Kissing Point Ferry Wharf Upgrade

Review of environmental factors

Transport for New South Wales | January 2020

NSW GOVERNMENT

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Review of Environmental Factors

Transport for New South Wales | January 2020

Prepared by WSP Australia Pty Ltd and Transport for New South Wales

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Executive summary

The Proposal

Transport for NSW proposes to upgrade the Kissing Point Ferry Wharf (the Proposal) as part of the Transport Access Program (TAP) which includes both landslide and waterside upgrade works.

Key features of the waterside upgrade include:

- Removal of about 20 metres of the existing jetty, gangway, pontoon and associated wharf structures including existing piles
- Installation of a new 18-metre long by nine metre wide, floating covered pontoon, held in position by four new piles and two pivot piles at end of the pontoon
- Installation of a three-metre wide by 18-metre long uncovered gangway
- Remediation of existing three-metre-wide and 80-metre-long jetty to be strengthened for design life specification of 50 years, and
- Installation of an intermediate rest area and rest area/viewing platform at interface with the gangway.

The key features of the landside upgrade include:

- Five new bicycle racks to be installed near the wharf
- Minor demolition of redundant non-compliant footpath and landscape
- New rest area and pedestrian crossing to comply with *Disability Discrimination Act 1992* (DDA) and the National Construction Code (NCC)
- New accessible parking to comply with Disability Standards for Accessible Public Transport 2002 (DSAPT) and compliant footpath and rest areas to Waterview Street
- New kiss and ride and repositioned shelter
- Installation of new drink fountain adjacent to the wharf.

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

Construction of the Proposal is anticipated to start in the second quarter of 2020 and it would take up to five months to complete the works. Construction work may not be continuous as it would rely on delivery schedules. Where possible, prefabricated wharf components, equipment and materials would be delivered to site on barges.

Figure ES-1 Overview of the Proposal

Need for the Proposal

The need for the Proposal was identified in response to the Transport for NSW TAP which is an initiative to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure.

The primary objective of the TAP program is to achieve 100% DSAPT compliance for all assets, access paths and transport services within the wharf interchange.

The DSAPT and DDA standards require all public transport infrastructure, including wharves, to have fully compliant disabled access by 2022.

Therefore, Kissing Point Wharf needs upgrading due to the lack of a fully compliant accessible pathway from Waterview Street to the pontoon and non-compliant pontoon and gangway 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

Six potential options for landside works and 2 potential options for waterside works for the proposed Kissing Point upgrade were considered as detailed below:

Landside options considered for Kissing Point Wharf included:

- 'Do nothing', which involves no upgrade. However, the disabled parking, crossing and path from the wharf to Waterview Street would not be fully compliant
- Landside Option 1 – Proposed a path through the park to Waterview St and extensive footpath and road regrading works to the bus stop
- Landside Option 2 – Proposed a path through the park with a switchback ramp to the Waterview Street bus stop
- Landside Option 3 – Proposed a direct path from the wharf to Waterview Street to a relocated bus stop outside of the entrance to the park
- Landside Option 4 – Proposed a direct path from the Wharf to Waterview Street and extensive upgrade works to the road and pavements up to the existing bus stop
- Landside Option 5 – Proposed upgrading the foot path from the wharf to Waterview street including new rest areas
- Landside Option 6 – Proposed a new bus stop inside the park and compliant path from the wharf to new bus stop using different entrance points.

Waterside options considered for Kissing Point Wharf included:

- 'Do nothing', which involves no upgrade. However, regular maintenance and remedial works on the existing wharf infrastructure would continue and the gangway and pontoon would remain non-compliant
- Waterside Option 1 – Retaining and remediating the existing jetty, demolishing the existing wharf and building a wharf
- Waterside Option 2 – Wharf relocation west of existing (new jetty and wharf).

The option of 'do nothing' was initially considered. However, this was discounted as it would not meet the objectives of the Proposal to improve accessibility at the interchange, passenger comfort, capacity of the ferry network and reduce maintenance frequency and vandalism.

The three landside options of relocating the bus stop were not progressed as there were passenger safety and line of sight issues associated with these options as well as loss of car and boat trailer parking amenities in the park.

The two landside options of providing an accessible path through the park to bus stop were also not progressed because of impact on the park amenities, environmental and visual impacts and constructability issues.

The preferred landside option is option 6, that is, to upgrade the foot path from the wharf to Waterview Street, with new rest areas. This option was considered to have the least social, environmental and park impacts while meeting compliance and safety requirements.

Considering the project objectives, the preferred waterside option is to retain and remediate the existing jetty, demolish the old wharf and provide a new wharf in a similar position and orientation as the previous wharf. This option was considered to provide improved access for less mobile passengers and have the least social and environmental impacts while complying with the operational requirements of Transdev Sydney Ferries, who operate the ferry network.

Statutory and planning framework

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

As the Proposal is for a wharf or boating facility and is to be carried out by Transport for NSW, 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

Transport for NSW first considered the proposed upgrade in April 2015, consulting with the City of Ryde Council (Council), to develop a design which is acceptable to Council as owners and operators of the land based elements of the Proposal. The Proposal did not proceed at the time. Consultation with Council was again initiated in 2019 to discuss the options under consideration and the preferred option when selected.

Consultation with Rowing NSW, Foreshore and Waterways Planning and Development Advisory Committee, Port Authority of NSW and the Department of Primary Industry (Fisheries) has also been carried out. Consultation with the Department of Planning, Industry and Development (Heritage NSW) is ongoing.

Stakeholder consultation would continue during the public display of this document, with a community information session planned during the REF public display period to capture community feedback. 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:

- Meeting the current and future patronage demand
- Minimising maintenance costs
- 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

River sediments within the Proposal footprint are known to contain elevated concentrations of contaminants. Acid sulfate soils may also be encountered. However, only minor disturbance of river sediments is proposed.

Water quality within the Parramatta River is known to be generally poor, due to impacts from stormwater discharge and altered flow regimes further upstream, and any residual impacts are not considered to be significant. The Proposal may result in minor impacts to water quality from the disturbance of sediments during the removal of piles and the installation of the prefabricated substructure elements, including piles.

The Proposal would not require significant earthwork to place piles. As such, the potential for sediment dispersion would be minor with the implementation of safeguards including installing a silt boom and curtain around the construction area for the duration of the work. Additional safeguards would be developed by the contractor to prevent sediment and sediment laden water entering any water course, drainage line or drain inlet.

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. No further disturbance of the terrestrial environment would occur during operation of the Proposal.

Safeguards to minimise hydrology and water quality impacts are detailed in Section 6.1.4 and 6.2.4.

Biodiversity

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 *Fisheries Management Act 1994* (FM Act) and *Biodiversity Conservation 2016* (BC Act).

There are unlikely to be any threatened species, populations or communities within the Proposal listed under the BC Act, therefore, no impact is expected and an assessment of significance has not been triggered.

Mangroves (protected under the FM Act) were identified 100m to the north-east of the wharf and no impacts are expected in this area, therefore no further assessment is required.

There would be direct impacts to about 256m^2 of Type 3 (minimally sensitive) Key Fish Habitat (KFH) and 14m^2 of Type 2 KFH due to works from pile installation and removal of existing habitat (pontoon and piles). Impacts would be offset by creation of new habitat of 346m^2 of Type 3 and 2m^2 of Type 2 KFH from the addition of hard surfaces and exposed light to new areas. There will also be indirect impacts from partial shading by the wharf structure but would only affect about 14 individual macroalgae plants.

Landside works are not expected to have terrestrial ecology impacts due to the disturbed nature of the available habitat. Landside impacts are expected to existing trees and a mix of locally indigenous and native vegetation for works related to the pedestrian pathways. The following trees and related impacts are expected:

- Up to three trees (T10, T14 and T26) of low to very low retention value are nominated for removal to accommodate construction of the Proposal
- Up to six trees (T7, T8, T10, T11, T12 and T13) are considered adversely impacted due to encroachment to the root zones.

Safeguards to minimise tree impacts are detailed in Section 6.3.4.

Noise and vibration

A Noise and Vibration Impact Assessment report concluded there would be exceedances of the noise criteria during certain construction activities within standard working hours as well as outside standard working hours. Areas of impact were determined for residential neighbourhoods of Putney (Noise Catchment Area (NCA) 1) and Mortlake (NCA2) as well as Rivendell school and Concord Repatriation General Hospital (NCA3).

- During standard hours, it is expected that there would be exceedances of noise management levels during landside construction works up to 15dBA to NCA1 and 5dBA to NCA2 and NCA3
- Outside standard hours, there are exceedances of noise management levels up to 17dBA in NCA1, 11dBA in NCA2 and 16dBA in NCA3. The most noise intensive works are associated with pile installation and hammering
- Sleep disturbance may occur from piling and drilling as works would be required to take place over calm water late at night or early morning.

The identified local heritage item ‘former boat slips’ is located approximately 140 north west of the wharf side vibration intensive works and about 40 metres from landside works. No vibration impacts are expected as it does not comprise a formal structure and is located outside the safe working distance limits.

Landscape character and visual amenity

The Proposal would have a low impact on landscape character with the greatest impacts from the shift in angle of the wharf. For some nearby receptors, this modification may improve views by opening up clearer views to water and the background. Impacts are measured as low during operation as the highest visual change would be for views to the Thomas Walker Estate and heritage buildings within Rivendell (on the southern side of the Parramatta River). Views towards these buildings and open green space are impacted particularly on approach from Kissing Point Park East and from Putney.

The visual impact of the Proposal would be minimised through safeguards detailed in Section 6.5.4.

Transport, traffic and access

Kissing Point Wharf would be closed for up to five months for construction with no access to the wharf. Generally, there are minor impacts from the Proposal due to increased construction vessel movements and disruption of commuting for users.

Land transport would provide users the ability to commute to and from Kissing Point using the existing bus system except for during the gap time of bus and ferry services. Additional bus services would be provided to address the gap of ferry services after 9:30pm on weekdays and after 6.40pm on weekends and public holidays and are identified as a mitigation measure for this impact.

Non-Aboriginal heritage

The Proposal is located within the curtilage of local heritage item Kissing Point Park (former boatslips) (item no.157). The historical archaeological assessment (refer to Section 6.8.2) determined that there is a low-medium potential for the Proposal to impact on remnant boatslips associated with the 20th century development of the site. For archaeological relics, there is a low potential for impacts due to heavily disturbed land.

If during works, archaeological relics are found, the unexpected heritage items procedure would be followed as described in Section 6.8.4. Heritage NSW would be further consulted prior to commencing works.

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.

However, it was noted that there is an AHIMS site in close proximity to the Proposal and there are to be no impacts or entry to this site during the proposed works. This site will be identified in the Sensitive Area Plan.

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

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. Construction overlap with the Woolwich Ferry Wharf upgrade works may occur, however it is likely to have minimal impact on commuters as the wharves service different ferry routes. Other development projects within the area are not expected to have cumulative impacts.

Justification and conclusion

The need for the Proposal was justified under the TAP as the existing structure does not provide access that 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.

Contents

Executive summary **i**

1 Introduction **1**

1.1 Proposal identification 1

1.2 Purpose of the report 4

2 Need and options considered **5**

2.1 Strategic need for the Proposal 5

2.2 Existing infrastructure 7

2.3 Proposal objectives and development criteria 9

2.4 Alternatives and options considered 11

2.5 Preferred waterside option 16

2.6 Preferred land based option 17

3 Description of the Proposal **18**

3.1 The Proposal 18

3.2 Design 22

3.3 Construction activities 24

3.4 Ancillary facilities 28

3.5 Public utility adjustment 30

3.6 Property acquisition 30

4 Statutory and planning framework **31**

4.1 Environmental Planning and Assessment Act 1979 31

4.2 Other relevant NSW legislation 37

4.3 Commonwealth legislation 39

4.4 Confirmation of statutory position 39

5 Consultation **40**

5.1 Consultation strategy 40

5.2 Community involvement 40

5.3 Aboriginal community involvement 40

5.4 ISEPP consultation 41

5.5 Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 notification 41

5.6 Government agency and stakeholder involvement 42

5.7 Ongoing or future consultation 43

Contents (continued)

6 Environmental assessment 44

6.1 Land surface and hydrology 44

6.2 Water quality 52

6.3 Biodiversity 55

6.4 Noise and vibration 74

6.5 Landscape character and visual impact 86

6.6 Socioeconomic 97

6.7 Transport, traffic and access 102

6.8 Non-Aboriginal heritage 106

6.9 Aboriginal heritage 111

6.10 Waste management and resource use 114

6.11 Hazards and risks 117

6.12 Other impacts 119

6.13 Cumulative impacts 121

7 Environmental management 125

7.1 Environmental management plans 125

7.2 Summary of safeguards and management measures 126

7.3 Licensing and approvals 135

8 Justification and conclusion 136

8.1 Justification 136

8.2 Objects of the EP&A Act 137

8.3 Conclusion 139

9 Certification 140

10 References 141

Tables

Table 2-1	Supporting NSW strategies and policies	7
Table 2-2	Existing wharf infrastructure	8
Table 2-3	Existing and future patronage/hour	9
Table 2-4	Development criteria for this Proposal	10
Table 2-5	Evaluation of options	14
Table 3-1	Construction activities	24
Table 3-2	Indicative plant and equipment	26
Table 3-3	Construction traffic (weekly average)	28
Table 4-1	Aims of the Sydney Harbour SREP	33
Table 4-2	Zone W1 Maritime Waters objectives	34
Table 4-3	Zone W8 Scenic Waters: Passive Use objectives	34
Table 4-4	Clause 21 to Clause 27 matters	35
Table 4-5	Heritage objectives	36
Table 4-6	Relevant Ryde LEP land use zoning policies	37
Table 4-7	Other relevant NSW legislation	37
Table 5-1	Summary of Transport for NSW PACHCI stages	40
Table 5-2	List of key stakeholders	42
Table 6-1	Aquatic and terrestrial environment safeguards and management measures	50
Table 6-2	Water quality safeguards and management measures	54
Table 6-3	Marine habitat present within the Proposal	58
Table 6-4	Existing trees and status	63
Table 6-5	Summary of key fish habitat impacts	68
Table 6-6	Biodiversity safeguards and management measures	72
Table 6-7	Unattended noise monitoring locations and noise levels	74
Table 6-8	Attended noise monitoring locations and noise levels	74
Table 6-9	Sensitive receivers	75
Table 6-10	Construction periods	77
Table 6-11	NMLs for residential receivers	77
Table 6-12	NML for non-residential receivers	78
Table 6-13	Sleep disturbance criteria	78
Table 6-14	Recommended safe working distances for vibration intensive plant	79
Table 6-15	Construction stage, scenario, and period	79
Table 6-16	Equipment and associated dBA	80
Table 6-17	Noise impact summary	81
Table 6-18	Predicted sleep disturbance noise impacts	82
Table 6-19	Noise and vibration safeguards and management measures	84
Table 6-20	Heritage landscape items	88

Tables (continued)

Table 6-21	Viewpoint location settings	90
Table 6-22	Landscape character impacts	93
Table 6-23	Visual impact assessment	94
Table 6-24	Landscape and visual safeguards and management measures	96
Table 6-25	Statistical data for Putney State Suburb	98
Table 6-26	Socioeconomic safeguards and management measures	101
Table 6-27	Traffic, transport and access safeguards and management measures	105
Table 6-28	Local heritage item	107
Table 6-29	Non-Aboriginal heritage safeguards and management measures	110
Table 6-30	Aboriginal heritage safeguards and management measures	113
Table 6-31	Waste and resource safeguards and management measures	116
Table 6-32	Hazard and risk safeguards and management measures	118
Table 6-33	Other impacts	119
Table 6-34	Other safeguards and management measures	120
Table 6-35	Past, present and future projects	122
Table 6-36	Potential cumulative impacts	124
Table 6-37	Cumulative impact safeguards and management measures	124
Table 7-1	Summary of site specific environmental safeguards	126
Table 7-2	Summary of licensing and approvals required	135
Table 8-1	Objects of the EP&A Act	137

Figures

Figure 1-1	Regional setting	2
Figure 1-2	Local setting and existing infrastructure at Kissing Point Wharf	3
Figure 2-1	Waterside components of Proposal	16
Figure 2-2	Proposed wharf from waterside view	17
Figure 3-1	View of Proposal from waterside perspective	19
Figure 3-2	Proposal landside elements	20
Figure 3-3	Proposal footprint	21
Figure 3.4	Overview of the proposed location of temporary site compounds, and ancillary structures	29
Figure 4-1	Kissing Point Wharf (landside and waterside features) located within Coastal Environment Area	32
Figure 4-2	Kissing Point Wharf (landside features) located within Coastal Use Area	32
Figure 6-1	Sydney Harbour – Foreshores and Waterways Area Development Control Plan: Ecological Communities and Landscape Characters (map sheet 3)	56
Figure 6-2	Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005: Wetlands Protection Area (map sheet 2)	56
Figure 6-3	Mapping of estuarine macrophytes (DPI 2009)	57
Figure 6-4	Field validated habitat (Eco Logical, 2019)	60
Figure 6-5	Wharf to be replaced	61
Figure 6-6	Concrete wall	61
Figure 6-7	Intertidal sandy beach and rock platform – facing west	61
Figure 6-8	Intertidal unvegetated rock platform	61
Figure 6-9	Intertidal rock platform with filamentous algae	61
Figure 6-10	Mangroves in intertidal zone to the west of the wharf	61
Figure 6-11	Juvenile mangroves	62
Figure 6-12	Unvegetated subtidal sediment with infauna burrows	62
Figure 6-13	Existing trees at Kissing Point (1 of 2)	65
Figure 6-14	Existing trees at Kissing Point (2 of 2)	66
Figure 6-15	Sensitive receiver locations	76
Figure 6-16	Landscape character and visual impact grading matrix	86
Figure 6-17	Landscape character zones	88
Figure 6-18	Viewpoint locations	89
Figure 6-19	Kissing Point Wharf from Wangal Park, Mortlake	91
Figure 6-20	Kissing Point Wharf from Thomas Walker Estate (Rivendell)	91
Figure 6-21	Kissing Point Wharf from Ryde Bridge	91
Figure 6-22	Kissing Point Wharf from Kissing Point Park (East)	91
Figure 6-23	Kissing Point Wharf from Putney Park	91
Figure 6-24	Kissing Point Wharf from Mortlake Ferry	91

Figures (continued)

Figure 6-25 Kissing Point Wharf 92

Figure 6-26 Kissing Point Park 92

Figure 6-27 3D view of proposed structure 95

Figure 6-28 Location of the Proposal in relation to the heritage item 'Kissing Point Park' (blue). Source: SIX Maps 2019 107

Figure 6-29 Potential archaeological location of remnant boat slips (yellow arrows) and potential jetty/wharf structure (green arrow) 108

Appendices

Appendix A Proposal drawings

Appendix B Consideration of clause 228(2) factors

Consideration of matters of national environmental significance

Appendix C Statutory consultation checklists and published community updates

Appendix D Aquatic Ecology Assessment

Appendix E Arboricultural Impact Assessment Report

Appendix F Construction Noise and Vibration Impact Statement

Appendix G Landscape Character and Visual Impact Assessment

Appendix H Statement of Heritage Impact and PACHCI letter

1 Introduction

This chapter introduces the Proposal and provides the context of the environmental assessment.

1.1 Proposal identification

Transport for New South Wales proposes to upgrade the existing wharf interchange at Kissing Point (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 Ryde Council. The Kissing Point Wharf is located on the southern face of Kissing Point, protruding into Parramatta River at the mouth of Kendall Bay. The existing wharf is located on Waterview Street, and accessed through a recreational and commuter carpark, which includes parking spots, boat trailer parking, a public toilet and bike storage. On either side of the carpark is Kissing Point Park and immediately to the east is Kendall Bay.

Figure 1-1 shows the regional setting while Figure 1-2 shows the local setting and existing conditions. The wharf is part of the F3 Ferry Service that operates between Circular Quay and Parramatta River. The Proposal is to improve access to the wharf, upgrade the existing jetty and install a gangway and floating pontoon to allow for more efficient and compliant passenger services. The key features of the Proposal are shown in Figure ES-1.

Features of the waterside upgrade include:

- Removal of about 20 metres of the existing jetty, gangway, pontoon and associated wharf structures including piles
- Installation of a new 18-metre long by nine metre wide, floating covered pontoon, held in position by four new piles and two pivot piles
- Installation of a three-metre wide by 18-metre long uncovered gangway
- Remediation of the existing jetty, including installation of an intermediate rest area and viewing platform at interface with the gangway.

Features of the landside upgrade include:

- Five new bicycle racks to be installed near the wharf
- Demolition of redundant non-compliant footpath and landscape
- New rest area and pedestrian crossing to comply with DDA and NCC
- New accessible parking to comply with Disability Standards for Accessible Public Transport 2002 (DSAPT) and compliant footpath and rest areas to Waterview Street
- New kiss and ride stop and reposition shelter.

Map: PS117405_GIS_001_A2	Author: Trent.Bowman
Date: 24/01/2020	Approved by: Emma.Taylor

1:5,000

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community © Department Finance, Services and Innovation 2019

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Kissing Point Ferry Wharf Upgrade Review of Environmental Factors

Figure 1.1
Regional setting

Figure 1-2 Local setting and existing infrastructure at Kissing Point Wharf

1.2 Purpose of the report

This review of environmental factors (REF) has been prepared by WSP Australia Pty Ltd on behalf of Transport for NSW. For the purposes of these works, Transport for NSW 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 the following documents/guidelines:

- Clause 228 of the Environmental Planning and Assessment Regulation 2000
- *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)
- *Marinas and Related Facilities EIS Guideline* (DUAP, 1996)
- *Biodiversity Conservation Act 2016 (BC Act)*
- *Fisheries Management Act 1994* (FM Act)
- *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 Transport for NSW examine and consider 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 and Public Places 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

TAP is an ongoing initiative of Transport for NSW to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure. The primary objective of the TAP program is to achieve 100% DSAPT compliance for all assets, access paths and transport services within the wharf interchange. In 2009, Transport for NSW assessed the condition of all ferry wharves across the transport network in terms of:

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

The DSAPT and DDA standards, require all public transport infrastructure, including wharves, to have fully compliant disabled access by 2022.

It was concluded that the Kissing Point Wharf needed upgrading due to its lack of an accessible pathway, non-DSAPT compliant wharf, and predicted future patronage.

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

2.1.1 Transport Access Program

TAP aims to provide the following benefits:

- 100% DSAPT compliance for all assets, access paths and transport services within the wharf interchange
- Improved customer amenity such as protection from wind, rain and sun, seating and waiting areas
- Improved safety for customers
- Improved access for mobility impaired customers and customers with prams
- Increased wharf capacity for future growth of ferry services
- More efficient interchanges with other modes of transport, both public and private and better way finding signage.

Ferry Wharf Upgrade Program

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

- Achieve 100% DSAPT compliance for all assets, access paths and transport services within the wharf interchange
- Increase the rate at which passengers embark and disembark
- Make the wharf safer for passengers to embark and disembark
- Meet current demand and enable future growth
- Enhance the efficiency of the interchange
- Improve passenger amenities and waiting areas
- Minimise construction impacts to customers and wharf operations
- Minimise the cost of ownership and maintenance
- Develop a functional, distinctive and iconic design theme that will unify and identify Sydney Harbour commuter wharves
- Discourage inappropriate activities at the wharves.

The 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 Sydney's Ferry Future

Published in 2013, the Sydney's Ferry Future Plan acknowledges, and builds on, the TAP and the ferry wharf upgrade program by outlining the short and long-term initiatives for getting the most out of the "ferry network today while investing in the infrastructure and services to attract more passengers in the future" (Transport for NSW, 2013). The plan:

- Focuses on short-term timetable, service and infrastructure improvements and the long-term expansion of the network
- Reinforces the need to upgrade wharf infrastructure and make it more accessible in line with the TAP.

The Proposal responds to this plan by improving and modernising the infrastructure, providing efficiencies by creating accessible pathways, and increasing the bike storage facilities available.

2.1.4 NSW Long Term Transport Master Plan

The Long Term Transport Master Plan (NSW Government, 2012) provides the framework for delivering an integrated, modern transport system across NSW over the next 20 years. It identifies transport actions and investment priorities over the short, medium and long-term that have emerged in response to six identified transport challenges. The master plan is clear in identifying the need to:

- Cater for a 31 per cent increase in people travelling into and out of Sydney city centre during peak periods by 2031 from 2021
- Provide improvements in public transport services and accessibility across the network to cater for the expected increase in the commuting population.

Upgrading and expanding the ferry wharf network are two recognised ways that support meeting the above objectives. As such, the Proposal directly responds to the plan by providing improved and safer access for ferry passengers at Kissing Point, and improving the capacity of the ferry network.

2.1.5 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, the Proposal responds to the above by improving the wharf infrastructure and access provisions at Kissing Point.
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 a disability. It identifies 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.
A Plan for Growing Sydney
A Plan for Growing Sydney (DPE, 2014) is focussed on the concept of growth centres and transit corridors, the above Plan realises the need to strengthen transport connections into and out of central Sydney. A key action of the Plan is to deliver a vision for Sydney Harbour including enabling opportunities to improve ferry services. The Proposal therefore responds to this action.
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 wharf currently enables Transdev Sydney Ferries to operate a ferry service for passengers between Circular Quay and Rydalmere Wharf. The existing infrastructure at Kissing Point Wharf includes the wharf and landside interchange infrastructure. The wharf incorporates a large sheltered wharf structure (7m by 10m) on a pontoon. The pontoon is connected to the shoreline via a jetty approximately 100m in length.

Landside interchange infrastructure includes footpaths along the foreshore, on Waterview Street, and within Bennelong Park, as shown in Figure 1-2. There are two bus stops at the top end of the park and on either side of Waterview Street (not shown). There is currently a turning area containing two accessible parking spaces and one taxi zone, in addition to 50 angled and parallel car parking and boat trailer spaces. Toilet facilities and bicycle facilities are provided.

The existing Kissing Point Wharf is generally in good condition, however does not currently meet the DSAPT compliance or DDA requirements, as it does not allow for equitable access to the wharf or for boarding the ferry.

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

Table 2-2 Existing wharf infrastructure

Element	Description
Existing infrastructure Figure 2-1	Existing wharf, comprising: • One berthing face at its southern side that is about 35-metre-long between external fender piles • A gangway supported by a floating pontoon with separate restraint piles • A large sheltered wharf structure about 7 metre by 10 metre large • Wharf furniture including seating, steel safety barriers, safety ladders, bollards, ferry timetable supports and glazed partitions. Landside infrastructure, including: • Footpaths along the foreshore and a shared path on Waterview Street • A network of footpaths in Bennelong Park that connects the playground and picnic area to the car park • Two bus stops at the top end of the park on either side of Waterview Street, which includes a shelter and seating • A taxi zone with shelter and seating • Pedestrian crossing linked in the park to the wharf entrance • Toilets for men, women and a disabled facility • Bicycle facilities include 2 lockers available for hire • A commuter parking area within a turning circle with a central island, 50 parking spaces. This includes two allocated for accessible parking, seven signposted for vehicles with boats/ trailers, and 24 restricted on Saturday, Sunday and Public holidays for boat/trailer users • Boat ramp with separate jetty
Operation	• Kissing Point Wharf operates as part of the F3 ferry route between Rydalmere Wharf and Circular Quay • Weekday ferry services typically operate every 30 minutes towards the city from Parramatta River. Supplementary ferry services also operate on Saturday and Sundays to support higher customer demand on these days. Weekend ferry service operates about every 30 minutes in either direction • Used by about 225 passengers per day each weekday and 172 passengers on average on Saturdays and 257 passengers on average on Sundays.
Land Ownership	Land owned by NSW Government: • Waterside elements of the wharf, including the jetty, gangway and pontoon (unincorporated land), bike lockers and wayfinding signs at the wharf. City of Ryde Council: • Landside elements of the wharf interchange, including associated roads, pavements, footpaths, cycleways and parking.

2.2.1 Patronage

Kissing Point Wharf serves as a commuter and recreational user wharf.

The ferry patronage data for Kissing Point Wharf is provided in Table 2-3. Comparing patronage from existing (2017) to future (2036) per hour, forecast show boarding increases by two and alighting increase by 16 passengers. Special events were also forecasted between 2017 and 2036, which show an increase of a total 40 boarding and alighting per hour. The highest activity in a one hour period for 2036 is 53 patrons compared to high activities during special events of 113 patrons.

Timetable operation of the ferry is not expected to change and services are assumed to be maintained. Services toward Circular Quay during AM Peak is 10 minutes and in PM Peak at 30 minutes. Saturday and Sunday operations are about every 30 minutes. The highest average patronage day is on a Sunday.

Table 2-3 Existing and future patronage/hour

Kissing Point patronage	2017	2036	Special events	
			2017	2036
Boarding	4	6	–	–
Alighting	31	47	–	–
Total	35	53	73	113

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 Kissing Point Wharf 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 queueing.
- Maintain:
  - Passenger amenity, enjoyment, and harbour views
  - Pedestrian and cycleways
  - Timetable reliability.
- 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 2-4 outlines the relevant development criteria used to help design the proposed wharf and select a preferred option.

Table 2-4 Development criteria for this Proposal

Theme	Relevant principles
Meet customer needs and improve the transport experience	Provide: • Safe, efficient and convenient passenger access • A comfortable, enjoyable and positive customer experience.
Optimise public transport access	Provide: • 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
- Private car:
  - Drop off and pick-up
  - Park and ride, with accessibility priority.

2.3.3 Architectural objectives

The Proposal's key architectural objectives include:

- Use Kit-of-Parts elements in designing the wharf
- Ensure compliance with functional and operational requirements
- Balance core operations and customer needs
- Design all elements for easy maintenance with an appropriate human scale
- Maintain elegant simplicity in architectural planning and detailing
- Respond sensitively to current and likely future built environment around the wharf.

2.3.4 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, including Kissing Point Park 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

Transport for NSW considered two waterside and six landside options for the Proposal in addition to the do nothing options, having regard to the existing and future passenger use, accessibility and service demand. The preferred option was selected using Multi-Criteria Analysis (MCA), whereby options were assessed during the key stakeholder workshops from a weighted qualitative and quantitative perspective, and ranked accordingly.

The MCA assessed across the following criteria:

- Infrastructure
- Facility operations and maintenance
- Deliverability
- Customer experience
- Transport integration
- Urban design and precinct planning
- Environment, sustainability and heritage.

2.4.2 Identified options

In addition to the 'do nothing' option, six potential options for landside works and two potential options for waterside works for the proposed Kissing Point upgrades were considered.

Landside options included:

- Landside Option 1 – Proposed a path through the park to Waterview Street and extensive footpath and road regrading works to the bus stop
- Landside Option 2 – Proposed a path through the park with a switchback ramp to the Waterview Street bus stop
- Landside Option 3 – Proposed a direct path from the wharf to Waterview Street to a relocated bus stop outside of the entrance to the park
- Landside Option 4 – Proposed a direct path from the Wharf to Waterview Street and extensive upgrade works to the road and pavements up to the existing bus stop

- Landside Option 5 – Proposed upgrading the foot path from the wharf to Waterview Street including new rest areas
- Landside Option 6 – Proposed a new bus stop inside the park and compliant path from the wharf to new bus stop using different entrance points.

Waterside options included:

- Waterside Option 1: Retaining and remediating the existing jetty, demolishing the existing wharf and building a new wharf
- Waterside Option 2: Wharf relocation west of existing (new jetty and wharf).

Table 2-5 summarises the options as described and qualitatively assesses them against the criteria described in Section 2.3.2.

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 DSAPT compliant at low tides and landside access to the wharf is not fully DSAPT compliant. Under the 'do nothing' option, 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.

Waterside options

Waterside Option 1: Wharf in existing position (Retaining and remediating the existing jetty, demolishing the existing wharf and building a wharf)

This option proposes removal of about 20 metres of the existing jetty, pontoon and gangway at the end of the existing jetty are replaced, with the majority of the existing jetty to be remediated and reused. The wharf would have a new 18 metre by nine metre pontoon and canopy shelter to accommodate a waiting area, seating and information kiosk. The pontoon will be accessed via a new 18-metre-long uncovered gangway, connected to the existing jetty via a new concrete platform.

This option preserves the existing wharf identity, would involve no greater visual impact than the present facility, would be less impact to the environment, while offering the lowest cost. However, the wharf would be closed during construction, and the customer experience would be less acceptable compared to Option 2 which provides a shorter jetty and allows the wharf to remain open during construction. Overall, Option 1 complies with the Proposal objectives, particularly improving the operation of Kissing Point Wharf as an effective transport interchange, and improves the safety and comfort of passengers by the provision of a sheltered waiting. In addition, this option minimises environmental impacts by retaining the existing jetty and maintaining a similar aquatic habitat.

Waterside Option 2: Wharf relocation west of existing (new jetty and wharf)

This option proposes that a new wharf be installed, along with a new pontoon and gangway. However, the jetty would also be demolished and replaced with a concrete jetty to the west of the existing pontoon. The wharf would have a similar structure to the previous option; 18 metre by nine metre pontoon, 18-metre-long uncovered gangway. The existing jetty and concrete platform could be decommissioned and removed, or retained for use as a fishing platform.

This option allows the existing wharf to remain operational during construction phase, and establishes a more prominent and visible wharf. The customer experience would be superior due to the shorter jetty access path, however it would have more impact from an environmental and visual impact perspective. Relative to the Proposal objectives, Option 2 does improve the accessibility and safety of the wharf, and would improve boarding, disembarking and queueing times compared to Option 1. However, Option 2 does not comply with the objective to prevent unnecessary environmental impacts, and is the more expensive option.

Landside options

Under all options the Proposal would include baseline works including: a concrete landing, bicycle racks, relocation of the disabled parking spaces, kiss and ride spaces, upgrading the footpath, repositioning of the existing taxi shelter and new pedestrian crossing.

Landside Option 1: Path through the park to Waterview Street and extensive footpath and road regrading works to the bus stop

In addition to the baseline works, this option would include a compliant path through the park then out to Waterview Street and up to the existing bus stop, including pram ramp and pedestrian refuges. This option would require extensive footpath and road regrading works in the park and street to achieve compliance.

This option would be a desirable user benefit as the path would connect to the bus stop, provide a pram ramp and pedestrian refuges and improve passenger amenity, pedestrian facilities and cycleways. However, the path upgrade would have significant impacts in the park, street and pavements which do not align with the Proposal objectives of preventing unnecessary environmental impacts.

This landside option was therefore not considered further.

Landside Option 2: Path through the park with a switchback ramp to the Waterview Street bus stop

In addition to the baseline works, this option would include providing an accessible path to the bus stop through the park via a switchback ramp in the park to the bus stop. This option aligns with the Proposal objectives, particularly by improving access from the bus stop to Kissing Point Wharf for passengers with a disability as they interchange between transport modes. However, the option was not supported as the path would reduce amenity in the park, and require substantial upgrade works. It would also not provide equitable path to the wharf as it would not be the most direct route. It would also have lower customer experience due to the length of the pathway between the ferry and bus stop.

This landside option was therefore not considered further.

Landside Option 3: Direct path from the wharf to Waterview Street to a relocated bus stop outside of the entrance to the park

In addition to the baseline works, this option proposed a new bus stop that was closer to the wharf located at the corner of Waterview Street and Delange Road.

The option would also include upgrading the existing footpath to Waterview Street for accessibility compliance, including rest areas in the park and pram ramps and pedestrian refuges in Waterview Street. This option provides the most direct, accessible path from the wharf to a relocated bus stop and aligns with the Proposal objectives. It is also the most cost efficient landside option that considers connectivity between bus and ferry, and has the least impact of the park. However, relocation of the bus stop is not supported by Transport for NSW (buses) due to line-of-sight issues and safety concerns associated with traffic congestion.

This landside option was therefore not considered further.

Landside Option 4: Proposed a direct path from the wharf to Waterview Street then extensive road and path upgrade works for an accessible path to the existing bus stop

In addition to the baseline works, this option would provide an accessible path from the wharf to Waterview Street, and up the footpath to the existing bus stop. This option would require extensive park, path, street realignment and regrading works and would include construction of new pram ramps and pedestrian refuges between the existing bus stops on both sides of Waterview Street.

This option aligns with the Proposal objectives by satisfying the desired compliance for connecting bus and ferry. However, it would require substantial regrading works at the entrance of the park, footpath and street re-alignment works. Furthermore it would be the most costly and disruptive option.

This landside option was therefore not considered further.

Landside Option 5: Path from wharf to Waterview Street

In addition to the baseline works, this option would provide a direct compliant path from the ferry wharf to Waterview Street for ferry users, pedestrians and cyclists. It is also the most cost efficient landside option that considers the environment, accessibility compliance between the ferry and the street, and has minimal impact on the park. However, the desirable option of connecting to the bus stop is not provided under this option.

Landside Option 6: New bus stop inside the park and compliant path from the wharf to new bus stop

In addition to the baseline works, this option includes a new bus stop to be located within the car park as it would be the closest and most cost effective option for a ferry and bus interchange as well as satisfying requirements for desirable bus/ferry interchange connections.

This option was not further assessed as there are line of sight issues and potential safety conflicts between buses and pedestrians using the park, would require loss of car and boat parking facilities. In addition, the required works may have impacted in the AHIMS site located within the park.

Table 2-5 summarises the options as described earlier and qualitatively assesses them against the criteria described in Section 2.3.2.

Table 2-5 Evaluation of options

Description		Do Nothing	Waterside		Landside					
			Wharf Option 1	Wharf Option 2	Op 1	Op 2	Op 3	Op4	Op 5	Op 6
Proposal objectives	Improve: • Operations • Passenger access, safety and comfort • Seating and waiting areas • Boarding, disembarking times and queuing	–	✓	✓	✓	✓	–	✓	✓	✓

Description		Do Nothing	Waterside		Landside					
			Wharf Option 1	Wharf Option 2	Op 1	Op 2	Op 3	Op4	Op 5	Op 6
	Maintain: • Passenger amenity, enjoyment and harbour views • Pedestrian infrastructure and cycleways	✓	–	✓	✓	–	✓	–	✓	✓
	Reduce: • Maintenance frequency and cost • Vandalism	–	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Prevent: • Unnecessary environmental and social impacts	✓	–	–	–	–	✓	–	✓	–
Development criteria	• Meet customer needs and improve transport experience	–	✓	✓	✓	✓	✓	✓	✓	✓
	• Optimise access to public transport	–	N/A	N/A	–	✓	✓	✓	–	✓
	• Integrate interchange investment with land use plans	–	N/A	N/A	✓	✓	✓	✓	✓	✓
	• Anticipate growth and change in demand	–	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
	• Ensure the sustainability and future performance of the public transport network	–	✓	✓	–	✓	–	✓	✓	✓

2.5 Preferred waterside option

The preferred wharf option proposes Waterside Option 1 – Retaining and remediating the existing jetty, demolishing the existing wharf and building a wharf.

This Option will provide a new wharf with a single sweep berth facility, replacing the existing wharf structure, pontoon and gangway at the end of the existing jetty. It will also involve demolishing about 20 metres of the exiting jetty.

The wharf would have a new 18-metre-long and 9-metre-wide pontoon located at the south-western end of the gangway to accommodate waste bins, Ferry Operations and Customer Information system (FOCIS) screens, data/electrical cabinet as well as installation of safety and security facilities (e.g. lighting, CCTV, ladders to the water, life ring, glass weather protective screens and tactile floor treatments). The pontoon will be held in place by four steel piles. A curved zinc roof supported by steel columns provides the shelter structure. The covered waiting area has stainless steel handrails, glass screens at the north western end and a curved glass screen at the south eastern end, providing weather protection for the centrally located seating.

The pontoon would be accessed via an 18-metre-long by 3-metre-wide uncovered gangway supported by a new concrete platform at the end of the jetty. The existing 3-metre-wide and 80-metre-long jetty would be remediated and strengthened to provide design life specifications of 50 years. The option would also provide a rest area on the jetty and rest area/viewing platform between the jetty and gangway.

Figure 2-1 and Figure 2-2 show the preferred waterside concept design.

The Option to replace the wharf in its existing location was identified as the preferred option as it achieves the Proposal objectives in section 2.3.1 and the development criteria summarised in Table 2-4. Selection of the preferred wharf option advantages include:

- Maintain existing and prominent familiar wharf identity by replacing existing wharf with new facility
- Reduced visual impact of maintaining existing views
- Least costly option.

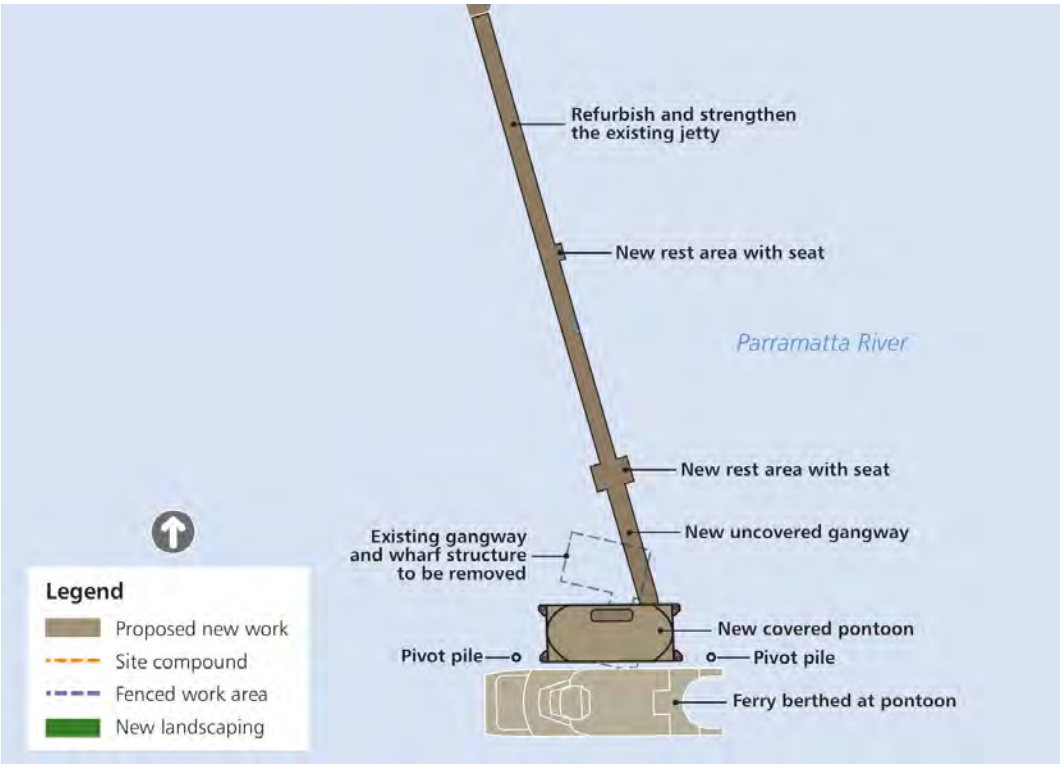

Figure 2-1 Waterside components of Proposal

Figure 2-2 Proposed wharf from waterside view

2.6 Preferred land based option

The preferred land based option was selected on the basis that it avoids unnecessary environmental, property and land use impacts. The preferred land based design was developed to address the identified deficiencies and non-compliances from the persective of accessibility, and to achieve the mandatory TAP requirements and Proposal objectives outlined in Section 2.3.

The preferred land based design is Landside Option 5 and includes the following features:

- Upgrade of exising footpath in the southern section of the car park to comply with DDA standards to meet accessiiblity requirements with widened footpath, rest stops and seats
- Installation of five new bicycle racks with space for 10 bicycles located adjacent to the accessible path leading to the wharf entry. Existing two bike lockers would remain onsite
- Combine the new kiss-and-ride space with the existing taxi rank parking zone adjacent to the pedestrian crossing and reposition the existing waiting shelter
- Relocate two accessible designated car parking spaces from the existing spaces in the carpark to a location adjacent to the accessible path which leads to the wharf entry
- Installation of updated wayfinding signage including existing signage located at the entry portal as well as other signage including wharf/fishing regulations, campaigns, next service information and help point and wharf identification
- Installation of a new water bubbler at the entrance of the jetty.

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 Kissing Point Wharf as part of the TAP. The waterside features of the Proposal would include:

- Removal of about 20 metres of the existing jetty, gangway, pontoon and associated wharf structures, including existing piles and gangway
- Installation of a new 18-metre long by nine metre wide, floating covered pontoon, held in position by four new piles and two pivot piles at end of the pontoon
- Installation of a new three-metre wide by 18-metre long uncovered gangway
- Remediation of existing three-metre-wide and 80-metre-long jetty to be strengthened for design life specification of 50 years, and
- Installation of an intermediate rest area and rest area/viewing platform at interface with the gangway.

The landside features of the Proposal would include:

- Five new bicycle racks to be installed near the wharf
- Minor demolition of redundant non-compliant footpath and landscape
- New rest area and pedestrian crossing to comply with *Disability Discrimination Act 1992* (DDA) and NCC
- New accessible parking to comply with Disability Standards for Accessible Public Transport 2002 (DSAPT) and compliant footpath and rest areas to Waterview Street
- New kiss and ride/taxi stop and repositioned shelter
- Installation of new drink fountain adjacent to the wharf.

Figure 3-1 shows the Proposal from the waterside perspective.

Figure 3-2 shows the Proposal's landside elements.

Figure 3-3 shows the Proposal footprint which comprises the indicative assessment area (further discussed in section 3.4).

Figure 3-1 View of Proposal from waterside perspective

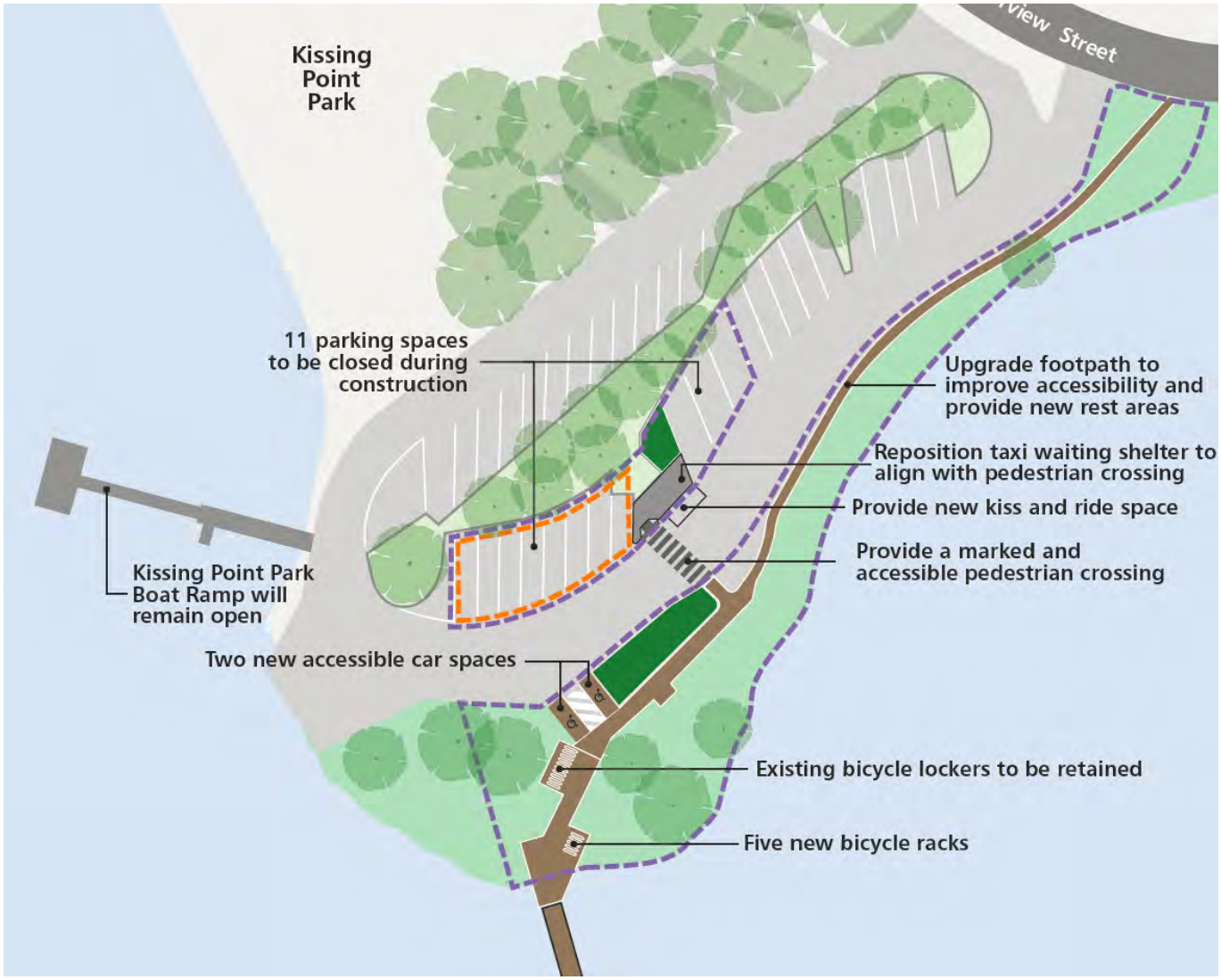

Figure 3-2 Proposal landside elements

Figure 3-3 Proposal 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 but not limited to the following:

- *Disability Discrimination Act 1992* (DDA)
- *Work, Health and Safety Act 2011* (WHS Act)
- National Construction Code landside and superstructure
- NSW Maritime Engineering Standards & Guidelines for Maritime Structures
- Standards Australia AS4997-2005 Guidelines for the Design of Maritime Structures
- DSAPT and amendments
- Disability (Access to Premises – Buildings) Standards 2010
- AS/NZS 2890.6:2009 Parking facilities – Off-Street Parking for People with Disabilities
- NSW Sustainable Design Guideline for Wharves
- Interchange Places – Design Handbook DRAFT (Transport for NSW – November 2012)
- Making Interchange Places – Interchange Product DRAFT Strategy (Transport for NSW – February 2012)
- NSW Government Code of Practice for Procurement
- Work Health Safety (WHS) Management Systems guidelines
- Environmental Management Systems (EMS) guidelines
- Crime Prevention Through Environmental Design (CPTED)
- Wayfinding Planning Guide for Ferry Wharves and Interchanges
- Beyond the Pavement – Urban Design Policy Procedures and Design Principles (Roads and Maritime Jan 2014)
- Environmental Impact Assessment Practice Note – Guidelines for Landscape Character and Visual Impact Assessment (EIA-N04) Roads and Maritime March 2018.
- Roads and Maritime: Guidelines for the Assessment of Public Ferry Wharf Safety 2016
- Australian Maritime Safety Authority (ASMA): navigation and safety
- Work, Health and Safety Act 2011 (WHS Act)
- NSW Maritime Engineering Standards & Guidelines for Maritime Structures
- Premises Standards 2010
- AS/NZS 2890.6:2009 Parking facilities – Off-Street Parking for People with Disabilities
- Transport for NSW Sustainable Design Guideline.

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.

3.2.2 Major design features

This section describes the Proposal's main design features.

Pontoon

The pontoon would be built about 80 metres from shore. The pontoon is accessed via the gangway which is connected to the existing concrete jetty and a new concrete viewing platform. The pontoon would comprise an 18 metre wide and nine metres long steel floating pontoon and canopy shelter, which would include a waiting area, seating and information kiosk. The pontoon would have one berthing face on the southern side for ferries and other smaller vessels.

A curved zinc canopy roof would be built over the pontoon that would be supported on steel columns. The pontoon would be surrounded by a mixture of glass and stainless steel balustrades.

The floating pontoon would be attached to, and held in place by, four steel piles that would be embedded into the underlying sandstone bedrock. The pontoon height relative to the landfall would vary depending on the state of the tide. The floating pontoon would be built from pre-fabricated units delivered in sections to site. Two pivot piles will be installed either end of the pontoon to assist ferries with berthing and departing.

Gangway

The wharf pontoon would be accessed by an uncovered aluminium gangway. The gangway would be 18-metres long and three-metres wide. The gangway would be built approximately parallel to the existing jetty. The gangway would be held in place by a pivot that would be attached to steel piles founded in the bedrock. The gangway gradient relative to the landfall would vary depending on the state of the tide. It would allow for disabled and low mobility compliant access for most of the time including during high and low tide. The gangway would be built off site and delivered as one unit to site.

Jetty

About 20 metres of the existing jetty will be demolished and the balance shall be remediated to meet the design life of 50 years. The existing jetty would have a new intermediate rest area to satisfy accessibility requirements and user benefit. In addition, the jetty would also have a new concrete waiting area/viewing platform at the end of the jetty which would interface with the new gangway.

Supporting infrastructure

The supporting infrastructure, lighting, signage, and furniture would be consistent with the provisions included on the other wharfs on the network and will include:

- Safety and security lighting on the step approaches and on the pontoon wharf
- Passenger information boards, notices, and (electronic and display board) timetables
- Safety ladders around the walkway and wharf pontoon
- Strung cabling and ducting to provide power and communications
- Closed circuit television (CCTV)
- Tactile flooring
- Revision to the existing parking arrangements to create fully compliant accessible carparking
- Creation of a new kiss and ride car park

- Realignment of existing paved area to provide compliant falls and maintain existing stormwater drainage arrangements
- New signage to assist with information and navigation (wayfinding)
- Provision of five new bicycle racks
- Provision of compliant pedestrian crossing
- Provision of compliant accessible footpath to Waterview Street.

3.3 Construction activities

The appointed contractor would confirm the final construction activities in discussion with Transport for NSW. 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 Transport for NSW 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 Transport for NSW 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 similar to that summarised in Table 3-1.

Table 3-1 Construction activities

Activity	Associated work
Site establishment and wharf closure	• 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 7), 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).
Demolition and removal of components of the existing ferry wharf	• Dismantle and demolish the existing structure (20 metres of jetty, pontoon, gangway and piles) using a barge crane and barged to approved and licensed facility for reuse and/or disposal.
Pile removal	• Remove the existing piles using a vibratory hammer • Piles would be removed by barge to off-site facility and reused where possible and/or disposal.

Activity	Associated work
Build the new wharf substructure	Substructure work • Remediate existing jetty piles • Drill new piles for viewing platform • Drill the new piles for the gangway, and floating pontoon using a barge mounted crane. Superstructure work • Remediate existing jetty slab • Install new intermediate rest area slab • Install rest area/viewing platform slab • Attach and build out the 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. Landside work • Install new DSAPT compliant footpath • Install bicycle racks • Install new signs and information boards • Install new kiss and ride zone • reposition existing taxi shelter • Upgrade pedestrian crossing for compliance to current NCC standards • Upgrade lighting near the wharf if required; and • Install new water fountain. Note: this work would be undertaken at the same time as the main wharf upgrade.

Site clean-up and opening the upgraded wharf	Testing and commissioning
	• Connect power and communications
	• Re-install Opal card readers and television timetable screens
	• Test and commission all infrastructure.
	Demobilisation
	• Demobilise the site compounds and remove temporary:
	  • Maritime navigation exclusion and no-go zones
	  • Footpath restrictions/closures
	  • Environmental safety controls.

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 a period of up to five months, starting early in the second quarter of 2020. Construction may not be continuous as it would rely on materials delivery and the manufacture of the prefabricated components. The construction program would also be affected by the need to coordinate with Sydney Ports Authority, City of Ryde Council, residents, and other stakeholders.

Working hours

The work would take place within standard working hours:

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

The exception would be piling, lifting and concrete work in Parramatta River. For safety reasons, this may need to take place at night or early in the morning when the water is calm and still and the river is least busy. Piling is estimated to occur over four weeks. During piling activities, a work schedule similar to the following may be adopted:

- Drilling of piles
  - Setup: 11pm to 12am
  - Drilling: 12am to 6am
  - Pack up: generally, 6am to 7am.
- Hammering of piles
  - Setup: 4am to 5am
  - Hammering: 5am to 7am.

Pile drilling or hammering, and lifting would take place intermittently during the above periods. This activity would occur after demolition works. 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.

Due to the requirement for calm water conditions, the new pontoon and gangway would be lifted into position by a barge-mounted crane between 11pm and 7am.

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 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 3-2 indicates the plant and equipment that would be likely used to build the Proposal, however this would be confirmed by the contractor.

Table 3-2 Indicative plant and equipment

Plant and equipment	
Barge mounted cranes*	Hammer drills
Boats and barges*	Hand tools
Bobcat	Light vehicles
Chainsaws	Lighting towers*
Concrete boom pump	Pile driver*
Concrete trucks	Power hand tools
Drill rig	Vibratory compactor
Generator*	Water pumps

*only used at night

3.3.5 Earthworks

The Proposal would have limited earthworks of an estimated 20m^3 of cut and fill. A small amount of riverbed sediment would be disturbed during the piling work.

Material removed from the site due to the Proposal works would be non-putrescible solid waste including concrete and asphalt. Estimated quantities are about 40m^3 which would be excavated and disposed off-site.

Landside modifications would have minor earthworks excavations for re-grading of road and footpath. Works would be carried out during the day by civil plant and equipment (e.g. excavators, concrete trucks, trucks and rollers).

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 either transported or shipped (barged) to site as prefabricated units ready for installation, or delivered in small quantities for use as needed. 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
- 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 involve:

- Creation of a maritime navigation exclusion zone around the Proposal footprint for the majority of the construction work to prevent both commercial and recreational traffic entering the area
- Temporary closure of the sections of the Kissing Point Park car park, with implementation of a Traffic Management Plan
- Closure of about 11 parking spaces
- Temporary traffic lights or stop-go provisions on Waterview Street and adjacent roads while major deliveries take place.

Construction traffic

Where feasible, materials and equipment would be shipped (barged) into and out of the area to limit any impact on Waterview Street. This would provide the best method to build the marine components. Some of the landside materials may also be delivered in this way provided there is adequate access for loading and unloading. The alternative would deliver materials and equipment by road.

Table 3-3 summarises the expected construction traffic associated with building the Proposal.

Table 3-3 Construction traffic (weekly average)

Vehicle type and association	Vehicle number (per week)		Typical travel patterns and limitations
	Average	Maximum	
Assuming that no materials or equipment are shipped to site:			
Construction traffic: heavy vehicles	2	5	Regular movements throughout the day
Deliveries: light and heavy vehicles	4	10	
Assuming that the majority of materials and equipment is shipped to site:			
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

A small site compound would be needed to store equipment, machinery and some limited materials. The preferred location for the proposed site compound is shown in Figure 3.4. While the specific requirements for this site would be confirmed by the contractor it would most likely comprise a shipping container with site offices and toilets.

Given the limited space and road access, the preference would be to ship any major machinery, equipment and prefabricated units to site, potentially even making use of an offshore storage barge. Transport for NSW's preference is to select ancillary facilities that are consistent with the following criteria namely:

- Away from ecological, biodiversity and heritage values
- Outside of flood prone land
- At least 40 metres from a watercourse
- On previously disturbed areas
- In public view to deter theft and illegal dumping
- More than 100 metres from residential property
- Outside the drip line of trees and on level ground wherever possible.

The nature of the work means that any site would be located within 40 metres of Sydney Harbour. The limited available space on land means that the ancillary facility would also need to be:

- Within Kissing Point Park car park
- On previously undisturbed land
- Within 100 metres of residential properties
- Potentially within the drip line of various trees.

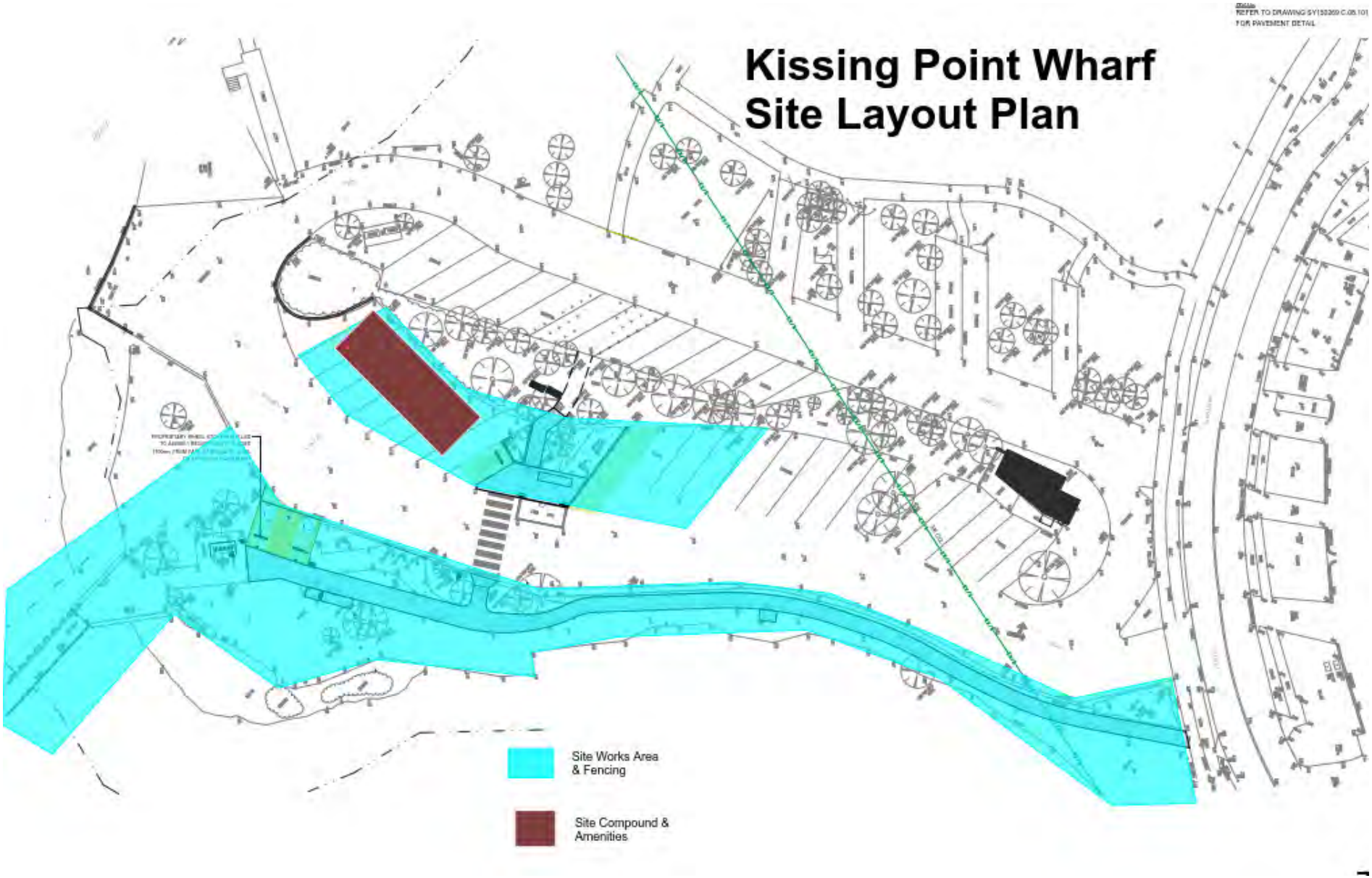

Figure 3.4 Overview of the proposed location of temporary site compounds, and ancillary structures

3.5 Public utility adjustment

The existing main switchboard is in good condition and power will be reticulated under the gangway to the pontoon in stainless steel conduits. A new distribution board will be installed in the electrical switch room within the pod. This board will provide all power for the gangway and new pod.

A new drink fountain will be provided adjacent to the wharf which will be connected to an existing water line in the park.

Final public utility protection requirements would be confirmed during detailed design.

3.6 Property acquisition

No property acquisitions are expected under this Proposal. The additional land needed to support construction would be used under agreement with the City of Ryde Council.

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 of infrastructure across the State.

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 Transport for NSW, 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*.

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 *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 the coastal environment area (waterside and landside features) and coastal use area zones (landside features) identified in the SEPP (Coastal Management) as shown in Figure 4-1 and Figure 4-2. Development on land within the coastal environment area (clause 13) and land within the coastal use area (clause 14) are not allowed except for land that is within the Foreshores and Waterways Area within the meaning of Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005. Goals of this plan are primarily focused on protecting and improving the hydrological and ecological catchment areas. The Proposal is not expected to have adverse impacts to the foreshore area and are aligned to this goal. Kissing Point Wharf is located within the Foreshores and Waterways Area Boundary so provisions of the Coastal Management SEPP are not applicable.

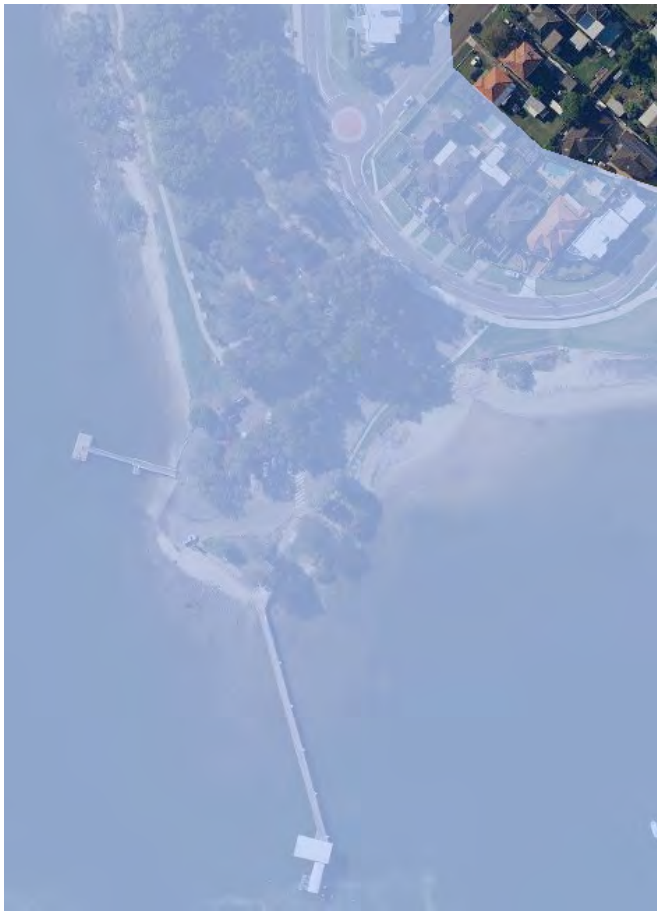

Figure 4-1 Kissing Point Wharf (landside and waterside features) located within Coastal Environment Area

Figure 4-2 Kissing Point Wharf (landside features) located within Coastal Use Area

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.	Section 7.2 of this REF includes safeguards to protect and maintain the area's natural and heritage values, including those associated with the existing wharf. 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 Transport for NSW guidelines (refer to Section 7), 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 Kissing Point 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 up to 5 months, during the demolition of the old wharf and construction of the new wharf. It is anticipated that bus transport would remain operational. Users would be notified of the proposed closure ahead of time as detailed in Chapter 5.
(e) To encourage a culturally rich and vibrant place for people.	The Proposal would continue to provide residents with access to the ferry network and interchange with other public transport provisions. This would sustain the local area as a vibrant place to live.
(f) To ensure accessibility to and along Sydney Harbour and its foreshores.	The Proposal would ensure that 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 up to 5 months during construction. It is anticipated that bus transport would remain operational. Possible short interruptions may occur depending on the nature of construction work being undertaken.
(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 up to 5 months during construction. No commercial shipping or other boat movements occur within the Parramatta River at Kissing Point, and no significant impacts are anticipated. The Proposal would improve access to public water transport at Kissing Point Wharf
(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,	The wharf would close for up to 5 months during construction, which would prevent Transdev Sydney Ferries from accessing the Kissing Point Wharf impacting the movement of public water transport at the Wharf. However, the development would improve access to Kissing Point Wharf with the aim of improving the effectiveness of public water transport. 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.	During construction, the NSW Rowing club and Kings School rowing club would be prevented from entering the Kissing Point Wharf navigational exclusion zone, impacting the movement on the harbour in and around the Wharf footprint. The proposed works would improve accessibility to public water transport at Kissing Point Wharf for less mobile passengers. This Proposal has been designed to meet the requirements of the DDA, hence aligns with this objective.

The Proposal has also been considered in respect to the objectives from clause 17 of the Sydney Harbour SREP zone W8 (Scenic Waters: Passive Use) in which part of the Proposal is located in Table 4-3.

Table 4-3 Zone W8 Scenic Waters: Passive Use objectives

Objective	Comment
(a) To give preference to unimpeded public access along the intertidal zone, to the visual continuity and significance of the landform and to the ecological value of waters and foreshores.	The Proposal does not impair public access along the intertidal zone, or the visual continuity and significance of the landform (refer to Section 6.5), or the ecological value of the waters and foreshore (refer to Section 6.3). The proposed works would improve access to the intertidal zone for less mobile individuals.
(b) To allow low-lying private water-dependent development close to shore only where it can be demonstrated that the preferences referred to in paragraph (a) are not damaged or impaired in any way, that any proposed structure conforms closely to the shore, that development maximises open and unobstructed waterways and maintains and enhances views to and from waters in this zone.	There is no low-lying private water-dependent development associated with, or impacted by the Proposal.
(c) To restrict development for permanent boat storage and private landing facilities in unsuitable locations.	The Proposal does not increase or affect permanent boat storage and private landing facilities.

Objective	Comment
(d) To allow water-dependent development only where it can be demonstrated that it meets a demonstrated demand and harmonises with the planned character of the locality.	The Proposal involves improving the accessibility of Kissing Point Wharf for less mobile passengers. The demand for these works has been previously identified (refer to Section 2.1). The Proposal would be designed to harmonise with the planned character of the locality. Visual and landscape character impacts for the Proposal have been assessed in Section 6.5.
(e) To ensure that the scale and size of development are appropriate to the locality and protect and improve the natural assets and natural and cultural scenic quality of the surrounding area, particularly when viewed from waters in this zone or areas of public access.	The Proposal will not significantly impact the scale and size of the existing wharf. Therefore, no significant impact to the natural assets, or natural and cultural scenic quality of the surrounding area is projected. Visual and landscape character impacts for the Proposal have been assessed in Section 6.5, and mitigation measures are detailed in Section 7.2.

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 listed in Division 2 at clauses 21-27 of the Sydney Harbour SREP are provided in Table 4-4.

Table 4-4 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 listed in Section 7.2, impacts would be minimised and/or managed.
Clause 22: public access to, and use of, foreshores and waterways	The wharf would close for up to 5 months during the construction period. 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 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 minimal 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 contains provisions to consult with the Foreshore and Waterways Planning and Development Advisory Committee (the committee) and relevant utility companies where development is either listed in Schedule 2 or needs to connect into services such as water and sewerage. Section 5.5 discusses this further.

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:

- Kissing Point Park (former boatslips).

Non-Aboriginal 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 4-5 below.

Table 4-5 Heritage objectives

Objective	Comment
1(a): to conserve the environmental heritage of the land to which this Part applies.	Overall, it is considered that the reconstruction of the current wharf would have low potential impact as it relates to its archaeological potential associated with this period (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 heritage item is related to its archaeological potential and has a low-medium impact.
1(c): to ensure that that archaeological sites and places of Aboriginal heritage significance are conserved.	There is low potential to impact other historical archaeological resources as works take place within heavily disturbed land. The Aboriginal archaeological potential of the Proposal footprint is considered low as works are minor and within heavily disturbed land.
1(d): to allow for the protection of places which have the potential to have heritage significance but are not identified as heritage items.	There is little to no potential for *in situ* sites to exist in the vicinity of the Proposal, due to its highly disturbed nature.
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. Clearance of 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 and provided on September 17, 2019 (Appendix H). 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.

4.1.2 Local Environmental Plans

Ryde Local Environmental Plan 2014

The landside component of the Proposal is located within the Ryde local government area (LGA). Local development control and land use zoning and planning in this LGA is currently governed under the Ryde local environmental plan (LEP) 2014.

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 a 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 4-6.

Table 4-6 Relevant Ryde LEP land use zoning policies

Objectives	Proposal consistency
RE1 – Public Recreation: covering bush shelter, toilet and additional bike racks	
• To enable land to be used for public open space or recreational purposes • To provide a range of recreational settings and activities and compatible land uses • To protect and enhance the natural environment for recreational purposes.	There would be no significant loss of recreational land associated with the Proposal. There would be a temporary loss of recreational land during construction phase due to installation of ancillary facilities (refer to Section 3.4). The Proposal would improve the accessibility of the recreational setting through provision of an upgraded pathway and rest areas. Recreational amenities within the site area would be enhanced due to the addition of bike racks and improved facilities.

4.2 Other relevant NSW legislation

Table 4-7 lists the NSW legislation relevant to the Proposal or the land on which the Proposal would be built.

Table 4-7 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	The due diligence assessment contained within Appendix H concludes that Aboriginal objects are not likely to be harmed, thus an Aboriginal heritage impact permit (AHIP) from OEH under Part 6 of this Act is not required for the Proposal. Section 6.10 provides further discussion.
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	The proposal would: • 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. Recommended for a permit sought from Heritage NSW, Community Engagement, Department of Premier and Cabinet.
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	There would be no roadworks on Waterview Street associated with the Proposal, therefore no consent from City of Ryde Council is required.

Legislation and application	Relevance to the Proposal and further requirements
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.	The aquatic ecology assessment (refer to section 6.3) carried out to support the REF, concluded that the Proposal would not trigger the need for a permit to Harm Marine Vegetation as well as the design does not require dredging or excavation of the seafloor. Department of Primary Industries (Fisheries) has no objections to the Proposal as noted in their consultation letter on 5 December 2019. Conditions noted in their consultation include the following mitigation measures: • Environmental safeguards (silt curtains, booms etc) used during construction • Any material removed from the waterway to be temporarily deposited or stockpiled away from waterways • Department of Primary Industries (Fisheries) and EPA to be notified in case any fish kills occurring in the vicinity of the works.
Biodiversity Conservation Act 2016: 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.	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.
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.	The Proposal would not involve undertaking or carrying out a scheduled activity. Transport for NSW would undertake further consultation with the NSW Environmental Protection Agency (EPA) to determine if additional measures are required, potentially including a licence (non-scheduled activity) for the Proposal under section 122 of the POEO Act. If standard controls set out in Transport for NSW guidelines and quality assurance specification are implemented and monitored, there is unlikely to be any material water, noise or air pollution impact (refer to Chapter 7). Appropriate waste management controls would be introduced to classify, store, transport, and dispose of all construction and work-generated waste.
Marine Pollution Act 2012: sets out provisions to prevent pollution in the marine environment.	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 7).
Ports and Maritime Administration Regulations 2012: requires Harbour Master permission to alter any structure or disturb the harbour floor within Sydney Port.	Kissing Point Wharf does not fall within the definition of Sydney Harbour under the Ports and Maritime Administration Regulations 2012 as it is not within four nautical miles from the Hornby Lighthouse.

Legislation and application	Relevance to the Proposal and further requirements
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.	A navigational exclusion zone would be installed while the work is taking place. The Harbour Master and Ports Authority would be updated throughout works.

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 C 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

DDA 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 DSAPT 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, Transport for NSW 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

Transport for NSW 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:

- To keep the local community and other key stakeholders regularly informed
- To provide the community and stakeholders with regular and targeted information to build awareness
- To be transparent in all that we do
- To encourage participation from communities and other stakeholders
- To listen to feedback, investigate suggestions and report back
- To engage in a manner that is collaborative, innovative, adaptive and sustainable
- To increase stakeholder understanding of the program and its objectives
- To ensure that community and stakeholder enquiries are managed and resolved effectively
- To ensure that project information is distributed in an effective and timely manner.

5.2 Community involvement

A community information drop-in session would be organised on site at Kissing Point wharf on Thursday 6 February during the REF display period.

The purpose of the information session would be to gain community feedback to help Transport for NSW understand views about the existing facilities and priorities for improvement. This process would assist Transport for NSW to develop the design.

5.3 Aboriginal community involvement

Aboriginal heritage impacts have been considered under the four-stage PACHCI process. The PACHCI is outlined in Table 5-1 below.

Table 5-1 Summary of Transport for NSW PACHCI stages

Stage and description	Consultation
Stage 1: initial assessment	An internal Transport for NSW 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 *National Parks and Wildlife Act 1974*.
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 a Stage 1 clearance letter for the Proposal completed in September 2019 in accordance with PACHCI, included in 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, Transport for NSW 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, 14 and 16 of ISEPP as it:

- Would involve the installation of a temporary structure in the form of the construction compound
- Would involve works within the curtilage of a listed local heritage item
- Would involve works within the foreshore area.

Transport for NSW has been consulting with City of Ryde Council on and off since year 2015 to develop a design which is acceptable to Council as owners and operators of the landside elements of the Proposal. Formal ISEPP letters were issued for the Proposal in November and December 2019 to City of Ryde Council, Department of Planning, Industry and Environment, Foreshore and Waterways Planning and Development Advisory Committee, and Utility Companies.

The Department of Primary Industries (Fisheries) has no objections to the Proposal as noted in their consultation letter on 5 December 2019. Conditions noted in their consultation include the following mitigation measures:

- Environmental safeguards (silt curtains, booms etc) used during construction
- Any material removed from the waterway to be temporarily deposited or stockpiled away from waterways
- Department of Primary Industries (Fisheries) and EPA to be notified in case of any fish kills occurring in the vicinity of the works.

The City of Ryde Council provided comment on the following:

- Design requirements, sub-consultant reporting and investigations, traffic management, landscaping and tree protection requirements and protection of existing assets. Many of these items have been considered in developing the REF and associated safeguards, where applicable to the scope.

No other responses have 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.

A standard response from Sydney Water was received on 20 December 2019 which noted that approval is required when building or excavating near Sydney Water assets. Transport for NSW will continue to engage with Sydney Water to ensure the appropriate approvals from the Water Servicing Coordinator is obtained prior to construction.

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. The following key stakeholders were consulted through this process:

- Transdev Sydney Ferries
- Community groups
- City of Ryde Council
- Emergency services
- Port Authority of NSW
- NSW Rowing Club
- Kings School Rowing Club.

Table 5-2 defines key stakeholders with relevant interests of issues as related to this Proposal.

Table 5-2 List of key stakeholders

Stakeholder group	Stakeholder	Interests
State government	Minister for Transport – Andrew Constance	• Community complaints • Media enquiries • Project impacts • Asset maintenance.
Local government	City of Ryde Council	• Project impacts and design • Community concerns • Construction progress.
Transport operators	Transdev Sydney Ferries	• Impacts on construction on transport operations including bus operation to the wharf • Wharf design • Scope of the project.
Local schools	Rivendell School Kings School Rowing Club	• Construction impacts on bus routes • Wharf design • Wharf closure for construction • Project scope.
Medical facilities	Thomas Walker Hospital	• Wharf design • Project scope.
Local business	Concord Ryde Sailing Club	• Wharf closure for construction • Wharf design • Project scope • Noise associated with construction.
Interest groups	Ferry users Disability groups Disability groups Disability groups	• Wharf closure for construction • Wharf design • Scope of the project • Noise associated with construction • Construction impacts on bus routes.

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, Transport for NSW would collate and consider the submissions received then determine whether the Proposal should proceed as described or whether any changes are required. It would also decide if any additional environmental assessment, safeguards or management measures are needed.

Hard copy versions would be made available at:

- City of Ryde offices at Top Ryde Centre, 1 Pope Street, Ryde NSW 2112.

A community information drop-in session will be held on-site at Kissing Point wharf where members of the project team will be available to provide information about the project. There will be no formal presentation. Details of the information session are provided below:

- Where: On site at Kissing Point Wharf
- When: 6 January 2020.

A submissions report would be published, which would respond to comments received. Transport for NSW would notify those who made submissions and distribute a community update. The update would summarise the submissions report process and the actions Transport for NSW took to address these comments. Detailed design and pre-construction consultation would be ongoing.

If the Proposal is approved, 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).

5.7.2 Construction consultation

The appointed work contractor(s) in partnership with Transport for NSW 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, Transport for NSW 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:

- Parramatta River Estuary Data Compilation and Review Study (Cardno, 2008)
- Kissing Point Wharf Interchange - Concept Design Report (RMS, 2018).

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 (Herbert C., 1983)
- NSW Planning Portal
- NSW eSPADE
- NSW EPA online contaminated land register
- Environmental Protection Licences (EPL) under the *Protection of the Environment Operations Act 1997*
- Kissing Point Wharf Interchange - Concept Design Report (RMS, 2018).

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 and terrestrial 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, and associated aquatic ecology impacts as well as landside infrastructure impacts.

6.1.2 Existing environment

Contaminated land

A search of licenses held under the POEO Act revealed that there is one premise located within a one-kilometre radius of the Proposal currently operating under a POEO license or EPL license. It is operated by Ardent Leisure Limited, which is located approximately 800m away from the Proposal.

A Stage 1 desktop study from a 2015 Coffey contaminated land assessment identified the following Chemicals of Potential Concern (COPC):

- Polycyclic Aromatic Hydrocarbons (PAHs)
- Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc)
- Organochlorine Pesticides (OCPs)
- Polychlorinated Biphenyls (PCBs).

Kissing Point is located at the mouth of Kendall Bay, which is within the central portion of the Port Jackson (Sydney Harbour) estuary. The estuary has a long history of contamination with extensive areas of polluted sediments mainly associated with the most industrialised part of the catchment.

Acid sulfate soils

Acid sulfate soil (ASS) occurs in areas rich in iron sulphide. These soils generate sulphuric acid if exposed to the air (oxygen). The acid is an issue as well as causing the mobilisation of metals (e.g. aluminium, iron, manganese) which may lead to a detrimental environmental impact. ASS can also decrease the amount of dissolved oxygen in surface waters, leading to eutrophic conditions and fish kills.

Based on the Stage 1 Contamination Assessment (Coffey, 2015), there is a high probability occurrence of acid sulfate soils materials. Harbour sediments are likely to have ASS characteristics and will need to be assessed and managed accordingly should they be disturbed.

Flooding

Kissing Point Wharf is not located within a flood prone area. The Parramatta River – Ryde Sub-Catchments Flood Study and Floodplain Risk Management Plan (SKM, 2013) identifies that the wharf is not within any flood risk precincts.

Water based

Sea levels

Tides at the site are semi-diurnal with two High Water levels and two Low Water levels each day. Chart Datum (0.0 metre CD) is 0.925m below Australian Height Datum (AHD). The tidal planes for Sydney Harbour are as follows:

- Mean sea level is 1.0 metres above CD
- Highest Astronomical Tide is 2.1 metres above CD
- Lowest Astronomical Tide is 0.0 metres above CD.

Water depth (bathymetry)

The bathymetry consists of a small flat tidal beach at the shoreline which is perched on an intertidal rock outcrop which extends for about 38m from the shoreline, at which point the seabed gently slopes down to 3m below CD for a further distance of 28m. The maximum depth in the middle of the waterway is about -7.6m. The seabed at the proposed ferry wharf is -2.5m at the western berth face.

Sedimentation

Sedimentation of a 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.

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 work undertaken over the years. In addition, the turbulence and wake generated by the ferry service would likely limit this accumulation of sediment and it is inferred that the ferry movements contribute to the maintenance of the existing channel.

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 are very low (i.e. 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. In this location, there is a degree of surface mixing in the local environment of the Proposal. Water circulation and currents are low and 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, with the strongest winds blowing from the south. The most common wind direction is from the north-east (Sydney Institute of Marine Science, 2016). These winds occur for about 22 per cent of the time and are responsible for generating waves in the local area, which may be as high as one metre (Sydney Institute of Marine Science, 2016). The next most common wind direction is from the west, which occurs for about 17 per cent of the time mainly during the winter.

Land based

Geology and soils

Geology for land based is similar to water based as confirmed in the NSW Department of Mineral Resources from 1983. The review also includes further detail of geology as medium to coarse-grained quartz sandstone with minor shale and laminate lenses.

Kissing Point Wharf sits at the southern end of Waterview Street where the area is generally flat and gently rises from the river level to 2.5m toward Kissing Point Park.

A Geotechnical Assessment (Coffey, 2015), including completion of two boreholes near the existing wharf, confirmed the subsurface profile at the Proposal comprises fill material/deposited sediments from 1.3 to 1.6 metres thick and consists of marine sediments overlying Sandstone bedrock.

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 part of the existing jetty, wharf and gangway.

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 the piles, then they would be cut-off at the riverbed. The scale of the disturbance would be minimal to cause any dynamic changes in current speed, wave characteristics, saline/freshwater mixing or flushing.

Localised sediment disturbance and smothering

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).

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 additional safeguards provided in section 6.1.4.

Erosion and scour

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 as well as placement of piles. 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 further described in Section 6.3. 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

It is not anticipated that a significant amount of sediment would accumulate within the channel over the five-month closure period as a result of the Proposal. The area around the wharf would be intermittently accessed by barges delivering and moving construction equipment. 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.

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

Acid sulfate soils

Acid sulfate soils may be encountered on the seabed within the Proposal footprint. However, only minor disturbance of river sediments is proposed. While there is the risk of acid sulfate soil, any sediment attached to any extracted piles would be removed in the water. As such, there is no possibility for these sediments to dry and oxidise.

Localised pollutant disturbance

Despite 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. Therefore, disposal and treatment would not be required.

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

There are no significant earthworks proposed however there would be small areas of soil exposed during footpath installation works. The potential for causing soil erosion or sediment laden runoff would be minor with the implementation of safeguards in section 6.1.4.

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, handing 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.

Flooding

There are no proposed land side work within the identified low and medium flood risk precincts. There are no expected flood impacts during construction.

Acid sulfate soils

The disturbance of potential ASS should be kept to a minimum to lower the risk of exposing these sediments to oxygen. ASS would be managed in accordance with the Acid Sulfate Soil Management Plan and the safeguards detailed in section 6.1.4 to mitigate potential impacts.

Contamination

No identified contaminated lands were noticed in the EPA Contaminated lands registers within 1km of the Proposal.

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.

Operation – water based

Erosion and scour

Additional piles and piers for the jetty would be installed as part of the Proposal. 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 limited amount of sediment substrate locally.

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 operation 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.

Transport for NSW inspect wharves after flooding events. This would continue during operation of the Proposal. No significant impacts from flooding are anticipated during operation of the Proposal.

Operation – land based

The Proposal is not anticipated to have any significant operation impacts to the terrestrial land surface due to the minor nature of the Proposal.

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
Soil and water	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. 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: • 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	Pre-construction
Erosion and sedimentation	Prior to commencement of construction activities a silt boom and curtain) should be installed around the work area that may disturbed the seabed. Installation should be undertaken during high tide periods from a boat. The device should be designed to rise and fall with the tide to prevent disturbance. 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. Inspection of the device should be undertaken on a daily basis after ebbing tides, with additional inspection be carried following storm events. Visual monitoring of turbidity inside and outside of the device should also be performed,. 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. Decommissioning should be carried out by boat during high tide periods and can be undertaken once construction activities are above seabed level. Prior to removing the device, conditions within the curtain will be assessed visually to verify that sediment has settled resulting in similar water turbidity to that outside the curtain.	Contractor	Pre-construction

Impact	Environmental safeguard	Responsibility	Timing
Erosion and sedimentation	Visual monitoring of local water quality (i.e. 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.	Contractor	Construction
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 6.3.	Contractor	Construction
Erosion and scour	Work positioning barges, drilling and pile driving should occur during calm conditions to prevent excessive scouring and minimise any safety risks.	Contractor	Construction
Acid sulfate soils	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.	Contractor	Construction
Contaminated land	If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other work 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	Construction

6.2 Water quality

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

6.2.1 Methodology

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

- Parramatta River Estuary Data Compilation and Review Study (Cardno, 2008)
- Sydney Harbour Catchment Water Quality Improvement Plan (Local Land Services, 2015).

6.2.2 Existing environment

The Parramatta River catchment extends from Blacktown Creek in the west, to about 22 kilometres to Sydney Harbour in the east. Much of the catchment has been developed for urban and previously 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
- Nutrients and pathogens from fertilizers and sewage overflows
- Heavy metals (in river sediments from stormwater discharge)
- Other contaminants such as hydrocarbons from oil and fuel leaks.

A review of the available information on water quality in the Parramatta River was undertaken by Cardno (2008) and Local Land Services (2015). 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 generally be of poor quality.

6.2.3 Potential impacts

Construction

Pollutants

The main impact to water quality would be from the disturbance to sediments during piling.

Sediments on the sea floor from piling 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 and allow them to settle out within the bounds of the curtain.

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 to result in minor impacts to water quality from encountering contaminants or potential ASS.

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.

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
    - 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 similarly to current movements, and no additional sediment disturbance 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
Water quality	Any chemicals or fuels stored at the site or equipment barges would be stored in a bunded area.	Contractor	Construction
Accidental spill	Refuelling of plant and equipment and storage of hazardous materials on barges is to occur within a double-bunded area.	Contractor	Construction
Accidental spill	A spill management plan would be developed and communicated to all staff working on site. Appropriate land and aquatic spill kits are to be maintained on site and on barges. Aquatic spill kits must be specific for working within the marine environment. All workers will be advised of the location of the spill kit and trained in its use. 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.	Contractor	Pre-Construction
Accidental spill	If an incident (e.g. 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
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	Pre-Construction
Accidental spill	Vehicles, vessels and plant must be properly maintained and regularly inspected for fluid leaks.	Contractor	Construction
Accidental spill	No vehicle or vessel wash-down or re-fuelling would occur on-site.	Contractor	Construction
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

6.3 Biodiversity

This section summarises the Proposal's aquatic and terrestrial biodiversity. Appendix D contains a supporting paper on aquatic ecology prepared by Eco Logical Australia in October 2019 and Appendix E contains an Arboricultural assessment prepared by Earthscape Horticultural Services.

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 environment. This was followed by a site walkover on 19 June and 13 July 2017 and aquatic survey of the marine environment covering an area extending to about 40 metres from the Proposal.

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
- BioNet Atlas of Wildlife: containing information on threatened and protected species
- 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, 2016).

Further detail on the methodology and legislative context for the assessment of aquatic biodiversity is provided in Appendix D.

The assessment also included an Arboricultural impact assessment using the Visual Tree Assessment (VTA) procedure. Inspection was performed on 29 October 2019. Further detail on the methodology for the assessment of arboriculture is provided in Appendix E.

6.3.2 Existing environment

Aquatic ecology

Protected areas

Map 3 of the 'Sydney Harbour - Foreshores and Waterways Area Development Control Plan 2005: Ecological Communities and Landscape Characters', identifies the area as 'mudflats' and 'water', with riparian land mapped as 'urban development with scattered trees and grassland' (Figure 6-1).

Figure 6-1 Sydney Harbour – Foreshores and Waterways Area Development Control Plan: Ecological Communities and Landscape Characters (map sheet 3)

Wetlands

Sheet 2 of the 'Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005: Wetlands Protection Area', does not identify the site as a 'Wetlands Protection Area' (Figure 6-2).

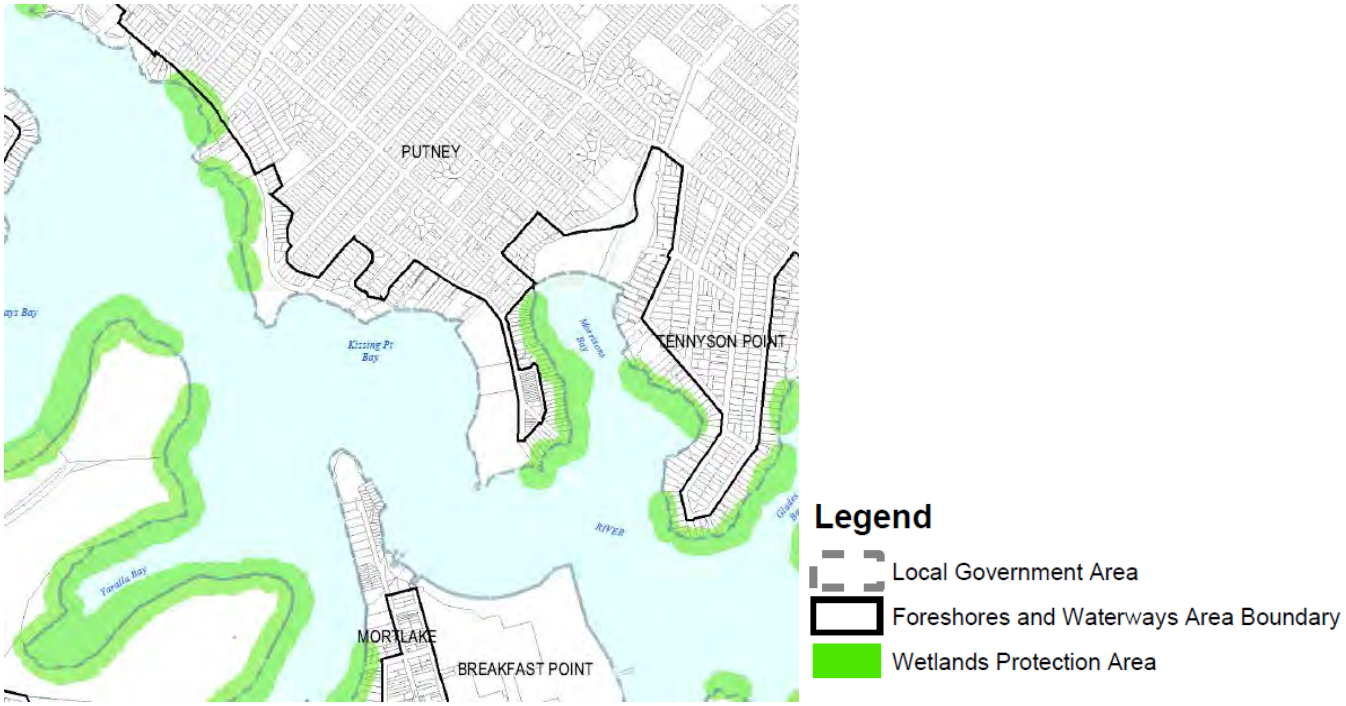

Figure 6-2 Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005: Wetlands Protection Area (map sheet 2)

Mangroves and seagrass

The State-wide mapping of estuarine macrophytes (mangroves, saltmarsh and seagrass) by Department of Primary Industries (Fisheries) identifies the nearest patch of marine vegetation (mangrove) as being 100m to the north-east of the wharf (Creese et al 2009, Figure 6-3). There are no local records of the threatened *Posidonia* seagrass population.

Figure 6-3 Mapping of estuarine macrophytes (DPI 2009)

Habitat

Department of Primary Industries (Fisheries) identifies three types of key fish habitat (KFH) in their *Policy and Guidelines for Fish Habitat Conservation and Management* (NSW DPI, 2013) comprising:

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

No threatened species, populations or communities were observed, or are expected to use the Proposal (see Section 4.3 and likelihood of occurrence assessment in Appendix D). Seahorses and their relatives (syngnathiformes) were not observed and are unlikely to occur this far up the Parramatta River estuary.

A summary of marine habitat identified within the Proposal as show in Figure 6-4, and corresponding KFH type, is provided in Table 6-3. The extent of each habitat type is shown in Figure 6-4.

Table 6-3 Marine habitat present within the Proposal

Habitat identified within the Proposal footprint	Description	Key Fish Habitat type
Manmade structures (Figure 6-5) and (Figure 6-6)	Foreshore habitat was highly modified by a footpath, mown lawn, carpark and small retaining wall at the start of the jetty. These constrain future establishment of mangroves and saltmarsh. The existing jetty was supported by piles on the rock platform, which had a dense covering of barnacles. In deeper water, most piles and the pontoon had a dense covering of short encrusting organisms, mostly common green and brown algae, turfing algae, ascidians, polychaetes and barnacles.	Type 3
Intertidal bare sand (Figure 6-7) and (Figure 6-8)	A sand deposit formed a small beach adjacent to the carpark reserve. The beach was strewn with woody debris and shells. No crabs or infauna burrows were observed, but they would likely occur in low numbers around the point. No saltmarsh had established above the beach due to grade and mowing.	Type 3
Intertidal rock (Figure 6-9) and (Figure 6-10)	A large intertidal rock platform extended around the point, featuring shallow depressions and deposits of gravel, sand and shell. A biofilm dominated by green filamentous algae covered much of the bedrock. Microhabitats in sheltered areas were suited to sessile marine species, including *Bembicium nanum* (striped-mouth conniwink), *Saccostrea glomerata* (Sydney rock oyster), *Chamaesipho tasmanica* (honeycomb barnacle) and *Cellana* spp. (limpets).	Type 3
Mangroves (Figure 6-10) and (Figure 6-11)	*Avicennia marina* (grey mangrove) occurred in two locations. Several mature-sized trees were established along a sandy beach north-east of the existing wharf, outside of the impact area. Five juvenile plants had established on soft sediment deposits on the rock platform, west of the proposed wharf. Given the shallow sediment depth over the bedrock, the trees west of the wharf are unlikely to form large specimens with spreading roots and pneumatophores. As such they are of low ecological value.	Type 2

Habitat identified within the Proposal footprint	Description	Key Fish Habitat type
Subtidal rock with scattered macroalgae	The subtidal portion of the rock platform supported scattered brown macroalgae, dominated by *Sargassum* spp. and *Pandina fraseri* (fan weed) at a low density of about 1 plant per square metre. Plants were clustered in the shallowest areas of the rock where there was increased light, plus where rock shape was more complex. Due to the high turbidity water of the Parramatta River, photographs of this vegetation type were not clear for inclusion in this report. Presence was verified using a video camera with on-board monitor.	Type 2
Subtidal bare sand (Figure 6-12)	The subtidal zone was characterised by soft silty-sand. A sparse cover of bioturbation from infauna is evident. A fine biofilm of green filamentous algae covered most of the substrate. No seagrass or macroalgae were observed.	Type 3

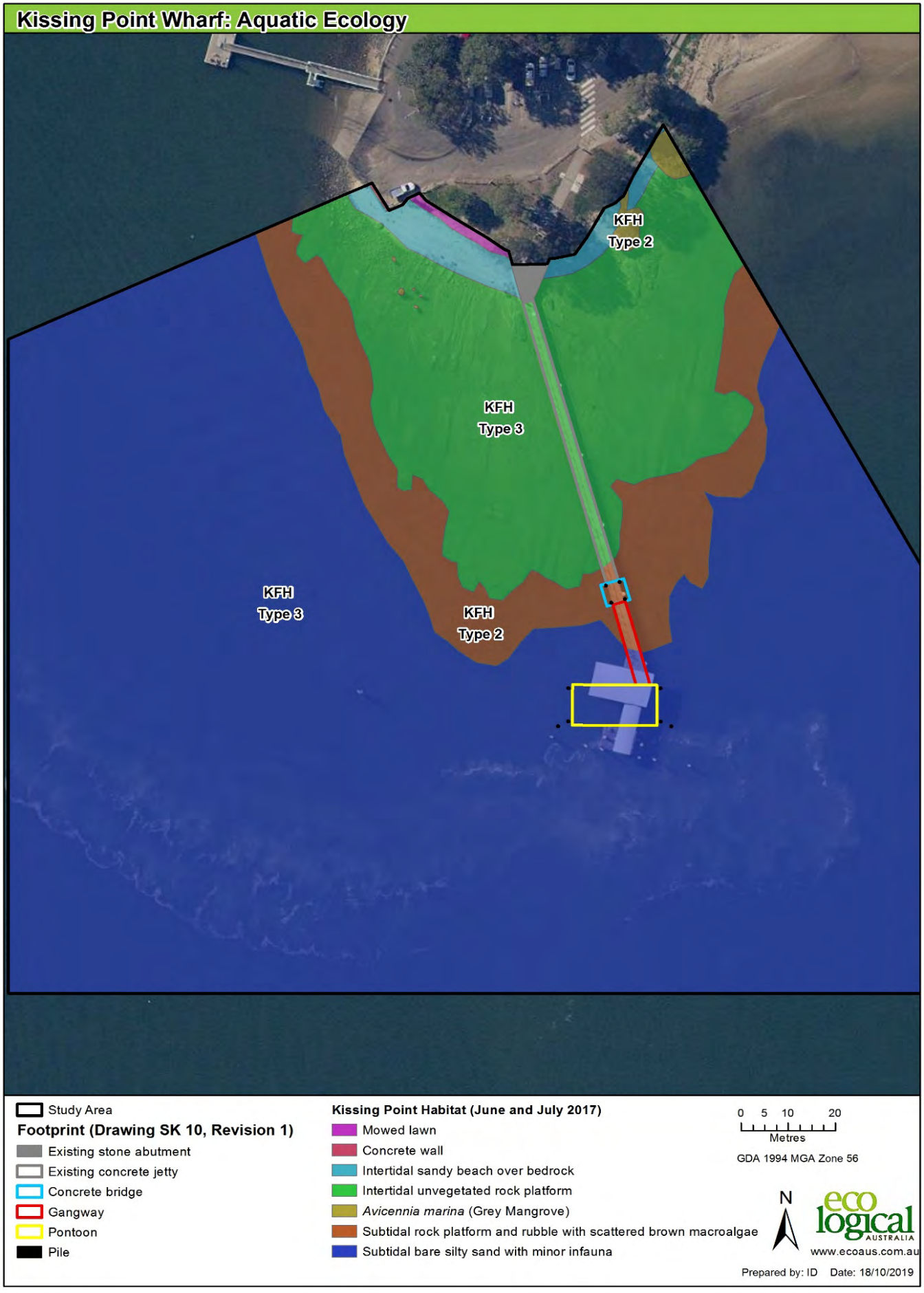

Figure 6-4 Field validated habitat (Eco Logical, 2019)

Figure 6-5 Wharf to be replaced

Figure 6-6 Concrete wall

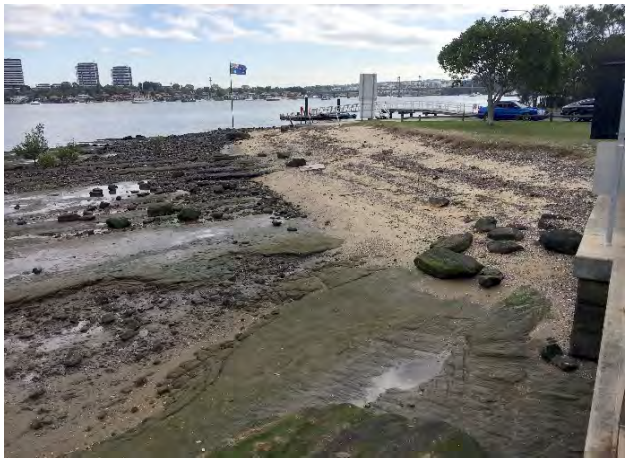

Figure 6-7 Intertidal sandy beach and rock platform – facing west

Figure 6-8 Intertidal unvegetated rock platform

Figure 6-9 Intertidal rock platform with filamentous algae

Figure 6-10 Mangroves in intertidal zone to the west of the wharf

Figure 6-11 Juvenile mangroves

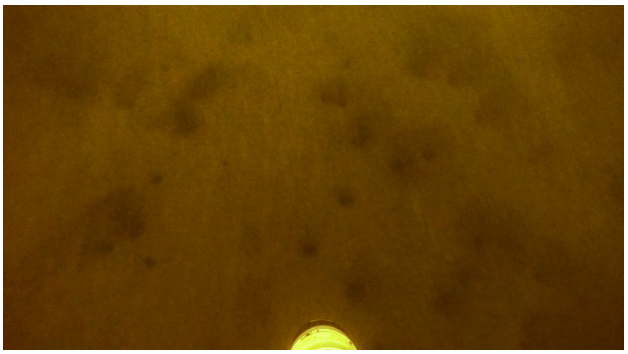

Figure 6-12 Unvegetated subtidal sediment with infauna burrows

Threatened flora

No threatened flora was identified within the Proposal.

The threatened seagrass population, *Posidonia australis*, occurs in the harbour and is known to grow on subtidal sand up to 10m deep. However, there are no records of this seagrass occurring in the vicinity of the Proposal. 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 Proposal.

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. Soft sediments in the Proposal occur at depths less than three metres, but no seagrass was observed on site. Scattered macroalgae was present on site along the edge of the rock platform, but was absent on existing piles. Mangroves occur in the harbour in protected bays and tidal waterways with soft intertidal sediment. They were found scattered along the beach east of the wharf, plus a small number of juveniles had established in soft sand deposits within rock crevices west of the wharf.

Threatened fauna

No threatened species, populations or communities were observed in the Proposal, or are expected to use the site (refer to Section 4.3.2 and likelihood of occurrence assessment in Appendix D).

Threatened aquatic mammals (whales, dolphins and seals) are unlikely to be present due to poor habitat availability, high turbidity and better habitat in coastal waters. Turtles are more common along coastal waters than in the harbour or its estuaries. It is possible they explore the greater area but would not depend on the site for feeding habitat or nesting.

Syngnathiformes (seahorses and their relatives) were not observed and are unlikely to reside in the Proposal due to freshwater influence from the Parramatta River and poor habitat. This was also confirmed by a lack of records west of Greenwich and Birchgrove.

Pests

No marine pests, including *Caulerpa taxifolia* (Caulerpa), were identified within the Proposal.

Caulerpa and other significant pests are not known to occur in the upper Parramatta River based on mapping provided by the Department of Primary Industries.

Terrestrial ecology

Vegetation

The Proposal is located within a Public Reserve known as Kissing Point Park surrounded by dense wooded areas of native trees. Areas around the foreshore of the Parramatta River have a more typical parkland character with open grassed areas and scattered trees. These include a variety of locally-indigenous and non-local native species.

Trees

Table 6-4 details the identified trees and associated health and retention value within the Proposal. Health of trees are generally assessed as good and fair with thinning crown. Retention value of the identified trees range primarily between low and moderate. Figure 6-13 and Figure 6-14 details the locations of these trees.

Table 6-4 Existing trees and status

ID	Species	Health	Retention value
T1	*Eucalyptus sp. [amplifolio]* (Cabbage Gum)	Fair	Very low
T2	*Eucalyptus sp. [tereticornis]* (Forest Red Gum)	Fair with thinning crown	Very low
T3	*Casuarina glauca* (Swamp Oak)	Good	Moderate
T4	*Casuarina glauca* (Swamp Oak)	Fair	Moderate
T5	Group of 5 *Casuarina glauca* (Swamp Oak)	Good	Very low
T6	*Casuarina glauca* (Swamp Oak)	Good	Low
T7	*Casuarina glauca* (Swamp Oak)	Good	Moderate
T8	*Casuarina glauca* (Swamp Oak)	Good	Low
T9	*Melaleuca quinquenervia* (Broad-leaved Paperbark)	Good	Moderate
T10	*Melaleuca quinquenervia* (Broad-leaved Paperbark)	Good	Moderate
T11	*Melaleuca quinquenervia* (Broad-leaved Paperbark)	Fair with slightly thinning crown	Moderate
T12	*Melaleuca quinquenervia* (Broad-leaved Paperbark)	Good	Moderate
T13	*Melaleuca styphelloides* (Prickly Paperbark)	Very good	Moderate
T14	*Casuarina glauca* (Swamp Oak)	Good	Low
T15	*Casuarina glauca* (Swamp Oak)	Good	Moderate
T16	*Casuarina glauca* (Swamp Oak)	Fair with slightly thinning crown	Moderate
T17	*Eucalyptus paniculata* (Grey Ironbark)	Good	Moderate
T18	*Grevillea robusta* (Silky Oak)	Good	Moderate
T19	*Casuarina cunninghamiana* (River Oak)	Good	Moderate
T20	*Melaleuca quinquenervia* (Broad-leaved Paperbark)	Good	Moderate
T21	*Ficus rubignosa* (Port Jackson Fig)	Good	Very low
T22	*Casuarina cunninghamlana* (River Oak)	Fair with thinning crown	Low
T23	*Ficus rubiginosa* (Port Jackson Fig)	Very good	Moderate
T24	*Casuarina cunninghamlana* (River Oak)	Good	Moderate
T25	*Casuarina cunninghamlana* (River Oak)	Fair with thinning crown	Low
T26	*Casuarina cunninghamlana* (River Oak)	Fair with thinning crown	Very low

The following trees are identified as locally-indigenous species and are representative of the original vegetation of the area and would be of benefit to the native wildlife and include the following:

- *Casuarina glauca* (Swamp Oak): T3, T4, T5, T6, T7, T8, T14, T15 and T16
- *Ficus rubiginosa* (Port Jackson Fig): T21 and T23
- *Melaleuca styphelioides* (Prickly Paperbark): T13.

None of the trees contain hollows that would be suitable as nesting hallows for arboreal mammals or birds. No other visible signs of wildlife habitation were discovered. No trees listed as Threatened or Vulnerable Species or form part of Endangered Ecological Communities (EECs) under the provision of the BC Act or EPBC Act.

Weeds

There are no identified trees scheduled as a potential “Biosecurity Risk’ within NSW under the provision of the *Biosecurity Act 2015*.

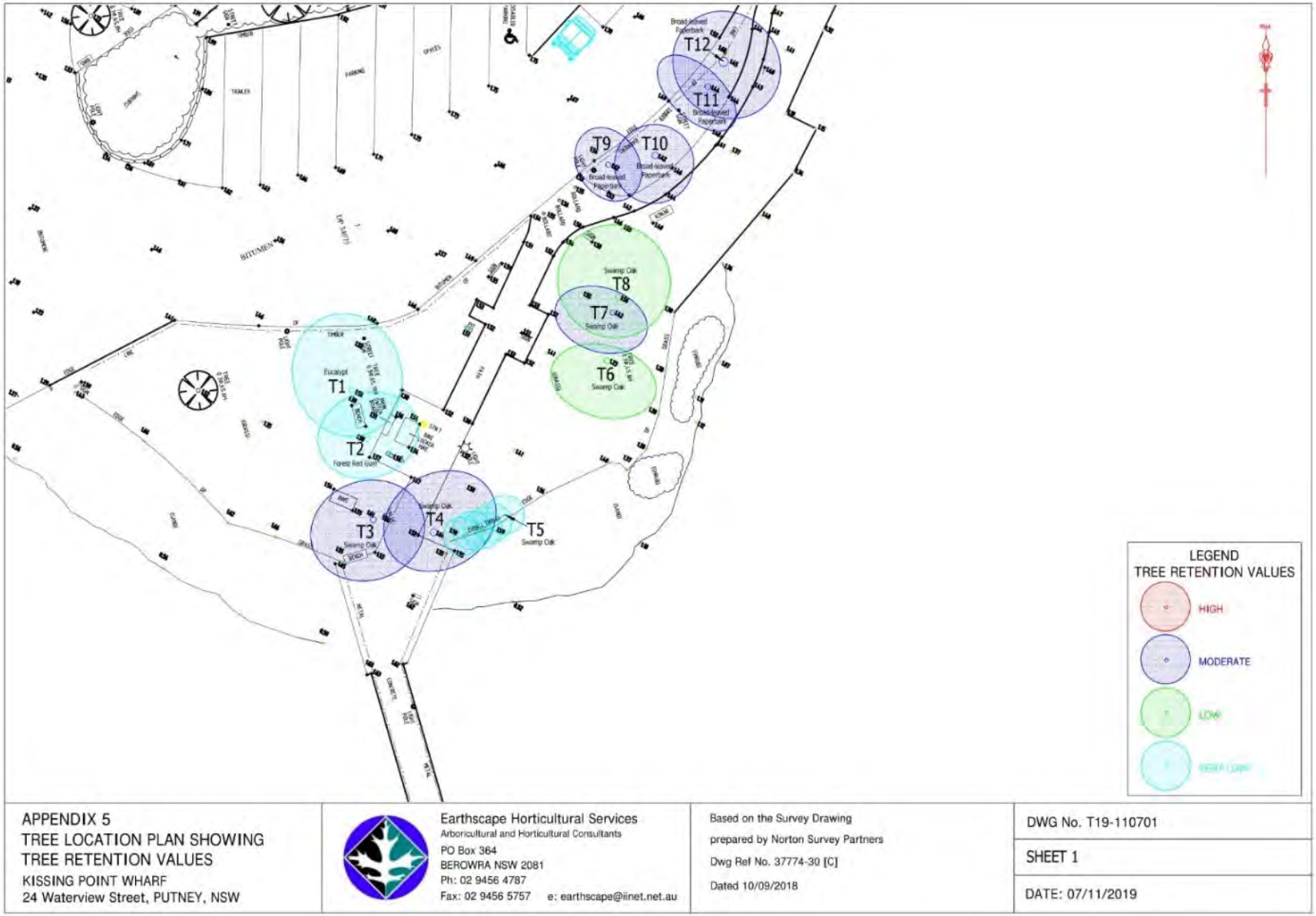

Figure 6-13 Existing trees at Kissing Point (1 of 2)

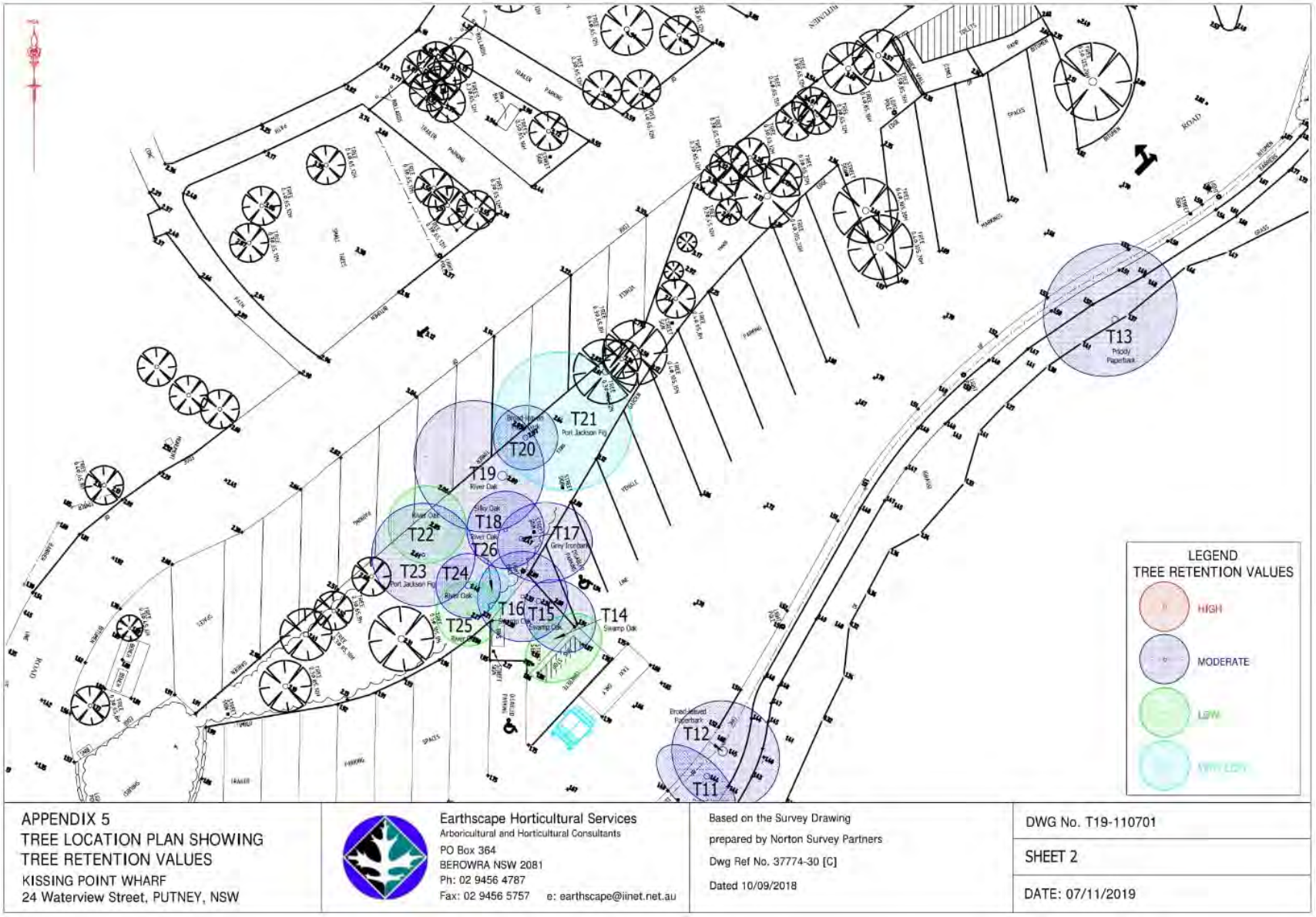

Figure 6-14 Existing trees at Kissing Point (2 of 2)

Habitat

A bat survey completed at Kissing Point Wharf (Biosphere Environmental Consultants, 2015) has reported that Eastern Bent-wing Bats did not appear to be present around Kissing Point Wharf despite apparent suitable habitat being within Kissing Point Park. Trees in the surrounding area comprise *Casuarina glauca* (Swamp Oak) and other locally-indigenous species that could provide potential habitat for native fauna. However, none of the trees contain cavities that would be suitable as nesting hollows for arboreal mammals or birds. The area immediately surrounding the Proposal is highly urbanised with parkland trees and maintained grass.

Threatened species

A search of the NSW Bionet Atlas identified records of 69 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 65 threatened species, 59 migratory species and six threatened ecological communities within a 1-kilometre radius of the Proposal footprint.

Threatened shore, wetland, migratory and pelagic birds may use the area to forage but are unlikely to rely on the Proposal footprint, as they generally avoid areas with concentrated human activities. Aerial foragers may follow a coastal route, fly over open water or hunt over decomposing wrack.

6.3.3 Potential impacts

Construction – aquatic ecology

Protected areas

No works are proposed within protected wetlands area as these are located approximately 150 metres west of the Proposal. Piling would occur during calm conditions, and potential sediment pluming would be contained by a silt curtain. Hence, with the implementation of mitigation measures listed in section 6.3.4, construction activities like hammering of piles are unlikely to produce water quality impacts on nearby protected areas.

Overall the proposal is unlikely to have significant ecological impact to protected marine vegetation.

Direct loss of vegetation and habitat

Direct impacts to vegetation and associated habitat would result from the installation of new piles. Impacts from any jack-up/anchor points would be temporary with the habitat recovering over time with no quantifiable impacts anticipated. The removal of type 3 KFH is generally not considered to be a significant impact; however, most of the impacts are mostly in type 3 KFH. A total of 10 new piles would be drilled and hammered to refusal into the bedrock creating a total impact area less than 4 m^2. Four piles would impact subtidal rock platform with scattered brown macroalgae, which is a type 2 KFH. The Department of Primary Industries (Fisheries) has confirmed that this minor impact on scattered brown macroalgae, would not require a permit to *Harm Marine Vegetation* under Part 7 of the FM Act. Mangroves nearby would not be harmed and be protected during construction by establishing no-go zones.

Some impact to these KFHs is expected from sediment disturbance, and construction vessel movements. Sediment disturbance would largely be mitigated through the use of a silt curtain. The volume of sediment moved would be minor and unlikely to affect the photosynthetic capabilities of nearby vegetation, or infauna burrows. With the implementation of mitigation measures (refer to section 6.3.4) there would be no direct loss of vegetation and habitat; however, loss of vegetation and habitat has been conservatively estimated in Table 6-5. These impacts also consider loss of vegetation from shading.

Table 6-5 Summary of key fish habitat impacts

Habitat	Direct Loss (m^2)	Gain (m^2)
Piles (wetted surface area) Type 3 KFH	79.17	–
Pontoon (wetted surface area) Type 3 KFH	73.0	216.0
Concrete seawall Type 3 KFH	No impact	–
Intertidal sandy beach Type 3 KFH	No impact	–
Intertidal unvegetated rock platform Type 3 KFH	No impact	–
Avicennia marina (Grey Mangrove) Type 2 KFH	No impact	–
Subtidal rock platform with scattered macroalgae Type 2 KFH	13.63	2.26
Subtidal bare sand with minor in fauna Type 3 KFH	103.78	104.97
Total	**269.58**	**347.73**

A total of about 269m^2 of KFH would be directly impacted the Proposal. About 256m^2 of type 3 KFH, and 14m^2 of type 2 KFH would be directly impacted by the Proposal. This impact is primarily from pile installation and removal of existing habitat (pontoon and piles). These impacts would be offset by creation of 348m^2 of type 2 and 3 new KFH. This would result in a minimal habitat loss of type 2 and 3 KFH from partial shading of scattered macroalgae. The Department of Primary Industries has confirmed that a permit to harm marine vegetation would not be required for these work.

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. However, as the potential for certain larger types of fauna to occasionally pass through the local area cannot be fully discounted, there is still the potential for injury risks from propeller or ship strikes. Providing standard measures are introduced while the wharf is being upgraded, any impacts are expected to be safeguarded and minimised.

There is also the potential for any 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 would be 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.

During construction, fish may be temporarily trapped by the silt curtain within the work area, especially as the area is very shallow. Advice from Department of Primary Industries (Fisheries) indicates that a permit to obstruct fish passage under section 219 of the FM Act would not be required for the Proposal.

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 (e.g. 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 could occur.

Key threatening process

The Proposal would not include a key threatening process listed under Part 7A of the FM Act.

Indirect and secondary impacts

There is the potential for sediment discharge, accidental spills and/or localised scour and erosion to occur while the Proposal is being built. Such risks would increase with unfavourable swell and weather conditions. Bed sediment particles to become entrained in the water, increasing turbidity and would reduce light penetration through the water column and sediment particles may settle on aquatic plants. Any reduction in photosynthesis would be minor, as the amount of sediment that is moved would be small.

Sediment movement could also smother infauna burrows. It is unlikely that large volumes of sediment would be moved, and that the thin layer of silt or sand that does settle on infauna burrows would not cause significant damage.

Pest species

The introduction of pest species could occur through vessel 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 – terrestrial ecology

Loss of vegetation and impact to threatened species

This Proposal is unlikely to have a major impact on terrestrial ecology due to the existing disturbed nature of the available habitat and the nature of the construction work to be undertaken.

For landside components of this Proposal, there are some expected impacts to existing trees and no expected terrestrial ecology impacts due to loss of trees due to the following work:

- Demolition of existing pathways
- Construction of new (widened and reconfigured) pedestrian pathways in a similar location
- Addition of new parking bays and relocation of the existing bus shelter within the existing commuter car park to improve accessibility.

Impacts to the removal of T10, T14 and T26 for construction of the Proposal are not considered significant. No other tree removal is determined for this Proposal as other impacts are limited to encroachment to the root zones. There are six trees (T7, T8, T10, T11, T12 and T13) to have adverse impacts due to root encroachment from the Proposal.

Injury and mortality

The removal of trees would have a negligible to minor risk of direct injury or mortality impacts. No wildlife habitat would be impacted as none of the trees contain cavities that would be suitable as nesting hallows.

Noise, vibration and lighting

Adverse noise and temporary vibration would be introduced while the Proposal is being built (refer to section 6.3.4). However, this is unlikely to affect any native species due to the highly disturbed nature of the existing environment and the fact the area is already lit. Fauna would be adapted to high levels of background noise. Standard safeguards and management measures would be implemented to reduce impacts from noise and vibration (discussed in section 6.4). Providing these are implemented and remain effective then impacts would be avoided and/or minimised.

Weed invasion

Mitigation measures detailed in section 6.3.4 would be implemented to minimise risk of weed being imported and exported out of site as a result of construction activities.

Operation – aquatic ecology

Vegetation and habitat

The Proposal would result in a minor net gain of KFH with a 348m^2 of type 2 and 3 KFH. The wetted sides of the new pontoon and shaded underside would create 216m^2 of KFH. In addition to this, newly exposed benthic habitat from the removal of the existing pontoon, fixed wharf, gangway and piles would improve 89m^2 of KFH. The removal of the existing wharf would open new areas up to light, but not areas suitable to macroalgae. The Department of Primary Industries (Fisheries) has confirmed that they have no objections to the proposed works (refer to Appendix D).

Shading

KFH gain as described earlier also includes the addition of hard surfaces and exposing light to new areas, including subtidal rock suitable for macroalgae establishment.

Partial shading from the new pontoon and gangway would have an indirect impact on about 14 individual macroalgae plants as well as on subtidal unvegetated sediment (Type 3 KFH) and subtidal rock platform with scattered macroalgae (Type 2 KFH).

The new pontoon and gangway would shade 114m^2 of subtidal habitat, but a similar amount would be opened up to light from the demolition of the existing wharf. Given the scattered distribution of macroalgae (about one plant per square metre) and only partial shading created, this impact would be minor and not of significance to the local extent. Benthic organisms (i.e. infauna) would not be significantly impacted, as they are not light dependant. New areas of subtidal sediment would also be exposed to sunlight with the upgrade, which would provide a positive impact to those areas.

Impacts from ferry operations

Potential impacts which could occur during operation of the Proposal are associated with ferry wash, disturbance of sediments, and a potential increase in pollutants and litter entering the marine environment. The Proposal does not include a significant change from operation of the existing wharf. Given the location and existing use the following impacts are considered minor:

- Ferry wash is unlikely to increase considering the current ferry use
- Propeller/thrust disturbance to sediments is unlikely to increase given the frequent use by ferries currently
- Pollutants expelled from ferries would be the same as existing conditions throughout the river
- Litter from visitors to the wharf would be reduced through increased bins, signage fencing and glazed screens.

Operation – terrestrial ecology

As there is not expected to be any change to passenger numbers or operational activities around the wharf there is limited potential for any operational terrestrial ecology impacts. Any removed trees as identified in the construction impacts would be replanted as described in the safeguards and mitigation measures of section 6.3.4. Land based operations of the wharf would function similar to existing conditions.

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 required.

The Proposal is not likely to significantly impact threatened 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 6-6 lists the aquatic biodiversity safeguards and management measures that would be implemented to account for the impacts identified in section 6.3.3.

Table 6-6 Biodiversity safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing
Aquatic biodiversity	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: • 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 (e.g. construction materials dropped into the harbour) • Biological hygiene (e.g. prevent spread of noxious species on and off the site) • Aquatic fauna management.	Contractor	Pre-construction
	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.	Contractor	Pre-construction
	All lines should be suspended off the seafloor to minimise drag across areas of habitat.	Contractor	Pre-construction
	Work positioning barges, drilling and pile driving should occur during calm conditions.	Contractor	Construction
	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.	Contractor	Construction

Impact	Environmental safeguard	Responsibility	Timing
Terrestrial ecology – Trees	Preparation of a Tree Protection Plan which includes tree protection devices and other recommended measures to ensure the protection and safe removal of nominated trees. Contents of the Tree Protection Plan would be in accordance with the Arboriculture Assessment (Appendix E). Topics may include but not limited to the following: • Identifying prohibited activities, demolition works and excavations within Tree Protection Zones • Consideration of tree damage and root pruning where applicable • Tree removal process of T10, T14 and T26 as well as replacement planting guidelines • Tree protection fencing of T1-T3, T6-T8, T9-T12, T13, T15-T19 and T22-T25 along with installation of tree protection signs and ground protection of any nominated tree • Replacement planting on a ratio of 2:1 due to loss of trees.	Contractor	Construction
Pest species	Management measures are to be implemented to ensure *Caulerpa taxifolia* is not introduced to the area. These are to include but not be limited to practices outlined in the NSW Control Plan for the Noxious Marine Alga *Caulerpa taxifolia* (NSW I&I 2009).	Contractor	Construction

6.4 Noise and vibration

This section summarises the Proposal's noise and vibration impacts. Appendix F contains a supporting technical paper prepared by WSP in November 2019.

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, 2016b). Noise levels from construction work were predicted using 3D noise modelling software (SoundPLAN) and calculated using CONCAWE^{tm} 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

Noise monitoring and ambient noise levels

The existing noise levels surrounding the Proposal were determined through a combination of unattended and operator attended noise surveys with the Australian Standard 1055-1997- Acoustics-Description and Measurement of Environmental Noise (AS 1055) and NSW Noise Policy for Industry (NPfI, EPA 2017). Unattended noise survey was performed between 15 and 23 October 2019 while operator attended noise survey was performed on 15 and 23 October 2019.

There are three identified noise monitoring (NM) locations, two as unattended and two as attended surveys with NM02 noted in both survey method types. Details of noise monitoring locations and results are identified in Table 6-7 and Table 6-8. Monitoring for unattended survey was performed across three time spans: day, evening and night. Figure 6-15 displays NM locations.

Main activities and sources that contribute to the ambient noise in the area are wind noise and ferry noise influences with minimal noise from birds and insects.

Table 6-7 Unattended noise monitoring locations and noise levels

ID	Survey Method	Location	Noise Level (dBA RBL[1])		
			Day[2]	Evening[2]	Night[2]
NM01	Unattended	Kissing Point Reserve	41	39	34
NM02	Unattended	Wangal Park	39	38	35

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 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.

Table 6-8 Attended noise monitoring locations and noise levels

ID	Survey Method	Location	dBA $L_{eq,\ 15min}$	dBA $L_{90,15min}$	dBA L_{MAX}
NM02	Attended	Wangal Park	52	46	68
NM03	Attended	Rivendell School	54	49	70

Sensitive receivers

The Proposal is located adjacent to residential receivers in Putney, recreation receivers within Kissing Point Park and across the river in Mortlake, as well as educational receivers at Rivendell School in Rocky Point. Identified sensitive receivers surrounding the Proposal are categorised as follows:

- Residential
- Non-residential receivers, including education, hospital and active recreational areas
- Potential vibration sensitive receivers, including Kissing Point Park (former boat slips) located approximately 450m west of the project area.

Sensitive receivers are assessed through consideration of noise catchment areas (NCAs) and are described in Table 6-9 and displayed on Figure 6-15.

Table 6-9 Sensitive receivers

NCA	Receiver type	Minimum distance from the Proposal footprint (m)*	Description
NCA01	Residential	100	Residential receivers located north
	Active recreation	0 (adjacent)	Kissing Point Reserve located adjacent to the Proposal
NCA02	Residential	440	Residential receivers and Wangal Park south-east of the Proposal at Mortlake
	Active recreation	340	
NCA03	Active recreation	280	Kissing Point reserve is located adjacent to the Proposal to the north
	Education	330	Rivendell School located south-west of the Proposal at Concord
	Hospital	500	Concord Hospital located south-west of the Proposal at Concord

*Minimum distance of the sensitive receiver buildings to the limits of the construction footprint (i.e. the nearest point to work at wharf).

Figure 6-15 Sensitive receiver locations

Criteria

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 Waterview Street. As traffic noise generation is not considered to be acoustically significant, construction traffic noise has not been assessed further. 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. The conditions required for piling usually occur during this early morning period.

Construction periods for this Proposal are shown in Table 6-10 below.

Table 6-10 Construction periods

Period	Time
Standard hours (SH)	Monday to Friday – 7am to 6pm Saturday – 8am to 1pm Sunday/Public Holiday – Nil
Out of hours work – period 2 (OOHW 2)	Monday to Friday – 10pm to 7am Saturday – 10pm to 8am Sunday/Public Holiday – 6pm to 8am

Out of hours construction

Out of hours piling is expected to occur over a four week period, with drilling occurring from approximately 1am to 6am and hammering from approximately 5am to 7am. The noisiest out of hours work are hammering the piles. Each pile would be hammered for one minute (about 10 hits with the hammer within one minute). For each pile the activity is likely to occur above five times over a period of one hour. Installation of pontoon and gangway is expected to occur out of hours periodically over three months.

Construction noise assessment criteria

In reference to the CNVG, construction noise management levels (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 Noise Policy for Industry (NPfI) plus an additional allowance of 10 dB during standard hours and 5dB outside of 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 6-11 presents the construction NMLs for each assessment period for residential receivers in each NCA and Table 6-11 lists NMLs adopted for non-residential receivers.

Noise management levels for non-residential receivers apply during any assessment period.

Table 6-11 NMLs for residential receivers

NCA	ID	dBA RBL		NML DBA $L_{EQ(15MIN)}$ [1]	
		Standard Hours	OOHW 2	Standard Hours	OOHW 2
NCA01	NM01	41	34	51	39
NCA02	NM02	39	35	49	40
NCA03	NM03	41	34	51	39

1. 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.

Table 6-12 NML for non-residential receivers

Non-residential receiver	Noise level type[1]	NML DBA $L_{EQ(15MIN)}$
Education	Internal	45
Passive recreation	External	60
Hospital wards and operating theatres	Internal	45
Commercial	External	70

1. Noise level type are defined specifically as internal and external as the acoustic performance of the building envelopes of these receivers is not known accurately. An external to internal correction of 10dB has been applied to internal NML to external NMLs.

Sleep disturbance

Some of the proposed construction work would be required to take place during the night-time periods (11pm to 7am) as these works require calmer water conditions to undertake installation from the water. Section 4.3 of the ICNG discusses the method for quantifying and assessing sleep disturbance (sleep awakening). This guidance references further information in the NSW Road Noise Policy (RNP, NSW EPA, 2013) that discusses criteria for the assessment of sleep disturbance.

The RNP suggests a screening level of $L_{1(1min)}$ dBA, equivalent to the RBL + 15dB. Where this level is exceeded, further analysis should be carried out. In addition, Section 5.4 of the RNP also states that:

- Maximum internal noise levels below 50–55dBA would be unlikely to result in people's sleep being disturbed
- If the noise exceeds 65–70dBA once or twice each night-time the disturbance would be unlikely to have any notable health or wellbeing effects.

The guidance within the RNP indicates that internal noise levels of 50–55dBA are unlikely to cause sleep awakenings. Therefore, at levels above 55dBA, sleep disturbance would be considered likely. Assuming that receivers may have windows partially open for ventilation, a 10dB outside to inside correction has been adopted as indicated in the ICNG.

Based on the above, the noise level 65dBA Lmax (external) has been adopted as sleep disturbance screening criterion for assessment purposes.

Table 6-13 describes site specific sleep disturbance noise goals used to assess the likelihood for sleep disturbance within residences due to night time construction activity.

Table 6-13 Sleep disturbance criteria

NCA	Noise monitoring location	Sleep disturbance criteria, $L_{A1,1min}$ DBA RBL	
		EPA screening criterion	RNP awakening goal
NCA01	NM01	49	65
NCA02	NM02	50	65
NCA03	NM03	50	65

Construction vibration assessment criteria

Assessment for recommended safe working distances for vibration intensive plant are detailed in Table 6-14. The distances are primarily based on the safe working distance provided in the CNVG. For driven piles, 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.

Table 6-14 Recommended safe working distances for vibration intensive plant

Plant item	Rating/description	Safe working distance	
		Cosmetic damage	Human response
Pile boring	≤ 800mm	2m (nominal)	4m
Driven piles	Typical driven pile[1]	20m	30–50m
Vibratory roller	< 200kN (typically 4–6t)	12m	40m
Jackhammer	Hand held	1m (nominal)	Avoid contact with structure

1. Vibration levels for driven piling modelled in line with FTA Noise and vibration manual. Driven piles plant item to represent impact piling rig.

One heritage item 'Former boat slips', is located 140 north west of the proposed vibration intensive wharf side works and about 40 metres from landside works, however it does not comprise a formal structure. No World, Commonwealth or State heritage items are within the Proposal. Vibration criteria impacts are not explored further. Detail on vibration criteria are in Section 3.4 of Appendix F.

6.4.3 Potential impacts

Construction stages

For assessment of construction and vibration impacts, six scenarios were determined to identify various construction stages. Table 6-15 identifies the construction stage and associated period.

Table 6-15 Construction stage, scenario, and period

Scenario	Construction stage	Period	Duration
S01	General wharf construction and demobilisation	Standard hours	5 months
S02	Demolition and removal of piles	Standard hours	2 weeks
S03	Road and footpath work	Standard hours	5 months
S04	Lifting pre-fabricated units including the pontoon and gangway	Standard hours Out of hours – period 2	Periodically over 3 months
S05	Pile installation (drilling)	Out of hours – period 2	4 weeks
S06	Pile installation (hammering)	Out of hours – period 2	4 weeks

Activity based noise

Each level of construction staging would include various types of equipment and be used during various times of the day. Table 6-16 lists the types of equipment and relevant sound power levels that would occur during construction and identify what scenario equipment would be used. The table also identifies the scenario total SWL and total maximum noise levels measured in dBA.

Table 6-16 Equipment and associated dBA

Equipment	Sound power level (dBA)	Scenario					
		S01	S02	S03	S04	S05	S06
Angle grinders[1, 4]	119		✓				
Barge[3]	95	✓	✓				
Boat[3]	100	✓	✓		✓	✓	✓
Compressor[4]	109	✓			✓		
Crane[4]	104	✓	✓		✓	✓	✓
Generator[4]	103	✓	✓		✓	✓	✓
Hand tools (electric)[4]	110	✓	✓		✓		
Piling rig (boring)[4]	112					✓	
Piling rig (impact)[1, 4]	121						✓
Light vehicle[4]	88	✓					
Daymaker[2]	80				✓	✓	✓
Jack hammer[1,4]	118			✓			
Smooth drum roller[1,4]	112			✓			
Pavement laying machine[4]	114			✓			
Asphalt truck[4]	103			✓			
Concrete truck[4]	109			✓			
Concrete pump[4]	102			✓			
Scenario total SWL (dBA)		**112**	**114**	119	**112**	**109**	**116**
Scenario total maximum noise levels L_{max} (dBA)		**-**	**-**	-	**117**	**114**	**121**

1. To account for the annoying characteristics of the plant, a +5 dB correction has been added to the sound power level of the plant item.
2. Sound power level extracted from Transport for NSW “Construction Noise and Vibration Strategy (2018)”
3. Sound power level provided based on a previous study of the Proposal and approved by Roads and Maritime
4. Sound power level extracted from the CNVG.

This information has been used to define the combined noise output (sound power level) generated in each location at a given time. Further detail is provided in Appendix E.

Noise impacts

Modelling inputs for each scenario included ground contours, locations of sensitive receptors, noise-generating equipment as well as any other inputs which have an effect on the noise environment, such as the buildings surrounding the Proposal.

Noise impacts were assessed within each NCA, receiver type and closest distance. Conservative calculations were performed as they include all equipment operating simultaneously at a typical distance to the receiver. Actual noise levels from the construction site would be expected to be lower. Table 6-17 identifies the modelled construction noise levels for each scenario and identifies exceedances of noise in daytime, night-time and highly noise affected receivers.

Impacts described in this section include during standard hours, outside standard hours and sleep disturbance. Noise levels presented are considered conservative, as it is assumed that noise sources will operate simultaneously. It is expected that noise impacts will be lower as all high noise level equipment will not be used simultaneously during the activity. In cases where noise impacts are expected to exceed, section 6.4.4 includes noise mitigation and management measures.

Table 6-17 Noise impact summary

Noise Catchment Area (NCA)	NML dBA			Modelled Maximum Noise level per scenario (dBA $L_{eq(15min)}$)[1]					
	SH2	OOH	HNA3	S01	S02	S03	S04	S05	S06
Residential receivers									
NCA01	51	39	75	52	54	66	52	49	56
NCA02	49	40	75	47	49	52	47	44	51
NCA03	51	39	75	51	53	56	51	48	55
Passive recreation									
NCA01	60	n/a	n/a	57	59	71	57	54	61
NCA02	60	n/a	n/a	45	47	50	45	42	49
NCA03	60	n/a	n/a	56	58	61	56	53	60
Commercial									
NCA02	70	n/a	n/a	43	45	51	43	40	47
Education									
Rivendell School	55	n/a	n/a	51	53	56	51	48	55
Hospital wards									
Concord Hospital	55	n/a	n/a	45	47	50	45	42	49

1. Appendix E provides detail on expected perception of NML exceedances in line with the CNVG
2. SH – Standard hours
3. HNA – Highly noise affected

Exceedances of daytime criteria

Exceedances of night time criteria

Highly noise affected receivers

Summary during standard hours

Construction activities include wharf construction and demobilisation, demolition and removal of piles, land-based construction activities and some activities associated with pontoon and gangway installation (Scenarios 1 to 4).

At the nearest sensitive receivers, noise levels are predicted to exceed relevant NMLs in NCA1 during all activities. Exceedances of NMLs are predicted in NCAs 2 and 3 are during pile demolition and land-based construction work.

Noise levels are predicted to result in exceedances of up to 15dBA during Scenario 3 work in NCA1, with exceedances in NCAs 2 and 3 limited to 5dBA above NMLs. The most noise intensive work are associated with land based work (Scenario 3), due to the proximity to the work to sensitive receivers

No receivers are predicted to be highly noise affected as a result of the work.

Summary during outside standard hours

Construction activities include installation of pontoon and gangway, piling and drilling (Scenarios 4 to 6). The assessment indicates that noise levels are predicted to exceed relevant OOH NMLs at the nearest sensitive receivers in all NCAs.

Noise levels are expected to result in exceedances of OOH NMLs by up to 17dBA in NCA1, 11dBA in NCA2 and 16dBA in NCA3 at the nearest sensitive receivers. The most noise intensive work are associated with pile installation (S06). Noticeable noise impacts are expected to occur during pile installation and hammering over a period of four weeks for the nearest receivers in NCAs 1, 2 and 3.

No receivers are predicted to be highly noise affected as a result of the work.

Summary of sleep disturbance

Night time construction activities also include installation of pontoon and gangway, piling and drilling (Scenarios 4 to 6). The maximum noise level from the equipment was assumed to be 5dB more than the $L_{eq,15min}$ noise level. No results exceeded external noise level as defined in Section 6.4.3.

The predicted maximum noise levels are detailed in Table 6-18. Results indicate that sleep disturbance for residential receivers is likely to occur for Scenarios 4 to 6. Noise levels are predicted to result in exceedances of RNP screening criteria; however, levels will remain below the awakening goal. Sleep disturbance may occur at the nearest residential receivers due to drilling of piles between 1am and 6am and hammering of piles between 5am to 7am.

Table 6-18 Predicted sleep disturbance noise impacts

NCA	Sleep disturbance criteria Dba L_{MAX}		Predicted noise level (dBA L_{MAX})		
	Screening criterion	Awakening goal	S04	S05	S06
NCA01	49	65	57	54	61
NCA02	50	65	52	49	56
NCA03	49	65	56	53	60

Potential for sleep disturbance

Vibration impacts

Primary vibration impacts from the proposed construction activities include pile boring, pile hammering, jackhammering and smooth drum (vibratory) roller equipment. The wharfside construction area is located over 150m from receivers in NCA 1, while land-based construction activities are located within 30m of residential receivers. Sensitive receivers in NCA1 are located outside the safe working distance limits for cosmetic damage and human response; no vibration impacts are expected. For other receivers within 30m of the Proposal, recommended vibration impact management measures are recommended to manage potential structural damage and human comfort impacts as described in Section 6.4.5.

Other potential vibration sensitive receivers, including Kissing Point Park (former boat slips) are located approximately 140 north west of the wharf side vibration intensive works and about 40 metres from landside works. No vibration impacts are expected as it does not comprise a formal structure and is located outside the safe working distance limits.

Given the distances and potential work areas of vibratory intensive plant for these sensitive receivers and as assessed with vibration criteria described in Section 6.4.3, sensitive receptors are determined to be located outside the safe working distance limits with no expected impacts, therefore no further action is required.

In cases where vibration impacts may occur, vibration impact management measures are included in Section 6.4.5.

6.4.4 Safeguards and management measures

Table 6-19 lists the noise and vibration safeguards and management measures that would be implemented to account for the impacts identified in section 6.4.3. Additional mitigation measures should be considered after the application of site specific and CNVG Standard Mitigation measures as detailed in Table 6-20.

Table 6-19 Noise and vibration safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing
Noise and vibration	Preparation of a noise and vibration management plan which may include but not limited to the following: • Limit number, timing and placement of plant equipment • Identify placement of site hording or fencing to reduce noise at immediate receivers with expected reduction of around 5dB to 10dB • Undertake as much construction work as possible at a contractor's off-site facility, including assemblage of pre-fabricated components • Manage construction process and night-time period works (e.g. pile hammering during out of hours work) • Avoid or minimise these out of hours movements where possible • Specify a noise verification program to be carried out for the duration of the work in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions in cases when vibration limits are exceeded • Plan traffic flow, parking and loading/unloading areas to minimise noise impacts (e.g. no reversing and concentrating activities) • Reduce unnecessary noise from construction personnel (e.g. no swearing or loud stereos) • Inform all employees, contractors and subcontractors are to receive an environmental induction • Minimise plant equipment and construction vehicles noise (e.g. non-tonal reversing beepers and ambient sensitive alarms) • Define exceedances of NMLs in each NCA for standard and OOH periods, including the area that require additional mitigation measures due to worst case exceedances of the proposed construction activities (Scenarios 4 through 6). Detailed description of noise and vibration measures are in Appendix F.	Contractor	Pre-construction

Impact	Environmental safeguard	Responsibility	Timing
Noise and vibration	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.	Contractor	Construction
Noise	The noise levels of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with the criteria in Table 4.2 of Appendix F.	Contractor	Construction
Noise and vibration	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 work (where applicable) and contact telephone number. Notification should be a minimum of 7 calendar days prior to the start of work. A contact telephone number and email address will be available for community feedback	TfNSW/Contractor	Pre-construction
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.	Contractor	Construction

6.5 Landscape character and visual impact

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

6.5.1 Methodology

This report has been prepared based on the structure outlined in the RMS Environmental Impact Assessment Practice Note EIA-N04 - Guideline for landscape character and visual impact assessment. (EIA- No4 Guidelines) December 2019. The RMS document 'Beyond the Pavement' 2014, also addresses the design and impact of wharves. Tasks outlined in the guide include:

- Analyse landscape character and its sensitivity
- Identify landscape character zones
- Determine magnitude of impacts
- Assess landscape character impacts
- Assess the visibility of the Proposal
- Determine the magnitude of change for each viewport
- Identify key viewpoints and their sensitivity to change
- 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.

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. Figure 6-16 details the landscape character and visual impact grading matrix.

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

Figure 6-16 Landscape character and visual impact grading matrix

6.5.2 Existing environment

Landscape context and character of the Wharf in its setting

Kissing Point Wharf is located at Kissing Point in the Parramatta River, approximately 4km by water and 13km by road from the city centre. The wharf sits at the end of Delange Road, a steeply sloping street connecting to Morrison Road.

The surrounding landscape character of Kissing Point includes the following:

- Predominant landscape character for the river's edge is typically green open space containing an occasional mix of park, recreation and ferry transit amenity
- Dominant landscape character for the area is a variety of residential including Putney, Rhodes, Concord West and Mortlake
- Higher density commercial/industrial areas are generally located on the ridgetops of both sides of the river with un-obstructing visual connections to Kissing Point Wharf.

The wharf is located within Kissing Point Park at the intersection of Waterview Street and Delange Road, within the residential suburb of Putney. It sits on the Western peninsula of Kendall Bay. Kissing Point Peninsula is a natural sandstone landform modified in part by industrial and shipping uses. The peninsula is formed by the division of Kissing Point Bay (to the East), Bray's Bay (to the South-West) and Yaralla Bay (South-East).

The built form is predominantly detached housing of two to three storeys on large blocks with streets and gardens containing mature trees, broad avenues and distinctive specimen trees. Delange Road ends with a driveway that connects over a shared path into a carpark. The eastern side of the street has a pathway that has informal connections to the water, providing access to a small beach. The western side of the carpark has a larger reserve which is currently planted with lawn areas and a number of casuarinas.

In assessing the landscape character of Kissing Point and how the proposed wharf will fit within the surrounding landscape, there are five identified landscape character zones as identified in Figure 6-17.

- Kissing Point Peninsula (LCZ1)
- Parramatta River (LCZ2)
- Ryde Bridge/Rhodes (LCZ3)
- Thomas Walker Estate (LCZ4)
- Mortlake Peninsula (LCZ5).

These landscape character zones were identified based on the following:

- Character of Kissing Point is a residential and parkland edge
- The existing character from the water and opposite points as a layering of elements, beginning with the wharf, adjacent sea walls, park and parking facilities and moving up the slope behind to the mixed scale residential buildings on the Northern edge of Kissing Point Road
- The material character of Kissing Point is a range of sandstone, from both the exposed rock shelves seen in the foreshore parks and the sandstone retaining walls that exist within the park. These open spaces are predominately grassy lawn areas with a number of tree plantings (predominately Casuarinas and Eucalypts). There is consistency in the broad scale of the residential lots, the grand houses and established gardens. The built form is predominantly up to three storeys
- Topography plays a defining role in the landscape character of Kissing Point, by opening up vistas to the harbour at the end of streets, requiring specific built responses to steep terrain, and through the general layering of buildings and vegetation on all sides of the peninsula.

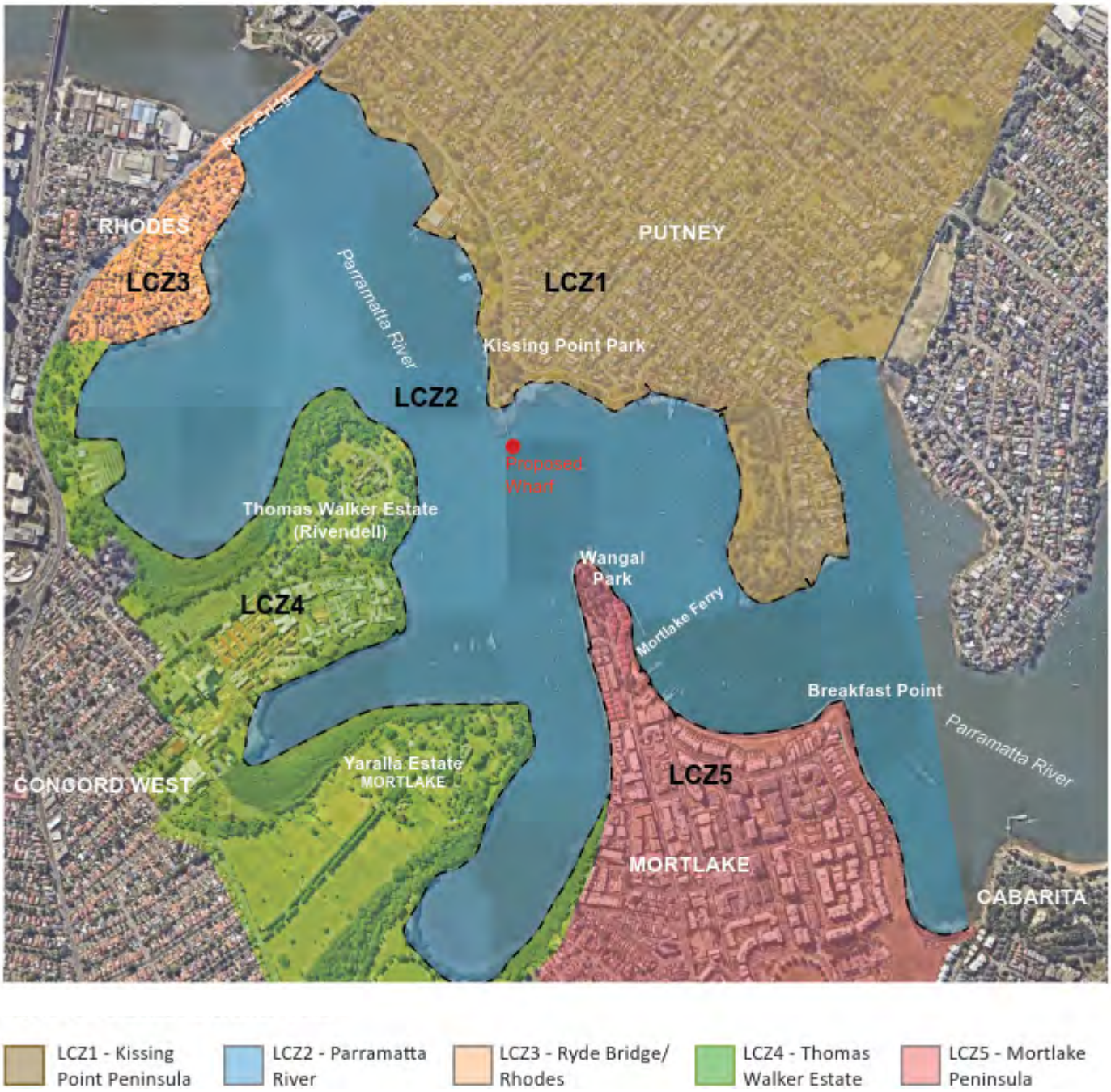

Figure 6-17 Landscape character zones

The heritage context of Kissing Point Wharf is minimal; however, these elements form an important component of the surrounding landscape. Details of these heritage landscape elements are in Table 6-20. Detailed heritage impacts are further described in Section 6.8 and 6.9.

Table 6-20 Heritage landscape items

Heritage landscape items	Detail
Thomas Walker Estate (Rivendell School)	The Thomas Walker Convalescent Hospital is of national heritage significance as a rare major institution which has survived along the foreshores of the Parramatta River from the 19th century. Along with Carrington Centennial Hospital, the Thomas Walker Convalescent Hospital is the only other convalescent hospital to have survived from the 19th century.
Halvorsen 20 Waterview Street, Putney	The site has considerable historical significance as the site of Australia's first hops brewery. Squires brewery operated at Kissing Point from around 1797 through to 1830.

Viewpoints

Figure 6-18 shows the key viewpoint locations. Distance zones have been established within the visual catchment. Distance for zones are the following:

- Foreground zone (FZ): 0 to 250m from the viewer
- Middle ground zone (MZ): 250m to 500m from the viewer
- Background zone (BZ): greater than 500m from viewer.

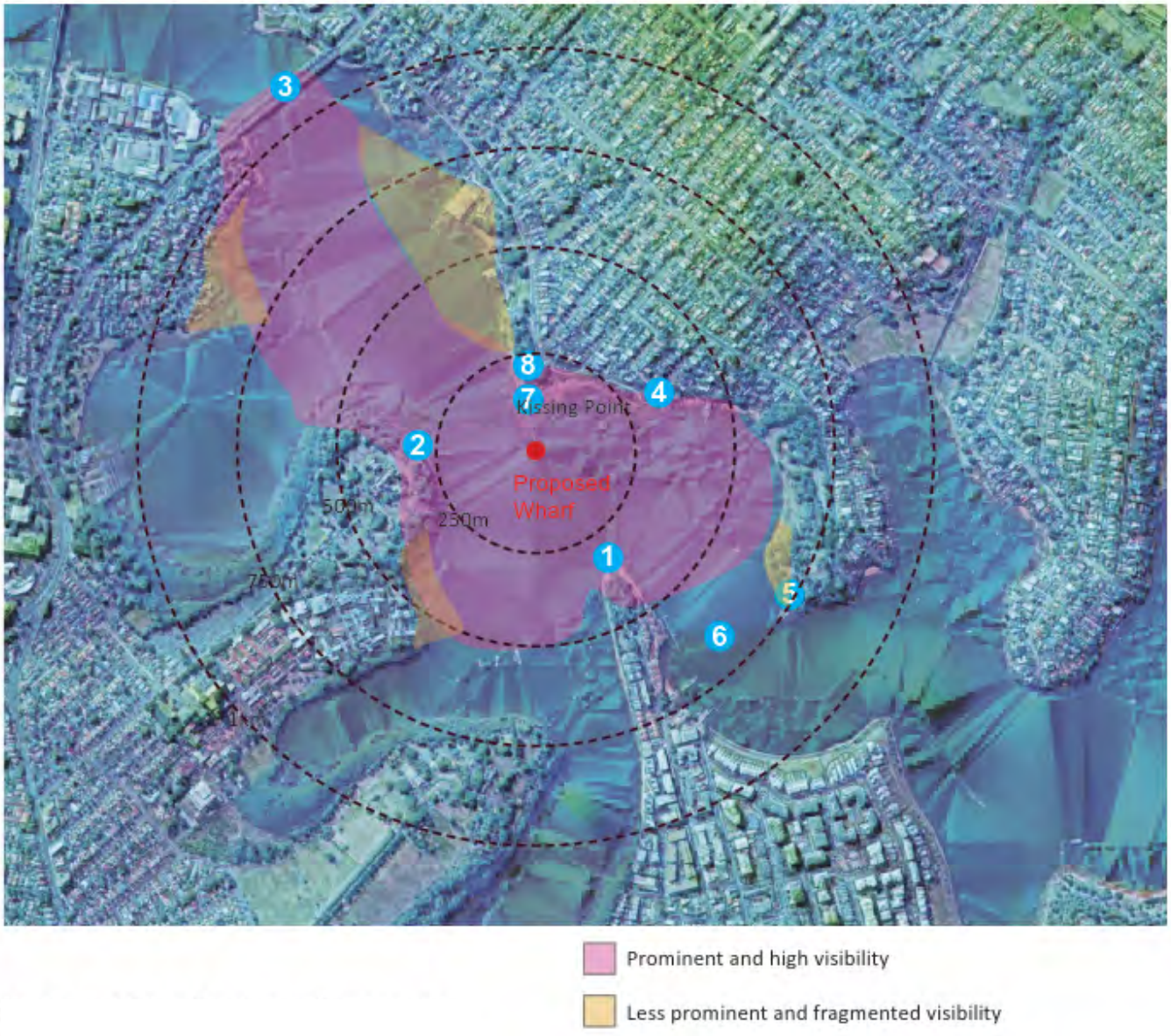

Figure 6-18 Viewpoint locations

Eight viewpoints were selected to perform this assessment in which are identified and described in Table 6-21.

Table 6-21 Viewpoint location settings

Viewpoint	Setting	Distance Zone
1. Wangal Park (Figure 6-19)	Anchor Lookout Spot (Mortlake), Meadow Bank, Ryde Bridge, Uhrs Point, Rocky Point, Parramatta River, Wangal Park	MZ
2. Thomas Walker Estate (Rivendell) (Figure 6-20)	Kissing Point, Kissing Point Park, Majors Bay, Putney, Putney Park, Parramatta River	MZ
3. Ryde Bridge (Figure 6-21)	Settler's Park, Bennelong Park, Parramatta River, Kissing Point Park, Kissing Point, Rocky Point, Rivendell School, Wangal Park, Putney Point, Sydney CBD, Thomas Walker Estate (Rivendell)	BZ
4. Kissing Point Park (East) (Figure 6-22)	Kissing Point Park, Putney, Uhrs Point, Concord Hospital, Concord West, Parramatta River, Thomas Walker Estate (Rivendell)	MZ
5. Putney Park (Figure 6-23)	Wangal Park, Anchor Lookout Spot (Mortlake), Ryde Bridge, Uhrs Point, Rocky Point, Parramatta River	BZ
6. View on departure by water (Mortlake Ferry) (Figure 6-24)	Wangal Park, Anchor Lookout Spot (Mortlake), Ryde Bridge, Uhrs Point, Rocky Point, Parramatta River, Green Point, Greens Point	BZ
7. Kissing Point Wharf (Figure 6-25)	Kissing Point Park, Kissing Point Wharf, Parramatta River, Anchor Lookout Spot (Mortlake), Thomas Walker Estate (Rivendell), Concord West, Yaralla Bay	FZ
8. Kissing Point Park (Figure 6-26)	Kissing Point Park, Kissing Point Wharf, Parramatta River, Anchor Lookout Spot (Mortlake), Thomas Walker Estate (Rivendell), Concord West, Yaralla Bay, Wangal Park	FZ

Figure 6-19 Kissing Point Wharf from Wangal Park, Mortlake

Figure 6-20 Kissing Point Wharf from Thomas Walker Estate (Rivendell)

Figure 6-21 Kissing Point Wharf from Ryde Bridge

Figure 6-22 Kissing Point Wharf from Kissing Point Park (East)

Figure 6-23 Kissing Point Wharf from Putney Park

Figure 6-24 Kissing Point Wharf from Mortlake Ferry

Figure 6-25 Kissing Point Wharf

Figure 6-26 Kissing Point Park

6.5.3 Potential impacts

Construction

Landscape character and visual impacts during construction are expected due to the following construction components:

- Presence of equipment, barges and piling equipment around the wharf
- Removal of the existing wharf structure and construction of a new wharf
- Established temporary compound site (30m by 15m) to include site sheds, amenities shed and storage containers for tools and materials.

Landscape character zones as defined in Section 6.5.2 generally have low to moderate sensitivity and magnitude. Work would have the greatest impact to values associated with Thomas Walker Estate/Rivendell School/Yaralla Estate (LCZ4) where the effects would be:

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

Construction work would also affect the visual amenity of recreational users and community members located at Wangal Park, Thomas Walker Estate (Rivendell), Kissing Point Park (East), Putney Park, Kissing Point Wharf and Kissing Point Park (VP1, VP2, VP4, VP5, VP7 and VP8). This impact would be limited to the construction duration.

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

Operation

Landscape character

Table 6-22 summarises the landscape impact assessment on the landscape character zones identified in section 6.5.2. Appendix G provides additional detail on the landscape character zones.

Table 6-22 Landscape character impacts

Landscape Character Zone	Description of impact	Impact
Kissing Point Peninsula (LCZ1)	• Function of wharf and location is the same maintaining its historical link • Form of wharf changes due to a shift to the east and rotates counter clockwise around 15 degrees impact the Eastern foreshore as largely unbuilt with a natural sandstone edge • Proposed wharf references a palette of marine colours and materials consistent with wharves throughout Sydney Harbour.	Low
Parramatta River (LCZ2)	• Retention of wharf location highlights its history and character of public buildings in open green space. Function of the wharf is retained and the landscape character of the space is undisturbed.	Negligible
Ryde Bridge/Rhodes (LCZ3)	• Wharf's distance to the character of the ridgetop of residential housing, intermingled open space and Ryde bridge would mitigate any significant impacts.	Low
Thomas Walker Estate (LCZ4)	• Wharf would enhance existing heritage and setting of the buildings and open space as the Proposal has a strong visual link and enhance connection for passengers and park goers.	None (Benefit)
Mortlake Peninsula (LCZ5)	• Diversity of housing type and built form has resulted in an inconsistent character to the zone; however the wharf's distance and design, coupled with the varied landscape character, would mitigate any significant impacts.	Negligible

The landscape character zones surrounding Kissing Point Wharf have a moderate to low sensitivity to change. The immediate surroundings to the wharf include a built residential foreshore with private boat moorings to the West, and an unbuilt foreshore with natural sandstone edge to the East.

The proposed wharf signals a shift in materiality as well as alignment from the foreshore. However, the magnitude of the change proposed is limited by distance and the fact that the wharf remains largely the same size.

Within its immediate character zone, the impact of the proposed wharf is considered moderate to low. The greatest impact is the marginal shift in location (8 metres) and angle of the wharf (15 degrees counter-clockwise to the current position).

The impact of the wharf on broader character zones and the surrounding peninsulas and island is considered low to negligible. Distance reduces the magnitude of change and the sensitivity of these zones is also reduced with the wharf forming part of a broad harbour backdrop to the more immediate character of these places. While the proposed wharf signals a shift in materials and location it does represent a link to a family of wharves throughout the harbour which share the same language and form.

Overall the impact on landscape character is moderate to low. The proposed wharf in shifting location to the East will produce a moderate impact on the natural character of this foreshore. Overall the surrounding landscape character zones have a low sensitivity to change. The small shift in location has a negligible effect on the broad scale character of the waterways and those areas separated by a greater distance.

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 view point. Table 6-23 summarises the visual impact assessment.

Table 6-23 Visual impact assessment

Viewpoint	Visible elements	Sensitivity	Magnitude	Impact
1. Wangal Park	Bridge, gangway and pontoon	Low	Moderate	Moderate-low Proposed wharf shifting in location to the east. Shift is considered marginal due to angle and distance. Areas of Kissing Point Park may be partly obscured.
2. Thomas Walker Estate (Rivendell)	Bridge, gangway and pontoon	High	Negligible	Negligible The repositioning of existing wharf will open up clearer views across the water to Kissing Point Park. There will be negligible impacts to views from the heritage building on the water's edge towards Putney.
3. Ryde Bridge	Bridge, gangway and pontoon	Negligible	Negligible	Negligible Viewed as an element within the Parramatta River. The repositioning of the wharf and extension of gangway and bridge will form part of the background and a series of wharves within the views towards the city.
4. Kissing Point Park (East)	Bridge, gangway and pontoon	Low	Moderate	Moderate-low Repositioning and lengthening of wharf structures will obscure heavily vegetated areas of the Thomas Walker Estate (Rivendell School).
5. Putney Park	Bridge, gangway and pontoon	Low	Low	Low There will be partial blocking of views to Uhrs Point with some views to portions of Parramatta River and Ryde Bridge opening up.
6. View on departure by water (Mortlake Ferry)	Bridge, gangway and pontoon	Low	Low	Low Distance of Green Point/Wangal Park is far and already obstructs the existing and proposed wharf location.

Viewpoint	Visible elements	Sensitivity	Magnitude	Impact
7. Kissing Point wharf	Pontoon	High	Low	Moderate Views along the gangway, bridge and repositioned pontoon will partially obstruct views to Breakfast Point medium density development. The preserved green space on the peninsula's of Dame Eadith Walker Estate, Rocky Point and Wangal Park are moderate.
8. Kissing Point Park	Pontoon	High	Low	Moderate-low Due to close proximity to the park, the proposed wharf will be greatly visible. The Proposal has low impact on views of the Parramatta River and opposing shoreline (Wangal Park).

The overall impact on views is considered low. The greatest impact comes from the shift in angle of the wharf. For some views this signals an improvement with the demolition of the current wharf opening up clearer views to water and background. The highest impact is in relation to the views to the Thomas Walker Estate and heritage buildings within Rivendell (on the southern side of the Parramatta River). Views towards these building and open green space are impacted particularly on approach from Kissing Point Park East and from Putney. However, the repositioning of the wharf location would introduce new views from other parts of the waterfront reducing the overall impact.

The visual impact of the proposed wharf is low as the distance and complexity of views around the harbour largely minimising the dominance of the wharf along the foreshore of Kissing Point. Figure 6-27 depicts the Proposal.

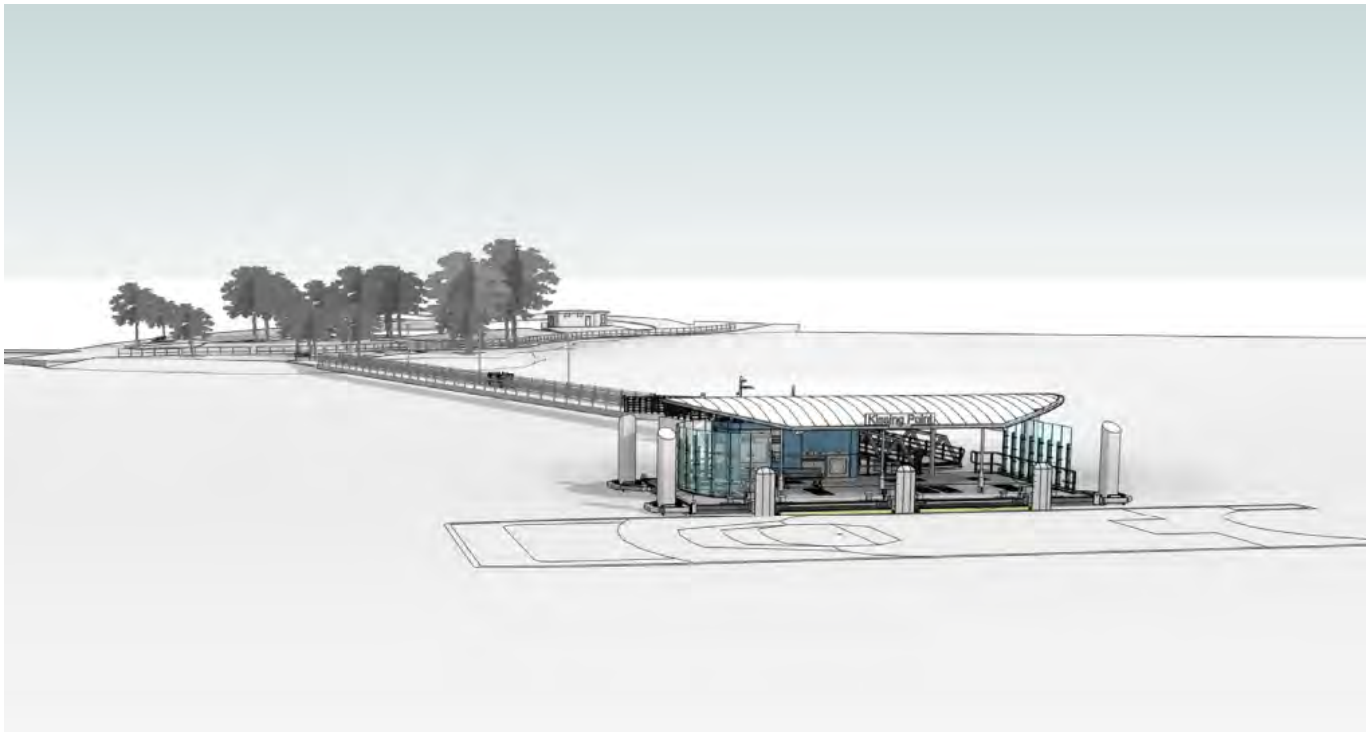

Figure 6-27 3D view of proposed structure

6.5.4 Safeguards and management measures

Table 6-24 lists the landscape and visual safeguards and management measures that would be implemented to account for the impacts identified in section 6.5.3.

Table 6-24 Landscape and visual safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing
Visual	Urban design principles would be integrated throughout the detailed design and construction of the proposal. The urban design principles would include: • Provide a unified and consistent design both with the proposed structure and existing built elements along the foreshore • Maintain views through the proposed structure • Ensure that the iconic elements of Thomas Walker Estate, and Greenwich Point maintain their character zones and are not adversely affected by the replacement wharf.	TfNSW	Detailed design
Visual	Hoarding would be erected around the construction compound where possible, to reduce visibility.	Contractor	Construction
Visual	Where OOHW is required, lighting would be directionally controlled to limit potential impacts of light spill on surround receivers, including residential properties.	Contractor	Construction

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 from Australian Bureau of Statistics (ABS), 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 Putney State Suburb.

6.6.2 Existing environment

Demographic and socioeconomic profile

The Proposal is situated within the state suburb of Putney. A review of the Australia Bureau of Statistics (ABS) Census data was undertaken for Putney. Table 6-25 summarises the key social and economic characteristics of the people that live in Putney, and how this has changed from 2011 to 2016.

Table 6-25 Statistical data for Putney State Suburb

Demographic Indicator	2011		2016		% Change
Population		4,076		4,107	+0.76
Population by age bracket	0-19	1,161	0-19	1,120	-3.53
	20-34	607	20-34	600	-1.15
	35-49	929	35-49	844	-9.15
	50-64	828	50-64	894	+7.97
	65+	552	65+	648	+17.39
Method of travel to work	Car (as driver or passenger)	1,368	Car (as driver or passenger)	1,426	+4.23
	Ferry	30	Ferry	42	+40
	Bus	139	Bus	153	+10.07
Median weekly household income		$2,154		$2,456	+14.02
Home ownership/ rentals	Home owners (outright and with a mortgage)	1,107	Home owners (outright and with a mortgage)	1,079	-2.53
	Home renters	192	Home renters	189	-1.56
	Other	32	Other	35	+9.38

It was concluded from the above information that:

- The median weekly household incomes were $1,018 higher than the national average for 2016 ($1,438)
- Most people in Putney drive or take the bus to work detailed traffic conditions are in Section 6.7
- Residents of the area are predominantly home owners of the area.

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.

The wharf sits within Kissing Point Park, an open parkland which provides some green space and shade at the river front, as well as limited recreational area in the vicinity of the existing wharf.

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

- Local amenity and a sense of place, as provided by the Kissing Point Park where the wharf is located, and the setting within 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 network 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 Kissing Point Park, Wangal Park, Anchor Lookout Spot
- Educational institution including Rivendell School and its associated outdoor passive recreation
- Recreational users including Kings School Rowing Club and Concord Ryde Sailing Club
- Medical facilities such as Thomas Walker Hospital
- Recreational and commercial access to Kissing Point Park boat ramp
- Local transport connections of bus route 507 along Waterview Street
- Dyson Street, which provides a shared use path for cyclists and pedestrians.

Local businesses

A local business within 500 metres of the wharf is Sailaway Sydney which provides recreational sailing tours along the Parramatta River and Sydney Harbour.

Crime Risk Issues

The review of the Crime Prevention Through Environmental Design (CPTED) Report (Elton Consulting, 2016) indicated:

- Crime levels are highest in Ryde followed by Putney then Tennyson Point
- The top offence for Putney, Ryde and Tennyson Point was theft, followed by malicious damage to property for both Ryde and Putney. The second most prevalent offence for Tennyson Point related to harassment threatening behaviour and private nuisance.
- The Ryde Local Area Command (LAC) advised that Kissing Point Wharf crime issues were generally low and the LAC was not aware of any significant incidents or any issues associated with fishing
- NSW Roads and Maritime (RMS) data indicated that:
  - there were three complaints recorded in 2013 regarding anti-social behaviour and cleanliness at the wharf. No complaints were recorded in 2014 and during January – March 2015
  - there were eight formal warnings issued at Kissing Point Wharf in 2013 and ten in 2014. These formal warnings are likely to relate to fishing and associated issues. There had been no infringements issued during January – March 2015.

6.6.3 Potential impacts

Construction

Kissing Point Wharf would be closed throughout the construction period as described in Chapter 3. Existing bus services will be used to support access to Sydney CBD as bus transport would remain operational. Ferry users travelling to or from the city could catch the existing 507 bus service along the Waterview Street to travel to Sydney CBD. There is an identified gap of ferry services from bus services and are detailed further in section 6.7.

The closure of the wharf would cause disruption to approximately 225 passengers due to the requirement to switch transport modes. Disruptions could potentially involve increased travel times for bus travel compared to travelling by ferry. Any disruption will be minimised through notification ahead of construction, and consequent updates. In addition, the short-term impacts during construction described above would be offset by the benefits of the upgraded wharf and interchange during operation (see below).

There will be a temporary closure of the sections of the Kissing Point Park car park with 11 car park spaces closed and would prevent vehicles from accessing part of the car park.

There would be temporary noise and visual impacts to residents in the broader area due to construction activities (refer to section 6.4 and 6.5 respectively). As such, there would be some loss of amenity in the area within Kissing Point Park and construction would result in a temporary loss of amenity in the Paramatta River near the wharf. 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 nearby sensitive receivers. The noisiest activities would be scheduled outside of these sensitive periods, whenever practical. Management measures described below and Section 6.4.4 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
- Improved landside amenity at the wharf from increased re-planted trees
- 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 as well as enhanced access to landside upgrades and disabled parking
- A covered pontoon, enabling passengers to wait close to ferries in an area with weather protection, ample seating and customer information.

No loss in character is expected as the Proposal's sense of place is consistent with the existing conditions. The overall visual impacts of the Proposal is considered to be low, as discussed in section 6.5. The wharf design is also consistent with other recently upgraded wharves across the network. The visual impact is not anticipated to result in any socioeconomic impacts.

During operation, the extra lighting and security cameras at the wharf would deter antisocial behaviour from occurring and provide a safer night-time environment for ferry users. Generally, the design of the ferry wharf is legible, creates a clear hierarchy of space, enable safe access/egress, and enables formal and passive surveillance as detailed in the Crime Prevention through Environmental Design assessment (Elton Consulting, 2016). As defined in Section 6.6.2, crime risks are relatively low with no foreseen impacts. Refer to Section 6.7.3 for safeguards in relation to deterring crime.

Other indirect socioeconomic benefits may be provided by the improved services and amenity at Kissing Point Wharf.

6.6.4 Safeguards and management measures

Table 6-26 lists the socioeconomic safeguards and management measures that would be implemented to account for the impacts identified in section 6.6.3.

Table 6-26 Socioeconomic safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing
General socio-economic impacts	An internet site and free-call number would be established for enquiries regarding the Proposal for the entirety of construction. Contact details would be clearly displayed at the entrance to the site.	TfNSW	Pre-construction
General socio-economic impacts	All enquiries and complaints would be tracked through a tracking system, and acknowledged within 24 hours of being received.	TfNSW	Pre-construction
General socio-economic impacts	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): 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. The CP would be prepared in accordance with the *Community Involvement and Communications Resource Manual* (RTA, 2008).	TfNSW	Pre-construction
Social impacts	The construction area would be secured at all times.	Contractor	Construction
	Closed Circuit Television (CCTV) is to be considered within the Proposal where required.	TfNSW	Detailed design
	Installation of Light Emitting Diode (LED) lighting is recommended along the pedestrian routes to car park, toilets and bus stops as well as near the bicycle racks and lockers to deter any antisocial behaviour. Lighting should create even and continuous coverage across wharf and public domain. Where OOHW is required, lighting would be directionally controlled to limit potential impacts of light spill on surround receivers, including residential properties.	TfNSW	Detailed design
	Consider installing additional help points within the car park, at the toilet area or at bicycle lockers/racks because of its distance from the wharf and isolation from nearby residents.	TfNSW	Detailed design
	For consideration during detailed design and pre-construction, the existing wharf would be evaluated for security and safety implications. Consultation with the Ryde LAC and patrolling Burwood LAC and Council should be undertaken in any future decision.	TfNSW	Detailed design

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 Methodology

A qualitative assessment of transport, traffic and access was performed and considers the following:

- Desktop assessment of existing transport options near the Proposal
- Evaluation of construction and operation impacts to maritime and landside transport.

6.7.2 Existing environment

Maritime transport

Ferry service and frequency

Kissing Point Wharf is serviced by the F3 Parramatta River route, which operates between Paramatta and Circular Quay. The ferry route also services Sydney Olympic Park Wharf and Meadowbank Wharf. Services from Circular Quay to Parramatta Wharf typically operate every 30 minutes, and every 10 minutes during the peak hours (4:55pm and 6:30pm). Services run every 60 minutes from 9:25pm – 12:25am and 6:25am – 8:25am. Services from Parramatta Wharf to Circular Quay run approximately every 20 minutes during the morning peak (6:37 – 9:16am), and every 30 minutes during the off-peak. After 7pm, services in this direction run every 60 minutes until services cease at 10:46pm.

Patronage data from Opal indicates that the patronage for Kissing Point Wharf is an average of 225 passengers per day.

Commercial and recreational activity

There are recreational vessels and sails around Kissing Point Wharf due to the proximity of the recreational boat hiring service (Sydney Harbour Luxury Boat Hire) and recreational sailings (Concord Ryde Sailing Club). In addition, there is also a public boat ramp directly west of Kissing Point Wharf.

Landside transport

The Proposal is located within Kissing Point Park in the suburb of Putney, and is accessed from Waterview Street or Kissing Point Park. Parking is restricted along Waterview Street. A commuter car park with 50 car park spaces shared with the boat trailer parking is available within Kissing Point Park.

The road network within the vicinity of the wharf is characterised by local roads with some on-street parking. Waterview Street is two-lane road with one lane in each direction.

The nearest bus stop is located on the Waterview Street opposite Kissing Point Park and is served by the 507-route number. The bus service is offered every 20 minutes during peak times to the city and every hour in off peak.

Pedestrians can access the wharf via a north-south footpath that runs along the foreshore and the eastern side of the interchange and connects to the shared path on Waterview Street. Pedestrians can also access the wharf via the footpath network in Bennelong Park. Cycling access is available along Waterview Street as a shared path with pedestrians. A secure bike locker is also available for cyclists located near the entrance of gangway of Kissing Point Wharf.

6.7.3 Potential impacts

Maritime transport

Kissing Point Wharf would be closed for up to five months throughout the construction period. Recreational and commercial users would not be able to use the wharf during the closure period.

Construction of the Proposal would result in up to two vessels travelling between an off-site facility and the wharf each week. 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. Closure of the wharf would disrupt about 225 passengers per day from wharf users; however, bus transport would remain operational. Land transport impacts are discussed in the following section.

Construction

Land transport

It is anticipated that construction vehicles would access the Proposal via surrounding road network which includes Waterview Street, Charles Street, Delange Road and Dyson Street. As detailed in section 3.3.7, up to two heavy vehicles would access the site per week for construction activities and up to two light and heavy vehicles would be used for deliveries per week. The above scenario assumes that a majority of materials and equipment are shipped to site. The additional light and heavy vehicles required throughout construction are not considered to be significant to the surrounding road network.

Most of the free, 50 car park spaces would be maintained with 11 spaces closed to accommodate construction activities. This could result in short interruptions depending on the nature of construction work being undertaken. Traffic management may be required while elements of the Proposal are being built, which could include the temporary closure of sections of Kissing Point car park.

Limited on-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. Final access and parking arrangements would be confirmed by the construction contractor and involve consultation with adjacent properties and commercial premises.

The existing bus service will continue regular operation (Monday through Friday 7:56am to 20:59pm, Saturday 7:45am to 17:07pm and Sunday 8:36am to 17:12pm) during construction of the Proposal. In timing of when there is a gap of ferry services from the city and Kissing Point Wharf (9:30pm to 11:37pm), additional bus services would be provided and identified as a mitigation measure.

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, accessibility 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. Provision of five additional bicycle racks may encourage patrons to use bicycle transport to access the wharf, promoting active transport travel compared to car travel to and from the wharf. No impacts are expected to land transport based on the existing patronage of the wharf.

Access improvement and DSAPT compliance would be made available for accessible parking and upgraded kiss and ride would provide a benefit to the wharf. Beneficial impacts are expected due to these upgrades.

Maritime transport

Ferry operations to Kissing Point would resume after the Proposal is built, and no significant 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 design life, and would also improve the efficiency and user experience of the wharf. Wharf disabled access would also provide as a key benefit to this wharf.

6.7.4 Safeguards and management measures

Table 6-27 lists the traffic, transport and access safeguards and management measures that would be implemented to account for the impacts identified in section 6.7.3.

Table 6-27 Traffic, transport and access safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing
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
Water transport	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. In addition, the Proposal would: • 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. Any variation to the above would be agreed in advance with the Harbourmaster.	Contractor	Pre-construction/ construction
Construction access and parking	Final access and parking arrangements would include a Traffic Management Plan. The Traffic Management Plan would also include measures to ensure light vehicle parking is strictly in accordance with Ryde Council requirements and prevents parking on footpaths and grassed areas adjacent the site.	Contractor	Pre-construction
Transport connection	Additional bus services would be provided to address the gap of ferry services between 9:30pm to 11:37pm on weekdays and after 6.40pm on weekends/public holidays. The community would be made aware of these amendments as outlined in the Communications Plan.	TfNSW	Construction

6.8 Non-Aboriginal heritage

This section summarises the proposal's non-Aboriginal heritage impacts. Appendix H contains a supporting technical paper (statement of heritage impact, SOHI) prepared by City Plan Services in December 2019.

6.8.1 Methodology

A Statement of Heritage Impact (SoHI) was prepared by City Plan Services , to inform this REF. Findings were summarised in the SoHI, which also includes Aboriginal heritage (refer to section 6.9). The purpose of a SoHI is to assess the impact of the proposed works on the heritage significance of the Proposal footprint, and to propose measures to mitigate any negative effect.

The assessment included desktop review of published known heritage items within the vicinity of Kissing Point Wharf. Heritage instruments and registers include the following:

- Ryde Local Environmental Plan 2014
- NSW State Heritage Inventory (SHI)
- Sydney regional planning instruments and maps
- Roads and Maritime's 'Section 170 Register
- Commonwealth Heritage List.

The SoHI was prepared in accordance with the Office of Environment and Heritage (OEH) Heritage Division publication *Assessing Heritage Significance* (OEH, 2015). Historical research was sourced from:

- City of Ryde Local Studies
- State Library of NSW
- National Library of Australia – Trove database.

A detailed inspection of the Proposal and its surrounding context was undertaken on 27 September 2019. Inspection of the site included the Kissing Point Wharf and its natural and built surrounding environment, including the wharf structure, the seawall which it abuts and the landside interface. Local heritage item 'Kissing Point Park (former boat slips)' (item no. I157) and its relationship with the existing wharf were also inspected.

6.8.2 Existing environment

European settlement

The earliest evidence of a jetty or wharf structure on the Kissing Point headland is an aquatint from 1825. An 1888 surveyors map shows a possible wharf or jetty structure to the west of the Proposal.

The Kissing Point Park heritage item formed part of the Kidman & Mayoh shipyard following the establishment of the Commonwealth Shipping Line in 1916. In the late 20th century, the wharf was incorporated within Kissing Point Park, and the resulting landscaping and grading works would have removed archaeological relics associated with earlier periods.

Kissing Point Wharf is of significance for its role in the history of ferry commuting and maritime use of Kissing Point and Putney throughout the 19th and 20th centuries and associated with the development of Putney and history of ferry services on the Parramatta River. It serves as a social and cultural associations since the late 20th century for the Putney community and adjacent evolving maritime services.

Listed heritage items

World, Commonwealth and State Heritage

There are no World Heritage Sites, Commonwealth Heritage Items, State Heritage Listed Items or items identified under Section 170 located within the vicinity of the Proposal.

Local Heritage

Kissing Point Wharf is located within the curtilage of local heritage item ‘Kissing Point Park (former boat slips)’ (item no. I157) listed under Part 1 of Schedule 5 of the Ryde Local Environmental Plan (LEP) 2014 as identified in Table 6-28. There are no heritage items listed on the Sydney Regional Environmental Plan (SREP) 2005 located within proximity of the Proposal. This heritage item is located on the eastern side of the existing Kissing Point Wharf as shown on Figure 6-28.

Table 6-28 Local heritage item

Item Name	Address	Item No.	Listing
Kissing Point Park (former boat slips)	24 Waterview Street	157	Part 1, Schedule 5, Ryde LEP 2014

Figure 6-28 Location of the Proposal in relation to the heritage item 'Kissing Point Park' (blue). Source: SIX Maps 2019

Archaeology

As a modern structure, the wharf has minimal potential to yield information that would contribute to a greater understanding of historical maritime technology of wharf construction.

The archaeological assessment determined that the existing wharf is within heavily disturbed land. The archaeological potential for this Proposal is identified as the following:

- Low-medium potential for archaeological relics associated with the former boatslips from the 20th century. Review of historical ship building identifies the Proposal has potential for industrial archaeology
- Low potential for archaeological relics associated with an earlier wharf structure from the 19th century development of the site.

Figure 6-29 depicts the potential location.

Figure 6-29 Potential archaeological location of remnant boat slips (yellow arrows) and potential jetty/wharf structure (green arrow)

6.8.3 Potential impacts

Construction

The Proposal is located within the curtilage of local heritage item Kissing Point Park (former boatslips) (item no.157). Landside works include minor landscaping and excavation within the curtilage of the local heritage item. The historical archaeological assessment (refer to Section 6.8.2) determined that there is a low-medium potential for the Proposal to impact on remnant boatslips associated with the 20th century development of the site and low potential for impacts to the previous 19th century wharf structure.

Based on the proposed works and significant landscaping and grading works undertaken historically associated with Kissing Point Park, any archaeological relics associated with earlier periods are likely to have been removed and are unlikely to be impacted. If during works, archaeological relics are found, the *Standard Management Procedure: Unexpected Heritage Items (2015)* is to be followed.

Operation

The Proposal is expected to have a positive impact, as the heritage value of the wharf is not associated with its fabric or composition, as a relatively modern structure, but with its function as a wharf, which would continue through operation of the proposal.

6.8.4 Safeguards and management measures

Table 6-29 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 6-29 Non-Aboriginal heritage safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing
Non-Aboriginal heritage	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) is to be followed.	Contractor	Construction
Non-Aboriginal heritage	Heritage NSW should be consulted prior to undertaking any work as a means of confirming any required permits or approvals.	TfNSW	Pre-construction
Non-Aboriginal heritage	City of Ryde Council to be notified of any work prior to proceeding.	TfNSW	Pre-construction

6.9 Aboriginal heritage

This section summarises the Proposal's Aboriginal heritage impacts. The Roads and Maritime Aboriginal Cultural Heritage Advisor (ACHA) has issued a Stage 1 clearance letter for the Proposal in accordance with PACHCI on 17 September 2019, included with Appendix H. The Stage 1 assessment results were included as part of a SoHI prepared by City Plan Heritage in December 2019 to inform this REF as part of Appendix H.

6.9.1 Methodology

The assessment included the following:

- Evaluation of relevant legislation and guidelines including the following:
  - National Parks and Wildlife Act 1974
  - National Parks and Wildlife Regulation 2009 (the Regulation)
  - Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales
- Desktop assessment via City of Ryde Council website
- Basic and extensive AHIMS database search; and
- Completion of the PACHCI Aboriginal heritage assessment, in reference 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, 2010a), and the Code of Practice of Archaeological Investigation of Aboriginal Objects in NSW (DECCW, 2010b).

6.9.2 Existing environment

Aboriginal history

The Sydney region has been inhabited by Aboriginal people for up to 30,000 years, as indicated by radiocarbon dating undertaken in Parramatta (JMcD CHM 2005). The area associated with Ryde Council was known by the original inhabitants, the 'Wallumedegal'. The Wallumedegal clan were part of the Darug language group with the clan boundaries following the north bank of the Parramatta River from Lane Cove River in the east to Parramatta at the head of the river to the west. The northern boundary was the Lane Cove River.

Previously Recorded Aboriginal Sites

A search of the Aboriginal Heritage Information Management System (AHIMS) identified no reported Aboriginal objects or places within the Proposal. However, two Aboriginal sites were identified within 50-meters of the Proposal.

The Proposal does not contain any landscape features that are associated with the presence of Aboriginal objects, according to the *Due Diligence Code of Practice for the Protection of Aboriginal objects in NSW* (DECCW, 2010c), and the Roads and Maritime Services' procedures.

The Aboriginal cultural heritage potential of the Proposal is severely reduced due to the extensive modification of the natural shoreline including land reclamation and previous construction of the wharf.

6.9.3 Potential impacts

Construction

The proposed works are unlikely to result in harm to Aboriginal objects and sites, as the work are limited to the existing wharf structure and minor public domain work; all of which are within heavily disturbed land. There would be a low potential to impact objects or sites of Aboriginal significance as the potential for Aboriginal objects and as determined by the PACHCI, no further investigations or assessment are required.

Operation

The Kissing Point Wharf would continue to operate as a wharf, served by the same vessels, so it is not expected that there would be any change in the nature or severity of impact to unknown Aboriginal objects or sites. No impacts to Aboriginal heritage items are anticipated during operation of the Proposal as no significant change to the existing operation is proposed. As such, an AHIP under the *National Parks and Wildlife Act 1974* is not required for the Proposal.

6.9.4 Safeguards and management measures

Table 6-30 lists the Aboriginal heritage safeguards and management measures that would be implemented to account for the impacts identified in section 6.9.3.

Table 6-30 Aboriginal heritage safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing
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. Works would only restart once the requirements of that procedure have been satisfied.	Contractor	Construction

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 Transport for NSW as part of the maintenance and operation of the existing structure
- Cleaning of the wharf is undertaken by Transport for NSW 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.

Based on the Stage 1 Contamination Assessment undertaken by Coffey (2015), no waste storage was noted or near to the site.

6.10.3 Potential impacts

Construction

Resource use

Transport for NSW 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 20 cubic metres of waste material as identified in Chapter 3. The main waste sources would come from decommissioning and dismantling the existing wharf, which would include:

- Concrete and scrap metal – this would be reused where possible depending on its condition
- 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 (e.g. glass, wood and metal) that could be reused or recycled
- Inert unrestricted packaging waste (e.g. plastic, paper, wood) that could be recycled
- Potential restricted wastes (e.g. 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.

Any excavated 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.

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 6-31 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 6-31 Waste and resource safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing
Waste	Appropriate measures to avoid and minimise waste associated with the Proposal should be investigated and implemented where possible.	Contractor	Construction
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 (e.g. where quality control specifications allow).	Contractor	Detailed design
Waste	Waste management, littering and general tidiness would be monitored during routine site inspections.	Contractor	Construction
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
Waste	Should spoil be generated during construction activities, further sampling and analysis should be undertaken to confirm the waste classification prior to disposal.	Contractor	Construction

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 waterside features of the wharf indicate there is a high probability of acid sulfate soils materials.

No flooding issues, or other hazards and risks are expected at the site.

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.

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 6-32 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 6-32 Hazard and risk safeguards and management measures

Environmental factor	Environmental safeguard	Responsibility	Timing
Hazards and risks	Appropriate emergency equipment such as flotation devices and first aid kits would be kept within the construction area.	Contractor	Construction
Hazards and risks	All utilities within and adjacent to the Proposal footprint would be located prior to the start of the work.	Contractor	Construction
Hazards and risks	Safe work method statements or similar would be implemented to manage health and safety risks for the work.	Contractor	Construction
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

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 6-33 below.

Table 6-33 Other impacts

Environmental factor	Existing environment	Potential impacts
Air quality	The nearest NSW air monitoring site to the Proposal is Rozelle, which forms part of the Sydney East monitoring network. A review of air quality data for the month of August 2019 indicates air quality is generally categorised as good (NSW Government, 2019).	• 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.	• 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.	The wharf includes climate change adaptation in its design including: • Enough clearance above the water to allow for an estimated sea level rise of 516 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 6-34 lists the additional safeguards and management measures that would be implemented to account for the impacts identified in section 6.12.1.

Table 6-34 Other safeguards and management measures

Environmental factor	Environmental safeguard	Responsibility	Timing
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

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 6-35.

6.13.1 Study 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, Industry and Environment – major project register
- Sydney and Regional Planning Panels DA register – Sydney North Planning Panel
- City of Ryde Development Application Register.

Projects identified on the above registers that would impact the Proposal have been identified in Table 6-35.

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 6-35.

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 6-35 Past, present and future projects

Project	Construction impacts	Operational impacts
Ferry wharf upgrade program The Ferry Wharf Upgrade Program includes upgrades to wharves across Sydney. The Proposal is located at Kissing Point, which is part of the F3 Parramatta River ferry route. The Ferry Wharf Upgrade Program includes planned upgrades to multiple wharves which service the F3 Kissing Point ferry route. Kissing Point Wharf Upgrade is expected to start in Quarter 2 2020, and to be closed for a period of five months.	Woolwich Wharf Upgrade will be under construction during the Kissing Point Upgrade works. Potential impacts are increased boat/barge traffic along the Parramatta River. Upgrade of Kissing Point wharf would require additional movements along the Parramatta River.	The Ferry Wharf Upgrade Program would have a beneficial cumulative impact through improved passenger amenity and consistent ferry wharf design across the network.
Demolition of existing boat shed (LDA2019/0172) 20 Waterview St, Putney, NSW 2112 Part demolition of the existing boat shed to remove the northern addition of the boat shed and engineer's office, demolition of ancillary structures, removal of trees and remediation work. The above Proposal is integrated development under the Environmental Planning and Assessment Act 1979, as the Proposal is within 40m of a waterway. The relevant approval body is the Department of Primary Industry – Water.	No expected construction or completion date is available. Potential impacts are increased boat/barge and road traffic along the Parramatta River as well as landside access along Waterview Street in case if project construction overlaps. There may also be potential increased cumulative noise impacts if demolition of boat shed and construction of wharf occur simultaneously. Co-ordination and consultation with Department of Primary Industry (Water) would likely be required to confirm impacts.	Boat shed is assumed to be constructed at time of completion of the Kissing Point Wharf upgrade. No operational impacts would be expected and would operate similar to existing conditions.
Waterview Concept Stage 1 (LDA218/0223) 20 Waterview Street, Putney The adaptive reuse of the existing boat shed for a mixed use development including food and drink premises and the establishment of building envelopes. The above Proposal is Integrated development under the Environmental Planning and Assessment Act 1979. As the Proposal is within 40m of a Waterway, the relevant approval body is the Department of Industry – Water.	No expected construction or completion date is available. Potential impacts are increased boat/barge and road traffic along the Parramatta River as well as landside access along Waterview Street in case if project construction overlaps. There may also be potential increased cumulative noise impacts from construction. Co-ordination and consultation with Department of Primary Industry (Water) would likely be required to confirm impacts.	New development is assumed to be constructed at time of completion of the Kissing Point Wharf upgrade. No operational impacts would be expected and would operate similar to existing conditions. New development may provide increased amenity with enhanced user experience.

Project	Construction impacts	Operational impacts
Replacement of existing jetty (LDA2019/0265) 35 Pellisier Rd, Putney, NSW 2112 Replacement of an existing jetty and use of the jetty in association with The King's School rowing program. The above Proposal is integrated development under the Environmental Planning and Assessment Act 1979, as the Proposal is within 40m of a waterway and the Proposal includes conducting dredging and reclamation work within the waterway. The relevant approval body is the Department of Industry – Water.	No expected construction or completion date is available. Potential impacts are increased boat/barge and road traffic along the Parramatta River as well as landside access along Waterview Street in case if project construction overlaps. There may also be potential increased cumulative noise impacts from construction. Closure of Kissing Point Wharf during construction may impact community and user access. Co-ordination and consultation with Department of Primary Industry (Water) and King's School would likely be required to confirm impacts.	Jetty is assumed to be constructed at time of completion of the Kissing Point Wharf upgrade. No operational impacts would be expected and would operate similar to existing conditions. Potential enhanced benefits and connectivity from the new jetty and Proposal.

6.13.3 Potential impacts

Table 6-36 outlines the possible cumulative impacts.

Table 6-36 Potential cumulative impacts

Environmental factor	Construction impacts	Operational impacts
Traffic and transport	Minor increase in marine and road traffic.	No operational impacts are anticipated.
Noise	Minor increase in noise if construction of piling work from the Proposal and major construction work (e.g. demolition) from other projects are concurrent.	No operational impacts are anticipated.
Socioeconomic	Closure of Kissing Point Wharf has impacts to recreational and commuter users.	No operational impacts are anticipated.

6.13.4 Safeguards and management measures

Table 6-37 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 6-37 Cumulative impact safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing
Cumulative construction impacts	• Consultation with Department of Industry – Water and King's Rowing School to confirm timing of projects with the Proposal • Consultation would include notification prior to the start of the work • Updates on any delays or changes to the construction period would also be communicated.	TfNSW	Pre-construction/ construction

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 tree removal impacts, 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 Transport for NSW 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	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. 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: • 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	Pre-construction
2	Erosion and sedimentation	Prior to commencement of construction activities a silt boom and curtain) should be installed around the work area that may disturbed the seabed. Installation should be undertaken during high tide periods from a boat. The device should be designed to rise and fall with the tide to prevent disturbance. 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. Inspection of the device should be undertaken on a daily basis after ebbing tides, with additional inspection be carried following storm events. Visual monitoring of turbidity inside and outside of the device should also be performed. 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. Decommissioning should be carried out by boat during high tide periods and can be undertaken once construction activities are above seabed level. Prior to removing the device, conditions within the curtain will be assessed visually to verify that sediment has settled resulting in similar water turbidity to that outside the curtain.	Contractor	Pre-construction

No	Impact	Environmental safeguards	Responsibility	Timing
3	Erosion and sedimentation	Visual monitoring of local water quality (i.e. 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.	Contractor	Construction
4	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 6.3.	Contractor	Construction
5	Erosion and scour	Work positioning barges, drilling and pile driving should occur during calm conditions to prevent excessive scouring and minimise any safety risks.	Contractor	Construction
6	Acid sulfate soils	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.	Contractor	Construction
7	Contaminated land	If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other work 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	Construction
8	Water quality	Any chemicals or fuels stored at the site or equipment barges would be stored in a bunded area.	Contractor	Construction
9	Accidental spill	Refuelling of plant and equipment and storage of hazardous materials on barges is to occur within a double-bunded area.	Contractor	Construction
10	Accidental spill	A spill management plan would be developed and communicated to all staff working on site. Appropriate land and aquatic spill kits are to be maintained on site and on barges. Aquatic spill kits must be specific for working within the marine environment. All workers will be advised of the location of the spill kit and trained in its use. 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.	Contractor	Pre-Construction
11	Accidental spill	If an incident (e.g. 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

No	Impact	Environmental safeguards	Responsibility	Timing
12	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	Pre-Construction
13	Accidental spill	Vehicles, vessels and plant must be properly maintained and regularly inspected for fluid leaks.	Contractor	Construction
14	Accidental spill	No vehicle or vessel wash-down or re-fuelling would occur on-site.	Contractor	Construction
15	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
16	Aquatic biodiversity	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: • 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 (e.g. construction materials dropped into the harbour) • Biological hygiene (e.g. prevent spread of noxious species on and off the site). Aquatic fauna management.	Contractor	Pre-construction
		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.	Contractor	Pre-construction
		All lines should be suspended off the seafloor to minimise drag across areas of habitat.	Contractor	Pre-construction
		Work positioning barges, drilling and pile driving should occur during calm conditions.	Contractor	Construction
		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.	Contractor	Construction

No	Impact	Environmental safeguards	Responsibility	Timing
17	Terrestrial ecology – Trees	Preparation of a Tree Protection Plan which includes tree protection devices and other recommended measures to ensure the protection and safe removal of nominated trees. Contents of the Tree Protection Plan would be in accordance with the Arboriculture Assessment (Appendix E). Topics are to include but not limited to the following: • Identifying prohibited activities, demolition works and excavations within Tree Protection Zones • Consideration of tree damage and root pruning where applicable • Tree removal process of T10, T14 and T26 as well as replacement planting guidelines • Tree protection fencing of T1-T3, T6-T8, T9-T12, T13, T15-T19 and T22-T25 along with installation of tree protection signs and ground protection of any nominated tree • Replacement planting on a ratio of 2:1 due to loss of trees.	Contractor	Construction
18	Pest species	Management measures are to be implemented to ensure *Caulerpa taxifolia* is not introduced to the area. These are to include but not be limited to practices outlined in the NSW Control Plan for the Noxious Marine Alga *Caulerpa taxifolia* (NSW I&I 2009).	Contractor	Construction

No	Impact	Environmental safeguards	Responsibility	Timing
19	Noise and vibration	Preparation of a noise and vibration management plan which would include but not be limited to the following: • Limit number, timing and placement of plant equipment • Identify placement of site hording or fencing to reduce noise at immediate receivers with expected reduction of around 5dB to 10dB • Undertake as much construction work as possible at a contractor's off-site facility, including assemblage of pre-fabricated components • Manage construction process and night-time period works (e.g. pile hammering during out of hours work) • Avoid or minimise these out of hours movements where possible • Specify a noise verification program to be carried out for the duration of the work in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions in cases when vibration limits are exceeded • Plan traffic flow, parking and loading/unloading areas to minimise noise impacts (e.g. no reversing and concentrating activities) • Reduce unnecessary noise from construction personnel (e.g. no swearing or loud stereos) • Inform all employees, contractors and subcontractors are to receive an environmental induction • Minimise plant equipment and construction vehicles noise (e.g. non-tonal reversing beepers and ambient sensitive alarms) • Define exceedances of NMLs in each NCA for standard and OOH periods, including the area that require additional mitigation measures due to worst case exceedances of the proposed construction activities (Scenarios 4 through 6). Detailed description of noise and vibration measures are in Appendix F.	Contractor	Pre-construction
20	Noise and vibration	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.	Contractor	Construction
21	Noise	The noise levels of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with the criteria in Table 4.2 of Appendix F.	Contractor	Construction

No	Impact	Environmental safeguards	Responsibility	Timing
22	Noise and vibration	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 work (where applicable) and contact telephone number. Notification should be a minimum of 7 calendar days prior to the start of work. A contact telephone number and email address will be available for community feedback	TfNSW/Contractor	Pre-construction
23	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.	Contractor	Construction
24	Visual	Urban design principles would be integrated throughout the detailed design and construction of the proposal. The urban design principles would include: • Provide a unified and consistent design both with the proposed structure and existing built elements along the foreshore • Maintain views through the proposed structure. Ensure that the iconic elements of Thomas Walker Estate, and Greenwich Point maintain their character zones and are not adversely affected by the replacement wharf.	TfNSW	Detailed design
25	Visual	Hoarding would be erected around the construction compound where possible, to reduce visibility.	Contractor	Construction
26	Visual	Where OOHW is required, lighting would be directionally controlled to limit potential impacts of light spill on surround receivers, including residential properties.	Contractor	Construction
27	General socio-economic impacts	An internet site and free-call number would be established for enquiries regarding the Proposal for the entirety of construction. Contact details would be clearly displayed at the entrance to the site.	TfNSW	Pre-construction
28	General socio-economic impacts	All enquiries and complaints would be tracked through a tracking system, and acknowledged within 24 hours of being received.	TfNSW	Pre-construction

No	Impact	Environmental safeguards	Responsibility	Timing
29	General socio-economic impacts	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): • 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. The CP would be prepared in accordance with the *Community Involvement and Communications Resource Manual* (RTA, 2008).	TfNSW	Pre-construction
30	Social impacts	The construction area would be secured at all times.	Contractor	Construction
		Closed Circuit Television (CCTV) is to be considered within the Proposal where required.	TfNSW	Detailed design
		Installation of Light Emitting Diode (LED) lighting is recommended along the pedestrian routes to car park, toilets and bus stops as well as near the bicycle racks and lockers to deter any antisocial behaviour. Lighting should create even and continuous coverage across wharf and public domain. Where OOHW is required, lighting would be directionally controlled to limit potential impacts of light spill on surround receivers, including residential properties.	TfNSW	Detailed design
		Consider installing additional help points within the car park, at the toilet area or at bicycle lockers/racks because of its distance from the wharf and isolation from nearby residents.	TfNSW	Detailed design
		For consideration during detailed design and pre-construction, the existing wharf would be evaluated for security and safety implications. Consultation with the Ryde LAC and patrolling Burwood LAC and Council should be undertaken in any future decision.	TfNSW	Detailed design
31	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
32	Water transport	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. In addition, the Proposal would: • 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. Any variation to the above would be agreed in advance with the Harbourmaster.	Contractor	Pre-construction/ construction
33	Construction access and parking	Final access and parking arrangements would include a Traffic Management Plan. The Traffic Management Plan would also include measures to ensure light vehicle parking is strictly in accordance with Ryde Council requirements and prevents parking on footpaths and grassed areas adjacent the site.	Contractor	Pre-construction
34	Transport connection	Additional bus services would be provided to address the gap of ferry services between 9:30pm to 11:37pm on weekdays and after 6.40pm on weekends and public holidays. The community would be made aware of these amendments in accordance with the Communications Plan	TfNSW	Construction
35	Non-Aboriginal heritage	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) is to be followed.	Contractor	Construction
36	Non-Aboriginal heritage	Heritage NSW should be consulted prior to undertaking any work as a means of confirming any required permits or approvals.	TfNSW	Pre-construction
37	Non-Aboriginal heritage	City of Ryde Council to be notified of any work prior to proceeding.	TfNSW	Pre-construction
38	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. Works would only restart once the requirements of that procedure have been satisfied.	Contractor	Construction

No	Impact	Environmental safeguards	Responsibility	Timing
39	Waste	Appropriate measures to avoid and minimise waste associated with the Proposal should be investigated and implemented where possible	Contractor	Construction
40	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 (e.g. where quality control specifications allow).	Contractor	Detailed design
41	Waste	Waste management, littering and general tidiness would be monitored during routine site inspections.	Contractor	Construction
42	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
43	Waste	Should spoil be generated during construction activities, further sampling and analysis should be undertaken to confirm the waste classification prior to disposal.	Contractor	Construction
44	Hazards and risks	Appropriate emergency equipment such as flotation devices and first aid kits would be kept within the construction area.	Contractor	Construction
45	Hazards and risks	All utilities within and adjacent to the Proposal footprint would be located prior to the start of the work.	Contractor	Construction
46	Hazards and risks	Safe work method statements or similar would be implemented to manage health and safety risks for the work.	Contractor	Construction
47	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
48	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
49	Cumulative construction impacts	• Consultation with Department of Industry – Water and King's Rowing School to confirm timing of projects with the Proposal • Consultation would include notification prior to the start of the work. Updates on any delays or changes to the construction period would also be communicated.	TfNSW	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
Approval from the Deputy Harbour Master	Approval from the Deputy Harbour Master for any work that disturb the seafloor.	Prior to the commencement of any works that disturb the seafloor.
Approval from the Department of Planning, Environment (NSW Heritage)	Consultation with NSW Heritage to confirm procuring permit or exemption for potential impacts to local heritage item of 'former boat slips'.	Prior to the commencement of the Proposal.

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, Transport for NSW 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 2.3, which included meeting the project objectives by providing improvements in access, user experience including passenger comfort and amenity, and safety. The design efficacy was determined by comparison to the option of doing nothing and other options outlined in section 2.4.

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 aquatic or terrestrial ecology significant impacts have been identified. Adverse impacts are expected for impacted trees due to root pruning to accommodate the new footpath. Identified 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 except for landside impacts related to tree pruning. The Proposal would result in community benefits through facilitation of a safe and reliable ferry service to Kissing Point 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.	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.
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 Proposal.
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 Proposal, which is summarised in section 6.3. The assessment concluded that no significant impact to aquatic ecology would be caused by the Proposal. Tree removal and adverse impacts are expected to occur from the Proposal. Adverse impacts are likely for one tree (T10) as encroachment to the root zones exceeds acceptable limits.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The Proposal would have minimal or no 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 2.3.3.
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. The Proposal aligns with this objective as it involves the maintenance of, and continued safe access to, the Wharf.
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 Proposal.

Object	Comment
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	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.

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, arboriculture, 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 Kissing Point Wharf 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 water quality, ecology (tree and aquatic), 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 Scientist
WSP

Date:

I have examined this review of environmental factors and accept it on behalf of Transport for NSW

Lisa Monaghan
Project Manager
Greater Sydney Program Office, Transport for NSW

Date: 24/1/2020.

10 References

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Terms and acronyms

Term/Acronym	Description
ABS	Australian Bureau of Statistics
ACHA	Aboriginal Cultural Heritage Advisor
ACHCRs	Aboriginal Cultural Heritage Consultation Requirements
AHD	Australian Height Datum
AHIMS	Aboriginal heritage information management service
AHIP	Aboriginal heritage impact permit
ARI	Average Recurrence Interval
ASS	Acid sulfate soil
ASMA	Australian Maritime Safety Authority
ASSMP	Acid Sulfate Soil Management Plan
BAM	Biodiversity Assessment Method
BC Act	*Biodiversity Conservation Act 1994* (NSW)
BCA	Building Code of Australia
Berthing	A place for a vessel to dock
BOSCAR	Bureau of Crime Statistics and Research
CLM Plan	Contaminated Land Management Plan
CCTV	Close circuit television
CD	Chart Datum
CEMP	Construction environmental management plan
CNVG	Construction Noise and Vibration Guideline
COPC	Chemical of Potential Concern
CP	Communication Plan
DDA	*Disability Discrimination Act 1992*
DECCW	Department of Environment, Climate Change and Water
DPI	Department of Primary Industries
DSAPT	Disability Standards for Accessible Public Transport 2002
EIS	Environmental impact statement
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process
EWMS	Environmental Work Method Statement
FLRSs	Opal Fixed Location Readers
FM Act	*Fisheries Management Act 1994* (NSW)
Gangway	A landing used by passengers to board or exit ships/vessels
HAT	Highest Astronomical Tide

Term/Acronym	Description
Heritage Act	Heritage Act 1977 (NSW)
ISEPP	*State Environmental Planning Policy (Infrastructure) 2007*
ISQG	Interim Sediment Quality Guidelines
Jetty	A structure extending into the harbour as part of a wharf
JTW	Journey to Work
KFH	Key Fish Habitat types as defined by NSW Department of Primary Industry
LAC	Ryde Local Area Command
LAT	Lowest Astronomical Tide
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
MHWM	Mean high water mark
NCAs	Noise Catchment Areas
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
PASS	Potential Acid Sulphate Soils
Piles	Foundations used to support marine structures and offshore platforms
POEO Act	*Protection of the Environment Operations Act 1997*
Pontoon	A floating structure serving as a dock
REF	Review of Environmental Factors
SEPP	State Environmental Planning Policy. A type of planning instrument made under the EP&A Act
SOHI	Statement of Heritage Impact
SRD SEPP	State Environmental Planning Policy (State and Regional Development) 2011
SWMP	Soil and Water Management Plan
Sydney Harbour SREP	Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005
TAP	NSW Government's Transport Access Program
Wharf	A landing place or pier where ships may tie up and load or unload
WRL	Water Research Laboratory

Appendix A

Proposal drawings

Under development

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
During construction of the Proposal, the following impacts are anticipated: • Impact from construction related noise to surrounding receivers. • Impacts to traffic and transport due to temporary closure of the wharf.	High, short-term negative impact.
Operation of the wharf would have improved public transport facilities at Woolwich.	Long-term, positive impact.
Impacts would be minimised through implementing the safeguards and management measures identified in section 7.1 of the REF	

b. Any transformation of a locality?

Impact	Level of impact
The Proposal would have a moderate to low impact to visual and landscape character. Impacts have been reduced through design of the wharf.	Moderate to minor, long-term negative impact.

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

Impact	Level of impact
The assessment of aquatic ecology indicates there would be a minor impact to marine biodiversity during construction.	Minor, short-term negative impact.
This would be offset by the creation of hard surfaces and newly exposed subtidal substrate.	Minor, long-term impact.
Adverse impacts are identified for six trees (T7, T8, T10, T11, T12 and T13) due to root encroachment from the Proposal.	Adverse, short-term impact
Further impact to aquatic and terrestrial ecology would be mitigated through implementing the safeguards and management measures identified in section 7.1 of the REF.	

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 moderate to low. Impacts have been reduced through design of the wharf, including retention of the wharf in its location.	Moderate to minor, 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.	Moderate, short-term negative impact. Minor, long-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
Non-Aboriginal heritage items (former boat slips) may be potentially impacted by the Proposal. Confirmation of impacts would be consulted with NSW Heritage for any excavation permit or exception.	Minor, long-term impact.
It is not anticipated that listed Aboriginal sites would be impacted by the Proposal.	Negligible, long-term impact.

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

j. Any risk to the safety of the environment?

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

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

Impact	Level of impact
The Proposal would not reduce the range of beneficial uses of the environment.	No impact.

l. Any pollution of the environment?

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

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

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

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. Other projects in the same timing of this Proposal include upgrade of Woolwich Wharf with minor increase of additional movements along the Parramatta River. No other significant cumulative impacts have been identified for the Proposal. The Proposal design includes an allowance for sea level rise.	Minor impact, short-term 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 *substantial* 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 *strain* 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 *substantial* 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 *substantial* 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 *minor or inconsequential* disruption to pedestrian or vehicular flow?	Yes	City of Ryde Council	ISEPP cl.13(1)(e)
Road & footpath excavation	Will the works involve more than *minor or inconsequential* excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	Yes	City of Ryde 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 Proposal for the works? If yes, does a heritage assessment indicate that the potential impacts to the item/area are more than *minor or inconsequential*?	Yes	City of Ryde 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 *minor* extent?	No	-	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 *National Parks and Wildlife Act 1974*?	No	-	ISEPP cl.16(2)(a)
Marine parks	Are the works adjacent to a declared marine park under the *Marine Parks Act 1997*?	No	-	ISEPP cl.16(2)(b)
Aquatic reserves	Are the works adjacent to a declared aquatic reserve under the *Fisheries Management Act 1994*?	No	-	ISEPP cl.16(2)(c)
Sydney Harbour foreshore	Are the works in the Sydney Harbour Foreshore Area as defined by the *Sydney Harbour Foreshore Authority Act 1998*?	Yes	-	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?	No	-	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
Inclinators	Do the works include an inclinator?	No	-	SREP cl.31(2)(a)(i) & Schedule 2

Issue	Potential impact	Yes/No	If 'yes' consult with	SREP clause
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?	No	-	SREP cl.31(2)(a)(i) & Schedule 2
Skids	Do the works include skids (i.e. 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
Water based restaurants and entertainment facilities	Do the works include water-based restaurants and/or entertainment facilities? (i.e. 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?	No	-	SREP cl.31(2)(a)(i) & Schedule 2

Appendix D

Aquatic Ecology Assessment

Kissing Point Wharf Upgrade
Aquatic Ecology Assessment

Hansen Yuncken Pty Ltd

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Template 2.8.1

Contents

1. Introduction 1

1.1 The Kissing Point Wharf proposal 1

2. Legislative context 3

2.1 Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) 3
2.2 NSW Environmental Planning and Assessment Act 1979 (EP&A Act) 3
2.3 NSW Biodiversity Conservation Act 2016 (BC Act) 3
2.4 NSW Fisheries Management Act 1994 (FM Act) 3
2.5 NSW Water Management Act 2000 (WM Act) 4
2.6 Sydney Regional Environmental Plan (SREP, Sydney Harbour Catchment) 2005 4
2.7 NSW Coastal Management Act 2016 (CM Act) and State Environmental Planning Policy (Coastal Management) 2018 (Coastal Management SEPP) 4

3. Methods 6

3.1 Desktop assessment 6
3.2 Field survey 6

4. Aquatic habitats and ecology 7

4.1 Previous aquatic habitat mapping 7
4.2 Aquatic habitats at Kissing Point Wharf 10
4.3 Presence or likelihood of threatened and protected species, populations and communities 15

4.3.1 Fish, sharks and marine vegetation 15
4.3.2 Other listed or protected species 17

5. Impact assessment and mitigation 18

5.1 Assessment of construction impact 19
5.2 Assessment of operational impact 20
5.3 Fisheries Management Act habitat protection and permit requirements 21
5.4 Sydney Regional Environmental Plan (SREP, Sydney Harbour Catchment) 2005 23
5.5 Recommended mitigation measures 25

6. Conclusions 27
7. References 28
Appendix A Threatened species likelihood of occurrence and impact 29
Appendix B Key fish habitat types 36

List of Figures

Figure 1: Proposed Kissing Point Wharf design (Drawing SK 10, Revision 1) 2
Figure 2: Sydney Harbour - Foreshores and Waterways Area Development Control Plan: Ecological Communities and Landscape Characters (map sheet 03) 7
Figure 3: Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005: Wetlands Protection Area (map sheet 2) 8
Figure 4: DPI Fisheries mapping of estuarine macrophytes (Creese et al 2009) 9
Figure 5: Field-validated habitat (June and July 2017) 12
Figure 6: Existing wharf and intertidal habitat 14
Figure 7: Subtidal habitat 15

List of Tables

Table 1: Impact to key fish habitat 23

Abbreviations

Abbreviation	Description
BC Act	NSW *Biodiversity Conservation Act 2016*
CM Act	NSW *Coastal Management Act 2016*
DDA	Disability Discrimination Act
DPI	NSW Department of Primary Industries
ELA	Eco Logical Australia Pty Ltd
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
FM Act	NSW *Fisheries Management Act 1994*
KFH	Key fish habitat
WM Act	NSW *Water Management Act 2000*

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Executive Summary

The New South Wales Government has proposed an upgrade of Kissing Point 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:

- Retainment of the existing stone abutment and concrete jetty leading from the carpark
- Installation of a 5 m long by 5 m wide concrete bridge, held in place by four new piles
- Installation of a new gangway 5 m wide by 20 m long, extending from the bridge
- Installation of an 18 m wide by 9 m long floating and glazed pontoon, held in position by four steel piles
- Installation of two protection piles to the east and west of the glazed pontoon.

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 Port Jackson (defined as Sydney Harbour, Middle Harbour, North Harbour and the Lane Cove and Parramatta Rivers), plus a 10 km buffer from shore. These were further assessed for the immediate area surrounding the Kissing Point Wharf. An underwater survey using a boat-mounted video camera was completed within 40 m of the proposed works and determined if those species would likely occur and be impacted.

The proposal would directly and indirectly impact a small area of key fish habitat (KFH) defined by DPI Fisheries Policy and Guidelines for Fish Habitat Conservation and Management (2013 update). Direct impact would result from the installation of piles. Indirect impact would result from partial shading from the wharf structure, but would only affect about 14 individual macroalgae plants. All impacts are minor given the similar scale and position to the existing wharf structure. The maximum impact across 270 m^2 (256 m^2 of type 3 KFH and 14 m^2 of type 2 KFH) would be compensated across 348 m^2 (346 m^2 of type 3 KFH and 2 m^2 of type 2 KFH), including new hard substrate habitat and newly exposed benthic habitat. A permit to *Harm Marine Vegetation* under Part 7 of the FM Act is not required.

The proposal does not involve dredging, reclamation or obstruction of fish passage and, therefore, does not trigger Section 199 consultation under Part 7 of the FM Act.

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 Kissing Point 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 Port Jackson and a 10 km buffer
- Aquatic survey during optimum conditions (calm seas with high water clarity) within at least 50 m of the proposed structure
- 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 Kissing Point Wharf proposal

The upgrade of Kissing Point Wharf (the proposal) would replace the existing wharf structure with the following features (Figure 1):

- Retainment of the existing stone abutment and concrete jetty leading from the carpark
- Installation of a 5 m long by 5 m wide concrete bridge, held in place by four new piles
- Installation of a new gangway 5 m wide by 20 m long, extending from the bridge
- Installation of an 18 m wide by 9 m long floating and glazed pontoon, held in position by four steel piles

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- Installation of two protection piles to the south of the glazed pontoon.

Construction is expected to start in early 2020 and take about four months to complete. Additional construction details are provided in Section 5.

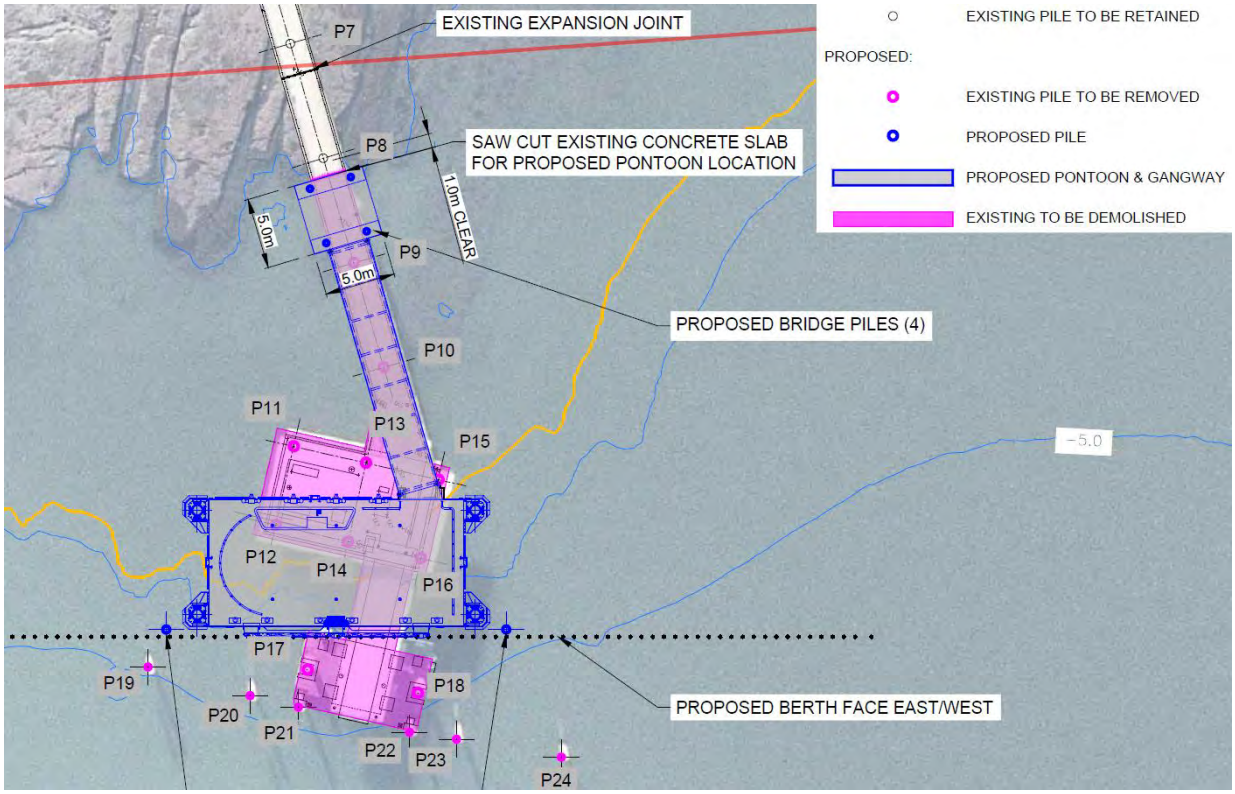


Figure 1: Proposed Kissing Point Wharf design (Drawing SK 10, Revision 1)

Source: Royal Haskoning DHV

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 and Public Spaces, 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 aquatic 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 Kissing Point Wharf is mapped as KFH. No dredging, reclamation or obstruction of fish passage would be required, therefore, Section 199 of the FM Act does not apply. There would be minor indirect and direct impact to marine vegetation (scattered microalgae), but this wouldn't be sufficient to require a permit to *Harm Marine Vegetation*.

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 41 of the *Water Management (General) Regulation 2018* (WM Reg) 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.

The new Coastal Management SEPP consolidates and updates SEPP 14 (Coastal Wetland), SEPP 26 (Littoral Rainforests) and SEPP 71 (Coastal Protection), which are now repealed. Under the Coastal Management SEPP, the Coastal Management SEPP mapping identifies the area surrounding Kissing Point Wharf as 'Coastal environment area'. However, Clause 13(3) of the Coastal Management SEPP states that development controls for coastal environment areas do not apply to land within the Foreshores and Waterways Area within the meaning of the *Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005*. Therefore, the Coastal Management SEPP does not apply.

3. Methods

3.1 Desktop assessment

Online database searches were used to confirm the presence of recorded species in the region prior to the field survey. This was then used to infer what was likely to be present in the study area. The desktop search on 24 June 2019 covered Port Jackson (defined as Sydney Harbour, Middle Harbour, North Harbour and the Lane Cove and Parramatta Rivers), 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 19 June 2017 on foot by ELA's senior aquatic ecologist, and on 13 July 2017 by three ELA ecologists in a boat, including one senior aquatic ecologist. Although the survey date is now several years old, discussion with DPI Fisheries staff indicate this duration is acceptable, especially where the dominant and most valuable fish habitat is reasonably stable. In this case, macroalgae supported by the rock platform is unlikely to change without interference.

The survey area covered at least forty metres from the edge of proposed work, plus farther areas where necessary to validate habitat extent. Weather conditions, on both days, were calm and there was minimal swell. Underwater visibility was less than one metre. The maximum depth was approximately eight metres.

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 3 of the 'Sydney Harbour - Foreshores and Waterways Area Development Control Plan 2005: Ecological Communities and Landscape Characters', identifies the study area as 'mudflats' and 'water', with riparian land mapped as 'urban development with scattered trees and grassland' (Figure 2).

Sheet 2 of the 'Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005: Wetlands Protection Area', does not identify the site as a 'Wetlands Protection Area' (Figure 3). Clause 61 of the SREP (Sydney Harbour Catchment) 2005 has not been triggered.

The State-wide mapping of estuarine macrophytes (mangroves, saltmarsh and seagrass) by DPI Fisheries identifies the nearest patch of marine vegetation (mangrove) as being 100 m to the north-east of the wharf (Creese et al 2009, Figure 4). There are no local records of the threatened *Posidonia* seagrass population.

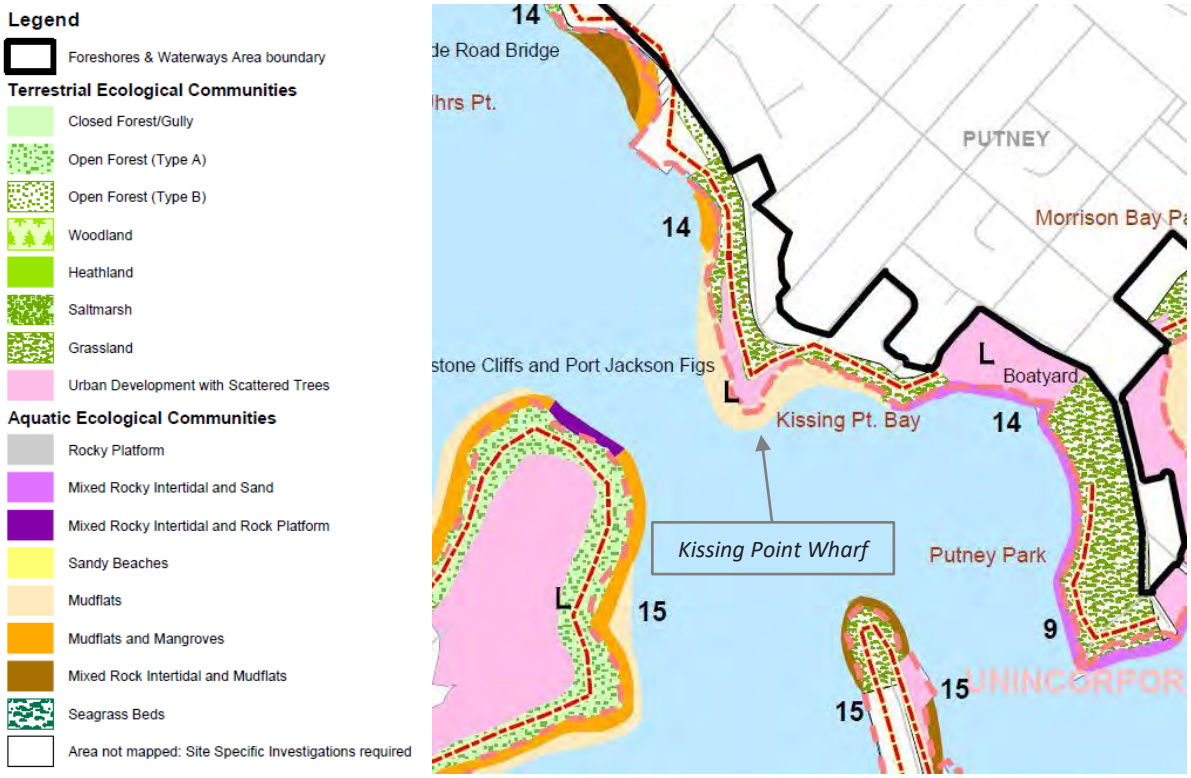


Figure 2: Sydney Harbour - Foreshores and Waterways Area Development Control Plan: Ecological Communities and Landscape Characters (map sheet 03)

Source: http://www.planning.nsw.gov.au/Policy-and-Legislation/Environment-and-Heritage/Sharing-Sydney-Harbour

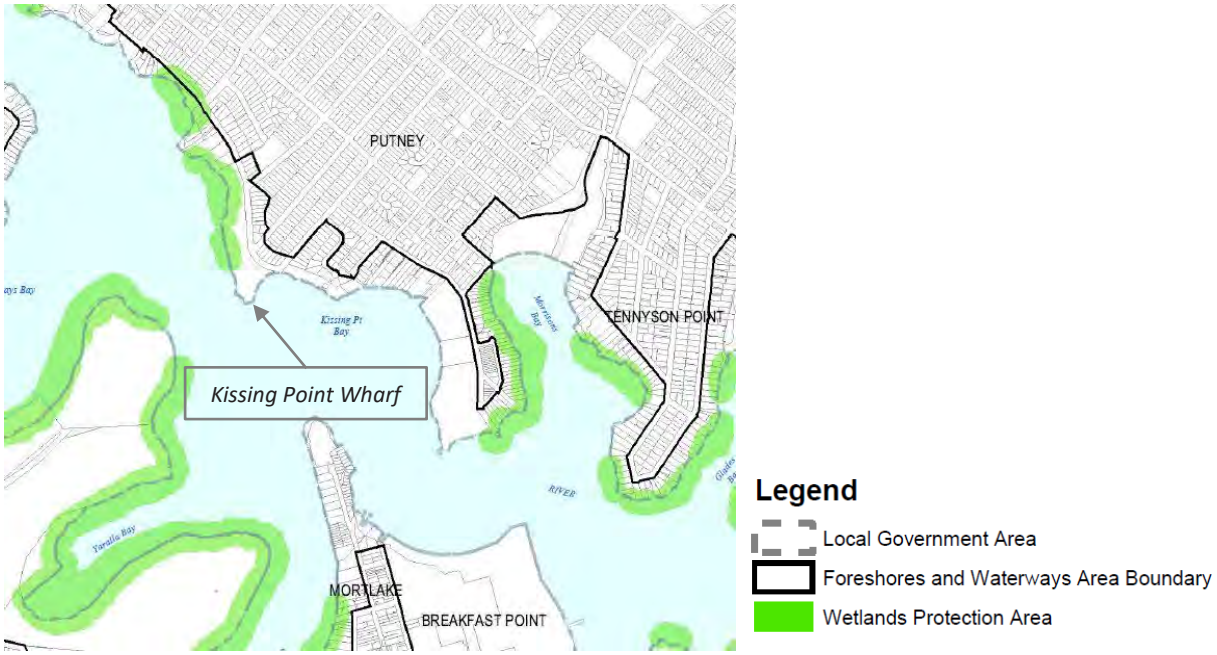


Figure 3: Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005: Wetlands Protection Area (map sheet 2)

Source: http://www.planning.nsw.gov.au/Policy-and-Legislation/Environment-and-Heritage/Sharing-Sydney-Harbour

Figure 4: 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 Kissing Point Wharf

Aquatic habitat in the study area has been modified by land reclamation, a small vertical seawall, the existing wharf structure and piles, and disturbance by regular boat traffic. Six distinct zones were mapped during the field survey (Figure 5):

- *Manmade structures* (Figure 6) – Foreshore habitat was highly modified by a footpath, mown lawn, carpark and small retaining wall at the start of the jetty. These constrain future establishment of mangroves and saltmarsh. The existing jetty was supported by piles on the rock platform, which had a dense covering of barnacles. In deeper water, most piles and the pontoon had a dense covering of short encrusting organisms, mostly common green and brown algae, turfing algae, ascidians, polychaetes and barnacles.
- *Intertidal bare sand* (Figure 6) – A sand deposit formed a small beach adjacent to the carpark reserve. The beach was strewn with woody debris and shells. No crabs or infauna burrows were observed, but they would occur in low numbers around the point. No saltmarsh had established above the beach due to grade and mowing.
- *Intertidal rock* (Figure 6) – A large intertidal rock platform extended around the point, featuring shallow depressions and deposits of gravel, sand and shell. A biofilm dominated by green filamentous algae covered much of the bedrock. Microhabitats in sheltered areas were suited to sessile marine species, including *Bembicium nanum* (striped-mouth conniwink), *Saccostrea glomerata* (Sydney rock oyster), *Chamaesipho tasmanica* (honeycomb barnacle) and *Cellana* spp. (limpets).
- *Mangroves* (Figure 6) - *Avicennia marina* (grey mangrove) occurred in two locations. Several mature-sized trees were establish along a sandy beach north-east of the existing wharf, outside of the impact area. Five juvenile plants had established on soft sediment deposits on the rock platform, west of the proposed wharf. Given the shallow sediment depth over the bedrock, the trees west of the wharf are unlikely to form large specimens with spreading roots and pneumatophores. As such they are of low ecological value.
- *Subtidal rock with scattered macroalgae* – The subtidal portion of the rock platform supported scattered brown macroalgae, dominated by *Sargassum* spp. and *Pandina fraseri* (fan weed) at a low density of about 1 plant per square metre. Plants were clustered in the shallowest areas of the rock where there was increased light, plus where rock shape was more complex. Due to the high turbidity water of the Parramatta River, photographs of this vegetation type were not clear for inclusion in this report. Presence was verified using a video camera with on-board monitor.
- *Subtidal bare sand* (Figure 7) – The subtidal zone was characterised by soft silty-sand. A sparse cover of bioturbation from infauna is evident. A fine biofilm of green filamentous algae covered most of the substrate. No seagrass or macroalgae were observed.

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 5, 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 and subtidal bedrock with scattered brown macroalgae
- Type 3 (minimally sensitive key fish habitat) – habitat is represented as unvegetated subtidal sediment, intertidal rock platform, intertidal sand and intertidal seawall.

No threatened species, populations or communities were observed in the study area, or are expected to use the site (see Section 4.3 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.

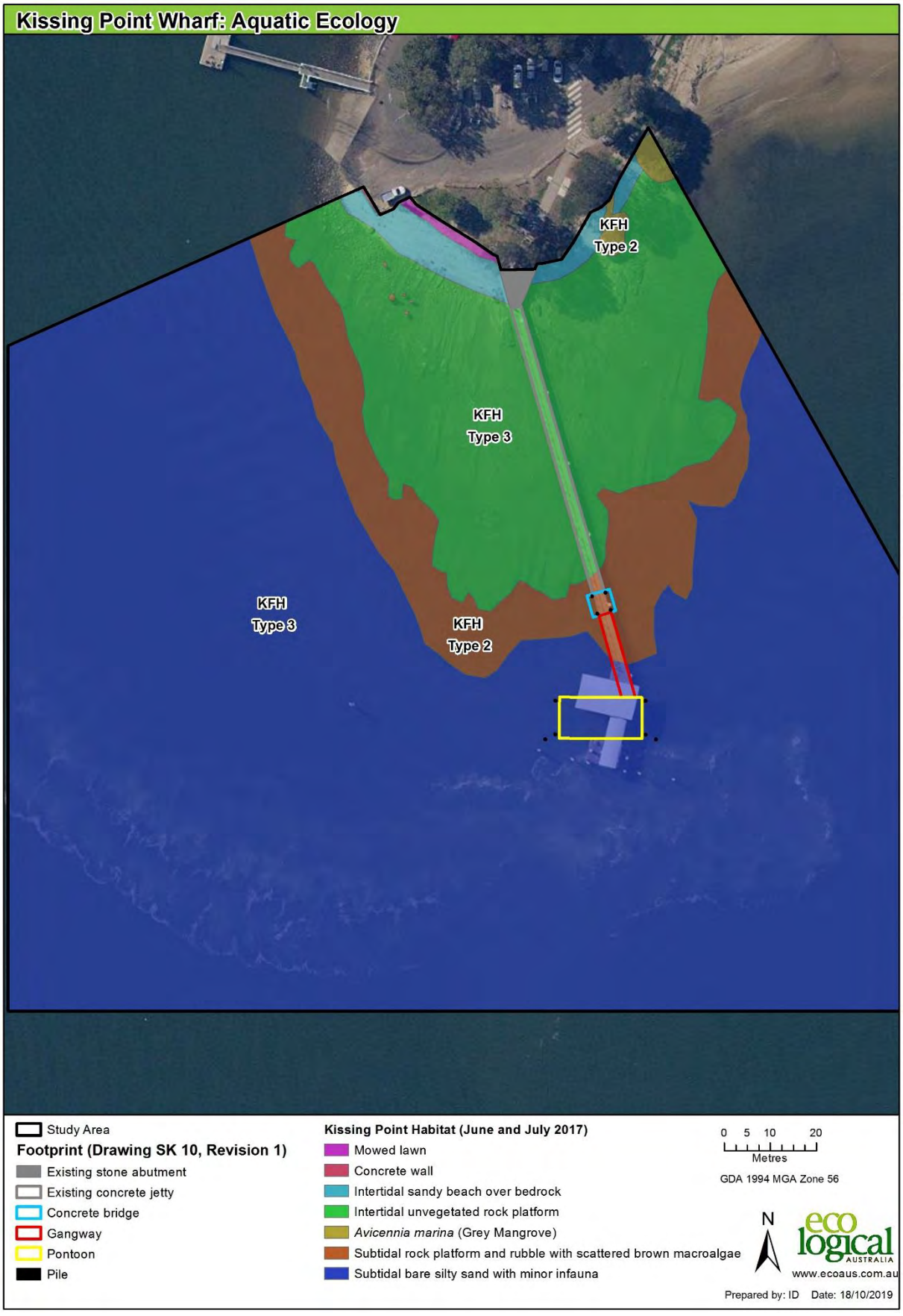
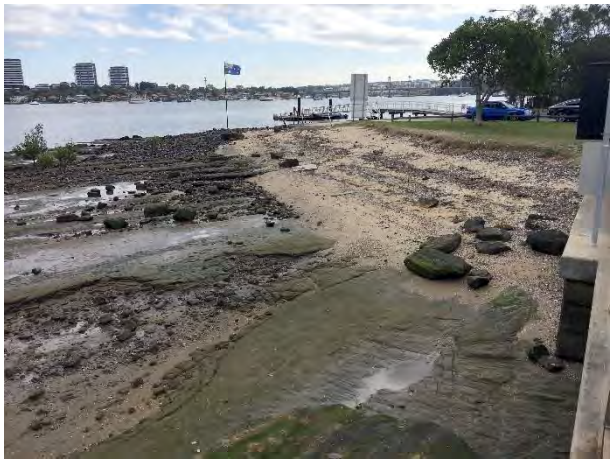


Figure 5: Field-validated habitat (June and July 2017)

Wharf to be replaced

Intertidal unvegetated rock platform

Concrete wall



Intertidal sandy beach and rock platform – facing west

Intertidal sandy beach – facing east

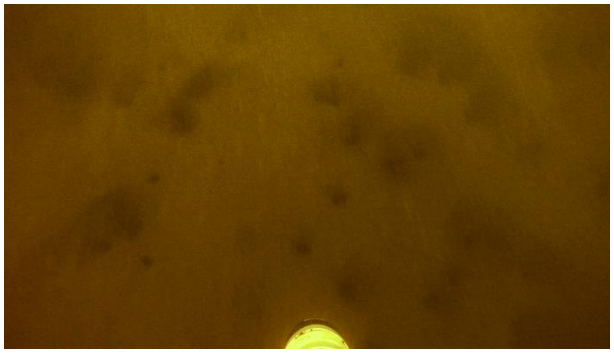
Juvenile mangroves

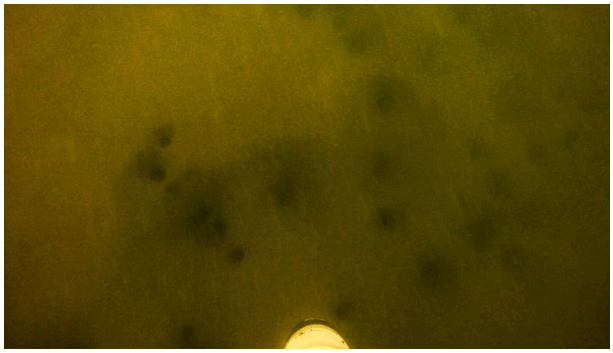
Mangroves in intertidal zone to the west of the wharf

Intertidal rock platform with filamentous algae

Mown lawn upslope of beach

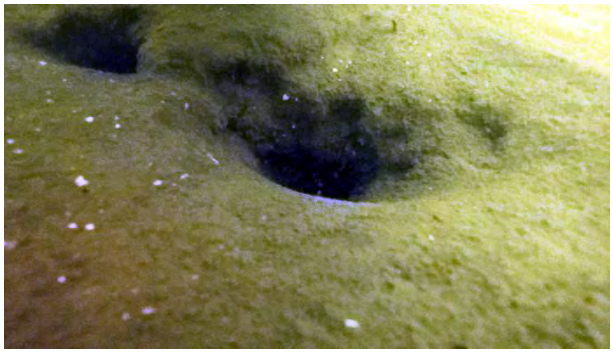
Figure 6: Existing wharf and intertidal habitat



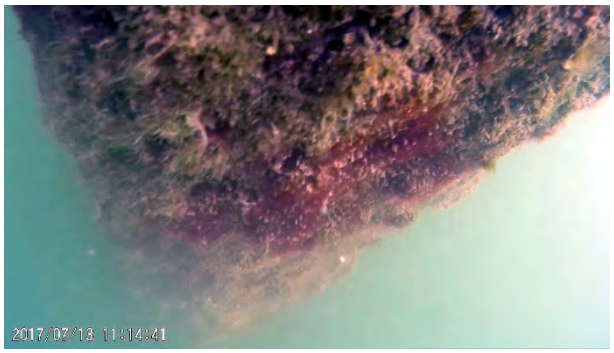


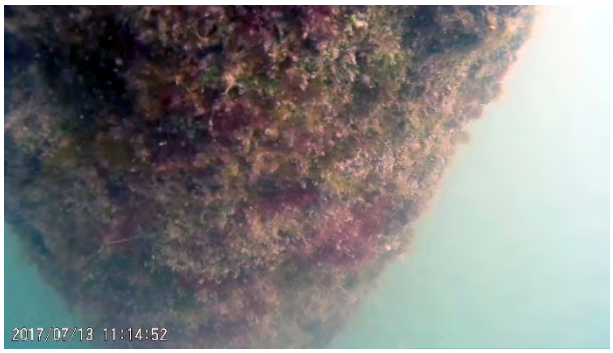
Unvegetated subtidal sediment with infauna burrows

Leatherjacket



Green filamentous algae on soft sediment





Encrusting organisms and turfing algae on piles

Encrusting organisms and turfing algae on piles

Figure 7: Subtidal habitat

4.3 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 opportunistically pass through the area given the connectivity to the broader harbour and coastal habitats, but they are unlikely to depend on habitat within the site for their survival.

4.3.1 Fish, sharks and marine vegetation

Protected and threatened fauna listed under the FM Act were assessed for their likelihood of occurrence. Listed marine or estuarine species include sharks, bony fishes, and the taxonomic order of

syngnathiformes (seahorses, seadragons, pipefish, pipehorses, ghostpipefish and seamoths). Further details on threatened species are included in Appendix A. Listed protected species assessed included:

- The Herbsts nurse shark, which only occurs in deep water (150-600 m) and would not be present in the study area.
- Elegant wrasse, Ballina angelfish, giant Queensland groper, bluefish and eastern blue devil fish require rocky reefs, caves and crevices, 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 occur in the harbour, and are known to 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). No seahorses were observed or expected on site, therefore, management of syngnathids is not required. Note that *Hippocampus whitei* (White's seahorse) is proposed for listing as endangered under the FM Act, but as it is not expected to occur at Kissing Point Wharf, an assessment of significance in accordance with Section 220ZZ of the FM Act is not required.

Other 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, so these species would not occur here.

Threatened sharks are unlikely in the area, as the site in on the western extent of their expected distribution. 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 prolonged periods due to a lack of structural, sheltering or foraging habitat. Regular boat traffic 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. The high intertidal zone, where saltmarsh is usually found, is intertidal sand and mown lawn. No saltmarsh species were observed.

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 Port Jackson, this zone is usually less than three metres deep. Soft sediments in the study area occur at depths less than three metres, but 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. Scattered macroalgae was present on site along the edge of the rock platform, but was absent on existing piles. The turbid was would restrict light penetration,

only allowing shallow and sparse macroalgae growth. Mangroves occur in the harbour in protected bays and tidal waterways with soft intertidal sediment. They were found scattered along the beach east of the wharf, plus a small number of juveniles had established in soft sand deposits within rock crevices west of the wharf.

4.3.2 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. 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 they explore the greater area but would not depend on the site for feeding habitat or nesting.

Threatened shore, wetland, migratory and pelagic birds may use intertidal zones 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 Kissing Point Wharf based on the work described in Section 1.1.

Demolition of existing piles, pontoon, gangway, fixed wharf and partial jetty

- The existing pontoon, gangway, fixed wharf and part of the jetty would be dismantled and removed using a barge or land-mounted crane and transported to land.
- Most of the existing piles (16) would be removed, either fully pulled or cut and capped.

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 the 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 will not budge 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 four weeks to complete. This would allow for respite from noise and a contingency for unfavourable weather.

Construction of new gangway and pontoon

- 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

Two impact types are likely to occur during wharf installation:

- Noise generation and disturbance from piling
- Disturbance from construction vessels, such as boat/propeller wash, temporary mooring and accidental spills.

Pile impact

A total of ten new piles would be drilled and hammered to refusal into the bedrock. Eight piles would be 0.61 m in diameter and two would be 0.90 m in diameter. Creating a total impact area less than 4 m^2. This impact would mostly be in type 3 KFH, on subtidal sediment. Four piles would impact subtidal rock platform with scattered brown macroalgae (type 2 KFH).

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 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. Estimates on number or species of fish potentially impacted is not part of this assessment.

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 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.

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 silt or sand that does settle on infauna burrows would not cause significant damage.

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 aren't 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.

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 from the pontoon and gangway
- 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 existing use the following impacts are considered minor:

- Ferry wash is unlikely to increase considering the current ferry use
- Propeller/thrust disturbance to sediments is unlikely to increase given the frequent use by ferries currently
- Pollutants expelled from ferries would be the same as existing conditions throughout the river
- Litter from visitors to the wharf would be reduced through increased bins, signage, fencing and glazed screens.

Shading impact

Partial shading from the new pontoon and gangway would have an indirect impact on subtidal unvegetated sediment (type 3 KFH) and subtidal rock platform with scattered macroalgae (type 2 KFH). The new structure would shade 114 m^2 of subtidal habitat, but a similar amount would be opened up to light from the demolition of the existing wharf. The small bridge would slightly extend the existing shading of a small area of scattered brown macroalgae that wraps around the subtidal end of the rock platform. Given the scattered distribution of macroalgae (about one plant per square metre) and only partial shading created, this impact would be minor and not of significance to the local extent. Benthic organisms (ie infauna) would not be significantly impacted, as they are not light dependant. New areas of subtidal sediment would also be exposed to sunlight with the upgrade, which would provide a positive impact to those areas.

Creation of hard substrates

Once installed, the piles would create 25 m^2 of new vertical hard substrate, which would provide areas for the attachment of sessile marine organisms and structural habitat for small fish (type 3 KFH). The number of new piles is less than the number of piles being removed, so there would be a loss of pile habitat. The new pontoon would create 261 m^2 of new hard substrate (type 3 KFH). The new pontoon is larger than the existing pontoon and would provide additional habitat. In total the new pontoon and piles would create more type 3 habitat than is being removed (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 4.3 and Appendix A). As such, an assessment of significance is not required.

Protected vegetation

The proposed works may harm brown macroalgae due to partial shading from the bridge and direct impact from four piles. In this area, macroalgae is scattered due to turbid water. The total number of plants impacted would be very low, estimated as 14 individuals across 14 m^2. Mangroves nearby would not be harmed and would be protected during construction by establishing no-go zones. Seagrass and saltmarsh do not occur in the area and would not be impacted. Overall, the works are unlikely to have any significant ecological impact to protected marine vegetation.

Protected fauna

As discussed in Section 4.3.1 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 Greenwich and Birchgrove.

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 directly and indirectly harm marine vegetation (14 m^2 of scattered brown macroalgae, type 2 KFH). However, given the scattered cover of these plants, the impact may only apply to about 14 individual plants. This small impact is unlikely to trigger the need for permit to *Harm Marine Vegetation*.

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).

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 as well as 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 256 m^2 of type 3 KFH and 14 m^2 of type 2 KFH (see breakdown in Table 1). This impact includes direct damage from pile installation, partial shading beneath the pontoon, and removal of existing habitat (pontoon and piles).

This habitat impact would be compensated by the creation of 346 m^2 of type 3 KFH and 2 m^2 of type 2 habitat. This would come from the addition of hard surfaces and exposing light to new areas, including subtidal rock suitable for macroalgae establishment. Using wetted pile heights ranging between 0.5–3 m, the habitat created by piles is calculated to be 25 m^2. The wetted sides of the new pontoon

(approximately 1 m in height) and shaded underside would create 216 m^2 of habitat (although upside-down pontoon habitat in Port Jackson may aid dispersal of exotic species, Glasby and Connell 2001). In addition to this, newly exposed benthic habitat from the removal of the existing pontoon, fixed wharf, gangway and piles would improve 89 m^2 of habitat.

The maximum impact would be 270 m^2, which would be offset by 348 m^2 of hard surfaces and newly exposed substrate, meeting the Fisheries Policy of 'no net loss' of KFH. Considering the current disturbance, the pre and post-construction habitat would provide the same function and value. The removal of the existing wharf would open new areas up to light, but not in an area suited to macroaglae (type 2 KFH). Therefore, the overall loss of type 2 habitat falls short of Roads and Maritime's offset guideline (ie -11 m^2).

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)	Net change (m^2)
Piles (wetted surface area) (type 3 KFH)	79.17	16 removed 10 gained	79.17 -	- 24.50	-54.67
Pontoon (wetted surface area) (type 3 KFH)	73.00	1 removed 1 gained	73.00 -	- 216.00	143
Concrete seawall (type 3 KHH)	11.70	No Impact	-	-	-
Intertidal sandy beach (type 3 KFH)	410.44	No Impact	-	-	-
Intertidal unvegetated rock platform (type 3 KFH)	4964.95	No Impact	-	-	-
Avicennia marina (Grey Mangrove) (type 2 KFH)	107.86	No Impact	-	-	-
Subtidal rock platform with scattered macroalgae (type 2 KFH)	2460.60	Partial shading Direct piling	12.50 1.13	- 2.26*	-11.37
Subtidal bare sand with minor infauna (type 3 KFH)	24,887.87	Partial shading Direct piling	101.38 2.40	89.14** 15.83*	1.19
Total	**33,995.59**		**269.58**	**347.73**	**+78.15**

*Existing piles that would be removed

**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 the harbour.

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 or saltmarsh communities occur on site. Scattered brown macroalgae was present on the subtidal rock platform. The new structure would partially the macroalgae during the middle of the day, and four piles may directly harm a small number of plants. Mangroves occur to the east and west of the current wharf, but if no-go zones are established and followed during construction, there would be no impact to these plants.

21(c) Development should promote ecological connectivity between neighbouring areas of aquatic vegetation (such as seagrass, saltmarsh and algal and mangrove communities).

No seagrass or saltmarsh communities occur on site or are likely to establish here. Harm to macroalgae and mangroves would be avoided through establishing no-go zones during construction. The proposal would not severe the connectivity of the marine vegetation any more than the existing conditions.

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 and high energy boat wash, it is unlikely the proposed works would alter the local hydrology to the extent that would impact the survival of mangroves on or surrounding site.

21(e) Development should protect and reinstate natural intertidal foreshore areas, natural landforms and native vegetation.

The natural intertidal foreshore consists of sand and rock platform, the high intertidal zone is heavily landscaped with mown lawn and planted trees. Native vegetation, eg mangroves, would not be affected. The proposal would not alter the surrounding area. The proposal cannot alter this situation due to nearby onshore land use.

21(f) Development should retain, rehabilitate and restore riparian land.

Riparian land is heavily landscaped with mown lawn and planted trees. The proposal does 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 site does not adjoin and is not in a designated wetland identified on the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 – Wetlands Protection Map. There would be no significant impact to marine vegetation.

21(h) The cumulative environmental impact of development.

No cumulative impact is expected. The foreshore and aquatic habitat are 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 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 (21 May 2016). Based on the analytical results, the sediments reported elevated contamination, with six chemicals of potential concern above low trigger values. Potential acid sulfate soils 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.

During construction, disturbance would arise from drilling rock prior to pile screwing and driving. These coarse, deeper sediments are unlikely to contain contaminates, which are usually associated with finer particles deposited or chemically altered under anoxic conditions. Fine-scale sediment plumes potentially carrying pollutants would be confined near the site during construction using a floating boom and silt curtain. As Coffey's sampling was confined to the upper 20 cm sediment layer, they recommend that further testing is required if spoil is generated from deeper pile drilling.

5.5 Recommended mitigation measures

The following mitigation measures are recommended to minimise the risk of impact during construction and operation at the 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
  - 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 and macroalgae)
  - 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)
  - other measure listed below.
- Establish no-go zones to avoid damage to nearby 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. The no-go zone should include all marine vegetation outside of immediate construction footprint (see Figure 5).

- 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 drilling and pile hammering. This should be wrapped from shore to shore, containing all site activity and should not be removed until the risk of sedimentation is negligible.
- All waste material should be disposed of on land and not reused in the construction.
- Care should be taken not to introduce *Caulerpa taxifolia* 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 another location. Fragments of *Caulerpa* can remain viable 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).
- 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.
- Seahorses are not expected on this site, so no specific mitigation measures are required.

6. Conclusions

The assessment in this report demonstrates that there would be only minor direct or indirect impacts to marine vegetation (about 14 macroalgae plants from partial shading and four new piles), but this wouldn't be sufficient to require a permit to *Harm Marine Vegetation* under Part 7 of the FM Act. As there would be no dredging, reclamation or obstruction of fish passage, consultation is not required with the Minister for Primary Industries under Section 199 of the FM Act.

Syngnathids (seahorses and their relatives) are unlikely to occur and do not need specific management.

The proposal would result in a minor net gain of key fish habitat, as defined by the DPI Fisheries Policy and Guidelines for Fish Habitat Conservation and Management (2013 update). The maximum impact across 270 m^2 (256 m^2 of type 3 KFH and 14 m^2 of type 2 KFH) would be compensated across 348 m^2 (346 m^2 of type 3 KFH and 2 m^2 of type 2 KFH), including new hard substrate habitat and newly exposed benthic habitat. However, the overall 11m^2 loss of type 2 KFH falls short of the Roads and Maritime's offset guideline.

In regard to the wetlands protection, biodiversity, ecology and environmental protection requirements of the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005, the proposal would not alter marine vegetation or wetland habitat in the long-term, due to replacement of similar habitat structures.

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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. Database search date: 24 June 2019.

Type	Species name	Common name	BC/FM Act Status	EPBC Status	Use of site	Is an impact assessment required?
Fish	*Epinephelus daemelii*	Black Rockcod	V	V	No suitable habitat present, eg rock overhangs, crevices or caves	No
	Hippocampus whitei	White's Seahorse	E proposed		No suitable habitat present and no records this far upstream.	No
	Macquaria australasica	Macquarie Perch	E1	E	No records in catchment	No
	Prototroctes maraena	Australian Grayling	E	V		No
Shark	*Carcharias taurus*	Grey Nurse Shark	E4A	CE	No records in river, no suitable habitat	No
	Carcharodon carcharias	Great White Shark	V	V		No
	Lamna nasus	Porbeagle, Mackerel Shark		Bonn		No
	Rhincodon typus	Whale Shark		V,Bonn		No
Ray	*Manta alfredi*	Reef Manta Ray		Bonn	No records in river, no suitable habitat	No
	Manta birostris	Giant Manta Ray		Bonn		No
	Pristis zijsron	Green Sawfish	E4	V	Presumed extinct in NSW	No
Turtle	*Caretta caretta*	Loggerhead Turtle	E1	E	No records in river, no suitable habitat	No
	Chelonia mydas	Green Turtle	V	V		No
	Dermochelys coriacea	Leatherback Turtle	E1	E		No
	Eretmochelys imbricata	Hawksbill Turtle		V,Bonn		No

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Type	Species name	Common name	BC/FM Act Status	EPBC Status	Use of site	Is an impact assessment required?
	Natator depressus	Flatback Turtle		V,Bonn		No
Whale	*Balaenoptera edeni*	Bryde's Whale		BonnBonn	No records in river, no suitable habitat	No No
	Balaenoptera musculus	Blue Whale	E1	E		No
	Balaenoptera borealis	Sei Whale	E1	V,BonnE		No
	Balaenoptera physalus	Fin Whale		V,Bonn		No
	Caperea marginata	Pygmy Right Whale		Bonn		No
	Eubalaena australis	Southern Right Whale	E1	E		No
	Megaptera novaeangliae	Humpback Whale	V	V		No
	Physeter macrocephalus	Sperm Whale	V			No
Dolphin	*Lagenorhynchus obscurus*	Dusky Dolphin		Bonn	No records in river, unlikely close to shore	No
	Orcinus orca	Killer Whale, Orca		Bonn		No
	Sousa chinensis	Indo-Pacific Humpback Dolphin		Bonn		No
Marine mammal	*Dugong dugon*	Dugong	E1	Bonn	No habitat on site	No
Seal	*Arctocephalus forsteri*	New Zealand Fur-seal	V		No records in river, unlikely this far upstream	No
	Arctocephalus pusillus doriferus	Australian Fur-seal	V			No
Frog	*Litoria aurea*	Green and Golden Bell Frog	E1	V	No habitat	No
Bird	*Actitis hypoleucos*	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
	Anous stolidus	Common Noddy		C,J		No
	Anseranas semipalmata	Magpie Goose	V			No
	Apus pacificus	Fork-tailed Swift		C,J,K		No
	Ardenna carneipes	Flesh-footed Shearwater	V	J,K		No

Type	Species name	Common name	BC/FM Act Status	EPBC Status	Use of site	Is an impact assessment required?
	Arenaria interpres	Ruddy Turnstone		C,J,K		No
	Botaurus poiciloptilus	Australasian Bittern	E1	E		No
	Calidris acuminata	Sharp-tailed Sandpiper		C,J,K		No
	Calidris alba	Sanderling	V	C,J,K		No
	Calidris canutus	Red Knot		C,J,K		No
	Calidris ferruginea	Curlew Sandpiper	E1	CE,C,J,K		No
	Calidris melanotos	Pectoral Sandpiper		J,K		No
	Calidris ruficollis	Red-necked Stint		C,J,K		No
	Calidris subminuta	Long-toed Stint		C,J,K		No
	Calidris tenuirostris	Great Knot	V	C,J,K		No
	Calonectris leucomelas	Streaked Shearwater		C,J,K		No
	Charadrius bicinctus	Double-banded Plover		Bonn		No
	Charadrius leschenaultii	Greater Sand-plover	V	C,J,K		No
	Charadrius mongolus	Lesser Sand-plover	V	C,J,K		No
	Charadrius veredus	Oriental Plover		J,K		No
	Diomedea antipodensis	Antipodean Albatross	V	V		No
	Diomedea epomophora	Southern Royal Albatross		Bonn		No
	Diomedea exulans	Wandering Albatross	E1	V,J		No
	Diomedea antipodensis gibsoni	Gibson's Albatross	V	V		No
	Diomedea sanfordi	Northern Royal Albatross		E,Bonn		No

Type	Species name	Common name	BC/FM Act Status	EPBC Status	Use of site	Is an impact assessment required?
	Ephippiorhynchus asiaticus	Black-necked Stork	E1			No
	Esacus magnirostris	Beach Stone-curlew	E4A			No
	Eudyptula minor	Little Penguin in the Manly Point Area	E2			No
	Fregata ariel	Lesser Frigatebird		C,J,K		No
	Fregata minor	Great Frigatebird		C,J		No
	Fregetta grallaria grallaria	White-bellied Storm-Petrel		V		No
	Gallinago hardwickii	Latham's Snipe		C,J,K		No
	Gallinago megala	Swinhoe's Snipe		Bonn,C		No
	Gallinago stenura	Pin-tailed Snipe		Bonn,C		No
	Gygis alba	White Tern	V			No
	Haematopus fuliginosus	Sooty Oystercatcher	V			No
	Haematopus longirostris	Pied Oystercatcher	E1			No
	Haliaeetus leucogaster	White-bellied Sea-eagle	V			No
	Ixobrychus flavicollis	Black Bittern	V			No
	Limicola falcinellus	Broad-billed Sandpiper	V	C,J,K		No
	Limosa lapponica	Bar-tailed Godwit		C,J,K		No
	Limosa limosa	Black-tailed Godwit	V	C,J,K		No
	Macronectes giganteus	Southern Giant Petrel	E1	E		No

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Type	Species name	Common name	BC/FM Act Status	EPBC Status	Use of site	Is an impact assessment required?
	Macronectes halli	Northern Giant-Petrel	V	V		No
	Numenius madagascariensis	Eastern Curlew		CE,C,J,K		No
	Numenius minutus	Little Curlew		C,J,K		No
	Numenius phaeopus	Whimbrel		C,J,K		No
	Onychoprion fuscata	Sooty Tern	V			No
	Pachyptila turtur subantarctica	Fairy Prion (southern)		V		No
	Pandion cristatus	Eastern Osprey	V			No
	Pandion haliaetus	Eastern Osprey		Bonn		No
	Philomachus pugnax	Ruff		C,J,K		No
	Phoebetria fusca	Sooty Albatross	V	V		No
	Pluvialis fulva	Pacific Golden Plover		C,J,K		No
	Pluvialis squatarola	Grey Plover		C,J,K		No
	Pterodroma leucoptera leucoptera	Gould's Petrel	V	E		No
	Pterodroma neglecta neglecta	Kermadec Petrel	V	V		No
	Pterodroma solandri	Providence Petrel	V	J		No
	Rostratula australis	Australian Painted Snipe	E1	E		No
	Sternula albifrons	Little Tern	E1	Bonn,C,J,K		No
	Sternula nereis nereis	Australian Fairy Tern		V		No

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Type	Species name	Common name	BC/FM Act Status	EPBC Status	Use of site	Is an impact assessment required?
	Thalassarche bulleri platei	Buller's Albatross		V,Bonn		No
	Thalassarche cauta cauta	Shy Albatross	V	V		No
	Thalassarche cauta steadi	White-capped Albatross	V	V		No
	Thalassarche eremita	Chatham Albatross		E,Bonn		No
	Thalassarche impavida	Campbell Albatross		E,Bonn		No
	Thalassarche melanophris	Black-browed Albatross	V	V		No
	Thalassarche salvini	Salvin's Albatross		V,Bonn		No
	Tringa brevipes	Grey-tailed Tattler		C,J,K		No
	Tringa incana	Wandering Tattler		J,Bonn		No
	Tringa nebularia	Common Greenshank		C,J,K		No
	Tringa stagnatilis	Marsh Sandpiper		C,J,K		No
	Xenus cinereus	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
Saltmarsh	Subtropical and Temperate Coastal Saltmarsh	Coastal Saltmarsh	E1	V	No plants observed	No
	Wilsonia backhousei	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

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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).

TYPE 1 - Highly sensitive key fish habitat:

- *Posidonia australis* (strapweed)
- *Zostera, Heterozostera, Halophila and Ruppia* species of seagrass beds >5m^2 in area
- Coastal saltmarsh >5m^2 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 Australia[2]
- 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

TYPE 2 – Moderately sensitive key fish habitat:

- *Zostera*, *Heterozostera*, *Halophila* and *Ruppia* species of seagrass beds <5m^2 in area
- Mangroves
- Coastal saltmarsh <5m^2 in area
- Marine macroalgae such as *Ecklonia* and *Sargassum* 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

TYPE 3 – Minimally sensitive key fish habitat may include:

- 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

Arboricultural Impact Assessment Report

EARTHSCAPE HORTICULTURAL SERVICES
Arboricultural, Horticultural and Landscape Consultants

ABN 36 082 126 027

ARBORICULTURAL IMPACT ASSESSMENT REPORT

PROPOSED ACCESSIBILITY UPGRADE

KISSING POINT WHARF
WATERVIEW STREET, PUTNEY

November 2019

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TABLE OF CONTENTS

1 INTRODUCTION 3
2 THE SITE 3
3 SUBJECT TREES 4
4 HEALTH AND CONDITION ASSESSMENT 4
4.1 Methodology 4
4.2 Safe Useful Life Expectancy (SULE) 4
5 LANDSCAPE SIGNIFICANCE 5
5.1 Methodology for Determining Landscape Significance 5
5.2 Environmental Significance 5
5.3 Heritage Significance 6
5.4 Amenity Value 6
6 TREE RETENTION VALUES 6
7 TREE PROTECTION ZONES 7
7.2 Structural Root Zone (SRZ) 8
7.3 Acceptable Encroachments to the Tree Protection Zone 8
7.4 Acceptable Encroachments to the Canopy 8
7.5 Legal Protection 8
8 PROPOSED DEVELOPMENT 9
9 IMPACT ASSESSMENT 9
10 RECOMMENDED TREE PROTECTION MEASURES 10
10.1 Tree Protection Plan 10
10.2 Prohibited Activities 10
10.3 Tree Damage 11
10.4 Tree Removal 11
10.5 Tree Protection Fencing 11
10.6 Tree Protection Signs 12
10.7 Ground Protection 12
10.8 Demolition Works within Tree Protection Zones 13
10.9 Excavations within Tree Protection Zones 14
10.10 Alternative Construction Methods 14
10.11 Underground Services 14
10.12 Pavements 15
10.13 Root Pruning 15
11 REPLACEMENT PLANTING 15
12 REFERENCES 16
APPENDIX 1 - CRITERIA FOR ASSESSMENT OF LANDSCAPE SIGNIFICANCE 17
APPENDIX 2 – ACCEPTABLE INCURSIONS TO THE TREE PROTECTION ZONE (TPZ) 18
APPENDIX 3 – TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE
APPENDIX 4 – IMPACT ASSESSMENT SCHEDULE
APPENDIX 5 – TREE LOCATION PLAN SHOWING RETENTION VALUES
APPENDIX 6 – TREE PROTECTION PLAN

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1 INTRODUCTION

1.1.1 This report was commissioned by Hansen Yuncken Pty Ltd on behalf of Transport for NSW (TfNSW) to assess the health and condition of twenty-six (26) trees located within or immediately adjacent to the commuter car park for Kissing Point Wharf, Waterview Street, Putney. The report has been prepared to aid in the assessment of a *Review of Environmental Factors* (REF) for proposed upgrade works to improve accessibility at the Wharf as part of the Wharf Upgrade Program, forming part of TfNSW Transport Access Program (TAP). TAP is NSW Government initiative to deliver modern, safe and accessible transport infrastructure across the state.

1.1.2 The purpose of this report is to assess the potential impact of the proposed development on the subject trees, together with recommendations for amendments to the design or construction methodology where necessary to minimise any adverse impact. The report also provides recommended tree protection measures to ensure the long-term preservation of the trees to be retained where appropriate.

1.1.1 This report has been prepared in accordance with Ryde City Council's guidelines for preparation of Arborists Reports as outlined in Section 4 of the *Tree Management Technical Manual* (August 2016) and Sections 2.3.2 – 2.3.3 of the Australian Standard for *Protection of Trees on Development Sites* (AS 4970:2009).

2 THE SITE

2.1.1 The subject property forms part of a Public Reserve known as Lot 1 in DP 34075, being 24 Waterview Street, Putney, also known as 'Kissing Point Park'. This report is limited to the environs of the existing commuter car parking area at Kissing Point associated with the Wharf. For the purposes of this report, the subject area will be referred to as 'the site'. The site is zoned Public Recreation [RE1] under the *Ryde Local Environmental Plan 2014* (RLEP). The site contains an existing commuter car park surrounded by dense wooded areas of native trees. Areas around the foreshore of the Parramatta River have a more typical parkland character with open grassed areas and scattered trees. These include a variety of locally-indigenous and non-local native species.

2.1.2 The soils of this area have been extensively disturbed and modified for urban development. The original soils of this area are typical of the Gymea Landscape Group (as classified in the *Soil Landscapes of the Sydney 1:100,000 Sheet*), consisting of "shallow to moderately deep (300 – 1000 mm) *Yellow Earths* and *Earthy Sands* on crests and inside of benches and shallow (< 200 mm) *Siliceous Sands* on leading edges of benches; localised *Gleyed Podzolic Soils* and *Yellow Podzolic Soils* on shale lenses; and shallow to moderately deep (< 1000mm) *Siliceous Sands* and *Leached Sands* along Drainage Lines."[1] Soil materials are derived Hawkesbury Sandstone and may be discontinuous with localised rock outcrop.

2.1.3 The original vegetation of this area has been substantially cleared for urban development. The original vegetation community consisted of open forest & woodland typical of Hawkesbury Sandstone areas.[2] The dominant locally-indigenous tree species formerly occurring in this area may have included *Angophora costata* (Sydney Red Gum), *Corymbia gummifera* (Red Bloodwood) and *Eucalyptus haemastoma* (Scribbly Gum). Other species occurring in this vegetation community may include *Allocasuarina littoralis* (Black She-Oak), *Banksia serrata* (Old Man Banksia). *Glochidion ferdinandi* (Cheese Tree) and *Ficus rubiginosa* (Port Jackson Fig) may also be found on sheltered sites on lower slopes. Mangrove/Salmarsh Complex vegetation communities may also occur in low lying foreshore areas and tidal flats, with *Casuarina glauca* (Swamp Oak) occurring in low lying areas subject to periodic inundation.

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3 SUBJECT TREES

3.1.1 The subject trees were inspected by Earthscape Horticultural Services (EHS) on the 29th October 2019. Each tree has been provided with an identification number for reference purposes denoted on the attached Tree Location Plan (**Appendix 5**), based on the survey prepared by Norton Survey Partners, Dwg. Ref No. 37774-30 [C] dated 10/09/2018. The numbers used on this plan correlate with the Tree Assessment Schedule (**Appendix 3**). Tree No.s T14, T18 & T26 were not shown on the original survey and have been plotted on the drawing in their approximate positions.

4 HEALTH AND CONDITION ASSESSMENT

4.1 Methodology

4.1.1 An assessment of each tree was made using the Visual Tree Assessment (VTA) procedure.[3] All of the trees were assessed in view from the ground. No aerial inspection or diagnostic testing has been undertaken as part of this assessment.

4.1.2 The following information was collected for each tree:-

- **Tree Species** (Botanical & Common Name);
- **Approximate height**;
- **Canopy spread** (measured using laser distance measurer in four directions and an average taken);
- **Trunk diameter** (measured with a diameter tape at 1.4 metres from ground level);
- **Live Crown Size** (measured by subtracting the total height of the tree from the lowest point of the crown and multiplying by the average crown spread to give a value in square metres);
- **Health & vigour** (using foliage size, colour, extension growth, presence of disease or pest infestation, canopy density, presence of deadwood, dieback and epicormic growth as indicators),
- **Condition** (using visible evidence of structural defects, instability, evidence of previous pruning and physical damage as indicators); and
- **Suitability** of the tree to the site and its existing location (in consideration of damage or potential damage to services or structures, available space for future development and nuisance issues).

4.1.3 This information is presented in a tabulated form in **Appendix 3**.

4.2 Safe Useful Life Expectancy (SULE)

4.2.1 The remaining Safe Useful Life Expectancy[4] of the tree is an estimate of the sustainability of the tree in the landscape, calculated based on an estimate of the average age of the species in an urban area, less its estimated current age. The life expectancy of the tree has been further modified where necessary in consideration of its current health and vigour, condition and suitability to the site. The estimated SULE of each tree is shown in **Appendix 3.**

4.2.2 The following ranges have been allocated to each tree:-

- Greater than 40 years (Long)
- Between 15 and 40 years (Medium)
- Between 5 and 15 years (Short)
- Less than 5 years (Transient)
- Dead or immediately hazardous (defective or unstable)

4.2.3 SULE ratings are intended to provide a general overview of the long-term sustainability of the trees within the site in consideration of these factors. The allocated ranges are not intended to be absolute. This information is useful in guiding future planning by highlighting the probable

lifespan of individual trees, for which a clear pattern may emerge. This information may be helpful in forecasting likely tree senescence and planning for replacement planting to ensure continuity in tree canopy across the site. It should be noted that SULEs *may* be extended or reduced depending on the way trees are managed. Intervention and remedial works may extend the SULE of some trees.

5 LANDSCAPE SIGNIFICANCE

5.1 Methodology for Determining Landscape Significance

5.1.1 The significance of a tree in the landscape is a combination of its environmental, heritage and amenity values. Whilst these values may be fairly subjective and difficult to assess consistently, some measure is necessary to assist in determining the retention value of each tree. To ensure a consistent approach, the assessment criteria shown in **Appendix 1** have been used in this assessment.

5.1.2 A rating has been applied to each tree to give an understanding of the relative significance of each tree in the landscape and to assist in determining priorities for retention, in accordance with the following categories:-

1. **Significant**
2. **Very High**
3. **High**
4. **Moderate**
5. **Low**
6. **Very Low**
7. **Insignificant**

5.2 Environmental Significance

5.2.1 Tree Management Controls

Prescribed Trees within the Ryde City Local Government Area (LGA) are protected under Part 9.5 (Tree Preservation) of the *Ryde Development Control Plan 2014* (RDCP) made pursuant to Clause 9 of the *State Environmental Planning Policy (Vegetation in Non-rural Areas) 2017* (SEPP VNRA). The RDCP generally protects all trees (including palm trees) of a height of five (5) metres or greater or with a trunk circumference of 450mm (140mm in diameter). Some exemptions apply. However, all of the subject trees are protected under the provisions of the RDCP 2014. It should be noted that the works are proposed to be undertaken under the provisions of the SEPP (Infrastructure) 2007, which takes precedent over the local Tree Management Controls. Removal of any tree(s) to facilitate the proposed works is therefore permissible under the SEPP (Infrastructure).

5.2.2 Wildlife Habitat

Casuarina glauca (Swamp Oak) [T3, T4, T5, T6, T7, T8, T14, T15 & T16], *Ficus rubiginosa* (Port Jackson Fig) [T21 & T23] and *Melaleuca styphelioides* (Prickly Paperbark) [T13] are all locally-indigenous species, representative of the original vegetation of the area and would be of benefit to native wildlife. However, none of the trees contain cavities that would be suitable as nesting hollows for arboreal mammals or birds. There were no other visible signs of wildlife habitation.

5.2.3 Noxious Plants & Environmental Weeds

None of the subject trees are scheduled as a potential 'Biosecurity Risk' ('Priority Weed' – formerly 'Noxious Weed') within NSW under the provisions of the *Biosecurity Act 2015.*

None of the subject trees are listed as Environmental Weed Species within the Ryde LGA.

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5.2.4 Threatened Species & Ecological Communities

None of the subject trees are listed as Threatened or Vulnerable Species or form part of Endangered Ecological Communities (EECs) under the provisions of the *Biodiversity Conservation Act 2016* (NSW) or the *Environment Protection and Biodiversity Conservation Act 1999*.

The National Parks and Wildlife Service (NPWS) 1:25000 Mapping Series (Native Vegetation of the Cumberland Plain)[5] indicates that there are no remnant native vegetation communities within or in the vicinity of the site.

5.3 Heritage Significance

5.3.1 Heritage Items

The subject property is listed as an item of Environmental Heritage [Item 157] under Schedule 5, Part 1 of the *Ryde Local Environmental Plan 2014* (RLEP). This Item is described as site of the former Commonwealth Government ship building slip yards (boatslips) first established on the foreshore areas of Kissing Point Park in 1918. Four slipways, a timber mill and blacksmiths shop were established on the site by the firm Kidman and Mayoh to facilitate the construction of wooden sailing ships under Government contracts. Following failure of the enterprise, the slipways continued to be used for scrapping old ships up until mid-1950's and were then abandoned after this time. Only archaeological remnants now remain.

5.3.2 Heritage Conservation Area

The subject property is *not* located within a Heritage Conservation Area under Schedule 5, Part 2 of the RLEP 2014.

5.3.3 Significant Tree Register

None of the subject trees are listed on Ryde City Council's *Significant Tree Register* (August 2007).

5.3.4 General

None of the subject trees have any known or suspected Heritage Significance. The 1943 aerial photograph of Sydney indicates that most of the site had been cleared of vegetation at this time for the former slip yards.

5.4 Amenity Value

5.4.1 Criteria for the assessment of amenity values are incorporated into **Appendix 1**. The amenity value of a tree is a measure of its live crown size, visual appearance (form, habit, crown density), visibility and position in the landscape and contribution to the visual character of an area. Generally the larger and more prominently located the tree, and the better its form and habit, the higher its amenity value.

6 TREE RETENTION VALUES

6.1.1 The Retention Values shown in **Appendix 3** and **Appendix 5** have been determined on the basis of the estimated longevity of the trees and their landscape significance rating, in accordance with **Table 1**. Together with guidelines contained in **Section 7** (Tree Protection Zones) this information should be used to determine the most appropriate position of building footprints and other infrastructure within the site, with due consideration to other site constraints, to minimise the impact on trees considered worthy of preservation.

TABLE 1 – TREE RETENTION VALUES – ASSESSMENT METHODOLOGY

	Landscape Significance Rating						
Estimated Life Expectancy	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Long - Greater than 40 Years	High Retention Value						
Medium- 15 to 40 Years			Moderate Retention Value				
Short - 5 to 15 years				Low Ret. Value			
Transient - Less than 5 Years				Very Low Retention Value			
Dead or Potentially Hazardous							

6.1.2 The following table describes the implications of the retention values on site layout and design.

TABLE 2 – TREE RETENTION PRIORITES.

RETENTION VALUE	RECOMMENDED ACTION
"High"	These trees considered worthy of preservation; as such careful consideration should be given to their retention as a priority. Proposed site design and placement of buildings and infrastructure should consider the recommended setbacks as discussed in the following section (refer also **Appendix 2**) to avoid any adverse impact on these trees. In addition to Tree Protection Zones, the extent of the canopy (canopy drip-line) should also be considered, particularly in relation to high rise developments. Significant pruning of the trees to accommodate the building envelope or temporary scaffolding is generally not acceptable.
"Moderate"	The retention of these trees is desirable, but not essential. These trees should be retained as part of any proposed development if possible. However, these trees are considered less critical for retention. If these trees must be removed, replacement planting should be considered in accordance with Council's Tree Replenishment Policy to compensate for loss of amenity (refer also **Section 9**).
"Low"	These trees are not considered to worthy of any special measures to ensure their preservation, due to current health, condition or suitability. They do not have any special ecological, heritage or amenity value, or these values are substantially diminished due to their SULE. These trees should not be considered as a constraint to the future development of the site.
"Very Low"	These trees are considered potentially hazardous or very poor specimens, or may be environmental or noxious weeds. The removal of these trees is therefore recommended regardless of the implications of any proposed development.

7 TREE PROTECTION ZONES

7.1.1 The Tree Protection Zone (TPZ) is a radial distance measured from the centre of the trunk of the tree as specified in **Appendix 4**. These have been calculated in accordance with AS 4970-2009 (Protection of Trees on Development Sites).[6]

7.1.2 The intention of the TPZ is to ensure protection of the root system and canopy from the potential damage from construction works and ensure the long-term health and stability of each tree to be retained. Incursions to the root zone may occur due to excavations, changes in ground levels, (either lowering or raising the grade), trenching or other forms or soil disturbance such as ripping, grading or inverting the soil profile. Such works may cause damage or loss of part of the root system, leading to an adverse impact on the tree.

7.2 Structural Root Zone (SRZ)

7.2.1 The Structural Root Zone (SRZ) provides the bulk of mechanical support and anchorage for a tree. This is also a radial distance measured from the centre of the trunk as specified in **Appendix 4**. The SRZ has been calculated in accordance with AS 4970-2009 (Protection of Trees on Development Sites).

7.2.2 Incursions within the SRZ are not recommended as they are likely to result in the severance of woody roots which may compromise the stability of the tree or lead to its decline and demise.

7.3 Acceptable Encroachments to the Tree Protection Zone.

7.3.1 Where encroachment to the TPZ is unavoidable, an incursion to the TPZ of not exceeding 10% of the area of the TPZ and outside the SRZ may be acceptable. Examples of acceptable incursions are shown in **Appendix 2**. Greater incursions to the TPZ may result in an adverse impact on the tree.

7.3.2 Where incursions greater than 10% of the TPZ are unavoidable, exploratory excavation using non-destructive methods may be required to evaluate the extent of the root system affected and determine whether or not the tree can remain viable

7.4 Acceptable Encroachments to the Canopy

7.4.1 The removal of a small portion of the crown (foliage and branches) is generally tolerable provided that the extent of pruning required is less than 10% of the total foliage volume of the tree and the removal of branches does not create large wounds or disfigure the natural form and habit of the tree. All pruning cuts must be undertaken in accordance with AS 4373:2007. This generally involves reduction of the affected branches back to the nearest branch collar at the junction with the parent branch, rather than at an intermediate point. The latter is referred to as “lopping” and is no longer an acceptable arboricultural practice. Generally speaking, the minimum pruning as required to accommodate any proposed works is desirable. Extensive pruning can result in a detrimental impact on tree health and may lead to exposure of remaining branches to wind forces that they were previously sheltered from, leading to a greater risk of branch failure.

7.4.2 Clearance to between the building line and canopy should take into account any projecting structures, such as balconies, awnings and the roofline and any requirement for temporary scaffolding to be erected during construction (typically 1-1.5 metres wide). High structures should preferably be located outside the canopy dripline (as shown indicatively on the attached plans) in order to avoid or minimise canopy pruning.

7.5 Legal Protection

7.5.1 Notwithstanding the above recommendations, Council may require a greater setback from certain types of structures to ensure the on-going legal protection of the tree (i.e. its legal status under Council’s Tree Management Controls). In Hornsby Shire, a tree located within three (3) metres of the foundation of an approved building (excluding detaches garages, carports and other ancillary buildings) is *not* protected under the HDCP. The measurement is taken from the trunk of the tree at ground level to the foundation of the building. As such, if a tree is considered worthy of

preservation, Council is unlikely to approve the construction of a dwelling or building within three (3) metres of the tree (regardless of whether this can be undertaken without having an adverse impact on its health or longevity).

8 PROPOSED DEVELOPMENT

8.1.1 The proposed development includes the demolition of existing pathways, construction of new (widened & reconfigured) pedestrian pathways in a similar location, addition of new parking bays and relocation of the existing bus shelter within the existing commuter car park in order to improve accessibility to Kissing Point Wharf as part of the Wharf Upgrade Program.

9 IMPACT ASSESSMENT

9.1.1 The intention of this assessment is to determine the incursions to the root zones and canopies created by the proposed development and evaluate the likely impact of the proposed works on the subject trees. Details shown on the following plans were used in this assessment:-

Title	Author	Dwg No.	Date
Demolition Plan	ACOR Consultants Pty Ltd	SY150269 C.08.1.10 [B]	19/08/2019
Civil Works Plan	ACOR Consultants Pty Ltd	SY150269 C.08.2.01 [B]	19/08/2019
Pavement Plan	ACOR Consultants Pty Ltd	SY150269 C.08.3.01 [B]	19/08/2019

9.1.2 A summary of the impact of the proposed development on each tree within the site is shown in **Appendix 5**. The following criteria have been examined as part of this assessment:-

- Existing Relative Levels (R.L.);
- Tree Protection Zone (TPZ);
- Structural Root Zone (SRZ);
- Footprint and envelope of the proposed development and temporary structures (scaffolding, hoardings etc);
- Incursions to the TPZ & SRZ, including estimated cut & fill beyond the building footprint;
- Incursions to the tree canopy from the building envelope and temporary structures; and
- Assessment of the likely impact of the works on existing trees.

9.1.3 The proposed development will necessitate the removal of two (2) trees of low and very low retention value. These include Tree No.s T14 (Swamp Oak) and T26 (River Oak). None of these trees are considered significant or worthy of special measures to ensure their preservation. The removal of these trees to accommodate the proposed development is therefore considered warranted in this instance.

9.1.4 Existing concrete and asphalt pavements are proposed to be demolished within the TPZs of Trees T9, T10, T11 & T12 (Broad-leaved Paperbark), T13 (Prickly Paperbark), T15 & T16 (Swamp Oak), T17 (Grey Ironbark) and T24 & T25 (River Oak). This work will not result in any adverse impact on the subject trees, provided that all demolition work within the TPZs is undertaken in accordance **Section 10.8.**

9.1.5 Proposed new pathways and paved areas are located within the TPZs of Trees T1 (Eucalypt), T9, T10, T11 & T12 (Broad-leaved Paperbark), T13 (Prickly Paperbark), T6, T7, T8, T15 & T16 (Swamp Oak) and T24 & T25 (River Oak). The extent of the encroachment to the root zones of Trees T1, T6 & T9 is less than 10% of the TPZ, which is within acceptable limits under AS 4970:2009. As such, the proposed works will not have any adverse impact on these trees. In the case of Trees T15, T16, T24 & T25, the proposed works will not result in any increase in

encroachment from the present situation. As such, the proposed works will not result in any adverse impact on these trees.

9.1.6 In the case of Trees T7, T8, T11, T12 & T13, the extent of encroachment to the TPZs will be between 15% and 30% of the TPZ, which exceeds acceptable limits under AS 4970:2009. Excavation for the pavement sub-grade has the potential to result in root severance and damage to these trees, which is likely to result in some adverse impact. In order to minimise any adverse impact on these trees, all excavations for the pavement sub-grade within the TPZs should be undertaken in accordance with **Section 10.9**. It should be noted that the new path is substantially within the footprint of the existing pathway (to be demolished) in relation to Trees T11, T12 & T13.

9.1.7 In the case of Trees T10, the extent of encroachment to the TPZs is 37% of the TPZ, which exceeds acceptable limits under AS 4970:2009. Excavation for the pavement sub-grade is likely to result in root severance and damage to this tree, which is likely to result in a significant adverse impact. In order to minimise any adverse impact on this tree, all excavations for the pavement sub-grade within the TPZ should be undertaken in accordance with **Section 10.9**.

9.1.8 No other trees will be adversely affected by the proposed development.

10 RECOMMENDED TREE PROTECTION MEASURES

10.1 Tree Protection Plan

10.1.1 The following Tree Protection Measures should be read in accordance with the Tree Protection Plan (**Appendix 6**). The Tree Protection Plan (TPP) indicates the position of tree protection devices and other recommended measures to ensure the protection of trees within the site to be retained as part of the proposed development.

10.2 Prohibited Activities

10.2.1 The following activities should be avoided within specified Tree Protection Zones (refer **Appendix 4 & 6** for extent of the TPZ for each tree):-

- Excavations and trenching (with exception of the approved remediation works, underground services, building foundations or pavement sub-grade);
- Soil disturbance, surface grading, compaction, tyning, ripping or cultivation of soil;
- Mechanical removal of vegetation, including extraction of tree stumps;
- Soil level changes including the placement of fill material (excluding imported validated fill for remediation works or placement of fill for approved works)
- Movement and storage of plant, equipment & vehicles (except within defined temporary haul roads, where ground protection has been installed, or within the footprint of existing floor slabs or paved areas);
- Erection of site sheds (except where approved by the site arborist);
- Affixing of signage, barricades or hoardings to trees;
- Storage of building materials, waste and waste receptacles;
- Stockpiling of spoil or fill;
- Stockpiling of bulk materials, such as soil, sand, gravel, roadbase or the like;
- Stockpiling of demolition waste;
- Disposal of waste materials and chemicals including paint, solvents, cement slurry, fuel, oil and other toxic liquids;
- Other physical damage to the trunk or root system; and
- Any other activity likely to cause damage to the tree.

10.3 Tree Damage

10.3.1 Care shall be taken when operating cranes, drilling rigs and similar equipment near trees to avoid damage to tree canopies (foliage and branches). Under no circumstances shall branches be torn-off by construction equipment. Where there is potential conflict between tree canopy and construction activities, the advice of the Site Arborist must be sought.

10.3.2 In the event of any tree becoming damaged for any reason during the construction period a consulting arborist [Australian Qualification Framework Level 5] shall be engaged to inspect and provide advice on any remedial action to minimise any adverse impact. Such remedial action shall be implemented as soon as practicable and certified by the arborist.

10.4 Tree Removal

10.4.1 The removal of Trees [**T14 & T26**] shall be carried out by an experienced tree surgeon in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998). Care shall be taken to avoid damage to other trees during the felling operation.

10.4.2 Stumps located within the TPZs of trees to be retained shall be grubbed-out where required using a mechanical stump grinder (or by hand where less than 150mm in diameter) without damage to the root system of other trees. Where trees to be removed are within the SRZ of any trees to be retained, consideration should be given to cutting the stump close to ground level and retaining the root crown intact. Stumps within the Tree Protection Zone of other trees to be retained shall **not** be pulled out using excavation equipment or similar.

10.5 Tree Protection Fencing

10.5.1 Trees [**T1-T3, T6-T8, T9-T12, T13, T15-T19 & T22-T25**] shall be protected prior to and during construction from all activities that may result in detrimental impact by erecting a suitable protective fence in the positions as indicated on the Tree Protection Plan (**Appendix 6**). As a minimum, the fence shall consist of temporary chain wire panels of 1.8 metres in height, supported by steel stakes as required and fastened together and supported to prevent sideways movement using corner braces where required. The fence shall be erected prior to the commencement of any work on-site and shall be maintained in good condition for the duration of construction. Where tree protection zones merge together a single fence encompassing the area is deemed to be adequate. Existing site boundary fences may form part of the enclosure.

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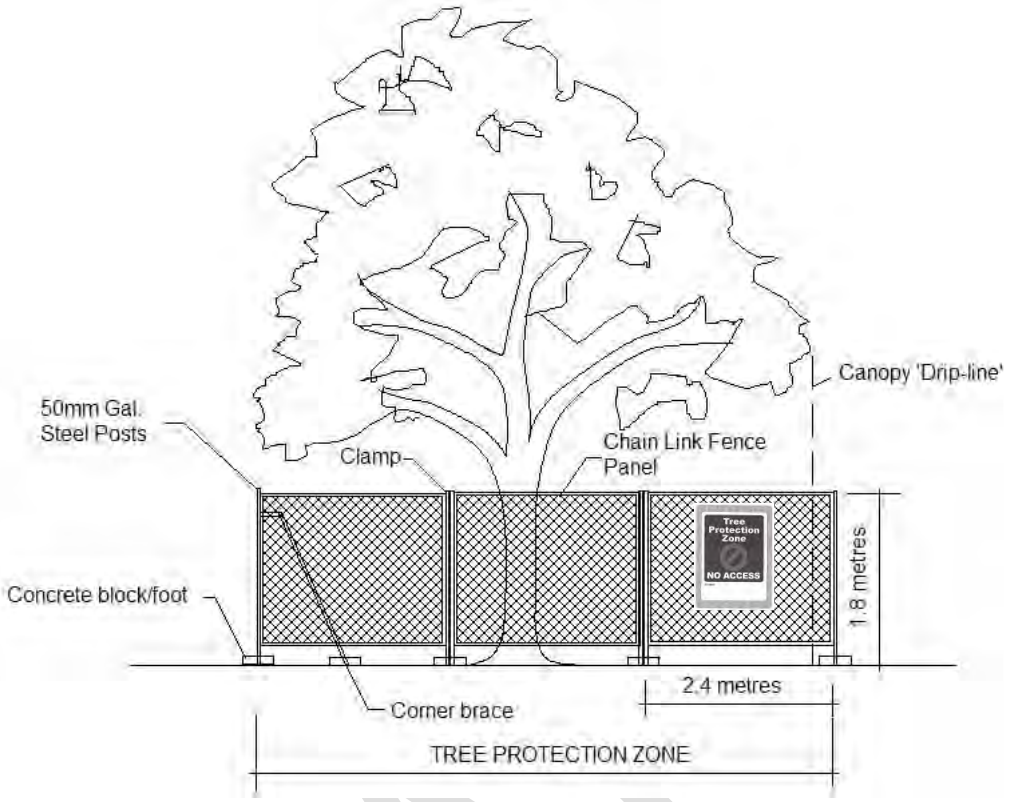

Figure 1 – Detail of Tree Protection Fence

10.6 Tree Protection Signs

10.6.1 Signs shall be installed on the Tree Protection Fence to prevent unauthorised movement of plant and equipment or entry to the Tree Protection Zone. The signs shall be securely attached to the fence using cable ties or equivalent. Signs shall be placed at minimum 10 metre intervals. The wording and layout of the sign shall comply with AS 4970-2009 as shown in **Figure 2**.

Figure 2 – Detail of Tree Protection Sign

10.7 Ground Protection

10.7.1 Construction haul routes shall be confined to existing paved areas wherever possible. Where this is not feasible and construction haul routes or access for plant and equipment must traverse soft landscape areas within TPZs of [**any tree nominated for retention**], 20mm thick marine ply sheets or truck mats (such as Envirex Versadeck® access mats) (refer **Figure 4** shall be placed over the top of the ground surface to minimise compaction and disturbance of the underlying soil profile and root zone.

Figure 4 – Showing typical detail for truck mats.

10.7.2 Ground protection shall be installed prior to any site works and maintained in good condition for the duration of the construction period. On completion of the works, ground protection shall be removed without damage or disturbance to the underlying soil profile.

10.8 Demolition Works within Tree Protection Zones

10.8.1 Demolition of paved areas within the Tree Protection Zones (TPZs) of trees [**T9-T12, T13, T15-T17 & T24-T25**] shall be undertaken under the supervision of a qualified Arborist [Australian Qualification Framework (AQF) Level 5].

10.8.1 Concrete pavements shall be demolished by breaking the slab into manageable sections (using a rock hammer or similar) and asphalt pavements shall be removed by breaking the topcoat into manageable pieces. The broken sections shall be carefully lifted and folded over the remaining paved surface to minimise disturbance and compaction of the underlying soil profile. Special care shall be taken where underlying woody roots have lifted or displaced the pavement. Any plant or equipment used in demolition work shall operate within the footprint of existing paved areas and avoid traversing soft landscape areas. Where this is unavoidable, suitable ground protection shall first be installed in accordance with **Section 10.7**.

10.8.2 The pavement sub-base within the TPZ shall be gradually removed (where required) in layers of no greater than 50mm thick using a small rubber tracked excavator or alternative approved method to avoid excessive disturbance and compaction of the underlying soil profile and damage to underlying roots and minimise. The machine shall work within the footprint of the existing path footprint to avoid compaction of the underlying soil. The final layer of sub-base material shall be removed using hand tools were required to avoid compaction of the underlying soil profile and avoid damage to any underlying woody roots.

10.8.3 Following removal of the pavement surface and sub-base, clean, friable topsoil shall be used to fill in the excavated area and bring flush with surrounding levels within new landscape areas. Soil shall only be imported and spread when the underlying soil conditions are dry to avoid compaction of the soil profile. Where there is insufficient recovered site topsoil for this purpose, any imported material shall be free of rocks, vegetation, heavy clay or other extraneous matter and supplied and

spread in accordance with **Section 10.9**. Any imported soil material should be similar in texture to the existing site topsoil.

10.8.4 Demolition of existing walls, kerbs and other structures within the TPZ of Trees [**T9-T12, T13, T15-T17 & T24-T25**] shall be undertaken under the supervision of a qualified Arborist [AQF level 5]. The structures shall be demolished using equipment on stationed outside the TPZ where possible or within the footprint of existing hardstand areas.

10.8.5 Care shall be taken to avoid the root systems, trunks and lower branches of trees in the vicinity of the structures during demolition works, with special attention required during demolition of the footings and other sub-surface members to avoid damage to woody roots. An observer ('spotter') shall be employed to assist the plant operator in order to detect and avoid damage to underlying woody roots during demolition. Trunk and/or branch protection shall be installed where there is a potential risk of damage to trees in proximity or overhead of the work.

10.9 Excavations within Tree Protection Zones

10.9.1 Prior to any mechanical excavations for building foundations or pavement sub-grade within the TPZs of Trees [**T1, T6, T7, T8, T9-T12, T13, T15-T17 & T24-T25**] exploratory excavation using non-destructive techniques shall be taken along the perimeter of the structure or pavement within the TPZ. Non-destructive excavation techniques may include the use of hand-held implements, air pressure (using an Air-spade® device) or water pressure (hydro-excavation in combination with a vacuum extraction unit). The exploratory excavation shall be undertaken along the perimeter of the foundation or pavement (within the TPZ) to the depth of the foundation or to a maximum of 800mm from surface levels, to locate and expose any woody roots prior to any mechanical excavation.

10.9.2 All care shall be undertaken to preserve woody roots intact and undamaged during exploratory excavation. Any roots encountered of less than 40mm in diameter may be cleanly severed with clean sharp pruning implements at the face of the excavation. The root zone in the vicinity of the excavation shall be kept moist following excavation for the duration of construction to minimise moisture stress on the tree. Where large woody roots (greater than 40mm diameter) are encountered during exploratory excavations, further advice from a qualified arborist shall be sought prior to severance.

10.10 Alternative Construction Methods

10.10.1 Where necessary, (to avoid severing large woody roots) consideration should be given to the installation of an elevated structure (e.g. pier and beam footing, suspended slab or floor supported on piers, cantilevered slab, up-turned edge beam etc) in preference to structures requiring a deep edge beam or continuous perimeter strip footing. The beam section of any pier and beam footing should be placed **above** grade to avoid excavation within the SRZ. Pier footings intersecting large woody roots should be slightly offset where necessary to avoid root severance.

10.10.2 For masonry walls or fences it may be acceptable to delete continuous concrete strip footings and replace with suspended in-fill panels (e.g. steel or timber pickets, lattice etc) fixed to pillars. For paved areas, consideration should be given to raising the proposed pavement level and using a porous fill material in preference to excavation where large woody roots are found within the sub-base.

10.11 Underground Services

10.11.1 All proposed stormwater lines and other underground services should be located outside TPZs of trees proposed to be retained wherever possible or installed by alternative measures. Alternative

measures include suspending pipelines beneath the floor of a building or structure (to avoid excavation with the TPZ), non-destructive excavation methods or Horizontal Directional Drilling (HDD). Where the installation of service lines within TPZs is unavoidable, the pipelines or conduits should be installed as follows.

10.11.2 Trenching for underground services and stormwater pipes within the TPZs of Trees [**any tree nominated for retention**], shall be undertaken using non-destructive excavation in accordance with **Section 10.9**. Where large woody roots are encountered during excavation or trenching (root diameter greater than 40mm), these shall be retained intact wherever possible (e.g. by tunnelling beneath roots and inserting the pipeline or conduit beneath or re-routing the service etc). Where this is not practical and root pruning is the only alternative, proposed root pruning should be assessed by a qualified arborist [AQF 5] to evaluate the potential impact on the health and stability of the subject tree.

10.11.3 Installation of underground services and stormwater pipes within the SRZs of Trees [**any tree nominated for retention**], shall only be undertaken by Horizontal Directional Drilling (HDD) (also referred to as sub-surface boring or Micro-tunnelling for large diameter pipes). The Invert Level of the pipe, plus the pipe diameter, must be lower than the estimated root zone depth as specified. At this site a minimum depth of 1 metre to the invert level of the pipe is specified.

10.12 Pavements

10.12.1 Proposed paved areas within the TPZs of Trees [**T7, T8, T9-T12, T13, T15-T17 & T24-T25**] shall be placed at or slightly above grade where possible to minimise excavations within the root zone and avoid severance and damage of woody roots.

10.13 Root Pruning

10.13.1 Where root pruning of [**any tree nominated for retention**] is required to facilitate construction, roots shall be severed with clean, sharp pruning implements and retained in a moist condition during the construction phase using Hessian material or mulch where practical. Severed roots shall be treated with a suitable root growth hormone containing the active constituents Indol-3-yl-Butric Acid (IBA) and 1-Naphthylacetic Acid (NAA) to stimulate rapid regeneration of the root system.

10.13.2 Any required root pruning shall be carried out in accordance with Australian Standard 4373-2007 – *Pruning of Amenity Trees* by a qualified and experienced arborist or tree surgeon [Australian Qualification Framework Level 3] in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998). No roots of greater than 40mm in diameter should be removed or pruned without further advice from a Consulting Arborist [Australian Qualification Framework Level 5].

11 REPLACEMENT PLANTING

11.1.1 In order to compensate for loss of amenity resulting from the removal of trees to accommodate the proposed development, a minimum number of two (2) new trees capable of attaining a height of at least ten (10) metres at maturity should be planted within the site.

11.1.2 Replacement trees should preferably include some locally indigenous species. These will be most appropriate to the site conditions and be most valuable in terms of preserving the landscape character and wildlife habitat of the area. The following species are appropriate to the site conditions and could be considered for replacement planting:-

- *Ficus rubiginosa* (Port Jackson Fig)
- *Syzygium paniculatum* (Magenta Cherry)
- *Glochidion ferdinandi* (Cheese Tree)

- *Angophora floribunda* (Rough barked Apple)
- *Angophora costata* (Sydney Red Gum)
- *Melaleuca quinquenervia* (Broad-leaved Paperbark)
- *Melaleuca leucadendra* (Cajaput)
- *Acmena smithii* (Lillypilly)

Andrew Morton
EARTHSCAPE HORTICULTURAL SERVICES
13th November 2019

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[5] National Parks and Wildlife Service of NSW (October 2002)
Native Vegetation of the Cumberland Plain - 1:25000 Mapping Series (Map 10 of 16)
NPWS, Sydney NSW

[6] Council of Standards Australia (August 2009)
AS 4970 – 2009 – Protection of Trees on Development Sites
Standards Australia, Sydney

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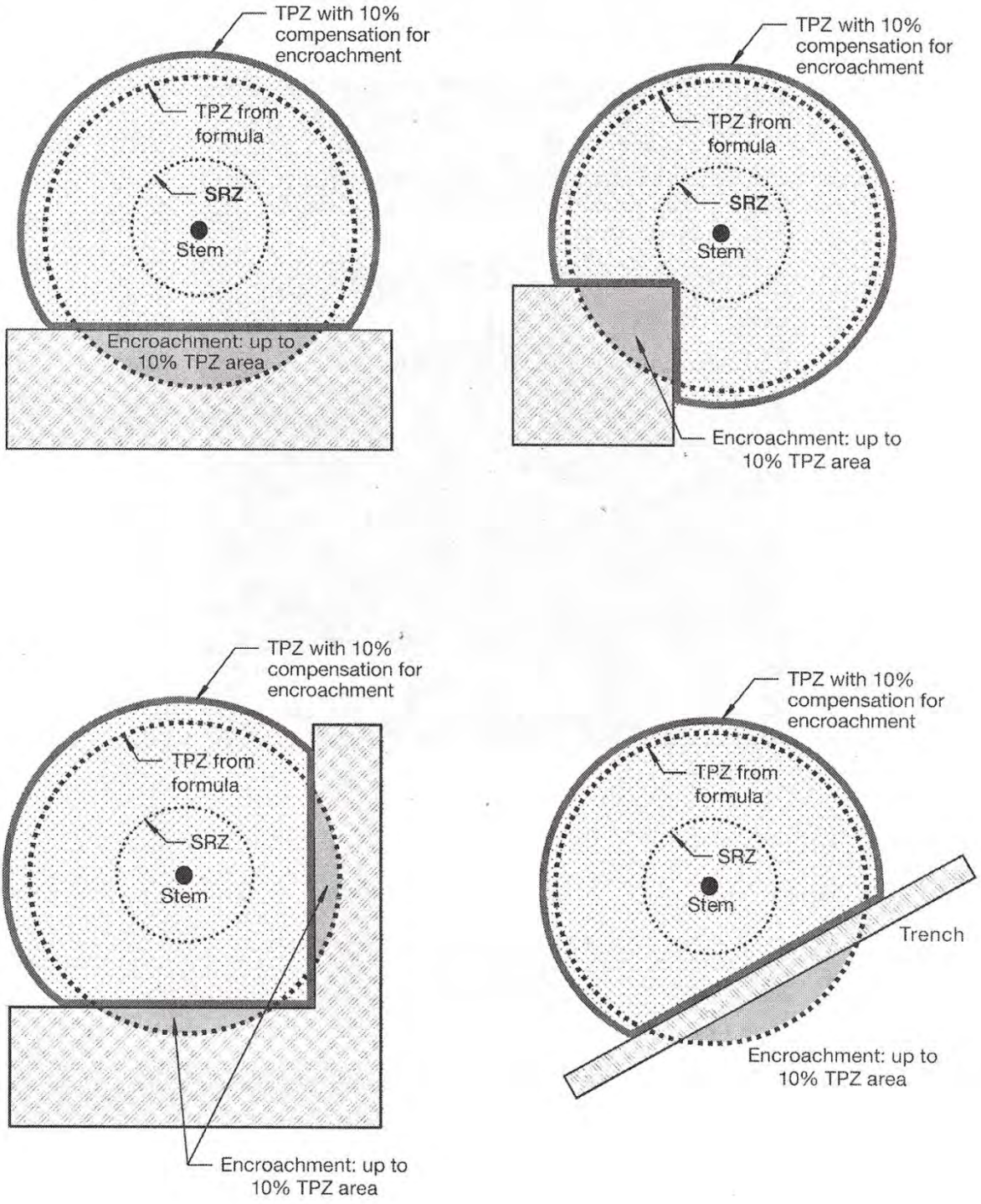
APPENDIX 1 - CRITERIA FOR ASSESSMENT OF LANDSCAPE SIGNIFICANCE

RATING	HERITAGE VALUE	ECOLOGICAL VALUE	AMENITY VALUE
1. SIGNIFICANT	The subject tree is listed as a Heritage Item under the Local Environment Plan (LEP) with a local, state or national level of significance or is listed on Council's Significant Tree Register	The subject tree is scheduled as a Threatened or Vulnerable Species as defined under the provisions of the *Biodiversity Conservation Act 2016* (NSW) or the *Environment Protection and Biodiversity Conservation Act 1999*.	The subject tree has a very large live crown size exceeding 300m² with normal to dense foliage cover, is located in a visually prominent position in the landscape, exhibits very good form and habit typical of the species
	The subject tree forms part of the curtilage of a Heritage Item (building /structure /artefact as defined under the LEP) and has a known or documented association with that item	The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species	The subject tree makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity
	The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event	The subject tree is a Remnant Tree, being a tree in existence prior to development of the area	The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance.
2. VERY HIGH	The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site.	The tree is a locally-indigenous species, representative of the original vegetation of the area and is a dominant or associated canopy species of an Endangered Ecological Community (EEC) formerly occurring in the area occupied by the site.	The subject tree has a very large live crown size exceeding 200m²; a crown density exceeding 70% (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area
3. HIGH	The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence	The tree is a locally-indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link / Wildlife Corridor or has known wildlife habitat value	The subject tree has a large live crown size exceeding 100m²; The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (e.g. crown distortion/suppression) with a crown density of at least 70% (normal); The subject tree is visible from the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area
4. MODERATE	The tree has no known or suspected historical association, but does not detract or diminish the value of the item and is sympathetic to the original era of planting.	The subject tree is a non-local native or exotic species that is protected under the provisions of the local or state planning controls (Development Control Plan etc).	The subject tree has a medium live crown size exceeding 40m²; the tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc) with a crown density of more than 50% (thinning to normal); and
			The tree is visible from surrounding properties, but is not visually prominent – view may be partially obscured by other vegetation or built forms. The tree makes a fair contribution to the visual character and amenity of the area.
5. LOW	The subject tree detracts from heritage values or diminishes the value of a heritage item	The subject tree is scheduled as exempt (not protected) under the provisions of the local or state planning controls (DCP etc) due to its species, nuisance or position relative to buildings or other structures.	The subject tree has a small live crown size of less than 40m² and can be replaced within the short term (5-10 years) with new tree planting
6. VERY LOW	The subject tree is causing significant damage to a heritage Item.	The subject tree is listed as an Environment Weed Species in the relevant Local Government Area, being invasive, or is a known nuisance species.	The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area. The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% (sparse).
7. INSIGNIFICANT	The tree is completely dead and has no known heritage value (or any habitat value)	The tree is scheduled as a potential 'Biosecurity Risk' ('Priority Weed' – formerly 'Noxious Weed') within NSW or within the relevant Local Government Area under the provisions of the *Biosecurity Act 2015*	The tree is completely dead and represents a potential hazard.

Ref:- Morton, A (2006) **Determining the Retention Value of Trees on Development Sites**
TreeNet - Proceedings of the 7th National Street Tree Symposium 2006 Government of South Australia Department for Transport, Energy and Infrastructure

APPENDIX 2 – ACCEPTABLE INCURSIONS TO THE TREE PROTECTION ZONE (TPZ)



NOTE: Less than 10% TPZ area and outside SRZ. Any loss of TPZ compensated for elsewhere.

REF:- Council of Standards Australia (August 2009)
AS 4970 – 2009 – Protection of Trees on Development Sites
Standards Australia, Sydney

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
1	***Eucalyptus sp. [amplifolia]*** (Cabbage Gum)	13	10	392	100	SM	Appears stable with poor branching structure. Exhibits multiple moderate wounds on trunk and PLs due Nectria Canker. Severe bark inclusion at junction of PL at 2 metres with fracture. Severe bark inclusion at junction of co-dominant leaders at 3 metres with fracture.	Crown lifted to 3 metres	.Fair	Moderate Nectria sp Canker infection (trunk and PLs)	Transient (less than 5 years)	4	**Very Low**	On-site
2	***Eucalyptus sp. [tereticornis]*** (Forest Red Gum)	12	8	245 + 165	56	SM	Appears stable with fair branching structure. Exhibits moderate bdieback with 30% deadwood and 50% epicormic growth.	Crown lifted to 5 metres	Fair with thinning crown	No Evidence	Transient (less than 5 years)	4	**Very Low**	On-site
3	***Casuarina glauca*** (Swamp Oak)	11	9	459	85.5	M	Appears stable with fair branching structure. Exhibits a moderate bark inclusion at junction of PL at 2 metres. Located close to concrete pathway.	Crown lifted to 3 metres	Good	No Evidence	Medium 15-40 Years	4	**Moderate**	On-site
4	***Casuarina glauca*** (Swamp Oak)	9	8	260 + 290	56	M	Appears stable with poor branching structure. Exhibits a severe bark inclusion at junction of PL at at GL. Located close to concrete pathway.	Crown lifted to 3 metres	.Fair	No Evidence	Medium 15-40 Years	4	**Moderate**	On-site
5	Group of 5 x ***Casuarina glauca*** (Swamp Oak)	5 to 6	4	70	24	I	Stability suspect with fair branching structure. Root plate undermined by wave action and tidal erosion.	No Evidence	Good	No Evidence	Transient (less than 5 years)	5	**Very Low**	On-site
6	***Casuarina glauca*** (Swamp Oak)	11	7	235x2	70	SM	Appears stable with poor branching structure. Exhibits a severe bark inclusion at junction of PLs at 1 metre with fracture. Crown suppressed on north side due crowding.	No Evidence	Good	No Evidence	Short 5-15 Years	4	**Low**	On-site
7	***Casuarina glauca*** (Swamp Oak)	11	7	363	70	M	Appears stable with sound branching structure. Crown suppressed on north and south sides due crowding.	No Evidence	Good	No Evidence	Long - more than 40 years	4	**Moderate**	On-site
8	***Casuarina glauca*** (Swamp Oak)	11	9	430	90	M	Appears stable with poor branching structure. Exhibits multiple large axial wounds from GL to 6 metres with decay evident. Crown suppressed on the south side due to crowding.	No Evidence	Good	Moderate borer infestation.	Short 5-15 Years	4	**Low**	On-site

PL = Primary Limb; SL = Secondary Limb;
TL = Tertiary Limb. GL = Ground Level

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
9	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	7	5	220x3	27.5	SM	Appears stable with fair branching structure. Located close to existing footpath and car parking area.	Crown lifted to 2 metres. Selectively pruned to clear light pole.	Good	No Evidence	Medium 15-40 Years	4	**Moderate**	On-site
10	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	9	6	240x4	45	M	Appears stable with fair branching structure. Exhibits multiple high bark inclusions at GL to 3 metres (typical for species)	Crown lifted to 2 metres	Good	No Evidence	Long - more than 40 years	4	**Moderate**	On-site
11	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	10	6	260 + 200x3	51	M	Appears stable with fair branching structure. Exhibits multiple high bark inclusions at GL to 2 metres (typical for species). Some dieback with 15% deadwood.	Crown lifted to 2 metres	Fair with slightly thinning crown	No Evidence	Long - more than 40 years	4	**Moderate**	On-site
12	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	9	8	700	60	M	Appears stable with fair branching structure. Exhibits multiple moderate bark inclusions at GL to 2 metres (typical for species).	Crown lifted to 2 metres	Good	No Evidence	Long - more than 40 years	4	**Moderate**	On-site
13	***Melaleuca styphelioides*** (Prickly Paperbark)	6	10	250x3	60	M	Appears stable with fair branching structure. Exhibits multiple moderate bark inclusions at 1 metre at junctions of co-dominant laterally inclined PLs (x4).	Crown lifted to 2 metres	Very Good	No Evidence	Long - more than 40 years	4	**Moderate**	On-site
14	***Casuarina glauca*** (Swamp Oak)	5	7	70x4	35	I	Appears stable with fair branching structure. Crown suppressed north-west side due overshadowing. Multiple co-dominant leaders at GL.	Previously cut to GL (crown restored)	Good	No Evidence	Short 5-15 Years	5	**Low**	On-site
15	***Casuarina glauca*** (Swamp Oak)	9	6	230x2	54	SM	Appears stable with fair branching structure. Exhibits a moderate bark inclusion at GL at junction of co-dominant PLs. Crown suppressed north side due crowding.	No Evidence	Good	No Evidence	Medium 15-40 Years	4	**Moderate**	On-site
16	***Casuarina glauca*** (Swamp Oak)	13	7	283	70	M	Appears stable with sound branching structure. Located close to edge of path.	Crown lifted to 3 metres	Fair with slightly thinning crown	No Evidence	Medium 15-40 Years	4	**Moderate**	On-site
17	***Eucalyptus paniculata*** (Grey Ironbark)	12	8	350	72	SM	Appears stable with sound branching structure. Crown suppressed west side due crowding.	Crown lifted to 2 metres	Good	No Evidence	Long - more than 40 years	4	**Moderate**	On-site

PL = Primary Limb; SL = Secondary Limb;
TL = Tertiary Limb. GL = Ground Level

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
18	***Grevillea robusta*** (Silky Oak)	13	6	290	60	SM	Appears stable with sound branching structure. Crown suppressed north side due crowding.	Crown lifted to 3 metres	Good	No Evidence	Medium 15-40 Years	4	**Moderate**	On-site
19	***Casuarina cunninghamiana*** (River Oak)	13	10	700	80	M	Appears stable with fair branching structure. Crown suppressed east side due crowding. Exhibits moderate deadwood with 15% interior crown deadwood.	Crown lifted to 4 metres	Good	No Evidence	Medium 15-40 Years	3	**Moderate**	On-site
20	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	11	5	270x2	35	SM	Appears stable with sound branching structure. Crown suppressed west side due crowding.	Crown lifted to 3 metres	Good	No Evidence	Long - more than 40 years	5	**Moderate**	On-site
21	***Ficus rubiginosa*** (Port Jackson Fig)	7	11	300x2 + 400 + 220	66	SM	Appears stable with fair branching structure. Exhibits multiple moderate wounds (cambial necrosis) on lower trunk and buttress due suspected root rot disease. Multiple moderate bark inclusions at junctions of co-dominant PLs (x4) at GL.	Crown lifted to 3 metres. Selectively pruned.	Good	Suspected Root Rot and/or butt rot disease.	Transient (less than 5 years)	4	**Very Low**	On-site
22	***Casuarina cunninghamiana*** (River Oak)	10	6	300	48	SM	Appears stable with fair branching structure. Exhibits moderate dieback with 10% deadwood and 20% epicormic growth.	Crown lifted to 2 metres	Fair with thinning crown	No Evidence	Short 5-15 Years	4	**Low**	On-site
23	***Ficus rubiginosa*** (Port Jackson Fig)	5	8	250	40	I	Appears stable with fair branching structure. Exhibits multiple co-dominant PLs at GL.	No Evidence	Very Good	No Evidence	Long - more than 40 years	5	**Moderate**	On-site
24	***Casuarina cunninghamiana*** (River Oak)	12	5	240 + 210	50	SM	Appears stable with sound branching structure. Exhibits 20% interior crown deadwood.	Crown lifted to 2 metres	Good	No Evidence	Medium 15-40 Years	4	**Moderate**	On-site
25	***Casuarina cunninghamiana*** (River Oak)	11	5	232	45	SM	Appears stable with fair branching structure. Exhibits moderate dieback with 20% deadwood and 50% epicormic growth.	Crown lifted to 2 metres	Fair with thinning crown	No Evidence	Short 5-15 Years	5	**Low**	On-site
26	***Casuarina cunninghamiana*** (River Oak)	10	3	146	21	I	Appears stable with fair branching structure. Exhibits moderate dieback with 10% deadwood and 50% epicormic growth. Main leader suppressed with poor form and habit.	Crown lifted to 2 metres	Fair with thinning crown	No Evidence	Transient (less than 5 years)	5	**Very Low**	On-site

PL = Primary Limb; SL = Secondary Limb;
TL = Tertiary Limb. GL = Ground Level

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
1	***Eucalyptus sp. [amplifolia]*** (Cabbage Gum)	P	5.9	2.2	108.4	Proposed new parking bays and associated kerb offset 3.8 metres north-east at RL? (assumed close to existing grade) Excavations for pavement sub-grade and kerb foundations within TPZ. Encroachment to TPZ = 12%.	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. However, this tree will tolerate the extent of encroachment proposed, provided that all proposed works within the TPZ are undertaken as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Undertake all excavations for pavement sub-grade and kerb foundations within TPZ in accordance with Section 10.9.
2	***Eucalyptus sp. [tereticornis]*** (Forest Red Gum)	P	4.4	2.0	59.4	Existing bike locker within TPZ to be demolished and replaced with new bike racks (within existing concrete platform). No actual incursion to root zone.	No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5.
3	***Casuarina glauca*** (Swamp Oak)	M	5.5	2.4	95.1	No proposed works within TPZ.	No adverse impact.	To be retained - no special Tree Protection Measures required.
4	***Casuarina glauca*** (Swamp Oak)	M	4.2	2.1	55.4	No proposed works within TPZ.	No adverse impact.	To be retained - no special Tree Protection Measures required.
5	Group of 5 x ***Casuarina glauca*** (Swamp Oak)	M	2.0	1.1	12.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special Tree Protection Measures required.
6	***Casuarina glauca*** (Swamp Oak)	M	4.2	2.1	55.4	Proposed new concrete paved area (seating bay) offset 3.7 metres north-west at RL1.44 (close to existing grade). Excavations for pavement sub-grade within TPZ. Encroachment to TPZ = 3%.	Extent of encroachment to root zone is less than 10% of the TPZ, which is within acceptable limits under AS 4970:2009. No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Undertake all excavations for pavement sub-grade within TPZ in accordance with Section 10.9.
7	***Casuarina glauca*** (Swamp Oak)	M	4.4	2.2	59.6	Proposed new concrete paved area (seating bay) offset 1.9 metres west at RL1.43 (close to existing grade). Proposed footpath offset 2.4 metres north-west at RL1.45 (100mm below grade). Excavations for pavement sub-grade within TPZ. Encroachment to TPZ = 22%.	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Proposed works may result in some adverse impact on this tree.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Undertake all excavations for pavement sub-grade within TPZ in accordance with Section 10.9.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
8	***Casuarina glauca*** (Swamp Oak)	M	5.2	2.3	83.6	Proposed new concrete paved area (seating bay) offset 2.6 metres west at RL1.43 (close to existing grade). Proposed footpath offset 1.9 metres north-west at RL1.45 (100mm below grade). Excavations for pavement sub-grade within TPZ. Encroachment to TPZ = 26%.	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Proposed works are likely to result in an adverse impact on this tree.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Undertake all excavations for pavement sub-grade within TPZ in accordance with Section 10.9.
9	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	4.8	2.3	72.3	Existing concrete pathway offset 1.9 metres south-west to be demolished within TPZ. Proposed footpath offset 3.6 metres south-east at RL1.48 (close to existing grade, partly within footprint of existing path to be demolished). Excavations for pavement sub-grade within TPZ. Encroachment to TPZ = 10%.	Extent of encroachment to root zone is less than 10% of the TPZ, which is within acceptable limits under AS 4970:2009. No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Demolish existing path within TPZ in accordance with Section 10.8. Undertake all excavations for pavement sub-grade within TPZ in accordance with Section 10.9.
10	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	4.8	2.3	72.3	Existing concrete pathway offset 1.6 metres south-east to be demolished within TPZ. Proposed footpath offset 1.5 metres south-east at RL1.47 (close to existing grade) and 1 metres north-east at RL 1.50 (close to existing grade, partly within footprint of existing path to be demolished). Excavations for pavement sub-grade within TPZ/SRZ. Encroachment to TPZ = 37%.	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Proposed works are likely to result in an significant adverse impact on this tree.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Demolish existing path within TPZ in accordance with Section 10.8. Undertake all excavations for pavement sub-grade within TPZ in accordance with Section 10.9.
11	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	5.4	2.4	91.6	Existing concrete pathway offset 1.8 metres south-east to be demolished within TPZ. Proposed footpath offset 1.8 metres south-east at RL1.47 (close to existing grade) and 3.8 metres south-west at RL 1.48 (close to existing grade partly within footprint of existing path to be demolished). Excavations for pavement sub-grade within TPZ/SRZ. Encroachment to TPZ = 28%.	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Proposed works are likely to result in an adverse impact on this tree.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Demolish existing path within TPZ in accordance with Section 10.8. Undertake all excavations for pavement sub-grade within TPZ in accordance with Section 10.9.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
12	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	6.0	2.8	113.0	Existing concrete pathway offset 1.5 metres south-east to be demolished within TPZ. Proposed footpath offset 1.6 metres south-east at RL1.47 (close to existing grade partly within footprint of existing path to be demolished). Excavations for pavement sub-grade within TPZ/SRZ. Encroachment to TPZ = 19% (6% increase).	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Proposed works may result in some adverse impact on this tree.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Demolish existing path within TPZ in accordance with Section 10.8. Undertake all excavations for pavement sub-grade within TPZ in accordance with Section 10.9.
13	***Melaleuca styphelioides*** (Prickly Paperbark)	M	5.4	2.4	91.6	Existing concrete pathway offset 1.8 metres north-west to be demolished within TPZ. Proposed footpath offset 1.4 metres north-west at RL1.46 (close to existing grade partly within footprint of existing path to be demolished). Excavations for pavement sub-grade within TPZ/SRZ. Encroachment to TPZ = 20% (6% increase).	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Proposed works may result in some adverse impact on this tree.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Demolish existing path within TPZ in accordance with Section 10.8. Undertake all excavations for pavement sub-grade within TPZ in accordance with Section 10.9.
14	***Casuarina glauca*** (Swamp Oak)	M	3.0	1.5	28.3	Proposed footpath offset 0.6 metres south-west at RL1.84 (close to existing grade). Excavations for pavement sub-grade within TPZ/SRZ. Encroachment to TPZ = 23% Bus shelter reloacted to south-east. May require some canopy pruning to facilitate relocation.	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Proposed works are likely to result in an significant adverse impact on this tree.	Remove tree.
15	***Casuarina glauca*** (Swamp Oak)	M	3.8	2.1	46.3	Proposed footpath offset 0.6 metres south-west at RL1.84 (close to existing grade, partly within footprint of existing pathway to be demolished). Excavations for pavement sub-grade within TPZ/SRZ. Encroachment to TPZ = 26% (less than present situation).	No increase to present encroachment. No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Demolish existing path within TPZ in accordance with Section 10.8. Undertake all excavations for pavement sub-grade within TPZ in accordance with Section 10.9.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
16	***Casuarina glauca*** (Swamp Oak)	M	3.6	1.9	40.7	Existing asphalt pathway offset 0.3 metres west to be demolished within TPZ. Proposed footpath offset 0.8 metres south-west at RL1.84 (close to existing grade, partly within footprint of existing pathway to be demolished). Excavations for pavement sub-grade within TPZ/SRZ. Encroachment to TPZ = 26% (less than present situation).	No increase to present encroachment. No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Demolish existing path within TPZ in accordance with Section 10.8. Undertake all excavations for pavement sub-grade within TPZ in accordance with Section 10.9.
17	***Eucalyptus paniculata*** (Grey Ironbark)	M	4.2	2.1	55.5	Existing parking bay offset 1.9 metres east to be demolished within TPZ.	No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Demolish existing asphalt pavement within TPZ in accordance with Section 10.8.
18	***Grevillea robusta*** (Silky Oak)	M	3.5	2.0	38.0	No proposed works within TPZ (existing asphalt pathway to be maintained).	No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5.
19	***Casuarina cunninghamiana*** (River Oak)	M	8.4	2.8	221.6	No proposed works within TPZ (existing asphalt pathway to be maintained).	No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5.
20	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	4.0	2.4	50.2	No proposed works within TPZ (existing asphalt pathway to be maintained).	No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5.
21	***Ficus rubiginosa*** (Port Jackson Fig)	M	7.2	2.7	162.8	No proposed works within TPZ (existing asphalt pathway to be maintained).	No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
22	***Casuarina cunninghamiana*** (River Oak)	M	3.6	2.0	40.7	No proposed works within TPZ (existing asphalt pathway to be maintained).	No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5.
23	***Ficus rubiginosa*** (Port Jackson Fig)	M	5.0	1.8	78.5	No proposed works within TPZ (existing asphalt pathway to be maintained).	No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5.
24	***Casuarina cunninghamiana*** (River Oak)	M	4.4	2.2	61.9	Existing asphalt pathway offset 1.5 metres east to be demolished within TPZ. Proposed footpath offset 1.5 metres east at RL2.40 (close to existing grade, partly within footprint of existing pathway to be demolished). Excavations for pavement sub-grade within TPZ/SRZ. No increase in encroachment from present situation.	No increase to present encroachment. No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Demolish existing path within TPZ in accordance with Section 10.8. Undertake all excavations for pavement sub-grade within TPZ in accordance with Section 10.9.
25	***Casuarina cunninghamiana*** (River Oak)	M	2.8	1.8	24.4	Existing asphalt pathway offset 1.6 metres east to be demolished within TPZ. Proposed footpath offset 1.6 metres east at RL2.40 (close to existing grade, partly within footprint of existing pathway to be demolished). Excavations for pavement sub-grade within TPZ/SRZ. No increase in encroachment from present situation.	No increase to present encroachment. No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Demolish existing path within TPZ in accordance with Section 10.8. Undertake all excavations for pavement sub-grade within TPZ in accordance with Section 10.9.
26	***Casuarina cunninghamiana*** (River Oak)	M	2.0	1.5	12.6	Located within footprint of proposed new pathway.	Proposed works will necessitate removal	Remove tree.

APPENDIX 5
TREE LOCATION PLAN SHOWING
TREE RETENTION VALUES
KISSING POINT WHARF
24 Waterview Street, PUTNEY, NSW

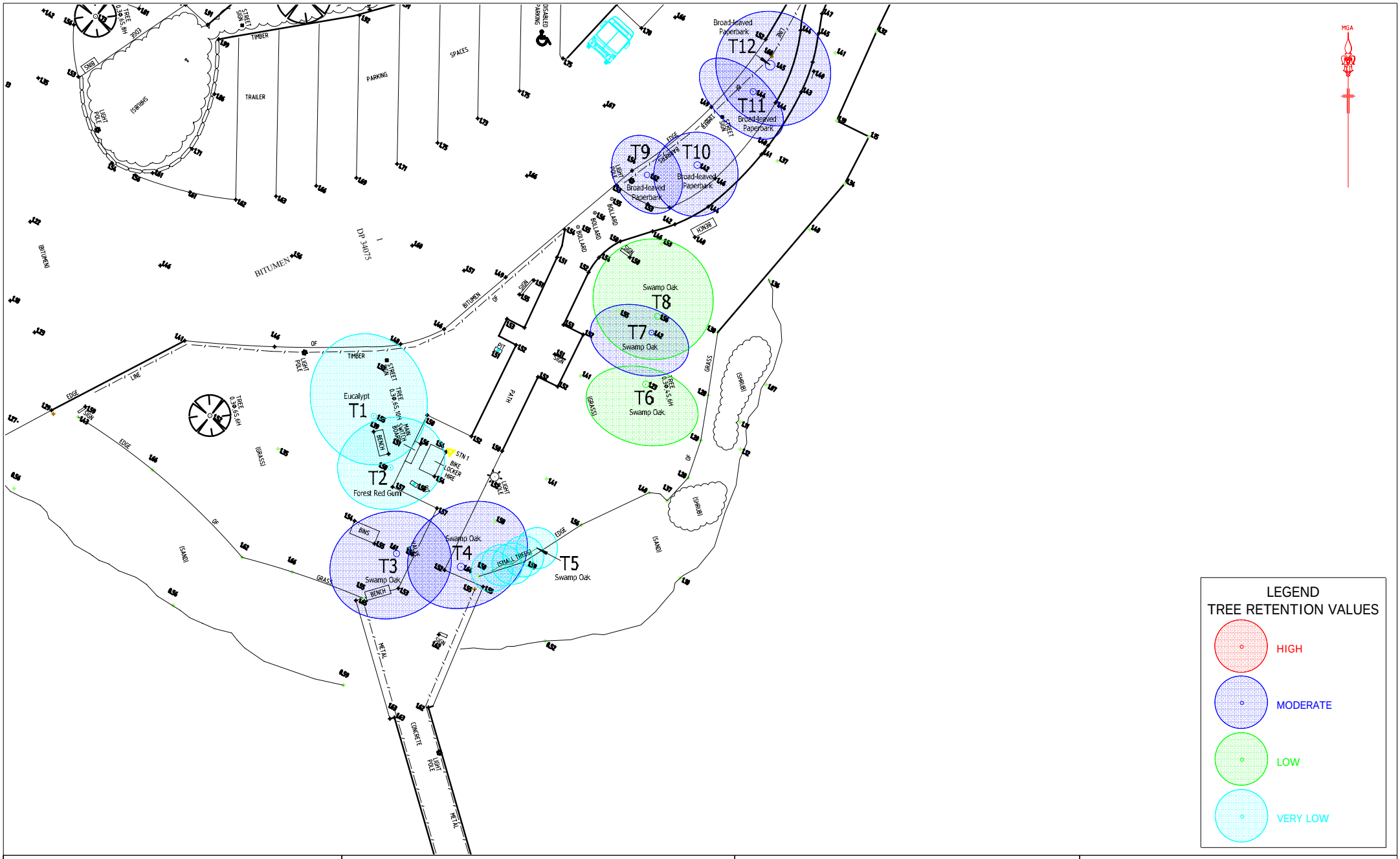
Earthscape Horticultural Services
Arboricultural and Horticultural Consultants
PO Box 364
BEROWRA NSW 2081
Ph: 02 9456 4787
Fax: 02 9456 5757 e: earthscape@iinet.net.au

Based on the Survey Drawing
prepared by Norton Survey Partners
Dwg Ref No. 37774-30 [C]
Dated 10/09/2018

DWG No. T19-110701

KEY PLAN

DATE: 07/11/2019



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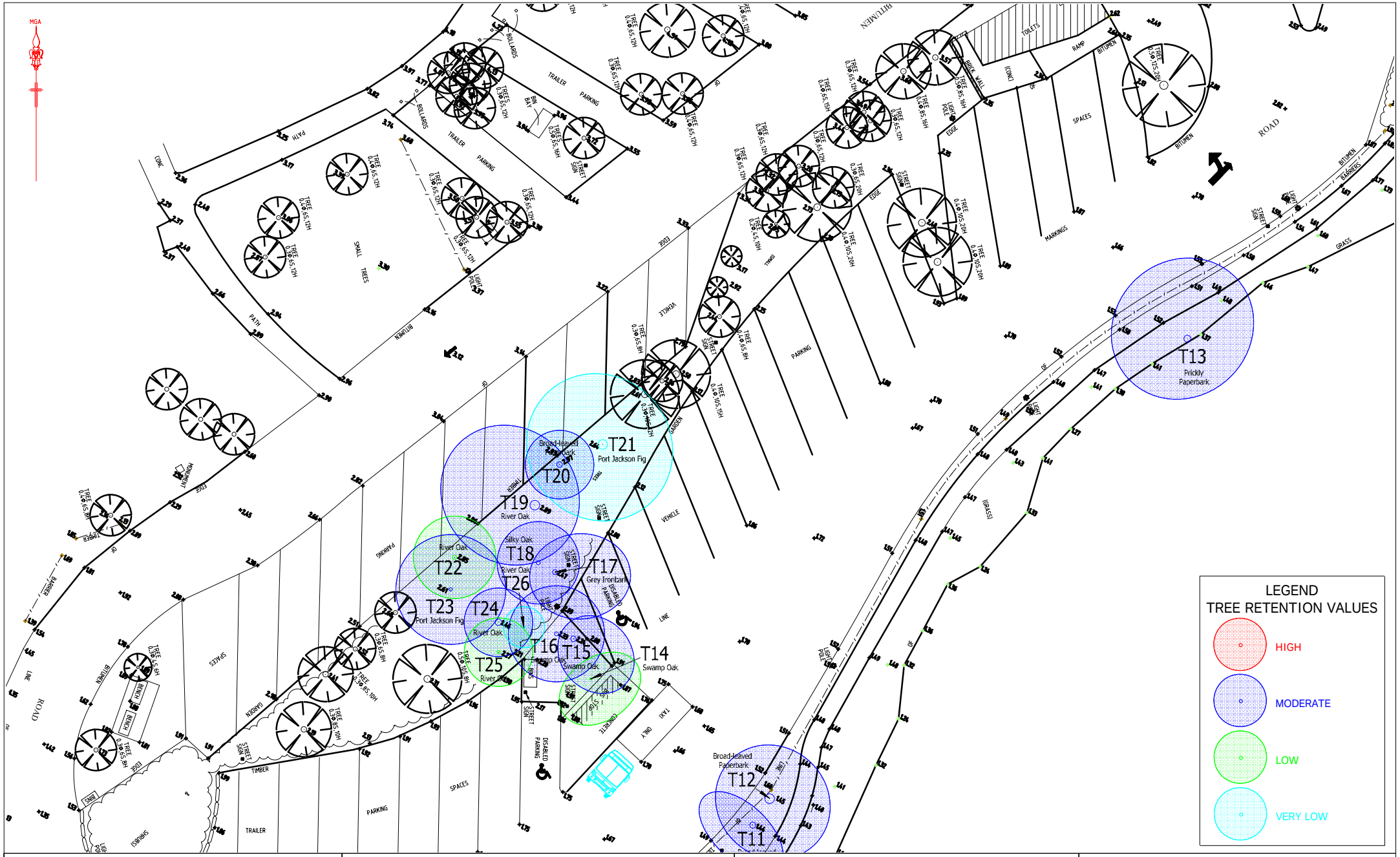
DWG No. T19-110701

SHEET 1

DATE: 07/11/2019



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prepared by Norton Survey Partners
Dwg Ref No. 37774-30 [C]
Dated 10/09/2018

DWG No. T19-110701

SHEET 2

DATE: 07/11/2019

APPENDIX 6

TREE PROTECTION PLAN

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prepared by Norton Survey Partners
Dwg Ref No. 37774-30 [C]
Dated 10/09/2018

DWG No. T19-110702 [A]

KEY PLAN

DATE: 07/11/2019

APPENDIX 6

TREE PROTECTION PLAN

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prepared by Norton Survey Partners
Dwg Ref No. 37774-30 [C]
Dated 10/09/2018

DWG No. T19-110702 [A]

SHEET 1

DATE: 07/11/2019

APPENDIX 6

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Dwg Ref No. 37774-30 [C]
Dated 10/09/2018

DWG No. T19-110702 [A]

SHEET 2

DATE: 07/11/2019

Appendix F

Construction Noise and Vibration Impact Statement

HANSEN YUNCKEN

KISSING POINT FERRY WHARF UPGRADE

CONSTRUCTION NOISE AND VIBRATION IMPACT STATEMENT

JANUARY 2020

Question today
Imagine tomorrow
Create for the future

Kissing Point Ferry Wharf Upgrade
Construction noise and vibration impact statement

Hansen Yuncken

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REV	DATE	DETAILS
A	30/10/2019	Draft report
B	04/11/2019	Draft for TfNSW review
C	26/11/2019	Final for TfNSW review
D	17/01/2020	Final including TfNSW comments

	NAME	DATE	SIGNATURE
Prepared by:	Rebecca Warren	17 January 2020	
Reviewed by:	B Ison	17 January 2020	
Approved by:	B Ison	17 January 2020	

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TABLE OF CONTENTS

EXECUTIVE SUMMARY III

1 INTRODUCTION 1

1.1 PROJECT DESCRIPTION 1

1.2 SENSITIVE RECEIVERS 3

1.3 SCOPE OF ASSESSMENT 4

1.4 RELEVANT GUIDELINES 4

2 BACKGROUND NOISE ENVIRONMENT 6

2.1 NOISE MONITORING LOCATIONS 6

2.2 NOISE MONITORING METHODOLOGY 6

2.3 INSTRUMENTATION AND QUALITY CONTROL 6

2.4 UNATTENDED NOISE SURVEY 7

2.5 OPERATOR ATTENDED NOISE SURVEY 7

3 NOISE AND VIBRATION CRITERIA 8

3.1 CONSTRUCTION NOISE ASSESSMENT PERIODS 8

3.2 CONSTRUCTION NOISE MANAGEMENT LEVELS 8

3.3 SLEEP DISTURBANCE 9

3.4 CONSTRUCTION VIBRATION CRITERIA 10

4 CONSTRUCTION NOISE AND VIBRATION ASSESSMENT 12

4.1 CONSTRUCTION NOISE 12

4.2 CONSTRUCTION VIBRATION 17

5 CONSTRUCTION SAFEGUARDS AND MANAGEMENT MEASURES 19

5.1 STANDARD MITIGATION MEASURES 19

5.2 ADDITIONAL MITIGATION MEASURES 20

6 CONCLUSION 22

LIST OF APPENDICES

APPENDIX A NOISE MONITORING RESULTS

APPENDIX B CONSTRUCTION MAPS

APPENDIX C CNVG STANDARD MITIGATION MEASURES

APPENDIX D ADDITIONAL MITIGATION MEASURE DEFINITIONS

APPENDIX E ADDITIONAL MITIGATION MEASURE LOCATIONS

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 Kissing Point Ferry Wharf upgrade. This upgrade forms part of the Transport Access Program (TAP), and consistent with previous assessments and guidance from Roads and Maritime, it has been conducted with reference to the Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime, 2016).

The assessment was based on the modelling of construction noise and vibration impacts at sensitive receivers during construction of the proposed wharf upgrade. Potential sensitive receivers for both noise and vibration have been categorised as residential, education, hospital and active recreation, with one heritage receiver identified in the study area. The receivers surrounding the Proposal have been categorised into three Noise Catchment Areas (NCAs).

A total of six construction scenarios have been proposed (Scenarios S01 to S06), with works to be undertaken during and outside standard construction working hours as defined in the CNVG. Construction work is expected to take about five months to complete. Night works are expected to take around four weeks 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 generated by construction traffic, and therefore these aspects have not been assessed.

The assessment of construction noise impacts at the nearest sensitive receivers indicates that noise levels are predicted to exceed relevant NMLs at the nearest sensitive receivers in NCA1 during all activities. Exceedances of NMLs are predicted in NCAs 2 and 3 during pile demolition and land-based construction works.

Noise levels are expected to result in exceedances of OOH NMLs by up to 17 dBA in NCA1, 11 dBA in NCA2 and 16 dBA in NCA3 at the nearest sensitive receivers. The most noise intensive works are associated with pile installation (S06). No receivers are predicted to be highly noise affected as a result of the works.

The identified local heritage item ‘former boat slips’ is located approximately 140 north west of the wharf side vibration intensive works and about 40 metres from landside works. No vibration impacts are expected as it does not comprise a formal structure and is located outside the safe working distance limits.

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. Additional noise mitigation measures are required for all scenarios during OOH and Scenarios 3 and 6 in NCA01 during standard hours. With the implementation of site specific and standard mitigation measures implemented, the level of additional mitigation required is expected to be reduced.

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 Kissing Point Ferry Wharf upgrade ('the Proposal').

This document assesses noise and vibration impacts associated with the Proposal construction work. Consistent with previous assessments and guidance from Roads and Maritime, the assessment has been conducted with reference to the Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime, 2016).

Operational noise associated with the Proposal is not part of the scope of this assessment and has not been such has not been assessed in this report.

1.1 PROJECT DESCRIPTION

The Proposal is located within the local government area of Ryde Council. The Kissing Point Wharf is located on the southern face of Kissing Point, protruding into Parramatta River at the mouth of Kendall Bay. The existing wharf is located on Waterview Street, and accessed through a commuter carpark, which includes parking spots, a public bathroom, and bike storage. On either side of the carpark is Kissing Point Park, and immediately to the east is Kendall Bay. The layout of the Proposal is provided in Figure 1.1.

The Proposal is to improve access to the wharf, and upgrade and install a gangway, jetty and floating pontoon 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 uncovered gangway
- Installation of a nine-metre wide by 18-metre long floating covered and glazed pontoon, held in position by four new piles with potential reuse of the existing piles if the condition and capacity of the piles are adequate
- Refurbishment of existing three-metre-wide and 80-metre-long jetty to be strengthened for design life specification of 50 years.
- Installation of an intermediate rest area and viewing platform at interface with the gangway

The landside features of the Proposal would include:

- New concrete landing for entry to wharf;
- Five new bicycle racks to be installed near the wharf;
- Demolition of redundant non-compliant footpath and landscape;
- New rest area to comply with DDA;
- New pedestrian facilities including footpath to Waterview Street and pedestrian crossing to comply with DDA;
- Upgrade of lighting in the carpark;
- Upgrade kiss and ride / taxi stop and shelter.

Construction work is expected to take place over a period of up to five months. Operation of the existing wharf will not be maintained during construction works and mitigation measures of additional bus services would be applied. Works are expected to occur during both standard hours and outside standard hours.

Piling work for the Proposal has an estimated duration of about four weeks to complete toward the beginning of the construction period (after demolition works). 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. The conditions required for piling usually occur during this early morning period. It is preferable to conduct such works during standard hours where possible, and are recommended as far as practicable to minimise impacts on receivers.

Other works to be completed during out of hours periods include the installation of the pontoon and gangway for a period of two weeks.

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.

Figure 1.1 Proposal construction layout

1.2 SENSITIVE RECEIVERS

The Proposal has the potential to adversely impact properties that are considered sensitive to construction noise and vibration. The construction site is located 100 m from Kissing Point, adjacent residential receivers in Putney, recreation receivers along Kissing Point Park, and across the river in Mortlake, and educational receivers at Rivendell School in Rocky Point. Identified sensitive receivers surrounding the Proposal were categorised as follows:

- Residential
- Non-residential receivers, including education, hospital and passive recreational areas
- Potential vibration sensitive receivers, including former boat slips in Kissing Point Park located approximately 140 m west of the project area.

There are no World, National, Commonwealth or State heritage items recorded within the Kissing Point Wharf Interchange project area.

Receivers have been categorised geographically into Noise Catchment Areas (NCAs) based on similar noise environments within these areas, to assist with assessment, consultation and notification.

Receivers are categorised and assessed in terms of their land use as these attract differing noise and vibration criteria.

The NCAs are described and minimum distances to nearby sensitive receivers outlined in Table 1.1. A map of sensitive receivers, NCAs, and background noise monitoring locations are presented in Figure 1.2.

Table 1.1 Noise catchment areas

NCA	MINIMUM DISTANCE TO PROPOSAL LOCATION[1]	DESCRIPTION
NCA01	100 m to residential Adjacent to active recreation	Residential receivers north of the proposed project boundary at Kissing Point. Kissing Point Reserve is located adjacent to the project to the north.
NCA02	440 m to residential 340 m to active recreation	Residential receivers and Wangal Park south-east of the Proposal boundary at Mortlake.
NCA03	280 m to active recreation 330 m to education 500 m to hospital	Rivendell School and Concord Hospital south-west of the proposed project boundary at Concord. Kissing Point Reserve is located adjacent to the project to the north.

(1) Minimum distance of the sensitive receiver buildings to the limits of the construction footprint (i.e. the nearest point to works occurring at the wharf or landside).

1.3 SCOPE OF ASSESSMENT

The purpose of this assessment is to outline the potential noise and vibration impacts associated with the upgrade of the Kissing Point ferry wharf.

The objectives of this study were to:

- Establish noise and vibration criteria at the nearest potentially affected sensitive receivers
- Determine acoustically significant plant required for the construction works and to predict noise levels at the nearest sensitive receivers
- From results of the noise predictions, assess construction noise levels to relevant criteria
- Recommend impact mitigation and management, where necessary.

1.4 RELEVANT GUIDELINES

The noise and vibration guidelines for construction activities are based on the publications managed by the New South Wales (NSW) Environment Protection Authority (EPA). The EPA guidelines applicable to this assessment include:

- Interim Construction Noise Guideline (DECC 2009) (ICNG)
- Construction Noise and Vibration Guideline (Roads and Maritime 2016)
- NSW Road Noise Policy (DECCW 2011)
- Assessing Vibration: a technical guideline (DECC, 2006)
- British Standard 6472-1: 2008 Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting (BS 6472 1 2008)
- German Standard 4150-3 Structural Vibration, Part 3: Effects of Vibration on Structures (DIN 4150-3).

Figure 1.2 Site overview and NCA locations (Source: NSW SIX maps)

2 BACKGROUND NOISE ENVIRONMENT

Background and ambient noise levels surrounding the proposed site were determined through a combination of unattended and attended noise surveys in accordance with the Australian Standard 1055-2018- *Acoustics-Description and Measurement of Environmental Noise* (AS 1055) and *NSW Noise Policy for Industry* (NPfI) (EPA 2017).

2.1 NOISE MONITORING LOCATIONS

Background noise monitoring locations were selected to be representative of the sensitive receivers with the potential to be impacted by noise from construction works. Monitoring locations were selected considering background noise influence, extraneous noise sources and logger security. These monitoring locations were assigned to Noise Catchment Areas (NCAs) based on location and expected characteristics of the noise environment. The noise monitoring locations are detailed in Table 2.1 and shown in Figure 1.2.

Table 2.1 Noise monitoring locations

MONITORING LOCATION (NCA)	SURVEY METHOD	DESCRIPTION
NM01 (NCA01)	Unattended measurement	Kissing Point Reserve, free field
NM02 (NCA02)	Unattended measurement and attended measurement	Wangal Park, free field
NM03 (NCA03)	Attended measurement	Rivendell School, free field

2.2 NOISE MONITORING METHODOLOGY

Unattended noise monitoring was conducted between 15 and 23 October 2019. Each noise logger was set to record the L_{A1}, L_{A10}, L_{A90} and L_{Aeq} levels of ambient noise. (L_{A1}, L_{A10}, L_{A90} are the levels exceeded for 1%, 10% and 90% of the sample time respectively.)

Operator attended monitoring of ambient noise levels was undertaken at representative logger locations during the day time on 15 and 23 October 2019. These attended measurements were undertaken at times of no rain and where the speed of wind, if any, was less than five metres per second. Attended measurements were completed to qualify noise influences and identify their contribution of the various noise sources to the existing noise environment.

2.3 INSTRUMENTATION AND QUALITY CONTROL

The monitoring equipment was fitted with windshields and was field calibrated before and after monitoring. No significant drifts in calibration (± 0.5 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 four kilometres south-west of the Proposal.

Monitoring data was 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 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 2.2. Copies of the calibration certificates can be provided upon request.

Table 2.2 Noise monitoring equipment

LOCATION	SURVEY METHOD	MANUFACTURER AND MODEL NO.	SERIAL NO.
NM01 and NM02	Unattended measurement	Rion	785234, 785237
NM01 and NM02	Attended measurement	Norsonic 140	1406502

2.4 UNATTENDED NOISE SURVEY

The results of the unattended noise monitoring are summarised in Table 2.3 and presented in Appendix A. The rating background level (RBL) is the overall single figure background level representing each day, evening and night time-period. The RBL is the 10th percentile L_{A90} noise level recorded over all day, evening and night time monitoring periods.

Table 2.3 Summary of unattended noise monitoring results

LOCATION	BACKGROUND NOISE LEVEL (dBA RBL[1])		
	DAY[2]	EVENING[2]	NIGHT[2]
NM01 (Kissing Point)	41	39	34
NM02 (Wangal Park)	39	38	35

(1) RBL – rating background level. The overall single-figure background level representing each assessment period (daytime/evening/night-time) as defined in the ICNG.

(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.

Noise levels decreased from RBL 41 dBA during the day period, 38 dBA during the evening period and 34 dBA during the night time period. Dominant noise sources were associated with wind noise and ferry noise influences.

2.5 OPERATOR ATTENDED NOISE SURVEY

The results of the attended background noise monitoring surveys undertaken on 15 and 23 October 2019 are detailed in Table 2.4.

Table 2.4 Summary of attended noise logging results

LOCATION	PERIOD	TIME	dBA $L_{eq,15min}$	dBA $L_{90,15min}$	dBA L_{MAX}	OBSERVATIONS
NM02	Day	16:30 15/10/2017	52	46	68	Traffic from Waterview Road ~ 57-64 dBA Birds up to 47 dBA, insects audible ~ 35-45 dBA, PA system audible ~ 50dBA
NM03	Day	15:13	54	49	70	Background noise wind in trees and waves on shore. Traffic from Anzac Bridge audible. Wind ~ 50dBA, waves ~ 45-50dBA, planes ~ 60-69dBA, ferry at wharf ~ 53-60dBA

The results of the attended noise survey are consistent with the results of the unattended noise monitoring.

3 NOISE AND VIBRATION CRITERIA

The CNVG provides detail into the application of the requirements of the ICNG. The CNVG defines the assessment method for noise assessment, 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 will 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 adopted as outlined in 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 the surrounding road network. As traffic noise generation is not considered to be acoustically significant, construction traffic noise has not been assessed further.

3.1 CONSTRUCTION NOISE ASSESSMENT PERIODS

The CNVG assessment periods applicable to the Proposal are presented in Table 3.1. As any works occurring out of standard hours will occur during the period requiring the most stringent management measures (OOHW Period 2), reasonable and feasible mitigation is designed around this period where works are undertaken out of hours.

Table 3.1 CNVG assessment periods

NAME	TIME PERIODS
Standard Hours (SH)	Monday to Friday – 7am to 6pm Saturday – 8am to 1pm Sunday/Public Holiday – Nil
Out of hours work - Period 2 (OOHW 2)	Monday to Friday – 10pm to 7am Saturday – 10pm to 8am Sunday/Public Holiday – 6pm to 8am

3.2 CONSTRUCTION NOISE MANAGEMENT LEVELS

The CNVG specifies that construction NMLs are to be defined using the method specified in the ICNG. The NMLs are determined based on the measured rating background level (RBL), as defined in the ICNG, plus 10 dB during standard hours and 5dB outside 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' (HNA) and require additional considerations to mitigate potential impacts.

Table 3.2 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 2.3.

Table 3.2 Noise Management Levels (NML) at residential receivers

NCA	NOISE MONITORING LOCATION	dBA RBL		NML dBA $L_{eq(15min)}$ [1]		
		STANDARD HOURS	OOHW 2	STANDARD HOURS	OOHW 2	HIGHLY NOISE AFFECTED
NCA01	NM01	41	34	51	39	75
NCA02	NM02	39	35	49	40	75
NCA03	NM03	41	34	51	39	75

(1) Time periods as defined in Table 3.1.

Table 3.3 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 3.3 Noise Management Levels (NML) at non-residential receivers

LAND USE	NML dBA $L_{eq(15\ min)}$
Education	Internal noise level – 45
Passive recreation	External noise level – 60
Hospital wards and operating theatres	Internal noise level – 45
Commercial	External noise level – 70

Some non-residential receiver types are assessed using criteria specified as internal (rather than external) NMLs, such as schools and hospital wards. As the acoustic performance of the building envelopes of these receivers is not known accurately, an external to internal correction of 10 dB has been applied to internal NML to external NMLs. This is generally accepted as the minimum noise reduction that is typically provided by standard building facades even allowing for windows being open for ventilation.

3.3 SLEEP DISTURBANCE

Some of the proposed construction work would be required to take place during the night-time periods (10pm to 7am) as these works require calmer water conditions to undertake waterside installation works.. Work carried out during the night has the potential to lower sleep quality of the residents adjacent to the construction footprints due to peak noise events. The potential sleep impacts include decrease ability to fall asleep, waking up during sleep and waking up too early.

Section 4.3 of the ICNG discusses the method for quantifying and assessing sleep disturbance (sleep awakening). This guidance references the NSW Road Noise Policy (RNP) (EPA, 2013) that discusses criteria for the assessment of sleep disturbance.

The RNP suggests a screening level of $L_{1(1min)}$ dBA, equivalent to the RBL + 15 dB. Where this level is exceeded, further analysis should be carried out. In addition, Section 5.4 of the RNP also states that:

- Maximum internal noise levels below 50-55 dBA would be unlikely to result in people's sleep being disturbed
- If the noise exceeds 65-70 dBA once or twice each night-time the disturbance would be unlikely to have any notable health or wellbeing effects.

The guidance within the RNP indicates that internal noise levels of 50-55 dBA are unlikely to cause sleep awakenings. Therefore, at levels above 55 dBA, sleep disturbance would be considered likely. Assuming that receivers may have windows partially open for ventilation, a 10 dB outside to inside correction has been adopted as indicated in the ICNG.

Based on the above, the noise level 65 dBA L_{max} (external) has been adopted as sleep disturbance screening criterion for assessment purposes. Feasible and reasonable safeguards should be considered where there are night-time predicted exceedances above this limit.

It should be noted that this assessment method (sleep disturbance criteria based on guidance for sleep awakening) may not capture the full extent of impacts during the early and late stage of sleep (difficulty falling asleep and waking up early). However this assessment method would provide an indication of the potential sleep disturbance when works occur in the night-time period. The night-time impacts due to construction works are quantified and managed through the $L_{eq(15\ min)}$ assessment.

Based on the above guidance, site specific sleep disturbance noise goals used to assess the likelihood for sleep disturbance within residences due to night time construction activity are presented in Table 3.4.

Table 3.4 Sleep disturbance noise management levels at residential receivers

NCA	NOISE MONITORING LOCATION	SLEEP DISTURBANCE CRITERIA, $L_{A1,1MIN}$ DBA RBL	
		EPA SCREENING CRITERION	RNP AWAKENING GOAL
NCA01	NM01	49	65
NCA02	NM02	50	65
NCA03	NM03	50	65

3.4 CONSTRUCTION VIBRATION CRITERIA

Vibration associated with construction activities can result in impacts on human comfort or the damage of physical structures such as dwellings. These two impacts have different criteria, with the effects of vibration on human comfort having a lower threshold.

Regarding human comfort, vibration arising from construction activities must comply with criteria presented in *Assessing Vibration: a technical guideline*, (DECC, February 2006) and *British Standard 6472-1: 2008 Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting* (BS 6472 1 2008).

Section J4.4.3 of *Australian Standard AS2187.2 – 2006 Explosives – Storage and use Part 2: Use of explosives* provides frequency-dependent guide levels for cosmetic damage to structures arising from vibration. These levels are adopted from *British Standard BS7385: 1990 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from groundbourne vibration* (BS7385-2:1993). In addition, further guidance on ground vibration assessment is contained in the German Standard 4150-3 *Structural Vibration, Part 3: Effects of Vibration on Structures* (DIN 4150-3).

Section 7 of the CNVG recommends safe working distances for achieving human comfort (*Assessing Vibration: a technical guideline* (DECC, February 2006) and cosmetic building damage (BS7385-2:1993) criteria for a range of different plant and equipment. These have been presented in Table 3.5.

Table 3.5 Recommended safe working distances for vibration intensive plant

PLANT ITEM	RATING/ DESCRIPTION	SAFE WORKING DISTANCE	
		COSMETIC DAMAGE	HUMAN RESPONSE
Pile boring	≤ 800mm	2 m (nominal)	4 m
Driven piles	Typical driven pile[1]	20 m	30-50 m
Vibratory roller	< 200 kN (typically 4-6 t)	12 m	40 m
Jackhammer	Hand held	1m (nominal)	Avoid contact with structure

(1) Vibration levels for driven piling modelled in line with FTA Noise and vibration manual. Driven piles plant item to represent impact piling rig.

3.4.1.1 HERITAGE STRUCTURES

Building structures classified as being of heritage significance are to be considered on a case by case basis, as a heritage listed structure may not be assumed to be more sensitive to vibration unless it is structurally unsound, which is unlikely for a regularly maintained structure. Where a historic structure is deemed to be sensitive to damage from vibration following inspection by qualified structural and / or civil engineers, 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 7.5mm/s is recommended for the heritage item listed in the Proposal and has been established with reference to the minor cosmetic damage criteria in BS 7385-2. 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.

4 CONSTRUCTION NOISE AND VIBRATION ASSESSMENT

This section outlines the assessment of construction noise and vibration impacts from the proposed works.

4.1 CONSTRUCTION NOISE

To assess the potential noise impacts during construction, scenarios comprising typical plant and equipment have been developed based on indicative staging information.

4.1.1 CONSTRUCTION STAGES AND DURATION

The Proposal would be constructed in stages with the stages occurring at different times depending on the activity. Table 4.1 presents the assessed construction scenarios and working times as supplied by the client.

Out of hours piling is expected to occur over four weeks, with drilling occurring from 1am to 6am and hammering from 5am to 7am. The noisiest out of hours work, hammering the piles, is to be restricted to the last two hours of the night-time period to minimise the impact. During these hammering activities, it is anticipated that each pile would be hammered for one minute (about 10 hits with the hammer within one minute). For each pile the activity is likely to occur about five times over a period of one hour. Installation of the pontoon and gangway is expected to occur out of hours for a period of two weeks.

Table 4.1 Construction stages and duration

SCENARIO REFERENCE	CONSTRUCTION STAGE	PERIOD	DURATION
S01	General wharf construction and demobilisation	Standard hours	5 months
S02	Demolition and removal of piles	Standard hours	2 weeks
S03	Road and footpath works	Standard hours	5 months
S04	Lifting pre-fabricated units including the pontoon and gangway	Standard hours and out of hours – period 2	Periodically over 3 months (10 days of lifting in total)
S05	Pile installation (drilling)	Out of hours – period 2	4 weeks
S06	Pile installation (hammering)	Out of hours – period 2	4 weeks

4.1.2 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 4.2.

Table 4.2 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, 4]	119	25%		1				
Barge[3]	95	50%	1	1				
Boat[3]	100	100%	1	1		1	1	1
Compressor[4]	109	100%	1			1		
Crane[4]	104	25%	1	1		1	1	1
Generator[4]	103	100%	1	1		1	1	1
Hand tools (electric)[4]	110	25%	1	1		1		
Piling rig (boring)[4]	112	25%					1	
Piling rig (impact)[1, 4]	121	25%						1
Light vehicle[4]	88	4 movements	1					
Daymaker[2]	80	100%				1	1	1
Jack hammer[1,4]	118	25%			1			
Smooth drum (vibratory) roller[1,4]	112	100%			1			
Pavement laying machine[4]	114	100%			1			
Asphalt truck[4]	103	100%			1			
Concrete truck[4]	109	100%			1			
Concrete pump[4]	109	100%			1			
Scenario total SWL, dBA			**112**	**114**	**119**	**112**	**109**	**116**
Scenario total maximum noise levels L_{max}, dBA			**-**	**-**	**-**	**117**	**114**	**121**

(1) To account for the annoying characteristics of the plant, a +5 dB correction has been added to the plant sound power level.

(2) Sound power level sourced from TfNSW *Construction Noise and Vibration Strategy (2018)*

(3) Sound power level adopted from a previous study of the Proposal and approved by Roads and Maritime

(4) Sound power level sourced from the CNVG.

4.1.3 ASSESSMENT METHODOLOGY

Prediction of construction noise impacts from the Proposal has been completed using SoundPLAN noise propagation modelling software (Version 8) noise prediction algorithm. Based on previous consultation with Roads and Maritime, the CONCAWE modelling algorithm was implemented for this assessment.

The most significant factors in determining the level of noise from construction activities are the receiver distance from the Proposal site, screening, ground absorption and source heights. The parameters used and values adopted in the noise modelling are presented in Table 4.3.

Table 4.3 Modelling parameters

PARAMETER	INPUT
Buildings	Building footprints and number of floors taken from aerial photography. Building heights estimated from Google Street-view as follows: per floor 3 m, pitched roof 2.5 m
Topography	Sourced from SIXMaps NSW (2m contour intervals)
Façade calculation	Impacts calculated at the most affected storey of nearby receivers
Meteorological conditions	Meteorological conditions were modelled as noise enhancing (source-to-receiver wind vectors and F class temperature inversions with wind speeds up to 2 m/s during night, source-to-receiver wind vectors and D class temperature inversions with wind speeds up to 3 m/s during day/evening)
SoundPLAN module	CONCAWE industrial module
Ground surface / absorption	Vegetated areas modelled assuming ground absorption of 0.6. Bodies of water modelled assuming ground absorption of 1.0.
Source heights	Construction plant and equipment heights are modelled to be 2 metres above ground
Sources	All equipment has been modelled as point sources and all equipment per work stage have been modelled to operate simultaneously.
Receiver heights	Noise contours modelled at a height of 1.5m to reflect typical first floor receiver height.
Modelled levels	This report represents the $L_{Aeq(15\ min)}$ emission level

4.1.4 PREDICTED CONSTRUCTION NOISE IMPACTS

The results of construction noise modelling have been presented as noise façade plots and are provided in Appendix B.

Precise construction methodology will be confirmed by the construction contractor, however potential noise impacts associated with an indicative construction staging has been conservatively assessed to facilitate community consultation and effective noise management and mitigation prioritisation. Predictions are conservative as all equipment is assumed to operate simultaneously at the closest offset to the receiver. Due to the nature of these construction activities, actual noise levels are expected to be lower than presented.

Noise levels have been predicted for the construction scenarios outlined in this report, with modelled noise levels for each scenario presented in Table 4.4.

Worst case noise impacts are presented for each NCA in Table 4.4, including noise level compared to criteria within each NCA and receiver types, with exceedances indicated as follows:

- The orange shaded cells show exceedances of the standard hours (SH) (daytime) period.
- The blue shaded cells show exceedances of the OOH (night-time) period (where relevant).
- The **bold red cells** show highly noise affected receivers

Where a predicted noise level exceeds the less stringent management levels (SH), it follows that the more stringent (OOH) management levels are also exceeded.

Table 4.4 Maximum predicted construction noise levels and indicative exceedances per scenario

NOISE CATCHMENT AREA (NCA)	NML dBA			MODELLED MAXIMUM NOISE LEVEL PER SCENARIO (dBA $L_{eq(15min)}$)[2]					
	SH	OOH	HNA	S01	S02	S03	S04	S05	S06
Residential receivers									
NCA01	51	39	75	52	54	66	52	49	56
NCA02	49	40	75	47	49	52	47	44	51
NCA03	51	39	75	51	53	56	51	48	55
Passive recreation									
NCA01	60	n/a	n/a	57	59	71	57	54	61
NCA02	60	n/a	n/a	45	47	50	45	42	49
NCA03	60	n/a	n/a	56	58	61	56	53	60
Commercial									
NCA02	70	n/a	n/a	43	45	51	43	40	47
Education									
Rivendell School	55	n/a	n/a	51	53	56	51	48	55
Hospital wards									
Concord Hospital	55	n/a	n/a	45	47	50	45	42	49

(1) HNA – Highly noise affected

(2) Appendix E provides detail on expected perception of NML exceedances in line with the CNVG

4.1.5 STANDARD HOURS

Construction activities to be completed within standard hours include wharf construction and demobilisation, demolition and removal of piles, land-based construction activities and some activities associated with pontoon and gangway installation (Scenarios 1 to 4).

The assessment of construction noise impacts at the nearest sensitive receivers indicates that noise levels are predicted to exceed relevant NMLs at the nearest sensitive receivers in NCA1 during all activities. Exceedances of NMLs are predicted in NCAs 2 and 3 during pile demolition and land-based construction works.

Noise levels are predicted to result in exceedances of up to 15 dBA during Scenario 3 works in NCA1, with exceedances in NCAs 2 and 3 limited to 5 dBA above NMLs. The most noise intensive works are associated with land based works (Scenario 3), due to the proximity to the works to sensitive receiver areas.

No receivers are predicted to be highly noise affected as a result of the works.

Based on the available construction schedule, it is understood that the impacts associated with standard hours works during Scenario 3 (land-based activities) are likely to occur over a 5 month period and are likely to result in noticeable noise impacts at the nearest receivers in NCAs 1, 2 and 3. General wharf construction activities will occur over a month period, and pile removal will be limited to 2 weeks.

Noise levels presented in this report are considered conservative, as it is assumed that noise sources will operate simultaneously. In reality, noise impacts will be lower as it is expected that all high noise level equipment will not be used simultaneously during the activity.

As a result of the predicted exceedances, noise mitigation and management measures have been outlined in Section 5 to reduce the potential noise impacts.

4.1.6 OUTSIDE STANDARD HOURS

Works to be completed outside standard hours include installation of pontoon and gangway, piling and drilling (Scenarios 4 to 6). The assessment of OOH construction noise impacts at residential receivers indicates that noise levels are predicted to exceed relevant OOH NMLs at the nearest sensitive receivers in all NCAs during works outside standard hours.

Noise levels are expected to result in exceedances of OOH NMLs by up to 17 dBA in NCA1, 11 dBA in NCA2 and 16 dBA in NCA3 at the nearest sensitive receivers. The most noise intensive works are associated with pile installation (S06). No receivers are predicted to be highly noise affected as a result of the works.

Based on the available construction schedule, it is understood that the impacts associated with OOH works during Scenario 4 (pontoon and gangway installation) are likely to occur periodically over a 3 month period. Pile installation and hammering are likely to occur over a period of 4 weeks, and are likely to result in noticeable noise impacts at the nearest receivers in NCAs 1, 2 and 3.

Noise levels presented in this report are considered conservative, as it is assumed that noise sources will operate simultaneously. In reality, noise impacts will be lower as it is expected that all high noise level equipment will not be used simultaneously during the activity.

As a result of the predicted exceedances, noise mitigation and management measures have been outlined in Section 5 to reduce the potential noise impacts.

4.1.7 SLEEP DISTURBANCE ASSESSMENT

Some construction activities would be required to take place out of hours for safe working reasons. The activities proposed for night-time construction work are detailed in Section 4.1.1.

An assessment for sleep disturbance has been carried out based on the maximum noise (L_{max}, dBA) from construction plant. The maximum noise level from the equipment was assumed to be 5 dB more than the $L_{eq,15min}$ noise level based on previous assessment.

The predicted maximum noise events with the potential to cause sleep disturbance are presented in Table 4.5. The blue shaded cells show locations where the potential for sleep disturbance has been identified.

Table 4.5 Predicted sleep disturbance noise impacts

NCA	SLEEP DISTURBANCE CRITERIA dBA L_{MAX}		PREDICTED NOISE LEVEL (dBA L_{MAX})		
	SCREENING CRITERION	AWAKENING GOAL	S04	S05	S06
NCA01	49	65	57	54	61
NCA02	50	65	52	49	56
NCA03	49	65	56	53	60

The predicted maximum noise levels calculated in Table 4.5 indicate that sleep disturbance for residential receivers is likely to occur at receivers adjacent to the construction footprints during the drilling of piles, hammering of piles, and lifting of the pontoon and gangway into position (Scenarios 4 to 6). Noise levels are predicted to result in exceedances of RNP screening criteria, however levels will remain below the awakening goal.

The drilling of piles is expected to occur between 1am and 6am, and hammering of piles between 5am to 7am. Piling is estimated to take around four weeks to complete. This would potentially result in sleep disturbance at the nearest residential receivers.

The potential for work to generate maximum noise level events should be considered as part of the construction noise management strategy. Mitigation measures are discussed further in Section 5.

4.2 CONSTRUCTION VIBRATION

The major potential sources of vibration from the proposed construction activities are during pile boring, pile hammering, jackhammering and smooth drum (vibratory) roller equipment (Scenarios 2, 3, 5 and 6).

4.2.1 SAFE WORKING DISTANCES FOR VIBRATION INTENSIVE PLANT

Table 4.6 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, 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*.

Table 4.6 Recommended safe working distances for vibration intensive plant

PLANT ITEM	RATING/ DESCRIPTION	SAFE WORKING DISTANCE	
		COSMETIC DAMAGE	HUMAN RESPONSE
Pile boring	≤ 800mm	2 m (nominal)	4 m
Driven piles	Typical driven pile[1]	20 m	30-50 m
Vibratory roller	< 200 kN (typically 4-6 t)	12 m	40 m
Jackhammer	Hand held	1m (nominal)	Avoid contact with structure

(3) Vibration levels for driven piling modelled in line with FTA Noise and vibration manual. Driven piles plant item to represent impact piling rig.

The safe working distances presented in Table 4.6 are indicative only and will vary depending on the particular plant item and local geotechnical conditions. They apply to typical buildings under typical geotechnical conditions.

The wharfside construction area is located over 150m from receivers in NCA 1, while land-based construction activities are located within 30m of residential receivers.

Given the distances and potential work areas of vibratory intensive plant, sensitive receivers in NCA1 are anticipated to be located outside the safe working distance limits for cosmetic damage and human response, therefore no further action is required.

The former boat slips as well as the Kissing Point Park are classified as having heritage significance. It is noted that the boat slips do not comprise a formal structure which may be susceptible to structural damage. Nonetheless, high level calculations of the vibration generating activities outlined in Table 3.5 indicate that any such works would not result in vibration levels above the screening level of 7.5 mm/s. Where piling were to occur within 30 m of a vibration-sensitive heritage receiver, more detailed investigations would be warranted to confirm the potential for vibration impact.

No other heritage items or buildings with the potential for structural damage were identified, therefore vibration impacts to heritage structures are not considered further in this assessment. This should be confirmed as part of a Construction Noise and Vibration Management Plan (CNVMP) should include management at these locations before the commencement of construction activities and after construction is completed. Structures that are potentially at risk of threshold or cosmetic damage would be identified by the contractor prior to the commencement of construction works.

Nonetheless, recommended vibration impact management measures to manage potential structural damage and human comfort impacts are presented in Section 5.

5 CONSTRUCTION SAFEGUARDS AND MANAGEMENT MEASURES

This section describes the required noise and vibration safeguards and management measures as per the CNVG that should be considered as part of Roads and Maritime's commitments for the construction of the Proposal. The measures provided in this section will be dependent upon the equipment selected for use.

As part of the preparation for commencing the construction work, a construction noise and vibration management plan (CNVMP) should be prepared.

5.1 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 are also considered to be applicable here. Relevant CNVG standard mitigation measures are provided in Appendix C.

5.1.1 NOISE MITIGATION MEASURES

In addition to the provision of standard mitigation measures and additional mitigation measures, the measures outlined in Table 5.1 are recommended for the proposed construction works and should be considered to minimise the predicted noise impacts at the nearest receivers.

Table 5.1 Recommended site specific controls

EQUIPMENT / PROCESS	DESCRIPTION	POTENTIAL BENEFITS
All plant	Limiting number of plant, use of alternative equipment and /or using a different, quieter method to carry out the work. Where feasible, limit the amount of plant equipment operating at any one time. For particularly noisy plant items (e.g. jackhammer), the use of such plant should be minimised where feasible.	Up to 3 dB or more reduction of scenario noise level.
Site design	Where feasible and reasonable, any site hoarding or fences erected should be constructed with thick plywood or fitted with temporary acoustic barriers to provide additional noise reduction at the immediate receivers.	Reduction of up to 5 dB to 10 dB at the nearest receivers (north and east of the project site).
Stationary plant, equipment and activities i.e. Jack hammer, Paving machine Concrete pump Compressor Generator	Consider implementation of temporary barriers around stationary sources or use of alternative quieter equipment where reasonable and feasible. Where temporary noise barriers are used to block line of sight between stationary works and equipment (paving, 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 in the north and east.

EQUIPMENT / PROCESS	DESCRIPTION	POTENTIAL BENEFITS
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 assembly of pre-fabricated components.	Limited potential to exceed predicted construction noise impacts.

Where the above recommended site specific controls are enacted, it is expected that exceedances of night time NMLs would be reduced to a maximum of 5 dBA in NCA01.

Monitoring of noise during high noise periods, such as piling and the lifting of pre-fabricated units, should be conducted at a nominated representative location. The purpose of monitoring is to confirm that construction noise from the project is consistent with the predictions of this assessment, and mitigation and management measures are appropriate for receivers. As required by the CNVG, after feasible and reasonable mitigation measures have been implemented, additional mitigation measures as outlined in Section 5.2 should be considered.

5.1.2 VIBRATION MITIGATION MEASURES

Adverse impacts from vibration due to construction works are not predicted at nearby sensitive receivers. However, if work is required within the identified safe working distances of the receiver structures, the outcomes of this vibration assessment should be revisited. On site specific vibration measurements should also be carried out to confirm vibration levels and safe working distance for the vibration intensive plant and equipment. If vibration limits as outlined in Section 3.4 are exceeded, the implementation of additional vibration mitigation measures should be considered.

5.2 ADDITIONAL MITIGATION MEASURES

Additional mitigation measures should be considered after the application of reasonable and feasible noise mitigation measures. The following measures (as detailed in Appendix C of CNVG) should be considered where an exceedance of construction noise levels would be present after implementation of the standard measures outlined in Appendix C and to be included as part of the CNVMP for the project.

The most stringent additional mitigation measures applicable for each construction scenario to receivers within each NCA are presented in Table 5.2. Definitions of the abbreviations of the additional mitigation measures are provided in Appendix D.

Appendix E presents maps of the exceedances of NMLs in each NCA for standard and OOH periods, including the area that require additional mitigation measures due to worst case exceedances of the proposed construction activities. The results are presented for standard hours and out of hours and night time exceedances.

Table 5.2 Additional mitigation measures – Airborne noise

NCA	ADDITIONAL MITIGATION MEASURES (AIRBORNE)					
	S01	S02	S03	S04 OOH	S05 OOH	S06 OOH
NCA01	-	-	N, V	V, N, R2, DR	V, N, R2, DR	V, IB, N, PC, SN, R2, DR
NCA02	-	-	-	V, N, R2, DR	N	V, N, R2, DR
NCA03	-	-	-	V, N, R2, DR	V, N, R2, DR	V, IB, N, PC, SN, R2, DR

AA = alternative accommodation, V = verification, IB = individual briefing, N = notification, R2 = respite period, DR = duration respite, R1 = respite period 1, PC = phone calls, SN = specific notifications

Receivers should be notified (as outlined in Table 5.2) as to the working times, and duration of the works, an outline of activities, and potential impacts from the works. The community should be notified well in advance (at least two weeks prior) to works commencing on site.

A complaints handling procedure should be implemented. Guidance on methods of complaints handling and additional community engagement strategies are outlined in Section 8.3.2 of the TfNSW Construction Noise and Vibration Strategy (TfNSW, 2018).

6 CONCLUSION

WSP has undertaken a construction noise and vibration assessment for the proposed Kissing Point Ferry Wharf upgrade. The assessment was conducted with reference to the Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime, 2016). Operational noise associated was not part of the scope of this assessment and as such has not been assessed.

Sensitive receivers surrounding the Proposal included residences, education, hospital and passive recreational areas, and these receivers have been categorised into noise catchment areas for assessment purposes.

Background noise levels surrounding the Proposal were determined using unattended noise surveys. These background noise levels were used to derive the project specific noise criteria for residential and non-residential receivers.

To assess the potential noise impacts during construction, six representative construction scenarios were developed based on indicative staging information. Precise construction methodology will be confirmed by the construction contractor, however potential noise impacts associated with an indicative construction staging has been conservatively assessed to facilitate community consultation and effective noise management and mitigation prioritisation.

The assessment of construction noise impacts at the nearest sensitive receivers indicates that noise levels are predicted to exceed relevant NMLs at the nearest sensitive receivers in NCA1 during all activities. Exceedances of NMLs are predicted in NCAs 2 and 3 during pile demolition and land-based construction works.

Noise levels are predicted to result in exceedances of up to 15 dBA during Scenario 3 works in NCA1, with exceedances in NCAs 2 and 3 limited to 5 dBA above NMLs. The most noise intensive works are associated with land based works (Scenario 3), due to the proximity to the works to sensitive receiver areas.

Noise levels are expected to result in exceedances of OOH NMLs by up to 17 dBA in NCA1, 11 dBA in NCA2 and 16 dBA in NCA3 at the nearest sensitive receivers. The most noise intensive works are associated with pile installation (S06). No receivers are predicted to be highly noise affected as a result of the works. Pile installation and hammering are likely to occur over a period of 4 weeks, and are likely to result in noticeable noise impacts at the nearest receivers in NCAs 1, 2 and 3.

No receivers are predicted to be highly noise affected as a result of the works.

The predicted maximum noise levels indicate that sleep disturbance for residential receivers is likely to occur at receivers adjacent to the construction footprints during the drilling of piles, hammering of piles, and lifting of the pontoon and gangway into position (Scenarios 4 to 6). Noise levels are predicted to result in exceedances of RNP screening criteria, however levels will remain below the awakening goal.

Given the distances and potential work areas of vibratory intensive plant, works are anticipated to be located outside the safe working distance limits for cosmetic damage, human response and heritage receivers, therefore no further action is required.

Noise mitigation and management measures have been outlined to reduce the potential noise impacts. Standard CNVG construction noise management measures and additional mitigation measures are recommended for the receivers within NCAs with predicted exceedances.

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. Additional noise mitigation measures are required for all scenarios during OOH and Scenarios 3 and 6 in NCA01 during standard hours. With the implementation of site specific and standard mitigation measures implemented, the level of additional mitigation required is expected to be reduced.

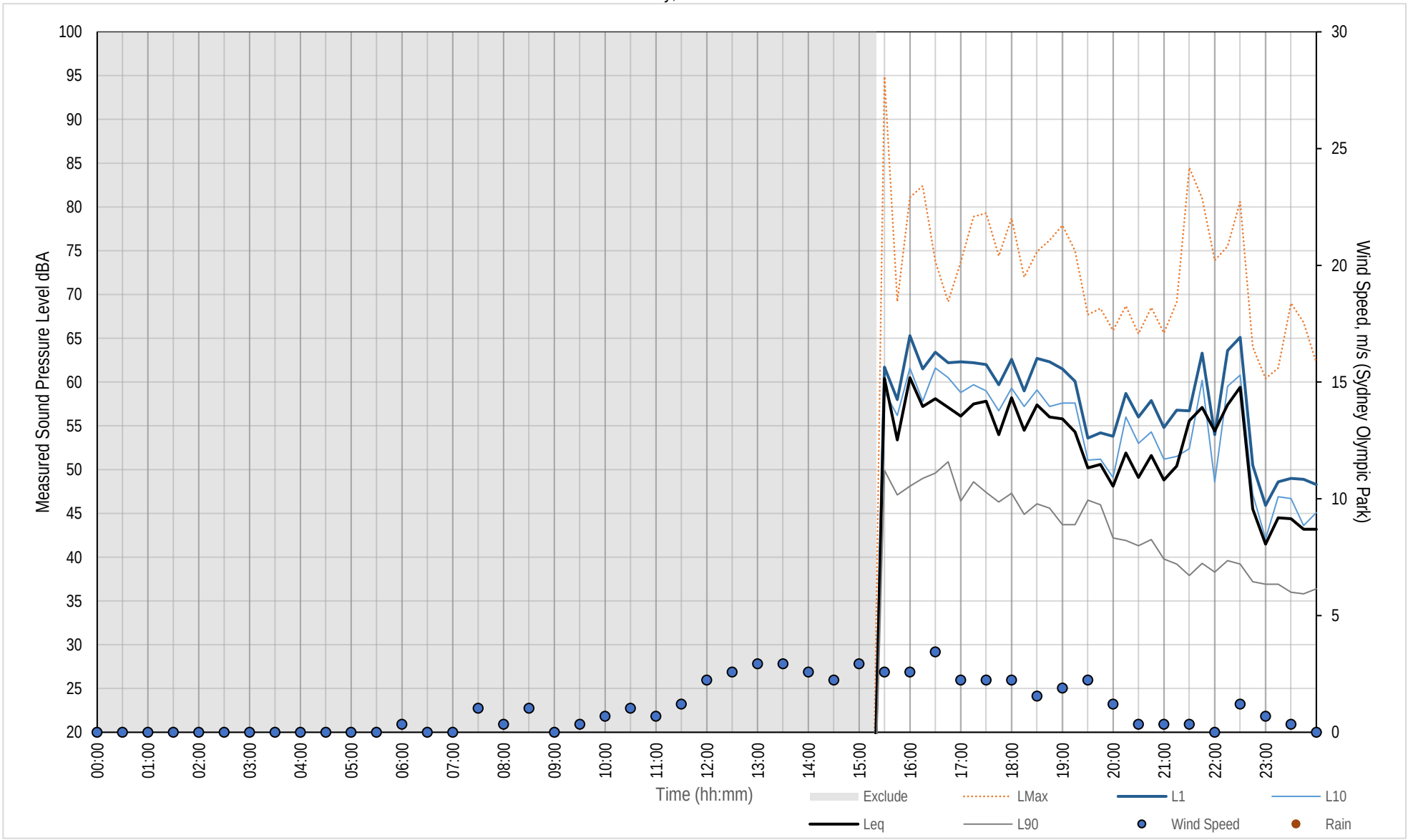
APPENDIX A

NOISE MONITORING RESULTS

A1. NOISE MONITORING RESULTS - NM01

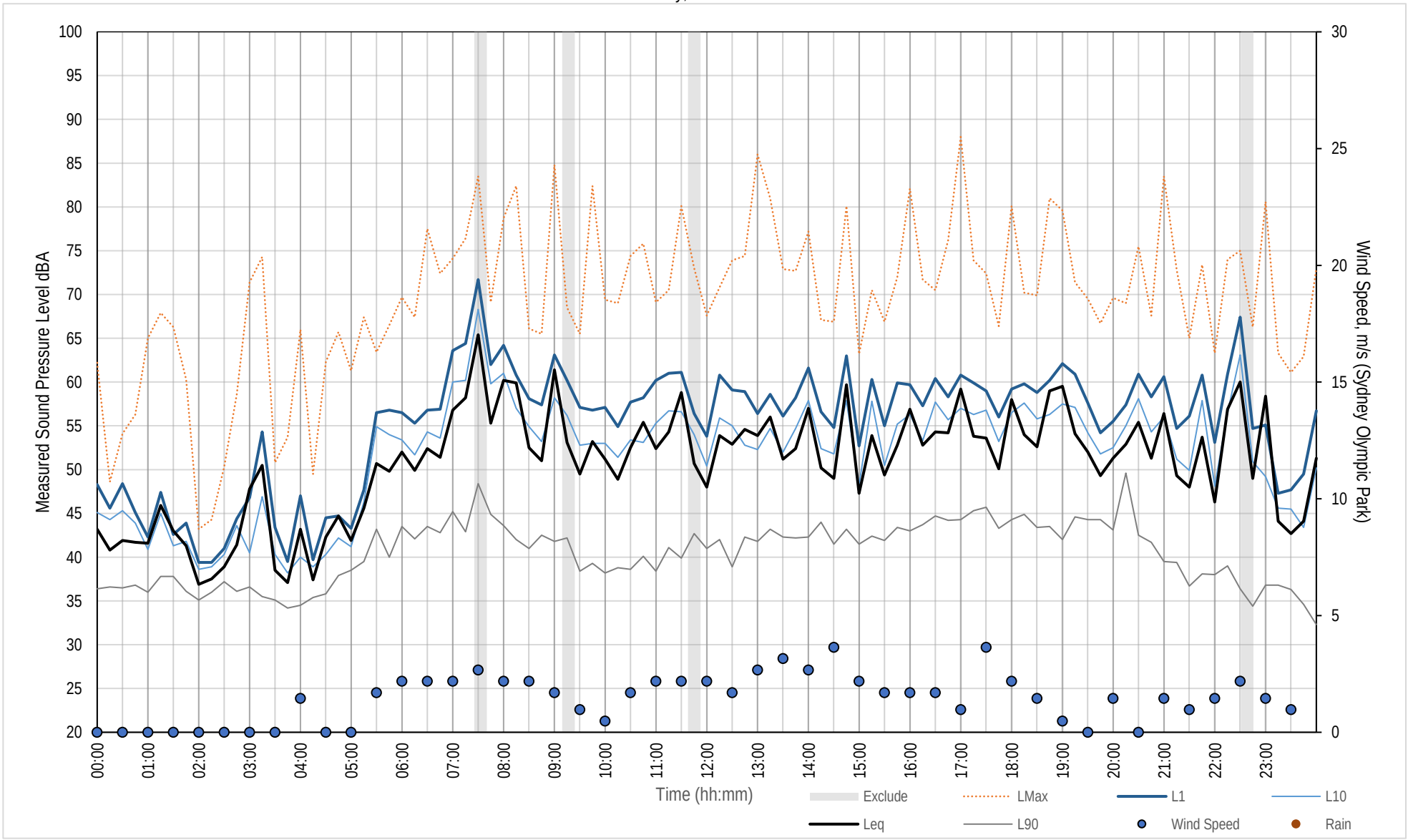
Measured Noise Levels - Kissing Point (NM01)

Tuesday, 15 October 2019



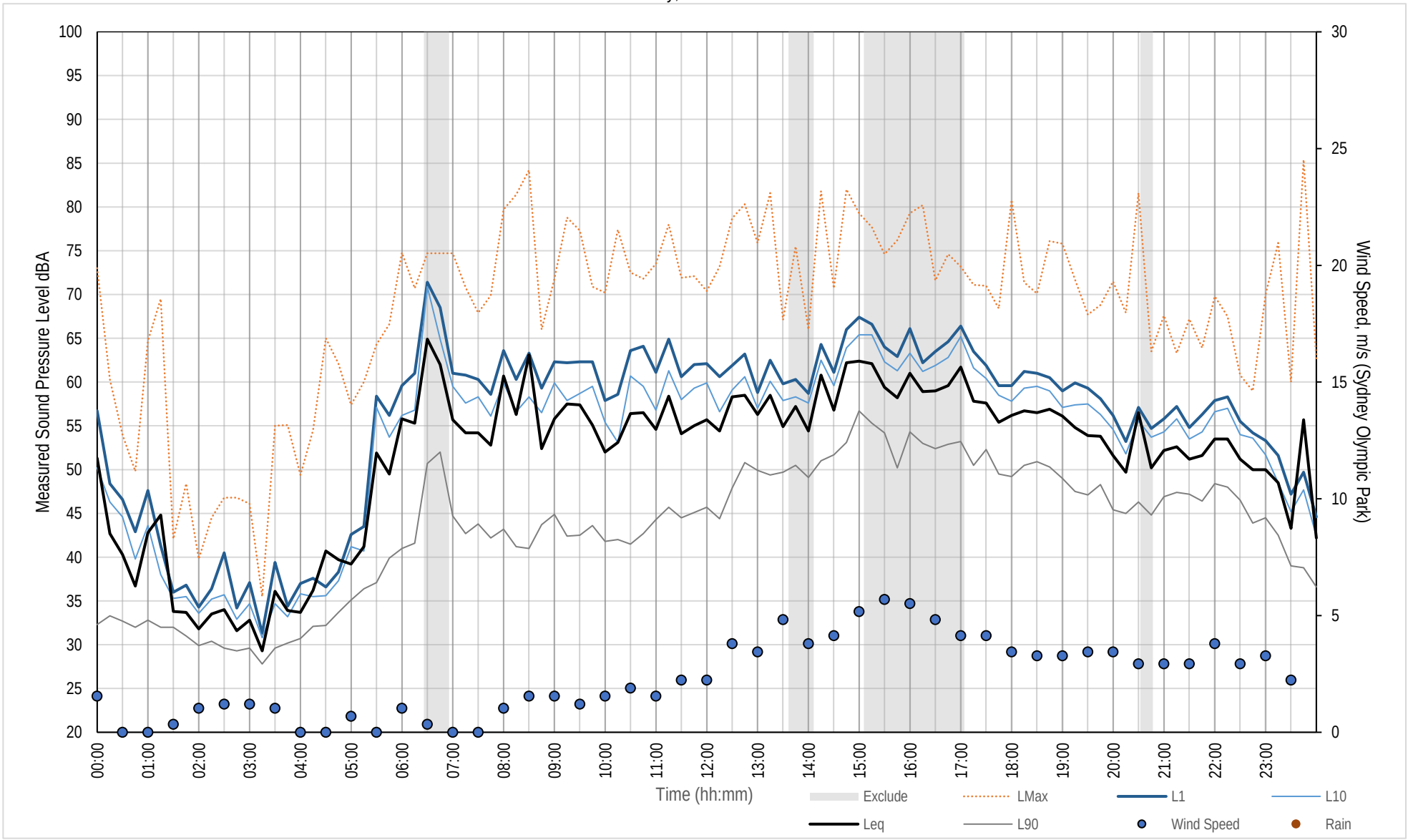
Measured Noise Levels - Kissing Point (NM01)

Wednesday, 16 October 2019



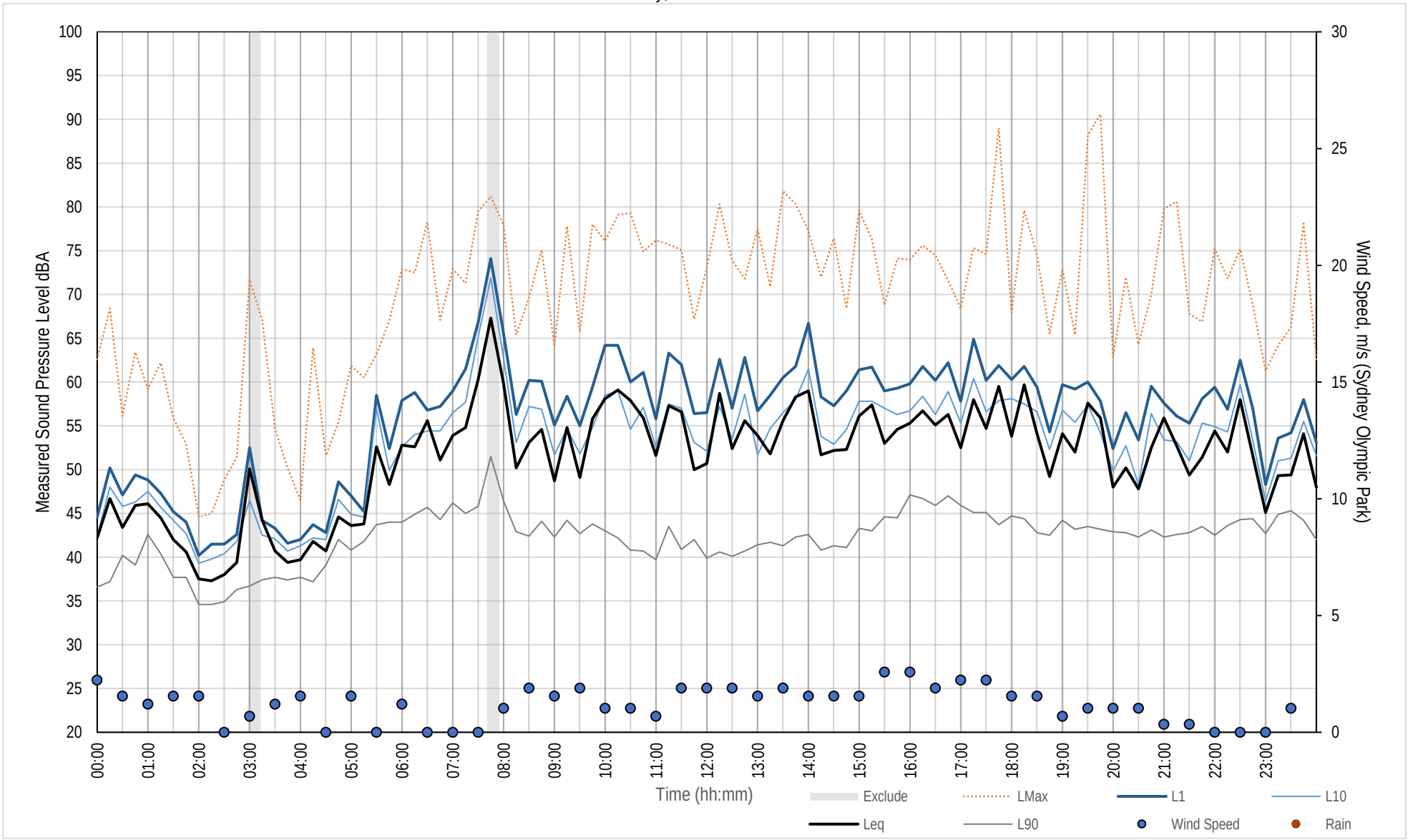
Measured Noise Levels - Kissing Point (NM01)

Thursday, 17 October 2019



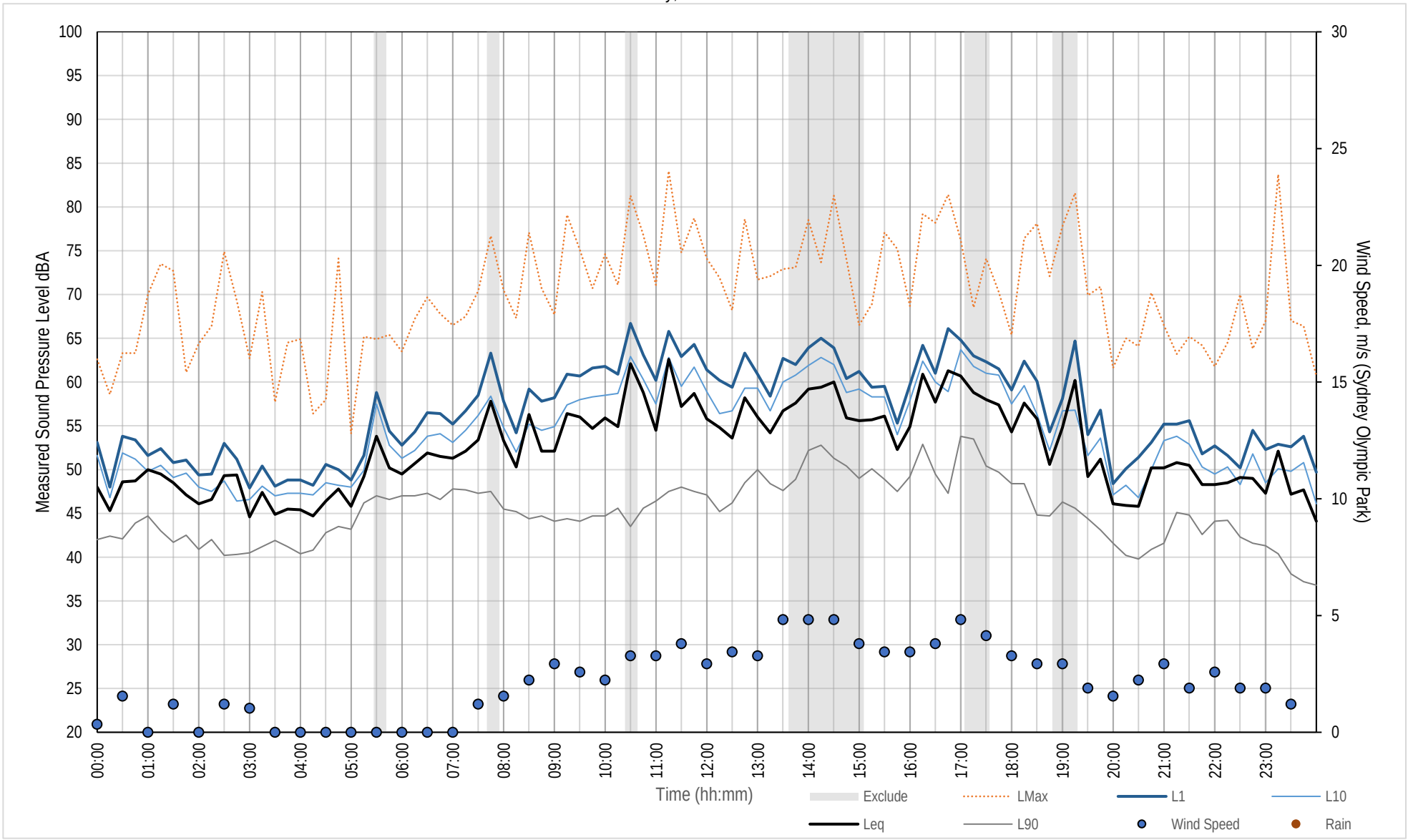
Measured Noise Levels - Kissing Point (NM01)

Friday, 18 October 2019



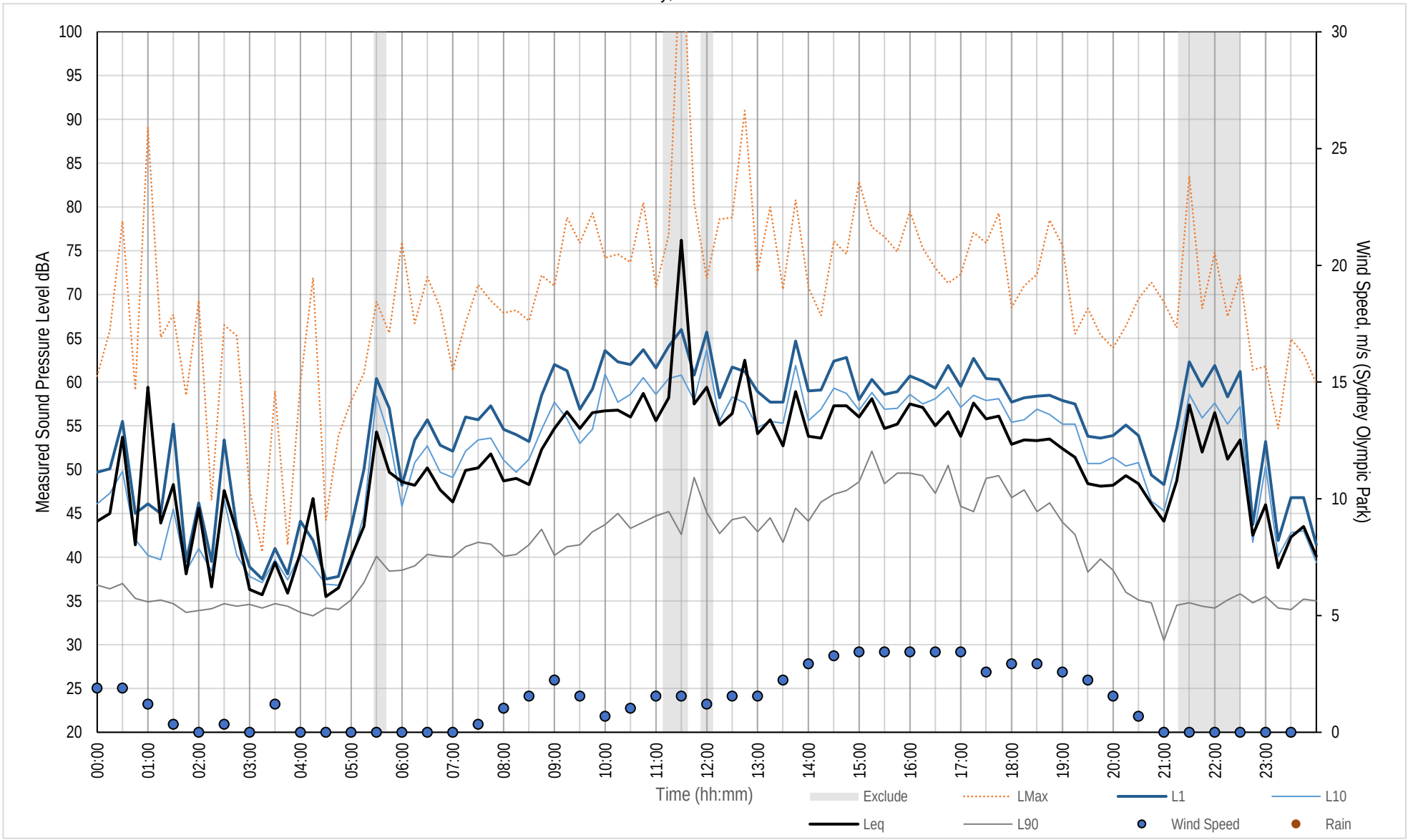
Measured Noise Levels - Kissing Point (NM01)

Saturday, 19 October 2019



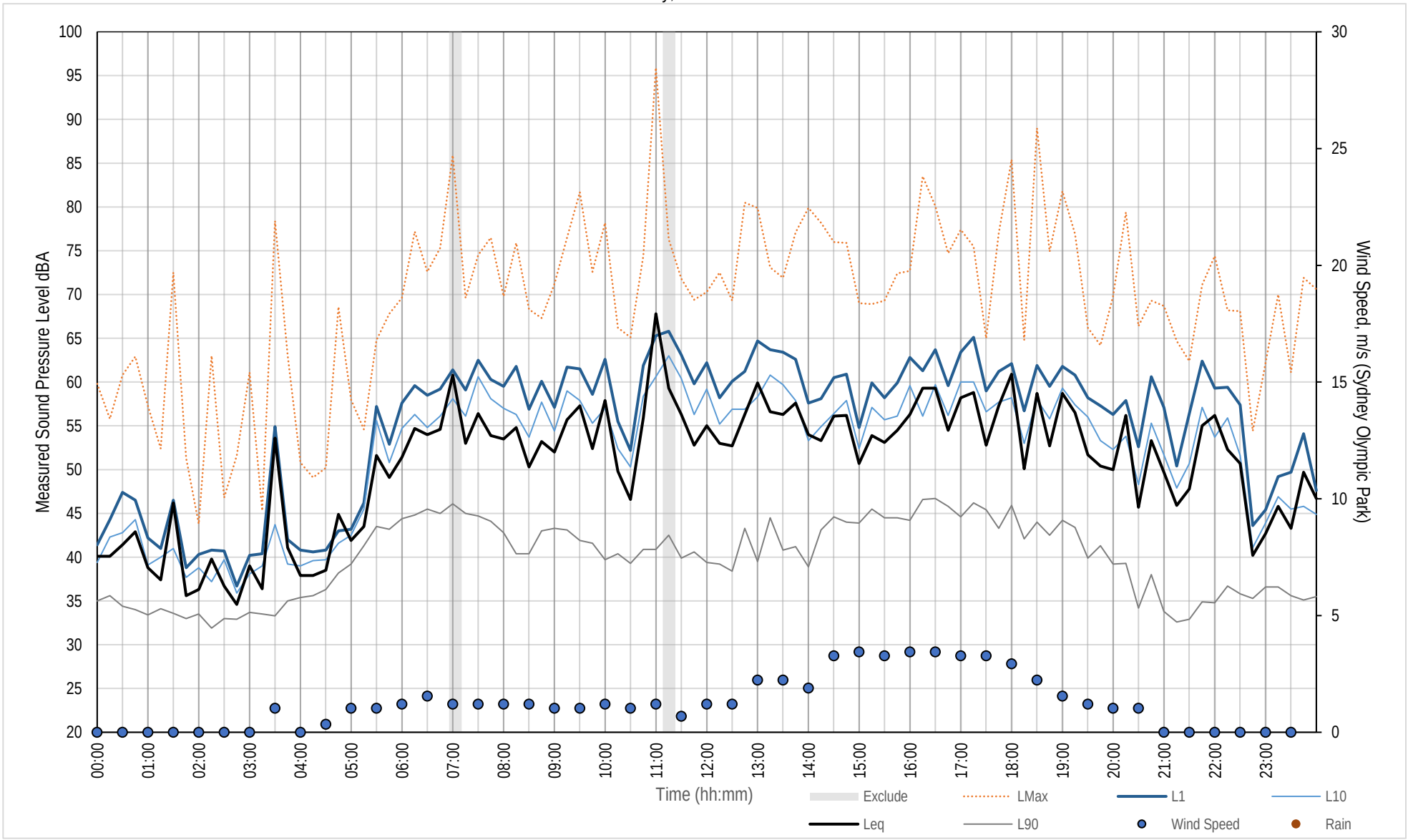
Measured Noise Levels - Kissing Point (NM01)

Sunday, 20 October 2019



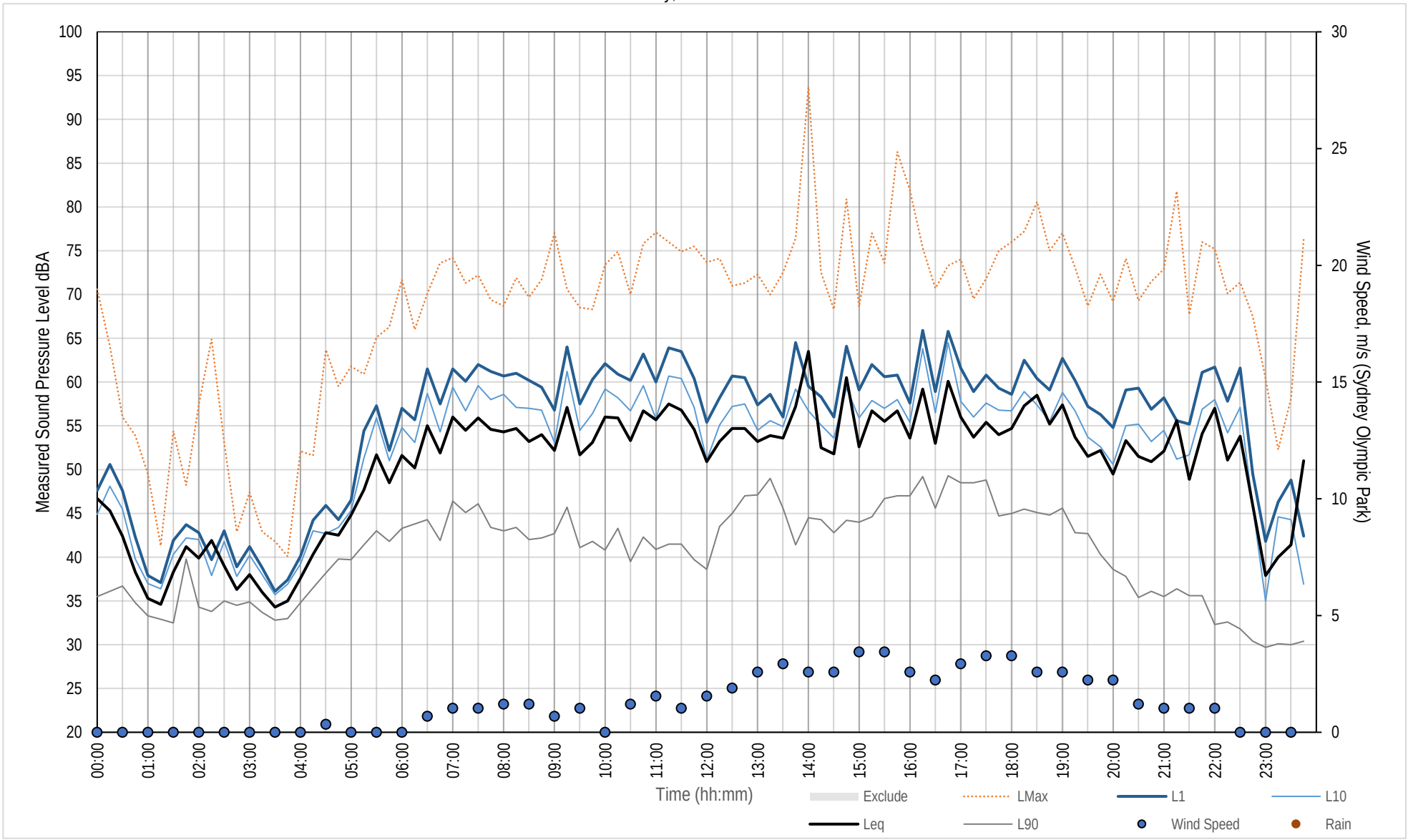
Measured Noise Levels - Kissing Point (NM01)

Monday, 21 October 2019



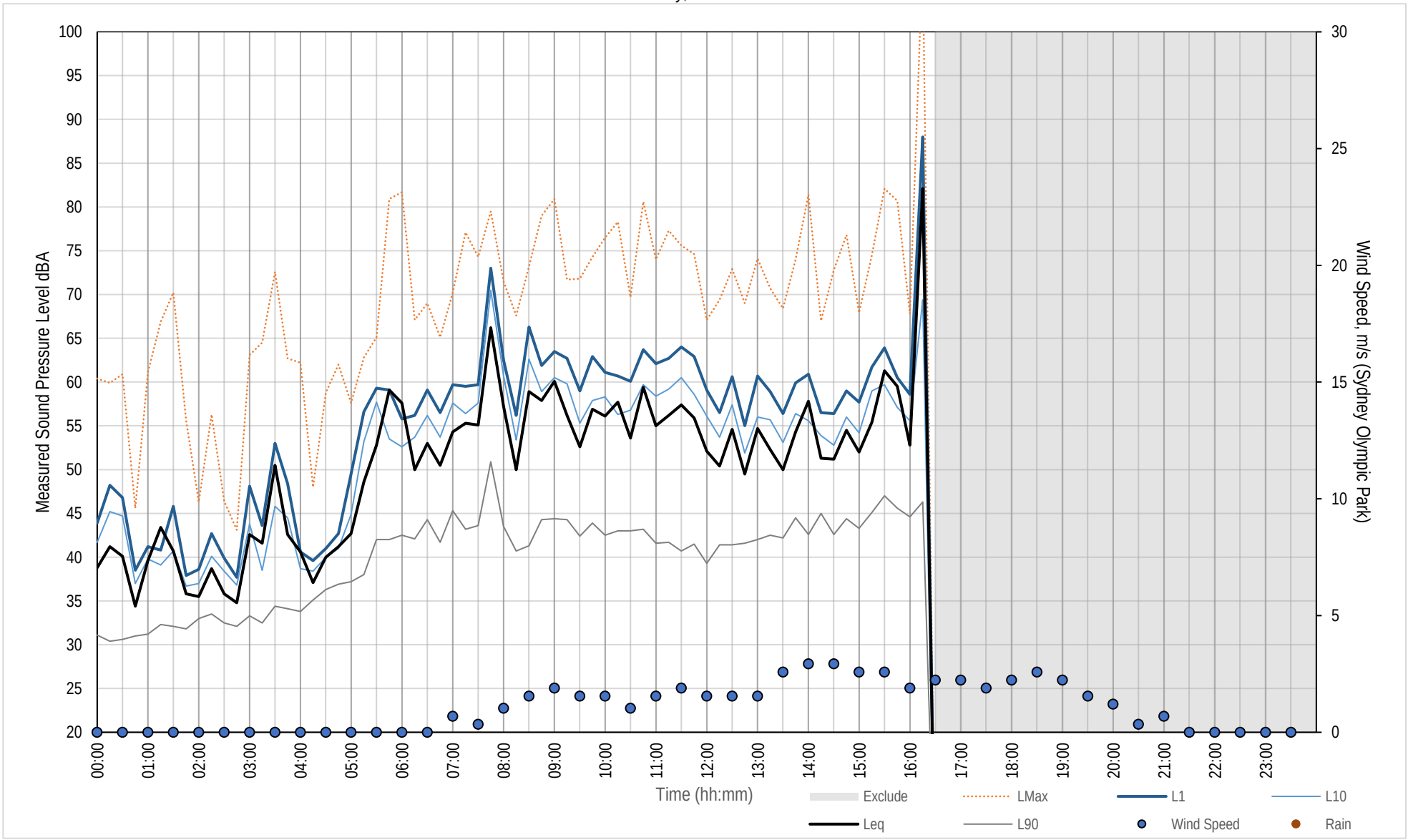
Measured Noise Levels - Kissing Point (NM01)

Tuesday, 22 October 2019



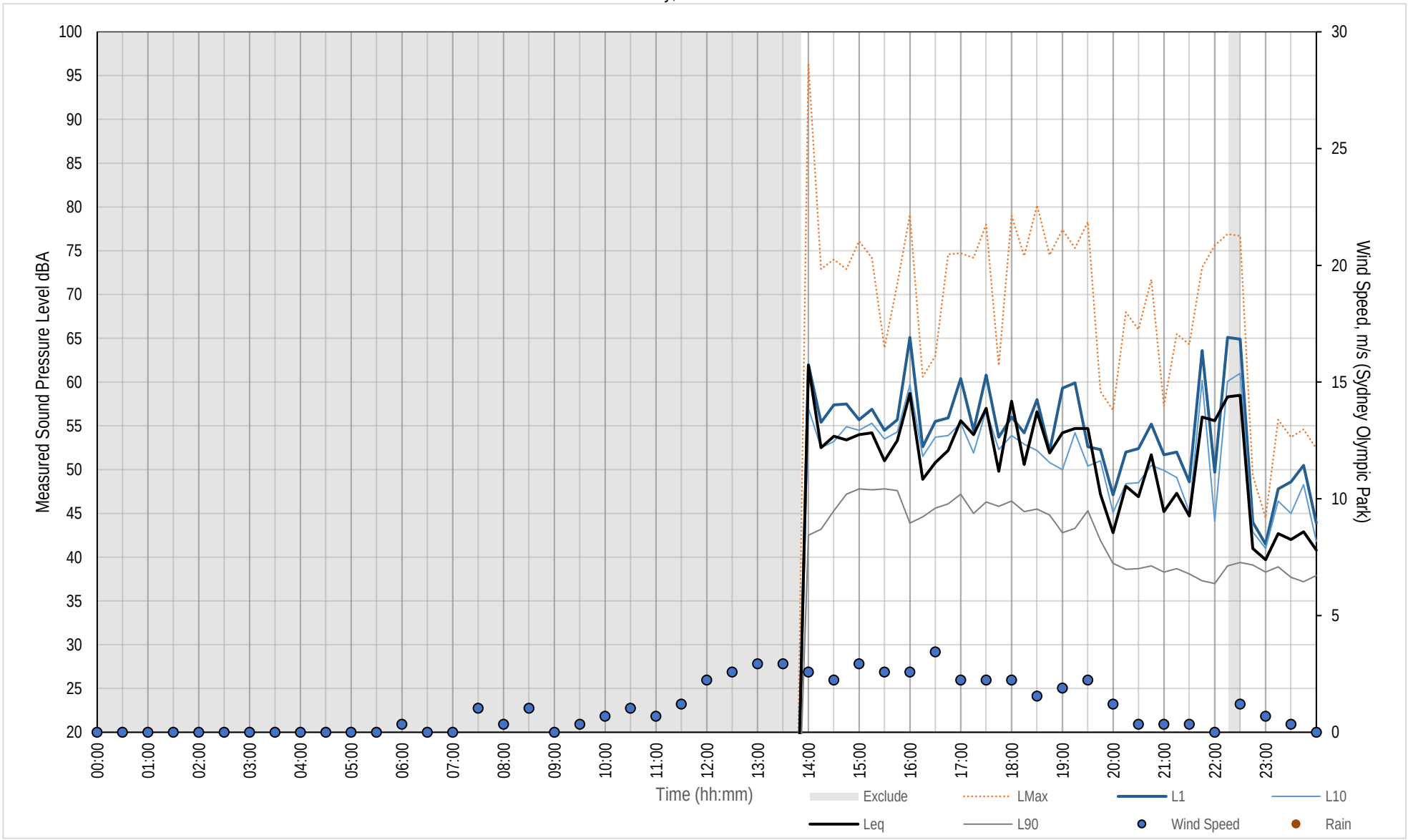
Measured Noise Levels - Kissing Point (NM01)

Wednesday, 23 October 2019



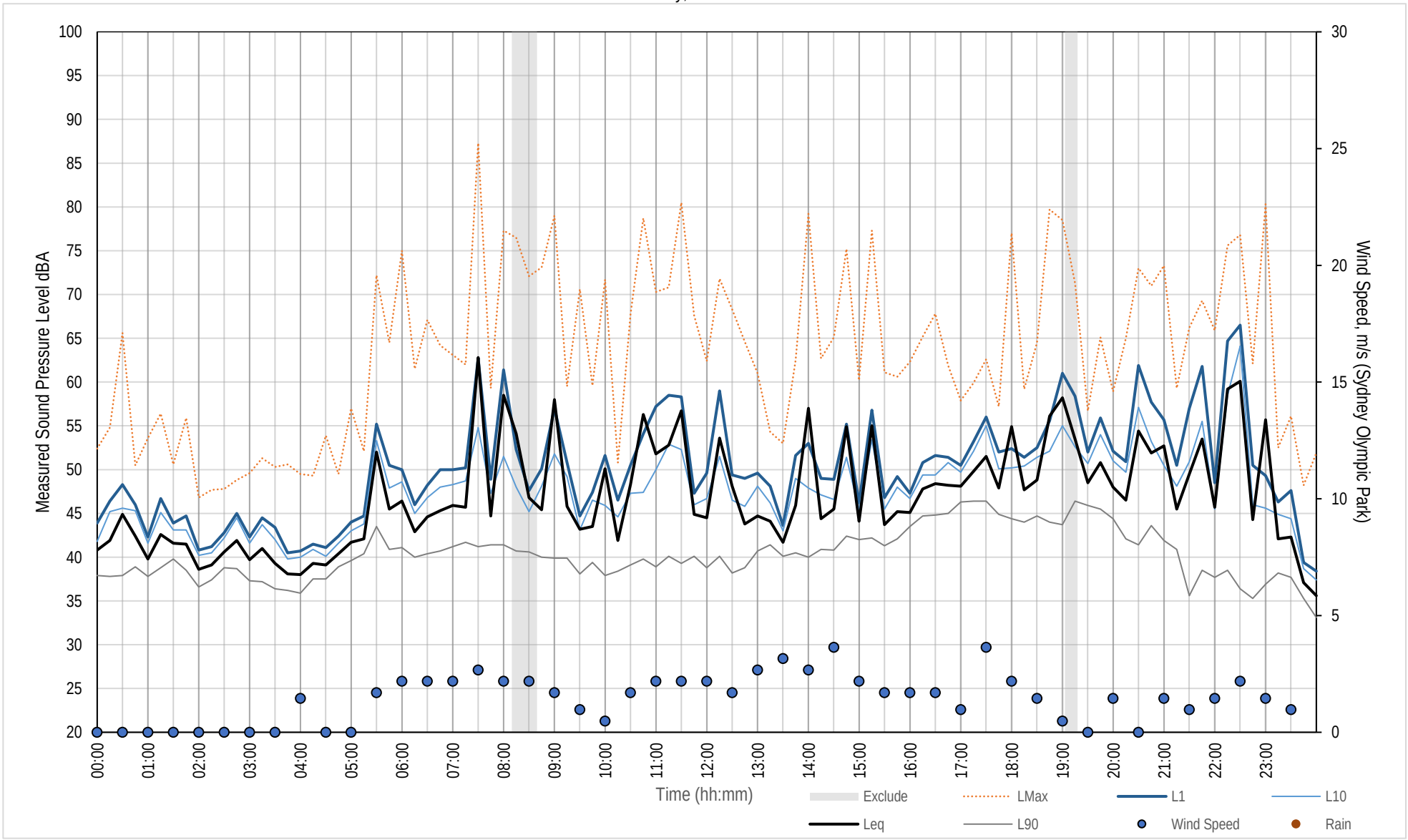
Measured Noise Levels - Wangal Park (NM02)

Tuesday, 15 October 2019



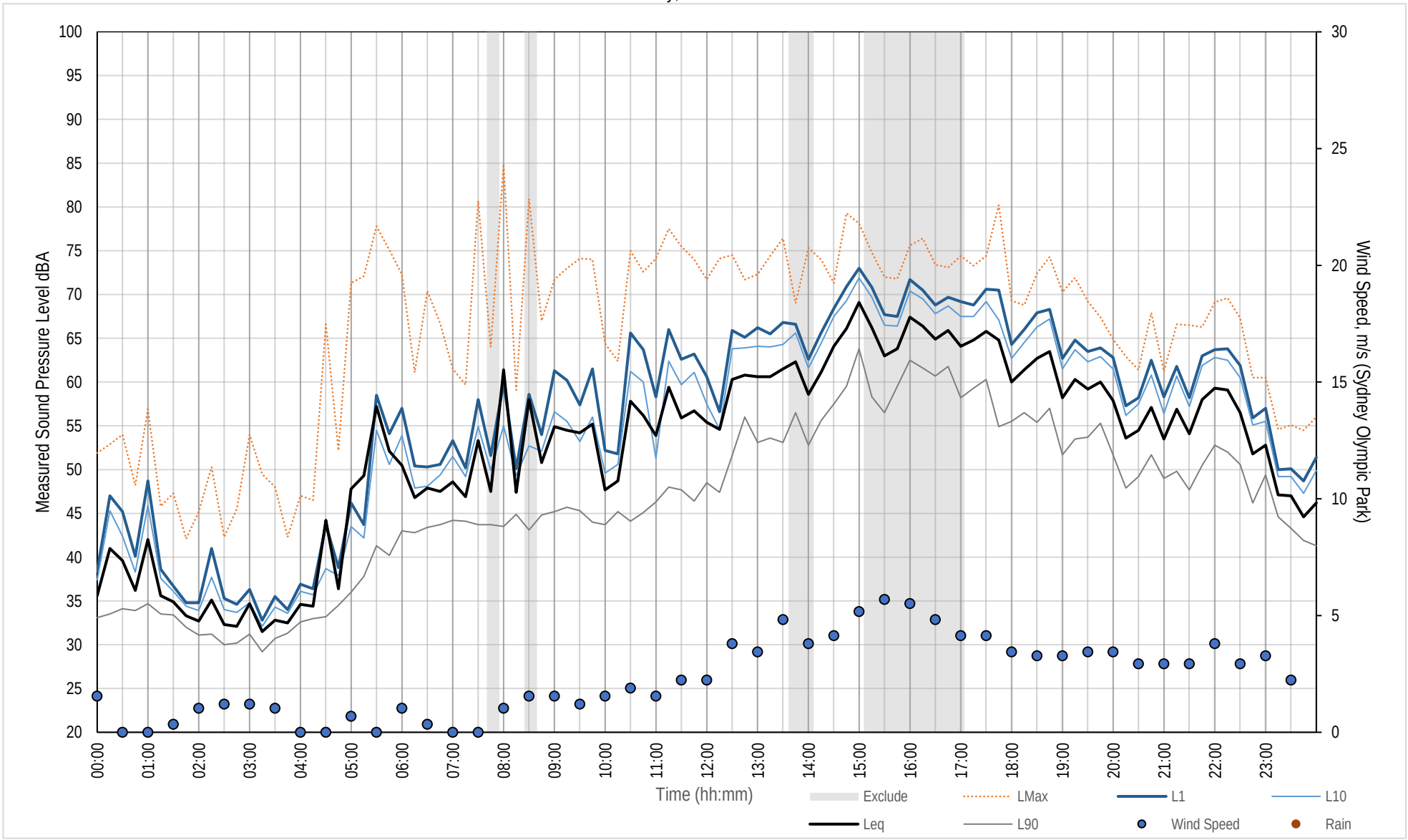
Measured Noise Levels - Wangal Park (NM02)

Wednesday, 16 October 2019



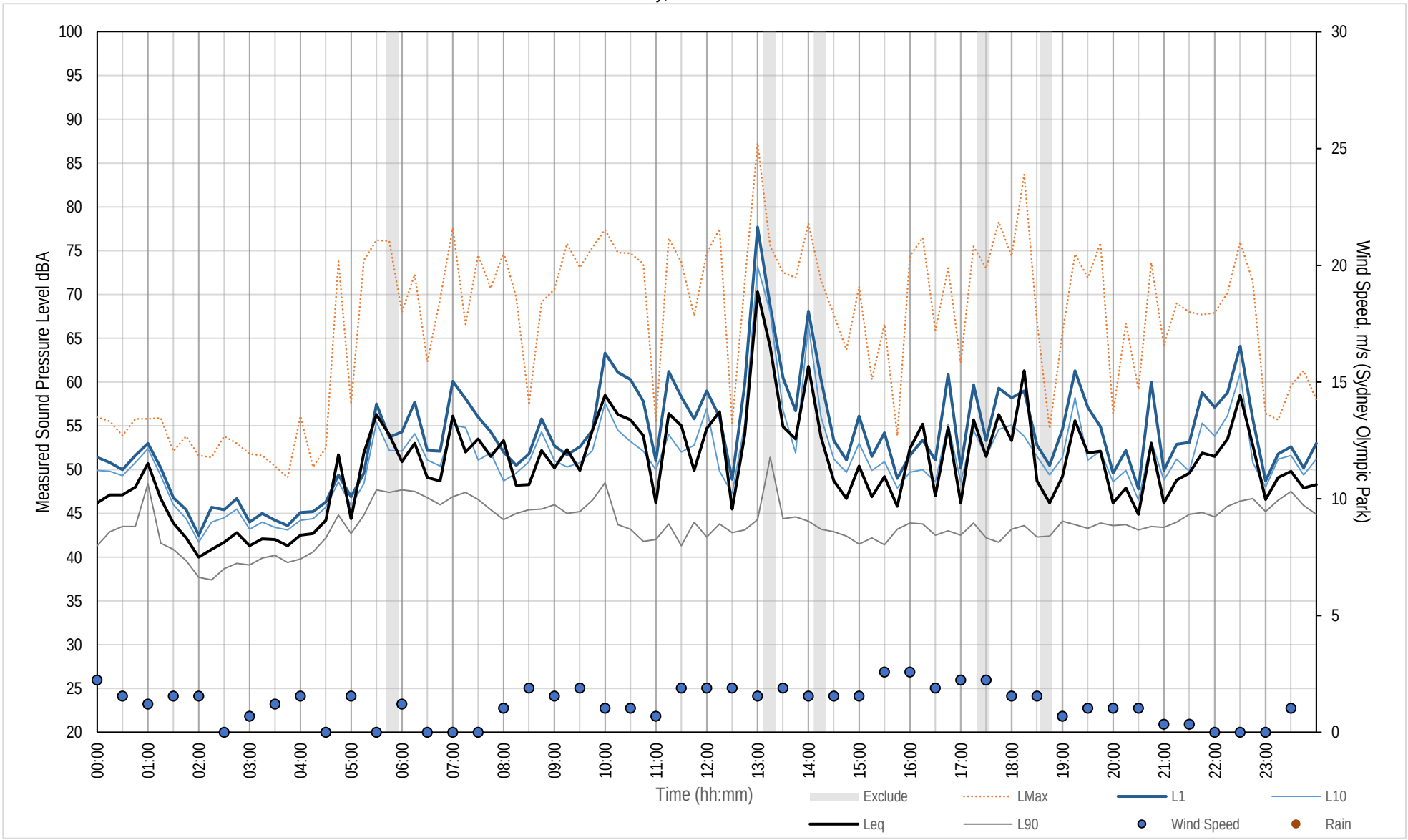
Measured Noise Levels - Wangal Park (NM02)

Thursday, 17 October 2019



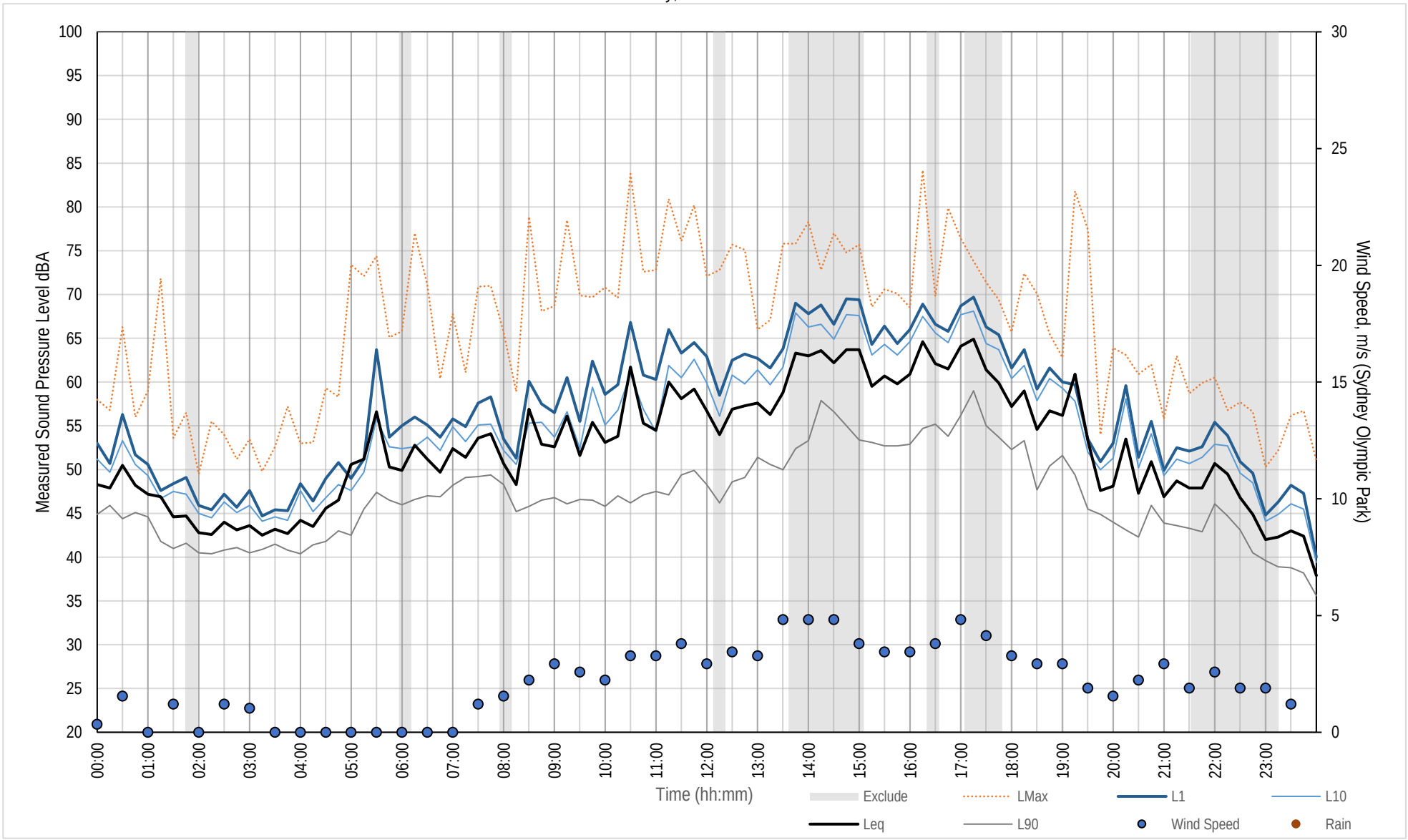
Measured Noise Levels - Wangal Park (NM02)

Friday, 18 October 2019



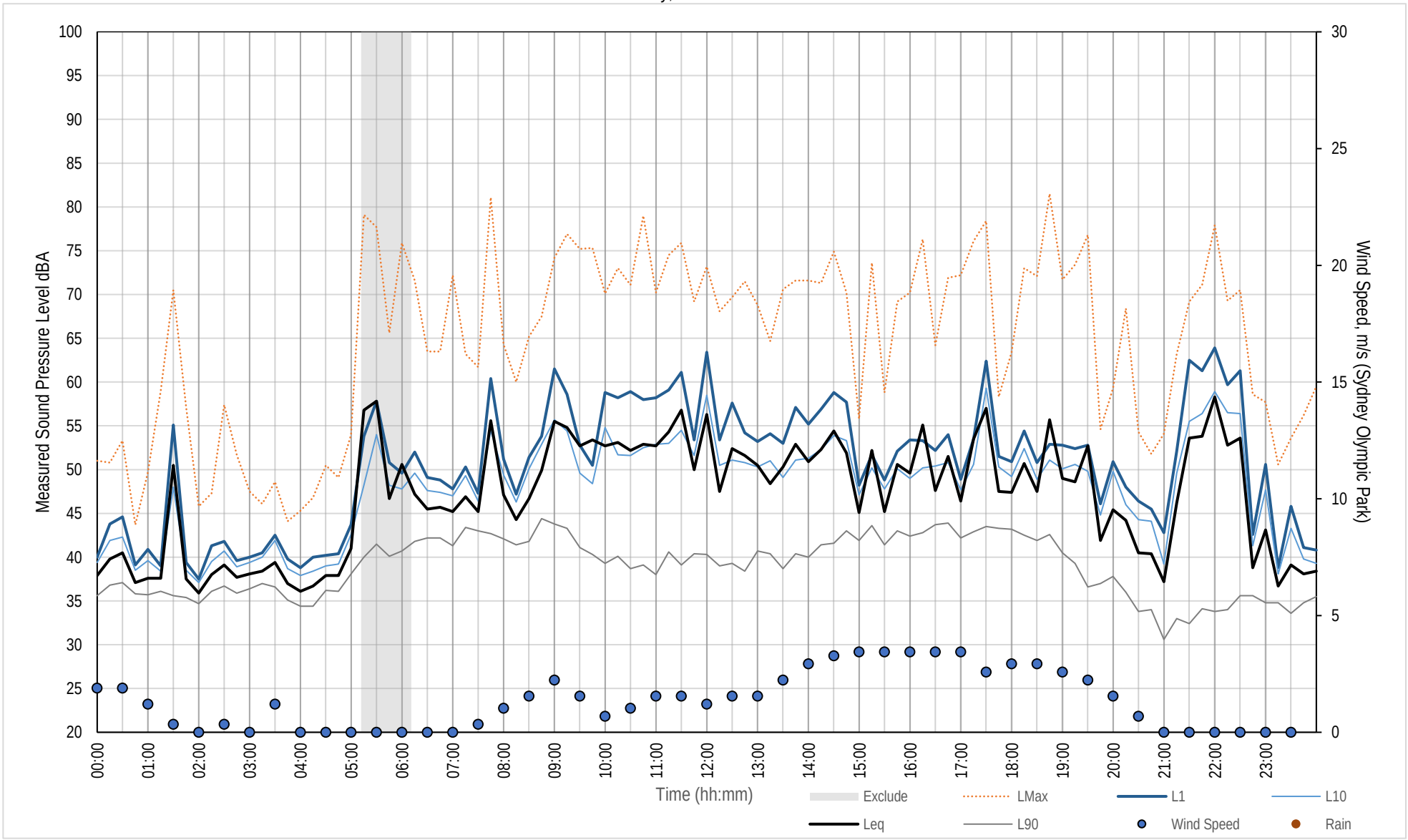
Measured Noise Levels - Wangal Park (NM02)

Saturday, 19 October 2019



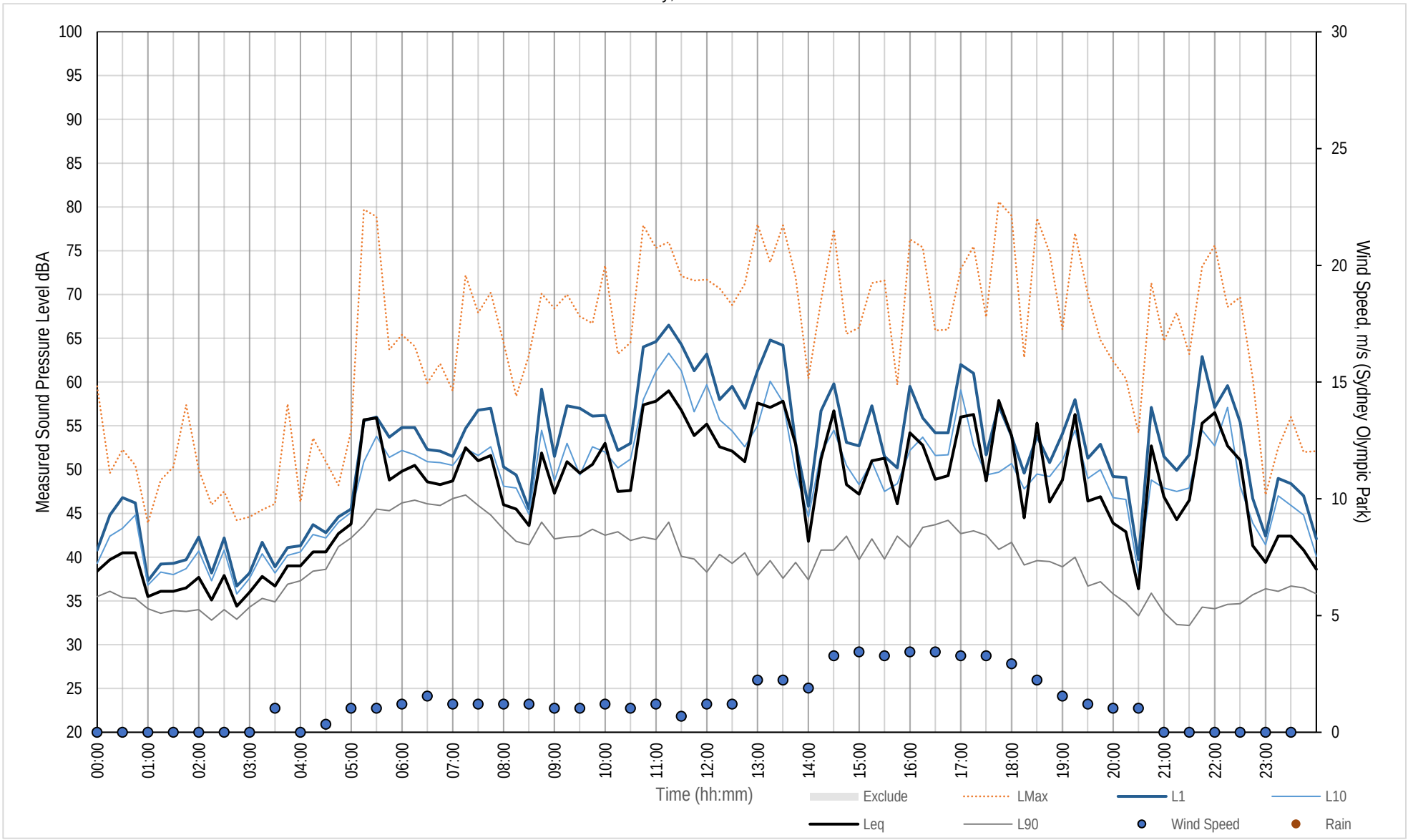
Measured Noise Levels - Wangal Park (NM02)

Sunday, 20 October 2019



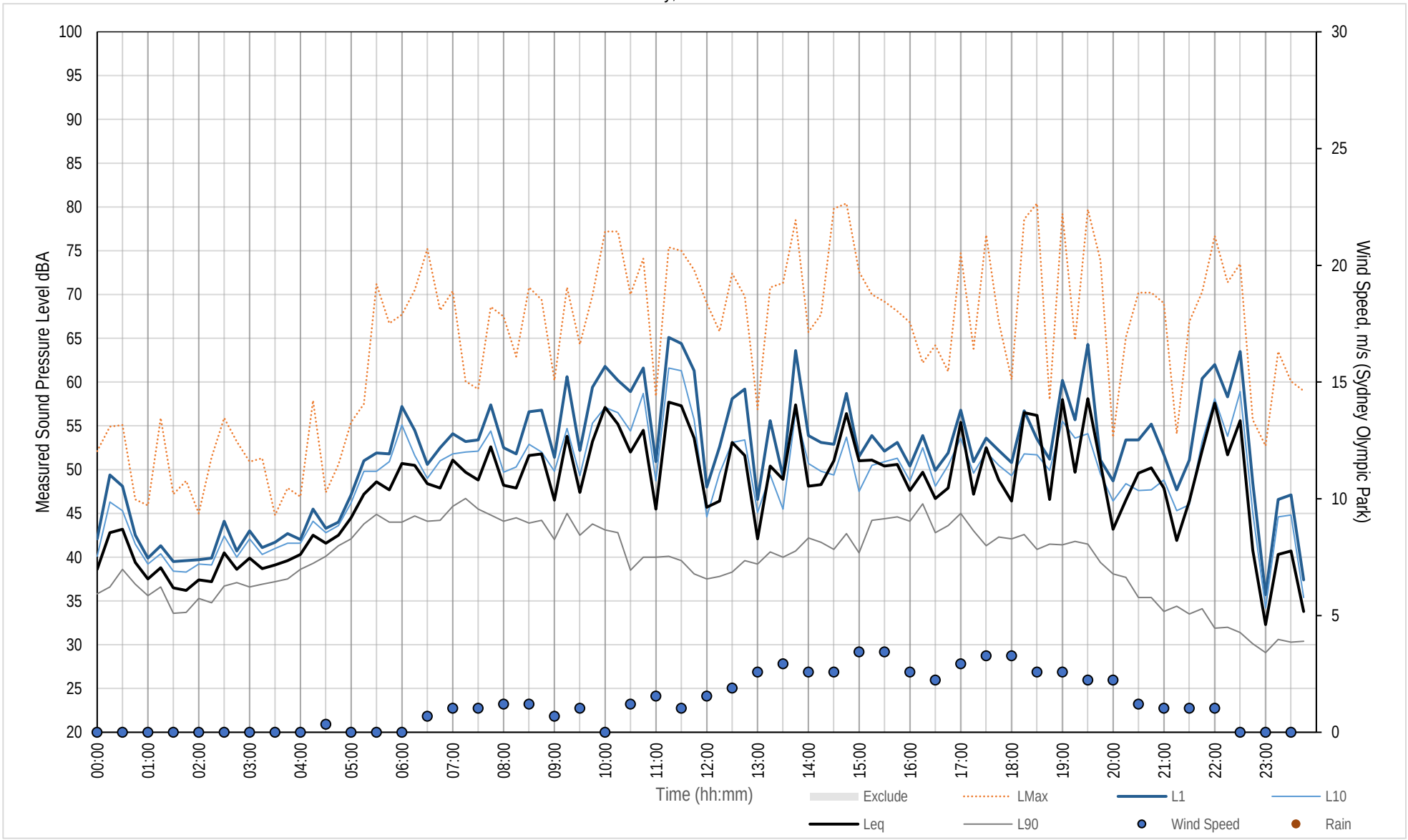
Measured Noise Levels - Wangal Park (NM02)

Monday, 21 October 2019



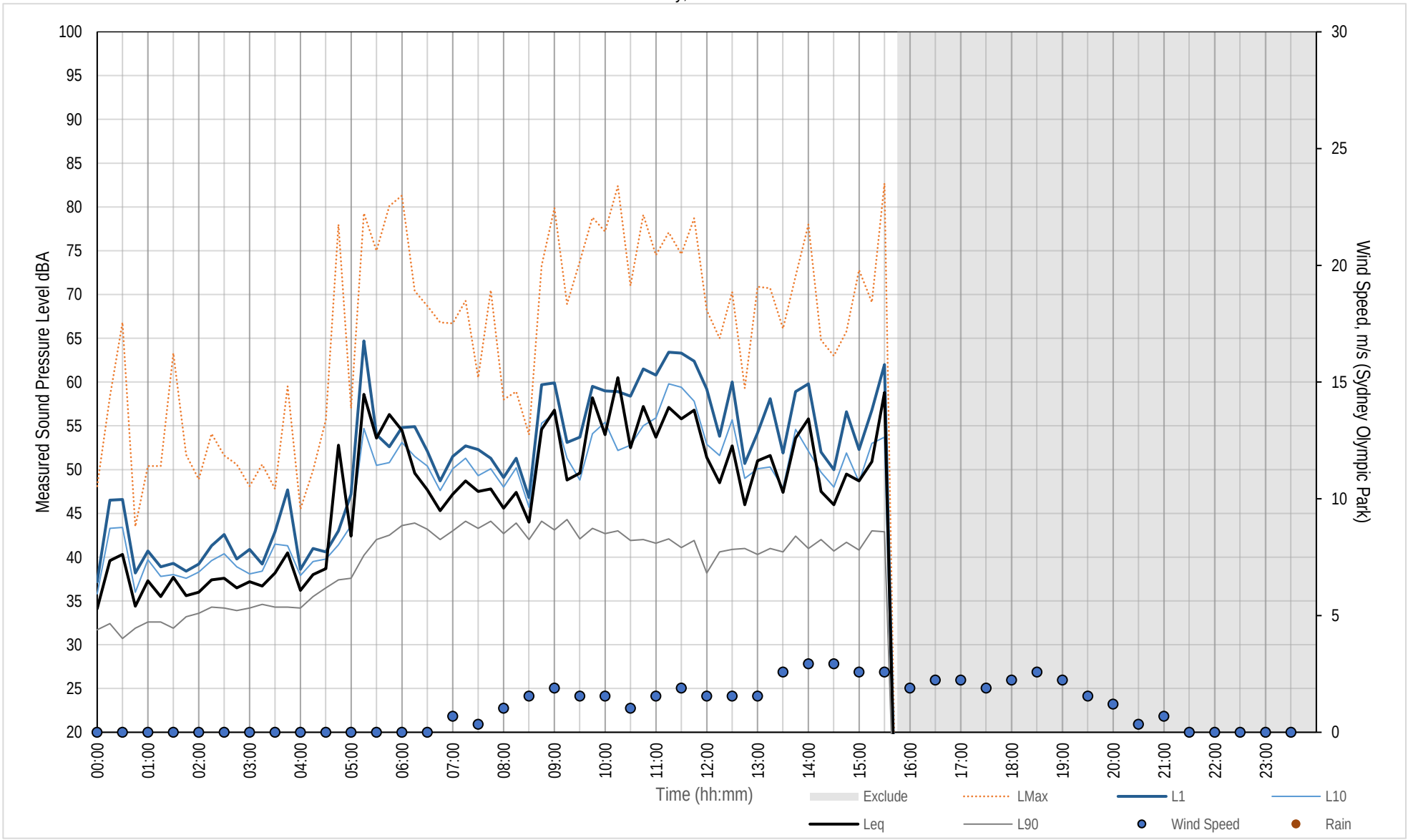
Measured Noise Levels - Wangal Park (NM02)

Tuesday, 22 October 2019



Measured Noise Levels - Wangal Park (NM02)

Wednesday, 23 October 2019



APPENDIX B

CONSTRUCTION MAPS

Map: <PS117405>_1	Author: RW
Date: 31/10/2019	Approved by: BI

To be read in conjunction with WSP document: <REPORT_ID>

Map Source: NSW SIXMaps

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0 80 160

1:7000 at A3

Legend

Project
- Site_layout

Noise level, dBA Leq period

35-40	55-60
40-45	60-65
45-50	65-70
50-55	70-75

Kissing Point Ferry Wharf Upgrade

Scenario 1 General wharf construction

wsp

Map: <PS117405>_2	Author: RW	N
Date: 31/10/2019	Approved by: BI	

To be read in conjunction with WSP document: <REPORT_ID>

Map Source: NSW SIX Maps

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Legend

Project
- Site_layout

Noise level, dBA Leq period

35-40	55-60
40-45	60-65
45-50	65-70
50-55	70-75

Kissing Point Ferry Wharf Upgrade

Scenario 2 Demolition and removal of piles

wsp

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Map: <PS117405>_3	Author: RW	N
Date: 31/10/2019	Approved by: BI	

To be read in conjunction with WSP document: <REPORT_ID>

Map Source: NSW SIX Maps

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Legend

Project

Site_layout

Noise level, dBA Leq period

35-40	55-60
40-45	60-65
45-50	65-70
50-55	70-75

Kissing Point Ferry Wharf Upgrade

Scenario 3 Road, footpath, and seawall works

wsp

Map: <PS117405>_4	Author: RW
Date: 31/10/2019	Approved by: BI

To be read in conjunction with WSP document: <REPORT_ID>

Map Source: NSW SIXMaps

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Legend

Project
- Site_layout

Noise level, dBA Leq period

35-40	55-60
40-45	60-65
45-50	65-70
50-55	70-75

Kissing Point Ferry Wharf Upgrade

Scenario 4 Lifting pre-fabricated units

wsp

Map: <PS117405>_5	Author: RW	N
Date: 31/10/2019	Approved by: BI	

To be read in conjunction with WSP document: <REPORT_ID>

Map Source: NSW SIX Maps

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Legend

Project
- Site_layout

Noise level, dBA Leq period

35-40	55-60
40-45	60-65
45-50	65-70
50-55	70-75

Kissing Point Ferry Wharf Upgrade

Scenario 5 Pile installation (drilling)

wsp

Map: <PS117405>_6	Author: RW	N
Date: 31/10/2019	Approved by: BI	

To be read in conjunction with WSP document: <REPORT_ID>

Map Source: NSW SIX Maps

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Legend

Project
- Site_layout

Noise level, dBA Leq period

35-40	55-60
40-45	60-65
45-50	65-70
50-55	70-75

Kissing Point Ferry Wharf Upgrade

Scenario 6 Pile installation (hammering)

wsp

APPENDIX C

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.	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. 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. Please contact Roads and Maritime Communication and Stakeholder Engagement for guidance. Website (If required) Contact telephone number for community Email distribution list (if required) Community drop in session (if required by approval conditions).
Site inductions	Airborne noise. Ground-borne noise & vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: 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	No swearing or unnecessary shouting or loud stereos/radios on site. No dropping of materials from height, throwing of metal items and slamming of doors.

ACTION REQUIRED	APPLIES TO	DETAILS
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.
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 levels in Table 4.2. Implement a noise monitoring audit program to ensure equipment noise emissions are limited to the more stringent of either the manufacturers specifications or noise levels in Table 4.2. This will ensure noise levels will be limited to those predicted in this assessment.
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 4.2.
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.

ACTION REQUIRED	APPLIES TO	DETAILS
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. 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.

ACTION REQUIRED	APPLIES TO	DETAILS
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 D

ADDITIONAL MITIGATION MEASURE DEFINITIONS

Table D.1 Additional mitigation measure definitions

ABBREVIATION	MEASURE	DESCRIPTION
N	Notification (letterbox drop or equivalent)	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.
SN	Specific notifications	Specific notifications are letterbox dropped (or equivalent) to identified stakeholders no later than seven calendar days ahead of construction activities that are likely to exceed the noise objectives. The specific notification provides additional information when relevant and informative to more highly affected receivers than covered in general letterbox drops. The exact conditions under which specific notifications would proceed are defined in the relevant Additional Mitigation Measures (Tables C1 to C3). This form of communication is used to support periodic notifications, or to advertise unscheduled works.
PC	Phone calls	Phone calls detailing relevant information made to identified/affected stakeholders within seven calendar days of proposed work. Phone calls provide affected stakeholders with personalised contact and tailored advice, with the opportunity to provide comments on the proposed work and specific needs. Where the resident cannot be telephoned then an alternative form of engagement should be used.
IB	Individual briefings	Individual briefings are used to inform stakeholders about the impacts of high noise activities and mitigation measures that will be implemented. Project representatives would visit identified stakeholders at least 48 hours ahead of potentially disturbing construction activities. Individual briefings provide affected stakeholders with personalised contact and tailored advice, with the opportunity to comment on the project. Where the resident cannot be met with individually then an alternative form of engagement should be used.
RO	Respite offer	Respite Offers 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. The purpose of such an offer is to provide residents with respite from an ongoing impact. This measure is evaluated on a project-by-project basis, and may not be applicable to all projects.
R1	Respite Period 1	Out of hours construction noise in out of hours period 1 shall be limited to no more than three consecutive evenings per week except where there is a Duration Respite. For night work these periods of work should be separated by not less than one week and no more than 6 evenings per month

ABBREVIATION	MEASURE	DESCRIPTION
R2	Respite Period 2	Night-time construction noise in out of hours period 2 shall be limited to two consecutive nights except for where there is a Duration Respite. For night work these periods of work should be separated by not less than one week and 6 nights per month. Where possible, high noise generating works shall be completed before 11pm.
DR	Duration respite	Respite offers and respite periods 1 and 2 may be counterproductive in reducing the impact on the community for longer duration projects. In this instance and where it can be strongly justified it may be beneficial to increase the work duration, number of evenings or nights worked through Duration Respite so that the project can be completed more quickly. The project team should engage with the community where noise levels are expected to exceed the NML to demonstrate support for Duration Respite. Where there are few receivers above the NML each of these receivers should be visited to discuss the project to gain support for Duration Respite.
AA	Alternative accommodation	Alternative accommodation options may be offered to residents living in close proximity to construction works that are likely to experience highly intrusive noise levels. The specifics of the offer will be identified on a project-by-project basis. Additional aspects for consideration shall include whether the highly intrusive activities occur throughout the night or before midnight.
V	Verification	See Appendix F of 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 unless to assist in managing complaints.

APPENDIX E

ADDITIONAL MITIGATION MEASURE LOCATIONS

Map: <PS117405>_7	Author: RW	N
Date: 31/10/2019	Approved by: BI	

To be read in conjunction with WSP document: <REPORT_ID>

Map Source: NSW SIXMaps

0 80 160

1:7000 at A3

Legend

Project
- Site_layout

Noise level, dBA Leq period

- <10 dBA above NML - clearly audible
- 10-20 dBA above NML - moderately intrusive
- >20 dBA above NML - highly intrusive

Kissing Point Ferry Wharf Upgrade

Scenario 1
Exceedances

wsp

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Map: <PS117405>_8	Author: RW	N
Date: 31/10/2019	Approved by: BI	

To be read in conjunction with WSP document: <REPORT_ID>

Map Source: NSW SIX Maps

0 80 160

1:7000 at A3

Legend

Project
- Site_layout

Noise level, dBA Leq period

- <10 dBA above NML - clearly audible
- 10-20 dBA above NML - moderately intrusive
- >20 dBA above NML - highly intrusive

Kissing Point Ferry Wharf Upgrade

Scenario 2
Exceedances

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Map: <PS117405>_9 | Author: RW

Date: 31/10/2019 | Approved by: BI

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0 80 160

1:7000 at A3

Legend

Project

Site_layout

Noise level, dBA Leq period

- <10 dBA above NML - clearly audible
- 10-20 dBA above NML - moderately intrusive
- >20 dBA above NML - highly intrusive

Kissing Point Ferry Wharf Upgrade

Scenario 3
Exceedances

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Map: <PS117405>_10	Author: RW
Date: 31/10/2019	Approved by: BI

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0 80 160

1:7000 at A3

Legend

Project

Site_layout

Noise level, dBA Leq period

- <10 dBA above NML - clearly audible
- 10-20 dBA above NML - moderately intrusive
- >20 dBA above NML - highly intrusive

Kissing Point Ferry Wharf Upgrade

Scenario 4
Exceedances

wsp

Map: <PS117405>_11	Author: RW	N
Date: 31/10/2019	Approved by: BI	

To be read in conjunction with WSP document: <REPORT_ID>

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0 80 160

1:7000 at A3

Legend

Project
- Site_layout

Noise level, dBA Leq period

- <10 dBA above NML - clearly audible
- 10-20 dBA above NML - moderately intrusive
- >20 dBA above NML - highly intrusive

Kissing Point Ferry Wharf Upgrade

Scenario 5
Exceedances

wsp

Map: <PS117405>_12	Author: RW	N
Date: 31/10/2019	Approved by: BI	

To be read in conjunction with WSP document: <REPORT_ID>

Map Source: NSW SIX Maps

0 80 160

1:7000 at A3

Legend

Project
- Site_layout

Noise level, dBA Leq period

- <10 dBA above NML - clearly audible
- 10-20 dBA above NML - moderately intrusive
- >20 dBA above NML - highly intrusive

Kissing Point Ferry Wharf Upgrade

Scenario 6
Exceedances

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Map: <PS117405>_@13	Author: RW	N	1:7000 at A3
Date: 31/10/2019	Approved by: BI		

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Legend

Project
- Site_layout

0 80 160 240 m

Noise level, dBA Leq period
- <5 dBA above NML - Noticeable
- 5-15 dBA above NML - clearly audible
- 15-25 dBA above NML - moderately intrusive
- >25 dBA above NML - highly intrusive

Kissing Point Ferry Wharf Upgrade

Scenario 4 OOH Exceedances

wsp

Map: <PS117405>_@14	Author: RW	N
Date: 31/10/2019	Approved by: BI	

To be read in conjunction with WSP document: <REPORT_ID>

Map Source: NSW SIX Maps

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1:7000 at A3

Legend

Project
- Site_layout

0 80 160 240 m

Noise level, dBA Leq period

- <5 dBA above NML - Noticeable
- 5-15 dBA above NML - clearly audible
- 15-25 dBA above NML - moderately intrusive
- >25 dBA above NML - highly intrusive

Kissing Point Ferry Wharf Upgrade

Scenario 5 OOH Exceedances

wsp

Map: <PS117405>_@15	Author: RW	N	1:7000 at A3
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Map Source: NSW SIXMaps

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Legend

Project
- Site_layout

Noise level, dBA Leq period
- <5 dBA above NML - Noticeable
- 5-15 dBA above NML - clearly audible
- 15-25 dBA above NML - moderately intrusive
- >25 dBA above NML - highly intrusive

0 80 160 240 m

Kissing Point Ferry Wharf Upgrade

Scenario 6 OOH Exceedances

wsp

Appendix G

Landscape Character and Visual Impact Assessment

KISSING POINT WHARF
LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT

Prepared for Roads and Maritime Services
November 2019

By Jane Irwin Landscape Architecture

1.0 INTRODUCTION

The project

This Landscape Character and Visual Impact Assessment (LCVIA) is a component of the REF for the Sydney Commuter Wharf Upgrade Program.

Jane Irwin Landscape Architecture has been engaged by Hansen Yuncken for Roads and Maritime Services NSW (RMS) to assess the development proposals for the upgrade of a number of ferry wharves throughout Sydney Harbour. The wharves are generally within the inner harbour and are currently being used by ferry commuters; recreational vessels; and accessed by the general public.

Assessment envelope

For the purposes of this assessment, and to provide some flexibility should the position of the wharf 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 height of the new pontoon roof structure would vary according to the tide but would generally be around the same height of the existing roof. The area shown in orange outline at Figure 14, combined with the fluctuating height of the pontoon roof structure, forms the envelope that has been used to undertake this assessment.

Purpose and scope of this report

The LCVIA Report has been prepared for RMS as part of the Review of Environmental Factors (REF) for the Kissing Point Wharf upgrade.

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 Part 5 Division 5.1 of the *Environmental Planning and Assessment Act 1979* (the Act). Under the Act, "land" includes the sea.

Part 5 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, RMS 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 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.

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 - outlines the existing character of the site and identifies a range of viewpoints

3.0 The Project - describes the proposed works and identifies certain design elements

4.0 Landscape Character Impact Assessment - outlines the character of the site and identifies a range of viewpoints

5.0 Visual Impact Assessment

6.0 Summary and Mitigation Strategy

NSW Transport - Road and Maritime Services urban design policies and guidelines
This report has been prepared based on the structure outlined in the *RMS Environmental Impact Assessment Practice Note EIA-N04 - Guideline for landscape character and visual impact assessment*. (EIA- No4 Guidelines) December 2018. The RMS document '*Beyond the Pavement'* 2014, also addresses the design and impact of wharves.
The guidelines differentiate between visual assessment (the impact on views), and landscape character assessment (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 and its sensitivity.
- Identify landscape character zones.
- Determine the magnitude of impact.
- Assess landscape character impacts.
- Assess the visibility of the proposal.
- Determine the magnitude of change for each viewport.
- Identify key viewpoints and their sensitivity to change.
- 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.

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 sensitivity and magnitude of the impact. Sensitivity relates 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	High-Moderate	Moderate	Negligible
	Moderate	High-Moderate	Moderate	Moderate-low	Negligible
	Low	Moderate	Moderate-low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Table 1. Landscape character and visual impact grading matrix

2.0 CONTEXTUAL ANALYSIS

Location

The study area for the following Visual Impact Assessment report is Kissing Point Wharf is located at Kissing Point on Sydney Harbour, approximately 4km by water and 13.2km by road from the CBD.

Landscape Context

The wharf is located within Kissing Point Park at the intersection of Waterview Street and Delange Road, within the residential suburb of Putney. It sits on the Western penisula of Kendall Bay. Kissing Point Peninsula is a natural sandstone landform modified in part by industrial and shipping uses. It forms the division of Kissing Point Bay (to the East), Bray's Bay (to the South-West) and Yaralla Bay (South-East). The Parramatta River is the waterbody on the Southern side of the Peninsula. The Rhodes Peninsula lies directly West of the wharf, Breakfast Point Peninsula to the South-East and Putney Point to the East.

Character of the wharf in its setting

Kissing Point wharf sits at the terminus of Delange Road, a steeply sloping street connecting to Morrision Road, the main ridgeline street through the suburb of Putney. The suburb is residential with some retail located at the East end of Morrison Road. The built form is predominantly detached housing of 2 to 3 storeys on large blocks. Both streets and gardens contain mature trees, broad avenues, and distinctive specimen trees. Delange Road terminates with a driveway that connects over a shared path into a carpark. The Eastern side of the street has a pathway that has informal connections to the water, providing access to a small beach. The Western side of the carpark has a larger reserve which is currently planted with lawn areas and and a number of casuarinas.

Heritage Context

City Plan on behalf of RMS has prepared a Statement of Heritage Impact for the proposal and reports that the significance of the proposed changes would be minimal, citing that;

"While the heritage impact of the proposal would be minimal, it could be made positive through the provision of signage and the recognition of the existing wharf structure within the Putney area. Indication of its location and historical development would contribute to a heightened awareness of Putney's lengthy maritime history.."

Several heritage items exist within the study area of Kissing Point Wharf. These elements include:

- Thomas Walker Estate (Rivendell School): The Thomas Walker Convalescent Hospital is of national heritage significance as a rare major institution which has survived along the foreshores of the Parramatta River from the 19th century. Along with Carrington Centennial Hospital, the Thomas Walker Convalescent Hospital is the only other convalescent hospital to have survived from the 19th century.
- Halvorsen, 20 Waterview Street, Putney: The site has considerable historical significance as the site of Australia's first hops brewery. Squires brewery operated at Kissing Point from around 1797 through to 1830.

Figure 1. Context map (courtesy Open Street View)

Figure 2. Context with proposal location of Wharf and viewpoints (image courtesy of Google Maps)

Figure 3. Existing foreshore with proposed wharf entry location (image courtesy of Google Maps)

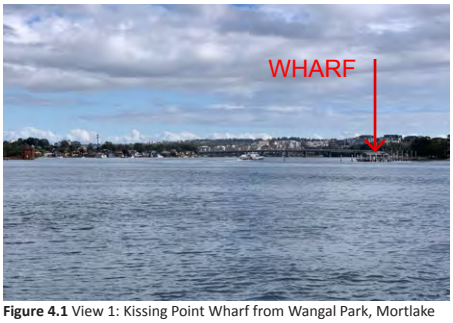


Figure 4.1 View 1: Kissing Point Wharf from Wangal Park, Mortlake

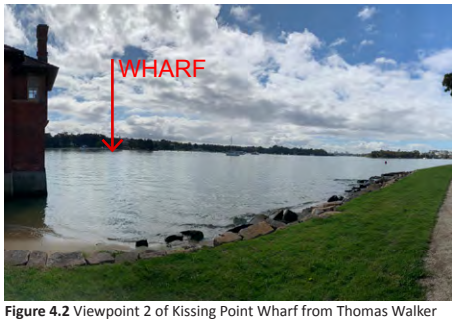


Figure 4.2 Viewpoint 2 of Kissing Point Wharf from Thomas Walker Estate (Rivendell)

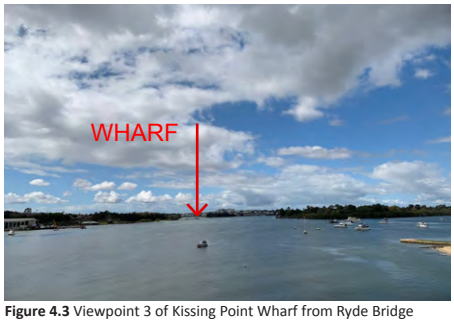


Figure 4.3 Viewpoint 3 of Kissing Point Wharf from Ryde Bridge

Figure 4.4 Viewpoint 4 of Kissing Point Wharf from Kissing Point Park (East)

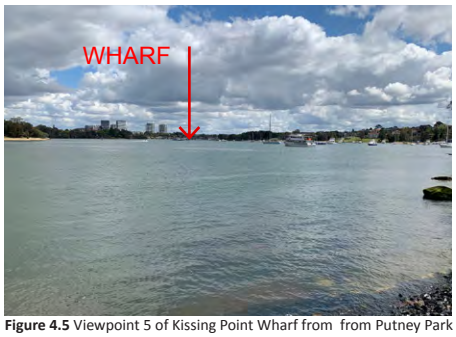


Figure 4.5 Viewpoint 5 of Kissing Point Wharf from from Putney Park

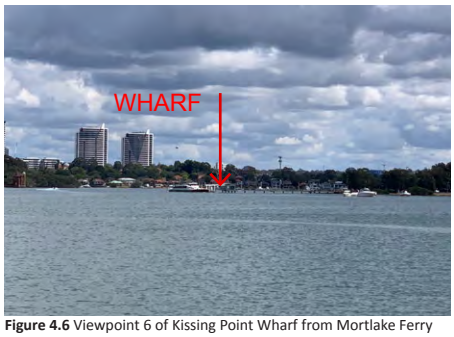


Figure 4.6 Viewpoint 6 of Kissing Point Wharf from Mortlake Ferry

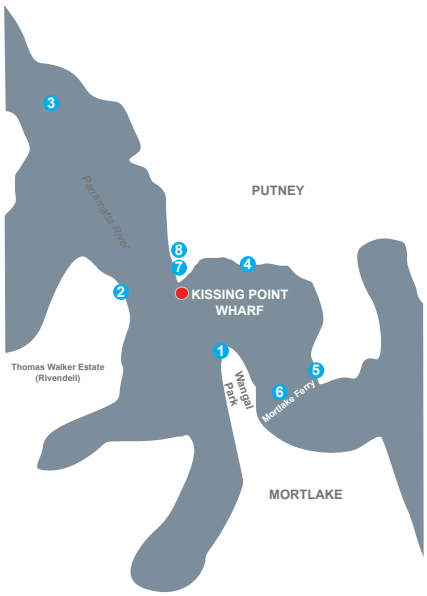


Figure 4.7 Viewpoint Orientation Plan

Figure 4.8 Viewpoint 7 Kissing Point Wharf

Figure 4.9 Viewpoint 8 Kissing Point Wharf (panoramic photo)

Figure 4. Existing Kissing Point Wharf from viewpoints

2.0 THE PROJECT

Under the Sydney Harbour Foreshores and Waterways DCP 2005 Landscape Character Type 14 applies to the Kissing Point area;

"These areas are mostly developed with detached residential development on the upper slopes and boat shed and wharves along the foreshore. Further development in these areas must consider protecting key visual elements including rock outcrops, native vegetation, vegetation in and around dwellings and maintaining the density and spacing of development."
Any development within this landscape is to satisfy the following criteria:

- "consideration is given to the cumulative and incremental effects of further development along the foreshore and to preserving the remaining special features;
- development is to avoid substantial impact on the landscape qualities of the foreshore and minimise the removal of natural foreshore vegetation, radical alteration of natural ground levels, the dominance of structures protruding from rock walls or ledges or the erection of sea walls, retaining walls or terraces;
- landscaping is carried out between buildings to soften the built environment; and
- existing ridgeline vegetation and its dominance as the backdrop to the waterway, is retained." - (NSW Department of Planning - Sydney Harbour Foreshores Area Development Control Plan 2005).

Project Description
General Brief

- To repair, renew and upgrade berthing structures in order to extend the design life of the structures.
- To upgrade passenger facilities to meet public expectations.
- To create a functional, distinctive and iconic design theme for Sydney Harbour which will both unify and identify the harbour wharves and ferry commuter system.
- To incorporate current disabled access standards and unify public domain design elements.
- To institute a defined maintenance regime for the relevant wharves with some certainty of ongoing costs.

Specific items in Architectural Brief

- Accommodate and assimilate heritage structures and heritage surroundings.
- Make maximum use of existing structures and urban design elements while recognising that terminals are located in prominent positions on Sydney Harbour and the quality of urban design and heritage values will be subject to significant public scrutiny and evaluation. To this end, the objectives and requirements of stakeholders, principally local Councils and the Urban Design Review Panel of the Sydney Harbour and Foreshores Committee will need to be met.
- Provide a roof form/shape which is innovative but not visually intrusive, reflective or blocks views from adjacent/nearby residences and facilities.

The proposal would include the demolition and removal of the existing wharf and the construction of a new wharf as follows:

Demolition and removal of the existing concrete wharf

- The existing wharf including existing pontoon, gangway, posts, covered area on pontoon, fencing, timber and steel piles, and associated facilities such as signage, information totems, seating, and closed circuit television (CCTV) system would be demolished and removed to an off-site location by barges.

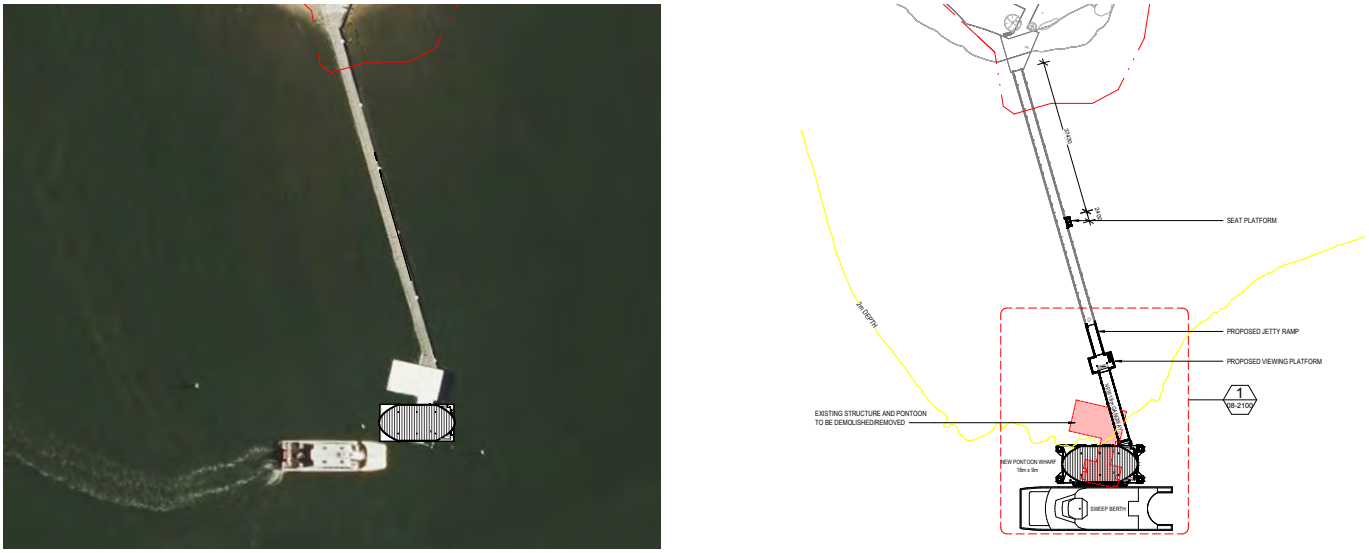


Figure 14. Proposed wharf footprint on aerial and CAD - courtesy of Conrad Gargett

Construction of a new wharf

- Construction of a concrete footpath, with adjoining pedestrian crossing and pram ramps, commencing on the south side of the existing footpath and extending south to the shore line. Lighting would be constructed along the length of the footpath and would meet Australian Standards.
- Construction and extension of the jetty ramp for approximately seven metres long and 3 metres wide. The extension of existing slab construction would provide support to Northern end of the gangway while the Southern end of the gangway will be supported by the pontoon.
- Construction of a concrete viewing platform approximately four metres long and five metres wide extending the gangway about 18 metres to the South East along the same alignment as the existing. The bridge would be supported by about 3 concrete protection piles. The bridge would have a DDA compliant ramp descending to the gangway.
- Construction of an uncovered aluminium gangway approximately eighteen metres long and up to three metres wide. The gangway would connect to the concrete headstock, bridge and the floating pontoon. The gangway would contain lighting and stainless steel balustrades. The gradient of the gangway would vary according to the tides. The orientation of the gangway would be at an angle of about 135 degrees to the bridge.
- Construction of
- Construction and installation of a rectangular steel floating pontoon approximately nine metres wide and 18 metres long off the gangway. The pontoon would have one berthing face on its Southern side. The pontoon would contain a curved zinc roof, glass and stainless steel balustrades and seating. The floating pontoon would be held in place by four steel piles. The orientation of the floating pontoon would be at an angle of approximately 15 degrees to the existing pontoon alignment.
- The concrete bridge and pontoon would be constructed to achieve DDA accessibility to people with a disability. The gangway is designed to achieve DDA compliance for no less than 80 per cent of the high and low tide levels listed in standard tide charts.
- Installation of safety and security facilities including; lighting, closed circuit television (CCTV), ladders to the water from the pontoon, a life ring on the pontoon platform and tactile floor treatments.
- Installation of a clad services pod on the floating pontoon including; for example, an electricity distribution board, bins, signage boards and a help point.

Ancillary facilities

- A temporary compound site would be established including site sheds, an amenities shed and storage containers for tools and some materials. The compound site would be located to the immediate West of the existing wharf entrance. The compound would be approximately 30 metres by 15 metres.
- The installation of electrical power lines to provide power to the wharf for lighting and security.
- The installation of water lines and meter to provide water to the wharf for maintenance.
- The proposal would include provision for electronic ticketing systems, which may be implemented in the future but would not be provided as part of this proposal.

The marshalling and storage of most equipment, plant and materials, and the pre-fabrication of parts, pre-casting of headstocks and fit outs, would be carried out by a contractor at an offsite facility. The construction and demolition materials and equipment would be delivered and removed from the site using barges. A majority of the construction and demolition activity would also be undertaken from the barges on the water with only minor works such as connection to services undertaken from the land. Construction contractors would generally arrive at the site via water with only minimal vehicle access to the site required (up to about 15 vehicle movements per day).

The proposal would require the Kissing Point Wharf to be closed to all ferries, water taxis and other vessels/watercraft for the duration of construction to enable the works to be carried out and would be re- opened to these vessels on completion of construction.

An overview of the proposal including the approximate location of the temporary compound is shown in the figure 14.

Architectural Character

The proposed ferry wharf installation would replace the existing concrete wharf, steps and shelter with three new interconnected elements adjacent to the foreshore. The overall design is part of a ‘family’ of wharves being upgraded around the harbour which share a consistency of design and materials.

The Pontoon
The pontoon would be the central gathering or holding place for ferry passengers. It is sized to accommodate passengers, with its users mainly consisting of commuters. Its primary purpose would be to provide shelter from the weather and a secure environment while passengers wait to board ferries and other vessels.

The roof form on the pontoon would be curvilinear, clad in a unfinished zinc or metal sheet (light grey in colour), and would achieve the lowest profile necessary to shed rainwater. The roof form and its surrounding glass screens would assist in deflecting wind away from waiting passengers. Internally the shelter would have a curved ceiling to give an uplifting and welcoming feel to the space.

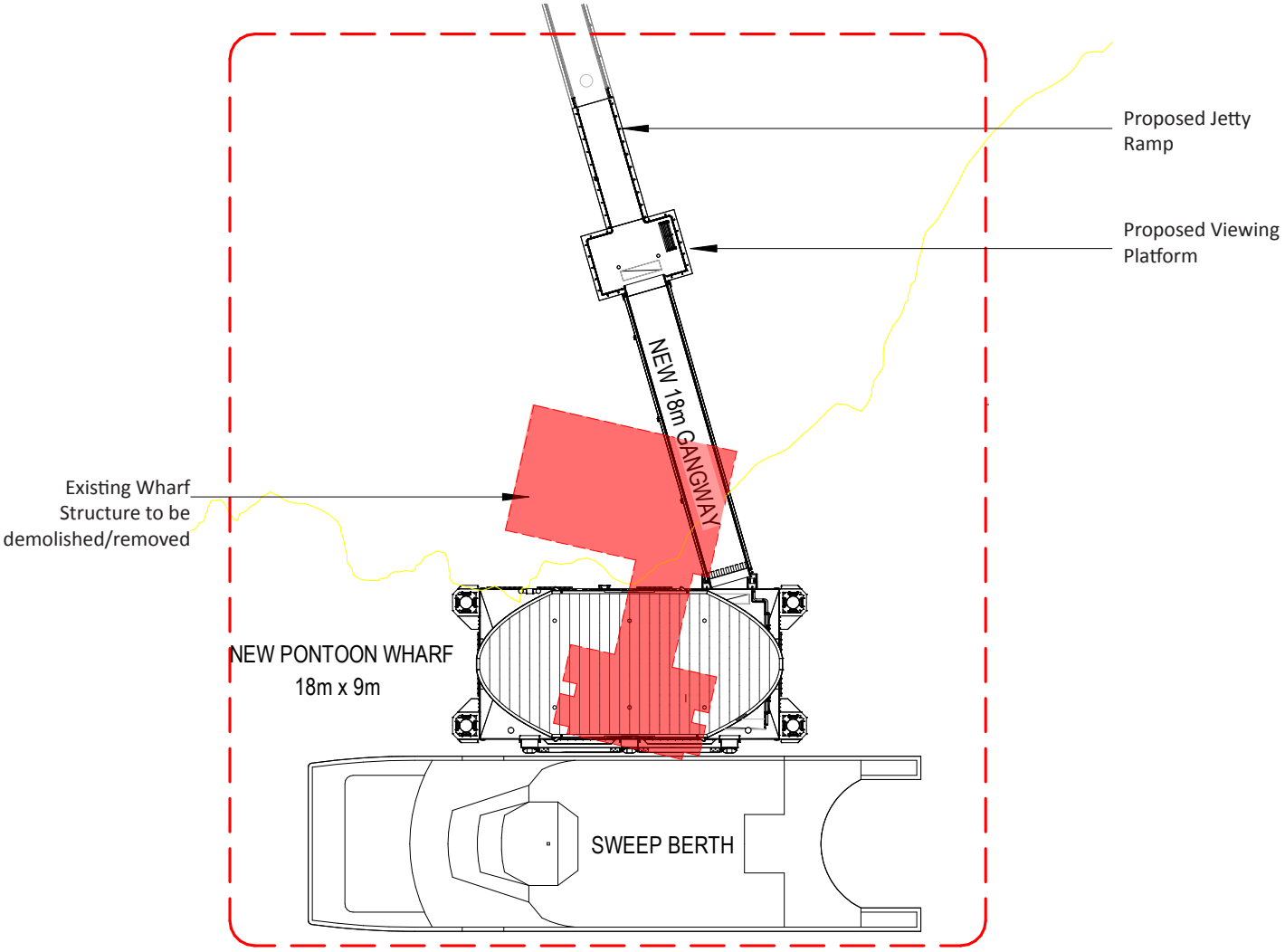
The pontoon would operate with the tides and vary in level with the tides. It would consist of an uncovered platform that would always sit about 850mm above water level. The pontoon would be supported by and operate around four steel piles that would be fixed in the harbour. The height of these would be determined by the tidal range. They would also be painted in a predominantly light colour, primarily for navigation purposes.

The Gangway
The gangway would be used by passengers to move from the land based structures to the platform and eventually on to ferries. This element would be affected by tidal movements, like the pontoon, and consequently would rise and fall. It is designed to be a transitional space and would be slightly lower in scale than the adjoining shelter. The structure would employ a truss system. Views would be maintained through the gangway as it is generally open, light and without a roof structure.

The Bridge
The bridge would form a cantilevered structure between the foreshore and the pontoon. It would be of an open construction with a stainless steel balustrade.

Lighting
Lighting at night would be designed to achieve adequate illumination for safety and security, whilst trying to reduce glare, and loss of light to the sky. All this is required so as not to create a brightly illuminated object that is hazardous to the ferry and other maritime operations. Lighting would be achieved through a series of up/down lights flooding the ceiling of the pontoon roof, whilst illuminating the floor only, and not the surrounds. Lighting of the gangway would be by down lights illuminating the floor.

Figure 15. 3D view of proposed wharf structure



LEGEND

Existing wharf structure to be demolished

Figure 16. Concept plan for proposed wharf - courtesy of Conrad Gargett

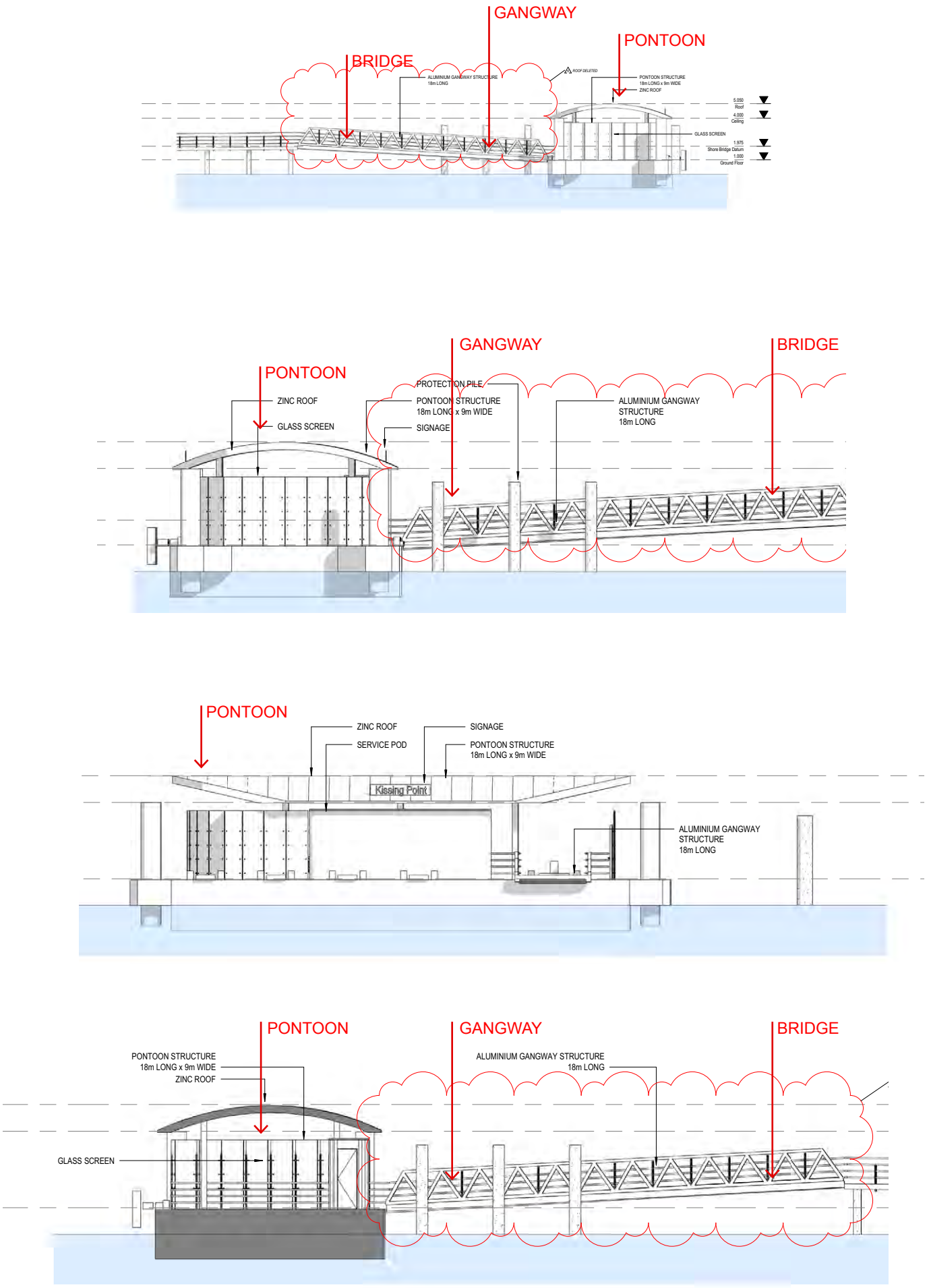


Figure 17. Architectural elevations of proposed wharf structure (Conrad Gargett, 2018)

3.0 LANDSCAPE CHARACTER IMPACT ASSESSMENT

Immediate Landscape Character

In assessing the landscape character of Kissing Point and how the proposed wharf will fit within this, it is important to consider:

- The character of Kissing Point is a residential and parkland edge.
- The existing character from the water and opposite points as a layering of elements, beginning with the wharf, adjacent sea walls, park and parking facilities and moving up the slope behind to the mixed scale residential buildings on the Northern edge of Kissing Point Road.
- The material character of Kissing Point is a range of sandstone, from both the exposed rock shelves seen in the foreshore parks and the sandstone retaining walls that exist within the park. These open spaces are predomindately grassy lawn areas with a number of tree plantings (predominately Causurinas and Eucalypts). There is consistency in the broad scale of the residential lots, the grand houses and established gardens. The built form is predominantly up to 3 storeys.
- Topography plays a defining role in the landscape character of Kissing Point, by opening up vistas to the harbour at the end of streets, requiring specific built responses to steep terrain, and through the general layering of buildings and vegetation on all sides of the peninsula.

Figure 18. Aerial Oblique of Wharf and immediate landscape context (Near Maps, 2019)

3.0 LANDSCAPE CHARACTER IMPACT ASSESSMENT

Surrounding Landscape Character

In assessing the landscape character of Kissing Point and how the proposed wharf will fit within this, it to identify the surrounding landscape character zones. General features of the surrounding landscape include:

- The predominate landscape character for the river's edge is typically green open space containing an occassional mix of park, recreation and ferry transit amenity.
- The dominant landscape character for the area is a variety of residential; Putney, Rhodes and Concord West are typically broad scale houses with established gardens, while Mortlake is higher density apartments from 4-6 storeys.
- The higher density commercial/industrial areas are generally located on the ridgetops of both sides of the river; unobstructing visual connections to the Wharf location.

Figure 19. Landscape character areas

3.0 LANDSCAPE CHARACTER IMPACT ASSESSMENT

Landscape Character Zones

In assessing the landscape character of Kissing Point and how the proposed wharf will fit within this, it to identify the surrounding landscape character zones. General features of the surrounding landscape include:

- The predominate landscape character for the river's edge is typically green open space containing an occassional mix of park, recreation and ferry transit amenity.
- The dominant landscape character for the area is a variety of residential; Putney, Rhodes and Concord West are typically broad scale houses with established gardens, while Mortlake is higher density apartments from 4-6 storeys.
- The higher density commercial/industrial areas are generally located on the ridgetops of both sides of the river; unobstructing visual connections to the Wharf location.

Figure 20. Landscape character zones

LCZ1 - Kissing Point Peninsula

LCZ2 - Parramatta River

LCZ3 - Ryde Bridge/ Rhodes

LCZ4 - Thomas Walker Estate

LCZ5 - Mortlake Peninsula

These elements form an important component of the surrounding landscape and therefore it will be important to consider these elements within our impact assesment.

3.0 LANDSCAPE CHARACTER IMPACT ASSESSMENT

Table 2. Landscape Character Assessment

Landscape character zone	**Description of zone**	**Sensitivity**	**Magnitude**	**Description of impact by proposal**
LCZ1 - Kissing Point Peninsula	A peninsula ridge on the north of the Parramatta River that is framed by Kissing Point Bay to the east and Kissing Point and Settlers Park to the West. It is defined by predominately park waterfrontage with a number of large 2 storey residential houses with generous garden setbacks. The suburb can be divided into two character areas, the open space along the southern water's edge and to the north, large retail lots. The built form of this area is of a generous scale with green setbacks. The second area is the Western end of the peninsula, past Bennelong Park. This area, formerly known as Halvorsen's Boat Building Complex, contains a still functioning boat building use.	ML	L	The impact on Kissing Point is considered low. Both the function of the wharf and location is maintained. The form will be changed. The proposed wharf shifts in location to the east and rotates counter-clockwise around 15 degrees. The proposed wharf references a palette of marine colours and materials and brings this wharf in line with a family of wharves throughout Sydney Harbour. The shift in location of the wharf to the East produces an impact on the Eastern foreshore which has a higher sensitivity to change, being largely unbuilt with a natural sandstone edge. The retention of the ferry wharf use at this location is a link to this history. Impact on the character of the harbour is considered negligible as the function of the wharf is to be retained.
LCZ 2 - Parramatta River	The large body of water surrounding Kissing Point Wharf and stretching to the South, East and West of it. Parramatta River is a tidal river system that flows into Sydney Harbour. The surrounding topography contains steep ridged peninsulas which enclose harbours, coves and inlets along its length. At Kissing Point Peninsula, Parramatta River tightens with the overlapping of Rocky Point.	ML	N	The character of Parramatta River is set by its unique landform and preserved green space headlands. Kissing Point Peninsula has a strong link to other parks, etstates and wharf headlands along the river. The retention of the ferry wharf use at this location is a link to this history and character of public buildings in open green space. Impact on the character of the harbour is considered negligible as the function of the wharf is to be retained and the landscape character of the space undisturbed.

Landscape character zone	Description of zone	Sensitivity	Magnitude	Description of impact by proposal
LCZ3 - Rhodes/ Ryde Bridge	A ridgetop land mass that is largely defined by medium to large residential housing lots with local streets. Concord Road splits this character zone and travelling north is connected to South Ryde via Ryde Bridge.	N	N	The impact is considered low. The character of the ridgetop is defined by a complexity of residential housing, intermingled open space and infrastructure (such as Ryde Bridge). The wharf's distance and proposed design would mitigate any significant impacts to this character zone.
LCZ 4 - Thomas Walker Estate/ Rivendell School/ Yaralla Estate	A large, predominately green, open space estate that contains a number of national historically significant buildings that are still in use as a schoolastic facility. The built forms are classified as one of Australia's best example of late 19th Century Buildings. The ground and gardens are predominately trees and lawns with significant mangroves to the eastern portion of the water's edge.	H	N	The character of Landscape Character Zone 4 is set by its heritage and setting of the buildings and open space. Kissing Point Wharf and Park has a strong link visual link to this zone and provision of viewing platform will enhance this connection for passengers and park goers.
LCZ5 - Mortlake Penisula	The suburb to the South of the Kissing Point wharf is characterised by a predominantly residential foreshore rising up to the ridges behind. Public parks occupy both points. Buildings range from 1-7 storeys high. The architecture of the suburb is largely mixed; with smaller housing lots intermixed with larger development that have been built within the last few decades.	L	N	The significance of Kissing Point Wharf on the landscape character of Mortlake Peninsula is Negligible. The diversity of housing type and built form has resulted in an inconsistent character to the zone. The wharf's distance and design, coupled with the varied landscape character, would mitigate any significant impacts to this zone.

N=Negligible; L=Low; ML=Moderate-Low; M=Moderate; HM=High-Moderate; H=High

Sensitivity - Moderate to Low
The landscape character zones surrounding Kissing Point Wharf have a moderate to low sensitivity to change. The immediate surrounds to the wharf include a built residential foreshore with private boat moorings to the West, and an unbuilt foreshore with natural sandstone edge to the East.

Magnitude - Low
The proposed wharf signals a shift in materiality as well as alignment from the foreshore. However the magnitude of the change proposed is limited by distance and the fact that the wharf remains largely the same size.

Impact - Moderate to Low
Within its immediate character zone the impact of the proposed wharf is considered moderate to low. The greatest impact is the shift in location and angle of the wharf. The new position is considered marginal as it is only 8 metres and 15 degrees counter-clockwise to the current position.

The impact of the wharf on broader character zones and the surrounding peninsulas is considered low to negligible. Distance reduces the magnitude of change and the sensitivity of these zones is also reduced with the wharf forming part of a broad harbour backdrop to the more immediate character of these places. While the proposed wharf signals a shift in materials and location it does represent a link to a family of wharves throughout the harbour which share the same language and form.

Figure 21. Kissing Point Park with existing wharf in midground

Figure 22. Kissing Point Park Parking Area - A range of native tree and grass species

Figure 23. Kissing Point Park (East) with pedestrian/cycle connections in the form of a shared path

Figure 24. Shared path facilities divide medium to large two storey residences on the eastern portion of Kissing Point Park

Figure 25. Waterfront residences near Uhrs Point

Figure 26. Green Point foreshore character - sandstone seawall with boardwalk decking

Figure 27. Character of redevelopment on Mortlake Peninsula

Figure 28. Character of redevelopment on Breakfast Point

Overall the impact on landscape character is moderate to low. The proposed wharf in shifting location to the East will produce a moderate impact on the natural character of this foreshore. Overall the surrounding landscape character zones have a low sensitivity to change. The small shift in location has a negligible effect on the more broad scale character of the waterways and the those areas separated by a greater distance.

5.0 VISUAL IMPACT ASSESSMENT

The proposed Kissing Point wharf introduces a new larger scale built element against the existing foreshore. The key viewpoints are shown in Figure 27.

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 from the viewer
- Background zone (BZ): areas greater than 500m from proposed new wharf from the viewer

Key viewpoint locations include:

1. Wangal Park
2. Thomas Walker Estate (Rivendell)
3. Ryde Bridge
4. Kissing Point Park (East)
5. Putney Park
6. View on approach by water (Mortlake Ferry)
7. Kissing Point Wharf
8. Kissing Point Park

Table 3. Visual Impact Assessment

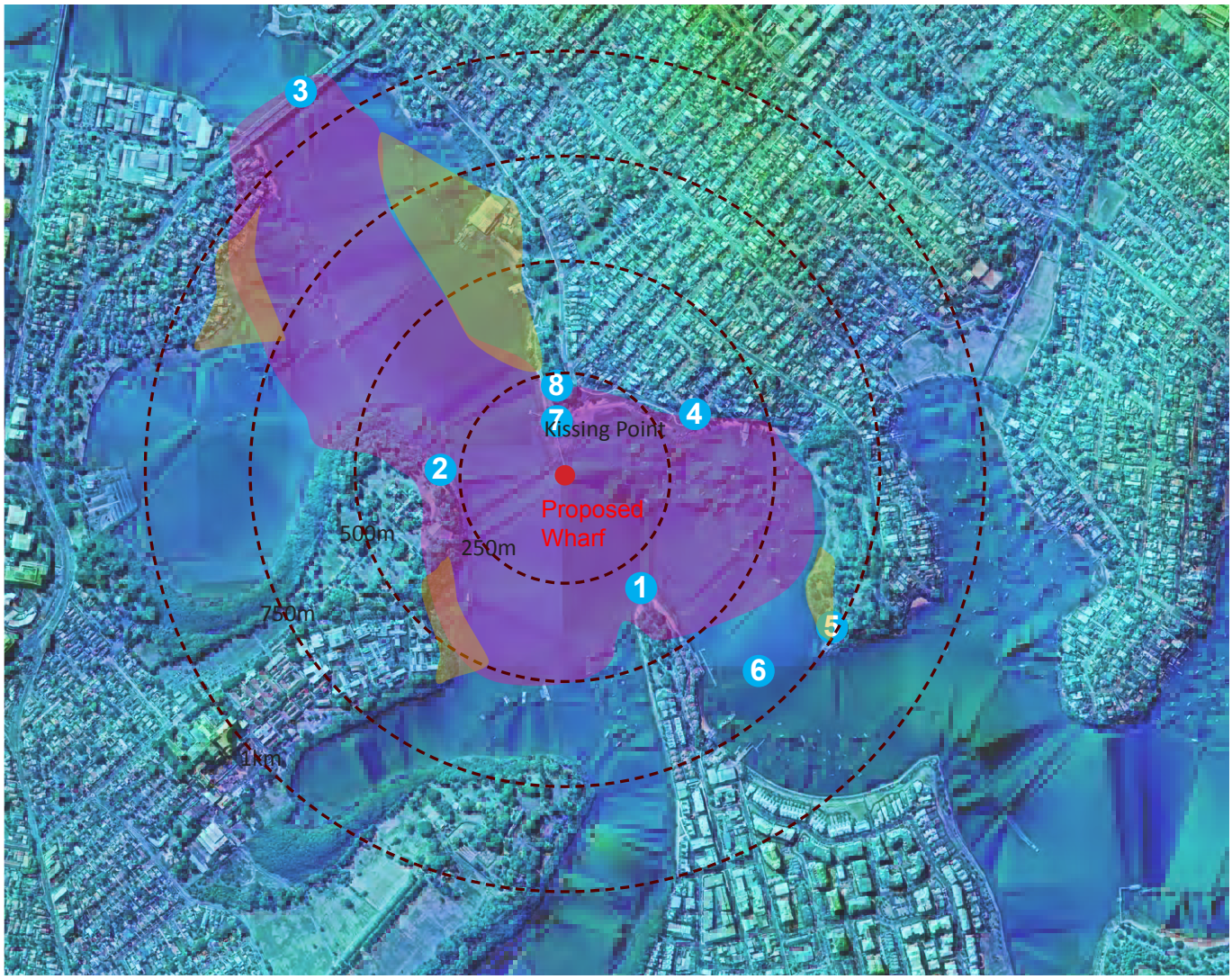


Figure 29. Visibility of project and key viewpoints

Viewpoint	Setting	Visible elements	Sensitivity	Magnitude	Distance zone	Overall rating	Comment
1 Figure 4.1 Wangal Park	Anchor Lookout Spot (Mortlake), Meadow Bank, Ryde Bridge, Uhrs Point, Rocky Point, Parramatta River, Wangal Park	Bridge, gangway and pontoon	L	M	MZ	ML	Views from Wangal Park will have a moderate impact with the proposed wharf shifting in location to the east. This shift will be marginal in angle and distance. Areas of Kissing Point Park may be partly obscured.
2 Figure 4.2 Thomas Walker Estate (Rivendell)	Kissing Point, Kissing Point Park, Majors Bay, Putney, Putney Park, Parramatta River	Bridge, gangway and pontoon	H	N	MZ	N	The repositioning of existing wharf will open up clearer views across the water to Kissing Point Park. There will be negligible impacts to views from the heritage building on the water's edge towards Putney.
3 Figure 4.3 Ryde Bridge	Settler's Park, Bennelong Park, Parramatta River, Kissing Point Park, Kissing Point, Rocky Point, Rivendell School, Wangal Park, Putney Point, Sydney CBD, Thomas Walker Estate (Rivendell)	Bridge, gangway and pontoon	N	N	BZ	N	The wharf will be viewed as an element within the Parramatta River. The repositioning of the wharf and extension of gangway and bridge will form part of the background and a series of wharves within the views towards the CBD. The impact is negligible.
4 Figure 4.4 Kissing Point Park (East)	Kissing Point Park, Putney, Uhrs Point, Concord Hospital, Concord West, Parramatta River, Thomas Walker Estate (Rivendell)	Bridge, gangway and pontoon	L	M	MZ	ML	The wharf, gangway and pontoon will have moderate impacts to the views from this area of Kissing Point Park. The repositioning and lengthening of these structures will obscure heavily vegetated areas of the Thomas Walker Estate (Rivendell School). The impact is considered as moderate.
5 Figure 4.5 Putney Park	Wangal Park, Anchor Lookout Spot (Mortlake), Ryde Bridge, Uhrs Point, Rocky Point, Parramatta River	Bridge, gangway and pontoon	L	L	BZ	L	There will be a partial blocking of views to Uhrs Point however some views to portions of Parramatta River and Ryde Bridge will be opened up.

Viewpoint	Setting	Visible elements	Sensitivity	Magnitude	Distance zone	Overall rating	Comment
6 Figure 4.6 View on departure by water (Mortlake Ferry)	Wangal Park, Anchor Lookout Spot (Mortlake), Ryde Bridge, Uhrs Point, Rocky Point, Parramatta River, Green Point, Greens Point	Bridge, gangway and pontoon	L	L	BZ	L	The impact is considered low with the distance and Green Point/Wangal Park already obstructing the existing and proposed wharf location.
7 Figure 4.8 Kissing Point Wharf	Kissing Point Park, Kissing Point Wharf, Parramatta River, Anchor Lookout Spot (Mortlake), Thomas Walker Estate (Rivendell), Concord West, Yaralla Bay	Pontoon	H	L	FZ	M	Views along the gangway, bridge and the repositioned pontoon will partially obstruct views to Breakfast Point medium density development. The preserved green space on the penisula's of Dame Eadith Walker Estate, Rocky Point and Wangal Park will be moderate.
8 Figure 4.9 Kissing Point Park	Kissing Point Park, Kissing Point Wharf, Parramatta River, Anchor Lookout Spot (Mortlake), Thomas Walker Estate (Rivendell), Concord West, Yaralla Bay, Wangal Park	Pontoon	H	L	FZ	M	Due to the close proximity to the Park the proposed wharf will be greatly visible from this viewpoint. The proposed location and extension of bridge and gangway will reduce have a low impact on views of the Parramatta River and opposing shoreline (Wangal Park). The impact is considered moderate to low.

N=Negligible; L=Low; ML=Moderate-Low; M=Moderate; HM=High-Moderate; H=High

Overall visual impact - Moderate to Low

The overall impact on views is considered low. The greatest impact comes from the shift in angle of the wharf. For some views this signals an improvement with the demolition of the current wharf opening up clearer views to water and background. The highest impact is in relation to the views to the Thomas Walker Estate and heritage buildings within Rivendell (on the southern side of the Parramatta River). Views towards these building and open green space are impacted particularly on approach from Kissing Point Park East and from Putney. However, the repositioning of the wharf location would introduce new views from other parts of the waterfront reducing the overall impact.

6.0 SUMMARY OF URBAN DESIGN PRINCIPLES AND MITIGATION STRATEGY

Urban design objectives and principles

Based on the landscape character and visual impact assessment, the following urban design principles and objectives for the proposed Kissing Point wharf have been identified:

- Provide a unified and consistent design both with the proposed structure and existing built elements along the foreshore.
- Maintain views through the proposed structure.
- Ensure that the iconic elements of Thomas Walker Estate, and Greenwich Point maintain their character zones and are not adversely affected by the replacement wharf.

Landscape character and visual impact mitigation strategy

The proposed wharf replaces the existing wharf and shifts East along the foreshore with a gangway extending to a pontoon which orientates to the South. The structure is a similar scale as the existing wharf and includes a bridge, gangway and

covered pontoon.

Scale
The size of the proposed wharf in catering to the future commuter demand and user amenity maintains the scale of the wharf along the waterfront. Proposed elements have been designed to retain simple clear lines that do not diminish its visual strength on views towards the foreshore.

Design
Material selection, location of services, and a standardised family of elements form the key design strategies for mitigating the impact of the proposed wharf. Attention has been made to upgrade access ramps and path connections on land and ramps and walkways within the proposed wharf to meet access standards. The proposed wharf has been designed for amenity through covered walkways 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 urban fabric through neutral tones. Overall the proposed wharf would promote a unified palette of materials which, while responding to the maritime heritage and surrounding character, also separates the structure as a piece of architectural design.

Summary
The overall impact of the proposal is considered to be to low. The wharf maintains the scale of the current structure while shifting in location to the south and rotating 15 degrees counter-clockwise. The surrounding landscape character zones remain largely unaffected by the shift in location and materiality. The visual impact of the proposed wharf is low with distance and the complexity of views around the harbour largely mitigating the dominance of the wharf along the foreshore of Kissing Point.

Of high sensitivity and importance is the relationship between the heritage elements in the study area. The location of the wharf has a low impact on certain views towards this structure. Some views towards these elements are improved with the removal of the existing wharf.

Mitigation Strategies
Mitigation strategies employed during the detailed design of the proposed wharf include selection of neutral and transparent materials, minimising impact on the foreshore through a single point of entry, reduction of fixed solid elements on the pontoon to maintain views through the structure, proposed gangway to remain unroofed to allow clear views to the harbour and finally a pontoon which sits at water level.

Issue Date	Revision	Author	Review
23/10/19	100% Draft Report	A. N. Georgouras	J. Irwin
21/11/19	100% Draft Report (REVISED)	A. N. Georgouras	J. Irwin

Prepared by:

jila

Appendix H

Statement of Heritage Impact and PACHCI letter

Transport
Roads & Maritime
Services

Statement of Heritage Impact

Kissing Point Wharf

NSW
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Transport
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Services

NSW
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Transport
Roads & Maritime
Services

Report Revision History

Revision	Date Issued	Prepared by	Reviewed by	Verified by
01	11/10/19	**Alexandra Ribeny** *Heritage Consultant*	**Carole-Lynne Kerrigan** *Associate Director - Heritage*	**Carole-Lynne Kerrigan** *Associate Director – Heritage*
02	01/11/19			
03	07/11/2019			
04 (Final)	03/12/2019			

Contents

Executive Summary **3**
1 Introduction **5**
1.1 Purpose 5
1.2 Project description 5
1.3 Background 9
1.4 Methodology 13
1.5 Author Identification 13
1.6 Limitations 13
2 Site Visit and Current Condition **14**
2.1 Site Context 14
2.1 Site Description 21
3 Aboriginal Heritage **26**
3.1 Legislative Framework 26
3.2 Desktop Assessment 26
4 Non-Aboriginal Heritage **32**
4.1 Legislative Framework 32
4.2 European History 34
4.3 Historical Archaeology 43
4.4 Heritage Significance 50
5 Heritage Impact Assessment **53**
5.1 Statutory Controls 53
5.2 'Statements of Heritage Impact' (OEH) 53
5.3 Summary of Impacts 54
6 Conclusions and Recommendations **55**
Appendix A: State Heritage Inventory Forms **56**
Appendix B: Site Inspection Form **57**
Appendix C: AHIMS Search Results **58**

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 Kissing Point Wharf to improve facilities and amenities for ferry passengers. The proposal footprint (the subject site) consists of the existing Kissing Point Wharf, south-eastern component of the commuter carpark and pedestrian pathway located to the east of the carpark, which runs north to Waterview Street.

Kissing Point Wharf is located on the northern side of the Parramatta River within the suburb of Putney. The wharf consists of a gangway and pontoon which project south-east from the landside abutment.

The proposed waterside works include retainment of the existing stone abutment and concrete jetty and installation of a concrete bridge, gangway, floating pontoon and two protection piles on either side. The proposed landside works include demolition of non-compliant footpath and landscape components, upgrades to lighting and the kiss and ride / taxi stop and shelter and installation of bicycle racks, Disability Discrimination Act (DDA) compliant rest area and pedestrian crossing and footpath to Waterview Street.

Kissing Point Wharf is not itself listed as a heritage item on any register, but it is located within the curtilage of local heritage item 'Kissing Point Park (former boat slips)' (item no. I157) listed under Part 1 of Schedule 5 of the Ryde Local Environmental Plan (LEP) 2014.

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 a detailed inspection of the site and its surrounding context. This was undertaken by Alexandra Ribeny (Heritage Consultant/Archaeologist) on 26 September 2019.

The second stage included desktop historical research, which established that the present Kissing Point Wharf was constructed in 2002 and has been consistently used as a wharf for the past 17 years. Historical sources indicate that the subject site was part of James Squire's early 19th century estate and formed part of the French-inspired 'Village of Eugenie' in the mid-late 19th century. From 1918 the subject site was incorporated within Kidman & Mayoh's shipyard and continued to be used for maritime activities until 1954, at which time the site was converted into a park.

Analysis of the historical documentary evidence was undertaken to establish whether the proposed footprint could contain historical archaeological resources. Site phasing analysis revealed the potential for an earlier wharf or jetty structure within the vicinity of the subject site in association with James Squire's occupation of the land. It also revealed the potential for 19th century remnant boatslips within the vicinity of the subject site. The proposed works would include some excavation and demolition within the vicinity of the carpark and jetty landside interface. The proposed works are therefore assessed to have low-medium potential to affect historical archaeological resources. As such, City plan heritage (CPH) recommends that a permit/application be sought from Heritage NSW.

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 State Heritage Inventory (SHI) form. CPH has concluded that, although the proposal would result in a positive heritage outcome overall, as it would ensure the continued use of the site for maritime purposes, it may result in a minor impact to local heritage item 'Kissing Point Park (former boat slips)' (item no. I157) on the basis that its heritage significance relates primarily to its archaeological potential. Under the ISEPP 2007, it is therefore recommended that Ryde City Council be notified of the works prior to proceeding.

This report includes Appendices A, B and C, where 'A' is a copy of the State Heritage Inventory (SHI) form for heritage item 'Kissing Point Park (former boatslips)' (item no. I157), '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 Kissing Point 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

Roads and Maritime proposes to upgrade the existing wharf interchange at Kissing Point (the proposal) as part of the NSW Government's Transport Access Program (TAP).

The upgrade of Kissing Point Wharf (the proposal) would replace the existing wharf structure with the following features (Figure 1 - Figure 3):

- *Retainment of the existing stone abutment and concrete jetty leading from the carpark;*
- *Installation of a 5 m long by 5 m wide concrete bridge, held in place by four new piles;*
- *Installation of a new gangway 5 m wide by 20 m long, extending from the bridge;*
- *Installation of an 18 m wide by 9 m long floating and glazed pontoon, held in position by four steel piles; and*
- *Installation of two protection piles to the south of the glazed pontoon.*

The landside features of the proposal would include:

- *New concrete landing for entry to wharf;*
- *Five new bicycle racks to be installed near the wharf;*
- *Demolish redundant non-compliant footpath and landscape;*
- *New rest area to comply with DDA;*
- *New footpath to Waterview Street;*
- *New pedestrian crossing to comply with DDA;*
- *Upgrade of lighting in the carpark;*
- *Upgrade kiss and ride / taxi stop; and*
- *Upgrade kiss and ride / taxi stop shelter.*

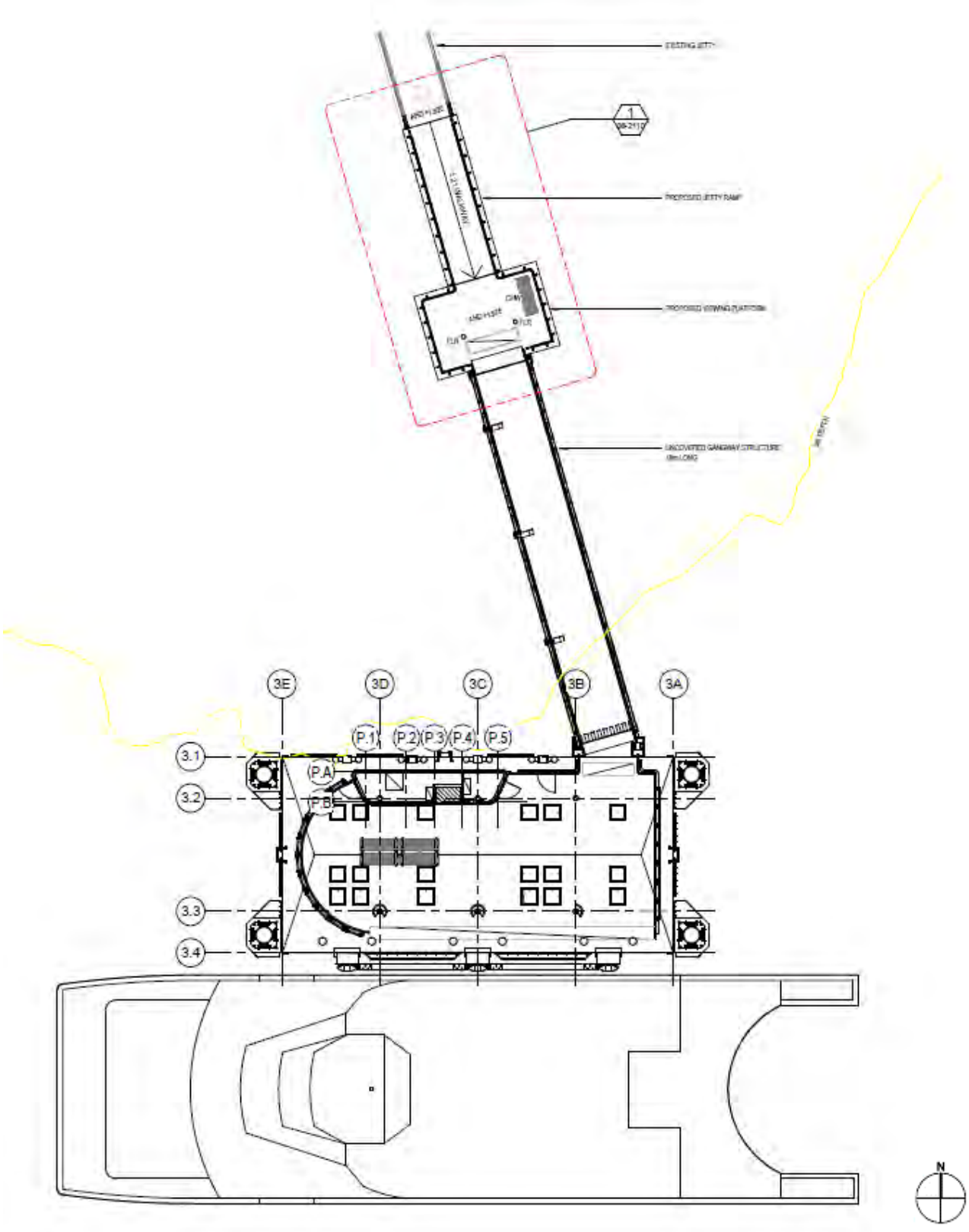


Figure 1: Proposed waterside works (Source: Proposed Wharf Setout, Ferry Wharves Upgrade Program 2 – Kissing Point Wharf, AR-08-2100, Rev 2, 02.10.19, Hansen Yuncken)

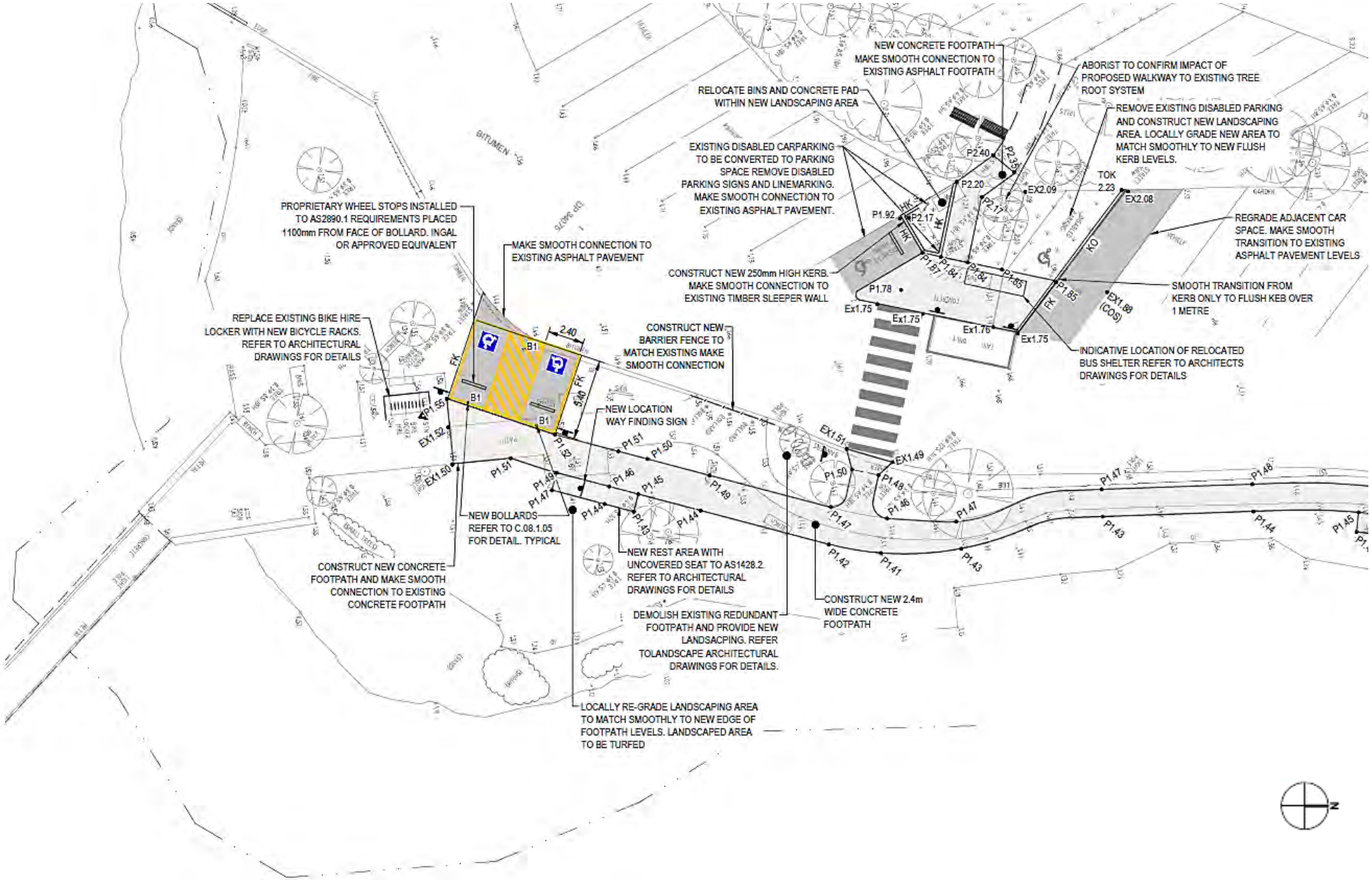


Figure 2: Proposed landside works, southern component (Source: Civil Works Plan, Ferry Wharves Upgrade Program 2 – Kissing Point Wharf, C.08.2.01, Rev B, July 2019, Hansen Yuncken)

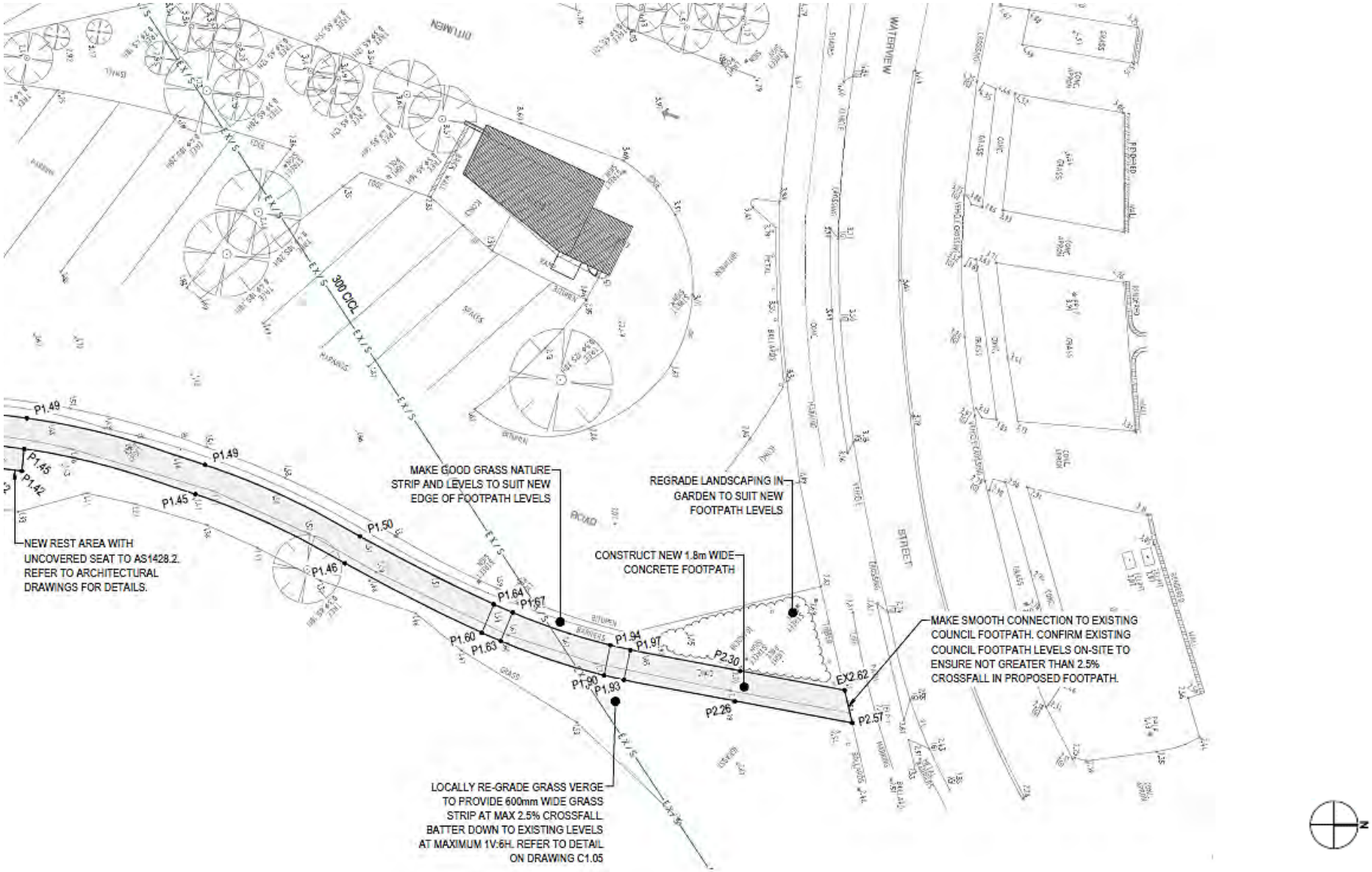


Figure 3: Proposed landside works, northern component (Source: Civil Works Plan, Ferry Wharves Upgrade Program 2 – Kissing Point Wharf, C.08.2.01, Rev B, July 2019, Hansen Yuncken)

1.3 Background

Kissing Point Wharf is located within the north-western Sydney suburb of Putney (Figure 4), which is situated within the City of Ryde local government area (LGA) and Cumberland Local Aboriginal Land Council boundaries (Figure 5). Kissing Point Wharf is located at the southernmost tip of Kissing Point, which forms a peninsula on the northern side of the Parramatta River.

The proposal footprint (the subject site) consists of the existing Kissing Point Wharf, south-eastern component of the commuter carpark and pedestrian pathway located to the east of the carpark, which runs north to Waterview Street (Figure 1). The existing wharf structure connects to the landside interface via a metal-framed concrete jetty supported on concrete piles. At the end of the jetty is a rectangular, steel-framed waiting-shelter pavilion supported on concrete piles with a curved corrugated metal roof. Steel-framed glass panels provide wind-protection. To the south of the waiting shelter a steel-framed gangway connects to a floating pontoon with concrete deck supported by steel piles.

Figure 6 presents a cadastral map of Kissing Point Wharf and its surrounding urban context. Figure 7 presents an aerial photograph of Kissing Point Wharf and its surrounding urban context.

Kissing Point Wharf is not itself listed as a heritage item on any register, but it is located within the curtilage of local heritage item 'Kissing Point Park (former boat slips)' (item no. I157) listed under Part 1 of Schedule 5 of the Ryde Local Environmental Plan (LEP) 2014. Figure 6 presents the heritage map of the Ryde LEP 2014 showing Kissing Point Wharf in context with the heritage items in the vicinity.

There are no heritage items listed on the Sydney Regional Environmental Plan (SREP) 2005 located within proximity of the subject site (Figure 9).

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 required from Heritage NSW and local councils. However, refurbishment and upgrade of Kissing Point 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 an assessment is completed through the preparation of a 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.

Figure 4: Location of the suburb of Putney (indicated in red) and subject site (indicated in yellow) relative to the Sydney CBD (Circled) (Source: SIX Maps 2019)

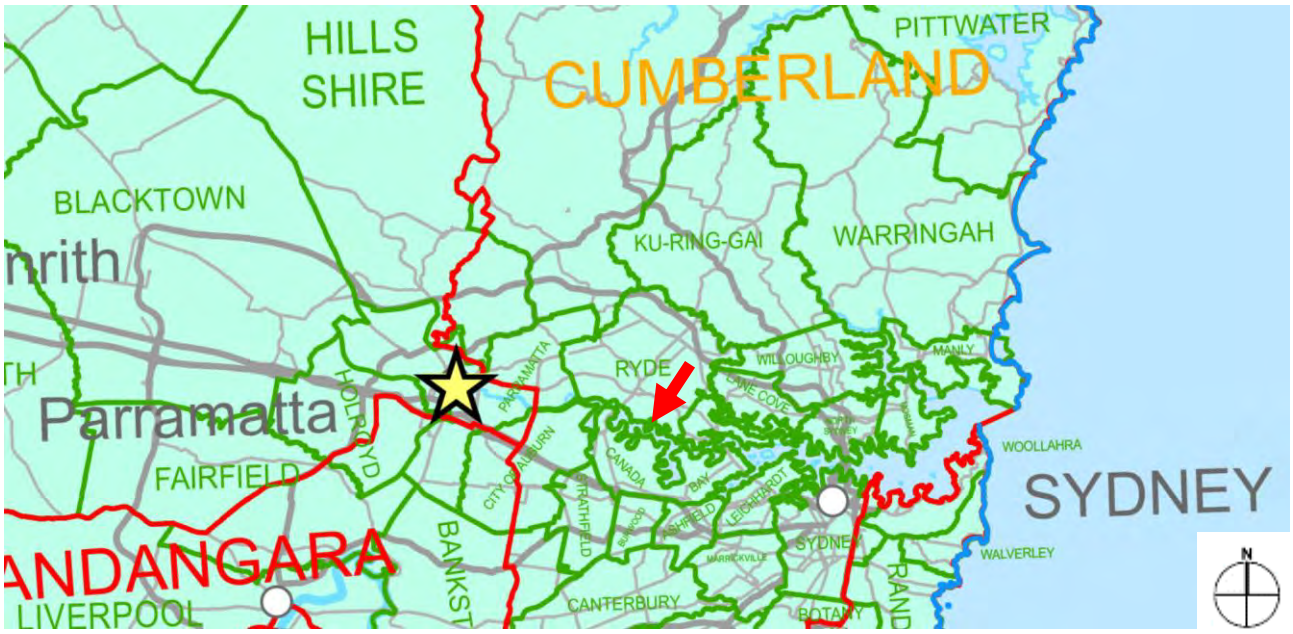


Figure 5: Approximate location of the subject site (indicated with arrow) within the Cumberland Local Aboriginal Land Council (Source: Aboriginal Land Councils, Aboriginal Land Rights Act 1983, available at http://alc.org.au/media/119304/state%20alc%202013.jpg)

Figure 6: Location of subject site (in red) in relation to heritage item 'Kissing Point Park (former boat slips)' (item no. I214) (in blue) (Source: SIX Maps 2018)

Figure 7: Location of the subject site (in red) in relation to heritage item 'Kissing Point Park (former boat slips)' (item no. I214) (in blue) (Source: SIX Maps 2018)

Table 1: Heritage listings for items within the vicinity of Kissing Point Wharf

Item Name	Address	Item No.	Listing
Kissing Point Park (former boat slips)	24 Waterview Street	157	Part 1, Schedule 5, Ryde LEP 2014

Figure 8: Heritage map, indicating the location of subject site (in red) in relation to heritage items (Source: Left - Heritage Map - Sheet HER_003, Ryde LEP 2014; Right - Heritage Map - Sheet HER_006, Ryde LEP 2014)

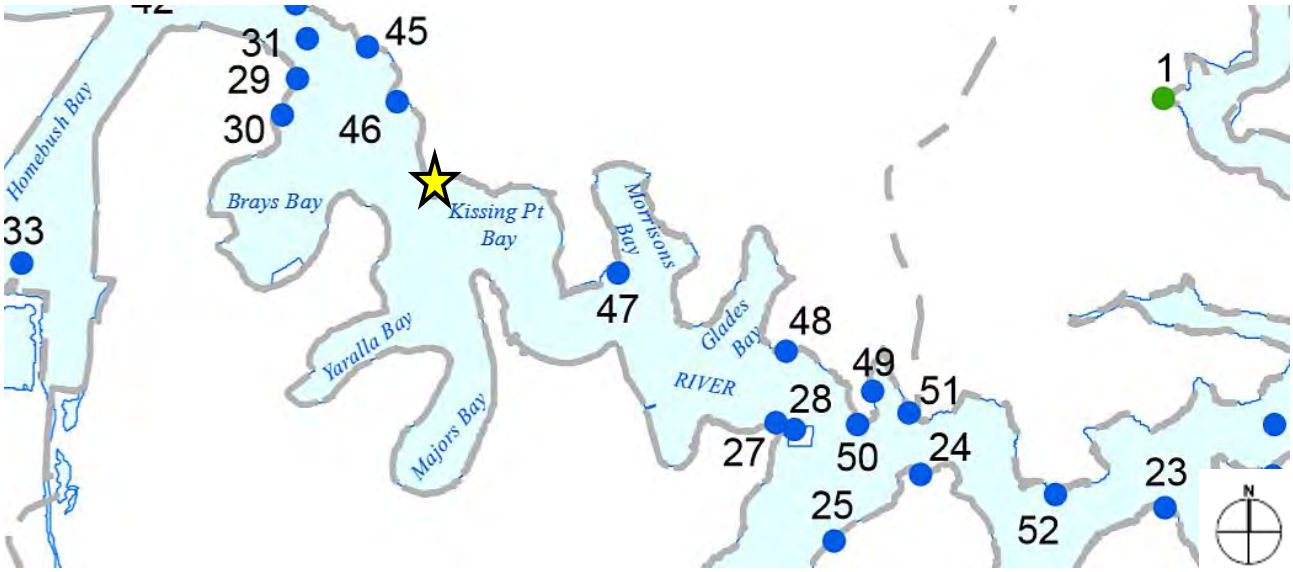


Figure 9: Sydney Harbour Catchment Regional Environmental Plan (SHCREP) 2005 heritage map indicating that no heritage items are located with proximity of the subject site (indicated with star) (Source: SHCREP 2005 Heritage Map, available at https://www.planning.nsw.gov.au/-/media/Files/DPE/Maps/sydney-harbour-heritage-map-2016.pdf?la=en)

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 Kissing Point Wharf. Reference was made to a number of heritage instruments and registers, including:

- the Ryde LEP 2014;
- the State Heritage Inventory (SHI);
- Sydney regional planning instruments and maps;
- the Roads and Maritime's 'Section 170 Register'; and
- the Commonwealth Heritage List.

A detailed inspection of the site and its surrounding context was undertaken by Alexandra Ribeny (Heritage Consultant) on 27 September 2019. Inspection of the site included the Kissing Point Wharf and its natural and built surrounding environment, including the wharf structure, seawall which it abuts and landside interface. Local heritage item 'Kissing Point Park (former boat slips)' (item no. I157) and its relationship with the existing wharf were also inspected. 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 City of Ryde Local Studies, 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 Heritage NSW publication *Statements of Heritage Impact.*

This report includes Attachments A, B and C, where 'A' is a printout of the SHI form for local heritage item 'Kissing Point Park (former boatslips)' (item no. I157), '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). 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 a pedestrian visual inspection.

2 Site Visit and Current Condition

The following section summarises the findings of a detailed inspection of the site and its surrounding context, which was undertaken by Alexandra Ribeny (Heritage Consultant) on 27 September 2019.

2.1 Site Context

The subject site is located within the suburb of Putney within the City of Ryde local government area (LGA) and Cumberland Local Aboriginal Land Council boundaries (Figure 5). The suburb of Putney is serviced by bus and ferry.

The subject site is located within Kissing Point Park, which is approximately 3.7 hectares in size and forms the Kissing Point headland on the northern bank of the Parramatta River. Kissing Point Park is listed as a local heritage item 'Kissing Point Park (former boat slips)' (item no. I157) under Part 1 of Schedule 5 of the Ryde LEP 2014. The curtilage of the item is indicated in Figure 10.

The following description is extracted from the State Heritage Inventory (SHI) form for the item:

> *The site has been heavily modified in the construction of the present park. Traces of concrete slipways are evident at low tide along with miscellaneous metal and timber remnants that mainly seem to date from the breaking of HMAS Tarakan. Kissing Point Park occupies the foreshore of the Parramatta River at Kissing Point. Large sections of the park close to Waterview Road have been converted to car park to cater for the large number of park visitors. Bushland areas are small and confined to areas away from public use.*[1]

Kissing Point Park is located to the south-west of Waterview Street, which follows the line of the Parramatta River (Figure 11). A number of streets run perpendicular with Waterview Street, including Charles Street, which terminates in a roundabout immediately north-east of the park (Figure 12). Waterview Street continues south-east along Kissing Point and then turns northwards into Delange Road (Figure 13). A large bitumen commuter carpark is accessed from Waterview Street to the south (Figure 14). The carpark terminates in a turning circle at the southernmost point of the headland (Figure 15).

Kissing Point Park contains recently upgraded playground and picnic facilities (Figure 16 & Figure 17). A timber boat launching jetty is located on the western side of Kissing Point (Figure 18). Kissing Point Park is part of the Ryde Riverwalk, which consists of a concrete pedestrian pathway, bench seating and heritage interpretive signage at regular intervals (Figure 19). To the north Yaralla Road provides access from Waterview Street and terminates in a turning circle to the west A large fish artwork sits adjacent to the turning circle (Figure 20). Further north still is the Concord Ryde Sailing Club, which is situated at the end of a long timber jetty which projects north-west from the riverbank (Figure 21).

Kissing Point Park enjoys views toward Rocky Point and the Rivendell School to the south-west (Figure 22).

1 'Boatslips (Former)', SHI form, available at https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?id=2340118

Figure 10: Kissing Point Park is listed as a local heritage item 'Kissing Point Park (former boat slips)' (item no. I157) (Source: 'Boatslips (Former)', SHI form, available at https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?id=2340118)

Figure 11: Kissing Point Park is located to the south-west of Waterview Street, which follows the line of the Parramatta River

Figure 12: Charles Street terminates in a roundabout immediately north-east of Kissing Point Park

Figure 13: Waterview Street continues south-east along Kissing Point and then turns northwards into Delange Road

Figure 14: A large bitumen commuter carpark is accessed from Waterview Street to the south

Figure 15: The commuter carpark terminates in a turning circle at the southernmost point of the headland

Figure 16: Kissing Point Park contains recently upgraded playground and picnic facilities.

Figure 17: Kissing Point Park contains recently upgraded playground and picnic facilities.

Figure 18: A timber boat launching jetty is located on the western side of Kissing Point

Figure 19: Kissing Point Park is part of the Ryde Riverwalk, which consists of a concrete pedestrian pathway, bench seating and heritage interpretive signage at regular intervals

Figure 20: Left – northern section of Ryde Riverwalk; Right - Yaralla Road provides access to the park from Waterview Street and terminates in a turning circle to the west. A large fish artwork sits adjacent to the turning circle.

Figure 21: Concord Ryde Sailing Club is located in the northern section of the park

Figure 22: Kissing Point Park enjoys views toward Rocky Point and the Rivendell School to the south-west

2.1 Site Description

The subject site consists of the existing Kissing Point Wharf, south-eastern component of the commuter carpark and pedestrian pathway located to the east of the carpark, which runs north to Waterview Street (Figure 1).

The south-eastern component of the commuter carpark is separated from the western side by a vegetated island. It contains a taxi zone with shelter and pedestrian crossing (Figure 23). Parking spaces are located both to the east of the island and on the outer circumference of the carpark. A pedestrian pathway located immediately to the east of the carpark contains heritage interpretive signage and connects with a cycleway to the north (Figure 24). A pedestrian pathway leads south from the carpark to the existing Kissing Point Wharf (Figure 25).

The existing wharf structure connects to the landside interface via a metal-framed concrete jetty supported on concrete piles (Figure 26). At the end of the jetty is a rectangular, steel-framed waiting-shelter pavilion supported on concrete piles with a curved corrugated metal roof (Figure 27). Steel-framed glass panels provide wind-protection (Figure 28). To the south of the waiting shelter a steel-framed gangway connects to a floating pontoon with concrete deck supported by steel piles (Figure 28 & Figure 29).

Figure 23: The subject site comprises the south-eastern component of the commuter carpark, including the existing kiss and ride / taxi stop and pedestrian crossing

Figure 24: A pedestrian pathway is located immediately to the east of the carpark

Figure 25: A pedestrian pathway leads south from the carpark to the existing Kissing Point Wharf

Figure 26: The existing wharf structure connects to the landside interface via a metal-framed concrete jetty supported on concrete piles

Figure 27: At the end of the jetty is a rectangular, steel-framed waiting-shelter pavilion supported on concrete piles with a shallow curved corrugated metal roof

Figure 28: Left – Steel-framed glass panels provide wind protection; Right – A steel-framed gangway connects to a floating pontoon with concrete deck supported by steel piles

Figure 29: Left – A floating pontoon with concrete deck connects to the southern side of the waiting shelter via a steel-framed gangway; Right - Steel piles located to the west of the pontoon

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 Hunters Hill Area

The following summary of the Aboriginal history of the Ryde area is extracted from the City of Ryde Council website:[2]

Wallumedegal

Aboriginal people lived for thousands of years in what we call the City of Ryde. When the first Europeans settled at Sydney Cove in 1788 the traditional owners of this area were the Wallumedegal. That name was told to Captain Arthur Phillip, first governor of the convict colony of New South Wales, by Woollarawarre Bennelong who came from the clan called the Wangal on the south side of the river.

It is likely that the name Wallumedegal or Wallumattagal was derived from wallumai the snapper fish, combined with matta, a word used to describe a place, usually a water place, as with Parramatta and Cabramatta. That would mean they were the snapper clan and the fish was their totem, just as burra (the eel) was the totem of the Burramatta or Boromeda-gal or clan at Parramatta and cobra (the white grub of the shipworm) that of the Cobragal at present Liverpool and Cabramatta.

Wallumedegal territory followed the north bank of the Parramatta River from Turrumburra (Lane Cove River) in the east to Burramatta at the head of the river to the west. The northern boundary would logically be the Lane Cove River and the northern neighbours therefore the Cameragal or spear clan. Further east, opposite the Cameragal, were the Cadigal, a harbour-dwelling clan, which occupied the present Eastern Suburbs and City of Sydney, from Inner South Head to Darling Harbour.

[2] 'Aboriginal History', City of Ryde, available at https://www.ryde.nsw.gov.au/Library/Local-and-Family-History/Historic-Ryde/Aboriginal-History, extracted from Smith, K. V. 1993, Wallumedegal: An Aboriginal History of Ryde

Figure 30: Post-1798 etching of Bennelong (Source: UNKNOWN 1798, Bennelong, available at https://trove.nla.gov.au/work/209692505?q=bennelong&c=picture&versionId=230133050)

The Wallumedegal survived for generations in a rich environment of river flats, creeks and mangrove swamps, fishing with pronged spears and handlines, feasting on shellfish, hunting birds and small game, and collecting a variety of edible bushfood plants. They spoke the same language as the Port Jackson and coastal clans, from Botany Bay to Broken Bay. The dialect of the sea coast, wrote Marine Captain Watkin Tench, was spoken at Rose Hill (Parramatta). The dialect of the same language west of Parramatta is now called Darug.

The first encounters between the foreigners in boats and the river people in February 1788 were friendly, with laughter and mimicry on both sides. Their lives changed forever the following November when armed marines built an earthwork fort at Parramatta.

Dispossession

This action displaced the family of the Burramattagal elder Maugoran and his wife Gooroobera, who were forced to move down the river to The Flats, near Meadowbank. Then in April 1789 came the smallpox epidemic, which Bennelong said killed half the Indigenous population. Smallpox might account for the fact that no Wallumedegal are identified in history, unless, which is possible, either or both of Maugoran's wives, Gooroobera or Bidgee - mother Tadyera who died of dysentery, were Wallumedegalleon (wallumedagaliang), or women belonging to the clan.

Significant Aboriginal People of Ryde

The most enduring symbol of the Aboriginal presence in the City of Ryde is the grave of Bennelong and Nanbarry, two key figures in the history of early Sydney.

Figure 31: Bidgee c. 1803 (Source: Piper, E & Petit, Nicolas-Martin. 1803, Bidgee, a native of New South Wales, Pubd. by Geo. Riley, [London] viewed 30 September 2019 http://nla.gov.au/nla.obj-135903463)

Bennelong, who was captured late in 1789 on the orders of Governor Arthur Phillip, escaped after six months. In October 1790, one month after Phillip was speared at Manly Cove, Bennelong came in peacefully to the settlement at Sydney. Phillip built him a brick hut at Tubowgulye, now Bennelong Point, and took him to England two years later.

Bennelong died in 1813 and was buried in the orchard of brewer James Squire at Kissing Point (Ryde) where he had lived for some time. When Nanbarry, nephew of Colebee the Cadigal elder, died in August 1821 he was buried at his request with Bennelong and his last wife, who might have been Boorong, sister of Bidgee. They lie together somewhere overlooking the river close to Bennelong Park.

For twenty years the most prominent leader in this district was Maugoran's youngest son, Bidgee, made chief of Kissing Point in 1816 by Governor Lachlan Macquarie, who also gave him a brass breastplate and a fishing boat. Bidgee meant a river flat.

Bennelong, Nanbarry and Bidgee went on long sea voyages in English sailing ships, but they spent their last years at Kissing Point. Bundle, was another key figure in the area who tracked robbers for Squire in 1804 when he was district constable. Bundle joined the crew of ships commanded by Captain Philip Parker King. He was the Old Bundle who held Bennelong's son Dicky, baptised as Thomas Walker Coke, in his arms the day he died aged nineteen in 1823.
History records that Bidgee and a few other Kissing Point Aborigines received blankets at

Parramatta in 1834 and 1836. At this time it seems that Samuel Marsden was probably referring to Bidgee (who seems to have died in 1837) when he wrote that:

> *"..from Sydney to Parramatta all along the north side of the river, there is but one original Native, the rest are all dead; thou they were very numerous in these districts."*

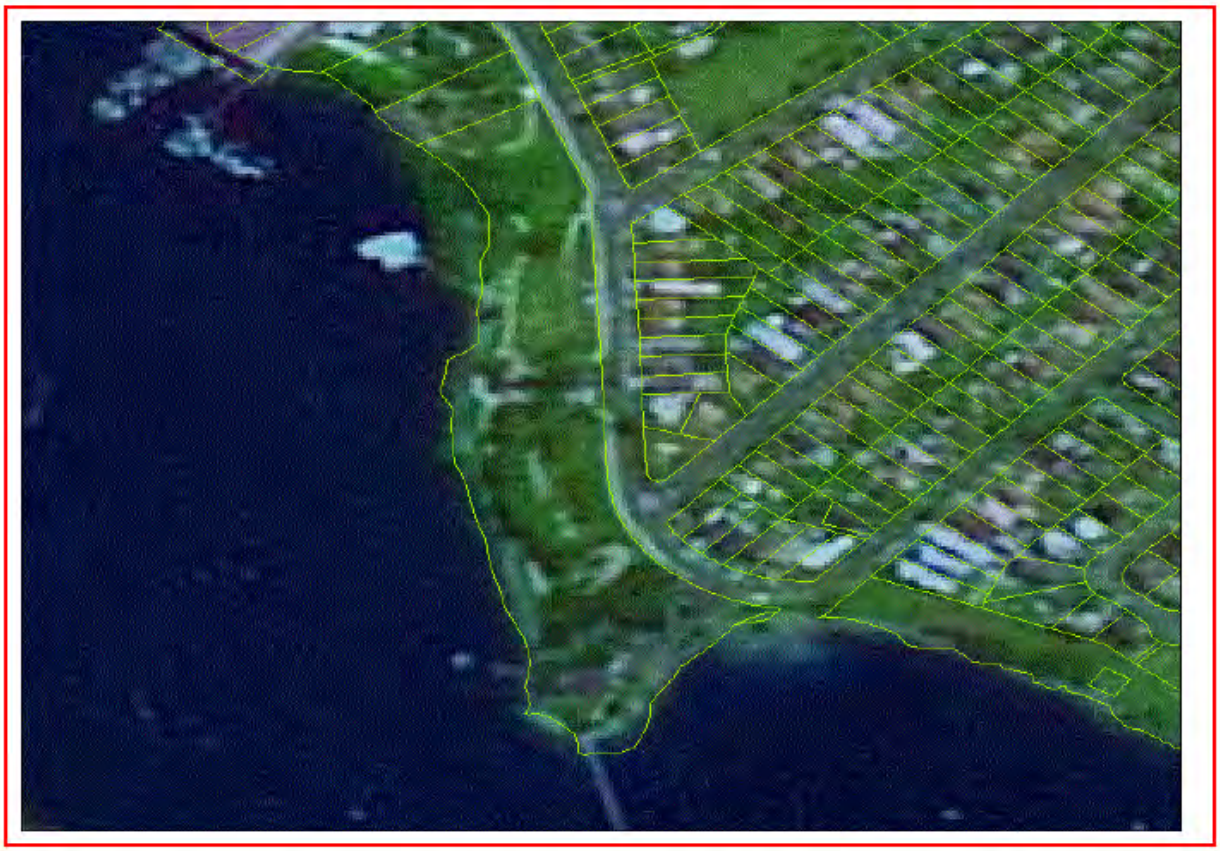
3.2.2 AHIMS Search Results

A basic search of the AHIMS database was undertaken for sites recorded within a 0 metre and 50-metre buffer of the subject site, which is comprised of Lot 1 DP 34075. The AHIMS search results indicated that 2 Aboriginal sites are located within a 50-metre buffer of the subject site

An extensive AHIMS search was undertaken by RMS for the subject site. Results indicated that the 2 registered Aboriginal sites are not located within the curtilage of the subject site.

AHIMS Web Service search for the following area at Lot : 1, DP:DP34075 with a Buffer of 50 meters, conducted by Alexandra Ribeny on 03 October 2019.

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. *

Figure 32: Basic AHIMS search results indicate that 2 Aboriginal sites are recorded within a 50-metre buffer of the subject site (Source: Basic AHIMS search result, Lot 1 DP 34075 with a Buffer of 50 metres, 03 October 2019, Alexandra Ribeny, CPH)

3.2.3 PACHCI Stage 1 Assessment Results

Roads and Maritime undertook a Stage 1 PACHCI Assessment on 17 September 2019. 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 is unlikely to harm known Aboriginal objects or places.*
- *The AHIMS search did not indicate any known Aboriginal objects or places in the immediate study area.*
- *The study area does not 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.*
- *The Aboriginal cultural heritage potential of the study area appears to be severely reduced due to past disturbance.*
- ***Please Note: There is an AHIMS site in close proximity to the project area, Site ID #45-6-2677. There are to be no impacts or entry to the site during the planned works.***

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 Ryde area.

A basic search of the AHIMS database indicated that 2 registered Aboriginal sites are located within a 50-metre buffer of the subject site. An extensive search of the AHIMS database revealed that the 2 registered Aboriginal sites are not located within the curtilage of the subject site, although one site is located within close proximity.

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)[3] is to be adhered to.

[3] 'Unexpected Heritage Items Procedure' (2015). Accessed on 01 September, 2017. Available from http://www.rms.nsw.gov.au/documents/about/environment/protecting-heritage/managingdevelopment/unexpectedheritageitemsprocedure.pdf

4 Non-Aboriginal Heritage

4.1 Legislative Framework

4.1.1 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's environment and heritage legislation. The Commonwealth Heritage List, established under the EPBC Act, comprises natural, Indigenous and historic heritage places on Commonwealth lands and waters or under Australian Government control. Places on the List have been identified by the Minister for the Environment (the Minister) as having Commonwealth heritage values.

4.1.2 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.*

Potential archaeological resources have been identified within the footprint of the proposed upgrade to Kissing Point Wharf (see *Section 4.3.3*).

4.1.3 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.

Kissing Point Wharf is located within the City of Ryde LGA. Kissing Point Wharf is not itself listed as a heritage item on any register, but it is located within the curtilage of local heritage item 'Kissing Point Park (former boat slips)' (item no. I157) listed under Part 1 of Schedule 5 of the Ryde LEP 2014. This heritage item could be impacted by the proposal to refurbish and upgrade the wharf. If the impact is assessed to be more than minor or inconsequential, City of Ryde 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

Italicised sections of the following history of Putney (Section 4.2.1) and Kissing Point (Section 4.2.2) are extracted from the Stage Heritage Inventory (SHI) form for 'Kissing Point Park (former boat slips)' (item no. I57).[4]

4.2.1 History of Putney

*Putney shares its early history with Ryde, as part of the Eastern Farms (located east of Parramatta), which were granted to emancipists and others in the first decade of settlement. It was of one the first areas of British settlement in the colony. The peninsula on the western side of Morrisons Bay is the heart of Putney today, and was originally part of the land granted to Nicholas Bayley in 1799. Putney's western boundary is Church Street from the Parramatta River to Morrison Road. Morrison Road generally forms the northern boundary and borders the land grants made to ex-convicts William Careless, John Jones, John Morris, Richard Cheers and James Weavers on 3 January 1792 (*Figure 33*). These were referred to as the Eastern Farms, later known as Kissing Point, a name believed to have originated from the way in which heavily laden boats passing up the Parramatta River bumped or 'kissed' the rocky outcrop which extends into the river at today's Kissing Point. By October these settlers had cleared their land and planted crops of maize.*

From around 1805 to the 1840s, the farm boundaries began to change as many landholders' efforts were unsuccessful and their land was bought up by more successful farmers and wealthier settlers. In that time, the farming practices changed from the growing of cereal crops to the production of fruit, especially citrus, peaches, apricots and grapes. James Squire was originally granted land in the Eastern Farms in 1795. He arrived in the First Fleet on board "Charlotte." At the 1802 Muster, James Squire owned 118 hectares of land of which nearly 50 hectares were cleared and 11 planted with wheat and corn. By 1806, his land holding included the farms of 13 early grantees, including:

Grantee	Acres
Pollard	25
Beazley	30
Callaghan	50
Raven	285
Morrison	55
Tyrell	60
Hatton	50
Chadwick	30
Laurel	30

*In 1822, shortly before his death, he purchased Bayley's original grant of 47 hectares. It is on this grant that the original Putney was built (*Figure 34 *&* Figure 35*).*

The land was later sold to Eugene Delange who subdivided the land calling it the Village of Eugenie. In 1856, Eugène Delange bought what had been the Bayley grant for subdivision.

[4] 'Boatslips (Former)', SHI form, available at https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=2340118

Delange called the subdivision the Village of Eugénie and named many of the roads after generals in Louis Napoleon III's army that won the day at Sebastopol (at least in the Francophile view of the resolution) in the Crimean War. Eugénie was the name of the wife of Napoleon III and was also reminiscent of his own given name, Eugène.

The main street was originally called Napoleon Street but this has changed to Delange Road. Others named after French marshals were Bosquet Street, changed to Phillip Street, and Canrobert Street, now Morrison Road. Only Pellisier Street remains, although that is misspelt from the original spelling of Marshal Pélissier's name.[5]

The estate did not sell except for a few blocks suitable as small farms. In 1878, Delange's son sold 49 hectares to Phillip Walker. Walker changed the street names from French to a more English orientation. The estate was advertised in December 1878 and finally went on sale in February 1879.[6] *Walker also bought some of the original Callaghan grant to enlarge the subdivision. It was probably Phillip Walker who first conjured up the name Putney for his subdivision of 1879, after a London suburb on the River Thames, site of the famous Oxford/Cambridge boat race.*[7]

[5] Alex McAndrew, Putney on Parramatta: From Struggle Town to Peninsula Paradise, the author, Epping NSW, 2003, pp 3, 4, 13-32; Gregory Blaxell, 'The generals of Putney', Northern District Times, 2 April 2008, p 21

[6] Alex McAndrew, Putney on Parramatta: From Struggle Town to Peninsula Paradise, the author, Epping NSW, 2003, p 29-32

[7] Ibid, p 30

Figure 33: Location of subject site (circled) relative to Putney's early land grants (Source: Plan of the Settlements in NSW, Charles Grimes, 1796, CartoGIS, CAPP, ANU and the National Centre of Biography, CASS, ANU, 2017, available at http://oa.anu.edu.au/entity/12454?pid=2277)

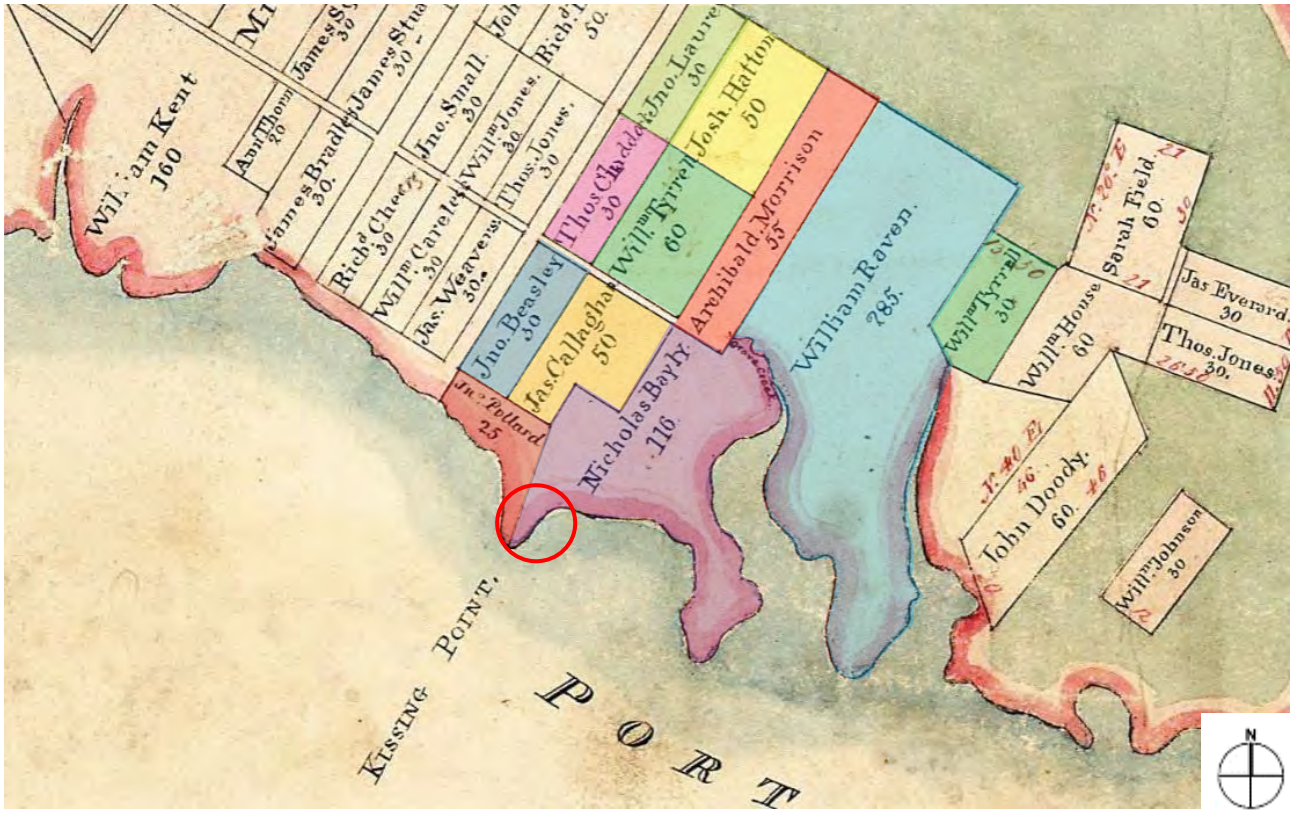


Figure 34: Original land grants which were purchased by James Squire by 1822 with subject site circled (Source: Parish of Hunters Hill, sheet 1, undated, 14063901.jp2, available at https://hlrv.nswlrs.com.au/)

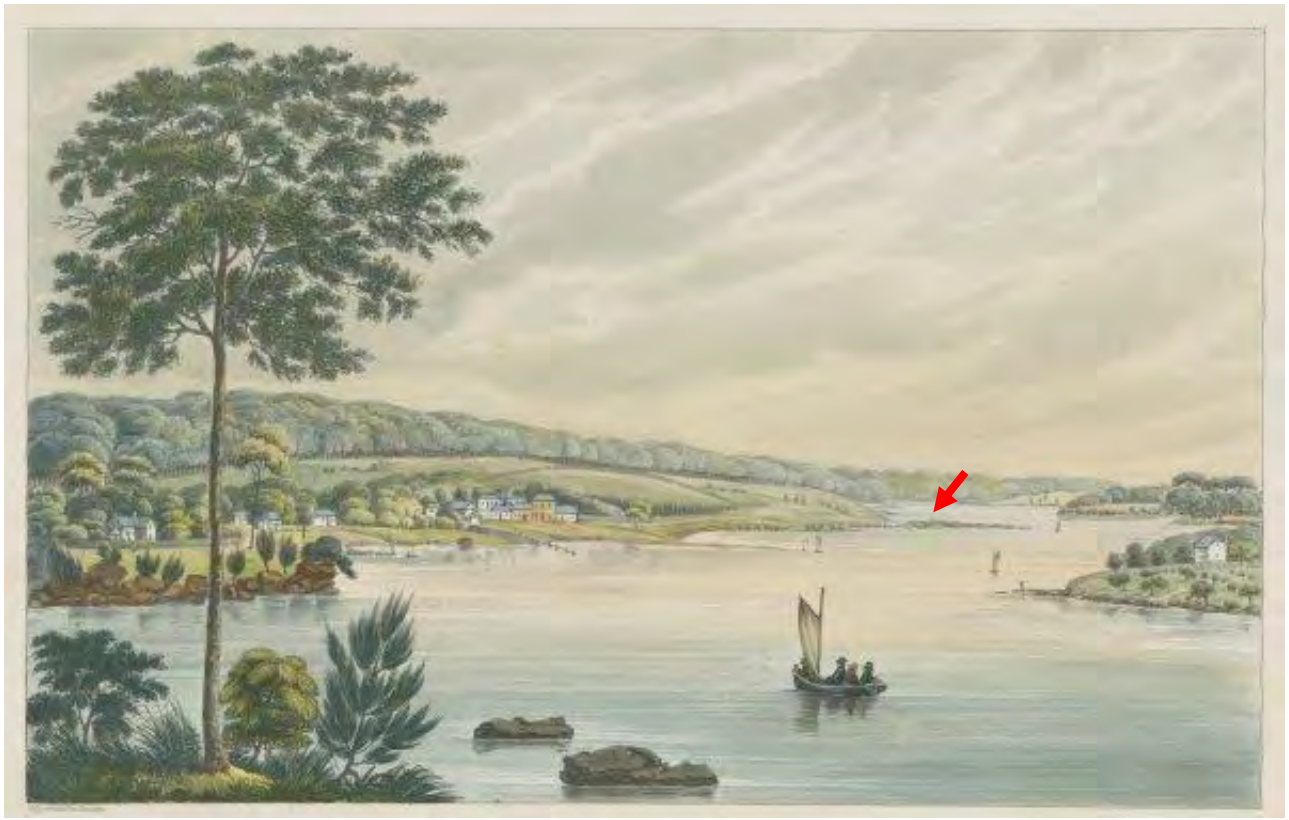


Figure 35: 1825 aquatint of James Squire's property at Kissing Point and location of the subject site indicated (arrow) (Source: Kissing Point, New South Wales, the property of the late Mr James Squires.jpg, 1825, J. Lycett, nla.pic-an7690866-v, http://nla.gov.au/nla.obj-135701358/view)

4.2.2 History of Kissing Point Park

*In 1916 Prime Minister W.M. Hughes established the Commonwealth Shipping Line. This decision was not endorsed by Parliament and was made at a time when steel plate was almost unobtainable. Construction contracts were let in several states and one for six auxiliary powered, four-masted wooden barques was awarded to the firm of Kidman and Mayoh in Sydney in 1918. None of the principals - Sir Sidney Kidman (1857-1935), Arthur Mayoh (1864-1938), and Joseph Mayoh (1863- 1950)- had any shipbuilding experience and Kidman was better known around the country as the 'cattle king'. The brothers Arthur and Joseph Mayoh were engineers who had come to Australia from England around 1909 and had been involved in the construction of Sydney's underground railway. The ships were to be 244 feet in length making them the largest timber ships ever attempted in Australia and a lease was taken on the foreshore of Cleves Estate at Kissing Point. Four slipways, a timber mill and blacksmith's shop were established on site (*Figure 36 *&* Figure 37*). The ships were to be built using timber from the north coast of New South Wales. Hundreds of men, among them champion axeman Charlie Murrill, were employed felling and squaring heavy timber including ironbark for the keels, turpentine for sheathing and ti-tree 'knees'. 'Bush carpenters' from the north coast came down to work in the shipyard, assisting the skilled shipwrights whose labour was in short supply at that time. Some Putney people got jobs as blacksmiths and labourers.*

Within six months questions were being asked in Parliament about the merit of building wooden sailing ships in the age of steam and steel. A number of design changes were imposed on the construction firm and the contract for four of the ships was cancelled in July 1919. Work continued on two vessels the final design being for five-masted barquentines without auxiliary power. Intended ownership passed to the island trading firm of Burns Philp and Co., at a discounted price.

*The hull of the Braeside (*Figure 38*) was launched in May 1920 but not on a spring tide and some damage was done in the shallow water. Even before launching the hull sagged nine inches and after launching it drooped at the bow and stern (hog) some 22 inches. Lloyds refused to issue a certificate of seaworthiness and Burns Philp would not accept delivery. Legal proceedings followed with accusations of poor workmanship, including the use of 'dummy rivets' and counter accusations of bribery. Kidman and Mayoh eventually lost their case and were found to owe money to the Commonwealth. The Burnside (*Figure 38*) was stripped of useful timber and burnt on the slipway in September 1923.The Braeside made only one voyage in December 1923 when she was towed to sea and burnt. Sid Kidman lost many thousands of pounds on the ships but is reported to have said that his biggest regret was that the wonderful work of the superb axemen of the north coast forests, their enthusiasm, craftsmanship and loyalty, all went for nothing.*

*The shipyard was abandoned until after WWII when the slips were used as a convenient site to break up ships. The first to arrive was a naval vessel with an unhappy history. Constructed and launched in the United Kingdom in 1944 this was a Mark III Tank Landing Ship L3017. Renamed HMAS Tarakan in 1946 (*Figure 39*) she was 347' long and used around northern Australia as a supply boat. Whilst dumping unwanted munitions offshore from Sydney in 1947 nine soldiers were injured, then in January 1950 during a minor refit at Garden Island a petrol fire broke out on board that killed seven sailors, one civilian, and injured 13 others. Too damaged to be of further use she was partly stripped at a Balmain coal dock when another fire occurred, this was attended by the fire-boat Bennelong. The hull was eventually beached on the old slips at Kissing Point and cut into small pieces.*

In 1953/4 the Kidman and Mayoh slips were used once again for breaking up a steel hulled sailing ship that had begun life in 1875 as a Blackwall Line frigate. In the late 19th Century as the Melbourne and later the Macquarie she made regular passenger runs between London and Melbourne or Sydney with an average time of 82 days. In 1897 she became a sail training ship. Her last role for 44 years was as the coal hulk in Sydney Harbour Fortuna owned by the Wallarah Coal Co. She did not go quietly as there was a fire on board in January 1954 that exploded oxy/acetylene bottles that shook the riverside suburbs for some 15km around. An image of this

*ship as the Macquarie was adopted as the logo of the Putney Progress Association and Putney Bowling Club (*Figure 40*).*

Figure 36: Kidman & Mayoh's shipyard at Kissing Point c. 1919 (Source: Gallop, H. R. c.1919, City of Ryde Library Local Studies Ref No. 4796462)

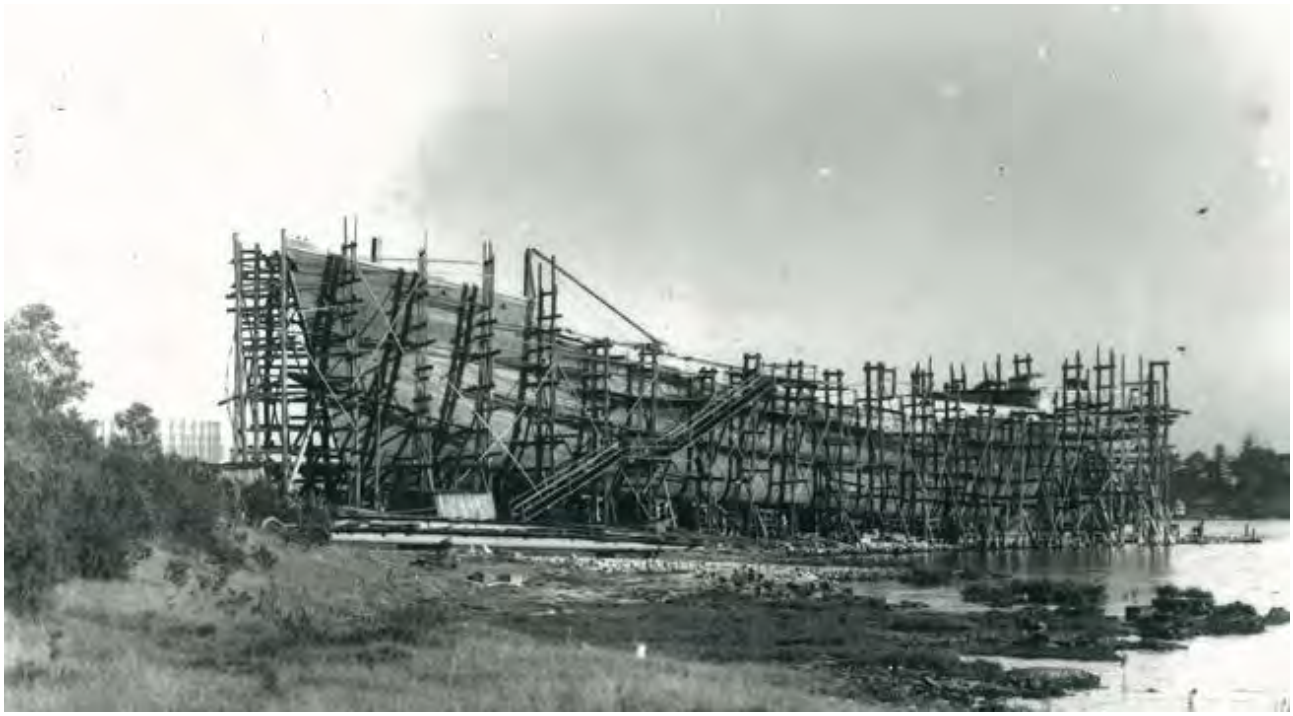


Figure 37: Ship under construction at Kidman & Mayoh's shipyard at Kissing Point c. 1919 (Source: Gallop, H. R. c. 1919, City of Ryde Library Local Studies, Ref No. 4739930)

Figure 38: Looking down at the hull of the ‘Braeside’ and the ‘Burnside’ at Kidman & Mayoh’s shipyard, Kissing Point, c. 1920 (Source: Foster, A. E., c. 1920, City of Ryde Library Local Studies, Ref No. 507536A)

Figure 39: HMAS Tarakan (formerly Mark III Tank Landing Ship L3017) (Source: HMAS Tarakan, NAVY, available at http://www.navy.gov.au/hmas-tarakan-i)

Figure 40: Logo for Putney Bowling Club depicting the late 19th century ship “Macquarie” (Source: The Putney Club, available at http://www.putneybowlingclub.com.au/)

4.2.3 History of the Subject Site

The above history of Putney (4.2.1) has revealed that the subject site was originally part of Nicholas Bayley's 1799 land grant of 116 acres. By 1822, and shortly before his death, James Squire had purchased Bayley's grant, which then became incorporated into his much larger estate; then an amalgamation of 12 other land grants. In the mid-19th century the land incorporating the subject site was sold to Eugene Delange, who subdivided it and named it the Village of Eugenie. In 1878 the land was sold to Phillip Walker.

The above history of Kissing Point Park (Section 4.2.2) has established that in the early 20th century the subject site became part of Kidman & Mayoh's shipyard, following the 1916 establishment of the Commonwealth Shipping Line. The shipyard underwent a period of abandonment until after WWII when the slips were used as a convenient site to break up ships. This practice continued until the mid-20th century.

In 1988 the Parramatta River was dredged in celebration of the bicentenary. In 1993 the RiverCats ferry service replaced Sydney Ferries' Fleet Class Ferries. The first RiverCats service departed from Rydalmere in June 1993 and Parramatta in July 1993.[8] The existing Kissing Point Wharf was constructed at the subject site in 2002 (Figure 41).[9]

Figure 41: 2002 photograph of Kissing Point Wharf (Source: Ferry wharf, Kissing Pt. 2002, available at https://trove.nla.gov.au/work/183916678?q=kissing+point+wharf&c=picture&versionId=200316212)

[8] Blaxwell, G. 'Putney', 2010, The Dictionary of Sydney, available at https://dictionaryofsydney.org/entry/putney

[9] Alex McAndrew, Putney on Parramatta: From Struggle Town to Peninsula Paradise, the author, Epping NSW, 2003, p 63

4.3 Historical Archaeology

4.3.1 Previous Scholarship

In 2015 a Maritime Archaeological Assessment was prepared for the former Halvorsen's Boat Building Complex[10] located at 20 Waterview Street, Putney and immediately to the north of Kissing Point Park. This was prepared with the aim of fulfilling the requirements of Heritage NSW regarding the maritime heritage related matters raised in their review of a Planning Proposal for the site. The assessment identified a number of areas of archaeological sensitivity, including remains of James Squire's late 18th/ early 19th century wharf, which was deemed to be of State significance, and remnant slipways and a timber wharf associated with the later Halvorsen's Boat Building complex, which were deemed to be of local significance. The report made a number of recommendations in relation to the ongoing management of these archaeological resources. The relevance of this publication to the subject site and proposal is limited to the early development of the site as part of James Squire's estate. Following the 1938 acquisition of the site by Lars Halversen Sons Pty Ltd, the development of the site followed an altogether different trajectory.

No archaeological publications have been located which relate specifically to the subject site.

4.3.2 Development of the Subject Site

An undated parish map (Figure 42), which must pre-date 1822, locates the subject site within Bayle's 116 acre grant at this time, with John Pollard's grant located immediately to the west. Another undated parish map (Figure 43) likewise locates the subject site within Bayley's grant, although the land to the west must have been acquired by James Squire by this time, as indicated by the dual naming of Kissing Point / Squire's Point.

An aquatint dating to 1825 (Figure 35), after Squire's acquisition of Bayley's grant, appears to show a southern extension of the Kissing Point headland and what may therefore be a jetty or wharf structure.

Another undated Parish map (Figure 44) appears to show the partial subdivision of Bayley's grant, including the land which comprised the subject site.

An 1888 surveyors map (Figure 45) shows what could be a wharf or jetty structure to the west of the subject site. An 1889 surveyors map (Figure 45) shows two structures on Mary Ann Watson's property to the west of the subject site, although no structures are indicated on the subject site.

An 1894 parish map (Figure 46) indicates that Delange Road had been established to the north-east of the subject site in association with Eugene Delange's acquisition of the Bayley grant. Pellisier, Bosquet and Canrobert Streets had also been established to the east of Delange Road, of which only Pellisier Street remains so-named today.

A 1907 parish map (Figure 47) indicates that the land which comprised the subject site and Kissing Point remained part of John Pollard's land grant at this time. This does not agree with earlier parish maps (Figure 43 & Figure 42) which locate it within Bayley's grant, suggesting either that Pollard's land had extended further east following the Delange acquisition, or that the boundaries are represented incorrectly. A dashed line which appears to follow the riverbank and makes contact with land in the approximate location of the existing Kissing Point Wharf may indicate that this was a former landing site and, potentially, the location of a former jetty or wharf structure.

An undated parish map (Figure 48), which likely dates to the early 20th century, shows the resumption of 25 acres, which roughly equates with the curtilage of heritage item 'Kissing Point Park (former boat slips)' (item no. I157) and which incorporated the subject site. The existing road

[10] 'Halvorsen's Boat Building Complex: Maritime Archaeology Assessment', March 2015, Cosmos Archaeology Pty Ltd

network had been established by this time. A 1918 subdivision plan (Figure 49) confirms that this land had by this time been appropriated as the Kidman & Mayoh shipyard.

A 1943 aerial photograph (Figure 50) shows features, which appear as parallel striations from the air, within the vicinity of the subject site. These are likely to have been associated with the boatslips which were established at this location in the years preceding the war. It also reveals the location of a remnant jetty or wharf structure on the eastern side of Kissing Point. An overlay of the 1943 aerial on an existing aerial of the subject site (Figure 50) reveals the location of these features relative to the existing wharf structure.

Figure 42: Pre-1822 parish map with location of subject site circled (Source: Parish of Hunters Hill, sheet 1, undated, 14063901.jp2, available at https://hlrv.nswlrs.com.au/)

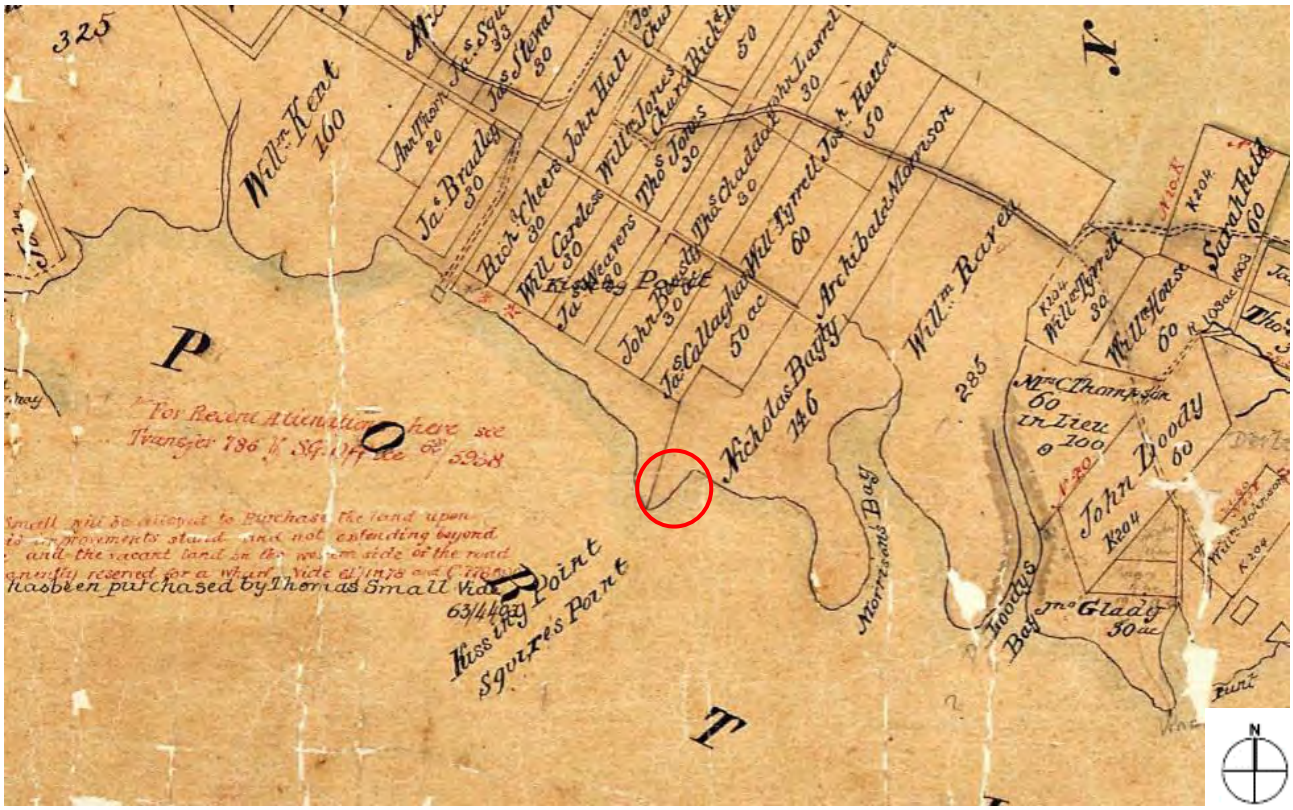


Figure 43: Pre-1822 parish map with location of subject site circled (Source: Parish of Hunters Hill, sheet 2, undated, 14063701.jp2, available at https://hlrv.nswlrs.com.au/)

Figure 44: Undated map with location of subject site (circled), indicating the subdivision of Bayley's grant (Source: Source: Parish of Hunters Hill, sheet 3, undated, 14063801.jp2, available at https://hlrv.nswlrs.com.au/)

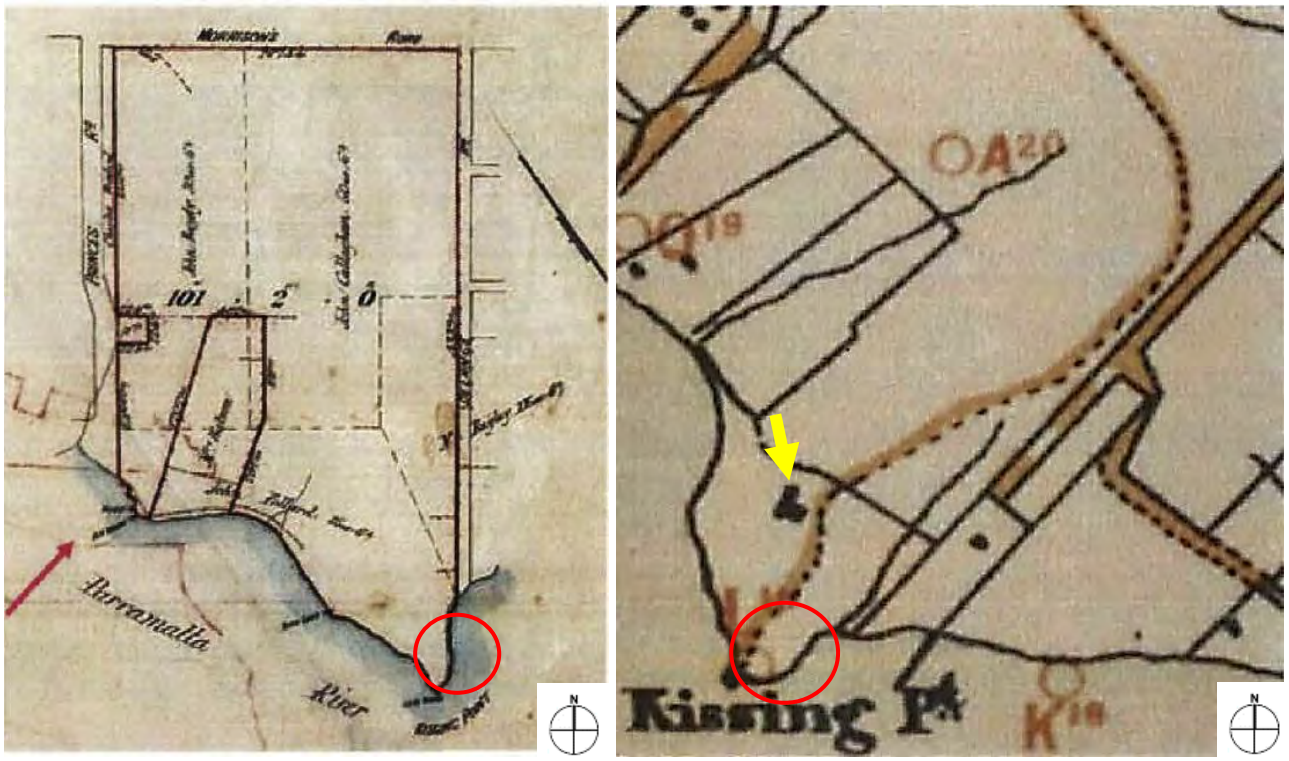


Figure 45: Left - Surveyors plan accompanying 1888 Torrens Certificate of Title; showing what may be a wharf to the west of the subject site (circled); Right – 1889 map showing two structures (indicated with arrow) on Mary Ann Watson's property to the west of the subject site (circled) (Source: Left - Torrens Title Old Form Bound Register, Vol. 886 Fol. 55. HLRV; Right - NSW Surveyor General, 1889, Map of the country between Broken Bay and Georges River. Sheet NO. 1. Surveyor General's Office, NSW. NLA, MAP RM 2855)

Figure 46: 1894 parish map with location of subject site circled (Source: By Higinbotham & Robinson, City of Sydney Archives, available at https://dictionaryofsydney.org/media/3930)

Figure 47: 1907 parish map with location of subject site circled (Source: Parish of Hunters Hill, sheet 1, 1907, 14039901.jp2, available at https://hlrv.nswlrs.com.au/)

Figure 48: Undated parish map with location of subject site circled (Source: County of Cumberland Parish of Hunters Hill, sheet 3, phHunters_Hill-Sheet_3-Cumberland.jp2, available at https://hlrv.nswlrs.com.au/)

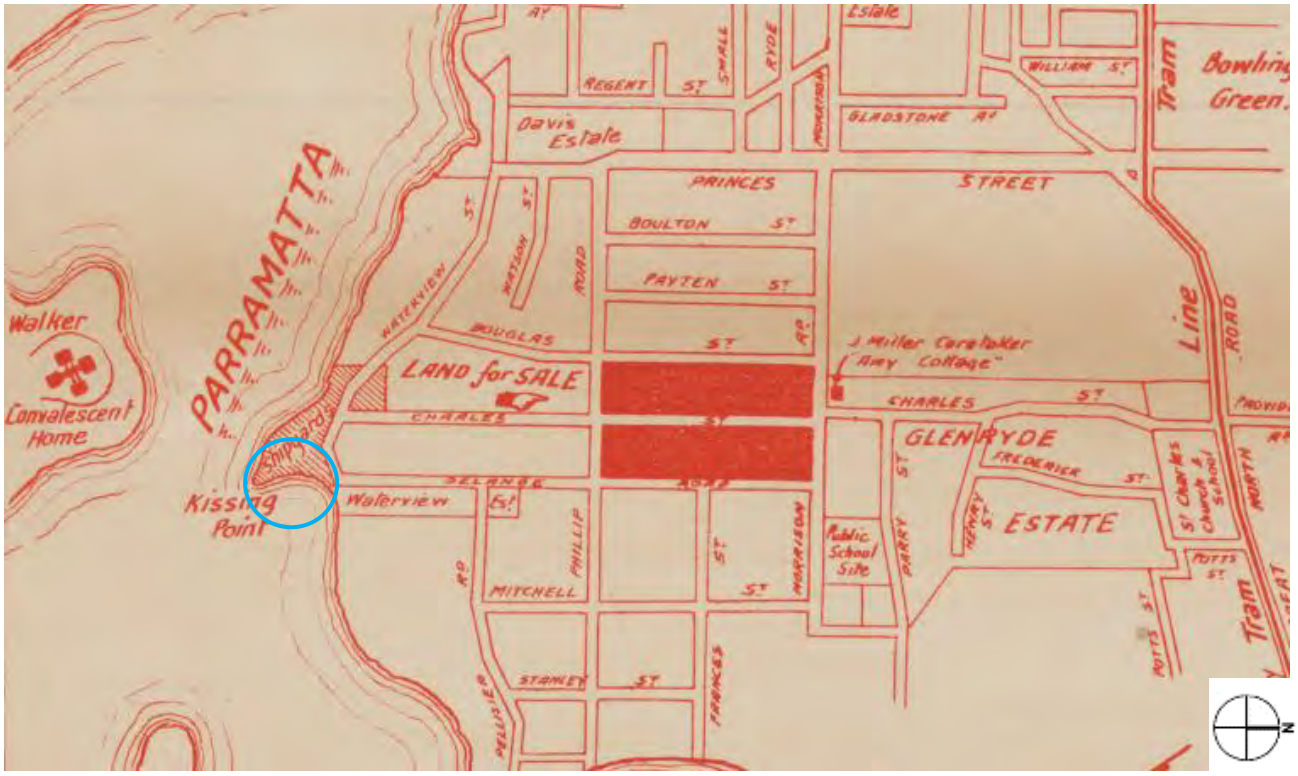


Figure 49: 1918 Cleves Estate subdivision plan with subject site circled. Note that the subject site had been incorporated within the Sydney and Mayoh shipyard by this time (Source: 004 - Z/SP/P19/4 - Cleves Estate, Ryde, 1918, State Library of NSW)

Figure 50: 1943 aerial of subject site (circled); inset - remnant boatslips (indicated with yellow arrows) and a potential jetty/ wharf structure (indicated with green arrow) are located within the vicinity of the subject site (Source: SIX Maps 2019)

Figure 51: 1943 aerial photograph overlay on existing aerial of subject site (circled). Note location of remnant boatslips (indicated with yellow arrows) and a potential jetty or wharf structure (indicated with green arrow) within the vicinity of the subject site (Source: SIX Maps 2019)

4.3.3 Summary

The above assessment has demonstrated that the subject site was initially incorporated within Nicholas Bayley's 116-acre land grant. Maps and historical sources do not suggest that the subject site was developed further at this time. This theory is further supported by James Squire's subsequent acquisition of the land in 1822 on the basis that it had remained 'underutilised'.[11] Maps and paintings dating to the period of Squire's occupation (1822 – 1856) indicate that the homestead, as well as the majority of maritime activity, were concentrated north of the subject site in the vicinity of what is today Bennelong Park. There is some suggestion, however, that the subject site may have contained a wharf or jetty structure during this period.

Between the mid-late 19th century the subject site was incorporated within the Village of Eugenie, although the subdivision and residential development of the land was concentrated to the north of the subject site. From the early 20th century the subject site was incorporated within the Sidney and Mayoh shipyard and was used for boat dismantling activities until the late 20th century. Aerial images suggest that remnant boatslips may be located within the vicinity of the subject site. A remnant jetty or wharf structure may also have been located to the east of the existing wharf; a logical location, given the wind protection which this location would have afforded.

In the late 20th century the subject site was incorporated within Kissing Point Park. Significant landscaping and grading works were undertaken in association with this period, which would have removed archaeological relics associated with earlier periods.

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.*[12]

4.4.1 Assessment of Significance Criteria

The following section has incorporated and expanded on the assessment of significance contained within the SHI form for local heritage item 'Kissing Point Park (former boat slips)' (item no. I157)[13] (italicised):

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 Putney from the establishment of the colony to the present day. The present Kissing Point Wharf site is important in the course of Putney'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.

The former boatslips are of historical significance as evidence of the site of a significant but unsuccessful Commonwealth Government ship building enterprise late in the First World War (from 1918).

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 Wallumedegal or Wallumattagal clan, in whose traditional territory it is located. The site is associated with James Squire, in whose 19th century estate it was incorporated. The subject site is also associated with Woollarawarre Bennelong of the Wangal clan, who served as an interlocutor between the Eora and

[11] 'Halvorsen's Boat Building Complex: Maritime Archaeology Assessment', March 2015, Cosmos Archaeology Pty Ltd, p.5
[12] 'Assessing Heritage Significance', NSW Heritage Manual (November 2015), Office of Environment and Heritage.
[13] 'Boat Slips (Former), SHI Form, available at https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=2340118

the British colonists and who is buried in the orchard of brewer James Squire at Kissing Point where he lived in his later years. The subject site is also associated with Nanbarry, nephew of Colebee the Cadigal elder, who was buried alongside Bennelong at his request.

The site has historical association with the Sydney firm Kidman and Mayoh, who were contracted in 1918 for construction of wooden sailing ships at the site.

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 Kissing Point Wharf structure is one of a number of ferry wharves which were established along the Parramatta River, from Meadowbank onwards, at the turn of the century as the result of improved infrastructure and de-silting measures. Amongst this group, the subject wharf structure is neither technically nor creatively remarkable, although it does contribute toward the maritime aesthetic of the 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 Kissing Point 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 Putney 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 Kissing Point Wharf structure as low. As a relatively modern structure, the present Kissing Point Wharf has minimal potential to yield information that would contribute to a greater understanding of historical maritime technology or wharf construction.

There is some potential for remnants of an earlier jetty or wharf structure, associated with the 19th century development of the site, to be located within the vicinity of the existing wharf. If uncovered, these could be instructive about early transportation and use of the Parramatta River from this location. There is also potential for remnant boat slips, associated with the 20th century development of the site, to be located within proximity of the existing wharf. These would be significant for their association with the Sidney and Mayoh shipyard, as well as a number of famous vessels which were dismantled at this location.

The site has potential for industrial archaeology

f) an item possesses uncommon, rare or endangered aspects of the local area's cultural or natural history

The subject site possesses rare or endangered aspects of local history and culture insofar as it represents the functional replacement of potential earlier wharf structures with the present wharf structure in the early 21st 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 Kissing Point Wharf demonstrates the principal characteristics of a modern wharf constructed at the beginning of the 21st century to accommodate the ferry service which had been extended further west along the Paramatta 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 Kissing Point Wharf

Kissing Point Wharf is of significance for its role in the history of ferry commuting and maritime use of Kissing Point and Putney throughout the 19th and 20th centuries. Kissing Point Wharf is associated with the development of Putney and history of ferry services on the Parramatta River for over a century and a half.

The Kissing Point Wharf site is of significance to the Wallumedegal or Wallumattagal clan, in whose traditional territory it is located. The site is associated with James Squire, in whose 19th century estate it was incorporated. The site is also associated with Woollarawarre Bennelong of the Wangal clan, who spend his later years on Squire's property and who is buried within its vicinity, as well as Nanbarry, nephew of Colebee the Cadigal elder, who was buried alongside Bennelong at his request. The subject site is also associated with Sir Sidney Kidman, Arthur Mayoh and Joseph Mayoh who established the Sidney and Mayoh shipyard on the site in 1918.

Kissing Point 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 Putney community at large, which has been shaped by its proximity to the river and its evolving maritime services.

The current Kissing Point Wharf structure is one of a number of ferry wharves which were established along the Lane Cove and Parramatta Rivers in the early 21st century. Amongst this group, the subject wharf structure is neither technically nor creatively remarkable, although it contributes toward the maritime aesthetic of the area. As a relatively modern structure, the wharf has minimal potential to yield information that would contribute to a greater understanding of historical maritime technology or wharf construction.

There is some potential for remnants of an earlier jetty or wharf structure, associated with the 19th century development of the site, to be located within the vicinity of the existing wharf. If uncovered, these could be instructive about early transportation and use of the Parramatta River from this location. There is also potential for remnant boat slips, associated with the 20th century development of the site, to be located within proximity of the existing wharf. These would be significant for their association with the Sidney and Mayoh shipyard, as well as a number of famous vessels which were dismantled at this location.

4.4.3 Statement of Significance for 'Kissing Point Park (former boat slips)' (item no. I157)

The following statement of significance has been extracted from the SHI form for local heritage item 'Kissing Point Park (former boat slips)' (item no. I157):[14]

> *The former boatslips are of historical significance as evidence of the site of a significant but unsuccessful Commonwealth Government ship building enterprise late in the First World War (from 1918). The site has historical association with the Sydney firm Kidman and Mayoh, who were contracted in 1918 for construction of wooden sailing ships at the site. The site has potential for industrial archaeology.*

[14] 'Boatslips (Former)', SHI form, available at https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=2340118

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, Kissing Point Wharf is located within the curtilage of local heritage item 'Kissing Point Park (former boatslips)' (item no. I157). Therefore, impact of the proposal upon this item 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, City of Ryde Council).

5.2 'Statements of Heritage Impact' (OEH)

The Heritage NSW document *Statements of Heritage Impact*[15] 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 existing Kissing Point 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 Putney and its surrounds. The proposal would ensure its ongoing viability within this context.
- The proposal would incorporate elements of the existing wharf structure, including the concrete jetty and piles, into the new where possible;

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.

- The subject site is located within the curtilage of local heritage item 'Kissing Point Park (former boatslips)' (item no. I157). The heritage significance of 'Kissing Point Park (former boatslips)' relates primarily to its archaeological potential. The historical archaeological assessment (Section 4.3) in this report has established that there is low-medium potential for remnant boatslips, associated with the 20th century development of the site, to be located within the vicinity of the proposed works. As stated in the State Heritage Inventory (SHI) form for this item:

  'As a largely archaeological resource, excavation or landscaping in the location of the former boatslips may require an archaeological report and permission under the NSW Heritage Act. The NSW Heritage Branch archaeological section should be consulted when work is being planned.'[16]

- Although the landscape has been heavily modified in association with the establishment of Kissing Point Park and the existing wharf site, the proposal would include minor landscaping and excavation works *'in the location of the former boatslips'*. Having regard to the actual scope of work to be undertaken, it should be confirmed whether a permit/application should be sought from Heritage NSW.
- The historical archaeological assessment (Section 4.3) in this report revealed that an earlier jetty/ wharf structure, associated with the 19th century development of the site, may have existed at this location. It has determined that there is low potential for archaeological relics associated with an earlier jetty/ wharf structure to be impacted by the proposal on the basis that:

[15] 'Statements of Heritage Impact' OEH. Available from http://www.environment.nsw.gov.au/resources/heritagebranch/heritage/hmstatementsofhi.pdf.
[16] 'Kissing Point Park, SHI Form, available at https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?id=2340118

- the subject site has undergone significant disturbance in association with the establishment of the park and existing wharf site;
- the existing concrete jetty and piles would be retained where possible; and
- alterations would be limited to the replacement of the existing pontoon and gangway, which are located at a significant distance from the riverbank and most probably outside the footprint of any earlier jetty/ wharf structure.

- In the event that Aboriginal or historical archaeological resources are encountered, the Roads and Maritime's *Standard Management Procedure: Unexpected Heritage Items* (2015)[17] is to be strictly adhered to.

The following sympathetic solutions have been considered and discounted for the following reasons:

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/ known impact to fabric or curtilage?	Recommendation	Action
1	Kissing Point Park (former boatslips)	Ryde LEP 2014 (item no. I157)	Local	Yes	The above historical archaeological assessment (Section 4.3) has determined that there is low-medium potential for the proposal to impact on remnant boatslips, associated with the 20th century development of the site. As the heritage significance of local heritage item 'Kissing Point Park (former boatslips)' (item no. I157) relates primarily to its archaeological potential associated with this period, it follows that the works would impact on the heritage significance of the item itself. Ryde City Council should therefore be notified of the proposal prior to the undertaking of any works. A permit should therefore be sought from Heritage NSW.	SoHI; consultation with Ryde City Council required under ISEPP. It is considered a permit may be required. At minimum consultation with Heritage NSW will be required to confirm.

[17] '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

6 Conclusions and Recommendations

This SoHI has concluded that the proposed works would have:

- low-medium potential to impact archaeological resources associated with local heritage item 'Kissing Point Park (Former boatslips)' (item no. I157) and, therefore, to impact upon the heritage significance of the item itself;
- low potential to impact other historical archaeological resources; and
- low potential to impact objects and sites of Aboriginal significance.

- Although the current Kissing Point 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.

- The Roads and Maritime's PACHCI Stage 1 Assessment determined that, although a registered Aboriginal site (Site ID #45-6-2677) is located within close proximity of the subject site, it is unlikely that the proposed works would impact Aboriginal cultural heritage.

- The historical archaeological assessment (Section 4.3) determined that the works would take place within heavily disturbed land. In relation to non-Indigenous archaeological potential, it has determined that:
  - there is low potential for archaeological relics associated with an earlier wharf structure to be impacted by the alterations/ removal to the existing Kissing Point Wharf; and
  - there is low-medium potential for archaeological relics associated with the former boatslips to be impacted by the proposal. In response to the recommended management guidelines, as outlined in the SHI form for the item, a permit should be sought from Heritage NSW, Community Engagement, Department of Premier & Cabinet.

- Local heritage item 'Kissing Point Park (former boatslips)' (item no. I157) is defined as a 'largely archaeological resource', which has 'potential for industrial archaeology'.[18] As the heritage significance of the item relates primarily to its archaeological potential associated with the 20th century development of the site, any impact to archaeological relics associated with this period would result in an impact to the heritage significance of the item itself. Under the ISEPP 2007, it is therefore recommended that Ryde City Council be notified of the works prior to proceeding.

- 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)[19] is to be followed.

CITY PLAN HERITAGE for Roads and Maritime Services

December 2019

[18] 'Boatslips (Former)', SHI form, available at https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=2340118

[19] '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

Boatslips (Former)

Item details

Name of item:	Boatslips (Former)
Other name/s:	Kidman and Mayoh shipyard
Type of item:	Built
Group/Collection:	Transport - Water
Category:	Slipway
Location:	Lat: 330 49’ 48.07" South Long: 1510 06’ 06.44" East
Primary address:	24 Waterview Street, Kissing Point Park, Putney, NSW 2112
Parish:	Hunters Hill
County:	Cumberland
Local govt. area:	Ryde

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
24 Waterview Street, Kissing Point Park	Putney	Ryde	Hunters Hill	Cumberland	Primary Address

Statement of significance:

The former boatslips are of historical significance as evidence of the site of a significant but unsuccessful Commonwealth Government ship building enterprise late in the First World War (from 1918). The site has historical association with the Sydney firm Kidman and Mayoh, who were contracted in 1918 for construction of wooden sailing ships at the site. The site has potential for industrial archaeology.

Date significance updated: 18 Dec 12

Note: The State Heritage Inventory provides information about heritage items listed by local and State government agencies. The State Heritage Inventory is continually being updated by local and State agencies as new information becomes available. Read the OEH ***copyright and disclaimer****.*

Description

Builder/Maker:	Kidman and Mayoh

Construction years:	1918-1918
Physical description:	The site has been heavily modified in the construction of the present park. Traces of concrete slipways are evident at low tide along with miscellaneous metal and timber remnants that mainly seem to date from the breaking of HMAS Tarakan. Kissing Point Park occupies the foreshore of the Parramatta River at Kissing Point. Large sections of the park close to Waterview Road have been converted to car park to cater for the large number of park visitors. Bushland areas are small and confined to areas away from public use.
Physical condition and/or Archaeological potential:	Archaeological site (remnants) **Date condition updated:**06 Dec 11
Modifications and dates:	Use of the boatslips ceased after 1954.
Current use:	Remnant (archaeological site)
Former use:	Boatslips

History

Historical notes: AREA HISTORY

Aboriginal people inhabited the Sydney basin for thousands of years prior to the arrival of Europeans. The northern coastal area of Sydney was home to the Guringai people, western Sydney was home to the Dharug clans, and southern Sydney was inhabited by the Dharawal clans. The AHO and the Metropolitan Local Aboriginal Land Council, the recognised custodians for this area, as well as members of the local Aboriginal community generally agree that the term Guringai may not be the original name for the area, tribe or language, however, given the lack of any credible alternative, it is considered to be an appropriate and convenient term to represent the area as distinct from other parts of Sydney. The clan names are in some regards less contentious for some areas. The City of Ryde Council area is commonly accepted to be Wallumedegal country (various spellings). The Guringai lived primarily along the foreshores of the harbour, and fished and hunted in the waters and hinterlands of the area. All clans harvested food from their surrounding bush. Self-sufficient and harmonious, they had no need to travel far from their lands, since the resources around them were so abundant, and trade with other tribal groups was well established. The British arrival in 1788 had a dramatic impact on all of the Sydney clans. Food resources were quickly diminished by the invaders, who had little understanding of the local environment. As a result, the Aboriginal people throughout the Sydney Basin were soon close to starvation. The Sydney clans fought back against the invaders, but the introduction of diseases from Europe and Asia, most notably smallpox, destroyed over half the population. The clearing of land for settlements and farms displaced local tribes and reduced the availability of natural food resources, leaving Aboriginal people reliant on white food and clothing. The French surgeon and pharmacist Rene Primavere Lesson, who visited Sydney in 1824, wrote: 'the tribes today are reduced to fragments scattered all around Port Jackson, on the land where their ancestors lived and which they do not wish to leave.' (Information taken from City of Ryde Aboriginal Site Management Report, Aboriginal Heritage Office, 2011)

Putney shares its early history with Ryde, as part of the Eastern Farms (located east of Parramatta), which were granted to emancipists and others in the first decade of settlement. It was of one the first areas of British settlement in the colony. The peninsula

on the western side of Morrisons Bay is the heart of Putney today, and was originally part of the land granted to Nicholas Bayley in 1799. Putney's western boundary is Church Street from the Parramatta River to Morrison Road. Morrison Road generally forms the northern boundary and borders the land grants made to ex-convicts William Careless, John Jones, John Morris, Richard Cheers and James Weavers on 3 January 1792. These were referred to as the Eastern Farms, later known as Kissing Point, a name believed to have originated from the way in which heavily laden boats passing up the Parramatta River bumped or 'kissed' the rocky outcrop which extends into the river at today's Kissing Point. By October these settlers had cleared their land and planted crops of maize.

From around 1805 to the 1840s, the farm boundaries began to change as many landholders' efforts were unsuccessful and their land was bought up by more successful farmers and wealthier settlers. In that time, the farming practices changed from the growing of cereal crops to the production of fruit, especially citrus, peaches, apricots and grapes. James Squire was originally granted land in the Eastern Farms in 1795. He arrived in the First Fleet on board "Charlotte." At the 1802 Muster, James Squire owned 118 hectares of land of which nearly 50 hectares were cleared and 11 planted with wheat and corn. By 1806, his land holding included the farms of 13 early grantees. In 1822, shortly before his death, he purchased Bayley's original grant of 47 hectares. It is on this grant that the original Putney was built.

The land was later sold to Eugene Delange who subdivided the land calling it the Village of Eugenie.

In 1856, Eugène Delange bought what had been the Bayley grant for subdivision. Delange called the subdivision the Village of Eugénie and named many of the roads after generals in Louis Napoleon III's army that won the day at Sebastopol (at least in the Francophile view of the resolution) in the Crimean War. Eugénie was the name of the wife of Napoleon III and was also reminiscent of his own given name, Eugène.

The main street was originally called Napoleon Street but this has changed to Delange Road. Others named after French marshals were Bosquet Street, changed to Phillip Street, and Canrobert Street, now Morrison Road. Only Pellisier Street remains, although that is misspelt from the original spelling of Marshal Pélissier's name. (Alex McAndrew, Putney on Parramatta: From Struggle Town to Peninsula Paradise, the author, Epping NSW, 2003, pp 3, 4, 13-32; Gregory Blaxell, 'The generals of Putney', Northern District Times, 2 April 2008, p 21).

The estate did not sell except for a few blocks suitable as small farms. In 1878, Delange's son sold 49 hectares to Phillip Walker. Walker changed the street names from French to a more English orientation. The estate was advertised in December 1878 and finally went on sale in February 1879. (Alex McAndrew, Putney on Parramatta: From Struggle Town to Peninsula Paradise, the author, Epping NSW, 2003, p 29-32). Walker also bought some of the original Callaghan grant to enlarge the subdivision. It was probably Phillip Walker who first conjured up the name Putney for his subdivision of 1879, after a London suburb on the River Thames, site of the famous Oxford/Cambridge boat race.

(Alex McAndrew, Putney on Parramatta: From Struggle Town to Peninsula Paradise, the author, Epping NSW, 2003, Putney subdivision map, p 30).

ITEM HISTORY

In 1916 Prime Minister W.M. Hughes established the Commonwealth Shipping Line. This decision was not endorsed by Parliament and was made at a time when steel plate was almost unobtainable. Construction contracts were let in several states and one for six auxiliary powered, four-masted wooden barques was awarded to the firm of Kidman and Mayoh in Sydney in 1918. None of the principals - Sir Sidney Kidman (1857-1935), Arthur Mayoh (1864-1938), and Joseph Mayoh (1863- 1950)- had any shipbuilding experience and Kidman was better known around the country as the 'cattle king'. The brothers Arthur and Joseph Mayoh were engineers who had come to Australia from England around 1909 and had been involved in the construction of Sydney's underground railway. The ships were to be 244 feet in length making them the largest timber ships ever attempted in Australia and a lease was taken on the foreshore of Cleves Estate at Kissing Point. Four slipways, a

timber mill and blacksmith's shop were established on site. The ships were to be built using timber from the north coast of New South Wales. Hundreds of men, among them champion axeman Charlie Murrill, were employed felling and squaring heavy timber including ironbark for the keels, turpentine for sheathing and ti-tree 'knees'. 'Bush carpenters' from the north coast came down to work in the shipyard, assisting the skilled shipwrights whose labour was in short supply at that time. Some Putney people got jobs as blacksmiths and labourers.

Within six months questions were being asked in Parliament about the merit of building wooden sailing ships in the age of steam and steel. A number of design changes were imposed on the construction firm and the contract for four of the ships was cancelled in July 1919. Work continued on two vessels the final design being for five-masted barquentines without auxiliary power. Intended ownership passed to the island trading firm of Burns Philp and Co., at a discounted price.

The hull of the Braeside was launched in May 1920 but not on a spring tide and some damage was done in the shallow water. Even before launching the hull sagged nine inches and after launching it drooped at the bow and stern (hog) some 22 inches. Lloyds refused to issue a certificate of seaworthiness and Burns Philp would not accept delivery. Legal proceedings followed with accusations of poor workmanship, including the use of 'dummy rivets' and counter accusations of bribery. Kidman and Mayoh eventually lost their case and were found to owe money to the Commonwealth. The Burnside was stripped of useful timber and burnt on the slipway in September 1923.The Braeside made only one voyage in December 1923 when she was towed to sea and burnt. Sid Kidman lost many thousands of pounds on the ships but is reported to have said that his biggest regret was that the wonderful work of the superb axemen of the north coast forests, their enthusiasm, craftsmanship and loyalty, all went for nothing.

The shipyard was abandoned until after WWII when the slips were used as a convenient site to break up ships. The first to arrive was a naval vessel with an unhappy history. Constructed and launched in the United Kingdom in 1944 this was a Mark III Tank Landing Ship L3017. Renamed HMAS Tarakan in 1946 she was 347' long and used around northern Australia as a supply boat. Whilst dumping unwanted munitions offshore from Sydney in 1947 nine soldiers were injured, then in January 1950 during a minor refit at Garden Island a petrol fire broke out on board that killed seven sailors, one civilian, and injured 13 others. Too damaged to be of further use she was partly stripped at a Balmain coal dock when another fire occurred, this was attended by the fire-boat Bennelong. The hull was eventually beached on the old slips at Kissing Point and cut into small pieces.

In 1953/4 the Kidman and Mayoh slips were used once again for breaking up a steel hulled sailing ship that had begun life in 1875 as a Blackwall Line frigate. In the late 19th Century as the Melbourne and later the Macquarie she made regular passenger runs between London and Melbourne or Sydney with an average time of 82 days. In 1897 she became a sail training ship. Her last role for 44 years was as the coal hulk in Sydney Harbour Fortuna owned by the Wallarah Coal Co. She did not go quietly as there was a fire on board in January 1954 that exploded oxy/acetylene bottles that shook the riverside suburbs for some 15km around. An image of this ship as the Macquarie was adopted as the logo of the Putney Progress Association.

Historic themes

Australian theme (abbrev)	New South Wales theme	Local theme
3. Economy-Developing local, regional and national economies	Industry-Activities associated with the manufacture, production and distribution of goods	ship building-
5. Working-Working	Labour-Activities associated with work practises	

	and organised and unorganised labour	(none)-

Assessment of significance

SHR Criteria a) [Historical significance]	The former boatslips are of historical significance as evidence of the site of a significant but unsuccessful Commonwealth Government ship building enterprise late in the First World War (from 1918).
SHR Criteria b) [Associative significance]	The site has historical association with the Sydney firm Kidman and Mayoh, who were contracted in 1918 for construction of wooden sailing ships at the site.
SHR Criteria e) [Research potential]	The site has potential for industrial archaeology
Integrity/Intactness:	Archaeological site
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:

DOCUMENTATION: A Heritage Impact Statement is required by Council to accompany any Development Application for non-minor work.

Please consult Council staff about your proposal and the level of documentation that will be required as early as possible in the process.

APPROACHES TO MANAGING THE HERITAGE SIGNIFICANCE OF THE ITEM: (note: the detailed requirements for each property will be determined on a case-by-case basis. The following advice provides general principles that should be respected by all development.)

As a largely archaeological resource, excavation or landscaping in the location of the former boatslips may require an archaeological report and permission under the NSW Heritage Act. The NSW Heritage Branch archaeological section should be consulted when work is being planned.

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Local Environmental Plan	Ryde Draft LEP 2011	I157			
Local Environmental Plan	Ryde LEP 2014	I157	02 Sep 14		
Local Environmental Plan - Lapsed	LEP No. 105	327	17 Jan 03	14	358

Study details

Title	Year	Number	Author	Inspected by	Guidelines used

Ryde Heritage Study	1988	327	Jonathan Falk Planning Consutants P/L Assoc with Rodney Jensen and Assoc P/L		No
Ryde SHI Review Stage 1	2012		Paul Davies Pty Ltd		Yes

References, internet links & images

Type	Author	Year	Title	Internet Links
Written			Research by Dr Peter Mitchell	
Written	Biosphere Environmental Consultants Pty Ltd	2008	Ryde Flora and Fauna Study	
Written	Gregory Blaxell	2010	Putney suburb history, Dictionary of Sydney online	

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:

Name:	Local Government
Database number:	2340118

Return to previous page

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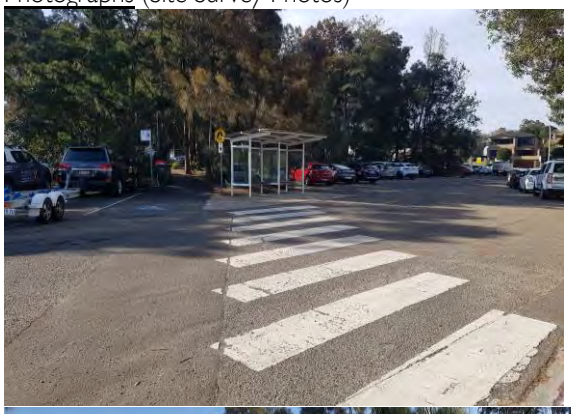
Appendix B: Site Inspection Form

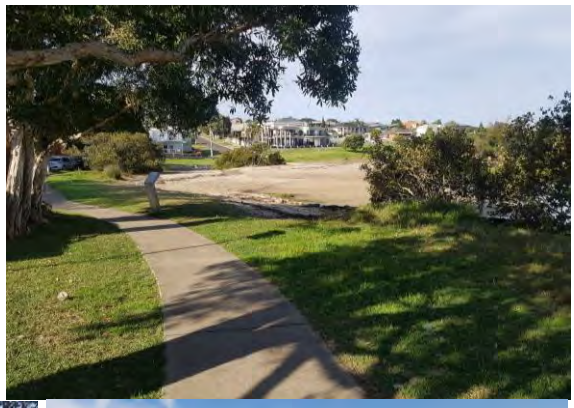
Appendix B: Site Inspection Recording Form

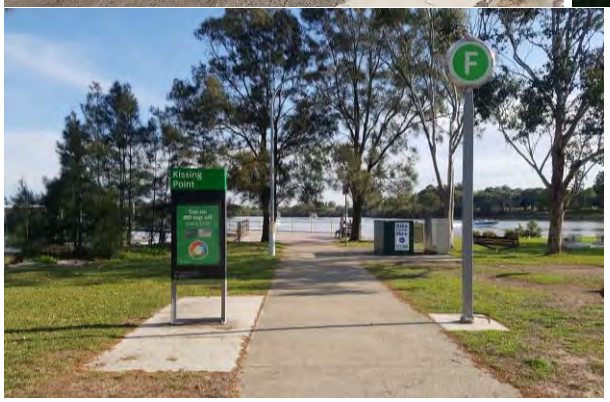
Project Name:	UPGRADE OF KISSING POINT WHARF		
Survey Date	27/09/2019	Recorded by	AR (CPH)
Site Recording Number	KPW1	Heritage Item Name	'Kissing Point Park (former boat slips)' (item no. I157)
Location	Waterview Street, Putney NSW		
Site Access	YES		
Owner	Roads and Maritime Services		
Current Use	Operational wharf		
Physical Description	Kissing Point Wharf is located on the northern side of the Parramatta River within the suburb of Putney. The wharf consists of a gangway and pontoon which project south-east from the landside abutment.		
Archaeological Potential	Site phasing analysis revealed the potential for an earlier wharf or jetty structure and 19th century remnant boatslips within the vicinity of the subject site. The proposed works would include some excavation and demolition within the vicinity of the carpark and jetty landside interface. The proposed works are therefore assessed to have low-medium potential to affect historical archaeological resources.		
Heritage Listing	The Kissing Point Wharf structure is not heritage listed.		
Significance	The present Kissing Point Wharf site is important in the course of Putney'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.		
Brief Historic Context	Kissing Point Wharf is located within the former 19th century estate of James Squire. The wharf is also located within proximity of the final resting place of Woollarawarre Bennelong of the Wangal clan, who served as an interlocutor between the Eora and the British colonists and who is buried in the orchard of brewer James Squire at Kissing Point where he lived in his later years. In 1988 the Parramatta River was dredged in celebration of the bicentenary and in 1993 the RiverCats ferry service replaced Sydney Ferries' Fleet Class Ferries. The existing Kissing Point Wharf was constructed at the subject site in 2002.		

Mud Map Sketch

Photographs (Site Survey Photos)







Appendix C: AHIMS Search Results

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : Kissing Point 2

Client Service ID : 454174

Alexandra Ribeny

Coombs Building
ACTON Australian Capital Territory 2601

Attention: Alexandra Ribeny

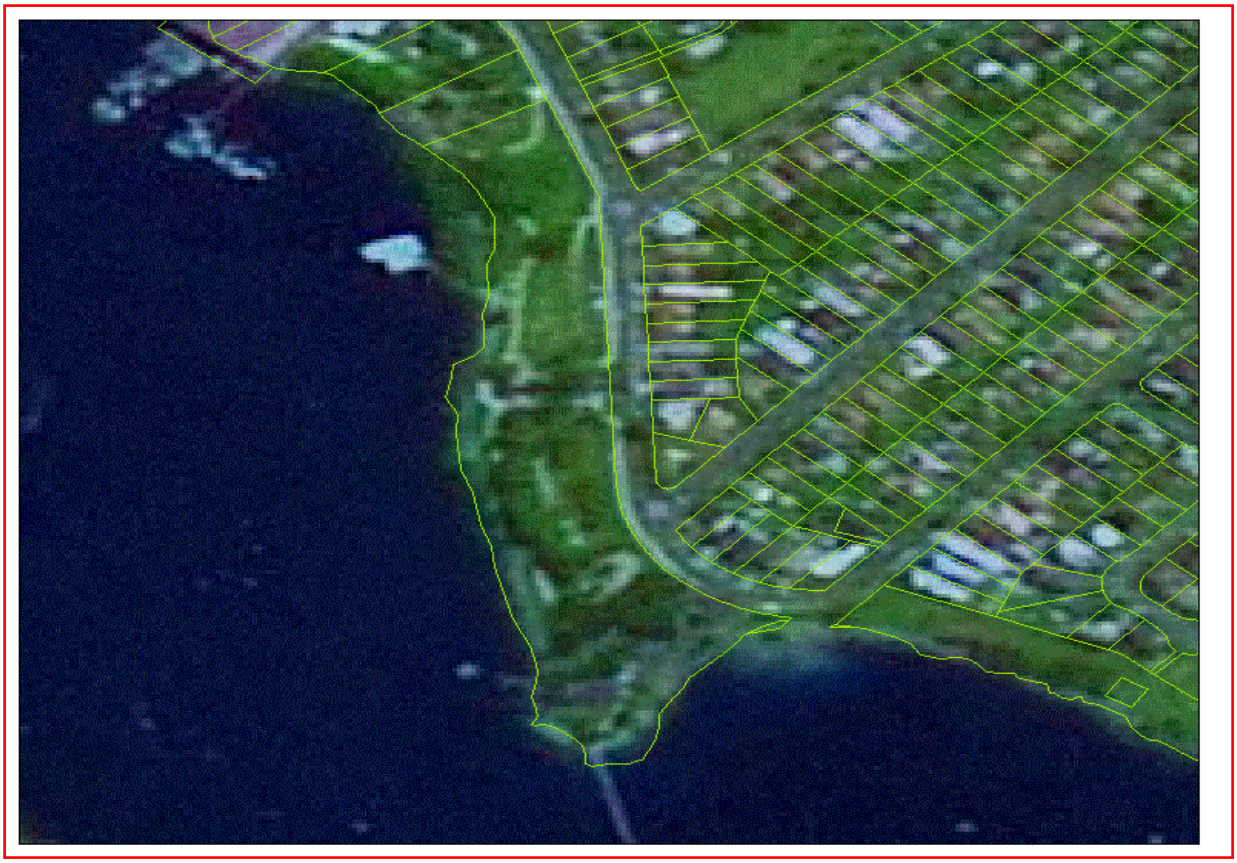
Email: alexandrar@cityplan.com.au

Date: 03 October 2019

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 1, DP:DP34075 with a Buffer of 50 meters, conducted by Alexandra Ribeny on 03 October 2019.

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) 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.

3 Marist Place, Parramatta NSW 2150
Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : Kissing Point

Client Service ID : 454173

Alexandra Ribeny

Coombs Building
ACTON Australian Capital Territory 2601

Attention: Alexandra Ribeny

Email: alexandrar@cityplan.com.au

Date: 03 October 2019

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 1, DP:DP34075 with a Buffer of 0 meters, conducted by Alexandra Ribeny on 03 October 2019.

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:

1	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) 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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