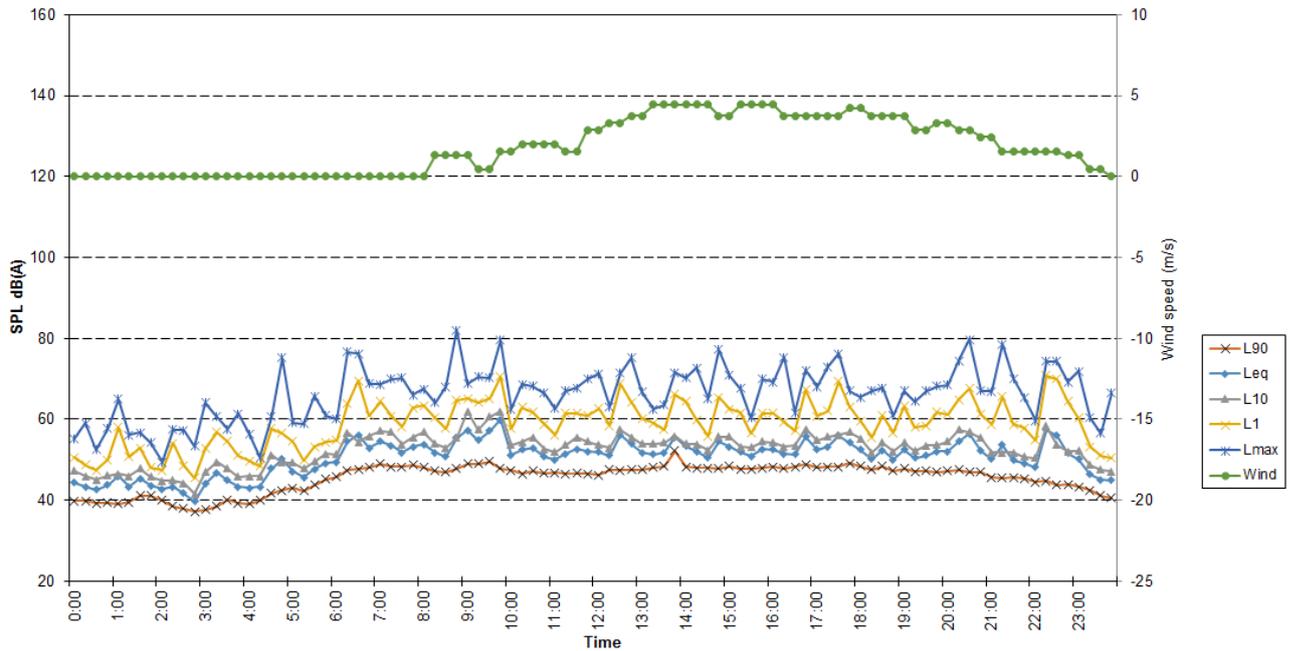
NOISE MONITORING RESULTS – NM03
8 MACARTHUR STREET



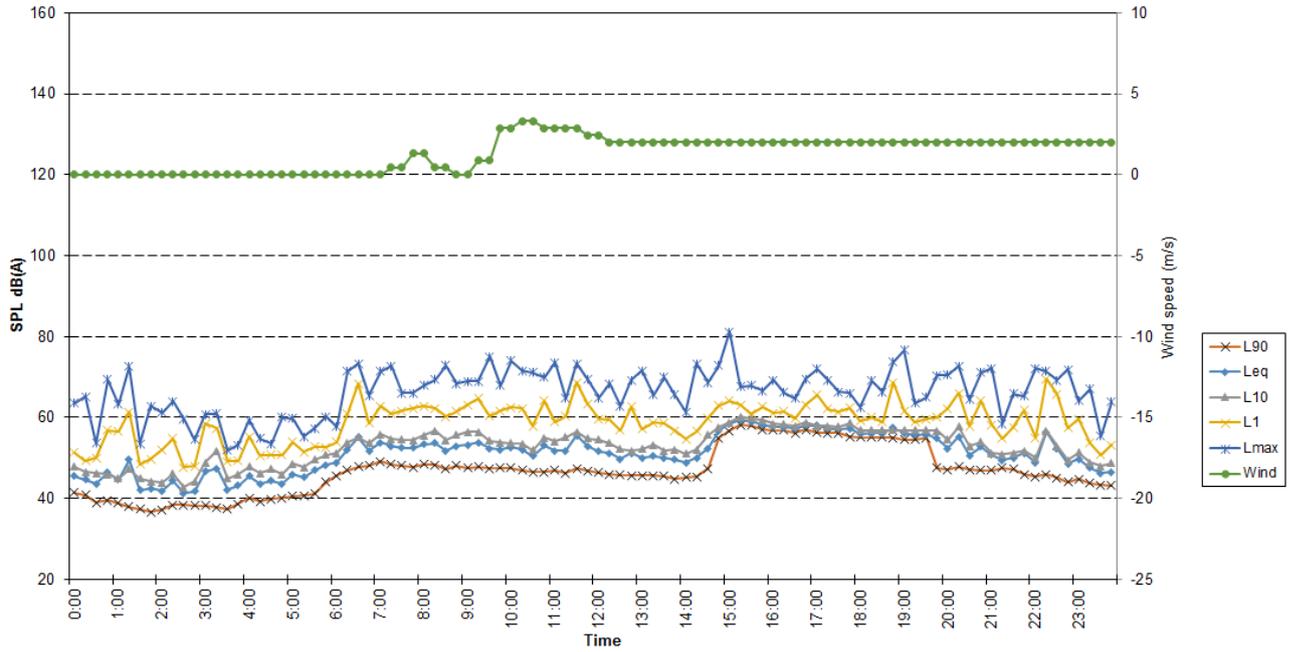
Location - NM03
 Measured Noise Levels - Tuesday 06/02/2018



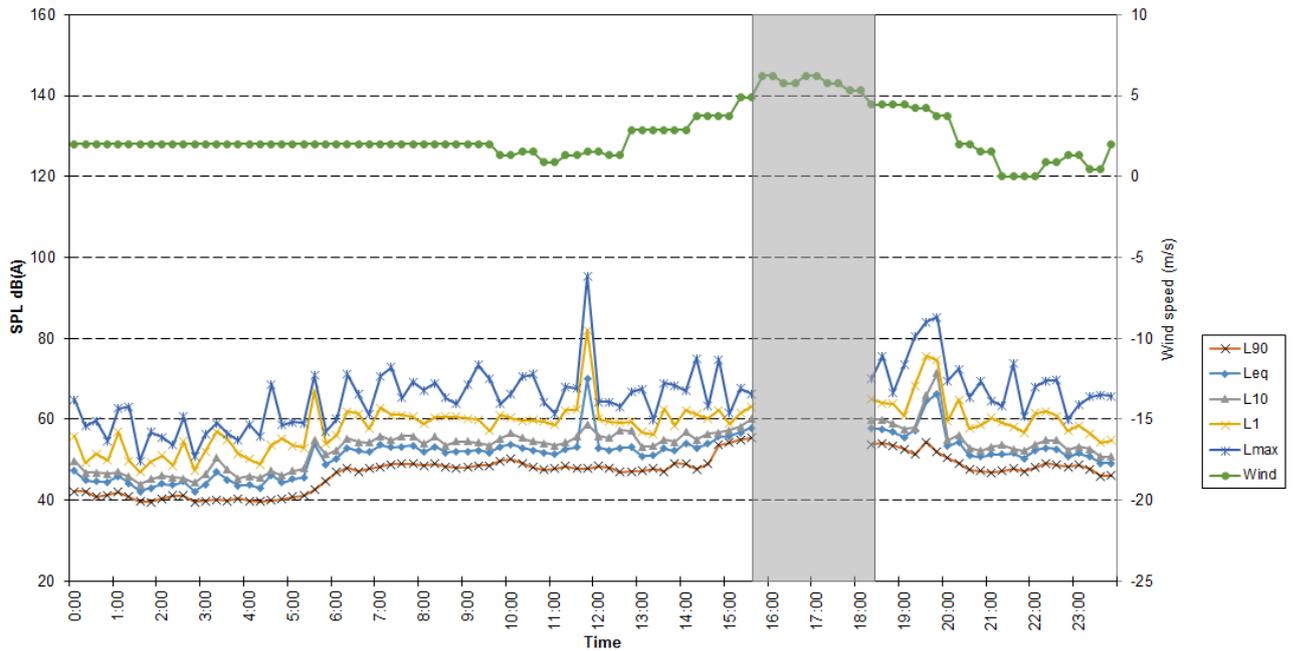
Location - NM03
 Measured Noise Levels - Wednesday 07/02/2018



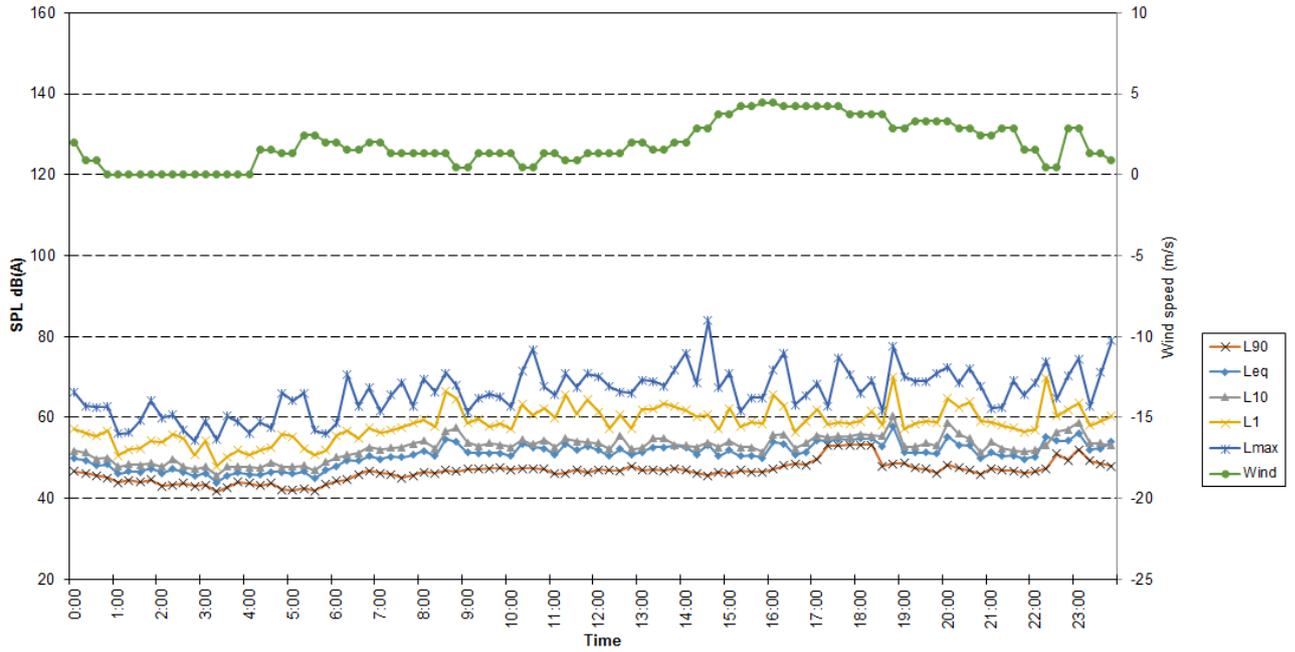
Location - NM03
 Measured Noise Levels - Thursday 08/02/2018



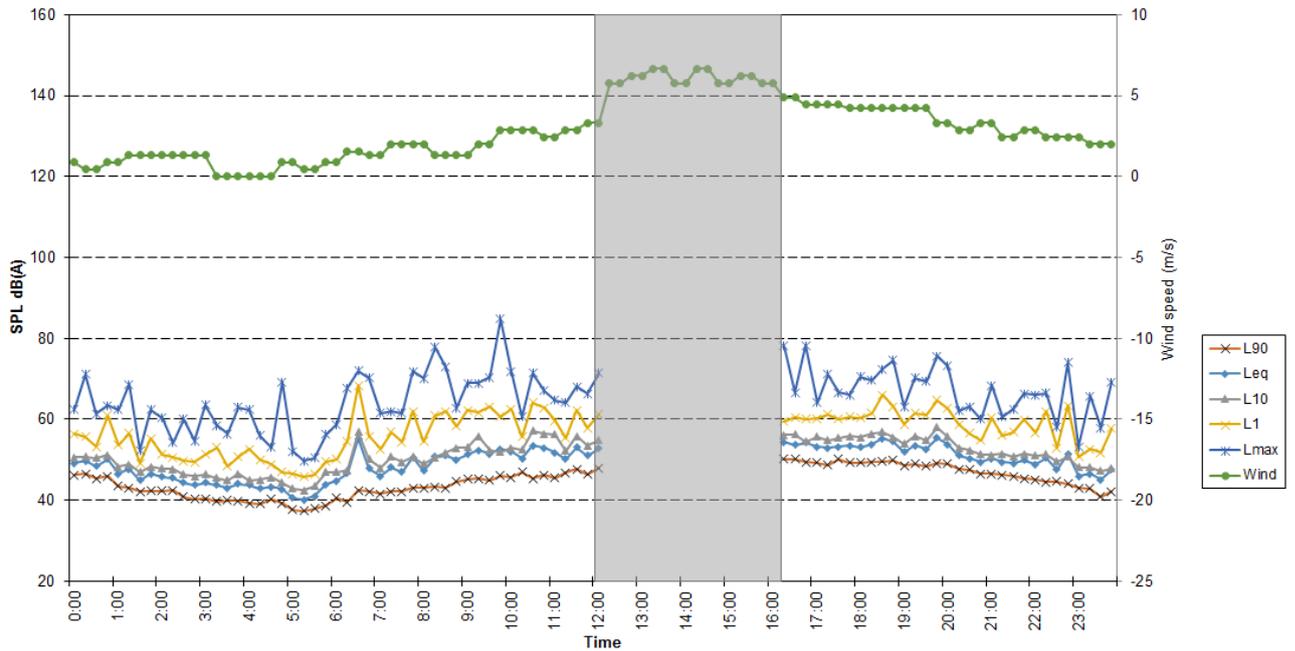
Location - NM03
 Measured Noise Levels - Friday 09/02/2018



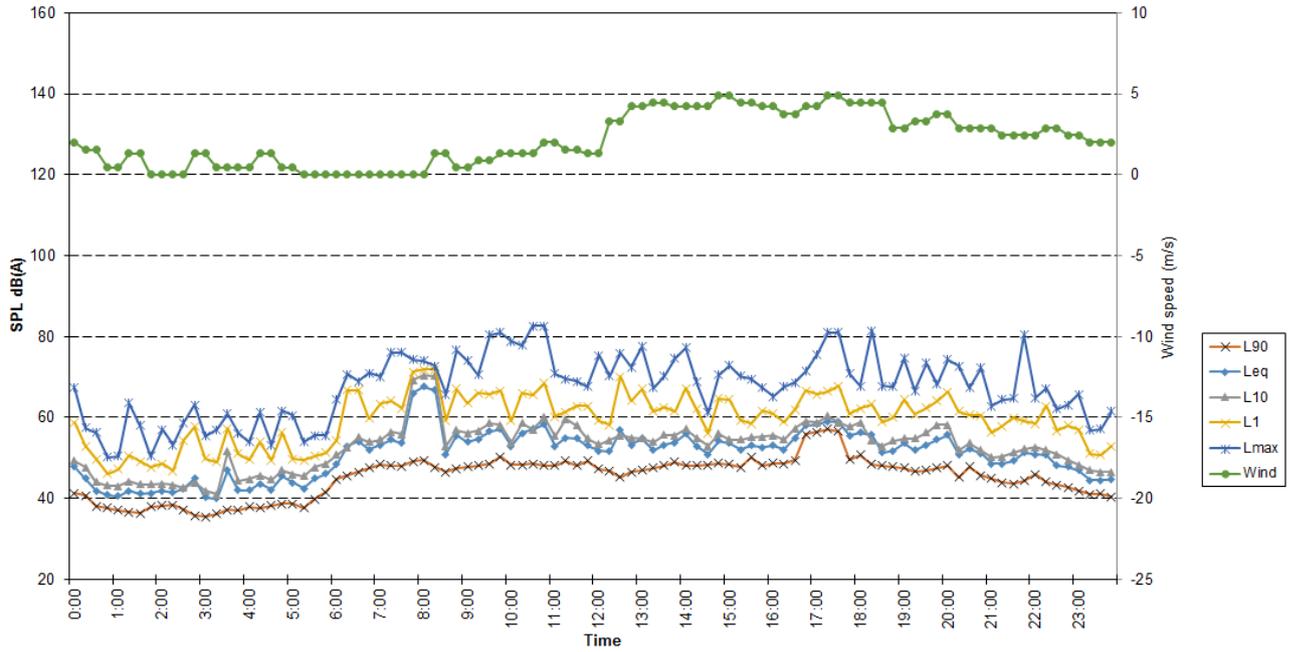
Location - NM03
 Measured Noise Levels - Saturday 10/02/2018



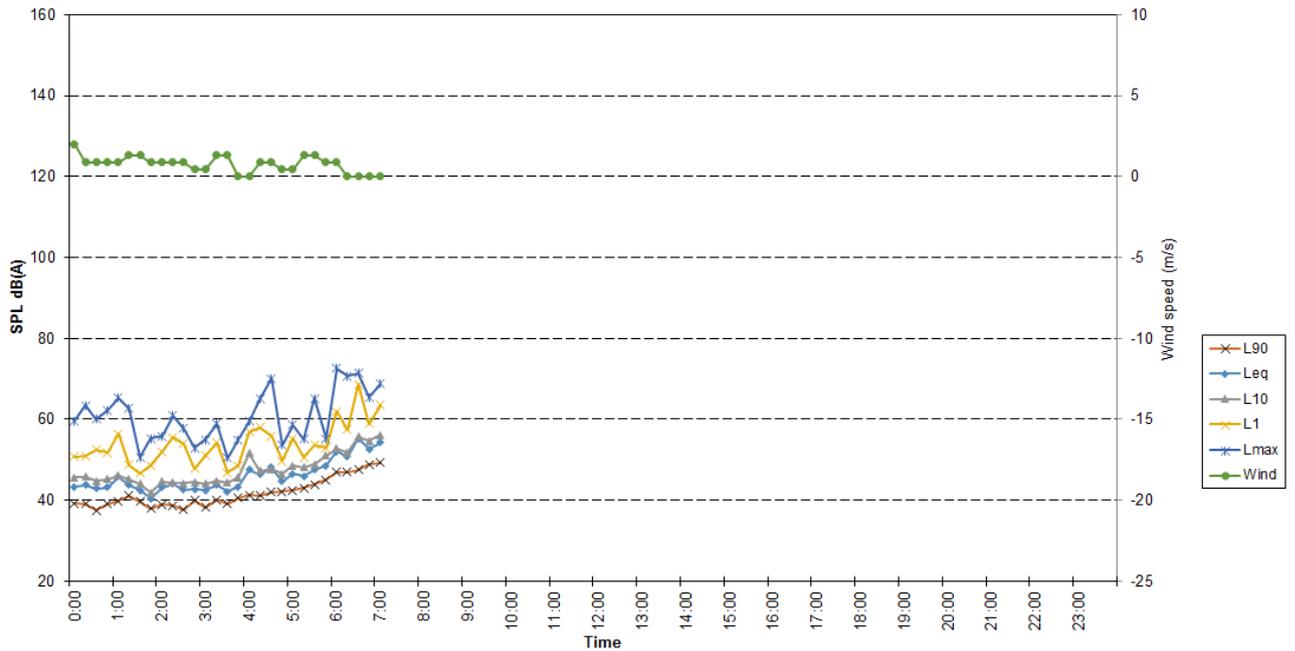
Location - NM03
 Measured Noise Levels - Sunday 11/02/2018



Location - NM03
 Measured Noise Levels - Monday 12/02/2018



Location - NM03
 Measured Noise Levels - Tuesday 13/02/2018



APPENDIX B

CNVG STANDARD MITIGATION MEASURES



ACTION REQUIRED	APPLIES TO	DETAILS
Management measures		
Implementation of any project specific mitigation measures required.	Airborne noise	Implementation of any project specific mitigation measures required.
Implement community consultation or notification measures (refer to Appendix C for further details of each measure).	Airborne noise. Ground-borne noise & vibration.	<p>Notification detailing work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night time period, any operational noise benefits from the works (where applicable) and contact telephone number.</p> <p>Notification should be a minimum of 7 calendar days prior to the start of works. For projects other than maintenance works more advanced consultation or notification may be required.</p> <p>Please contact Roads and Maritime Communication and Stakeholder Engagement for guidance.</p> <p>Website (If required)</p> <p>Contact telephone number for community Email distribution list (if required)</p> <p>Community drop in session (if required by approval conditions).</p>
Site inductions	Airborne noise. Ground-borne noise & vibration	<p>All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include:</p> <ul style="list-style-type: none"> — all project specific and relevant standard noise and vibration mitigation measures — relevant licence and approval conditions — permissible hours of work — any limitations on high noise generating activities — location of nearest sensitive receivers — construction employee parking areas — designated loading/unloading areas and procedures — site opening/closing times (including deliveries) — environmental incident procedures.
Behavioural practices	Airborne noise	<p>No swearing or unnecessary shouting or loud stereos/radios on site.</p> <p>No dropping of materials from height, throwing of metal items and slamming of doors.</p>
Verification	Airborne noise Ground-borne noise & vibration	Where specified a noise verification program is to be carried out for the duration of the works in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions.
Attended vibration measurements	Ground-borne vibration	Where required attended vibration measurements should be undertaken at the commencement of vibration generating activities to confirm that vibration levels are within the acceptable range to prevent cosmetic building damage.

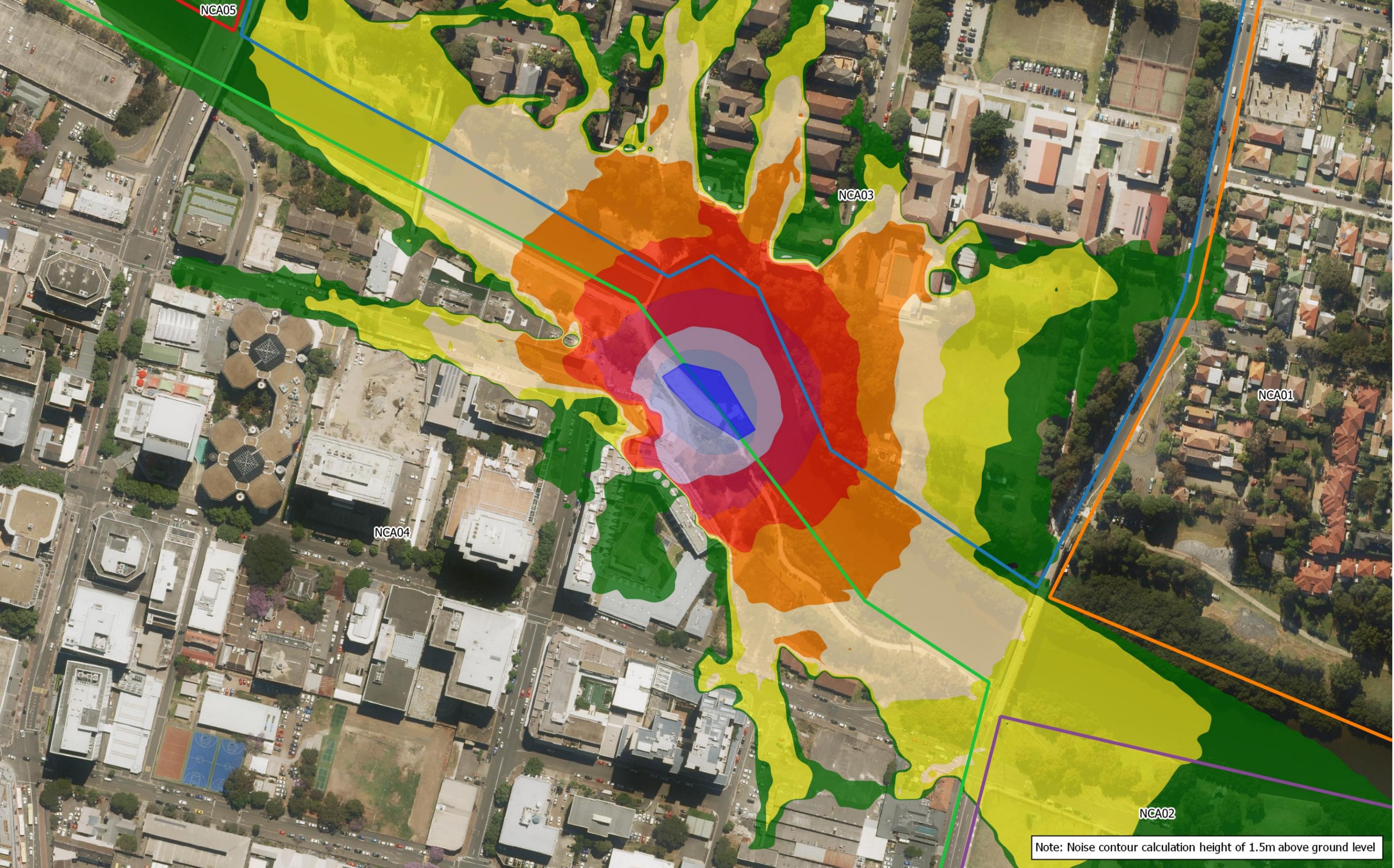
ACTION REQUIRED	APPLIES TO	DETAILS
Update Construction Environmental Management Plans	Airborne noise. Ground-borne noise & vibration.	The CEMP must be regularly updated to account for changes in noise and vibration management issues and strategies.
Source controls		
Equipment selection.	Airborne noise. Ground-borne noise & vibration	Use quieter and less vibration emitting construction methods where feasible and reasonable. For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration benefits. Ensure plant including the silencer is well maintained.
Plant noise levels.	Airborne-noise.	The noise levels of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with the criteria in Table 5.2. Implement a noise monitoring audit program to ensure equipment remains within the more stringent of the manufacturers specifications or Table 5.2.
Rental plant and equipment.	Airborne-noise.	The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the criteria in Table 5.2.
Use and siting of plant.	Airborne-noise.	The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive receivers. Only have necessary equipment on site.
Plan worksites and activities to minimise noise and vibration.	Airborne noise. Ground-borne vibration.	Locate compounds away from sensitive receivers and discourage access from local roads. Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site. Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible. Very noise activities should be scheduled for normal working hours. If the work can not be undertaken during the day, it should be completed before 11:00pm. Where practicable, work should be scheduled to avoid major student examination periods when students are studying for examinations such as before or during Higher School Certificate and at the end of higher education semesters.

ACTION REQUIRED	APPLIES TO	DETAILS
		If programmed night work is postponed the work should be re-programmed and the approaches in this guideline apply again.
Reduced equipment power	Airborne noise. Ground-borne vibration.	Use only the necessary size and power
Non-tonal and ambient sensitive reversing alarms	Airborne noise.	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work. Consider the use of ambient sensitive alarms that adjust output relative to the ambient noise level.
Minimise disturbance arising from delivery of goods to construction sites.	Airborne noise.	Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers. Select site access points and roads as far as possible away from sensitive receivers. Dedicated loading/unloading areas to be shielded if close to sensitive receivers. Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible. Avoid or minimise these out of hours movements where possible.
Engine compression brakes	Construction vehicles	Limit the use of engine compression brakes at night and in residential areas. Ensure vehicles are fitted with a maintained Original Equipment Manufacturer exhaust silencer or a silencer that complies with the National Transport Commission's 'In-service test procedure' and standard.
Path controls		
Shield stationary noise sources such as pumps, compressors, fans etc.	Airborne noise.	Stationary noise sources should be enclosed or shielded where feasible and reasonable whilst ensuring that the occupational health and safety of workers is maintained. Appendix D of AS 2436:2010 lists materials suitable for shielding.
Shield sensitive receivers from noisy activities.	Airborne noise.	Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when situating plant.
Receptor controls		
See Appendix C for additional measures	Airborne noise. Ground-borne vibration.	In some instances additional mitigation measures may be required.

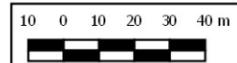
APPENDIX C

ADDITIONAL MITIGATION MEASURE LOCATIONS

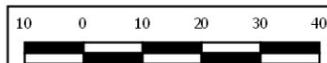




Note: Noise contour calculation height of 1.5m above ground level

Map: Construction S03 modelled noise levels	Author: TDN		 1:2,000 at A3	Legend <ul style="list-style-type: none"> ■ Construction footprint ■ NCA01 ■ NCA02 ■ NCA04 ■ NCA05 	Noise Levels, dBA Leq <ul style="list-style-type: none"> ■ 40 - 45 ■ 45 - 50 ■ 55 - 60 ■ 60 - 65 ■ 65 - 70 ■ 70 - 75 ■ 75 - 80 ■ > 80 	Sydney Ferry Wharfs Construction and vibration noise impact assessment 
Date: 24/04/2018	Approved by: SM					



Map: Construction S03, S05 and S06 mitigations	Author: TDN		 1:1,200 at A3	Legend  Construction footprint  NCA01  NCA02	Mitigations  N, V	Sydney Ferry Wharfs Construction and vibration noise impact assessment
Date: 24/04/2018	Approved by: SM			 NCA03  NCA04  NCA05	 www.wsp.com	

To be read in conjunction with WSP document: 2271407A-180424-TDN-PARRAMATTA FERRY WHARF Final Issue
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Appendix F

Landscape character and visual impact assessment

PARRAMATTA WHARF INTERCHANGE

LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT



Prepared for NSW Roads and Maritime Services
April 2018
By Jane Irwin Landscape Architecture

jila

Document Control

Issue	Date	Submission	Author	Review
1	07.03.18	Draft for Review	HL	LC
2	13.03.18	Draft for Review	HL	LC
3	17.04.18	Draft for Review	HL	LC
4	18.04.18	Draft for Review	HL	LC
5	24.04.18	Final Issue	HL	LC

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PARRAMATTA WHARF INTERCHANGE - LANDSCAPE CHARACTER & VISUAL IMPACT ASSESSMENT

1.0 INTRODUCTION

1.1 The project

Jane Irwin Landscape Architecture (JILA) has been engaged by Hansen Yuncken for Roads and Maritime Services NSW (Roads and Maritime) to assess the proposal for the upgrade of the wharf interchange at Parramatta (the proposal). JILA's scope is to provide urban design and landscape architectural services from concept to documentation, with the landscape character and visual impact assessment (LCVIA) forming part of a process that informs the design outcome of the wharf and landside upgrades.

1.2 Assessment envelope

For the purposes of this assessment, and to provide some flexibility should elements need to be adjusted due to any site or navigational constraints, an envelope has been used to assess the potential landscape character and visual impacts of the proposal. The area shown in red outline at Figure 1, combined with the fluctuating height of the pontoon roof structure, forms the envelope that has been used to undertake this assessment.

1.3 Purpose and scope of this report

The landscape character and visual impact assessment (LCVIA) has been prepared for Roads and Maritime as part of the Review of Environmental Factors (REF) for the proposal.

Under clause 68 (4) of the State Environment Planning Policy (SEPP Infrastructure) 2007, development for the purposes of a wharf may be carried out by or on behalf of a public authority on any land without consent, subject to the requirements of Division 5.1 of the **Environmental Planning and Assessment Act 1979** (the Act). Under the Act, "land" includes the sea.

Division 5.1 of the Act defines development involving (among other things) the use of land, carrying out of work and demolition and construction of buildings as an activity. When considering an activity Roads and Maritime as the determining authority must examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity. This is done through the preparation of a REF.

The requirements of an REF are specified in Environmental Planning and Assessment Regulation 2000 (the Regulations) clause 228 (Under the regulations, guidelines have been developed for the likely impacts of marinas and related facilities such as wharves). The guidelines therefore apply to the commuter wharf projects. LCVIA forms one of the environmental factors which requires consideration as part of the REF process. The Department of Urban Affairs and Planning - **EIS Guideline - Marinas and Related Facilities - September 1996**, sets out the following issues to consider if a proposal is likely to have a visual impact.

a) Visual impact from adjoining properties and from surrounding land and water — consider potential impacts such as changed or obstructed views due to:

- The facility form, bulk, colour or reflectivity.
- Lighting from security requirements or night operations.
- Boat mooring and movements.
- The clearing of vegetation.

b) Proposed methods of reducing visual impact such as landscaping, materials selection and design and orientation of structures.

1.4 Report structure

The structure of this report is as follows:

- 1.0 Introduction - outlines the purpose of the report including the assessment methodology
- 2.0 Contextual analysis
- 3.0 Urban and landscape design concept
- 4.0 Landscape character impact assessment
- 5.0 Visual impact assessment
- 6.0 Summary and Mitigation Strategy

1.5 Urban Design policy and guidelines

This report has been prepared based on the structure outlined in the **Roads and Maritime Environmental Impact Assessment Practice Note EIA-N04 - Guideline for landscape character and visual impact assessment**. (EIA- No4 Guideline) March 2013.

The guideline differentiates between visual assessment (the impact on views), and landscape character (the impact on the aggregate of an area’s built, natural and cultural character or sense of place).

Tasks outlined in the guide include:

- Analyse landscape character.
- Identify landscape character zones.
- Assess landscape character impacts.
- Assess the visibility of the proposal.
- Identify key viewpoints.
- Assess visual impacts.
- Refine the concept design to avoid and minimise landscape character and visual impacts.
- Develop a mitigation strategy to minimise landscape character and visual impacts.

These tasks are undertaken to inform the project approval authority, other agencies and the community about the landscape character and visual impact of the proposal and what mitigation strategies should be implemented, as well as improve the proposals overall design.

1.6 Assessment methodology

According to the terms defined within the EIA-N04 Guideline, both a landscape character and a visual impact assessment have been conducted to determine impacts of the proposal on the character of the place and the views within that place.

The assessment grading for the landscape character assessment and visual impact assessment is set out in Table 1 below. Through this table, impact is assessed based on both the sensitivity and magnitude.

Landscape character relates to the built, natural and cultural aspects that make a place unique. Landscape character assessments refer to the sensitivity (ability to absorb change) of the character zone to the proposed change and the magnitude or scale of the project within the character zone. EIA-N04 Guideline notes that landscape character assessment is the assessment of impact on the aggregate of an area’s built, natural and cultural character or sense of place.

Visual impact assessments refer to the quality of a view, type of viewer, number of viewers, and how sensitive it is to the proposed change, while magnitude refers to the nature (eg. scale, colour, reflectivity, materials) of the project and its proximity to the viewer. EIA-N04 Guideline refers to visual assessment as the assessment of impact on views. It addresses people’s views of an area from their homes or other places of value in the community.

Based on these two assessment criteria a judgement must be made as to the quality of design outcome, and the strategies for mitigating and balancing the objectives of the project with its impact on its setting.

		Magnitude			
		High	Moderate	Low	Negligible
Sensitivity	High	High Impact	Moderate - High	Moderate	Negligible
	Moderate	Moderate - High	Moderate	Moderate - Low	Negligible
	Low	Moderate	Moderate - Low	Low Impact	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Table 1. Landscape character and visual impact grading matrix

2.0 CONTEXTUAL ANALYSIS

2.1 Location

The study area for the LCVIA is to the immediate east of the corner of Phillip St and Charles St in Parramatta, on the southern shore of the Parramatta River, approximately 23.6km from the CBD by road and 21.6km by water. Stewart Street Reserve sits atop a sheer cliff face to the north east of the study area, and to the north west is a constructed weir and river crossing. As mentioned in Section 1.2, the area shown in red outline at Figure 1, combined with the fluctuating height of the pontoon roof structure, forms the envelope that has been used to undertake this assessment.

2.2 Landscape Context

Parramatta City has grown substantially from the early 1990s as large numbers of new dwellings were added to the area, particularly from urban renewal. Population growth is expected to continue, due to several major developments. Parramatta is a residential, commercial and institutional area, with some industrial areas. The suburb extends to both the north and south of the Parramatta River, which winds through the suburb from the north west at Parramatta Park, through a constructed channel, which is pedestrianised in parts, and out to the east. Here it flows to the neighbouring suburb of Rydalmere where waterfront parks can be found and pockets of mangroves create a generally leafy, natural outlook.

Figure 2 maps the location of the wharf and its immediate landscape context.

2.3 Character of the proposed wharf interchange in its setting

Parramatta Wharf is located on the south bank of a wide hollow in the river where Sydney Ferries are able to turn and return to the city. The topography rises steeply to the south, where a series of ramps and stairs connects pedestrians to Charles Street and the Parramatta CBD. Outdoor eating areas and restaurants form the backdrop for the wharf in its current setting. There is also pedestrian access from here to the east to the Queens Wharf waterfront reserve. Across the relatively narrow stretch of water, a sheer cliff face encloses the study area. Sitting atop this cliff are multi-unit residential dwellings and some existing vegetation. The proposal would be accessed from Charles and Philip St to the west, the River Foreshore Reserve to the north west and the Queen Wharf Reserve to the south east. Secure parking and bus stops are provided along Philip St.

Figures 3 and 4 show the different zones of the context with the proposal location and access points.

The wharf and low lying adjacent spaces, with topography rising behind, are predominantly viewed in elevation from the water and at close proximity. The wharf is also clearly visible on approach from the River Foreshore walk to the west which continues to the wharf itself. Landside, topography and the built elements of the outdoor dining areas of the wharf precinct restricts views to the wharf, and views from the river are contained by the opposing cliff face and narrow waterways. The wharf makes up a limited element in the wider context.

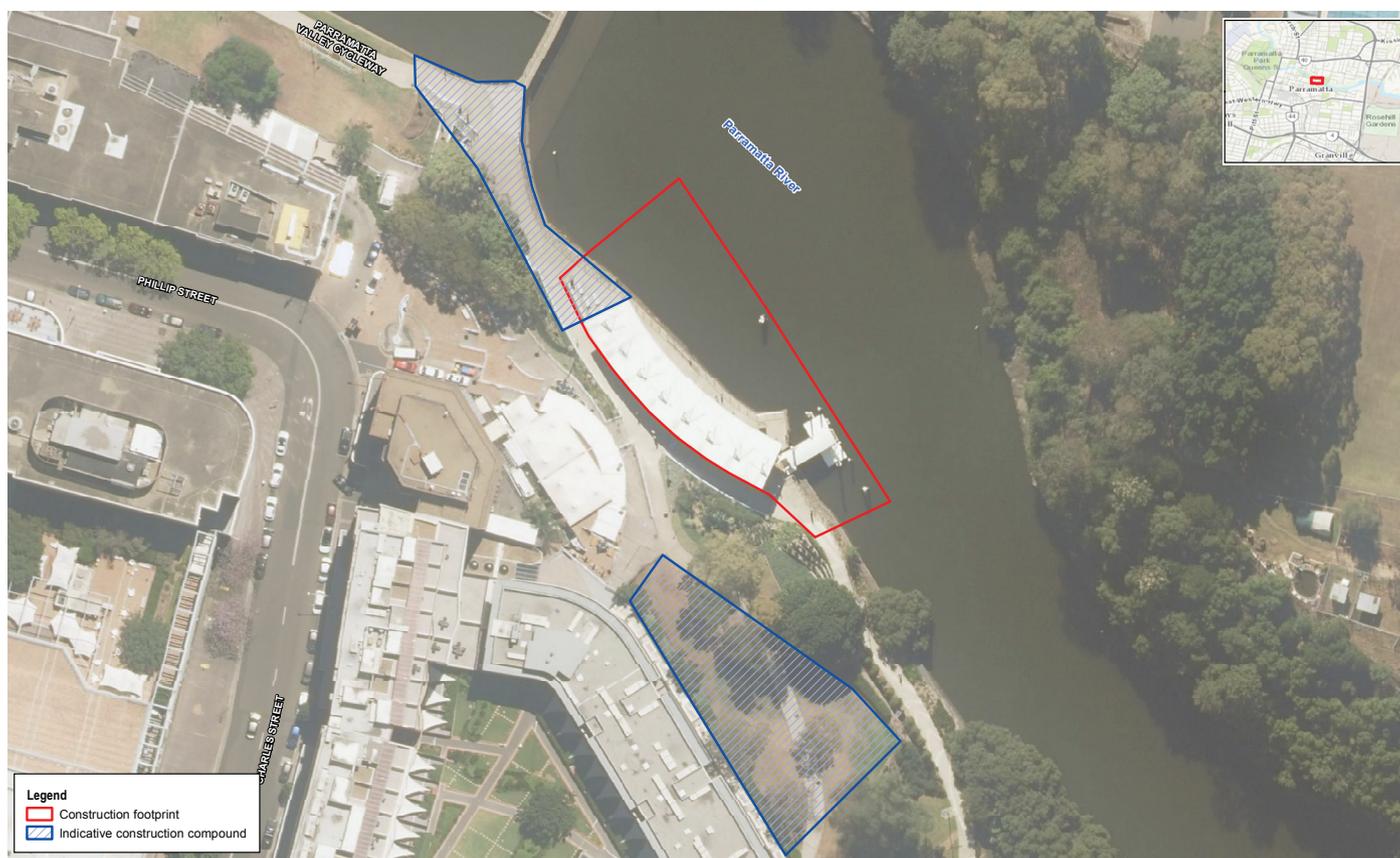


Figure 1. Assessment Envelope

2.4 Heritage Context

City Plan has prepared a Statement of Heritage Impact for the proposal and reports that the significance of the wharf is;

- no impact upon heritage items within the vicinity of the works, including 'Harrisford (and potential archaeological site)' (SHR no.100248), 'Newlands gates and trees' (item no.1544), 'Charles Street Weir' (item no.1733) and 'Wetlands' (item no.1735);
- The potential for archaeological resources in the vicinity of the wharf was identified in the form of a former wharf structure identified as the 'Charles Street Wharf'
- low potential to impact sites of Aboriginal significance

2.5 Sydney Harbour Foreshores Area Development Control Plan Context

Under the Sydney Harbour Foreshores Area Development Control Plan, 2005 Landscape Character Type 15 applies to the Parramatta area;

"These areas have a high level of built form characterised by industrial and institutional uses in the foreground and residential development in the background. Part of the Parramatta River Regional Park is located within this landscape. Development is suitable for these areas provided that the following issues are taken into consideration; the contribution industrial uses make to the economics and vitality of the river and their need for location on the waters edge; establishment of open space and recreational opportunities; mitigating against incompatible land uses; and preserving the mangrove screening along the foreshore and reducing the stark contrast of built elements behind these natural features."

Any development within these areas is to satisfy the following criteria:

- The industrial uses along the river are maintained and preserved. Pressure for these uses to relocate is minimised.
- Design and mitigation measures are provided between incompatible land uses to minimise noise and amenity impacts.
- Remaining natural elements along the foreshore are preserved to maintain the natural screen along the foreshore.
- Vegetation is integrated within the development to minimise the contrast between natural and built elements.

2.6 Planning Context

This report is produced with consideration of the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 which provides an improved and clearer planning framework and better environmental outcomes for Sydney Harbour. The plan aims to "establish a balance between promoting a prosperous working harbour, maintaining a healthy and sustainable waterway environment and promoting recreational access to the foreshore and waterways." (SREP, 2005, p.1)

Additionally, the report considers the planning context for the Parramatta LGA. Under the Parramatta Local Environment Plan (LEP) 2011, Zone W2 - Recreational Waterways applies to the proposal site.

The objectives of Zone W2 are as follows:

- To protect the ecological, scenic and recreation values of recreational waterways.
- To allow for water-based recreation and related uses.
- To provide for sustainable fishing industries and recreational fishing.
- To enable works associated with the rehabilitation of land towards its natural state.

The planning context is further detailed in the Review of Environmental Factors for the proposal.

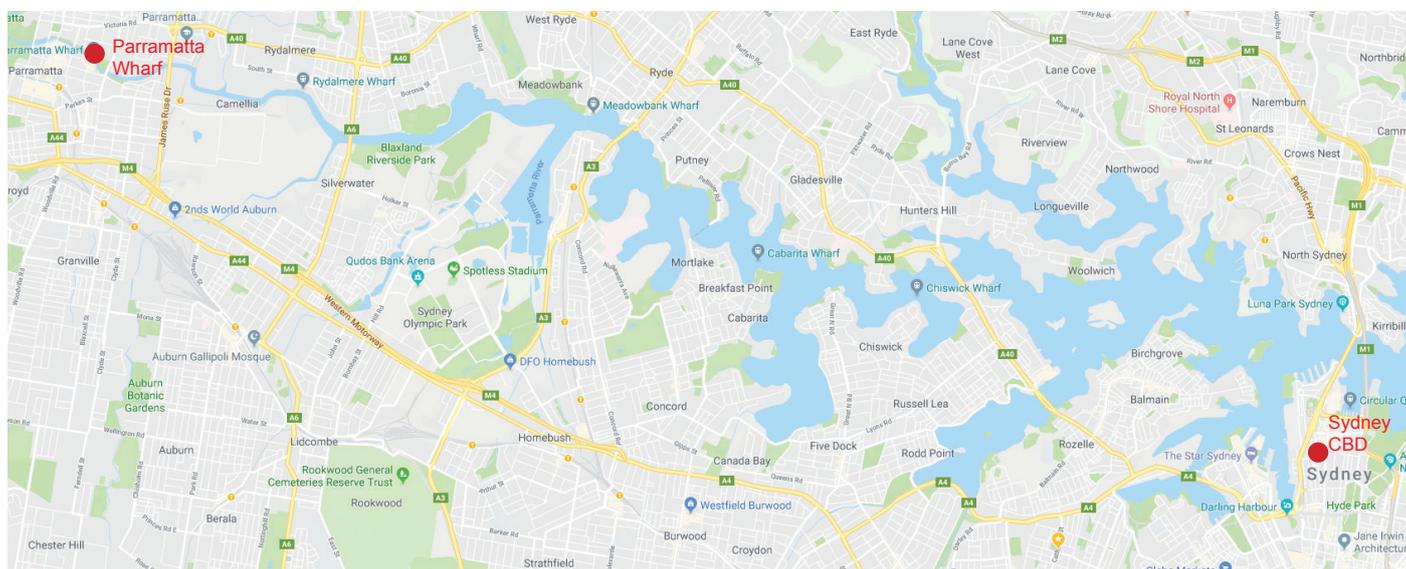


Figure 2. Context map (image courtesy of Google Maps)



Figure 3. Context with proposal location (image courtesy of Google Maps)

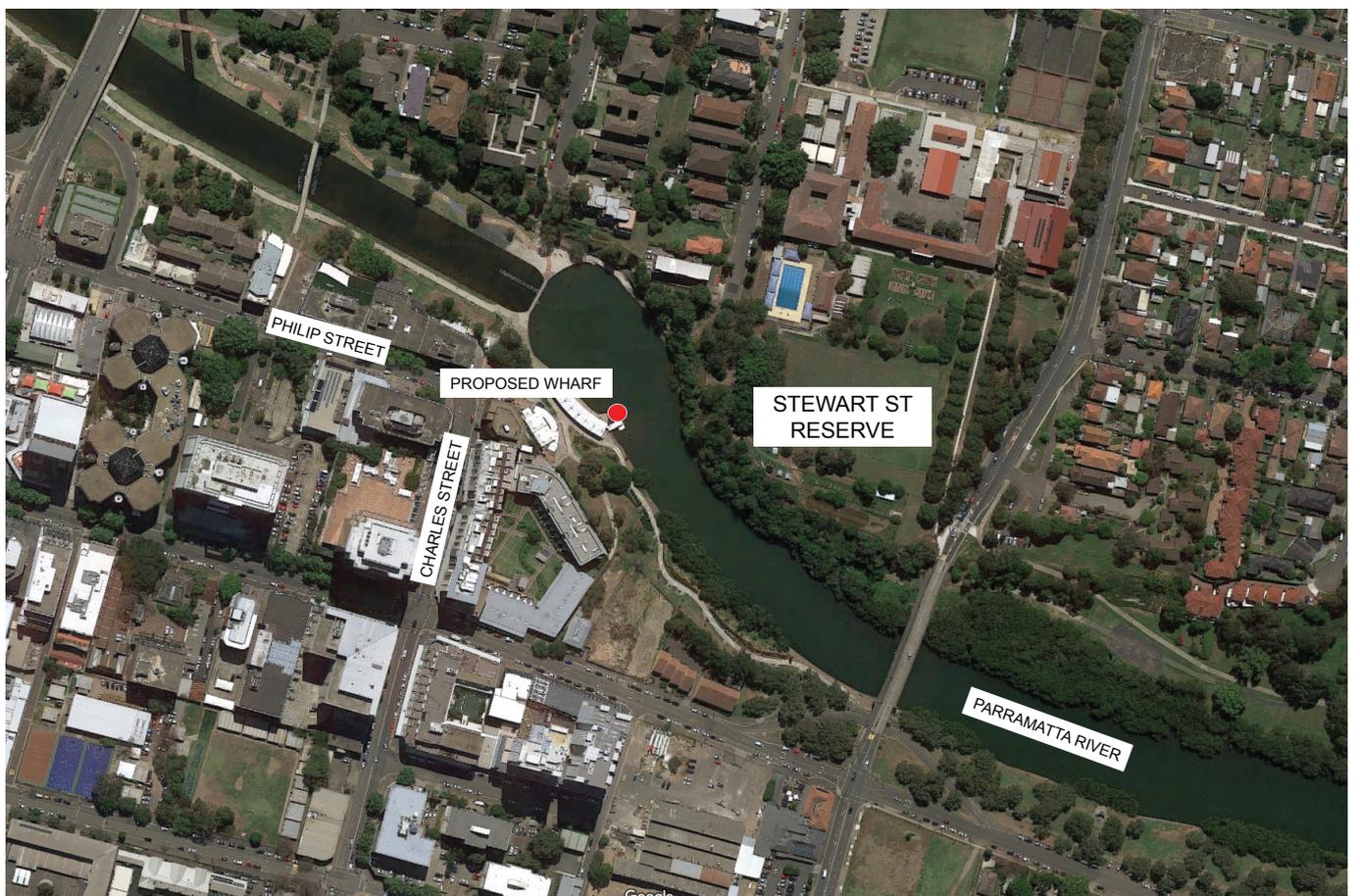


Figure 4. Existing foreshore with proposed wharf entry location (image courtesy of Google Maps)

3.0 URBAN DESIGN OBJECTIVES AND PRINCIPLES

3.1 Vision

To provide an upgraded wharf interchange that promotes ferry travel around Sydney Harbour. The interchange would provide for commuter amenity and safety, would improve connectivity to other transport modes in the context area, and would be integrated sensitively into the landscape.

Figure 5 shows a photomontage depicting the proposal in context. Figures 6 and 7 detail the architectural elements for the new proposal. Figure 8 shows the material palette for the proposal that allow integration into the family of wharves that make up the Sydney ferry wharves network.

3.2 Objectives and principles

Objectives

- Minimise clutter and work with the shapes and material selection of the original foreshore design.
- Reduce visual impact on the character of the Parramatta River and public domain of the foreshore and park.
- Minimise interruption to views.
- Respect the setting and place.
- Promote features that contribute to the character of the setting in any design interventions – contemporary design, robust materials palette.
- Retain and enhance the existing pedestrian and cycle systems.
- Upgrade facilities and open space to meet current standards and improve amenity.

Principles

- Maintain views through the gangway and pontoon to mitigate the visual impact of the structures and to retain views beyond.
- Interventions to the public domain, including extension of paved space, inclusion of structures should complement the existing design patterns and materials.
- The location of the wharf should consider the existing path network. Connection from the wharf to the existing path network and bicycle paths should not have a detrimental impact on other users of the foreshore.
- Path construction to achieve accessible grades to the wharf should be sensitively integrated into the landscape.

3.3 Preferred concept - waterside

The proposed wharf interchange would include the construction of a new wharf as follows:

Pontoon

The pontoon would be built in the same location as the existing pontoon. It would comprise a 27-metre long and 7.5-metre wide steel floating pontoon with canopy shelter, which would include a waiting area, seating and information kiosk. The wharf would have one berthing face on the southern (river) side. The new pontoon would be larger than the existing pontoon, and require modification to the existing seawall to accommodate the structure (discussed further in the landside features section below).

The pontoon would be built from pre-fabricated units delivered to site. A curved zinc canopy roof would be built over the pontoon and supported on steel columns. The pontoon would be surrounded by a mixture of glass and stainless-steel balustrades.

The pontoon would be held in place by five steel piles, that would be drilled and subsequently hammered into the underlying sandstone bedrock. The pontoon height would vary relative to the landfall depending on the state of the tide with pile heights installed to enable the pontoon to float up and down during flood conditions.

Gangway and Jetty

The pontoon would be accessed by an 18-metre long and three-metre wide uncovered gangway. The gangway would be built to be 90 degrees to the shore, and be held in place by a pivot that would be attached to a new section of jetty. This jetty would be fixed to and extend from a realigned seawall, and supported by piers. The gradient of the gangway would vary according to tides. It would allow for disabled and low mobility users for most of the time except during extreme high and low tide, which is consistent with the TfNSW Guideline for the Assessment of Public Ferry Wharf Safety (TfNSW, 2016). The gangway would be built off site and delivered as one unit to site.



Figure 5. Proposed wharf photomontage (image courtesy of Hansen Yuncken)

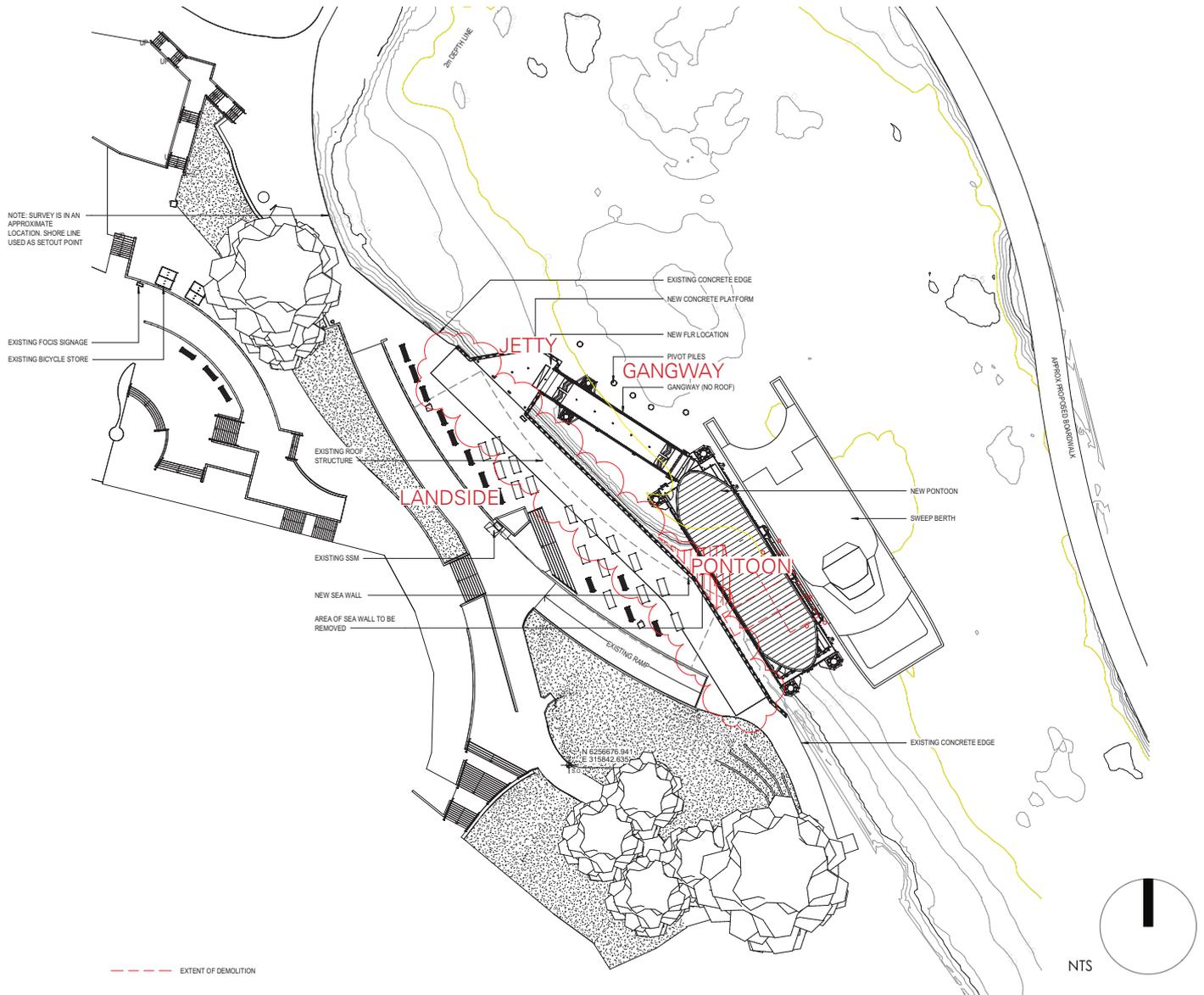


Figure 6. Proposed wharf plan (plan courtesy of Conrad Gargett Ancher Mortlock Woolley)

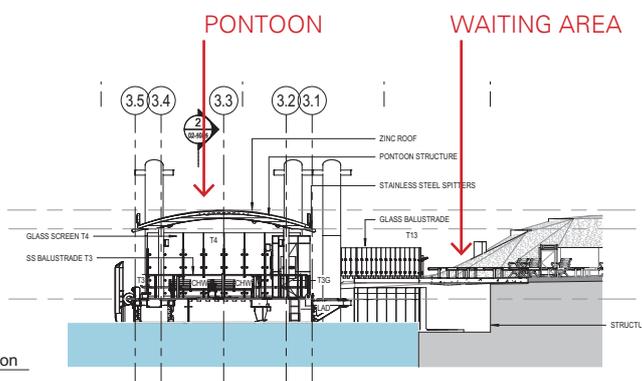
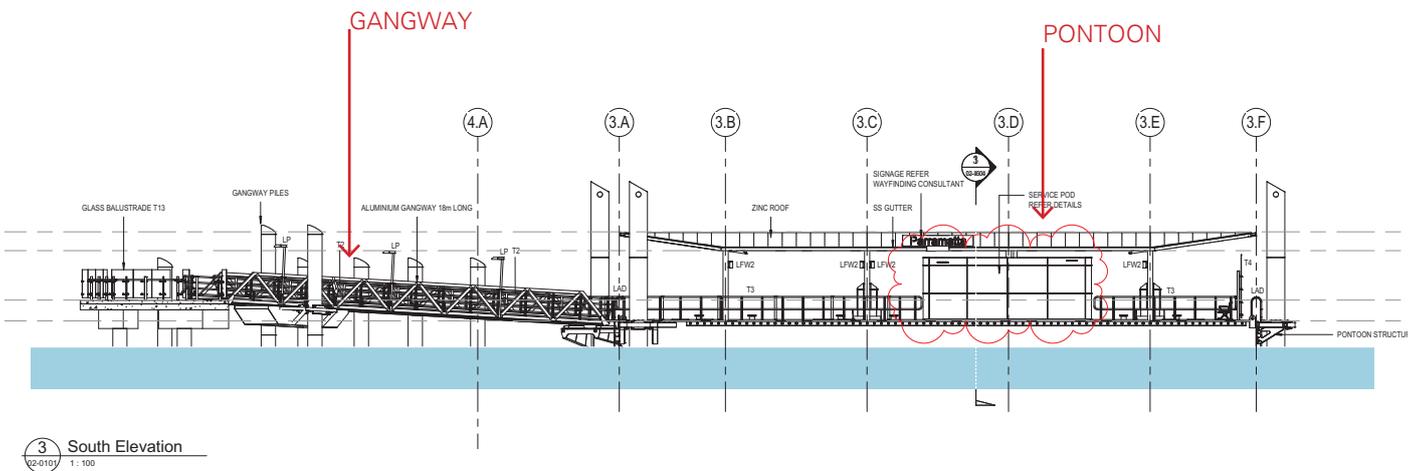
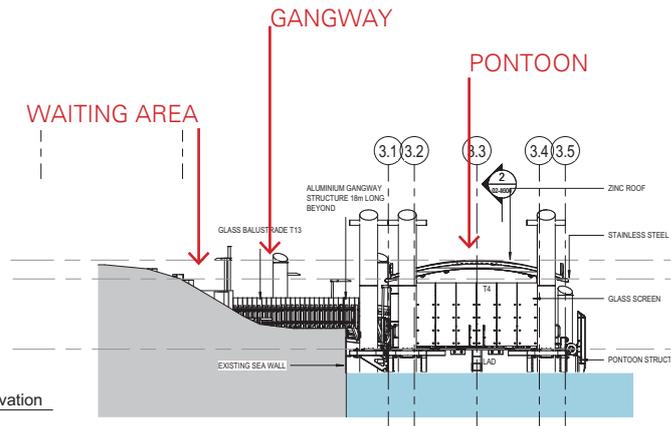
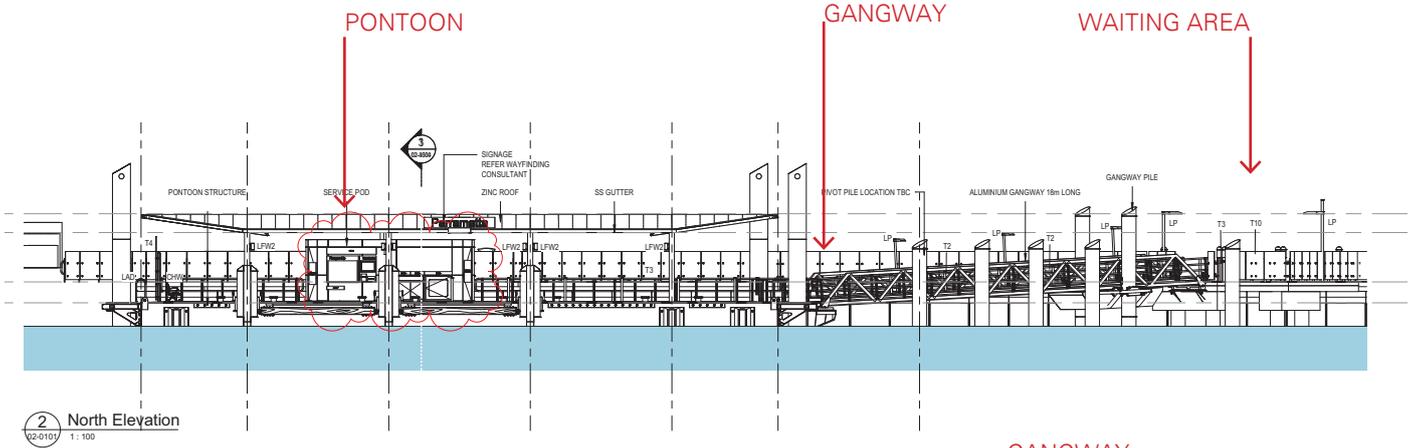


Figure 7. Architectural elevations of proposed wharf structure (plan courtesy of Conrad Gargett Ancher Mortlock Woolley)



Stainless steel handrails



Non-slip floor surface



Bridge and gangway



Zinc roof



Open light steel truss system - gangway



Service Pod



Pontoon with service pod



Lighting within wharf

Figure 8. Material palette of wharf

3.4 Preferred concept - landside

The proposed wharf interchange would include the construction of associated landside infrastructure as follows:

Landside Features

Modifications to the existing interchange would include:

- Modification of the existing seawall and excavation of underlying sandstone to accommodate the new pontoon, permanently removing 30 square metres and replacing 70 linear metres of the existing gabion construction with a contiguous pre-cast concrete solution
- Removal of existing Roads and Maritime communications equipment and signage under the existing shelter
- Removal of an existing raised stormwater drain within the shelter
- Installation of new wayfinding signage around the interchange, in accordance with the Transport for NSW Wayfinding Kit of Parts (KOP).

Supporting Infrastructure

While the details of the supporting infrastructure, lighting, signage, and furniture would be confirmed during the detailed design, they would be consistent with the provisions included on the other wharves on the network. It would therefore include:

- Safety and security lighting on the approaches and throughout the wharf
- Opal self-service machines (SSM) to be installed at the entrance to the wharf at the top of the gangway
- Safety ladders around the walkway and wharf pontoon
- Life ring on the pontoon
- Closed circuit television (CCTV)
- Glass weather screen
- Tactile flooring.

The above would be developed in accordance with relevant Roads and Maritime design specifications.

Demolition of existing seawall is described in Figure 9 below.

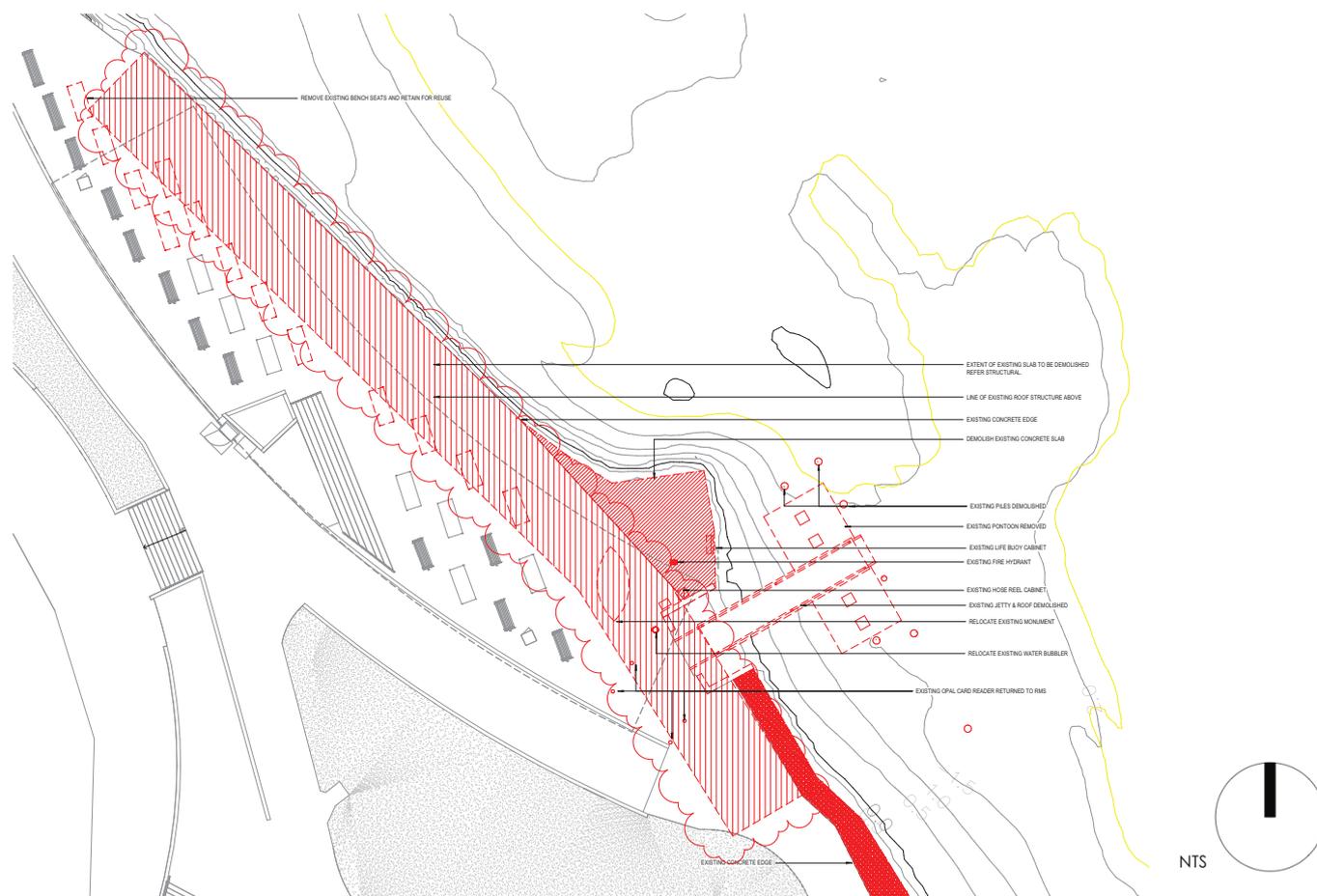


Figure 9. Demolition plan for landside infrastructure (plan courtesy of Conrad Gargett Ancher Mortlock Woolley) NTS

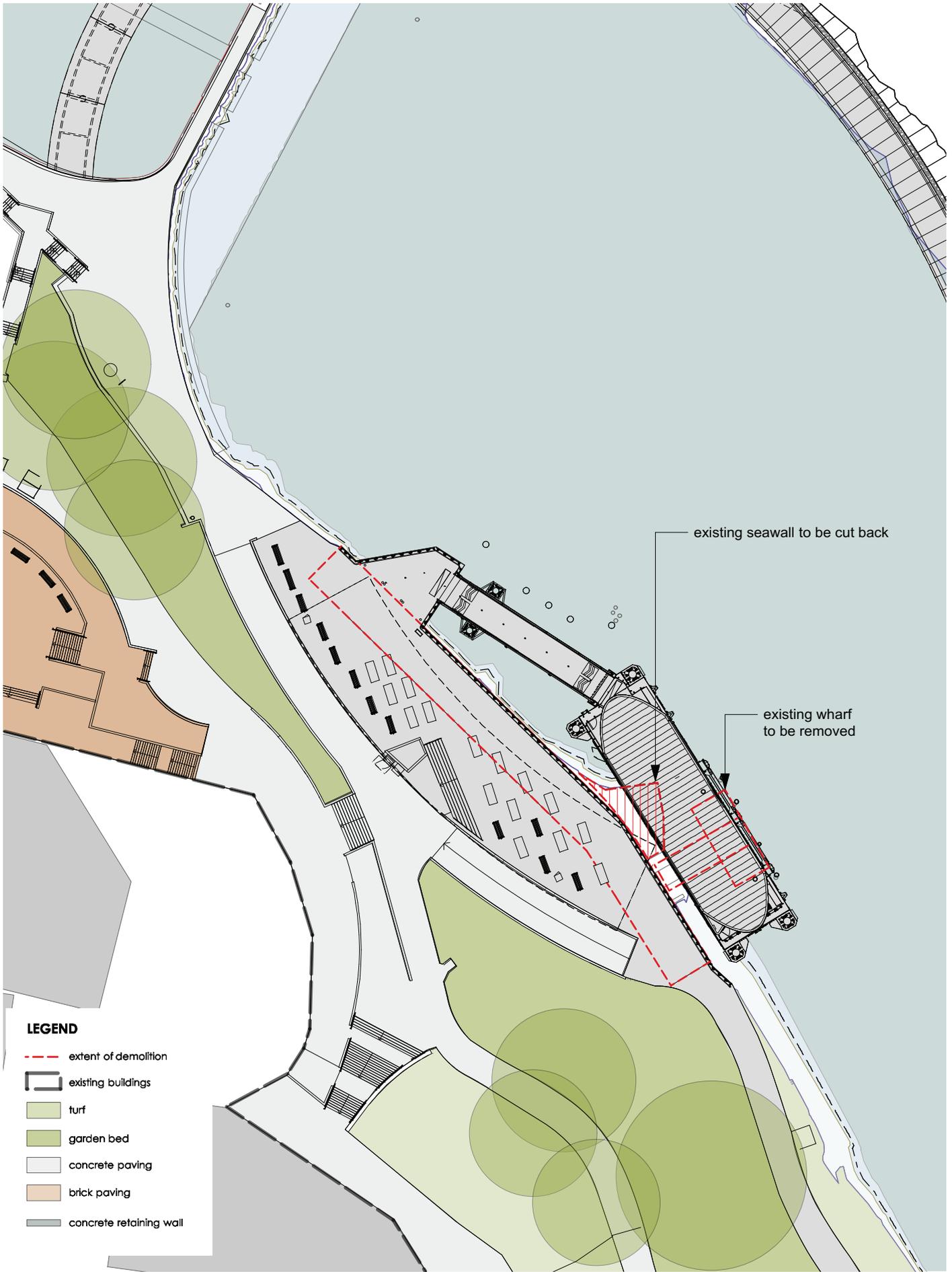


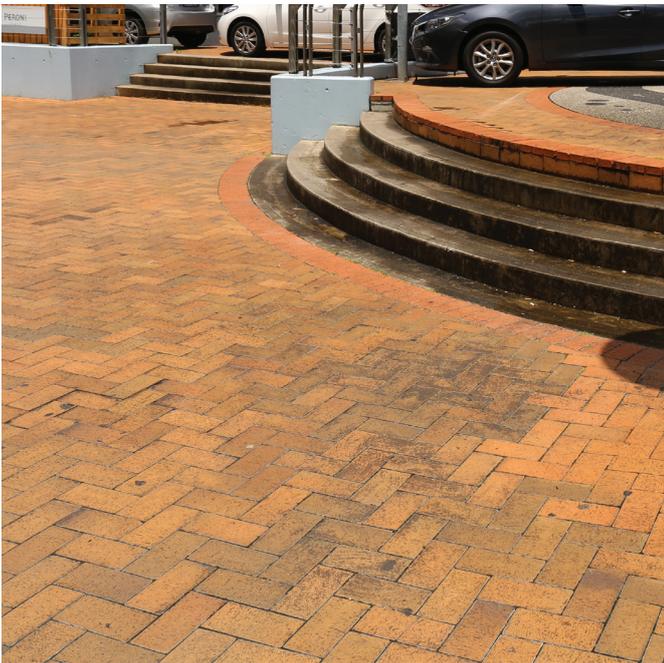
Figure 10. Proposal and foreshore context (JILA) - scale 1:500 @ A4



Existing striped pavement



Existing shelter



Existing brick paving and stair



Existing concrete retaining wall and ramps

Figure 11. Material palette of landside works

4.0 LANDSCAPE CHARACTER IMPACT ASSESSMENT

4.1 Surrounding Landscape Character

In assessing the landscape character of Parramatta, and how the proposed upgrade would fit within this, it is important to consider:

- That the wharf sits within an urbanised character setting along this part of the river,
- How the proposal would sit against a backdrop of the elements that characterise the Parramatta River.
- The existing character from the water and opposite cliff faces as a layering of elements, beginning with the wharf, adjacent outdoor dining and pedestrian areas, and moving up the steep topography behind to the buildings that characterise the area.
- The heritage context.
- The proposed landscape intervention, and other planned upgrades to the waterfront.
- The character of Parramatta River at this location.

Refer to Figure 2 and 3 for context of Parramatta Wharf. Refer to Figure 11 for landside materials palette.

Figure 12 indicates the character zones surrounding the proposal. Table 2 provides an assessment of the impact on these character zones.

LANDSCAPE CHARACTER ZONES

- | | |
|------------------------------|---------------------------|
| 1. Parramatta City Foreshore | 4. Parramatta Residential |
| 2. Parramatta City | 5. Parramatta River |
| 3. Foreshore Reserves | 6. Parramatta Park |



Figure 12. Land uses and character zones

Table 2. Landscape Character Impact Assessment

Landscape character zone	Description of zone	Sensitivity	Magnitude	Description of impact by proposal
<p>ZONE 1. Parramatta City Foreshore</p>	<p>This zone forms the southern edge of the wharf area and one of the main pedestrian access ways to the wharf. It is a highly developed landscape that greatly influences an overall reading of landscape character at the waterfront, and forms the backdrop to the wharf.</p> <p>The topography rises steeply in the immediate context of the wharf, where a conglomeration of stairs and ramps navigate the level change.</p>	M	M	<p>The foreshore here is used by both tourists and residents for leisure and commuting and as such has a moderate degree of sensitivity. Its urban character allows for a tolerance of new built form, as such sensitively designed elements can be incorporated into this already developed waterfront.</p> <p>The relatively narrow section of the Parramatta River creates an enclosed character where an larger pontoon has the potential to impact upon the character of the immediate foreshore. However, the use of neutral colours and material palette would help to mitigate any imposition that the upgrade would create.</p> <p>In order to maintain adequate width for ferry access along the waterway, the realignment of the seawall would also have some impact on the character of the immediate foreshore.</p> <p>The impact is considered moderate.</p>
<p>ZONE 2. Parramatta City</p>	<p>This zone has a mixture of commercial towers, residential towers and hotels. Views to the river are generally obscured from the surrounding streets. Panoramic views are available from the buildings themselves.</p>	L	N	<p>Parramatta is undergoing significant change through urban renewal and other new public development. Work is underway to revitalise the Parramatta waterfront, the Lennox Street portal has allowed for better access along the river to the wharf and plans for a river boardwalk would also help to create better amenity and connection to the river. As such, the city has a great capacity to absorb change. An upgrade to the river public transport option would be in keeping with other work evident in the city.</p> <p>The contemporary steel structures making up the covered gangway and pontoon are in keeping with the family of wharves that make up this part of Parramatta River and provide greater commuter amenity and familiarity. As such the waterside upgrade should not impact the existing character of the city.</p> <p>The impact is considered negligible.</p>

Landscape character zone	Description of zone	Sensitivity	Magnitude	Description of impact by proposal
ZONE 3. Foreshore Reserves	<p>This zone forms the publicly accessible, vegetated edges of the Parramatta River to the immediate east and west of the wharf area. It is a landscape that follows the topography of the waterway, with both open grassed space and established trees.</p> <p>Pockets of mangroves dot the shoreline of the river to the east. To the west, the foreshore is built as a canal, with turfed areas and concrete built edges. There are seating areas, picnics areas and pedestrian paths throughout.</p>	M	L	<p>The increase in size of the pontoon would have little impact on the character of the greater foreshore zones. The constructed edges of the river running through the city brings a significant element of human intervention to this section of the river, as such the upgrade of an existing built element should not impact on this already existing character.</p> <p>The reserves to the east act as a transition landscape to the character of the river edge further down stream. These areas experience frequent pedestrian activity. The upgrade of the wharf would not significantly impact the character of these areas.</p> <p>The impact is considered moderate-low.</p>
ZONE 4. Parramatta Residential	<p>This zone is characterised by older large residential houses of two to three stories in a range of styles, interspersed with small to medium blocks of units, generally sitting high in elevation above the river.</p> <p>The terrain is gentle, with tree lined streets. Higher density unit blocks are currently under construction at various locations towards the river and Parramatta CBD.</p>	M	N	<p>The zone is undergoing a shift in density and built form and as such is a character zone in transition. As a result it has the capacity to absorb a higher degree of change.</p> <p>The wharf upgrade involves a change in scale to provide increased capacity and improve commuter amenity. However these changes are separated from the residential zone by distance and further reduced by the capacity of the zone to absorb change.</p> <p>The impact is considered negligible.</p>
ZONE 5. Parramatta River Corridor	<p>The body of water that flows through the suburb of Parramatta. Parramatta River extends from Sydney Harbour 25km west to Parramatta. Formed from a drowned river valley the river twists with many bays and inlets, creating a sequence of different spaces with a distinct character.</p> <p>The character of the river corridor at Parramatta Wharf is one of enclosure, with a steep escarpment to the north of the wharf interchange and a stepped foreshore to the south rising up to the city. The river changes character at this point with an weir moderating flow. Parklands extend either side of the river, providing a green and active foreshore.</p>	L	L	<p>Parramatta Wharf is part of a family of wharves located along the river to Sydney City. The proposed upgrade replaces the current pontoon with a slightly larger pontoon. Access to the wharf would be shifted to the west of the current shelter, and the seawall modified to accommodate the increase in pontoon size.</p> <p>The waterfront at Parramatta is already largely constructed and urbanised, the introduction of a new element would not alter the existing character of this section of the river. Plans for a foreshore boardwalk on the opposite shore would also provide additional built character to this section of the river.</p> <p>The significance of the wharf in the broader landscape character of Sydney Harbour is the continuity it provides to commuting by water and its role in linking the waterside suburbs to a greater experience of the harbour.</p> <p>Impact is considered low.</p>

Landscape character zone	Description of zone	Sensitivity	Magnitude	Description of impact by proposal
ZONE 6. Parramatta Park	<p>The 85-hectare Park is an iconic outdoor gathering place for the people of Parramatta. Facilities are available to picnic, exercise, explore history and for public events and festivals.</p> <p>The park was inscribed onto the UNESCO World Heritage List in 2010 as one of 11 Australian sites forming the Australian Convict Sites World Heritage property.</p>	H	N	<p>Parramatta Park is well used as an event destination and for daily activity. It is large and has a variety of spaces and attractions. It's significance in Australia's recent convict history gives it a high degree of sensitivity, although the distance between the park and the upgrade serves to negate any impact the upgrade may have on the character of the park.</p> <p>The impact is considered negligible.</p>

N=Negligible; L=Low; ML=Moderate-Low; M=Moderate; HM=High-Moderate; H=High

Landscape Character Assessment Methodology

Magnitude (the degree of intrusion/scale of the project). Magnitude is the expression of change in landscape character between the proposal and the existing environment.

Sensitivity (how sensitive is the landscape character zone to the proposed change, relating to natural environment, scale, number of viewers). Visual sensitivity is a measure of the importance of the visual environment to different user groups and areas. The sensitivity is affected by the function of areas, and the perceived quality of particular land uses and landscapes.

Character impact is then determined from the magnitude of change and the sensitivity of the landscape character zone to the change. This is calculated using the landscape character and visual impact matrix, Table 1.

Sensitivity - Moderate-Low

While the proposal would occupy a heavily frequented location along the waterfront the relatively narrow section of the Parramatta River and surrounding topography serves to localise the impact of the upgraded elements. The wharf would also be read as a family of similar structures along the Parramatta River including Rydalmere Wharf further down the river. The character zones of Parramatta City and surrounding developing areas have a high capacity to tolerate change due to the transformation currently observed and planned further work for the waterfront. Therefore the sensitivity is considered moderate to low as the wharf is in keeping with the new character of these developments.

Magnitude - Low

The proposal would upgrade an existing built form to the foreshore of the Parramatta River. The magnitude in the greater landscape character zone is considered low with the structure in keeping with similar maritime structures at Rydalmere and other Sydney Ferry Wharves. The proposal would have some impact on landside works, where excavation and realignment of the seawall would impact on the immediate foreshore character. The immediate foreshore though is already highly developed, and the proposed changes would not significantly impact the overall feel of the southern edge of the river. The Parramatta foreshore boardwalk planned to improve the pedestrian connection to the northern shore, and the water itself would serve to complement the wharf upgrade and minimise the impact that the new gangway and pontoon would have on the existing character.

4.2 Overall Landscape Character Impact

Moderate-Low

Within the immediate character zone the impact is considered moderate-low. The landscape character zones around the proposal would undergo some change due to wharf works and increased commuter capacity. The proposal would have a low impact on the character of Parramatta River as the proposal upgrades an existing element on the river, though this impact is minimised by realigning the seawall to accommodate the larger structure. The upgrade would read as part of a family of wharves along the length of the river.

Landside works to accommodate for increased pontoon size have been sensitively integrated with the current foreshore, with minimal works planned. The adjustment to the seawall would have some impact on the character of the landside wharf zone, due to removal of a portion of the existing seawall and installation of new concrete facing.

Additionally, the proposal also has a positive impact on character and amenity for ferry commuters and foreshore users. Allowing for a greater capacity and more integrated water arrival gateway to the city of Parramatta.

5.0 VISUAL IMPACT ASSESSMENT

The proposed upgrade of Parramatta wharf replaces the current structure with a new built element against the existing river foreshore. The key viewpoints are described in Figure 13.

Distance zones have been established within the visual catchment to aid in assessing the impact on key views. These zones are shown in the diagram below and referenced in the table. Distance has been broken down to:

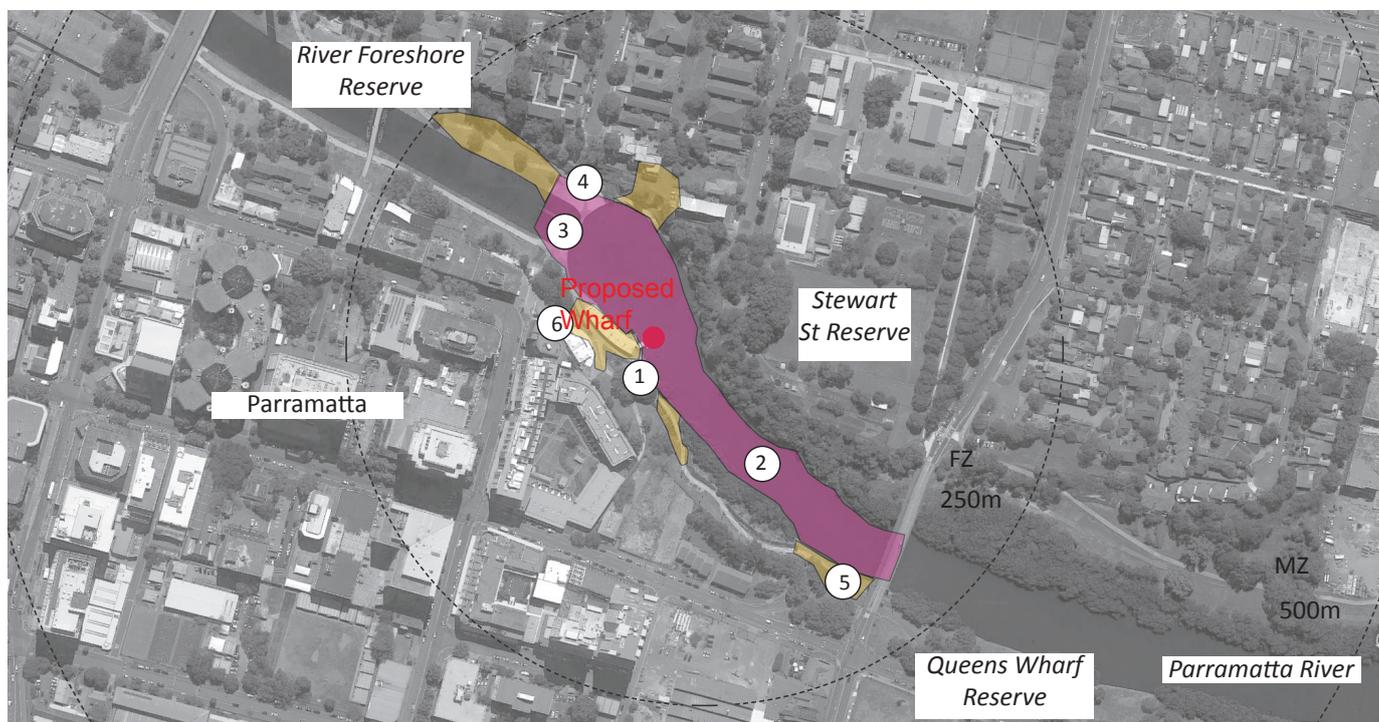
- Foreground zone (FZ): 0 - 250m from the viewer
- Middle ground zone (MZ): 250m to 500m
- Background zone (BZ): areas greater than 500m from proposed new wharf

5.1 Visual Envelope Mapping - Methodology of Visual Assessment

The visual impact of each key viewpoint is established through an assessment of the sensitivity of the view combined with the magnitude of the proposal within that viewpoint. The impact is then determined by using Table 1.

Key viewpoint locations include:

- | | |
|--|--|
| 1. Parramatta River foreshore - view north | 4. Parramatta River northern shore - view south east |
| 2. Parramatta River - view west | 5. Queens Wharf Reserve - view northwest |
| 3. Parramatta River Weir - view south east | 6. Charles Street Weir - view east |



- Prominent and high visibility
- Less prominent and fragmented visibility

Figure 13. Visibility of project and key viewpoints

5.2 Key Viewpoints



Figure 14. View from southern foreshore

Viewpoint 1 - Parramatta River foreshore - view north

Figure 14 captures the views from the pedestrian approach to the proposal from the south. Views to and across the river are available. The wharf interchange forms a primary structure within this view.



Figure 15. View from Parramatta River water approach

Viewpoint 2 - Parramatta River - approach by water - view west

Figure 15 captures the views from Parramatta River, approaching by water from the east. Views to the river are readily available, as well as longer views to the weir beyond the proposal. The wharf interchange is a dominant element within the wider context of this view.



Figure 16. View from Parramatta River weir

Viewpoint 3 - Parramatta River Weir - view south east

Figure 16 captures the views from the weir that crosses the river, to the west of the proposed upgrade. Views to the river are readily available, as well as long unimpeded vistas along the water. The curve of the weir warps around to the opposite side of the river to the proposal. The wharf interchange is a significant element within the wider context of this view.



Figure 17. View from Queens avenue staircase



Figure 18. View from atop cliff, river northern shore

Viewpoint 4 - Parramatta River - northern shore - view south east

Figures 17 and 18 capture the views from the north and north west of the proposal. Views to the river are available, though often screened by dense vegetation. The wharf interchange forms a partially obstructed structure within this view.



Figure 19. View from Queens Wharf Reserve foreshore

Viewpoint 5 - Queens Wharf Reserve - view west

Figure 19 captures the views from Queens Wharf Reserve to the east. Views to the river are readily available, as well as longer views to the weir beyond the proposal. The wharf interchange is a small element within the wider context of this view.



Figure 20. View from Charles Street terrace

Viewpoint 6 - Charles Street Weir - view east

Figure 20 captures the views from Charles St, the main wharf access road, to the west of the proposal. Views to the river are available, though obscured by an existing built shelter and surrounding terraces. The wharf interchange forms a primary structure within this view.

Table 3. Visual Impact Assessment

Viewpoint	Setting	Visible elements	Sensitivity / Magnitude	Distance zone	Overall rating	Comment
<p>1</p> <p>Figure 14 Parramatta Foreshore - view north</p>	<p>Built terraced landscape down to the waters edge from Parramatta City. Outdoor dining, and connections to the city and the weir crossing. The foreshore also ramps to the east, providing connection to Queens Wharf Reserve.</p>	<p>Pontoon, gangway</p>	<p>M / M</p>	<p>FZ</p>	<p>M</p>	<p>The foreshore is a potentially sensitive location, as it is used by local residents and tourists for dining and recreation. The wharf structures would be visible from most parts of the terraced foreshore, although current structures obscure parts of the wharf from certain areas. The wharf structures sit below the elevated foreshore, so views across the river would not be greatly impacted.</p> <p>Approaching the wharf from the east and west, the new gangway and pontoon would be clearly visible, and the increase in size and covered roof element would have some impact on views along the river in both directions. Use of transparent and lightweight materials help to mitigate the impacts of the upgrade in size of the pontoon.</p> <p>The pontoon is narrower than other pontoons in the family of wharves that make up the Sydney ferry upgrade. This would maintain the width required for two ferries to pass at the river neck, and also minimise visual impacts on views along the river.</p> <p>The impact is considered moderate.</p>
<p>2</p> <p>Figure 15 Parramatta River - approach by water - view west</p>	<p>This section of the Parramatta River is narrow and winding and fringed with mangroves and waterfront parks. Here it is used for commercial and public watercraft use.</p>	<p>Pontoon, gangway</p>	<p>M / M</p>	<p>FZ</p>	<p>M</p>	<p>From the water approach the wharf would be seen at an oblique angle with both the foreshore and weir as a backdrop. The narrower pontoon and relocated seawall would maintain the existing views along the river.</p> <p>The covered pontoon would have some impact on views when seen alongside the foreshore. Material choice and design would help to mitigate this, and complement the material palette of the existing structure and waiting area.</p> <p>The impact is considered moderate.</p>
<p>3</p> <p>Figure 16 Parramatta River Weir - view south east</p>	<p>Narrow pedestrian river crossing, steel handrails and concrete footpath.</p>	<p>Pontoon and gangway</p>	<p>M / L</p>	<p>FZ</p>	<p>ML</p>	<p>The new pontoon and gangway would be seen as a separate element from the foreshore with the Parramatta River as a backdrop.</p> <p>The increase in size and roof of the new pontoon would incur additional obstruction on the views to Queens Wharf Reserve and Gasworks Bridge in the distance, although the uncluttered design and use of transparent materials would help to mitigate this impact.</p> <p>The impact is considered moderate-low.</p>

Viewpoint	Setting	Visible elements	Sensitivity / Magnitude	Distance zone	Overall rating	Comment
4 Figure 17-18 Parramatta River - northern shore - view south east	End of residential street, narrow, steep staircase down to water level.	Pontoon and gangway	L / L	FZ	L	The dense vegetation along the top of the northern foreshore cliff acts to obscure the proposal from this viewpoint. Additionally, the upgrade sits below the elevation of the far shoreline. Where it can be seen, the increase in size of the pontoon would not impact on views of the river or across to the southern foreshore. The wharf reads as a smaller element in the wider context of the view. The impact is considered low.
5 Figure 19 Queens Wharf Reserve - view west	Waterfront Park - open grassed areas, and foreshore walk with established trees and mangroves.	Pontoon and gangway	L / N	FZ	N	From Queens Wharf Reserve the wharf would be seen at an oblique angle with both the foreshore and weir as a backdrop. The narrower pontoon and relocated seawall would maintain the existing views along the river. From this distance the wharf would be read as a small element in the wider context so any impact on views would be limited. The impact is considered negligible.
6 Figure 20 Charles Street Weir - view east	End of busy city street that opens onto the top of the terraces leading down to the wharf interchange.	Pontoon and gangway	L / N	FZ	N	The wharf structures would be partially visible from most parts of the Charles Street approach, current structures would obscure some parts of the wharf. The wharf structures sit below the foreshore, so views across the river would not be impacted. The impact is considered negligible.

N=Negligible; L=Low; ML=Moderate-Low; M=Moderate; HM=High-Moderate; H=High

5.3 Visual Impact Assessment Summary

Overall visual impact - Low

The upgrade of an existing fixed element along the Parramatta foreshore would be visible from a few points along the river, though largely contained by the topography of the surrounding land. From the northern shore, the proposal would additionally be obscured by existing vegetation, and beyond the Charles Street terrace obscured by existing buildings. The new wharf can be seen to the east from Queens Wharf Reserve, though the winding river obscures longer distance views. The wharf would be viewed against the backdrop of the built terrace and outdoor dining areas up to Charles and Philip Street, and where the views are oblique, other built elements on the river reduce the potential impact of the wharf seen as a single element within the view. The proposal is anticipated to have a low impact from surrounding views.

Views from the foreshore would be slightly more vulnerable to change, although existing structures already provide a physical barrier between the land and the river. The new pontoon would be a large scale structure at the river level, with the potential to screen views further along the river from certain points. In order to maintain adequate ferry access, the pontoon would be located close to the shore, with a realignment of the seawall. This results in a gangway that hugs the current shoreline to the wharf and has less impact on views up and down the river. Transparent materials would help to alleviate any impact on views across the river from these points. This is considered a low impact on the public areas directly associated with the site.

The overall visual impact of the proposal at Parramatta is considered low. The greatest impact would be on views within the foreground zone where the proposed upgrade of the wharf to accommodate greater commuter capacity would result in a larger structure on the water. Longer distance views are largely obscure by topography and built environment. The open structure of the wharf and gangway aim to further reduce the impact of the proposal on views.

6.0 SUMMARY OF URBAN DESIGN CONCEPT AND MITIGATION STRATEGY

6.1 Summary of urban design recommendations and mitigation measures

The concept for the proposed wharf and interchange upgrade works at Parramatta has been based on an investigation of the following:

- potential visual impact;
- access;
- safety and security;
- buildability;
- material palette and character;
- architectural form and design;
- vegetation impacts; and
- maintenance.

The concept design responds to the following elements:

Scale

The proposal, in catering to the future commuter demand and user amenity, would upgrade an existing built element to the foreshore. This change requires sensitivity to the surrounding landscape character.

Design

Material selection, location of services, and a standardised family of elements form the key design strategies for mitigating the impact of the proposal. Attention has been made to ramps and walkways within the proposed wharf to meet access standards. The proposed wharf has been designed for amenity through covered pontoon and protection screens to minimise impacts of weather on ferry users.

Colour

Colour plays an important role in mitigating the impact on views and landscape character. Selection of materials and paint colour respond to the surrounding palette, are low in reflectivity, and complement the surrounding elements of the wharf precinct and the river landscape through neutral tones. Overall the proposal would promote a unified palette of materials which, while responding to the maritime heritage of the river generally and surrounding character, also separates the structure as a piece of architectural design.

Mitigation Measures include:

- A unified palette of materials which respond to the maritime heritage of the river and surrounding character zones;
- A standardised family of elements;
- Selection of neutral and transparent materials;
- Minimising impact on the foreshore through a single point entry;
- A reduction of fixed solid elements on the pontoon to maintain views through the structure; and
- Analysis for wharf location which assessed key views, access, and landside connections.

6.2 Conclusion

The overall impact of the proposal is considered to be low to moderate. The proposal upgrades an existing fixed structure along the urban Parramatta waterfront. As the surrounding areas are undergoing transformation with construction of higher density commercial and residential developments, the landscape character is also shifting. This shift provides a greater capacity to absorb change, with the proposal forming part of a series of new structures and upgrades to existing structures along this section of the Parramatta River.

The proposal would have a low impact on views in and around the structure. Long range views from surrounding points along the Parramatta River are generally obscured. There is a moderate impact on views immediately surrounding the wharf. The roofing elements of the entry portal, waiting area and pontoon would reduce some views from the terraced foreshore along the river.

For landside works, minimal work is required to maintain adequate space for berthing access. This would require a realignment of the seawall and may have some impact on the landscape character in the immediate vicinity. The mitigation measures listed above are recommended for minimal impact on the existing landscape character and views. Consideration of concurrent public works in the vicinity ought to also be taken into consideration for the wharf upgrade.

Appendix G

Statement of heritage impact



Transport
Roads & Maritime
Services

Statement of Heritage Impact

Parramatta Wharf

PLANNING
BUILDING
HERITAGE
URBAN DESIGN

CITY
PLAN
SERVICES



Transport
Roads & Maritime
Services

Parramatta Wharf

Statement of Heritage Impact

April 2018

PLANNING
BUILDING
HERITAGE
URBAN DESIGN

CITY
PLAN
SERVICES

Report Revision History

Revision	Date Issued	Prepared by	Reviewed by	Verified by
01	15/03/18	Alexandra Ribeny <i>Heritage Consultant</i>	Carole-Lynne Kerrigan <i>Associate Director - Heritage</i>	Kerime Danis <i>Director – Heritage</i>
02	19/03/18		Kerime Danis <i>Director - Heritage</i>	
03	22/03/18			
04	06/04/18			
05	13/04/18			
06	19/04/18			
FINAL	24/04/18			

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Executive Summary

This Statement of Heritage Impact, (SoHI) incorporating an Aboriginal heritage due diligence assessment and a historical archaeological assessment, has been commissioned by Roads and Maritime Services NSW (Roads and Maritime). Roads and Maritime proposes to upgrade Parramatta Wharf to improve facilities and amenities for ferry passengers. The subject site is defined as the wharf itself, landside abutment and waiting shelter.

Parramatta Wharf is located on the southern side of Parramatta River within the suburb of Parramatta. The wharf consists of a gangway and pontoon which project north-east from the landside abutment.

The proposed works include demolition and removal of the wharf structure, a section of seawall and the concrete slab which it abuts, and their replacement with a new gangway and pontoon, as well as the relocation and upgrade of a number of fixtures and facilities within the adjacent waiting shelter.

Parramatta Wharf is not itself listed as a heritage item on any register, but it is located within the vicinity of local heritage items listed under Part 1 of Schedule 5 of the Parramatta Local Environmental Plan (LEP) 2011, including 'Newlands Gates and Trees' (item no.1544), 'Charles Street Weir' (item no.1733) and 'Wetlands' (item no.1735). It is also located within the vicinity of state heritage item 'Harrisford (and potential archaeological site)' (SHR no.100248), listed under the *State Heritage Act 1977*.

This SoHI incorporating an Aboriginal heritage due diligence assessment and a historical archaeological assessment has been prepared in accordance with the heritage management guidelines outlined in the Roads and Maritime Services (Roads and Maritime) *Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI)*, *Australia ICOMOS Burra Charter, 2013*; and relevant publications by the Heritage Division of the NSW Office of Environment & Heritage.

The first stage of assessment involved on-site liaison between City Plan Heritage (CPH) and the representatives of Roads and Maritime. A detailed inspection of the site and its surrounding context was undertaken by Brittany Freeland (Senior Heritage Consultant) and Alexandra Ribeny (Heritage Consultant/Archaeologist) on 22 November 2017.

Aboriginal Heritage Assessment

A basic search of the AHIMS database did not locate any Aboriginal sites within DP 869816, which encompasses the subject site, however, two Aboriginal sites were identified within a 50 metre buffer. An extensive search of the AHIMS database established that both Aboriginal sites are located approximately 280 metres to the south-west of the subject site; a significant distance from the project footprint.

Roads and Maritime undertook a Stage 1 PACHCI assessment and determined that the proposed works would be unlikely to impact Aboriginal cultural heritage. The assessment indicated that while the surrounding area contains landscape features that indicate the presence of Aboriginal objects, the cultural heritage potential appears to be reduced due to past disturbances in the form of the construction of the existing wharf. The assessment concluded that no further Aboriginal heritage assessment is required and the Roads and Maritime's *Unexpected Heritage Items (2015)* procedure should be strictly adhered to during construction.

Non-Aboriginal Heritage Assessment

Desktop historical research established that the present Parramatta Wharf was constructed in 1993 for the RiverCat ferry service and has been consistently used as a wharf for the past 25

years. Historical sources indicate a number of historical wharf structures were formerly present within the Parramatta area and the former 1877 'Charles Street Wharf' was located to the west of the subject site at the termination of Charles Street. Analysis of the historical documentary evidence was undertaken to establish whether the proposed footprint could contain historical archaeological resources. Site phasing analysis did not indicate the presence of any earlier landside structures or wharf structures within the vicinity of the subject site. It has, however, indicated the presence of timber pylons adjacent to the existing wharf structure in 1993, which appear to have been installed at an earlier date. Earlier research and archaeological assessments identify the location of the subject site within an area of high archaeological sensitivity. As the subject site is located within heavily disturbed land, however, the works are assessed to have low-medium potential to affect historical archaeological resources. As such, CPH recommends that the Roads and Maritime's *Unexpected Heritage Items* (2015) procedure be strictly adhered to.

Roads and Maritime's concept design was assessed according to the statutory controls on the relevant planning instruments and also the recommended management guidelines for the site as presented in the site's SHI form. CPH has concluded that the proposal would have no impact upon the heritage values of heritage items 'Harrisford (and potential archaeological site)' (SHR no.100248), 'Newlands Gates and Trees' (item no.1544), 'Charles Street Weir' (item no.1733) and 'Wetlands' (item no.1735), as these are at a significant distance from the works and would not therefore be directly or indirectly impacted.

While the heritage impact of the proposal would be minimal, it could be made positive through the provision of signage and recognition of the existing and former wharf structures within the Parramatta area. Indication of their location and historical development within the Parramatta wharf precinct would contribute to a heightened awareness of Parramatta's lengthy maritime history.

This report includes Appendices A, B and C, where 'A' is a copy of the State Heritage Inventory (SHI) forms for heritage items within the vicinity of Parramatta Wharf, 'B' is the Site Inspection Recording Form for the existing wharf, and 'C' comprises copies of the search results from searches of the Aboriginal Heritage Information Management System (AHIMS) database.

1 Introduction

1.1 Purpose

Roads and Maritime proposes to upgrade Parramatta Wharf as part of the Transport Access Program (TAP), which aims to improve Sydney's ferry services for customers. This SoHI has been prepared to assess the impact of the proposal on items of heritage significance within and near the footprint of the proposed work.

1.2 Project description

The proposed works include (Figure 1, Figure 2 & Figure 3):

Roads and Maritime Services (Roads and Maritime) proposes to upgrade the existing wharf interchange at Parramatta (the proposal) as part of the NSW Government's Transport Access Program (TAP).

The waterside features of the proposal would include:

- removal of the existing gangway, pontoon and associated wharf structures, including existing piles and gangway;
- installation of a new three-metre wide by 18-metre long gangway;
- installation of a 7.5-metre wide by 27-metre long floating covered and glazed pontoon, held in position by four new piles;
- minor excavation to provide sufficient depth for the new pontoon; and
- installation of five new protection piles.

The landside features of the proposal would include:

- modification of the existing seawall to accommodate the new pontoon, permanently removing 30 square metres and replacing 50 linear metres of the existing gabion construction with a contiguous pre-cast concrete solution;
- removal of existing Roads and maritime communications equipment and signage under the existing shelter;
- removal of an existing raised stormwater drain within the shelter; and
- installation of new wayfinding signage around the interchange, in accordance with the Transport for NSW Wayfinding Kit of Parts (KOP).

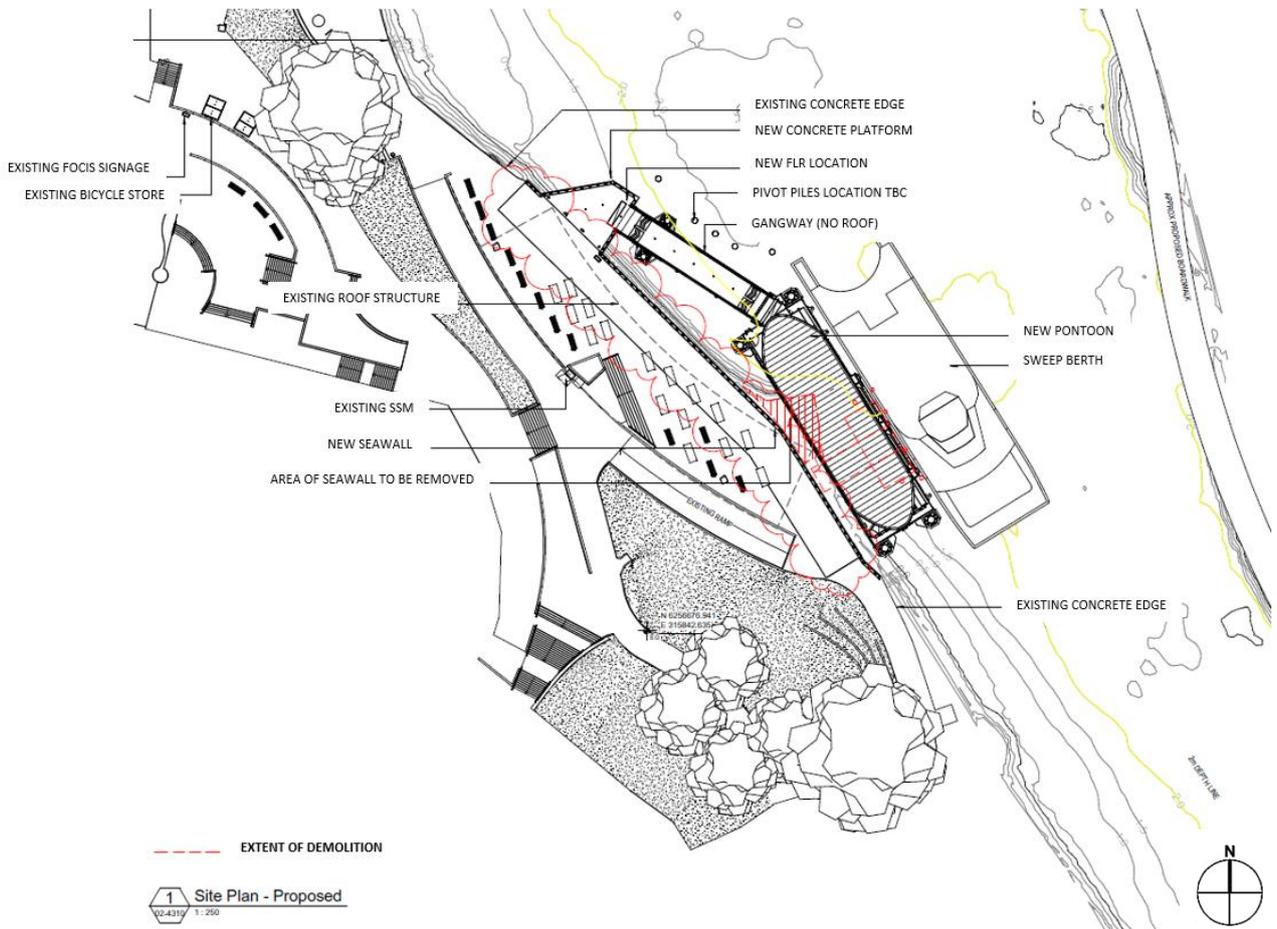


Figure 1: Plan of proposed works at Parramatta Wharf. Proposed demolitions are indicated in red. (Source: Proposed Site Plan, Drawing no. AR-02-1000)

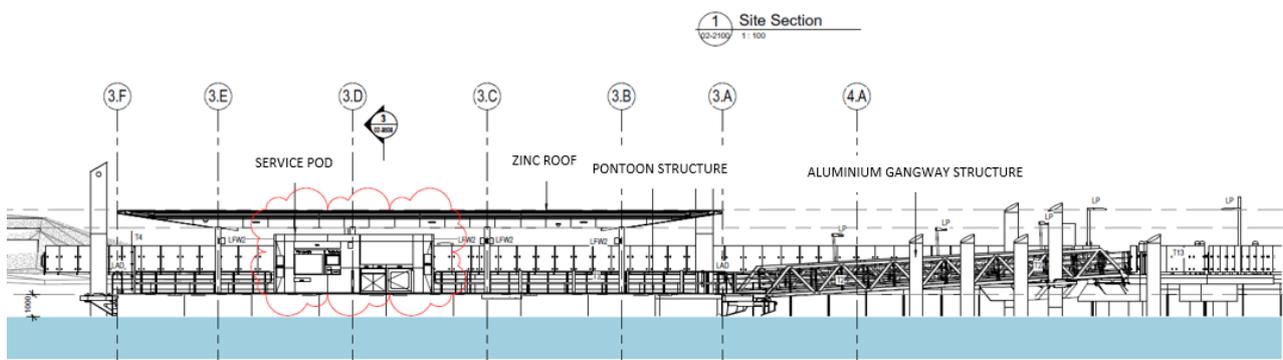


Figure 2: Plan of proposed wharf structure (Source: Proposed Site Plan, Drawing no. AR-02-3500)

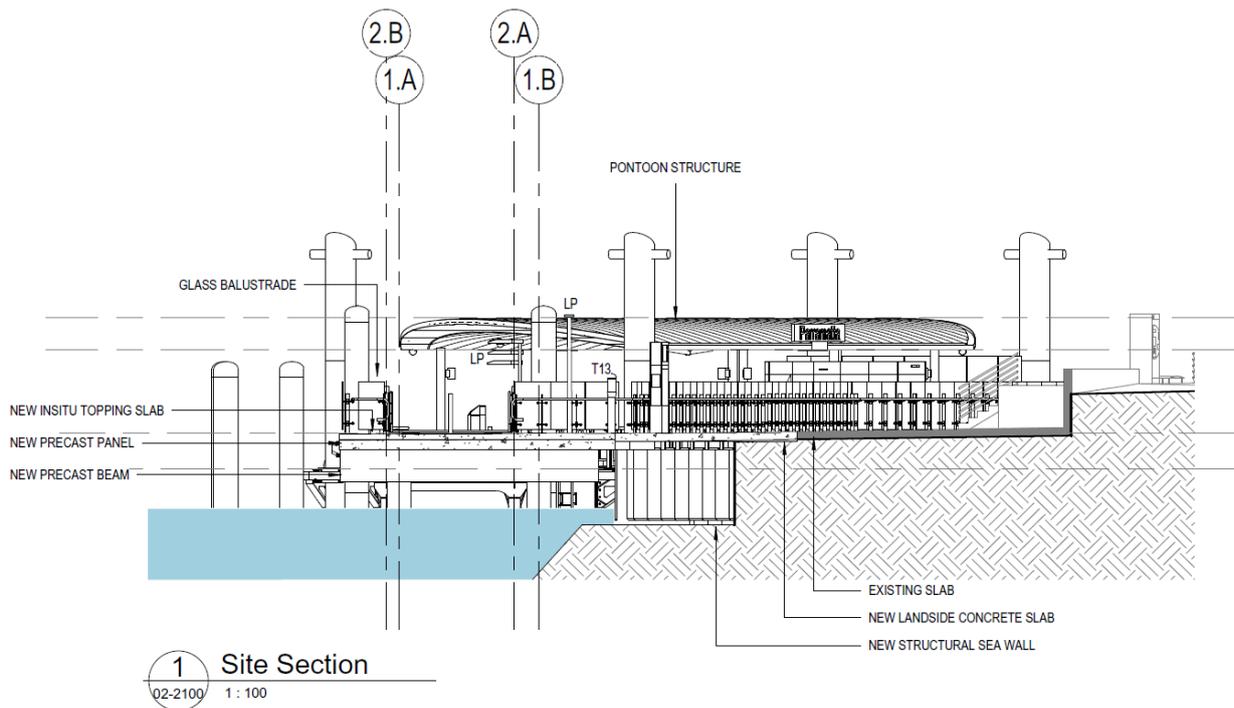


Figure 3: Plan of proposed Pontoon structure and landside interface (Source: Proposed Site Plan, Drawing no. AR-02-3500)

1.3 Background

Parramatta Wharf is located on the southern side of Parramatta River within the suburb of Parramatta (Figure 4). The wharf consists of a short timber jetty and pontoon and large land-side waiting shelter located directly to the north of a commercial and residential precinct. The land-side component of the wharf is contained within Lots 1 and 2 of Deposited Plan (DP) 869816. The suburb of Parramatta is located within the City of Parramatta Local Government Area (LGA). Figure 4 presents a cadastral map of Parramatta Wharf and its surrounding urban context. Figure 5 presents an aerial photograph of the context of Parramatta Wharf and its surrounding urban context.

Parramatta Wharf is not listed as a heritage item on any register, but the wider site that is subject to upgrade works is located within the vicinity of the following heritage items listed under Part 1 of Schedule 5 of the Parramatta Local Environmental Plan (LEP) 2011:

- 'Newlands Gates and Trees' (item no.I544), 9 Thomas Street;
- 'Charles Street Weir' (item no.I733), Charles Street; and
- 'Wetlands' (item no.I735), Parramatta River.

These listings are summarised in Table 1. Figure 6 presents the heritage map of the Parramatta LEP 2011 showing Parramatta Wharf in context with the heritage items in the vicinity

The subject site is also located within the vicinity of State heritage item 'Harrisford (and potential archaeological site)' (SHR no.100248) at 180 George Street, listed under the *State Heritage Act 1977*. Figure 7 and Figure 8 present maps of its curtilage.

Heritage items and archaeological sites are protected under the NSW *Heritage Act 1977*, the *Environmental Planning and Assessment Act 1979* (NSW), and the *National Parks and Wildlife Act*

1974 (NSW), and approvals to do works on or near heritage items and archaeological sites are normally required from the NSW Office of Environment and Heritage (OEH) and local councils. However, refurbishment and upgrade of Parramatta Wharf is identified as development that may proceed without consent under the State Environmental Planning Policy (Infrastructure) 2007 (ISEPP). Under Clause 14 of the ISEPP, government bodies must consider whether proposed work would impact items of local heritage significance or HCA's. Such assessment is completed through the preparation of a Statement of Heritage Impact (SoHI).

Under the ISEPP, if a proposal is assessed to have an impact that is not minor or inconsequential, consultation with the relevant local council is required. However, if the proposal is assessed to have no heritage impact or only minor impact, no consultation is required. This SoHI assesses the impact of the proposal on the heritage values of heritage items and archaeological sites in the vicinity.

In addition to the above Australia's World Heritage Properties are protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). As Parramatta contains the World Heritage site 'Old Government House and Domain' (Ref.1306), the proposed works must be considered in terms of their potential impact on the views and curtilage of the site. Figure 9 indicates that the subject site does not impact any areas of potential sensitivity.

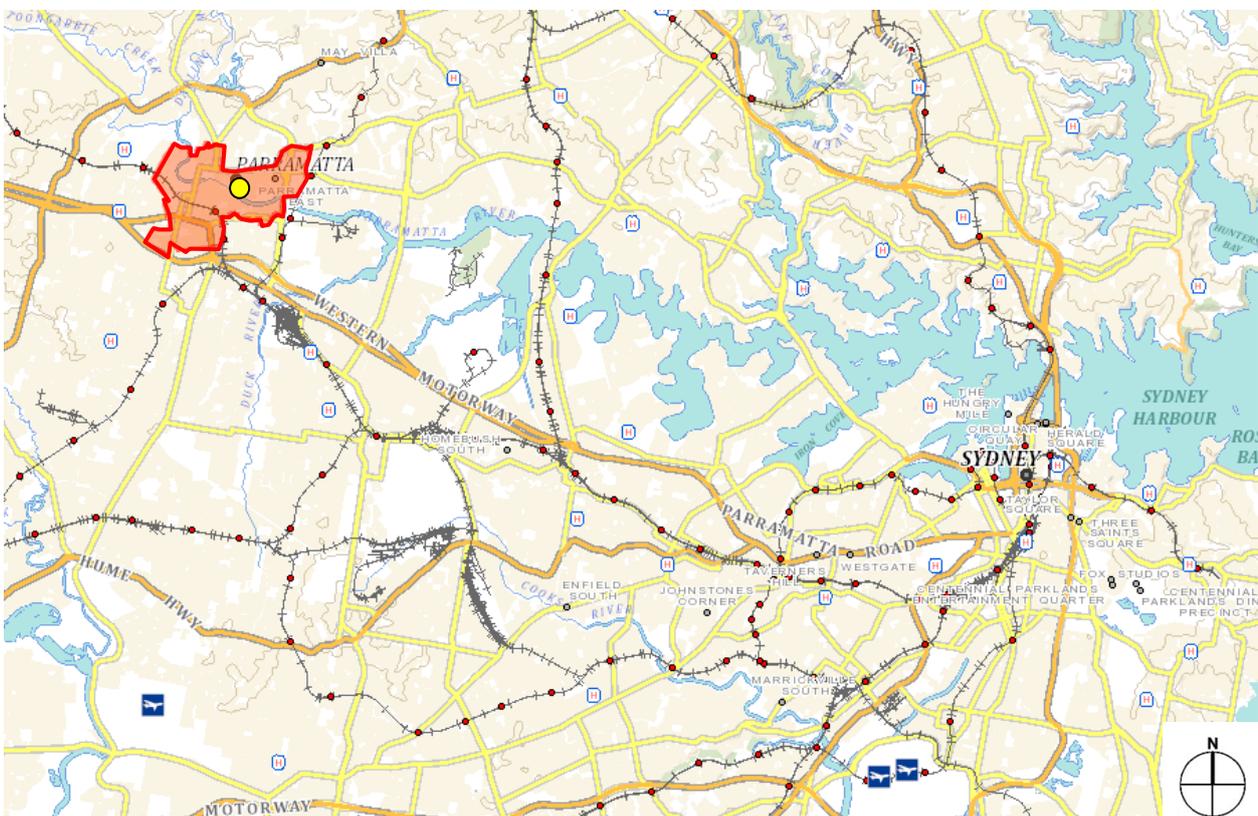


Figure 4: Location of the suburb of Parramatta (indicated in red) relative to the Sydney CBD. The location of the subject site is indicated in yellow (Source: SIX Maps)

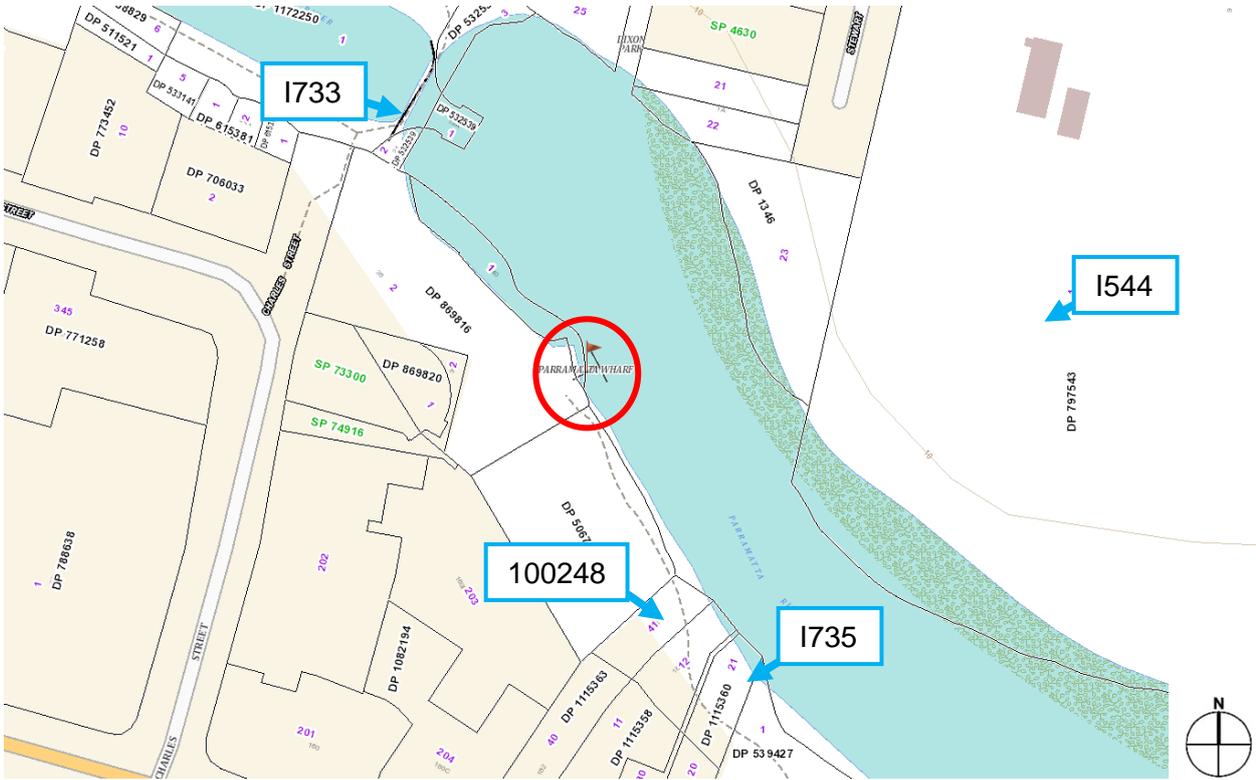


Figure 5: Location of Parramatta Wharf in relation to the Parramatta River (Source: SIX Maps 2018)

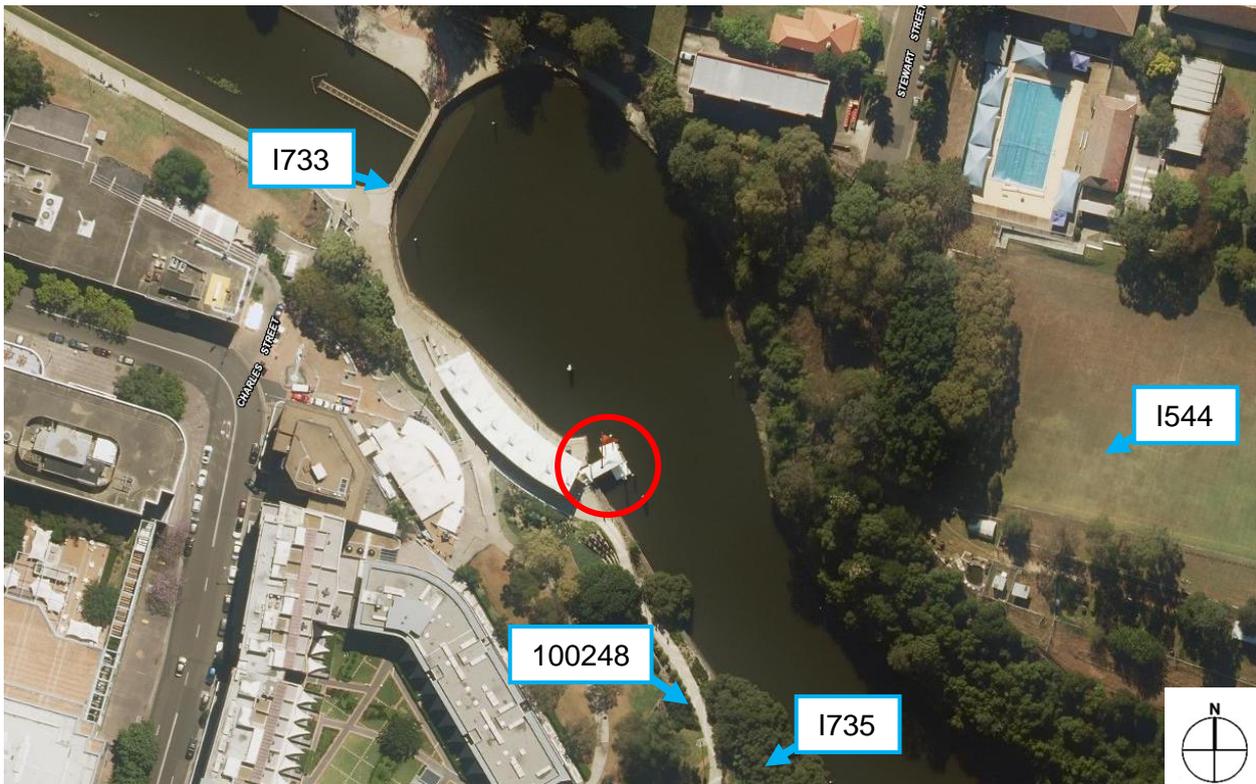


Figure 6: Location of Parramatta Wharf in relation to the Parramatta River (Source: SIX Maps 2018)

Heritage Council of New South Wales

PLAN

Under the Heritage Act, 1977

Description *Pt. Land in D.P. 59495 - 'Harrisford'*

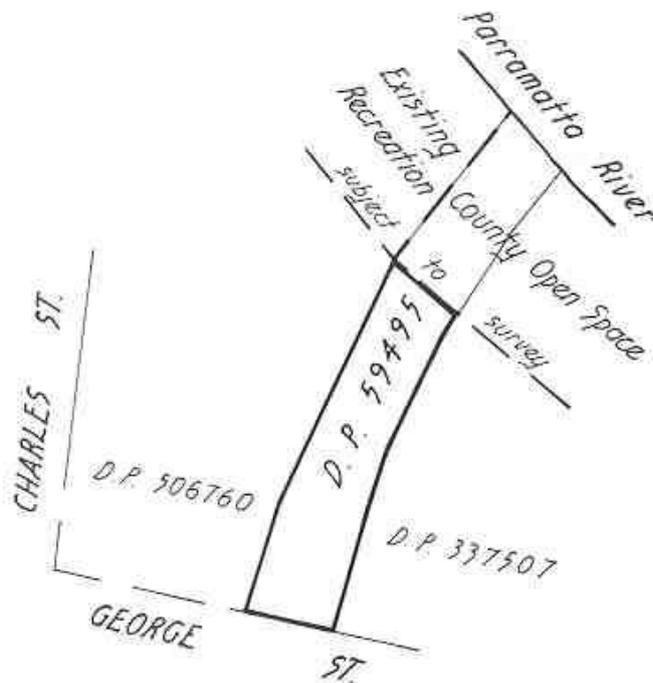
Municipality/City *Parramatta*

Locality *Parramatta*

Parish of *St John*

County of *Cumberland*

Scale *1 : 1000*



COMPILED FROM INFORMATION IN	FILE REFERENCE	PLAN APPROVED	PLAN NUMBER
<i>Plans on file</i>	<i>H.C. 32277</i>	<i>[Signature]</i>	<i>H.C. 588</i>
BY <i>R.E.B.</i> DATE <i>24-9-82</i>		for SECRETARY, HERITAGE COUNCIL	

THIS IS THE PLAN REFERRED TO IN ~~INTERIM~~ PERMANENT CONSERVATION ORDER No. *248*

N. S. W. GOVERNMENT GAZETTE No. *68* OF *6-5-83*

SUBJECT LAND SHOWN THIS:

Figure 8: State Heritage Inventory (SHI) record for 'Harrisford (and potential archaeological site)' (item no.100248)



State Heritage Register - SHR 00248, Plan 588

Harrisford

182 George Street, Parramatta

Gazettal Date: 02 April 1999

0 10 20 30 40 Metres

Scale: 1:750 @A4

Datum/Projection: GCS GDA 1994



Legend

- SHR Curtilage
- Land Parcels
- Railways
- Roads
- LGAs
- Suburbs

Figure 9: State Heritage Inventory (SHI) record for 'Harrisford (and potential archaeological site)' (item no.100248)

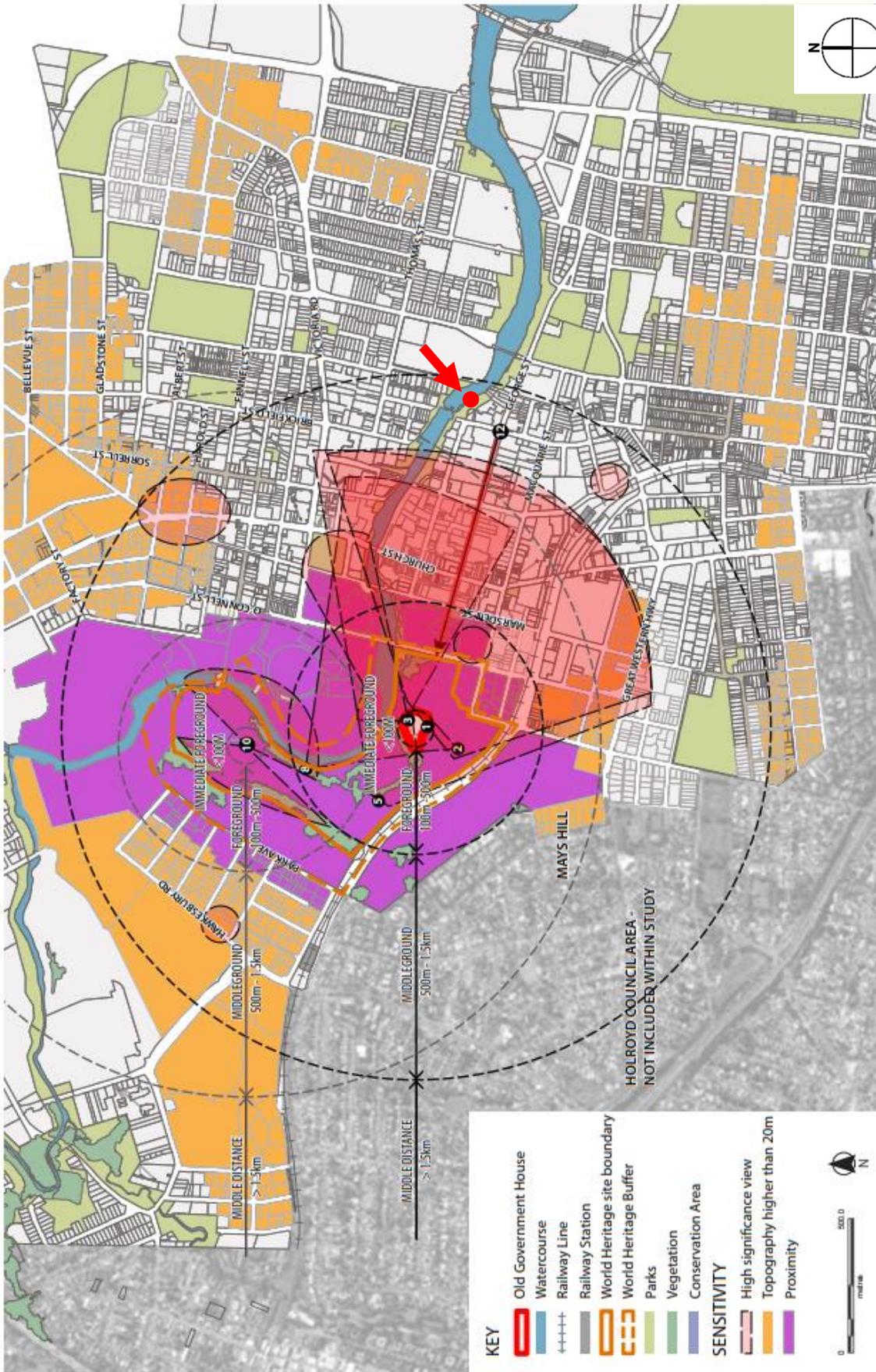


Figure 10: World Heritage site 'Old Government House and Domain' areas of potential sensitivity with subject site indicated in red (Source: Development in Parramatta City and the Impact on Old Government House and Domain's World and National Heritage Listed Values: Technical Report', Planisphere, 2012)

1.4 Methodology

The first step towards the preparation of this SoHI involved identification and investigation of all known heritage items within the vicinity of Parramatta Wharf. Reference was made to a number of heritage instruments and registers, including:

- the Parramatta LEP 2011;
- the State Heritage Inventory (SHI);
- Sydney regional planning instruments and maps; and
- the Roads and Maritime's 'Section 170 Register'.

A detailed inspection of the site and its surrounding context was undertaken by Brittany Freeland (Senior Heritage Consultant) and Alexandra Ribeny (Heritage Consultant/Archaeologist) on 22 November 2017. This involved liaison between CPH and the representatives of Roads and Maritime. Inspection of the site included the Parramatta Wharf and its natural and built surrounding environment, including the wharf structure, seawall which it abuts and landside waiting shelter. Items of heritage significance inspected within its immediate surroundings included the State heritage-listed 'Harrisford (and potential archaeological site)' (SHR no.100248) and local heritage items 'Charles Street Weir' (item no.1733) and 'Wetlands' (item no.1735). Local heritage item 'Newlands Gates and Trees' (item no.1544) was not directly inspected, due to its location on the opposite side of the Parramatta River, however, it was photographed in relation to the wharf site. Unless otherwise noted, all photographs were taken by CPH.

Aboriginal Heritage Assessment

An Aboriginal heritage assessment (*Section 3*) was prepared in accordance with the heritage management guidelines outlined in the Roads and Maritime's *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI). As such, it refers to the outcomes of the Stage 1 PACHCI assessment undertaken by Roads and Maritime.

Non-Aboriginal Heritage Assessment

A non-Aboriginal heritage assessment (*Section 4*) was prepared in accordance with the OEH Heritage Division publication *Assessing Heritage Significance*. Historical research was undertaken using resources from Parramatta City Local Studies, 'Parramatta Heritage Centre', the State Library of NSW and National Library of Australia's Trove database. Historical documentary evidence, including historical photographs and aerial photographs, were analysed to determine the likelihood that historical archaeological resources are present on the site. A statement of heritage significance was prepared for the existing wharf structure and subject site.

A heritage impact assessment (*Section 5*) for the subject site and proximal heritage items was undertaken in accordance with the OEH Heritage Division publication *Statements of Heritage Impact*.

This report includes Attachments A, B and C, where 'A' is a printout of the SHI forms for Parramatta Wharf, 'B' is the Site Inspection Recording Form for the existing wharf, and 'C' comprises copies of the search results from searches of the AHIMS database.

1.5 Author Identification

This SoHI, incorporating an Aboriginal Heritage Due Diligence Assessment and Historical Archaeological Assessment, has been prepared by CPH. Its principal author is Alexandra Ribeny (Heritage Consultant / Archaeologist). It has been reviewed by Carole-Lynne Kerrigan (Associate Director), who has also endorsed its contents.

1.6 Limitations

This report constitutes a basic desktop assessment only, and no community consultation (from a heritage perspective) or fieldwork beyond two pedestrian visual inspections.

2 Existing Environment

2.1 Site Context

The suburb of Parramatta is located on the Parramatta River approximately 23 kilometres west of the Sydney Central Business District (CBD) and within the Local Government Area (LGA) of the City of Parramatta. Positioned as the commercial centre of Greater Western Sydney, Parramatta is serviced by multiple transportation options and is home to various government agencies and a sizeable shopping precinct.

The subject site is located on the southern bank of the Parramatta River with views toward Stewart Street Reserve and River Foreshore Reserve on the northern side of the river (Figure 11). To the south of the subject site, Charles Street and Phillip Street meet at a bend and extend into a short cul-de-sac, which provides access to the wharf.

The subject site sits at a lower elevation than street level and is accessed via a stairway (Figure 12). The subject site is located at a bend in the Parramatta River, which widens at the Charles Street weir. A concrete pedestrian pathway runs along either side. To the north-west of the subject site is the heritage item 'Charles Street Weir' (item no.1733), at which point the river widens. The following description is extracted from the State Heritage Inventory (SHI) form for the item:

Charles Street Weir forms the first downstream tidal barrier in Parramatta. It was built across the river at Charles Street and Queens Avenue, immediately west of the Parramatta Wharf. This wharf is the last turning point for ferries approaching from Sydney. A narrow foreshore reserve extends westwards from the weir along both sides of the river. This open space with its pathways, lawns, gardens and scattered trees is used for recreational purposes. The Charles Street Weir is a concrete structure measuring 22.1 metres in length by 1.5metres in width. Its height over the weir to the west is 2 metres. Today, the water contained in the dam lies 0.85 metres below the surface of the weir. On the east side, the water lies 1.45 metres below the weir surface, a level difference of 0.6 metres. Given that the eastern side of the weir is used as a turning circle for ferries, the weir wall is likely to extend several metres below the water level to the riverbed. The weir itself is a straight structure located between curved symmetrical concrete embankment walls. Generally the concrete is relatively smooth and shows the imprints of timber formwork used at the time of construction. Trolley tracks, now mostly covered with concrete, extending across the top of the Charles Street Weir are regarded as integral part of the heritage listed item and should be protected.¹

Across the river from the subject site to the north is a sandstone outcrop, on top of which is located local heritage item 'Newland Gates and Trees' (item no.1544) at 9 Thomas Street (Figure 13). The following description is extracted from the State Heritage Inventory (SHI) form for the item:

The significant elements on the site include archaeological site, plantings and the remanant gates. Large sandstone gateposts and a row of Bunya pines along Macarthur Street are remnants of the occupation prior to the school. The site is bounded by Thomas Street, Parramatta River, Stewart Street and Macarthur Street. The site of Newlands House (demolished in 1932, gates only remain) has archaeological potential. Surviving fence comprises four tall sandstone gateposts topped with segmented pediments on steps. Below are incised stem and leaf pattern in pedestals with picked background. Cast iron Fleur-de-lis palisade pedestrian and driveway gates.²

East of the subject site is the State heritage item 'Harrisford (and potential archaeological site)' (SHR no.100248), which is located on a grassy rise with a view to Parramatta River (Figure 14). The following description is extracted from the State Heritage Inventory (SHI) form for the item:

¹ SHI Form, accessed on 02 February 2018. Available from <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5063021>

² SHI Form, accessed on 02 February 2018. Available from <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=2240354>.

Two storey Old Colonial Georgian house of brick with stone quoins now painted. Joinery and fittings, while in 1830s style, are reproductions.

National Trust (Parramatta Branch): Fabric: Flemish bond brick walls, with sandstone quoins, foundations, and stringline at first floor level and corrugated iron roof which was originally shingles. Roof Construction: Hip. Verandah Decoration: Window Sill: Sandstone. Window Arch: Soldier brick flat arch painted brick red. Fence: Timber picket Fence: set in timber posts with shaped tops and timber picket gate. Garden: Well kept. Additions: Early kitchen or schoolroom building at rear of cottage.

Architectural Style: Colonial Georgian two-storey cottage. Front Door: Georgian red soldier brick elliptical arch above segmented fanlight decorated with leadlight and stained glazing. Late Victorian moulded four panelled door with glazed panels above lock rail. Sidelights flank door with glazed upper panels above timber.³

Still further east is the Queens's Wharf Reserve, which provides a scenic walking route along the Parramatta River. Along the shoreline of the reserve is located local heritage item 'Wetlands' (item no.1735) (Figure 15). The following description is extracted from the State Heritage Inventory (SHI) form for the item:

This item consists of remnant wetland vegetation, characterised by mangrove and saltmarsh complex, located along the foreshores of Parramatta and Duck rivers and their tributaries, Vineyard and Subiaco creeks.⁴

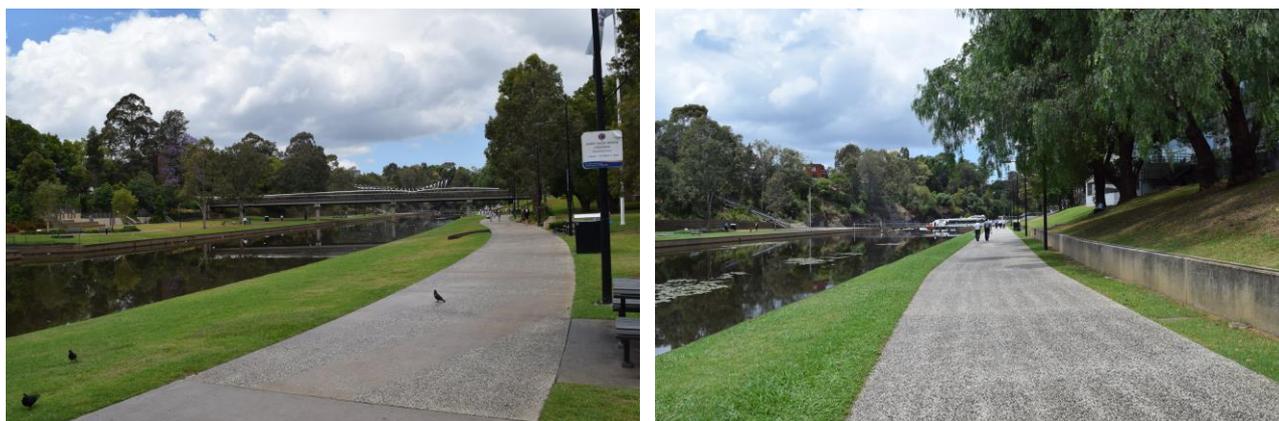


Figure 11: Pedestrian walkway along Parramatta River with views toward Stewart Street Reserve and River Foreshore Reserve on the northern side of the river. View south-east

³ SHI Form, accessed on 02 February 2018. Available from <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?id=5051407>.

⁴ SHI Form, accessed on 02 February 2018. Available from <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=2240429>.



Figure 12: View toward heritage item 'Charles Street Weir' (item no.1733) (indicated with red arrow) with connection between pedestrian walkway and weir crossing (left) and staircase leading to Charles Street (right), view south-east



Figure 13: View across Parramatta River toward local heritage item 'Newland Gates and Trees' (item no.1544) (indicated with red arrow), which sits above a stone outcrop, view north-east



Figure 14: Location of state heritage item 'Harrisford (and potential archaeological site)' (SHR no.100248) (indicated with red arrows) on a grassy rise to the south of the subject site, view south



Figure 15: Local heritage item 'Wetlands' (item no.1735) is located along the southern bank of the Parramatta River to the east of the subject site, view north-east

2.1 Site Description

The subject site consists of a gangway and pontoon, concrete slab and gabion-constructed stone sea wall which it abuts and a large landside waiting shelter (Figure 16).

A large waiting shelter positioned on the southern bank of the Parramatta River includes bench seating, opal service machines and a large canopy which follows the river's arc and is approximately 45 metres in length (Figure 17). A number of Aboriginal art installations are located within the waiting shelter and adjacent to it (Figure 18 & Figure 19). A plaque which details their installation is fixed to a concrete buttress at the rear of the waiting shelter (Figure 20).

A sea wall with concrete capping and stainless steel balustrade has been constructed along the southern edge of the river in the area of the subject site and immediate environs (Figure 21). Immediately adjacent to the wharf structure to its north a gabion-constructed section of seawall projects into the river. The existing wharf structure consists of a short gangway, approximately 5 metres in length, with a canopy and metal railings. The gangway projects north-east from the landside interface and connects to an approximately 4 X 9 metre ferry pontoon (Figure 22 & Figure 23). The existing pontoon structure is surrounded by timber pylons.



Figure 16: A large waiting shelter (circled) is located on the southern bank of the Parramatta River immediately to the west of the subject site, view east



Figure 17: The existing waiting shelter consists of bench seating, opal service machines and a large canopy which follows the arc of the river



Figure 18: Aboriginal artwork installations within the vicinity of the subject site



Figure 19: Aboriginal artwork installation within the vicinity of the subject site



Figure 20: Aboriginal artwork within the waiting shelter (left) and a plaque which details its installation (right)



Figure 21: A sea wall runs the length of the river and is topped by a concrete edge and stainless steel balustrade. Immediately adjacent to the wharf structure to its north a section of seawall projects into the river. Facing south-east



Figure 22: A short gangway with canopy and stainless steel balustrade leads to the ferry pontoon (left) and connects with the concrete pedestrian pathway (right)



Figure 23: Existing pontoon surrounded by timber pylons and connected to the short gangway structure

3 Aboriginal Heritage

3.1 Legislative Framework

Aboriginal heritage in NSW is protected under the *National Parks and Wildlife Act 1974*. Aboriginal cultural heritage in New South Wales is protected under the *National Parks and Wildlife Act 1974* (the *NPW Act*). The *NPW Act* is accompanied by the National Parks and Wildlife Regulation 2009 (the Regulation), the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (DECCW 2010a) and other industry-specific codes and guides.

3.1.1 Roads and Maritime Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI)

Roads and Maritime has developed the Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI), which constitutes Roads and Maritime's due diligence process for the purposes of Section 87(2) of the *NPW Act* and a procedure for investigating the potential impacts to Aboriginal cultural heritage. This Aboriginal heritage assessment has been completed in accordance with the PACHCI.

3.2 Desktop Assessment

3.2.1 Aboriginal Association with the Parramatta Area

The following summary of the Aboriginal history of the Parramatta area is taken from the City of Parramatta website:

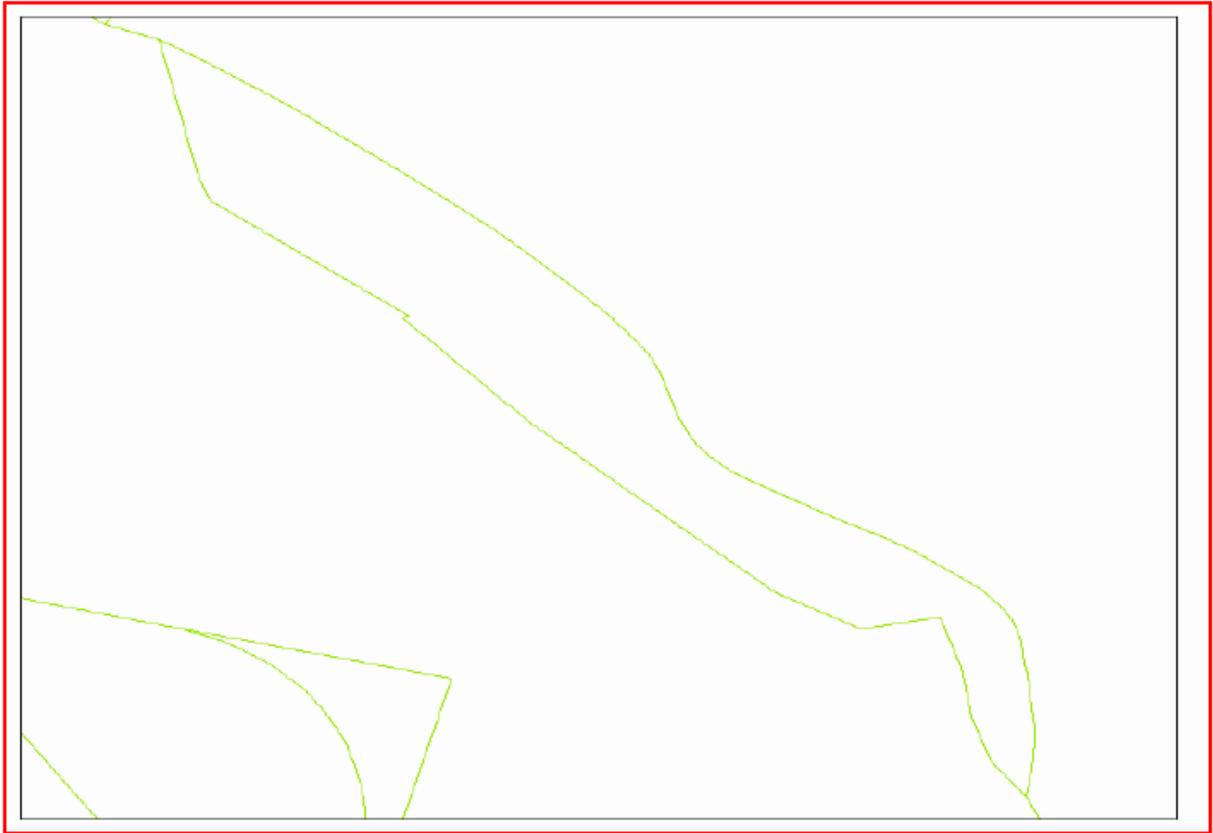
For over 60,000 years, the area comprising present day Parramatta has been occupied by the Burramattagal people, a clan of the Darug, who first settled along the upper reaches of the Parramatta River. Burramattagal is thought to be derived from the Aboriginal word for 'place where the eels lie down' to breed (within the Parramatta River). The Burramattagal have a close connection with the river, from which they caught fish, eels, and other food. Their stable, bark canoes often held a central small fire, built on a mound of soil, to cook up their fresh catch. 'Fire-stick farming', employed to burn vegetation to facilitate hunting and to change the composition of plant and animal species in the area, was also practiced by the Burramattagal people.

Soon after Governor Phillip's arrival with the First Fleet (of convicts from England) in 1788, Parramatta was developed as a farming settlement to feed the new English colony. This colonisation led to the immediate and tragic displacement of local Aborigines from the land that they had inhabited for thousands of years. Local Aboriginal groups led a resistance against the new settlers, with the most prominent warrior known as Pemulwuy. More of this history can be found in resources in Parramatta Library and Parramatta Heritage Centre. The Darug people still populate the areas of Parramatta, Greater Western Sydney, La Perouse and the Blue Mountains. There are a number of Darug organisations and advisory committees that include active Darug people, as well as prominent Darug artists.⁵

3.2.2 AHIMS Search Results

A basic search of the AHIMS database was undertaken for sites recorded within a 0 metre and 50 metre buffer of Lots 1 and 2 DP 869816, which encompass the subject site. No Aboriginal sites were recorded within a 0 metre buffer, however, 2 sites are recorded within a 50 metre buffer (Figure 25).

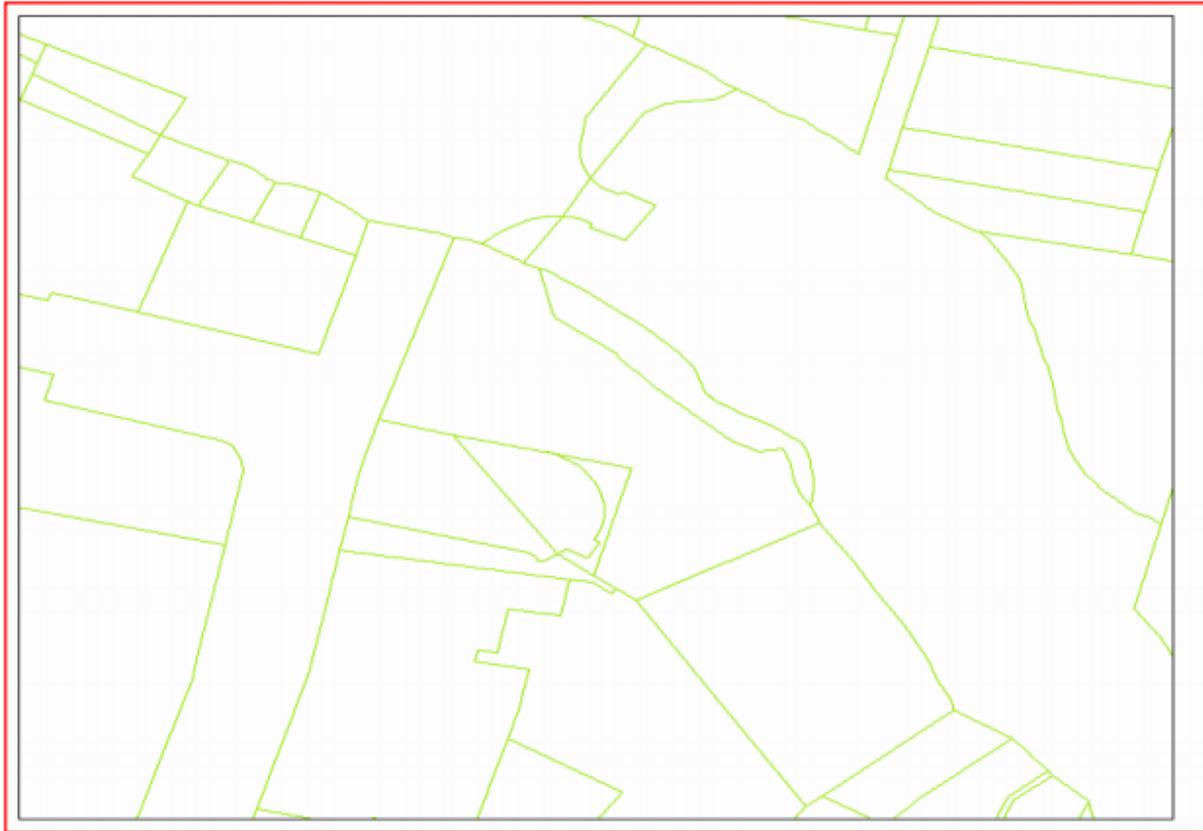
⁵ 'Aboriginal and Torres Strait Islanders', City of Parramatta (2017). Accessed 09 March 2018, available from <https://www.cityofparramatta.nsw.gov.au/living-and-community/aboriginal-and-torres-strait-islanders>.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

Figure 24: AHIMS Basic Search results indicating the presence of 2 Aboriginal sites within a 0 metre buffer of DP 869816 (Source: AHIMS Basic Search Lot 1 DP: DP869816 with a Buffer of 0 metres, conducted by Alexandra Ribeny on 08 February 2018)



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

2	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

Figure 25: AHIMS Basic Search results indicating the presence of 2 Aboriginal sites within a 50 metre buffer of DP 869816 (Source: AHIMS Basic Search Lot 2 DP: DP869816 with a Buffer of 50 metres, conducted by Alexandra Ribeny on 08 February 2018)

The AHIMS search results indicate no Aboriginal sites are located within a 0 metre buffer of Lots 1 and 2 DP 869816, which encompasses the subject site. 2 Aboriginal sites are located within a 50 metre buffer. An extensive search was therefore performed so as to determine the context and precise location of the sites (Table 2). It was established that both sites are recorded in the same location, approximately 280 metres to the south-west of the subject site; the location of which is indicated in Figure 26.

Table 2: AHIMS Extensive Search results

Site Name	Site Number	Site Type
'Charles/George 1'	45-6-2648	Artefact scatter
'RTA-G1'	45-6-2673	Artefact scatter



Figure 26: Location of Aboriginal sites 'Charles/George 1' (45-6-2648) and "RTA-G1' (45-6-2673) (flagged) approximately 280 metres to the south-west of the subject site (indicated in red) (Source: SIX Maps 2018)

3.2.3 PACHCI Stage 1 Assessment Results

Roads and Maritime undertook a Stage 1 PACHCI Assessment on 14 March 2018. The proposed work was assessed as being unlikely to have an impact on Aboriginal cultural heritage and was based on the following due diligence considerations:

- *The project works are within the existing wharf area (disturbed zone).*
- *The project is unlikely to harm known Aboriginal objects or places (AHIMS sites).*
- *The AHIMS search did not indicate moderate to high concentrations of Aboriginal objects or places in the study area.*
- *The study area does contain landscape features that indicate the presence of Aboriginal objects, based on the Office of Environment and Heritage's Due diligence Code of Practice for the Protection of Aboriginal objects in NSW and the Roads and Maritime Services' procedure, however, the cultural heritage potential of the study area appears to be reduced due to past disturbances in the form of the construction of the existing wharf.*
- *There is an absence of sandstone rock outcrops likely to contain Aboriginal art.*

The assessment concluded that no further Aboriginal heritage assessment is required and the proposal may proceed in accordance with the environmental impact assessment process, as relevant, and all other relevant approvals. However, should the scope of the proposed work change, further consultation with Roads and Maritime's Aboriginal Cultural Heritage Officer and regional environmental staff should be undertaken to reassess any potential impacts on Aboriginal cultural heritage.

3.2.4 Desktop Assessment Summary

This desktop Aboriginal heritage assessment has established that Aboriginal people have a long and enduring connection with the Parramatta area.

A basic search of the AHIMS database indicated that no Aboriginal sites are located within DP 869816, which encompasses the subject site, whereas two Aboriginal sites are recorded within a 50 metre buffer. An extensive search of the AHIMS database located both Aboriginal sites approximately 280 metres to the south-west of the subject site. As the works are limited to the wharf structure, landside interface and waiting shelter, these would not be directly impacted.

The Roads and Maritime's PACHCI Stage 1 Assessment has determined that it is unlikely that the proposed works would impact Aboriginal cultural heritage. Should any Aboriginal objects be encountered during the works, all work must immediately cease, Roads and Maritime are to be notified and the 'unexpected heritage items procedure' in the *Standard Management Procedure: Unexpected Heritage Items* (2015)⁶ is to be adhered to.

⁶ 'Unexpected Heritage Items Procedure' (2015). Accessed on 01 September, 2017. Available from <http://www.rms.nsw.gov.au/documents/about/environment/protecting-heritage/managingdevelopment/unexpectedheritageitems-procedure.pdf>

4 Non-Aboriginal Heritage

4.1 Legislative Framework

Historical heritage in NSW is protected by the *New South Wales Heritage Act 1977* and the *Environmental Planning and Assessment Act 1979* (EP&A Act) and its sub-instruments. These are discussed below.

4.1.1 NSW Heritage Act 1977

Architectural Works

In NSW, the legal protection for items of State heritage significance is afforded by the *Heritage Act 1977*. Those items of State significance that are listed on the State Heritage Register identifies them as possessing values that are important to the NSW community.

The research undertaken did not identify any heritage item that is included on the State Heritage Register, therefore the provisions of the *Heritage Act, 1977* for State level items do not apply; This means that neither a section 60 Application under section 57(1) of the Act or notification for Standard Exemptions under section 57 (2) of the Act are required for any work to the heritage items located within the study area. All of the heritage items are of local significance.

Archaeological Management

The archaeological resources ('relics') of New South Wales are recognised through the protection offered under the Heritage Act in which a 'relic' is defined as:

...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 the terms of the Act, automatic statutory protection is provided for 'relics'. Section 139 (1) of the Heritage Act provides that:

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

No specific archaeological resources have been identified within the footprint of the proposed upgrade to Parramatta Wharf (see *Section 4*).

4.1.2 State Environmental Planning Policy (Infrastructure) 2007 (ISEPP)

The ISEPP governs development that involves infrastructure. Under clause 68 (4a) of the ISEPP:

...development for the purposes of associated public transport facilities for a public ferry wharf may be carried out by or on behalf of a public authority without consent on any land.

Where development may be carried out without consent, under Clause 14 of the ISEPP government bodies are required to consult the respective local council for any work proposed to a heritage item of local significance if its impact is assessed to be more than minor or inconsequential. Clause 14 of the State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) sets the requirements for such activity. The subject clause is provided below:

14 Consultation with councils – development with impacts on local heritage:

(1) This clause applies to development carried out by or on behalf of a public authority if the development:

(a) is likely to have an impact that is not minor or inconsequential on a local heritage item (other than a local heritage item that is also a State heritage item) or a heritage conservation area, and

(b) is development that this Policy provides may be carried out without consent.

(2) A public authority, or a person acting on behalf of a public authority, must not carry out development to which this clause applies unless the authority or the person has:

(a) had an assessment of the impact prepared, and

(b) given written notice of the intention to carry out the development, with a copy of the assessment, to the council for the area in which the heritage item or heritage conservation area (or the relevant part of such an area) is located, and

(c) taken into consideration any response to the notice that is received from the council within 21 days after the notice is given.

Parramatta Wharf is located within the Parramatta LGA. Parramatta Wharf is not listed as a heritage item, but it is situated within the vicinity of State heritage item 'Harrisford (and potential archaeological site)' (SHR no.100248) and within the vicinity of local heritage items 'Newlands Gates and Trees' (item no.I544), 'Charles Street Weir' (item no.I733) and 'Wetlands' (item no.I735), which could be impacted by the proposal to refurbish and upgrade the wharf. If the impact is assessed to be more than minor or inconsequential, Parramatta Council would need to be consulted in accordance with Clause 14 of the ISEPP.

This SoHI fulfils the requirement under Clause 14 (2)(a) for an impact assessment.

4.2 European History

4.2.1 History of Parramatta

The following is an extract from the Dictionary of Sydney entry for Parramatta,⁷ which is itself based on the history of the area published by Kass et al. in 1996:⁸

After the penal colony was founded at Sydney Cove in January 1788, Governor Arthur Phillip organised exploring expeditions up the Parramatta River. When more fertile land near the head of the river was found, he decided to set up a second settlement. On 2 November 1788, a site was selected for a redoubt at the Crescent, in what is now Parramatta Park, and on 4 November 1788, convicts were sent to the site. Land was cleared and planted with crops. Apart from government agriculture, private farming also began. In November 1789, James Ruse was occupying land at Experiment Farm, which he was cultivating. Later, it was granted to him.

From Rose Hill to Parramatta

The settlement was originally known as Rose Hill (Figure 27) in honour of George Rose, Secretary to the British Treasury, who was reputed to have helped Phillip secure appointment as governor of the penal colony. On 2 June 1791, Phillip renamed it Parramatta, using the locality name used by the Burrumattagal. Various meanings have been ascribed to the name Parramatta, but Elizabeth

⁷ T Kass, 2008. "Parramatta", Dictionary of Sydney, available at <http://dictionaryofsydney.org/entry/parramatta>.

⁸ T Kass, C Liston and John McClymont, 1996. Parramatta: A Past Revealed. Parramatta: Parramatta City Council.

Macarthur wrote at the time that it meant 'head of the river'. It was the first place to be given a name by Europeans that was based on an Aboriginal name.⁹

A town was laid out in 1790 with a long transverse street, later known as George Street (Figure 28), leading from the wharf to Government House. It was lined on both sides with convict huts. Other buildings erected included a granary, stores, and military barracks. A hospital was operating in 1789: in 1792 a new brick hospital was built on a site by the river. A gaol was commenced in 1797 in what is now Prince Alfred Park. The first service at St John's Church was held on 17 April 1803. Its distinctive towers were added in the 1810s. Originally all communication to and from Parramatta was by river, but a rough track to Sydney was opened. Parramatta Road was laid out about 1797 under the direction of Surveyor-General, Augustus Alt.¹⁰

Government House was set up as the governor's Parramatta residence and a large area around it was set aside as the Governor's Domain. It became Parramatta Park after it had been greatly reduced in size. Until the 1850s many governors preferred to rule from Parramatta rather than Sydney.

Manufacturing in Parramatta included weaving, brewing, and brick kilns. The streets were regularised in 1811 and 1814. Inns emerged as commerce expanded in the town, changing a convict-based economy into a market-based economy.

The Female Orphan School (Figure 29), a pet project of Governor Macquarie's wife Elizabeth, was completed on 30 June 1818. It now forms part of the University of Western Sydney. The Female Factory was occupied in February 1821, housing convict women awaiting assignment or returned to the government by their employers.

In May 1823, a Governor's Proclamation permitted those who held land in towns, including Parramatta, to obtain a lease for 21 years. Those who were willing to pay 21 years 'quit rent' or had spent over £1,000 on building were entitled to a grant. Previously, some grants been made in the town but most land was held under lease or at sufferance. The proclamation gave townspeople secure tenure of their land, which they could develop for commercial or residential purposes. When the leases expired in the 1840s, there was a long period of tidying up of property ownership in Parramatta, which enabled some canny speculators to obtain a good deal of land in the area. The process of finalising grants continued into the 1850s.

The Town Prospers

Parramatta grew as the major regional centre for western Cumberland with its courthouse (Figure 30), Government House, markets and stores. It provided professional services in law and medicine. Many specialist suppliers operated from Parramatta while notable hotels such as the Red Cow and the Woolpack added to its attractions. The establishment of the King's School (Figure 30) fixed Parramatta's role as a major educational centre. The school moved into new premises on the north side of the river in 1835.

The end of the convict regime in the 1840s and the withdrawal of the imperial garrison and the loss of its financial expenditure meant a reduction of functions for Parramatta, so its economy suffered. However, Parramatta was left with a legacy of major convict era buildings. These were later converted into public institutions such as the Lunatic Asylum (former Female Factory), Benevolent Asylum (George Street convict barracks) Lancer Barracks (former military barracks), and Parramatta Gaol.

The arrival of the railway in 1860 (Figure 31) changed the focus away from George Street and the road from the wharf to Church Street and the railway station. Major stores and businesses began to re-align themselves along Church Street (Figure 32) rather than George Street.

⁹ Kass et al. 1996, p.26.

¹⁰ J Jervis, 1927. "The Road to Parramatta - Some Notes on its History", Journal of the Royal Australian Historical Society 13, pp. 68-69.

A local government authority was proclaimed for Parramatta on 27 November 1861. An election on 20 December 1861 was followed by the first meeting of council on 2 January 1862 in the courthouse. Parramatta's Town Hall was completed in September 1883.

Industrial businesses set up in Parramatta included blacksmiths, which later turned into engineering firms such as that of the Ritchie family; millers such as Henry Harvey and the Byrnes Brothers; tanneries, brick kilns and tweed mills (also run by Byrnes Brothers). Parramatta's continuing role as a retail centre with many stores was reflected in the number of newspapers issued at Parramatta, though, unfortunately, few issues survive from before the 1870s. Major banks established in Parramatta included the Commercial Banking Co of Sydney (1861) and Bank of New South Wales (1874).

A suburbanisation boom from the 1870s onwards created satellite towns in areas such as Harris Park and Granville. Initially, since there were only a few general stores in those centres, most residents still patronised Parramatta for major purchases or professional services. At the same time, more intense development pressures within Parramatta forced some manufacturers to shift to outer areas on 'green field' sites. Byrnes Brothers weaving mills moved to Granville and Ritchie's engineering works went to Auburn.

As a town with an 'old world' feel by the 1870s, Parramatta emerged as a holiday or honeymoon destination, a function it retained into the 1910s. Centred on a pleasant landscape of farms and orchards with the river and hills nearby, its less hectic lifestyle brought Sydneysiders there for holidays. Parramatta was also the centre for many established sports including clubs for cricket, football and tennis, as well as wheeled sports such as bicycling, motor-cycling and eventually car racing.

Parramatta has a special place in the history of flying. On 3 November 1911, William Ewart Hart flew his plane from Penrith to Parramatta for breakfast with his father, taking his 16-year-old brother, Jack, as a passenger. It took 19 minutes to complete the journey. It is reported that Jack vowed he would never go up with Billy again after the flight. It is recognised as the first long distance flight in Australia.

Commercial Development

Major stores commenced by local entrepreneurs included Erby's, Rawlinson's and the most famous of all, Murray Brothers. WR Murray and EN Murray combined their businesses in 1884 and expanded. In 1889, they built new multistorey premises which dominated Church Street (Figure 32), and which may be the first multistorey commercial store built in western Sydney. They are still extant at 263 Church Street.

By the 1930s, Sydney-based chain stores such as McIlraith's, Moran & Cato (Figure 33) and Nock & Kirby were entering Parramatta and pushing out local firms. Grace Brothers opened its new Parramatta store on 5 April 1933. A band of local unemployed men welcomed and entertained customers as they entered the premises. Murray Brothers expanded into new purpose-built premises on a new site at the corner of Macquarie and Church Streets. Local ice cream producer Lynam's opened a milk bar in Macquarie Street in the 1930s. For 18 months, it was conducted by John Goffage, later better known as Australian character actor 'Chips' Rafferty (Figure 33). Industrial development spread east along Parramatta River and to the south in the 1920s into what was then the Municipality of Granville.

Growth and Change

Municipal amalgamation forced by the state government in 1948 permitted Parramatta to absorb the municipalities of Granville, Dundas, Ermington and Rydalmere, despite the observation of Granville's Town Clerk that 'You can't make one rich man by tying three poor men together'.¹¹ A major part of Blacktown Shire covering Northmead and Winston Hills was added to the City of Parramatta in 1972.

¹¹ Kass et al. 1996, p.368.

Institutions such as the George Street Benevolent Asylum and Homes for the Aged were closed, and their sites redeveloped, reducing Parramatta's dependence on government institutions. Yet, the continuation of others such as the former Female Factory, which became the Lunatic Asylum (now Cumberland Hospital), the former Female Orphan School (later Rydalmere Lunatic Asylum) and now the University of Western Sydney's Rydalmere campus, maintained the role of large institutions in Parramatta and ensured the survival of its historical fabric.

Vigorous commercial redevelopment commenced in the 1950s, as commercial offices entered the Parramatta central business district, diversifying its former retail focus. The process was hastened by zoning and the need for regional headquarters for firms serving western Sydney, which had boomed after World War II. Retailing changes were highlighted by the remodelling of Grace Brothers store in 1956 with rooftop parking. The opening of David Jones Church Street store by the Parramatta River on 22 November 1961 helped to steer retailing northwards away from the railway station.

Subsequently, Westfield redeveloped the Grace Brothers site on Church Street next to the railway station. When it opened in 1975, it sought to reverse the trend of shoppers bypassing Parramatta for regional shopping centres such as Roselands. The strategy was successful and Westfield has expanded further since then. Wholesale redevelopment of entire blocks adjacent to the railway station is currently altering the core of Parramatta (Figure 34).



Figure 27: A view of the Governor's house at Rose Hill in the township of Parramatta (Source: NLA)

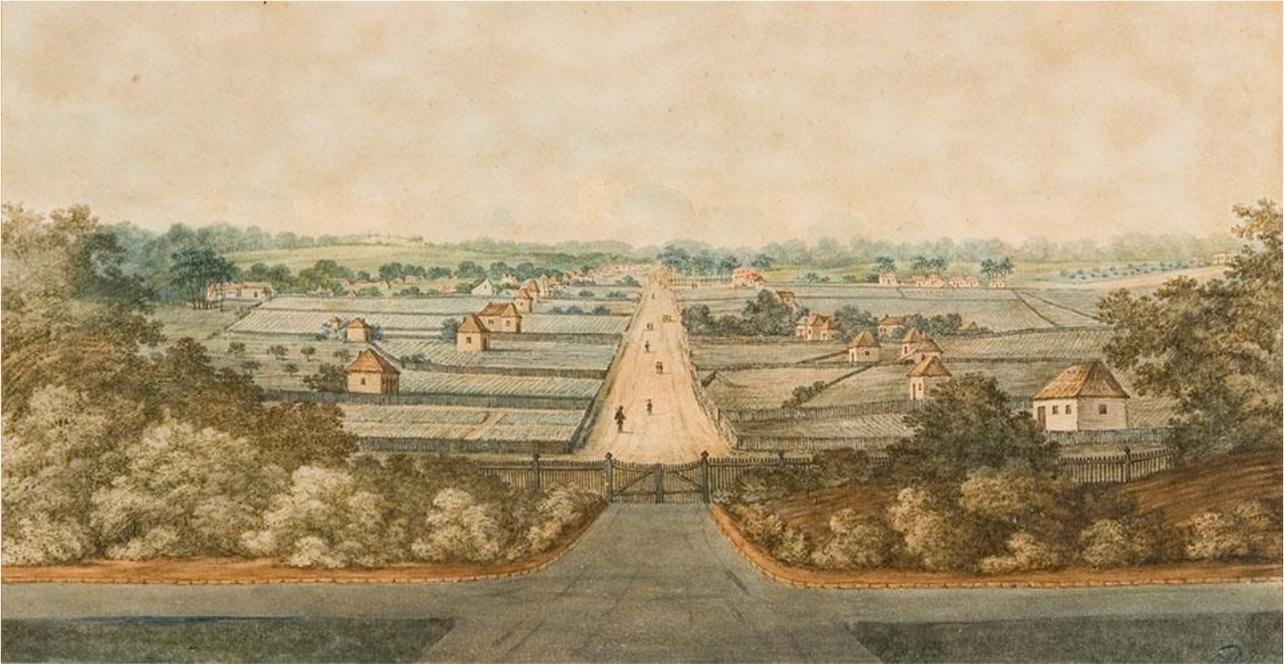


Figure 28: The settlement of Parramatta 1804-5 with the central thoroughfare of George Street and Convict residences on either side (Source: The Dictionary of Sydney)



Figure 29: View of the Female Orphan School near Parramatta 1775-1828 (Source: NLA, Trove)

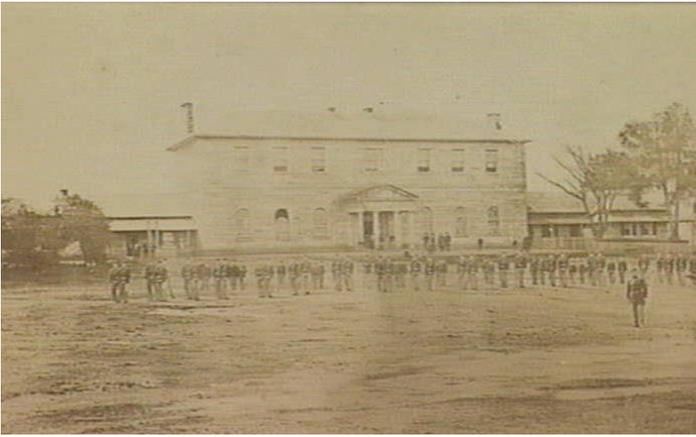


Figure 30: Kings School, 1863 (left) and Parramatta Court House, unknown date (right)



Figure 31: Parramatta Station 1870 (Source: Flickr, accessed 02 March 2018, available from <https://www.flickr.com/photos/26602074@N06/3527352932>)



Figure 32: Church Street, Parramatta c.1890 (left) and Town Hall, Parramatta c.1890 (right) (Source: The Dictionary of Sydney)



Figure 33: Moran and Cato department store (left) and 'Chips' Rafferty (right) (Source: IMDb)



Figure 34: The Parramatta CBD today (Source: 'Parramatta CBD population growing at record pace' (09 March 2017) The Daily Telegraph)

4.2.2 Development of Parramatta Wharf

The first landing point (1790) along the Parramatta River was slightly east of the Gasworks Bridge, which was defined by natural stone located at the point at which salt and fresh water were divided. As the water at this point was very shallow and boats were subject to tidal fluctuations, a wharf was built further downstream. Unfortunately, no plans or illustrations survive which detail the location of this early wharf. Originally a short timber structure, the wharf appears to have been enlarged in 1804 and continued in use until 1809.¹²

In 1808 land was acquired by a John Macarthur for the construction of a new stone wharf in deeper water, so as to accommodate the importation of a larger number of goods. The Parramatta town plan dating to 1823 (Figure 44) depicts this wharf, which remained in operation for many decades afterwards. This wharf serviced and was located next to a 3 storey 'stone granary' which acted as the chief granary of the New South Wales colony. In 1825 the stone granary was demolished, but the stone wharf appears to have continued in use for another 10 years. By the mid-1930s a water-mill and windmill structure and dam had been constructed by George Howell to the east of the stone wharf.¹³

In 1834/35 the Lennox Wall (or wharf) was constructed (Figure 35), likely in front of the 1808 wharf structure (of which there may still be remains). This was probably constructed in response to the arrival of steam boats on the Parramatta River. Silting became an issue throughout the 1830's and so a new wharf was constructed in 1846 at Redbank (Figure 39) for disembarkation during low tides.¹⁴ The Lennox Wall, being a public wharf, became known as the 'King's Wharf' during the reign of Edward IV and, when Queen Victoria ascended the throne, the 'Queen's Wharf' (Figure 36).

W.S.Campbell, a resident of Parramatta, described the Parramatta River of the mid-19th century as follows:

¹² Varman, R. 1996. Queens Wharf Reserve Parramatta: Archaeological Assessment, p.8

¹³ Ibid. p.14

¹⁴ Ibid. p.17

...Along the center of the river hereabouts, for a mile or so, large mud oysters, about the size of a cheese plate were dredged up from the bottom of the river by one or two fishermen. They were known as "mud oysters" and were sold in Sydney. They were very coarse and no one, I think, about the river ever made use of them. They are now either extinct or very scarce.

About a quarter of mile back from the asylum and along road from Kissing Point on right side and at top of the hill stood the flagpole or semaphore, 30 to 40 feet high used to signal messages from Sydney to Parramatta, known as "intermediate signal station"

Most of the country in the vicinity of the river was in its primeval state, or nearly so, in 1848 and for about five years afterwards, and was exceedingly beautiful. The only wharves where steamers went alongside, between the lower Parramatta wharf, known as "Redbank", and Sydney, where Pennant Hills wharf and Kissing Point wharf. At Bedlam Ferry the steamers stopped in mid-stream, and passengers were taken to and from them by the punt man, who made a small charge.¹⁵

An 1888 newspaper excerpt describes a ferry journey from the Sydney CBD to Parramatta as follows:

As we proceed, the river widens and grows shallow, the banks disappear, in some parts the ground is swampy and the ti-tree grows even in the water... At last we arrive at the Parramatta wharf, dis-embark, and proceed by tram for a couple of miles.

The two mile tram journey described after disembarkation suggests that the author had arrived at the Redbank Wharf and taken a tram to Parramatta; a likely response to the ongoing silting of the riverbed.

Besides the 'all-tides' wharf down river wharf at Redbank and the Queen's Wharf, another wharf was built by the Parramatta River Steam Company along the Macarthur's River frontage by 1867 (of which there may still be remains).¹⁶ After the 1860's George Howell's dam was demolished (Figure 37), which gave access to small boats up to Charles Street where a small wharf was built in 1877. Construction on the Gasworks Bridge (Figure 38) began in 1872 following the opening of the Gasworks in Parramatta. A tramway was established in 1883.¹⁷

With the end of the Depression in the early 1930's there was a large effort to clean and modernise Parramatta. A large number of historical buildings and facilities were removed and the seawall and wharf structures are today some of the only remaining remnants from the earlier period.¹⁸

The following history, taken from the SHI form for heritage item no.1733, indicates that a weir and floodgate had been constructed immediately west of the existing wharf structure in 1921 and that this was then replaced in 1951 by the Charles Street Weir (Figure 40):.

Charles Street Weir marks the junction of the tidal and non-tidal sections of Parramatta River and separates downstream saline water from the upstream fresh water. The Weir was initially located at the end of the river's deep water, allowing larger vessels to turn back downstream and avoid its shallow, rocky upper end. Although designed in 1941, construction works began in 1950 and the Weir was completed by the 12th of January 1951. In 1921, prior to the Charles Street Weir, a weir with floodgates had been built just east of the present-day Charles Street Weir adjacent to the modern ferry wharf, providing access across the river. The now Charles street Weir superseded

¹⁵ The Parramatta River and Its Vicinity 1848 to 1861, W S Campbell, Royal Australian Historical Society, Journal and Proceedings, v. 5, pt. 6. 1919, pp. 250-283

¹⁶ Ibid. p.18

¹⁷ Ibid. p.21

¹⁸ Varman, R. 1996. Queens Wharf Reserve Parramatta: Archaeological Assessment, p.22

the c.1921 weir as part of 'improvements' to the Parramatta River by the Department of Public Works. This existing weir is now a reinforced structure, set into the rock of the riverbed.¹⁹

In 1951 Sydney Ferries Limited was taken over by the NSW government, but it wasn't until 1969 that a privately-owned ferry service was established by Stannard Brothers Launch Services Pty Ltd. This service suffered financial losses, however, and was discontinued in 1973.

The modern wharf site (the subject site) was established for the RiverCat service in 1993. Its location at the corner of Charles and Phillip Streets meant that it did not affect any of the earlier wharf structures, with the possible exception of the 1877 timber 'Charles Street' wharf (Figure 41) (for further discussion of its location see *Section 4.3.1*). Table 3 lists the earlier wharf structures which are known to have existed in Parramatta and Figure 41 indicates their approximate location.



Figure 35: Lennox Bridge, Parramatta, 1836-1839 (Source: Parramatta Heritage Centre)

¹⁹ SHI Form, accessed on 02 February 2018. Available from <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5063021>.

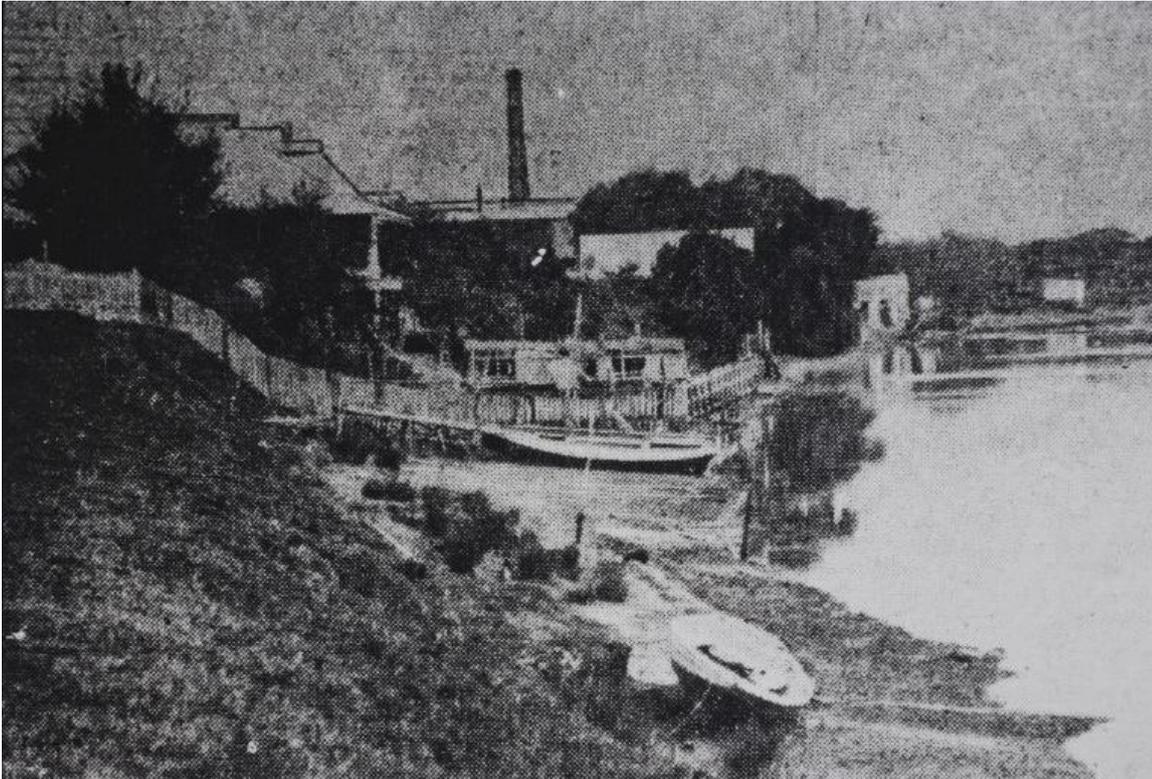


Figure 36: Queen's Wharf on the southern bank of the Parramatta River, c.1890's (Source: Parramatta Local Studies)



Figure 37: Howell's mill, located south of the Gasworks Bridge (Source: Parramatta Heritage Centre)



Figure 38: George Street Parramatta with Queen's Wharf and the Gasworks Bridge (Source: Parramatta Local Studies Photograph Collection)

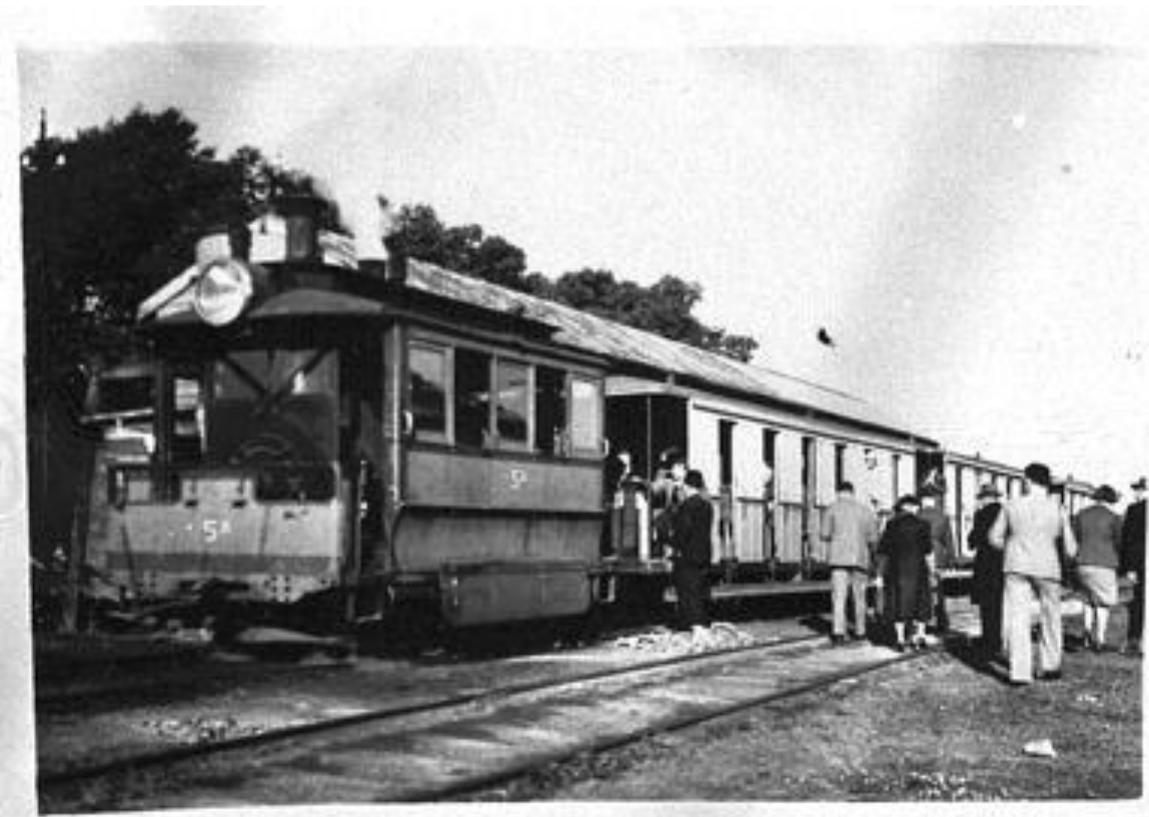


Figure 39: Tram service which connected to Redbank Wharf, located there the Parramatta River meets Duck Creek, c.1940 (City of Sydney Archives)



Figure 40: Charles Street weir, constructed in 1951 (Source: Waymarking, available at http://www.waymarking.com/waymarks/WMA8EC_Charles_Street_Weir_Parramatta_NSW)

Table 3: Historical wharves located within Parramatta

No.	Wharf	Date	Location	Description	Current Status
1	First landing area wharf	c.1790	In line between 1790 Store and Barracks	Short timber structure, later enlarged in 1804	Lower component of timber posts may still exist.
2	Stone (granary) wharf	c.1808	To the east of the 1790-built (timber) wharf, where a section of sea wall is today missing		Footings may survive behind the Lennox Wall.
3	Queen's Wharf	c.1834/35	Lennox sea wall and steps	Stone sea wall and steps	Survives today as the Lennox sea wall and steps
4	Redbank Wharf	c.1846	Redbank, at confluence of Parramatta River and Duck Creek		
5	Parramatta River Steam Co. Wharf	c.1867	Queens Wharf Reserve	Timber structure	Timber piers and some submerged timbers with slots for uprights. Some corroded metal fasteners survive.
6	Charles Street Wharf	c.1877	Northern termination of Charles Street	Small timber structure	Regular breaks in seawall suggest former location of timber wharf
7	Rivercat Wharf	1993	Charles Street	Concrete and timber structure	Currently operational

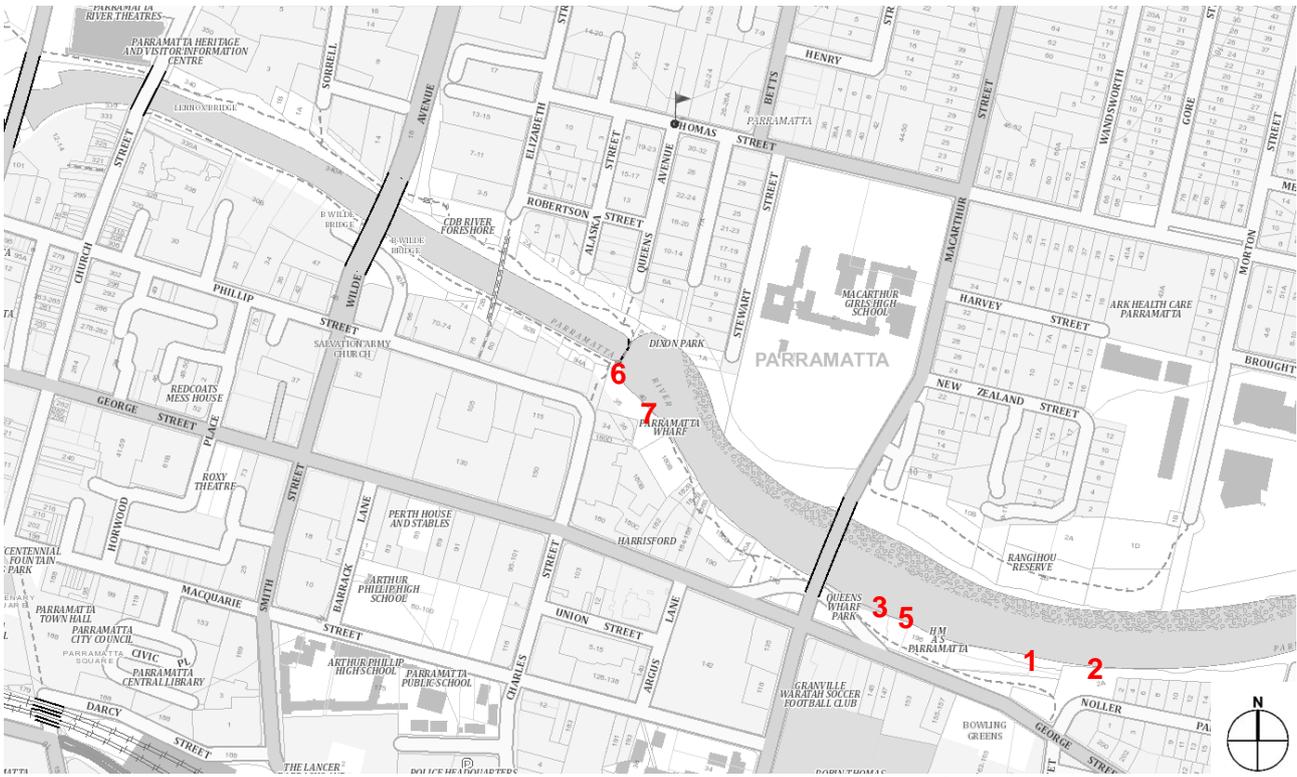


Figure 41: Location of historical wharves along Parramatta River. Note: Redbank wharf is not indicated as it was located at the juncture of the Parramatta River and Duck Creek further upstream (Source: SIX Maps 2018)

4.3 Historical Archaeological Potential

A large number of archaeological studies have been undertaken in the Parramatta area to date. These have identified a large number of potential archaeological sites, both on the northern and southern sides of the Parramatta River. An Archaeological Zoning Plan produced by Edward Higginbotham & Associates Pty Ltd²⁰ in 1989 located the subject site within, or adjacent to, a ‘Group 1’ zone (Figure 42), which is described as follows:

Underground archaeological remains. The Future of Parramatta’s Past. Each site should be subject to archaeological investigation prior to development. Once the archaeological investigation is completed, there may be a requirement for archaeological remains to be conserved in situ, either completely or in part. This requirement will be based on the following factors, namely, their survival and present condition, archaeological potential and cultural significance.²¹

It is also noteworthy that the subject site is not identified within an area where archaeological resources have been ‘destroyed’.

In February 2000 the Parramatta Historical and Archaeological Landscape Management Strategy (PHALMS) was launched by the NSW Government. The objective of this strategy was to factor Parramatta’s wealth of archaeological assets into the ongoing development strategy of the town centre. These studies, and others like them, have highlighted the high degree of archaeological sensitivity which characterises the whole of the Parramatta CBD area.

²⁰ ‘The Future of Parramatta’s Past: An Archaeological Zoning Plan’, Edward Higginbotham & Associates Pty Ltd (1989)
²¹ Ibid. p.44-45

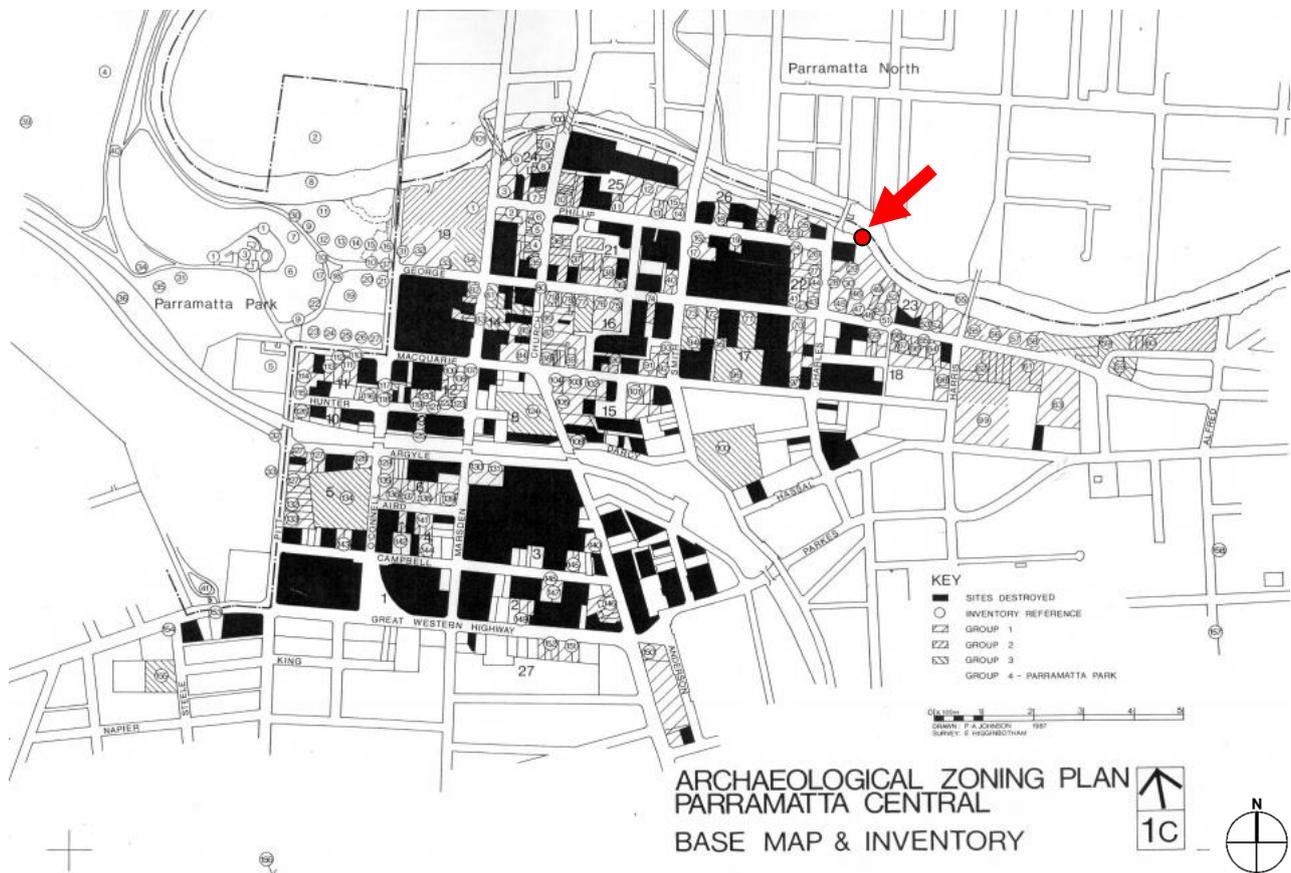


Figure 42: An Archaeological Zoning Plan identifies the subject site (indicated in red) adjacent to an area of archaeological sensitivity (Archaeological Zoning Plan (1989) Edward Higginbotham & Associates Pty Ltd)

4.3.1 Site Phasing: changes through time

Documentary evidence for the development of Parramatta Wharf is largely limited to written historical sources. These are supplemented by a small number of maps, aerial photographs and historical photographs. The following images depict the development of the subject site from the early 19th century to the present day.

A map of the Parramatta township dating to 1814 (Figure 43) indicates the presence of the 'wharf and stone granary', constructed in 1808, to the east of the subject site.

The Parramatta town plan dating to 1823 (Figure 44) depicts the stone granary wharf, constructed in 1808, which remained in operation for many decades afterwards.

A late 19th century parish map (Figure 46) depicts the Gasworks bridge to the east of the subject site, which had been constructed in 1872. Also present to the west of the subject site is the Lennox Bridge, constructed in 1836/39, and the 'Queen's Wharf', constructed in 1834/35.

A map extracted from the *Queens Wharf Reserve Parramatta: Archaeological Assessment*²² indicates the location of the 1877 'Charles Street' wharf immediately to the west of the subject site at the termination of Charles Street (Figure 45). It was also located within Samuel Barber's land at this time, consistent with a later map dated to post 1921 (Figure 50).

²² Varman, R. 1996. *Queens Wharf Reserve Parramatta: Archaeological Assessment*

An undated map (Figure 47) does not yet depict a Weir, which indicates that it likely predates 1921. The land immediately to the south of the subject site appears to have been privately leased, which had been permitted since 1823. It is not possible, however, to make out who occupied the land at this time.

A 1928 aerial photograph indicates that a weir structure was present to the north of the subject site at this time. The waterway appears shallow and the southern river bank further north at this time; perhaps the result of silt build-up. The subject site is characterised by wetlands and no wharf structure is present, indicating that the 1877 wharf structure may have been removed by this time.

A 1943 aerial photograph of Parramatta (Figure 49) indicates that the subject site was characterised by wetlands and an open field to the south. No structures are present within the vicinity of the subject site at this time, nor does there appear to have been a sea wall present at this time. Although the Charles Street weir had not yet been built, the former 1921 weir and floodgates had been constructed between the later Charles Weir site and the subject site. The river also appears to be very shallow in this image, which is consistent with silting; a recurring issue throughout the 20th century which led to the discontinuation of the ferry service.

A post-1921 map (Figure 50) (as a Weir is now present) indicates that the seawall had been constructed by this time to accommodate the higher water level created by the weir. The land immediately south of the subject site (Section 23, Allotment 16) was occupied by a Samuel Barber at this time.

A 1951 aerial photograph indicates that the Charles Street Weir had replaced the 1921 weir and floodgates by this time (Figure 51). The construction of the new weir appears to have increased the water level, as the riverbed is no longer visible. The subject site is located within a wetland area and no wharf structure is present. A 1970 aerial photograph suggests that the area within the vicinity of the subject site had not undergone any significant changes in the intervening years and is similarly characterised by wetlands at this time (Figure 52).

Two images (Figure 53 and Figure 54) taken in 1993 of the subject site depict the wharf structure at the time it was constructed. It appears that the gangway may have been replaced or upgraded since this time, as the existing structures contains a canopy addition. The original landside waiting shelter also appears to have been replaced by a much larger structure, which is present at the site today. Figure 53 appears to depict the construction of the gabion section of seawall, which extends further into the river, likely to accommodate the existing wharf structure. This is further suggested by the observation that the gabion section of seawall is absent in the 1943 aerial photograph (Figure 49).

Of note are the unpainted timber piles, located on either side of the wharf structure in 1993 (Figure 53 & Figure 54). These appear older and may have been installed at an earlier date. It is unclear whether these belonged to an earlier wharf structure, as historical sources do not indicate the presence of an earlier wharf in this precise location. An historical wharf was located to the west of the subject site in 1877 (the 'Charles Street Wharf'), of which remnants may be present in the form of submerged timbers and footings.

The 1993 images (Figure 53 & Figure 54) also appear to depict the construction of the gabion section of seawall, which today projects into the river to the north of the existing wharf structure. That the gabion seawall section can be observed in both a 1994 aerial photograph (Figure 55) and a 1995 map (Figure 56) appears to confirm this.

Analysis of historical maps and aerial photographs indicates that the project footprint would be located within land which has been heavily disturbed. The southern shoreline of the Parramatta River has significantly modified since the early 19th century for the creation of a number of weirs and the gabion section of seawall which would be affected by the proposed works was constructed in 1993.

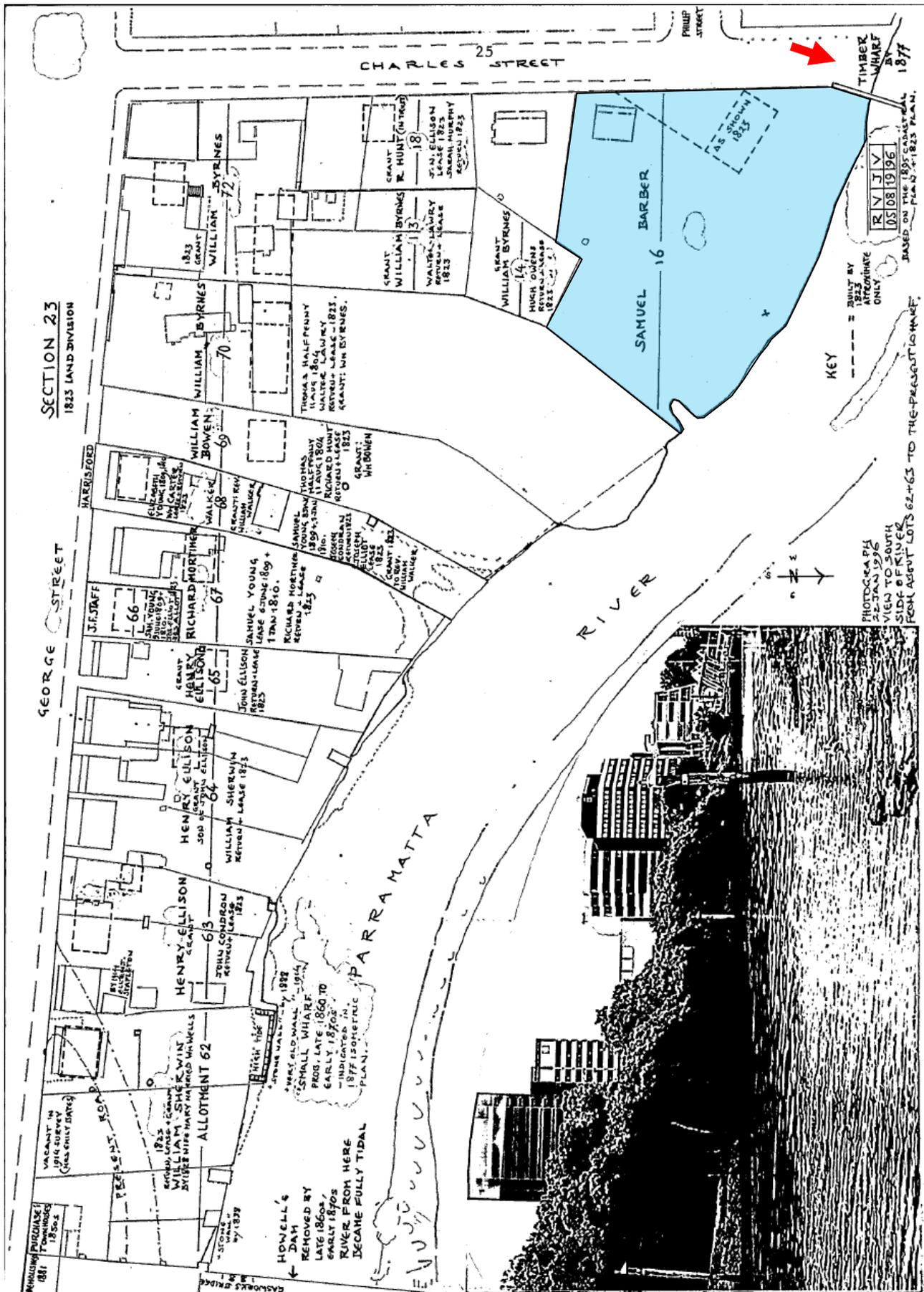


Figure 45: Map indicating location of 1877 'Charles Street Wharf' (indicated with red arrow) to the west of the subject site and within Samuel Barber's land (indicated in blue) (Source: Varman, R. 1996. Queens Wharf Reserve Parramatta: Archaeological Assessment)

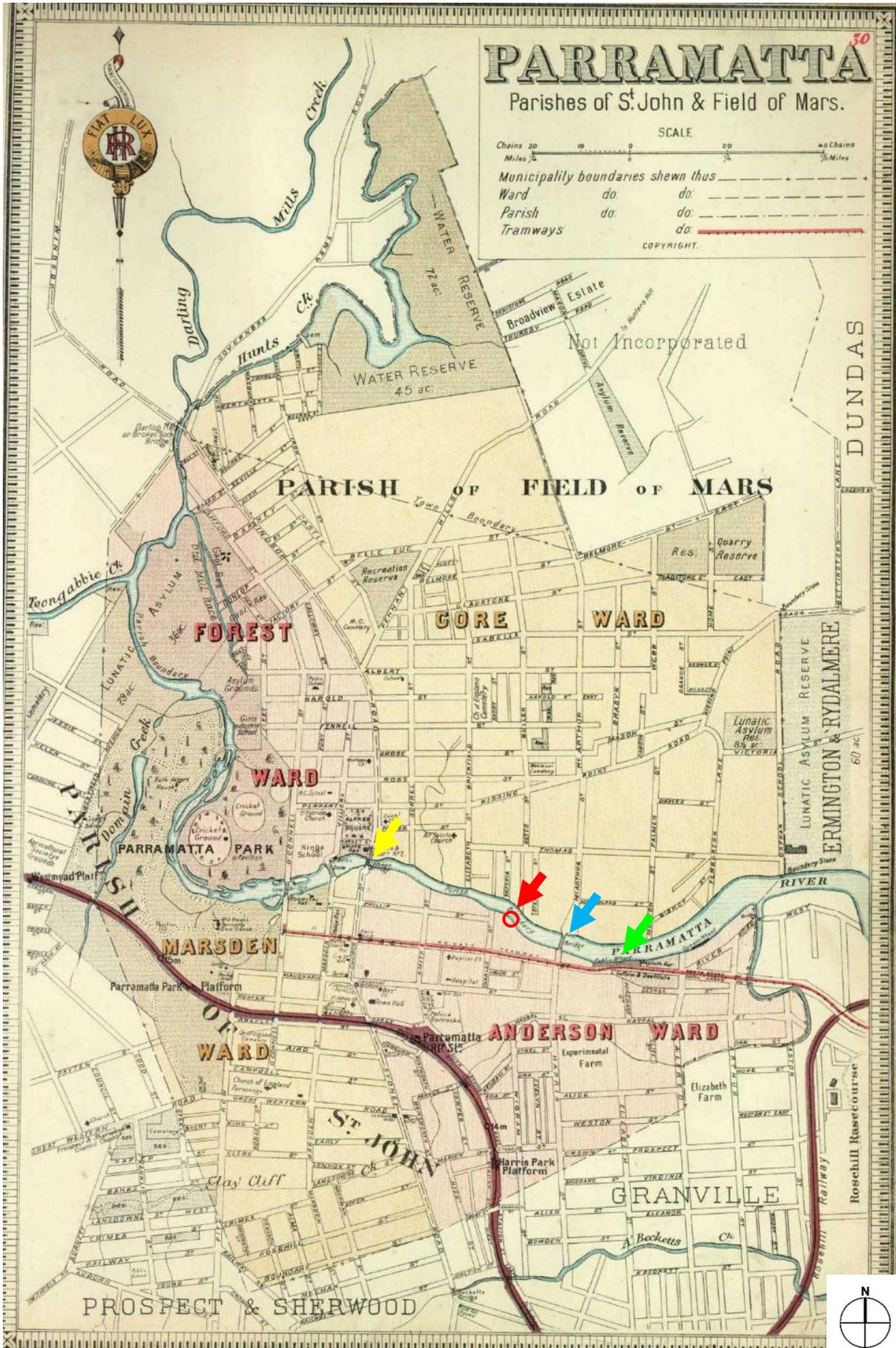


Figure 46: 1889 - 1894 parish map with subject site indicated in red. Other features of note include the Lennox Bridge (yellow arrow), Gasworks Bridge (blue arrow) and 'Queen's Wharf' (green arrow) (Source: Dictionary of Sydney)

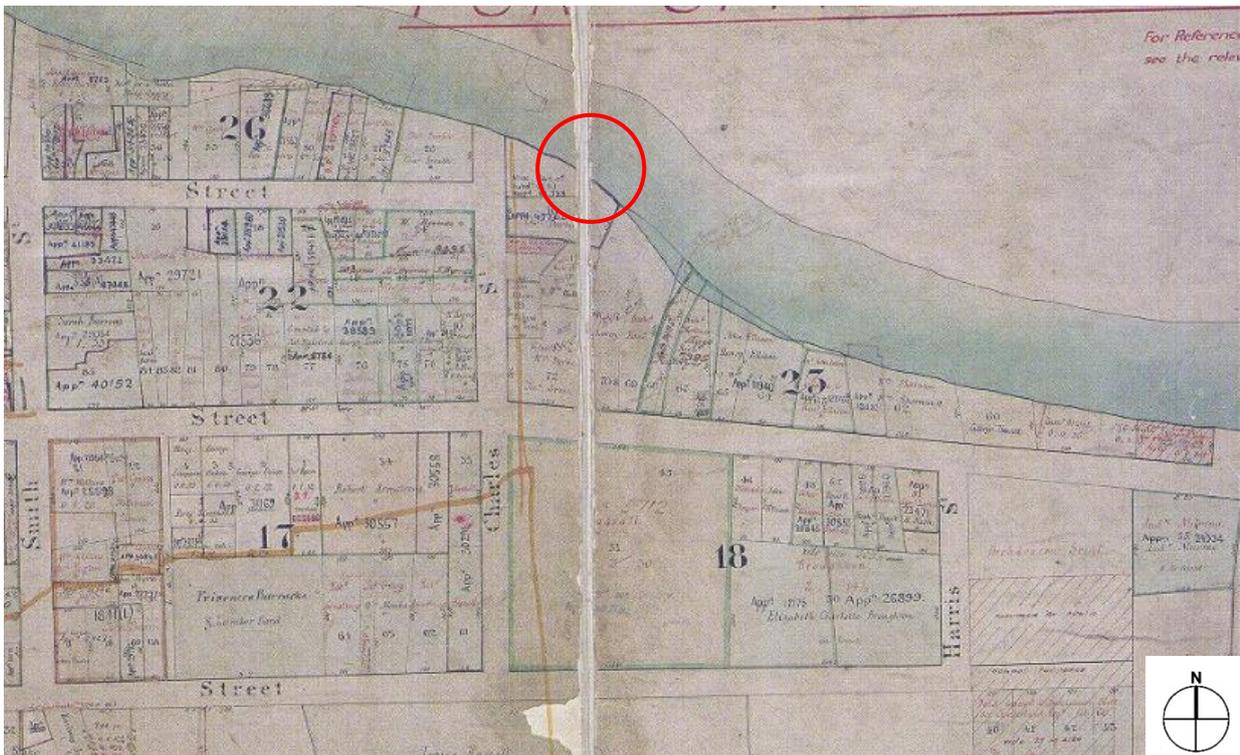


Figure 47: Undated (pre-1921) map of Parramatta south with subject site indicated in red (Source: HLRV)



Figure 48: Aerial photograph of Parramatta 1928, indicating that the river had not yet been widened at this time (Source: Spatial Services, NSW DFSI)



Figure 49: 1943 aerial photo of Parramatta with subject site (indicated in red) and 1921 weir and floodgates adjacent to it (indicated with yellow arrow) (Source: SIX Maps 2018)



Figure 50: Undated (post 1921) map with subject site indicated in red. The land immediately south (allotment 16) owned by a Samuel Barber at this time (Source: HLRV, Town of Parramatta, 2b)



Figure 51: Aerial photograph of Parramatta 1951, which indicates that the Charles Street Weir had been completed by this time (indicated with yellow arrow) (Source: Spatial Services, NSW DFSI)



Figure 52: Aerial photograph of Parramatta 1970 indicating that subject site remained characterised by wetlands at this time (Source: Spatial Services, NSW DFSI)



Figure 53: Construction of Parramatta Wharf in 1993. The former waiting shelter (indicated with red arrow) has been replaced since this time. It is not clear whether the original piles (indicated with blue arrow) predate the wharf (Source: City of Sydney Archives)



Figure 54: Construction of Parramatta Wharf in 1993. Changes since this time include the removal/replacement of the former gangway structure (indicated with red arrow) (Source: City of Sydney Archives)



Figure 55: 1994 aerial photograph of Parramatta. Note the presence of the gabion-constructed section of seawall (indicated with blue arrow) within the subject site (indicated in red) (Source: Spatial Services, NSW DFSI)

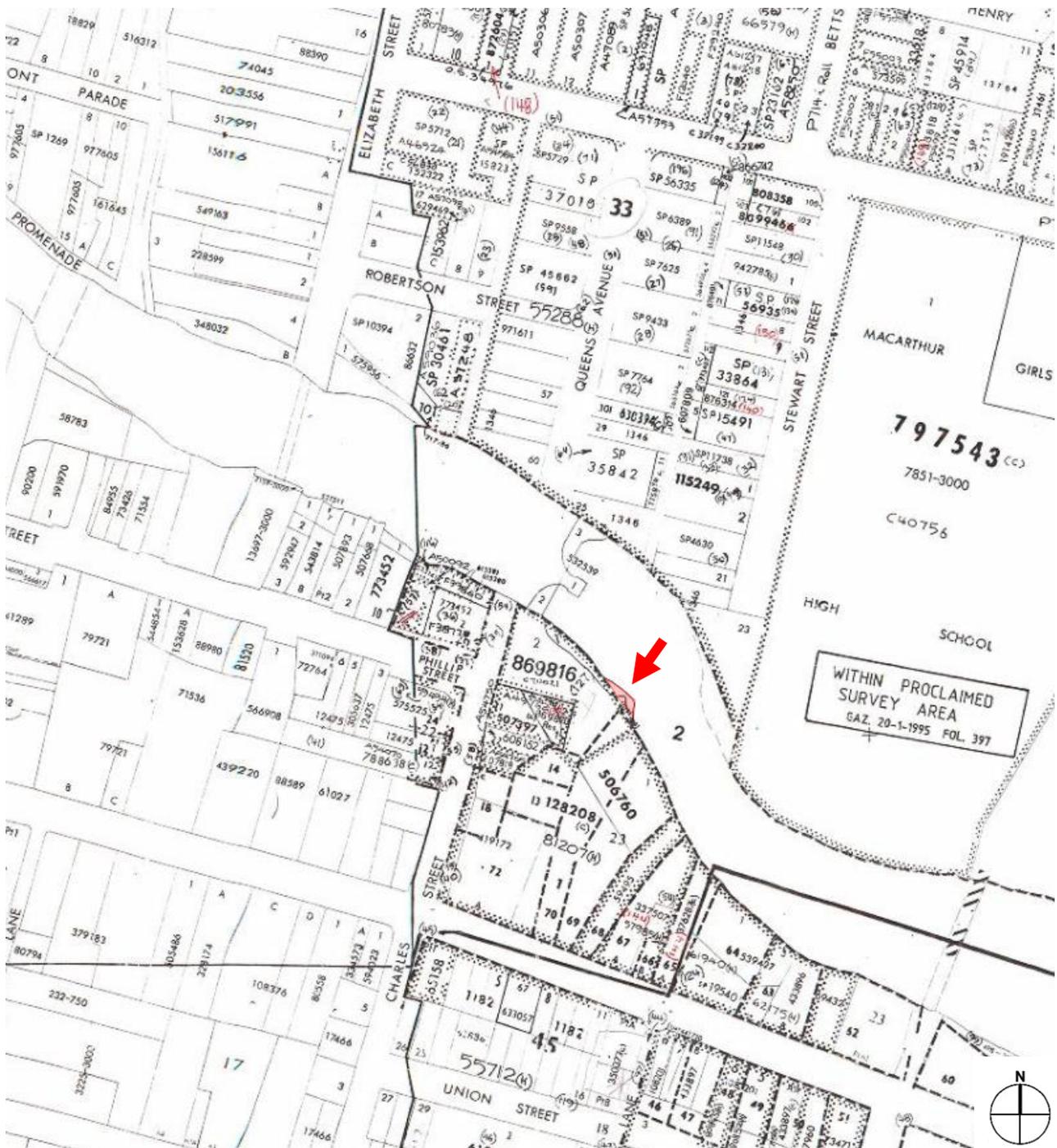


Figure 56: 1995 survey map which depicts the section of sea wall (indicated in red) which had been extended into the river by this time to accommodate the wharf structure, constructed in 1993 (Source: HLRV, map no.U0052-41)

4.3.2 Historical Archaeological Potential

Analysis of the documentary evidence has shown that a large number of earlier wharf structures have existed within Parramatta from 1790, when Governor Philip initiated exploration of the area, to the present day. It has also indicated that just one of these earlier wharf structures was present within the vicinity of the subject site to the west of the existing wharf structure at the corner of Charles and Philip Streets. As this wharf, constructed in 1877, was of timber construction, it is

unlikely that underwater remnants would still be present. A 1996 archaeological assessment²³ indicated that this wharf is today indicated only by 'regular breaks in the seawall'. Documentary evidence has indicated that Charles Street weir, which was established in 1951, replaced an earlier weir and floodgate, which had been constructed in 1921. The establishment of these weirs allowed ferry transportation to resume to this point in the Parramatta river, where silting had become an issue. The present Parramatta Wharf structure was constructed in 1993.

Analysis of historical images, to establish the phased development of the site, has not yielded any evidence of earlier landside structures or significant landscape features within, or proximal to, the existing wharf site. The subject site, though located within privately-owned land, appears to have been characterised by an open field and wetlands until the development of the current Parramatta wharf site (the subject site) in 1993. Analysis of historical images has also indicated that the historical 'Charles Street' timber wharf, reportedly constructed in 1877, was located to the west of the subject site, although an archaeological assessment dated to 1996²⁴ determined that it is today represented only by a break in the seawall.²⁵ Although there is potential for remnants of this structure to be present in the form of timber piles and footings, these would be located outside of the project footprint and would not therefore be directly impacted by the works. The timber piles, located on either side of the wharf structure in 1993, may have belonged to an earlier wharf structure, though none have been identified in historical aerial photographs and maps.

The current wharf structure has largely remained unchanged since its construction in 1993, although the large landside waiting shelter, today present on the site, replaced a much smaller waiting shelter structure in the intervening years. The proposed new Parramatta Wharf would be constructed where the current wharf structure is located, although the landside abutment would be located slightly further to the north. The new Parramatta Wharf would replace the 1993 structure and would involve the removal of the existing pontoon and gangway. The archaeological potential of the current Parramatta Wharf structure is assessed as low as it is of modern construction and can yield very little information about historical wharf construction techniques. The gabion-constructed section of seawall, which projects into the river slightly north of the existing wharf structure, was most probably constructed in 1993. Its construction would have involved significant disturbance and the removal of a section of wetlands.

The subject site, which consists of the existing wharf structure, waiting shelter and gabion-constructed section of seawall, are modern installations within an area of heavily disturbed land. The historical archaeological potential of the subject site is therefore assessed as low-medium on the basis of the following considerations:

- timber piles, which predated the existing wharf structure, were located within the vicinity of the subject site in 1993;
- the subject site is located within an area of high historical archaeological sensitivity; and
- the subject site is located within heavily disturbed land.

4.4 Heritage Significance

The following assessment of significance has been prepared in accordance with the *Assessing Heritage Significance* guidelines, as contained within the *NSW Heritage Manual*.²⁶

4.4.1 Assessment of Significance Criteria

As the present Parramatta Wharf is not a heritage-listed item, the following assessment relates to the subject site and, primarily, the existing wharf structure located therein.

²³ Varman, R. 1996. Queens Wharf Reserve Parramatta: Archaeological Assessment

²⁴ Ibid

²⁵ Ibid

²⁶ 'Assessing Heritage Significance', NSW Heritage Manual (November 2015), Office of Environment and Heritage.

a) an item is important in the course, or pattern, of the local area's cultural or natural history

The present wharf structure, like those which preceded it, has aided the development of Parramatta from the establishment of the colony to the present day. The present Parramatta Wharf site is important in the course of Parramatta's cultural history as it reflects the evolution of maritime transportation along the river and changing community needs and requirements to Sydney's ferry services at the turn of the 20th century.

b) an item has strong or special associations with the life or works of a person, or group of persons, of importance in the local area's cultural or natural history

The subject site is of associative significance for Aboriginal people of the Burramattagal clan, in whose traditional territory it is located.

c) an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in the local area

The current Parramatta Wharf structure is one of a number of ferry wharves which were established along the Parramatta River, from Meadowbank onwards, at the end of the 20th century as the result of improved infrastructure and de-silting measures. Amongst this group, the subject wharf structure is neither technically or creatively remarkable, although it does contribute toward the maritime aesthetic of the Charles Street river shorefront.

d) an item has strong or special association with a particular community or cultural group in the local area for social, cultural or spiritual reasons

Although this criterion has not been addressed through community consultation, it is assumed that Parramatta Wharf has social and cultural associations for those who have used the ferry services since the late 20th century and for the broader community, which has been shaped by the Parramatta area's lengthy maritime history.

e) an item has potential to yield information that will contribute to an understanding of the local area's cultural or natural history

The above archaeological desktop assessment (*Section 4.3*) has assessed the archaeological potential of the present Parramatta Wharf structure as low. As a relatively modern structure, the present Parramatta Wharf has minimal potential to yield information that would contribute to a greater understanding of historical maritime technology or wharf construction. There is potential for remnants of an earlier wharf structure (the 1877 'Charles Street Wharf') to be located to the west of the subject site in the form of submerged timbers and footings. If uncovered, this could be instructive about early transportation and use of the Parramatta River from this location.

f) an item possesses uncommon, rare or endangered aspects of the local area's cultural or natural history

The subject site only possesses rare or endangered aspects of local history and culture insofar as it represents the functional replacement of earlier wharf structures (i.e. the 'Queen's Wharf', stone granary wharf, etc.) with the present wharf structure in the late 20th century.

**g) an item is important in demonstrating the principal characteristics of a class of the local area's cultural or natural places; or
cultural or natural environments**

The present Parramatta Wharf demonstrates the principal characteristics of a modern wharf constructed at the end of the 20th century to accommodate the ferry service which had been extended further west along the Parramatta River. It therefore has the potential to demonstrate, when compared with earlier structures which were established to the east, the evolution of wharf construction and location and changing community requirements.

4.4.2 Statement of Significance for Parramatta Wharf

The present Parramatta Wharf site is important in the course of Parramatta's cultural history as it reflects the evolution of maritime transportation along the river from the establishment of the colony to the present day, which shaped the development of Parramatta and its surrounds. It also reflects community needs and subsequent requirements to Sydney's ferry services at the turn of the 20th century and changing functions of the wharf.

Parramatta Wharf has social and cultural associations for those who have used the ferry services since the late 20th century. It is also of associative significance for the Parramatta community at large, which has been shaped by its proximity to the river and its evolving maritime services. The subject site is also of significance to the Barramattagal clan in whose traditional territory it is located.

The current Parramatta Wharf structure is one of a number of ferry wharves which were established along the Parramatta River, from Meadowbank onwards, at the end of the 20th century. Amongst this group, the subject wharf structure is neither technically or creatively remarkable, although it contributes toward the maritime aesthetic of the area.

The archaeological potential of the existing Parramatta Wharf structure is assessed as low, given its modern construction. It does, however, have the potential to reveal aspects of the evolution of late 20th century wharf construction when compared to earlier examples to the east.

Historical resources have indicated that the 1877 'Charles Street wharf' was located to the west of the subject site at the termination of Charles Street. Remnants of this structure may be present in the form of submerged timbers and footings. If located, these could be informative about early transportation and use of the Parramatta River from this location.

4.4.3 Statement of Significance for Proximal Heritage Items

The following statement of significance is extracted from the State Heritage Inventory (SHI) for heritage item 'Harrisford (and potential archaeological site)' (SHR no.100248):

Harrisford, which is located between George Street and the river, is one of the oldest houses remaining in the township of Parramatta. It is an important element at the head of the river, representing the early years of settlement. Site possesses potential to contribute to an understanding early of urban development in Parramatta.²⁷

The following statement of significance is extracted from the State Heritage Inventory (SHI) for heritage item 'Newlands Gates and Trees' (item no.1544):

Newlands House site and Gates are of significance for the local area for historical and aesthetic reasons and as a representative example of a Colonial Georgian gate, a rare example of this age and quality in the local area. The remnant fabric continues to make a major contribution to the Parramatta townscape. The site possesses potential to further contribute to an understanding of early urban development in Parramatta.²⁸

The following statement of significance is extracted from the State Heritage Inventory (SHI) for heritage item 'Charles Street Weir' (item no.1733):

²⁷ SHI form, accessed 08 February 2018. Available from <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?id=5051407>.

²⁸ SHI form, accessed 08 February 2018. Available from <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=2240354>.

Charles Street Weir has historical, aesthetic, social and scientific significance. The heritage significance of the Charles Street Weir is enhanced by its place within a recreational reserve. For the local community, it holds an important sense of place.²⁹

The following statement of significance is extracted from the State Heritage Inventory (SHI) for heritage item 'Wetlands' (item no.1735):

The wetlands along Parramatta River are of significance for Parramatta area as remnant representative areas of mangroves and salt marshes which once extensively lined the foreshores and tidal water flats of the region.³⁰

²⁹ SHI form, accessed 16 March 2018. Available from <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5063021>

³⁰ SHI form, accessed 08 February 2018. Available from <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=2240429>.

5 Heritage Impact Assessment

5.1 Statutory Controls

Under the ISEPP 2007, development related to public ferry wharfs may be carried out without consent. However, if the works are proposed to be carried out to any local heritage item, or within a Heritage Conservation Area (HCA), government bodies must consider the impact of the proposed work. As outlined above, Parramatta Wharf is proximal to numerous heritage listings. Therefore, impact of the proposal upon these items must be assessed, and if the impact is assessed to be more than minor or inconsequential, Roads and Maritime must notify the relevant local council (here, Parramatta City Council).

5.2 'Statements of Heritage Impact' (OEH)

The Office of Environment and Heritage (OEH) document *Statements of Heritage Impact*³¹ encourages consideration of the following themes in assessment of heritage impact:

The following aspects of the proposal respect or enhance the heritage significance of the item or conservation area for the following reasons.

- The potential heritage significance of the current Parramatta Wharf is not associated with its fabric or composition, as a relatively modern structure, but with its ongoing use by the community and role in shaping Parramatta and its surrounds. The proposal would ensure its ongoing viability within this context.
- There are no expected direct or indirect impacts to historical heritage items within the vicinity of the subject site. While in proximity, the works are at a distance and would not change the physical fabric of these heritage items.

The following aspects of the proposal could detrimentally impact on heritage significance. The reasons are explained as well as measures to be taken to minimise impacts.

- Historical evidence has revealed that the 1877 'Charles Street' timber wharf structure was located to the west of the subject site at the termination of Charles Street. Should remnants of this structure be present, these would be outside of the project footprint and would not therefore be directly impacted by the works.
- Historical evidence has indicated that timber piles, located on either side of the existing wharf in 1993, were installed at an earlier date and may have belonged to an earlier structure. Previous archaeological assessments have identified that the subject site is located within an area of high archaeological sensitivity for historical archaeological resources. In the event that Aboriginal or historical archaeological resources are encountered, the Roads and Maritime's *Standard Management Procedure: Unexpected Heritage Items* (2015)³² is to be strictly adhered to.
- A section of seawall would be removed as part of the works, however, this would be limited to a gabion-constructed component, which is of modern construction.

³¹ 'Statements of Heritage Impact' OEH. Available from

<http://www.environment.nsw.gov.au/resources/heritagebranch/heritage/hmstatementsofhi.pdf>

³² 'Unexpected Heritage Items Procedure' (2015). Accessed on 01 September, 2017. Available from

<http://www.rms.nsw.gov.au/documents/about/environment/protecting-heritage/managing-development/unexpectedheritage-items-procedure.pdf>

- An Aboriginal art monument would be relocated within the interchange area and would therefore remain within its intended context.
- Installation of signage to indicate the location and historical context of the former and present wharf structures, in particular the 1877 'Charles Street Wharf', is recommended as a means of communicating the historical context of the wharf site.

The following sympathetic solutions have been considered and discounted for the following reasons:

The proposed works are considered sympathetic to the heritage context of the site and would not impact on heritage fabric. No other sympathetic solutions have been considered and discounted for the proposed works.

5.3 Summary of Impacts

The following table summarises the expected impacts to heritage items in the vicinity and known places of Aboriginal heritage significance. CPH makes the following recommendations and actions.

Item #	Name	Heritage Listing/ Protection	Heritage significance	Potential or known impact to fabric?	Potential or known impact to curtilage?	Recommendation	Action
1	Harrisford (and potential archaeological site)	SHR (no.100248)	State	No	No	Continue with proposal as is; impacts on the physical fabric not considered significant	SoHI; no consultation required under ISEPP
2	Newlands Gates and Trees	Parramatta LEP 2011 (item no. I544)	Local	No	No	Continue with proposal as is; impacts on the physical fabric not considered significant	SoHI; no consultation required under ISEPP
3	Charles Street Weir	Parramatta LEP 2011 (item no. I733)	Local	No	No	Continue with proposal as is; impacts on the physical fabric not considered significant	SoHI; no consultation required under ISEPP
4	Wetlands	Parramatta LEP 2011 (item no. I735)	Local	No	No	Continue with proposal as is; impacts on the physical fabric not considered significant	SoHI; no consultation required under ISEPP

6 Conclusions and Recommendations

This SoHI has concluded that the proposed works would have:

- no impact upon heritage items within the vicinity of the works, including 'Harrisford (and potential archaeological site)' (SHR no.100248), 'Newlands gates and trees' (item no.1544), 'Charles Street Weir' (item no.1733) and 'Wetlands' (item no.1735);
 - low-medium potential to impact historical archaeological resources; and
 - low potential to impact objects and sites of Aboriginal significance.
- Although the current Parramatta Wharf structure is not heritage listed, its potential heritage value is not associated with its fabric or composition, as a relatively modern structure, but with its function. The proposal would therefore ensure its ongoing viability within this context.
 - This desktop archaeological assessment has not located any historical archaeological sites or Aboriginal sites within the immediate vicinity of the works. It has determined that the works would take place within heavily disturbed land and would affect a section of gabion-constructed sea wall which was installed in 1993. In relation to potential impacts, it has determined that:
 - the historical 'Charles Street' timber wharf structure was located to the west of the subject site at the termination of Charles Street. If remnants are present in the form of submerged piles and footings, these would be outside of the project footprint and would not be directly impacted by the works; and
 - the timber piles present on either side of the existing wharf in 1993 may have belonged to an earlier wharf structure, though none have been identified in historical images and maps.

If work results in unexpected archaeological finds, all work must stop, Roads and Maritime are to be notified and the 'unexpected heritage items procedure' in the *Standard Management Procedure: Unexpected Heritage Items (2015)*³³ is to be followed.

- It has been concluded that the proposal would have a neutral heritage impact overall. ISEPP notification, as detailed in *Table 2*, has been undertaken and no further consultation is required with Parramatta Council prior to proceeding.
- Although it is not required, the following measures would result in an improved heritage outcome overall:
 - interpretation in the form of signage to indicate the location and historical context of the 'Charles Street' timber wharf and other historical and current wharf structures within the Parramatta area would improve the heritage outcome of the proposed new works; and
 - preservation and retention of the existing Aboriginal artwork within and adjacent to the subject site.

CITY PLAN HERITAGE for Roads and Maritime Services
April 2018

³³ 'Unexpected Heritage Items Procedure' (2015). Accessed on 01 September, 2017. Available from <http://www.rms.nsw.gov.au/documents/about/environment/protecting-heritage/managing-development/unexpectedheritage-items-procedure.pdf>

Appendix A: State Heritage Inventory Forms



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Charles Street Weir

Item details

Name of item:	Charles Street Weir
Type of item:	Built
Group/Collection:	Utilities - Drainage
Category:	Other - Utilities - Drainage
Primary address:	Charles Street, Parramatta, NSW 2150
Local govt. area:	Parramatta

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
Charles Street	Parramatta	Parramatta			Primary Address

Statement of significance:

Charles Street Weir has historical, aesthetic, social and scientific significance. The heritage significance of the Charles Street Weir is enhanced by its place within a recreational reserve. For the local community, it holds an important sense of place.

Date significance updated: 08 May 15

Note: There are incomplete details for a number of items listed in NSW. The Heritage Division intends to develop or upgrade statements of significance and other information for these items as resources become available.

Description

Physical description:

Charles Street Weir forms the first downstream tidal barrier in Parramatta. It was built across the river at Charles Street and Queens Avenue, immediately west of the Parramatta Wharf. This wharf is the last turning point for ferries approaching from Sydney. A narrow foreshore reserve extends westwards from the weir along both sides of the river. This open space with its pathways, lawns, gardens and scattered trees is used for recreational purposes. The Charles Street Weir is a concrete structure measuring 22.1 metres in length by 1.5 metres in width. Its height over the weir to the west is 2 metres. Today, the water contained in the dam lies 0.85 metres below the surface of the weir. On the east side, the water lies 1.45 metres below the weir surface, a level difference of 0.6 metres. Given that the eastern side of the weir is used as a turning circle for ferries, the weir wall is likely to extend several metres below the water level to the riverbed. The weir itself is a straight structure located between curved symmetrical concrete embankment walls. Generally the concrete is relatively smooth and shows the imprints of timber formwork used at the time

of construction. Trolley tracks,

now mostly covered with concrete, extending across the top of the Charles Street Weir are regarded as

integral part of the heritage listed item and should be protected. (The Parramatta Weirs, Stedlinger

Associates, 2004).

History

Historical notes: Charles Street Weir marks the junction of the tidal and non-tidal sections of Parramatta River and separates downstream saline water from the upstream fresh water. The Weir was initially located at the end of the river's deep water, allowing larger vessels to turn back downstream and avoid its shallow, rocky upper end. Although designed in 1941, construction works began in 1950 and the Weir was completed by the 12th of January 1951. In 1921, prior to the Charles Street Weir, a weir with floodgates had been built just east of the present-day Charles Street Weir adjacent to the modern ferry wharf, providing access across the river. The now Charles street Weir superseded the c.1921 weir as part of 'improvements' to the Parramatta River by the Department of Public Works. This existing weir is now a reinforced structure, set into the rock of the riverbed.

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Local Environmental Plan	Charles Street Weir	I63			

Study details

Title	Year	Number	Author	Inspected by	Guidelines used
Parramatta City Comprehensive Heritage Review	2011		Parramatta City Council and Zoran Popovic		Y e s
A Heritage Study of Four Weirs along the Parramatta River	2003		Stedinger Associates		Y e s

References, internet links & images

None

Note: internet links may be to web pages, documents or images.



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Harrisford

Item details

Name of item:	Harrisford
Type of item:	Built
Group/Collection:	Residential buildings (private)
Category:	House
Location:	Lat: -33.8148138945 Long: 151.0104875960
Primary address:	182 George Street, Parramatta, NSW 2150
Parish:	St John
County:	Cumberland
Local govt. area:	Parramatta
Local Aboriginal Land Council:	Deerubbin

Property description

Lot/Volume Code	Lot/Volume Number	Section Number	Plan/Folio Code	Plan/Folio Number
LOT	40		DP	1115363
LOT	41		DP	1115363

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
182 George Street	Parramatta	Parramatta	St John	Cumberland	Primary Address

Owner/s

Organisation Name	Owner Category	Date Ownership Updated
The Kings School Old Boys Union	Community Group	

Statement of significance:

Harrisford, which is located between George Street and the river, is one of the oldest houses remaining in the township of Parramatta. It is an important element at the head of

the river, representing the early years of settlement. Site possesses potential to contribute to an understanding early of urban development in Parramatta.

Date significance updated: 26 Jun 06

Note: There are incomplete details for a number of items listed in NSW. The Heritage Division intends to develop or upgrade statements of significance and other information for these items as resources become available.

Description

Construction years:

1823-1829

Physical description:

Two storey Old Colonial Georgian house of brick with stone quoins now painted. Joinery and fittings, while in 1830s style, are reproductions.

Archaeological Site: AZP Reference: PC 48

Parramatta River REP 22 Inventory No: 129

National Trust (Parramatta Branch): Fabric: Flemish bond brick walls, with sandstone quoins, foundations, and stringline at first floor level and corrugated iron roof which was originally shingles. Roof Construction: Hip. Verandah Decoration: Window Sill: Sandstone. Window Arch: Soldier brick flat arch painted brick red. Fence: Timber picket Fence: set in timber posts with shaped tops and timber picket gate. Garden: Well kept. Additions: Early kitchen or schoolroom building at rear of cottage.

Archit Style: Colonial Georgian two-storey cottage. Front Door: Georgian red soldier brick elliptical arch above segmented fanlight decorated with leadlight and stained glazing. Late Victorian moulded four panelled door with glazed panels above lock rail. Sidelights flank door with glazed upper panels above timber

Physical condition and/or Archaeological potential:

Archaeological zoning 3 (standing structures pre-1844. A conservation plan should be prepared addressing the whole site including standing buildings and underground archaeological remains (Higginbotham, 1991, 3).

Date condition updated: 08 Jul 08

Modifications and dates:

Leased and opened as the King's School in 1832 (was an existing building before that). 2003 - a high rise apartment building was built only meters from Harrisford's western boundary.

1980 restoration by King's School Old Boys Association (Clive Lucas Stapleton & Partners)

Further information:

CPS, NTL, PRS

Current use:

commercial

Former use:

Aboriginal land, residence, private school, peanut factory, industrial

History

Historical notes: Archaeological Site Data Appn. 9495. George St. - item 48.

Pre 1823 lease to Young, 9/6/1809 (LTO. Book 4D, no.41).

Elizabeth Young, 1/1/1810 (LTO Book 3, no.55).

1823 return: William Carter. 1823 Lease: William Carter (LTO Book 25, no.39). Grant: Reverend William Walker; section 23, allotment 68.

The 1823 map has a building on it. The 1844 (Brownrigg) map has the same building on it - masonry (Higginbotham, 1991, 72).

Archaeological Site Data Appn. 9495. George St. Pre 1823 Lease: Young, 9 June 1809 (LTO Book 4D No 41) Elizabeth Young, 1 Jan 1810 (LTO Book 3 No 55) 1823 Return: William Carter, 1823 Lease: William Carter (LTO Book 25, No 39). Grant: Rev. William Walker. Sec 23, Allt 68. Sites of Buildings: 1823 map: building, 1844 map: same building of masonry.

SD 1932: John Wall

SD 1930: Henry Harris No. at this time was 106

SD 1929: Henry Harris No. at this time was 106

SD 1925: Percy Harris,

SD 1915: Percy Harris, "Harrisford"

PCC RO 1914: N0.40, Sec 23, lots 68 pt.67. Permanent Trustee of NSW. Tre's will of Sarah Emma White (Estate of Mary Ann Connor).

SD 1912: John Harris, "Harrisford" John Harris bought the house and named it Harrisford.

SD 1910: Miss M.A. Connor

NSW PO 1904: Miss M.A. Connor

SD 1895: Miss M.A. Connor

SD 1889: Miss Ann Evans

PCC RB 1879: N0.172: Eury, Michael owner and occupier.

PCC RB 1872: N0.126: Eury, Michael owner. Griffiths, Mrs (William crossed out in rate book.) occupiers. Brick house, 50 pounds. Wm. Griffith and his wife Susan established a school here named Linden. William died here in 1870 and in 1872, his wife moved the school to larger premises in Macquarie St.

The building in 1870 was painted and had a Georgian fanlight and six panelled door and glazed half sidelights with lattice style decoration. Pickets on fence had round tops with unusual turned spindle gate. | Wm. Eury, Michael Owner.

PCC Assess of Land owners & Occupiers 1865: N0.111: Eury, Michael Owner. Woolls, William brick house ,10 rooms, 65 pounds. 1865. Wm. Griffith and his wife Susan established a school here shortly after called Linden before moving to larger premises in Macquarie St. John Harris bought the house and named it Harrisford. The building in 1870 is painted and has a Georgian fanlight and six panelled door with glass shale sidelights with lattice style decoration. Pickets on fence are round topped with unusual turned spindle gate.

The house Harrisford was built between 1823 and 1829 for the Rev. William Walker when he married Rowland Hassall's daughter.

In 1832, Walker leased it to the Kings School who occupied the building until 1836.

The Kings School was one of four early schools in the colony. January 1830 saw the Sydney College's foundation stone laid. The same month the Commissioners of the Church and School Corporation made public their intentions to establish two schools, one at Sydney and the other at Parramatta, to be known as the King's School and to be modelled on the King's School at Canterbury, England, where (Sydney Anglican) Archdeacon Broughton had been a pupil. Whereas the Sydney College offered no religious instruction, the King's School was unashamedly Anglican. The Sydney College commenced in 1835 and the Parramatta King's School opened its doors at the beginning of 1832. In December 1831 the Australian College admitted its first students. Formed under the guidance of the fiery Presbyterian, Rev. John Dunmore Lang, it came to rival the Sydney College, the foremost school in the colony. The fourth institution was called The Normal Institution, established in 1834, an achievement of the Rev. Henry Carmichael, a Presbyterian school-master who disagreed with Lang's educational ideas. The Normal Institution, like the Sydney College, was to provide a secular education. All four schools offered a higher, and classical, education for the sons of the well-to-do families of the colony (Thompson, 1986, 24-25).

William Woolls was engaged, aged 18, by the headmaster of the King's School, the Rev. Robert Forrest, on the recommendation of his Archdeacon, W.G. Broughton. The school commenced on 13 February 1832, and Woolls was to act as class usher and a master of one of the two houses occupied by boarders. Opening with about a dozen boys, the school by the end of that year had a respectable enrolment of 41 boarders and 12 day boys. Two nearby cottages housed the boarders (Thompson, 1986, 25).

After a short time, Woolls was offered a position as classics master by William Timothy Cape, headmaster of the reinaugurated Sydney College, which had opened at a new premises in College Street, Sydney in 1835. Woolls joined its staff in January 1838, remaining there until October 1839 when he resigned, owing to 'some misunderstanding with the committee' over the 'inadequate amount of his salary'. It was when Woolls opened and conducted his own institution that he really made a name for himself in colonial educational circles. He apparently returned to Parramatta in 1841 and opened his own private academy in 'Harrisford', which the Kings School had vacated some five years earlier (Gilbert, 1985, 31-32). 'Mr Woolls Academy' at Harrisford between 1841 and 1865 was remarkably successful (ibid, 32).

It was here he recorded particulars for the colony's 1841 census that beneath his roof resided 31 persons. This would have included his family, his staff and his boarding pupils. It was also at this address that he was to earn a rare commendation from the colony's governor. In his annual report for the year ended 30 September 1842, Sir George Gipps that '...of the private schools many serve to be mentioned with commendation, particularly that of the Rev'd. Mr Forrest at Campbelltown, that of Mr Cape in Sydney, and of Mr Woolls in Parramatta.' (Thomson, 1986, 45-46). Gipps especially commended only three of the colony's many private schools (Gilbert, 1985, 32).

A brief description of the activities of a school boy at Woolls' school is the reminiscences of one pupil, Walter Campbell. For two years in the mid-1850s, he was a boarder at Harrisford. In his mature years he was to become involved in agriculture and botany. He would become the NSW Director of Agriculture. Campbell wrote his reminiscences in 1932, painting an idyllic picture of his days at Harrisford. He says of Woolls: 'He was remarkably kind and sympathetic in imparting instruction, The boys, who were nearly all boarders, had their quarters in Harrisford, with a detached one-roomed building between it and the river serving as the school room. This was much the same arrangement that had existed twenty years earlier when Harrisford was used by The Kings School. The Parramatta River, not unexpectedly, provided the pleasures of fishing and swimming, but in 1841 a master had drowned who had gone to the rescue of a boy in difficulties. For the 25 or so pupils, there were rambles and picnics in General Macarthur's Bush, and walks to Baulkham Hills and Beyond. Campbell also provides a glimpse of Woolls' domestic life, his daughters and Mrs Woolls playing the piano, and Woolls himself playing 'a large old-fashioned amber coloured flute with six finger holes and one key'. The household exhibited some degree of

prosperity for there were two housemaids, a cook and a handyman. At one time the cook had been an Aboriginal woman. There was an assistant master to instruct in arithmetic, writing and spelling, leaving Woolls to attend to Latin and other subjects. Some of the pupils from The King's School enrolled at Woolls' school, including George Fairfowl Macarthur. In the early 1840s Woolls also had as pupils Henry and Robert Radford, stepsons of wealthy Sydney wool-merchant A.B. Spark. Spark lived in affluence in his mansion, 'Tempe' on the banks of the Cooks River, about 16km from Sydney (ibid, 1986, 62-63).

In all probability it was in 1840 that William Woolls commenced his own school, after he resigned from the staff of the Sydney College in August or September 1839. In 1840 he was able to lease the building in George Street, Parramatta which had been used as The King's School, an dwhich later became known as 'Harrisford'. It was here he recorded particulars for the colony's 1841 census that beneath his roof resided 31 persons. This would have included his family, his staff and his boarding pupils. It was also at this address that he was to earn a rare commendation from the colony's governor,. In his annual report for the year ended 30 Septmeber 1842, Sir George Gipps that '...of the private schools many serve to be mentioned with commendation, particularly that of the Rev'd Mr Forrest at Campbelltown, that of Mr Cape in Sydney, and of Mr Woolls in Parramatta.' (Thomson, 1986, 45-46).

One of the most popular schools in Parramatta was 'Mr Woolls' Academy': Gilbert, 32) at Harrisford.

A brief description of the activities of a school boy at Woolls' school is the reminiscences of one pupil, Walter Campbell. For two years in the mid-1850s, he was a boarder at Harrisford. In his mature years he was to become involved in agriculture and botany. He would become the NSW Director of Agriculture. Campbell wrote his reminiscences in 1932, painting an idyllic picture of his days at Harrisford. He says of Woolls: 'He was remarkably kind and sympathetic in imparting instruction, The boys, who were nearly all boarders, had their quarters in Harrisford, with a detached one-roomed building between it and the river serving as the school room. This was much the same arrangement that had existed twenty years earlier when Harrisford was used by The Kings School. The Parramatta River, not unexpectedly, provided the pleasures of fishing and swimming, but in 1841 a master had drowned who had gone to the rescue of a boy in difficulties. For the 25 or so pupils, there were rambles and picnics in General Macarthur's Bush, and walks to Baukham Hills and Beyond. Campbell also provides a glimpse of Woolls' domestic life ,his daughters and Mrs Woolls playing he piano, and Woolls himself playing 'a large old-fashioned amber coloured flute with six finger holes and one key'. The household exhibited some degree of prosperity for there were two housemaids, a cook and a handyman. At one time the cook had been an Aboriginal woman. There was an assistant master to instruct in arithmetic, writing and spelling, leaving Woolls to attend to Latin and other subjects. Some of the pupils from The King's School enrolled at Woolls' school, including George Fairfowl Macarthur. In the early 1840s Woolls also had as pupils Henry and Robert Radford, stepsons of wealthy Sydney wool-merchant A.B. Spark. Spark lived in affluence in his mansion, 'Tempe' on the banks of the Cooks River, about 16km from Sydney (ibid, 1986, 62-63).

Woolls moved to the larger premises of Newlands in 1864 (Gilbert says 'in or about 1865'. Never large, catering for about 30 boys at a time it seems to have been a happy, enlightened and enlightening institution which the boys remembered with gratitude and affection (ibid, 32). Gilbert adds that Woolls remained at Newlands for the last seven years or so of his teaching career (ibid, 36). The school was for local boys as wells as boarders. During Woolls' stay at Newlands, he continued his extensive botanical studies including botany in the school curriculum, taking the boys regularly on field trips around the hills of Parramatta collecting samples of unknown specimens. Woolls was an important early schoolmaster and botanist. He lectured frequently on the botanical landscape and was recognised by the greatest of the British and European botanists and on whose recommendation Woolls was admitted in 1865, as a Fellow of the Linnean Society in London, one of the most respected scientific organisations in Britain. In August 1872 Woolls retired from teaching and was admitted to the Holy Order in 1873, becoming the Rev. William Woolls (ibid).

From 1836 to 1854, it was used by several other schools. In 1840 William Woolls leased the house for a school, operating it here until 1865. Walker sold the property in 1854.

During the 1860s William Woolls' Academy is little recorded. A small fragment of school life is preserved in the records of a cricket match in which Woolls' school participated. It was played on 15/11/1862 between teams from The King's School and one provided by Woolls' pupils and was won by the latter by 13 runs. Shortly after the match the King's School was to close for about six years, resuming in 1869 with the Rev. George Fairfowl Macarthur as its headmasters. Woolls' school continued to survive. Sometime in 1865 he moved his school to a large house called 'Newlands' built on property which had once belonged to the Rev. Samuel Marsden on the northern bank of the Parramatta River (Thomson, 1986, 87).

Later residents included John Harris, nephew of Surgeon Dr John Harris of Harris Park.

A 1932 photograph shows Harrisford with Victorian cast iron balustrading and valances on ground and first-floor verandahs (Gilbert, 1985, 27, based on a photograph c/o Mr Peter Yeend, The Kings School).

The building was later used a peanut butter factory, stationery shop and car workshop.

A November 1979 photograph shows Harrisford bereft of its Victorian verandahs, with signs advertising office supplies (Gilbert, 1985, 27).

Harrisford was restored by King's School Old Boys Union in 1980 to its 1830s configuration, using Clive Lucas, Stapleton & Partners heritage architects.

A 1982 photograph shows the completed Harrisford with Georgian windows, paint removed from its bricks, quoins picked out, on its reopening day, Saturday 3rd February, 1982 (Gilbert, 1985, 27).

Historic themes

Australian theme (abbrev)	New South Wales theme	Local theme
4. Settlement-Building settlements, towns and cities	Accommodation-Activities associated with the provision of accommodation, and particular types of accommodation – does not include architectural styles – use the theme of Creative Endeavour for such activities.	Housing townfolk - terraces and cottages-
4. Settlement-Building settlements, towns and cities	Accommodation-Activities associated with the provision of accommodation, and particular types of accommodation – does not include architectural styles – use the theme of Creative Endeavour for such activities.	Adapted heritage building or structure-
4. Settlement-Building settlements,	Towns, suburbs and villages-Activities associated with creating, planning and managing urban functions, landscapes and lifestyles in towns, suburbs and villages	Planned towns serving a specific industry-

towns and cities		
4. Settlement- Building settlements, towns and cities	Towns, suburbs and villages-Activities associated with creating, planning and managing urban functions, landscapes and lifestyles in towns, suburbs and villages	Indicators of early town planning and the disposition of people within the emerging settlement-
4. Settlement- Building settlements, towns and cities	Towns, suburbs and villages-Activities associated with creating, planning and managing urban functions, landscapes and lifestyles in towns, suburbs and villages	Developing towns in response to topography-
6. Educating- Educating	Education-Activities associated with teaching and learning by children and adults, formally and informally.	Private (independent) schooling-
9. Phases of Life- Marking the phases of life	Persons-Activities of, and associations with, identifiable individuals, families and communal groups	Associations with Rev. William Woolls, teacher, botanist and priest-
9. Phases of Life- Marking the phases of life	Persons-Activities of, and associations with, identifiable individuals, families and communal groups	Associations with Rev. William Walker, priest-
9. Phases of Life- Marking the phases of life	Persons-Activities of, and associations with, identifiable individuals, families and communal groups	Associations with John Harris, nephew of Dr John Harris, surgeon-
9. Phases of Life- Marking the phases of life	Persons-Activities of, and associations with, identifiable individuals, families and communal groups	Associations with Michael Eury, owner-

Assessment of significance

SHR Criteria a) This item historically significant.
[Historical significance]

SHR Criteria d) This item is socially significant.
[Social significance]

SHR Criteria g) This item is representative.
[Representativeness]

Assessment criteria:

Items are assessed against the  **State Heritage Register (SHR) Criteria** to determine the level of significance. Refer to the Listings below for the level of statutory protection.

Recommended management:

Conservation works undertaken by Clive Lucas in 1980s for Kings School Old Boys Union

Procedures /Exemptions

Section of act	Description	Title	Comments	Action date
57(2)	Exemption to allow work	Standard Exemptions	<p>SCHEDULE OF STANDARD EXEMPTIONS</p> <p>HERITAGE ACT 1977</p> <p>Notice of Order Under Section 57 (2) of the Heritage Act 1977</p> <p>I, the Minister for Planning, pursuant to subsection 57(2) of the Heritage Act 1977, on the recommendation of the Heritage Council of New South Wales, do by this Order:</p> <p>1. revoke the Schedule of Exemptions to subsection 57(1) of the Heritage Act made under subsection 57(2) and published in the Government Gazette on 22 February 2008; and</p> <p>2. grant standard exemptions from subsection 57(1) of the Heritage Act 1977, described in the Schedule attached.</p> <p>FRANK SARTOR</p> <p>Minister for Planning</p> <p>Sydney, 11 July 2008</p> <p>To view the schedule click on the Standard Exemptions for Works Requiring Heritage Council Approval link below.</p>	Sep 5 2008

 **Standard exemptions** for works requiring Heritage Council approval

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Heritage Act - State Heritage Register		00248	02 Apr 99	27	1546
Heritage Act - Permanent Conservation Order - former		00248	06 May 83	68	2048

Regional Environmental Plan			05 Jun 90		
Local Environmental Plan			21 Jul 89	84	4633
Local Environmental Plan			27 Feb 97	20	
National Trust of Australia register		7868			

Study details

Title	Year	Number	Author	Inspected by	Guidelines used
City of Parramatta Heritage Study	1993	218	Meredith Walker		Y e s

References, internet links & images

Type	Author	Year	Title	Internet Links
Written	Gilbert, Lionel	1985	William Woolls, 1814-1893: 'a most useful colonist'	
Written	Higginbotham, Edward	1991	The Future of Parramatta's Past - an archaeological zoning plan 1788-1844	
Written	Thomson, M.H.H.	1986	William Woolls – a man of Parramatta	

Note: internet links may be to web pages, documents or images.



(Click on thumbnail for full size image and image details)

Data source

The information for this entry comes from the following source:

<http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?id=5051407>

Name: Heritage Office

Database number: 5051407

File number: S90/06019 & HC 32277

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Newlands Gates, Trees and Archaeological Site

Item details

Name of item:	Newlands Gates, Trees and Archaeological Site
Other name/s:	Macarthur Girls High
Type of item:	Built
Group/Collection:	Education
Category:	School - Private
Primary address:	1 Macarthur Street, Parramatta, NSW 2150
Local govt. area:	Parramatta

Property description

Lot/Volume Code	Lot/Volume Number	Section Number	Plan/Folio Code	Plan/Folio Number
LOT	1		DP	797543

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
1 Macarthur Street	Parramatta	Parramatta			Primary Address
9 Thomas Street	Parramatta	Parramatta			Alternate Address

Statement of significance:

Newlands House site and Gates are of significance for the local area for historical and aesthetic reasons and as a representative example of a Colonial Georgian gate, a rare example of this age and quality in the local area. The remnant fabric continues to make a major contribution to the Parramatta townscape. The site possesses potential to further contribute to an understanding of early urban development in Parramatta.

Date significance updated: 05 Mar 02

Note: There are incomplete details for a number of items listed in NSW. The Heritage Division intends to develop or upgrade statements of significance and other information for these items as resources become available.

Description

Physical description:

The significant elements on the site include archaeological site, plantings and the remnant gates. Large sandstone gateposts and a row of Bunya pines along Macarthur Street are remnants of the occupation prior to the school. The site is bounded by Thomas Street, Parramatta River, Stewart Street and Macarthur Street. The site of Newlands House (demolished in 1932, gates only remain) has archaeological potential. Surviving fence comprises four tall sandstone gateposts topped with segmented pediments on steps. Below are incised stem and leaf pattern in pedestals with picked background. Cast iron Fleur-de-lis palisade pedestrian and driveway gates.

Further information:

J. Jervis, Cradle City, 32, 91.

History

Historical notes:

The gateway is associated with the residence of Henry Harvey, a prominent landowner in the Parramatta district. The original house was known as "Newlands" and was built c.1835 for the Marsden Family. Macarthur Girls High School was built on the site in the early 1930s. National Trust (Parramatta Branch): The gateway is associated with the residence of Henry Harvey, a prominent landowner in the Parramatta district. The original house was known as "Newlands" and built for the Marsden family in 1835. Macarthur Girls High School was built on the site in 1932. | |

Assessment of significance

SHR Criteria a)

[Historical significance]

This item historically significant.

SHR Criteria c)

[Aesthetic significance]

This item is aesthetically significant

SHR Criteria e)

[Research potential]

This item is technically or scientifically significant.

SHR Criteria f)

[Rarity]

This item is rare.

Assessment criteria:

Items are assessed against the  **State Heritage Register (SHR) Criteria** to determine the level of significance. Refer to the Listings below for the level of statutory protection.

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Local Environmental Plan		354	21 Feb 97	20	873

Study details

Title	Year	Number	Author	Inspected by	Guidelines used
City of Parramatta Heritage	1993	354	Meredith Walker		

Study					Y e s
Parramatta Heritage Review	2004		National Trust (Parramatta Branch)		N o

References, internet links & images

None

Note: internet links may be to web pages, documents or images.

Data source

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Database number: 2240354

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Home > Topics > Heritage places and items > [Search for heritage](#)

Wetlands

Item details

Name of item:	Wetlands
Type of item:	Landscape
Group/Collection:	Landscape - Natural
Category:	Wetland or river
Primary address:	Parramatta River, Camelia, Clyde, Rydalmere, Ermington, NSW
Local govt. area:	Parramatta

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
Parramatta River	Camelia, Clyde, Rydalmere, Ermington	Parramatta			Primary Address
System	Camelia, Clyde, Rydalmere, Ermington	Parramatta			Alternate Address

Statement of significance:

The wetlands along Parramatta River are of significance for Parramatta area as remnant representative areas of mangroves and salt marshes which once extensively lined the foreshores and tidal water flats of the region.

Note: There are incomplete details for a number of items listed in NSW. The Heritage Division intends to develop or upgrade statements of significance and other information for these items as resources become available.

Description

Physical description:	This item consists of remnant wetland vegetation, characterised by mangrove and saltmarsh complex, located along the foreshores of Parramatta and Duck rivers and their tributaries, Vineyard and Subiaco creeks.
Further information:	Parramatta Regional Environmental Study. Open Space and Recreation Heritage Study. Department of Environment and Planning Sydney. 1986

Assessment of significance

SHR Criteria g) This item is representative.
[Representativeness]

Assessment criteria: Items are assessed against the  **State Heritage Register (SHR) Criteria** to determine the level of significance. Refer to the Listings below for the level of statutory protection.

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Local Environmental Plan		429	21 Feb 97	20	873

Study details

Title	Year	Number	Author	Inspected by	Guidelines used
City of Parramatta Heritage Study	1993	429	Meredith Walker		Y e s
Parramatta Heritage Review	2004		National Trust (Parramatta Branch)		N o

References, internet links & images

None

Note: internet links may be to web pages, documents or images.



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Data source

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Name: Local Government

**Database
number:** 2240429

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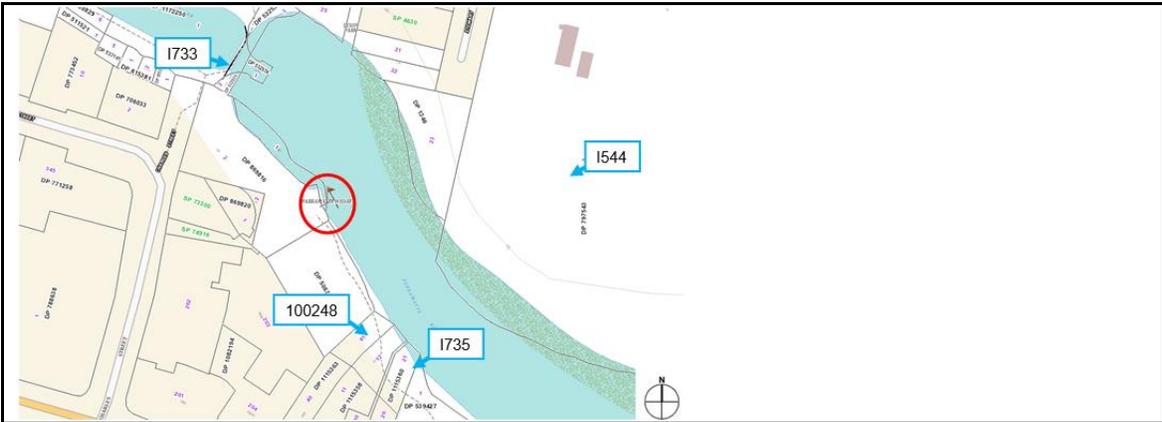
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Appendix B: Site Inspection Form

Appendix B: Site Inspection Recording Form

Project Name:	UPGRADE OF PARRAMATTA WHARF		
Survey Date	22/11/2017	Recorded by	AR (CPH)
Site Recording Number	PW1	Heritage Item Name	None
Location	Philip Street, Parramatta NSW		
GPS / Lot No.	Jetty abutment: Lot 2 DP 869816		
Site Access	YES		
Owner	Roads and Maritime Services		
Current Use	Operational wharf		
Physical Description	Parramatta Wharf is located on the southern side of Parramatta River to the north of a large commercial and residential precinct and within the suburb of Parramatta. The wharf consists of a short timber jetty and pontoon and large land-side waiting shelter.		
Archaeological Potential	Low-medium. The archaeological potential of the subject site is assessed as low-medium on the basis that it is potentially located within the vicinity of an historical wharf structure and within an area of high archaeological sensitivity.		
Heritage Listing	The Parramatta Wharf structure is not heritage listed.		
Significance	The present Parramatta Wharf structure reflects the continued and evolving use of the Parramatta area and its associated maritime transportation services since the early 20 th century.		
Brief Historic Context	The historical 'Charles Street Wharf' was located within the vicinity of the existing Parramatta wharf site. The current Parramatta Wharf was installed in 1993 on the southern bank of the Parramatta River and various components appear to have been replaced or upgraded in the intervening years.		
Mud Map Sketch			



Photographs (Site Survey Photos)



Parramatta Wharf Upgrade

Appendix C: AHIMS Search Results



AHIMS Web Services (AWS)

Extensive search - Site list report

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-6-2648	Charles/George 1	AGD	56	315690	6256470	Open site	Valid	Artefact : -		102196
	Contact									
	Recorders									
45-6-2673	RTA-G1	AGD	56	315690	6256470	Open site	Valid	Artefact : -	1433,1682,2176,2240,2353,3049,3509	100552,102196,103782
	Contact									
	Recorders									
									Permits	1841,2176,3050,3509

Report generated by AHIMS Web Service on 17/04/2018 for Philip Burns for the following area at Lot : 2, DP:DP869816 with a Buffer of 50 meters. Additional Info : EDD. Number of Aboriginal sites and Aboriginal objects found is 2

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

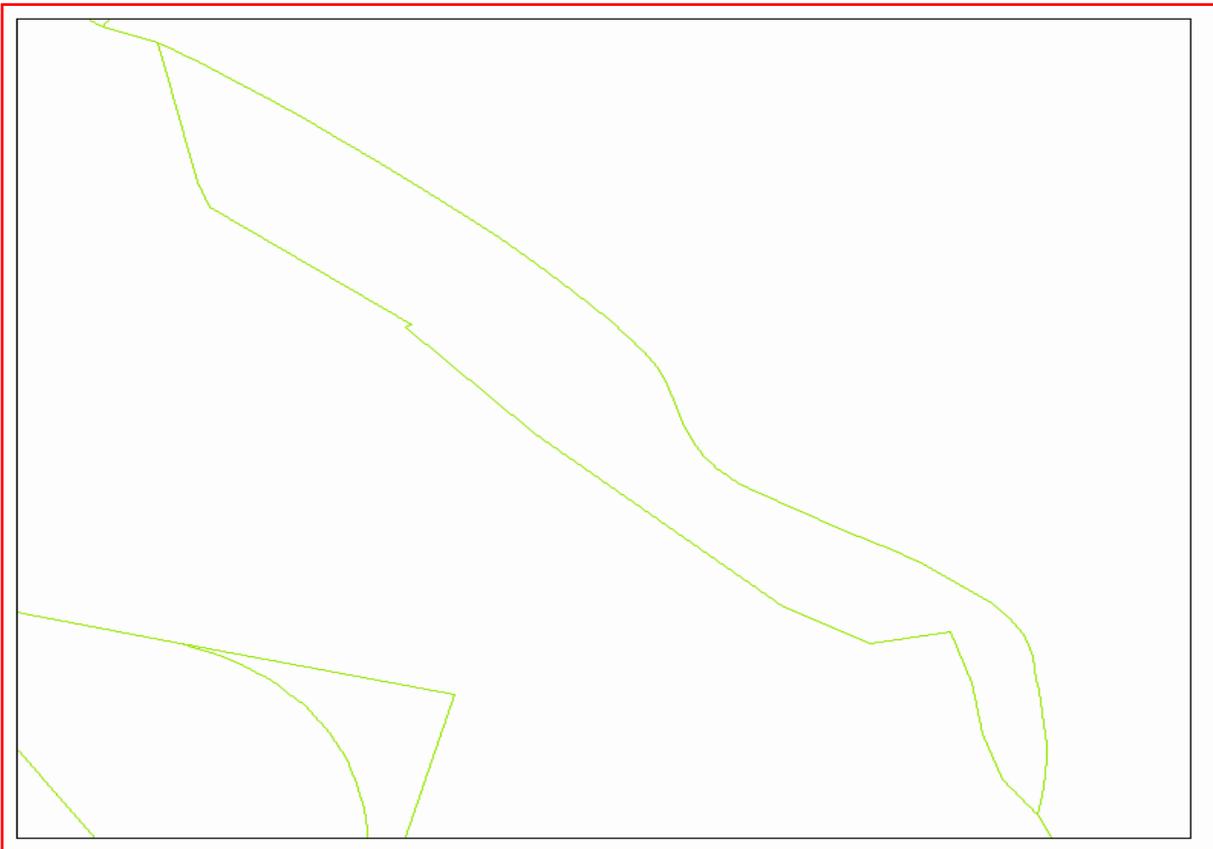
Alexandra Ribeny
Coombs Building
ACTON Australian Capital Territory 2601
Attention: Alexandra Ribeny
Email: alexandrar@cityplan.com.au

Date: 08 February 2018

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 1, DP:DP869816 with a Buffer of 0 meters, conducted by Alexandra Ribeny on 08 February 2018.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the [NSW Government Gazette \(http://www.nsw.gov.au/gazette\)](http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

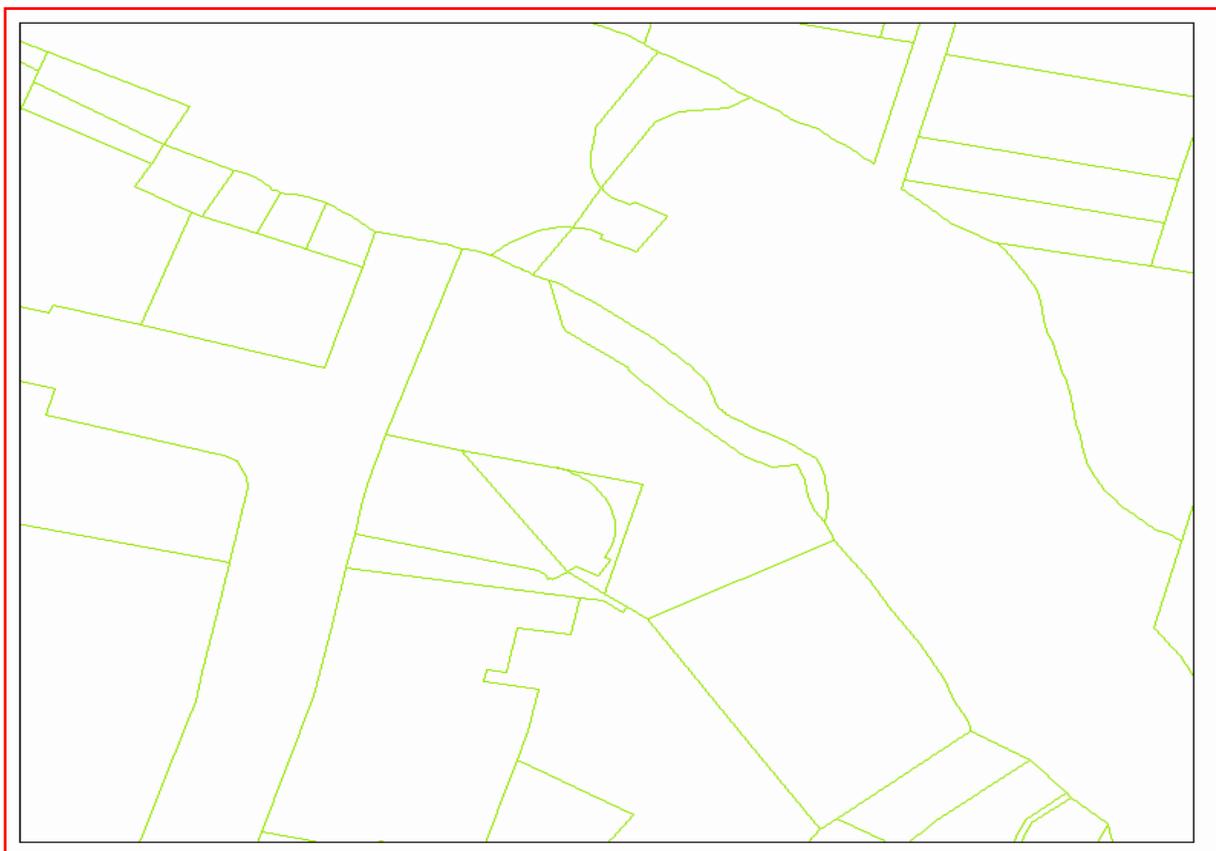
Alexandra Ribeny
Coombs Building
ACTON Australian Capital Territory 2601
Attention: Alexandra Ribeny
Email: alexandrar@cityplan.com.au

Date: 08 February 2018

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 2, DP:DP869816 with a Buffer of 50 meters, conducted by Alexandra Ribeny on 08 February 2018.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

2	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the [NSW Government Gazette \(http://www.nsw.gov.au/gazette\)](http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

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- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.



rms.nsw.gov.au



contactus@rms.nsw.gov.au



Customer feedback
Roads and Maritime

Parramatta Wharf
Statement of Heritage Impact
Locked Bag 928,
North Sydney NSW 2059



Transport
Roads & Maritime
Services

Appendix H

Stage 1 PACHCI clearance letter



14 March, 2018

Jimmy Lam
Project Manager
Roads and Maritime Services

Dear Jimmy,

Preliminary assessment results for the Parramatta Wharf Upgrade based on Stage 1 of the Procedure for Aboriginal cultural heritage consultation and investigation (the procedure).

The project, as indicated in the checklist attached was assessed as being unlikely to have an impact on Aboriginal cultural heritage.

The assessment is based on the following due diligence considerations:

- The project works are within the existing wharf area (disturbed zone).
- The project is unlikely to harm known Aboriginal objects or places (AHIMS sites).
- The AHIMS search did not indicate moderate to high concentrations of Aboriginal objects or places in the study area.
- The study area does contain landscape features that indicate the presence of Aboriginal objects, based on the Office of Environment and Heritage's *Due diligence Code of Practice for the Protection of Aboriginal objects in NSW* and the Roads and Maritime Services' procedure, however, the cultural heritage potential of the study area appears to be reduced due to past disturbances in the form of the construction of the existing wharf.
- There is an absence of sandstone rock outcrops likely to contain Aboriginal art.

Your project may proceed in accordance with the environmental impact assessment process, as relevant, and all other relevant approvals.

If the scope of your project changes, you must contact me and your regional environmental staff to reassess any potential impacts on Aboriginal cultural heritage.

RMS staff and/or contractors should be aware of the potential of Aboriginal objects (including skeletal remains) being discovered during the course of the project, if this occurs all works in the vicinity of the find must cease. Follow the steps outlined in the Roads and Maritime Services' *Unexpected Archaeological Finds Procedure*.

For further assistance in this matter and do not hesitate to contact me.

Yours sincerely



Lee Davison
Aboriginal Cultural Heritage Officer
Sydney Region

Roads and Maritime Services

Level 3, 27 Argyle Street, Parramatta NSW 2150
T 0428 683 845 | E lee.davison@rms.nsw.gov.au
