Transport for NSW

Ferry Wharves at La Perouse and Kurnell

Final Feasibility Study Report

NSW GOVERNMENT | Transport for NSW

ARUP

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Executive Summary

This Feasibility Study has been commissioned by Transport for NSW (TfNSW) to investigate the re-establishment of public wharves at La Perouse and the Kurnell Peninsula for commercial and recreational use. Its purpose is to inform decision-makers on the viability of the project to progress to the next implementation stages.

The study has been identified as a Priority Regional Project within the Botany Bay, Georges River and Port Hacking Regional Boating Plan (2015) and initiated in the context of the impending 250th anniversary of Captain Cook's landing at the Kurnell Meeting Place in 2020. A passenger ferry service between these two localities across the heads of the bay had previously operated since the 1890's until 1974 when it ceased following the wharves being severely damaged from a major storm event.

The study has been directed by a Project Control Group (PCG) established by TfNSW which also includes the NSW National Parks and Wildlife Service (NPWS), Randwick City Council, and Sutherland Shire Council. Stakeholder and community consultation has been undertaken, with feedback obtained considered in the study. Consultation will continue at the next stages of the project should it proceed further.

La Perouse and Kurnell are located at either side of the ocean entrance to Botany Bay. Each place has a diverse variety of land uses encompassing suburban communities, commercial and industrial precincts, and the Kamay Botany Bay National Park. Both the La Perouse and Kurnell areas of the National Park contains a rich array of historical, cultural and environmental value.

The provision of wharves at La Perouse and Kurnell could accommodate a number of different users. The core use is expected to be a ferry service for tourists/visitors to the area and commuters. The wharf infrastructure would also likely be used by other commercial vessels and by some recreational boats.

The optimal wharf locations at La Perouse and the Kurnell is influenced by a range of criteria. Three potential wharf siting options at each side of the bay were assessed through a semi-quantitative multi-criteria assessment against a number of key criteria to identify preferred locations.

Consideration of the conceptual wharf layouts and design aspects has been made to a sufficient level to inform this feasibility study. It is expected that a fixed wharf structure will be the most appropriate form for the proposed new La Perouse and Kurnell wharves in terms of whole of life cost and minimising the risk of structural damage during storm events from wave impacts. To provide flexibility for vessel access over all tide levels ramps from the approach jetty level down to a number of lower landings will be required. The choice of materials for the new wharves construction will be governed by durability, aesthetic and cost considerations. The new wharves will be required to be designed to meet the relevant legislation and guidance for disability access.

Availability of nearby car parking will be an important consideration should new wharves at La Perouse and Kurnell be introduced. A preliminary assessment suggests that additional car parking spaces could be required at the Kurnell and La Perouse sites respectively to support the ferry service. In addition to the major wharf and car parking infrastructure components, other amenities and infrastructure provisions are expected to include passenger waiting area/shelter, ticketing area, toilet amenities, pathways from car parking to transport connections, and gate/security provisions.

The key outcomes of the study are summarised below:

- The preferred wharf locations are: at the southern end of Frenchman's Bay within the site of the old ferry wharf (La Perouse); and at the site of the old wharf and existing viewing platform near Captain Cook's Obelisk (Kurnell).
- A total infrastructure capital cost for the two wharf locations is estimated to be in the order of $17 million. Whole of life asset maintenance costs will also apply.
- A preliminary assessment suggests that there is likely to be no significant environmental and other impacts from the construction and operation of the La Perouse and Kurnell wharf and associated infrastructure that cannot be appropriately managed and mitigated. Potential heritage and aquatic ecology impacts will be particularly important to assess in further detail and manage.
- If the wharf infrastructure was to be delivered by TfNSW or Roads and Maritime Services as the proponent, it can likely be assessed and determined under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act), usually by a Review of Environmental Factors (REF). Referral to the Commonwealth might also be required.
- A ferry service between La Perouse and Kurnell will probably primarily need to be a tourist shuttle as it is not likely to be commercially viable for commuters only. Some form of Government assistance would likely be required to facilitate establishment of a ferry service.
- Establishing a ferry service is expected to provide numerous indirect social, economic and tourism benefits for La Perouse, Kurnell and wider Sydney that could provide a compelling case for justifying any direct economic revenue shortfall associated with its implementation and operation. Should the project be progressed, it is recommended that a Business Case is undertaken to better quantify these indirect benefits.
- Complementary measures to maximise the patronage potential of a ferry service could be considered, including improving intermodal links to the wharves (e.g. synchronising timetabling, increase frequency of buses), revitalising La Perouse and Kurnell tourist attractions, and effective marketing engagement.
- A core La Perouse to Kurnell ferry service could benefit from the establishment of supplementary water linkages to other locations in Botany Bay (e.g. at Brighton-Le-Sand's and near Sydney Airport) to create a wider network. Such supplementary services would also require new wharf infrastructure, the feasibility of which is outside the detailed consideration of this study.
- In addition to targeted stakeholder consultation, a total of 111 submissions were received during the public comment period when the Draft version of this report was exhibited. Of the submissions received, 74% expressed support for potential new ferry wharves at Kurnell and La Perouse, 11% were unsupportive, and the remaining submissions were neutral in nature. Feedback received during the consultation process will be considered in further stages of the project should it proceed.

Should the project be progressed beyond this current study, the next steps are expected to generally consist of the following:

1. Preparation of a Business Case. This should consider direct economic revenue, indirect socio-economic benefits, whole of infrastructure life costs, and operating costs.
2. Undertake further investigations, preliminary wharf infrastructure design and Environmental Assessment pursuant to obtaining planning approvals.

3. Securing of funding/investment sources for the wharf infrastructure capital costs.
4. Detailed design and documentation of wharf infrastructure.
5. Construction of wharf infrastructure.
6. Operator procurement (where required).
7. Marketing and service implementation.

1 Introduction

1.1 Background

Currently, travel between the historically-significant Sydney areas of La Perouse and Kurnell Peninsula is restricted to road connections around Botany Bay. A passenger ferry service between these two localities across the heads of the bay had previously operated since the 1890's until 1974 when it ceased following the wharves being severely damaged from a major storm event. Since this time there has been various calls for re-introducing a ferry service, including a formal study in 1999 which was ultimately not progressed.

Arup was commissioned by Transport for New South Wales (TfNSW) to undertake a feasibility study into the re-establishment of wharves between La Perouse and the Kurnell Peninsula for commercial and recreational use. The study has been identified as a Priority Regional Project within the Botany Bay, Georges River and Port Hacking Regional Boating Plan released by Transport for NSW in March 2015. It has also been initiated in the context of the impending 250th anniversary of Captain Cook's landing at the Kurnell Meeting Place in 2020.

The study has been directed by a Project Control Group (PCG) established by TfNSW which also includes the NSW National Parks and Wildlife Service (NPWS), Randwick City Council, and Sutherland Shire Council.

This report documents the study processes and outcomes.

1.2 Study Purpose

The purpose of the study has been to undertake preliminary investigations and assessments to inform decision-makers on whether introducing new wharves at La Perouse and Kurnell, for a ferry service and other uses, is potentially feasible and worthy of pursuing further to the next project implementation stages.

1.3 Study Inputs

Arup has drawn upon a range of inputs to inform the study, with the key ones including:

- Various GIS spatial data within the study area.
- Site visits to the study area.
- Available aerial images, maps and navigation charts.
- Australian Government Census data.
- A study investigating the feasibility of a similar ferry service prepared in 1999.
- Other relevant investigations and studies within Botany Bay.
- Information received from relevant stakeholders and interested parties.

Specific inputs drawn upon are referenced throughout the report.

1.4 Study Area

La Perouse and the Kurnell Peninsula are located at respectively the northern and southern sides of the ocean entrance to Botany Bay, which lies approximately 14 km south of the Sydney CBD (refer Figure 1).

The main focus of the study is to investigate the potential for wharves to support a ferry service between these two locations and other uses. Commentary has also been given on secondary uses for the wharves and potential linkages to other locations around Botany Bay, including Brighton Le Sands.

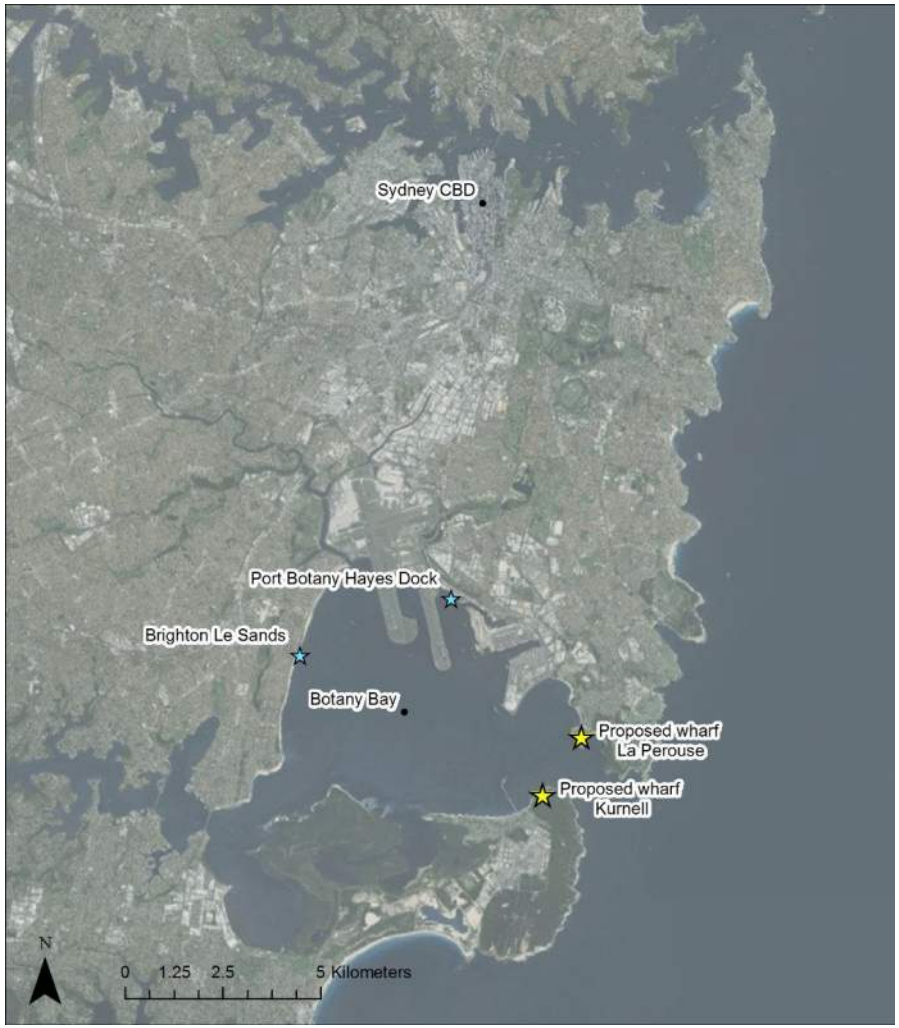


Figure 1 Locality plan showing La Perouse and Kurnell Peninsula study area.

1.5 Report Structure

The contents of this report have been structured as presented in Figure 2.

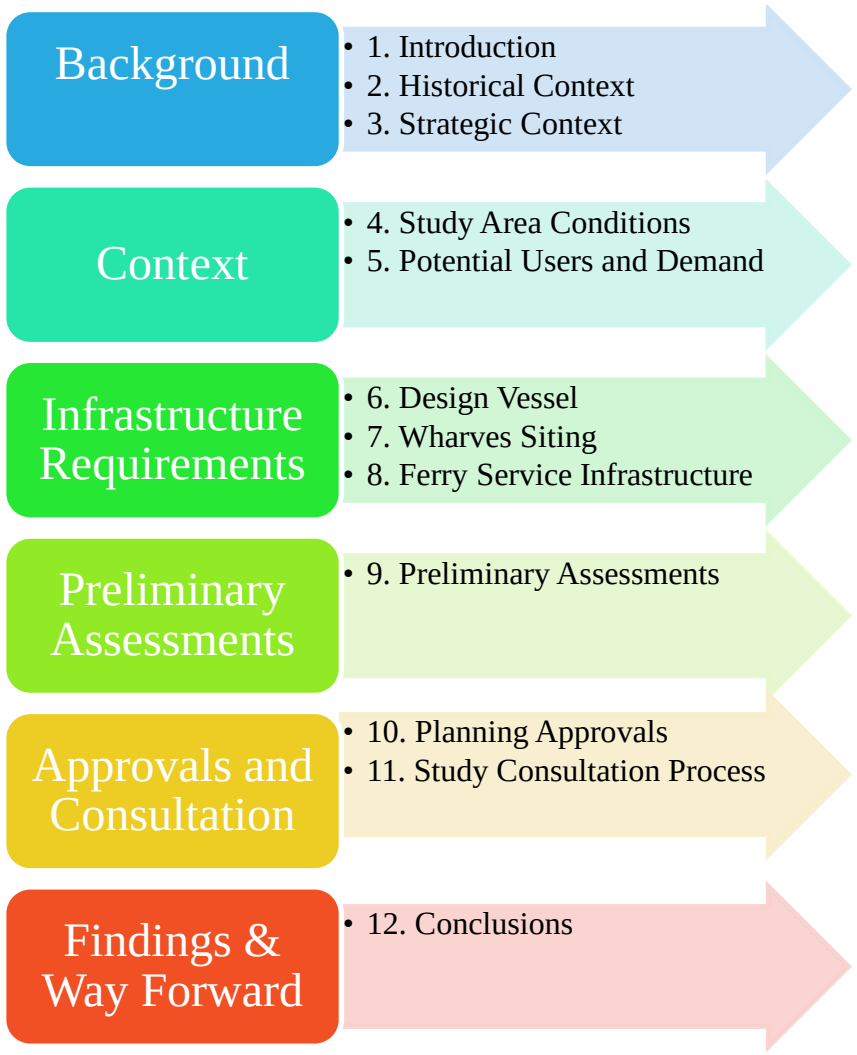


Figure 2 Feasibility study report structure

2 Historical Context

2.1 Historical Ferry Services

The two headlands of Botany Bay have a long history of being served by a public ferry service operating across the heads from Kurnell in the south to La Perouse in the north. The service provided access to the city and the eastern suburbs, as well as providing an affordable day trip activity, popular with families during weekends and holidays. The trip was a short 20 minute crossing.[1]

In 1899 the NSW Government established the Captain Cook Landing Place Reserve at Kurnell. The site was administered by the Lands Department which constructed a wharf. The Fisher family, who operated a boatshed and ferry service from La Perouse, provided services to Kurnell using this wharf[2]. The La Perouse wharf is illustrated in the aerial photograph opposite.

Figure 3 La Perouse ferry wharf circa 1943

Source: Six Maps

[1] Big savings on new ferry at Kurnell, St George & Sutherland Shire Leader, 27 Jan 1965, p3

[2] Ferries and Wharves, Sutherland Shire Environment Centre http://www.ssec.org.au/our_environment/our_bioregion/kurnell/history/services/ferries.htm [accessed 9/10/15]

The services between Kurnell and La Perouse used a variety of ferries over the years. They included the *Camfisher*, later renamed as *Lady Eucumbene*, which had a capacity of 45 passengers[3], *Erina*[4], *James Matra*[5] and the *Kurnell*. The *Kurnell* was built in North Sydney and at the time one of the largest passenger motor boat in the state. It was capable of speeds of up to 12 knots and with a capacity of 150 passengers and 70 foot long. The *Kurnell* commenced in service on March 1913.[6]

The ferry service operated on a split timetable in the latter years, running from 6.15am-10.00am and then an afternoon service between 2pm and 6pm[7].

The ferry service between La Perouse and Kurnell was discontinued in 1959. It restarted 7 years later, finally ceasing in 1974 when both wharves were destroyed by storms.[8]

Figure 4 Old Kurnell ferry shelter

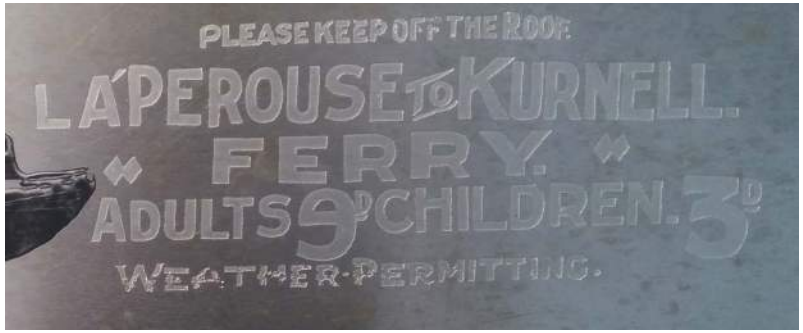


Figure 5 Plaque noting old ferry service

[3] Camfisher/Eucumbene/Lady Eucumbene http://ferriesofsydney.com/camfisher.html [accessed 9/10/15]
[4] Ferries and Wharves, Sutherland Shire Environment Centre http://www.ssec.org.au/our_environment/our_bioregion/kurnell/history/services/ferries.htm [accessed 9/10/15]
[5] Big savings on new ferry at Kurnell, St George & Sutherland Shire Leader
[6] A new ferry boat, The Sydney Morning Herald, 6 March 1913, p5
[7] Big savings on new ferry at Kurnell, St George & Sutherland Shire Leader, 27 Jan 1965, p3
[8] NSW Hansards, 24 June 1998, (p6471-6472) https://www.parliament.nsw.gov.au/prod/parlment/hanstrans.nsf/V3ByKey/LA19980624/$File/ao240698.pdf [accessed 9/10/15]

2.2 Previous Studies

Since the discontinuation of the previous ferry service, various local governments and parts of the community have proposed the re-introduction of the service.

In the late 1990's, a Task Force consisting of local government, the NSW National Parks and Wildlife Service and other community groups formally commissioned a Feasibility Study for reintroducing such as service[9]. Key outcomes of this 1999 study were:

- There was a significant latent demand for such a service for commuters and tourists.
- The preferred site for the new wharves were the locations of the previous wharves at both La Perouse and Kurnell.
- The financial feasibility analysis concluded that, "although not totally and emphatically positive, there is sufficient justification … to support proceeding with the proposed ferry system, at least to the next stage of the process". However, the analysis was relatively sensitive to a number of assumed variables. Also, the analysis assumed that the private sector would finance the wharf infrastructure, and therefore if these costs, "… can be subsidised, or even underwritten by the government, then the project would become more attractive to the private sector". Potential indirect economic benefits to the overall economy were apparently not considered.
- One proviso of the analysis was that the financial viability of a new ferry service was dependent on the development of, "at least one major tourist resort on the peninsula and the expansion of tourist facilities on the southern part of Botany Bay National Park."
- Further studies were recommended to address specific issues raised by that study.

The project did not proceed after this study was published, presumably due to difficulties in securing government and/or private operator support and funding for the ferry service infrastructure.

[9] *La Perouse – Kurnell and Botany Bay Ferry Service, Feasibility Study (Issue 2),* Patterson Britton & Partners (June 1999)

3 Strategic Context

3.1 Regional Boating Plan – Botany Bay, Georges River and Port Hacking Region

This strategic document is one of many Regional Boating Plans for 11 geographical regions within the state developed by Transport for NSW. Through consultation and assessment, The Plan identifies priority projects and actions to keep the waterways of Botany Bay and its upstream tributaries including the Georges River safe, improve accessibility, and enhance the overall boating experience (Port Hacking is also considered although not directly relevant to this study).

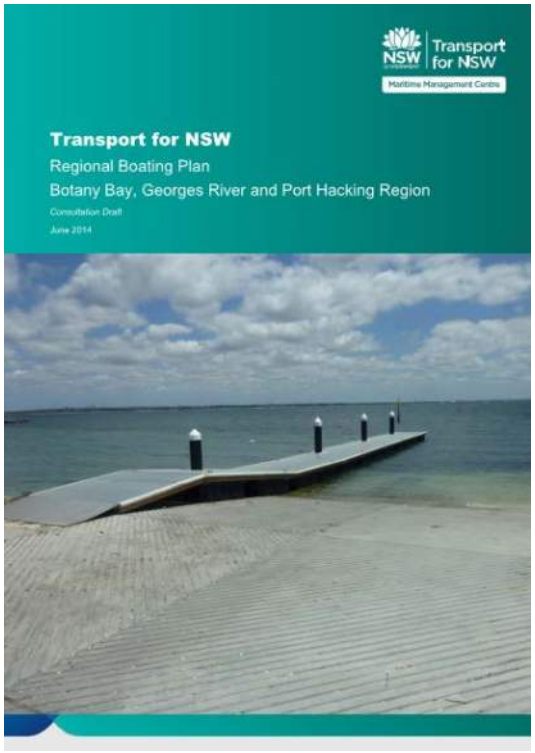
According to 2012 figures, there are approximately 350 commercial vessels based out of Botany Bay or the Georges River. Botany Bay is generally closed to commercial fishing.

Areas of Botany Bay are popular for swimming, personal watercraft riding (e.g. jetskis), kite boarding and windsurfing. The more protected river reaches and bays are popular for passive craft users (e.g. kayaks) and water-skiers. There are numerous marinas and small craft launching areas on the Georges River, although less so within Botany Bay.

The key findings that are relevant to this study are outlined below:

- There are relatively few formal waterway access points in Botany Bay and the Georges River to services the significant catchment population. Most existing access points do not meet demand at peak times, primarily governed by car and trailer parking capacity.
- There are many locations within the region that are popular day trip destinations and supporting infrastructure would enhance the boating experience. The closest formal access point near Kurnell is the Bonna Point boat ramp with limited access at low tide. La Perouse currently does not have a formal access point, with recreational boats visiting the location having to moor offshore. The closest recreational boat ramp and carpark facility on the bay's northern shoreline is along Foreshore Drive between Port Botany and Sydney Airport.

As such, the layout and design of wharf and landside infrastructure to support a potential new ferry services would ideally also consider opportunities for facilitating recreational boat access and use.

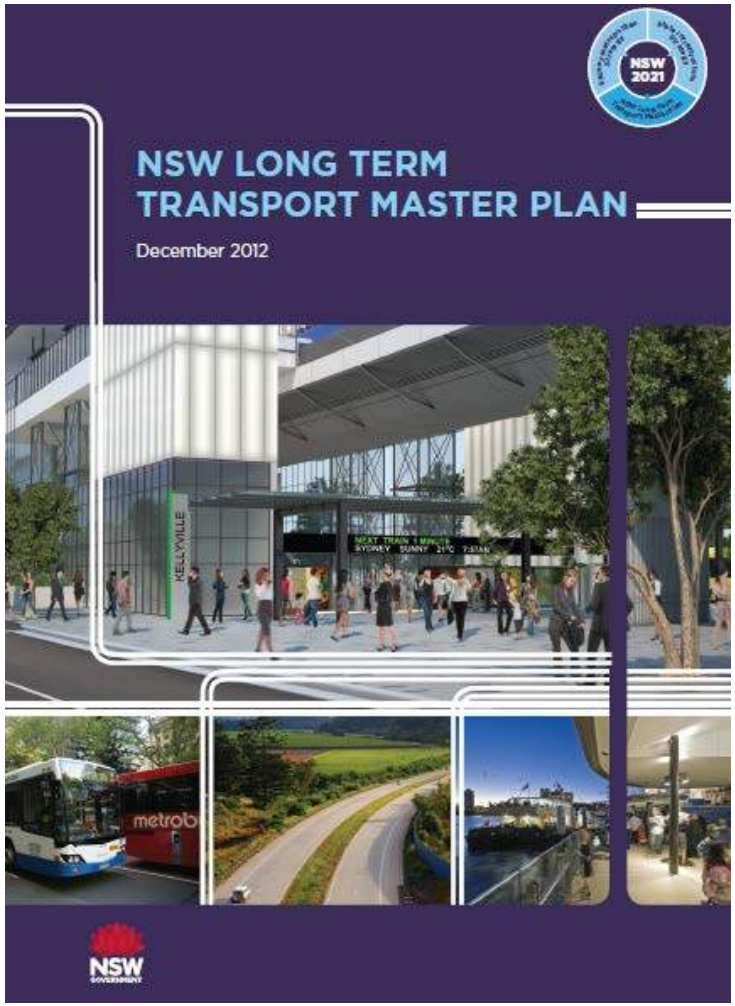


3.2 NSW Long Term Transport Masterplan

The NSW Long Term Transport Master Plan was released in December 2012 and outlines a 20 year plan for the direction of transport services across NSW. The plan presents an integrated approach to transport planning and identifies the roles different modes of transport play in meeting the future needs of the State population. The Master Plan aims to integrate public transport services to maximise future use as well as improve the overall customer experience.

The Master Plan does not make mention of a future ferry service between La Perouse and Kurnell, however it does note the following in relation to ferry infrastructure and services:

- Work with tourism stakeholders to develop the ferry leisure market.
- Plan for long term ferry service, fleet and infrastructure improvements to match population and travel growth.
- Review the ferry network to provide an opportunity for greater integration with bus and rail services.
- Modernise and expand Sydney's ferry fleet to meet new service requirements, including a new fleet procurement strategy.
- Plan to construct a new ferry hub at Barangaroo.
- Increase the number of locations where berthing, mooring and repairing ferries can occur.
- Ferry services pose particular accessibility challenges and infrastructure needs to be upgraded to comply with national disability access standards.
- Ensure ferry services are an efficient and important component of a seamless multi-modal network.



3.3 Sydney's Ferry Future

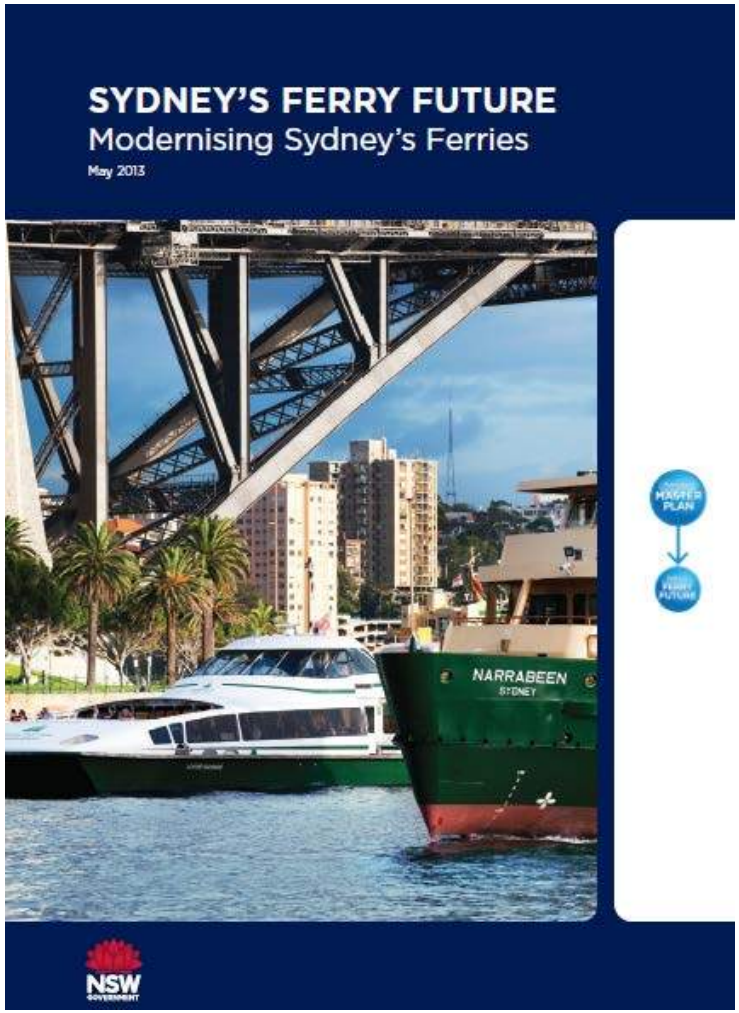
Sydney's Ferry Future outlines the strategy for ferry services over the next 20 years. It builds upon the aims, objectives and actions outlined in the NSW Long Term Transport Master Plan.

The document notes that Transport for NSW considered more than 30 new potential locations to be served by Sydney Ferries. Locations were assessed based on:

- Current and future demand including population and employment catchment.
- Directness of the ferry service in relation to the road alternative.
- Cost of new infrastructure.
- Frequency, cost, travel time and catchment of other modes compared to ferries.

Five locations were recommended for further consideration based on this assessment. Neither La Perouse nor Kurnell were identified for further investigation.

Of relevance to a potential ferry service between La Perouse and Kurnell, the document notes that about one-third of ferry trips on a weekday are for leisure, increasing to nearly three-quarters on weekends. This is much higher than other transport modes and creates high use outside the traditional commuter peak, especially on sunny days and weekends.



3.4 NPWS, Meeting Place Precinct – Conservation Management Plan

The Botany Bay National Park – Kurnell / Conservation Management Plan (2008) has been designed to achieve the long term conservation of the heritage values of the Meeting Place Precinct of Kamay Botany Bay National Park, which includes the shoreline around the historic location of the previous ferry wharf.

The Plan was prepared on behalf of the National Parks and Wildlife Service. It identifies the cultural and natural heritage values of the area and sets out policies to ensure their conservation.

3.5 Kamay Botany Bay National Park Plan of Management

The Kamay Botany Bay National Park Plan of Management (POM) is the primary statutory planning and regulatory document for the lands reserved under the *National Parks and Wildlife Act* at Kurnell and La Perouse. Proposed activities and works within those areas are required to be consistent with the POM.

Originally published in 2002 with draft amendments proposed in 2014, the POM makes provision for facilities for visitor access and enjoyment of the park and it is necessary that infrastructure to support the wharves is consistent with the POM. If specific proposals are not consistent with the existing POM there is a statutory process for amendment.

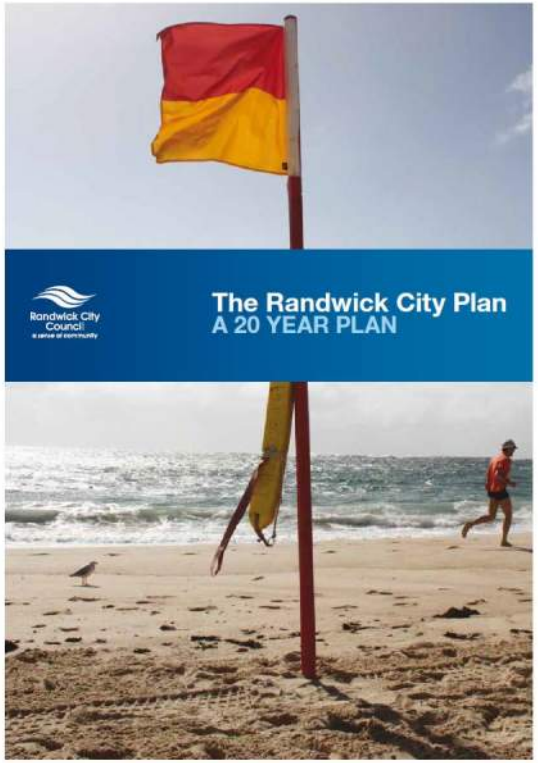
This POM makes reference to the:

- La Perouse Headland Conservation Management Plan (2007).
- Kamay Botany Bay La Perouse Headland and Bare Island Draft Interpretation, Landscape and Architectural Plan 2011.

3.6 The Randwick City Plan

Randwick City Council published their Randwick City Plan in 2006. It is intended to guide the objectives of the LGA for the next 20 years.

Six themes are identified which are leading long term activities: Responsible management (sustainability); A sense for community; Places for people; A prospering city; Moving around (Transport); and Looking after our environment. The first theme, Responsible management, has been added in the revision of the document, issued in 2009.



4 Study Area Conditions

4.1 Land Use

4.1.1 General

La Perouse and Kurnell are located at either side of the ocean entrance to Botany Bay. Other major land uses around Botany Bay are Sydney Domestic and International Airport, Port Botany and the suburb of Brighton-Le-Sands.

4.1.2 Land and Bay Tenure

The seabed of Botany Bay up to the Mean High Water mark is administered by Roads and Maritime Services under the *Transport Legislation Amendment Act 2011*. The potential locations for wharves and associated infrastructure that extend above the Mean High Water Level are a mixture of Crown Land administered by Randwick Council or National Park managed by the NPWS.

4.1.3 La Perouse

The La Perouse peninsula is a major Sydney tourist destination that provides spectacular views of Botany Bay, Bare Island and Kurnell. Open spaces on the peninsula are mown grasslands, beaches and rocky shores, and it contains several historic sites including the Bare Island fortifications, Macquarie Watchtower, Cable Station and La Perouse Museum. Popular activities include sight-seeing, picnics, swimming, diving, angling and walking. The La Perouse museum and several restaurants are located on the peninsula.

The area gives access to multiple surrounding beaches, such as Congwong Beach, Little Congwong Beach and Frenchmans Bay. Figure 6 provides an overview of the points of interest at La Perouse. In the immediate surroundings there is the New South Wales Golf Club to the east and low rise residential areas to the north.

4.1.4 Kurnell

The eastern half of the Kurnell peninsula is included in Kamay Botany Bay National Park. The national park is of international heritage significance as the first meeting place between indigenous Australians and the Cook expedition. Tourist attractions at Kurnell include Cook's landing place, an indigenous soundscape and walk, monuments to Cook, Banks and Solander and a welcome wall from the Dharawal nation. The Penisula is a popular location for whale watching especially in the June/July season.

An Environmental Education Centre is located at Kurnell and brings several thousand school children to the site each year. The site provides facilities for visitors, including extensive grassed areas, picnic tables and a network of walking tracks. It is a particularly popular location for anglers and divers

West of the National Park is the community of Kurnell, which mostly consists of low rise residential areas. The northern-most tip includes several local shops, such as a coffee and ice cream shop, an art gallery and some picnic tables. Figure 7 provides an overview of the points of interest at Kurnell. South of Kurnell is the former Caltex Refinery, which closed down as a refinery in October 2014. Now, the site is used as a fuel import terminal. A one kilometre long berthing facility extends out from the Kurnell shoreline, northwards into the bay.

The crown lands outside of the National Park is managed by Sutherland Shire Council.

Figure 6 Points of Interest - La Perouse

Figure 7 Points of Interest - Kurnell

4.2 Demographics

4.2.1 Population

The surrounding areas of La Perouse is relatively sparsely populated due to large non-residential functions (such as the golf course and the Eastern Suburb Memorial Park) and the low density housing of La Perouse and Phillip Bay. The Kurnell peninsula is also sparsely populated, due to the National Park, other nature reserves on the peninsula and the former Caltex refinery forming most of the land area.

Figure 8 shows the 2011 population distribution of La Perouse, Kurnell and surrounding areas.

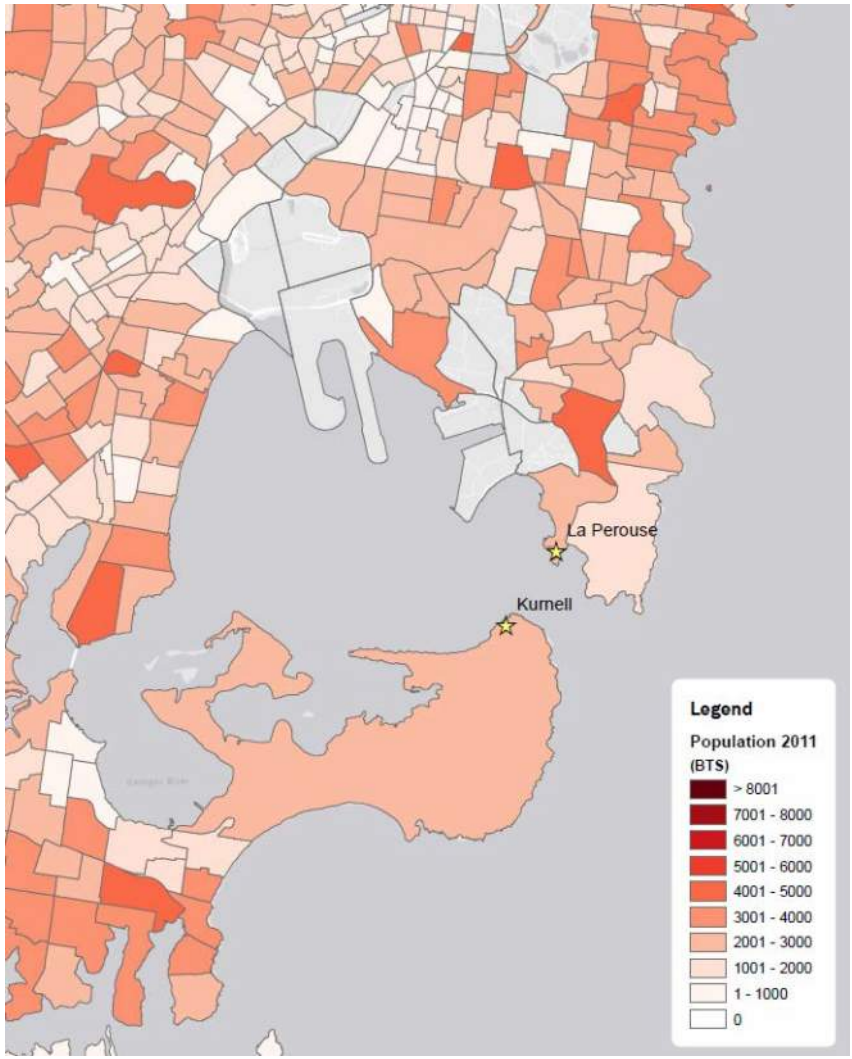


Figure 8 Population distribution in 2011 (Census 2011)

4.2.2 Employment

The area of La Perouse itself hosts relatively little employment, mostly by the restaurants. Large employment centres in the neighbourhood are Sydney Kingsford Smith Airport, the University of New South Wales, and Prince of Wales Hospital.

Employment in Kurnell consists mostly of jobs at the Caltex refinery and small scale industrial/manufacturing land uses. During the conversion to a fuel import terminal, the number of jobs at the refinery will decrease. Other employment consists of shops and other small businesses in Kurnell.

Figure 9 shows the 2011 employment distribution of La Perouse, Kurnell and surrounding areas.

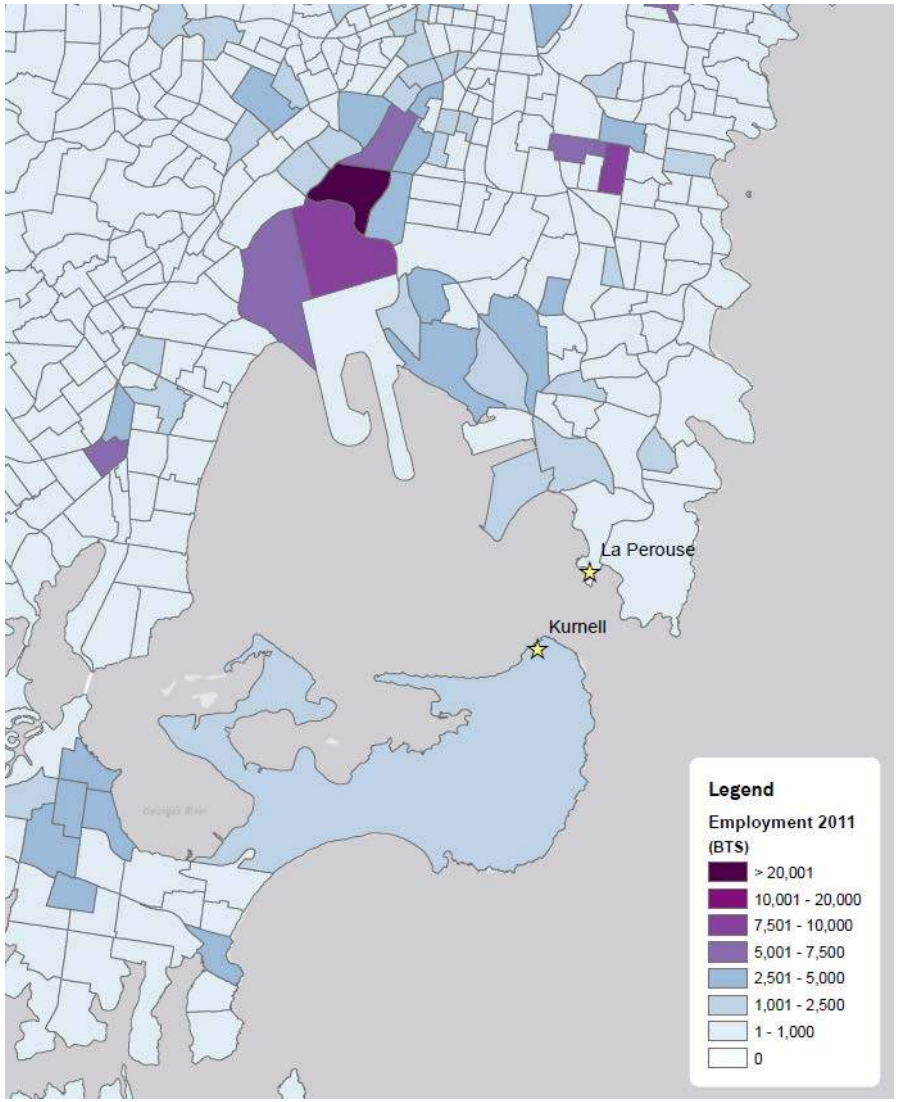


Figure 9 Employment distribution in 2011 (Census 2011). This map includes employment at the Caltex refinery.

4.3 Transport

4.3.1 Road Network

La Perouse is primarily served by Anzac Parade, a road owned and managed by the NSW Roads and Maritime Services which provides access to the eastern suburbs and Sydney CBD. South of Bunnerong Road into La Perouse, Anzac Parade provides a single traffic lane into the site. Within La Perouse itself, a one-way loop road exists which provides access to the various landmarks. The loop road, which runs in a clockwise direction, provides on-street parking on either side of the street.

Captain Cook Drive, which runs from Taren Point through Woolooware and the Caltex Refinery, acts as the main access road into Kurnell. Prince Charles Parade and Polo Street provide local access into Botany Bay National Park and to the existing Caltex Wharf.

Figure 10 Existing road network

4.3.2 Parking

Unrestricted on-street parking opportunities are available at both La Perouse and Kurnell. Demand is typically highest at these locations on weekends (especially in the warmer months) due to the influx of tourists and visitors to the area.

At La Perouse more than 450 on-street spaces are available on the loop road (Figure 11), Anzac Parade and adjacent residential streets. Observations over a number of weekends indicate these spaces are typically occupied during the day, with high demand for spaces resulting in vehicles circulating on roads in the area. This is largely associated with the visitors using the nearby beaches, cafes and restaurants as well as those attending events such as the Blakmarkets on Bare Island every first Sunday of each month. During weekdays demand for car parking is lower and therefore some spare capacity exists.

A mix of on and off-street parking opportunities exist at Kurnell. Approximately 100 on-street spaces are available on Prince Charles Parade and Captain Cook Drive, while a further 100 off-street spaces are available within Kamay Botany Bay National Park. Parking in the National Park attracts a daily fee of $8.

Figure 11 On-street parking – La Perouse

Figure 12 On-street parking – Kurnell

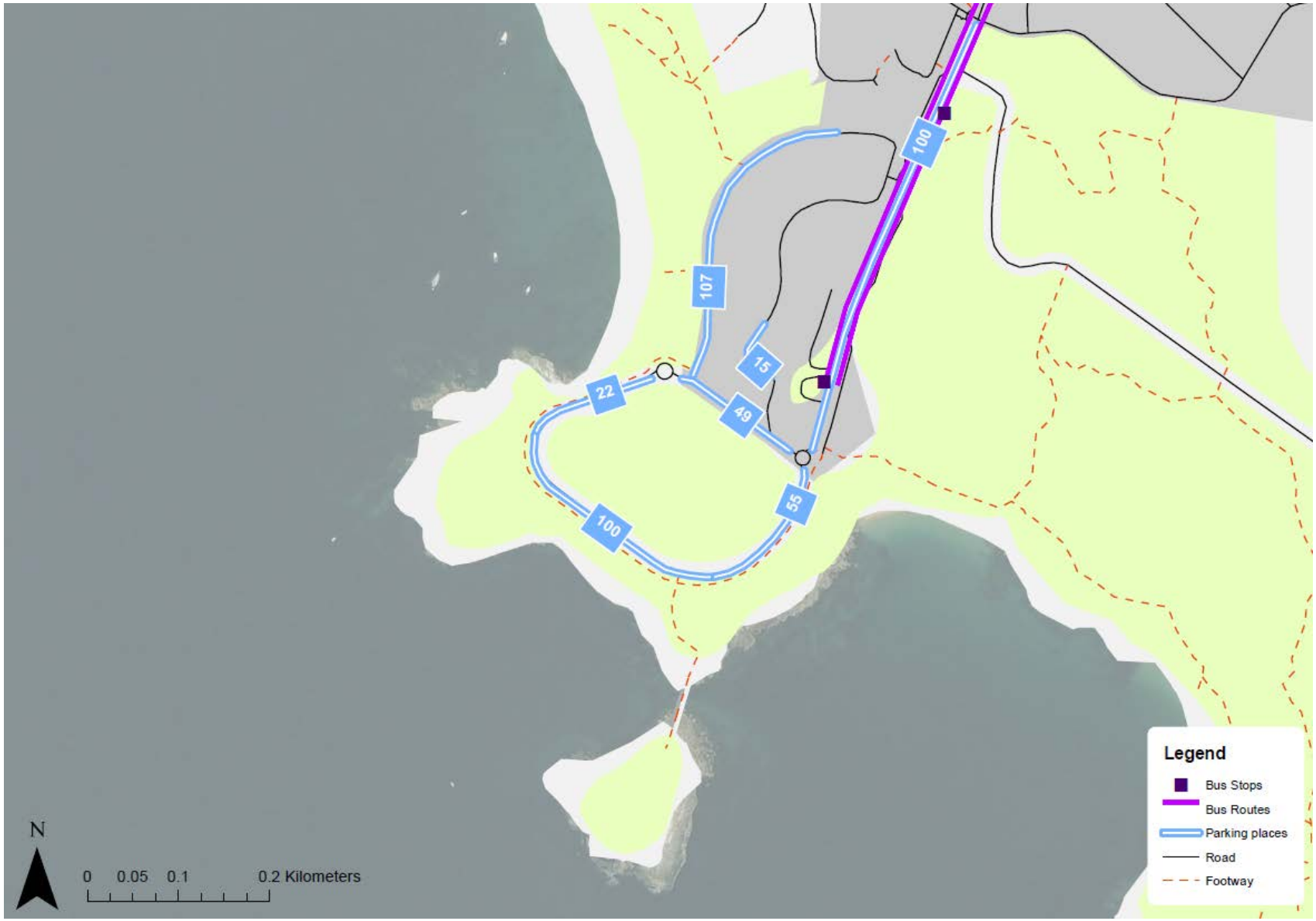


Figure 13 On-street parking capacity – La Perouse

Figure 14 On-street parking capacity – Kurnell

4.3.3 Public Transport

La Perouse is currently served by a number of different bus routes, those being:

- 391 (to Matraville, Kingsford and CBD via Bunnerong Road).
- 393 (to Maroubra, Kingsford and CBD via Anzac Parade).
- 393 (to Maroubra, Kingsford and CBD via Anzac Parade).
- 394 / X94 / L94 (to Maroubra, Kingsford and CBD via Anzac Parade).
- 399 (to Malabar, Maroubra, Kingsford and CBD via Anzac Parade).

These services typically operate at 15 minute intervals during commuter peak hours, however less frequently on weekends at half hour intervals. The bus stop at La Perouse is located just north of the loop road on Anzac Parade, where buses commence and terminate their routes.

Kurnell is served by a single bus route, the 987, which provides a connection to Cronulla railway station via Captain Cook Drive. Services are relatively infrequent, running every hour during weekdays and weekends. The bus stop is located on Polo Street adjacent to the vehicle entry to Botany Bay National Park.

Figure 15 Existing bus stop at La Perouse

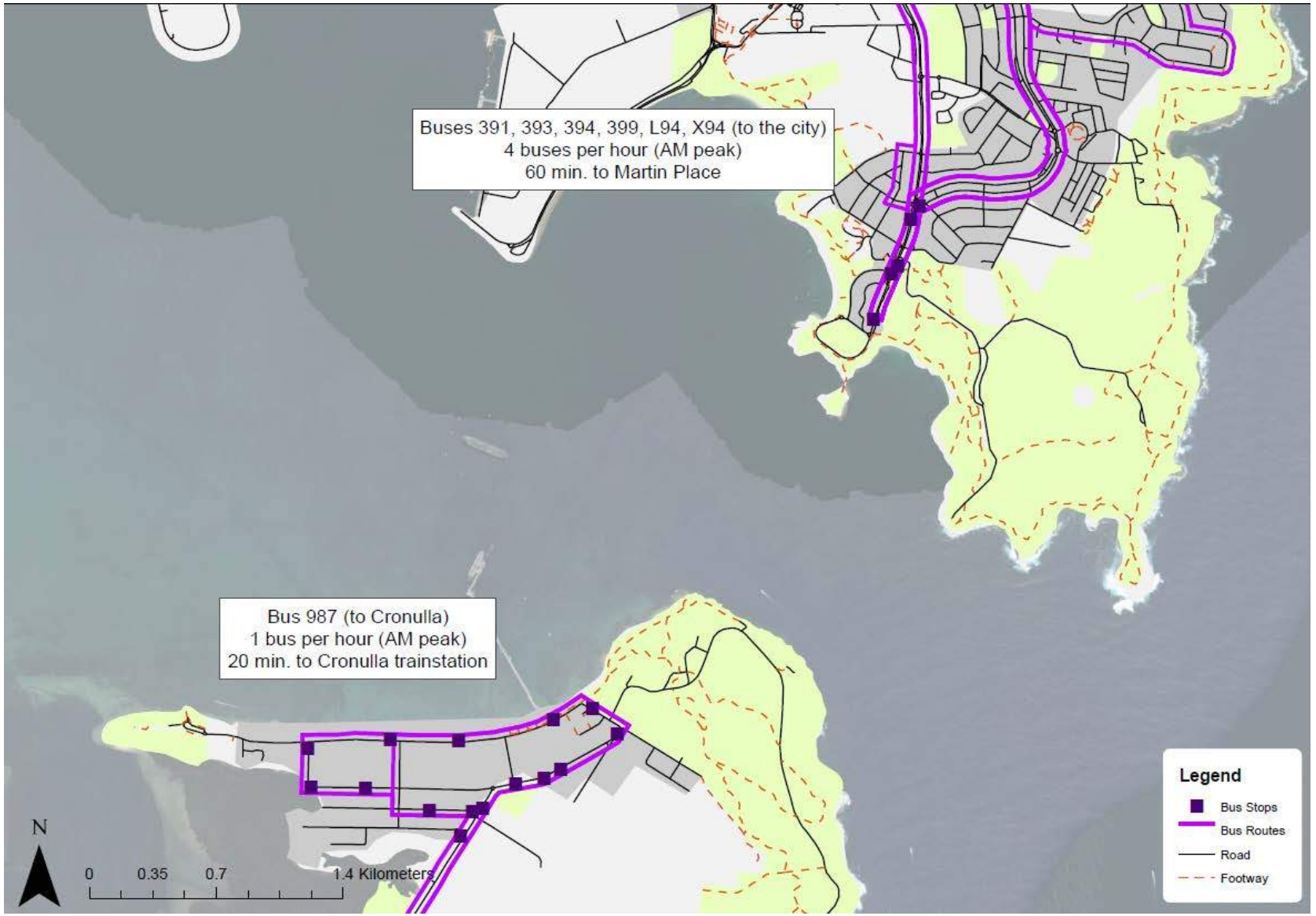


Figure 16 Public transport network

4.3.4 Walking and Cycling

A shared pedestrian and bicycle path (Figure 17) is located along Anzac Parade which provides access to and within the La Perouse area. This shared path extends north along Bunnerong Road towards Foreshore Road. A footpath is provided on one side of the loop road which has sufficient capacity to accommodate pedestrian demand during busy periods. This footpaths provides good, direct access to the local shops as well as the nearby bus stop. A number of walking tracks are available nearby which provide connections into Botany Bay National Park as well as north along the coast towards Malabar.

The Botany Bay Trail Master Plan (prepared for the Southern Sydney Regional Organisation of Councils) provides for a long term shared, largely continuous pathway along the Botany Bay foreshore between Phillip Bay/La Perouse to Kurnell.

At Kurnell a network of footpaths exists along Prince Charles Parade and into Botany Bay National Park. No footpath is currently provided on the eastern side of Polo Street which restricts access for some users to the nearby bus stop.

A series of paved paths and walking tracks exists within the National Park itself, including a wide path adjacent to the coastline (Figure 18) and a walkway into the Visitors Centre.

Figure 17 Shared pedestrian / cycle path – La Perouse

Figure 18 Pedestrian path - Kurnell

4.4 Cultural Heritage

4.4.1 Non-Indigenous Cultural Heritage

4.4.1.1 National Heritage Register

There are currently two places of National Heritage significance located within the study area:

1. Kurnell Peninsula Headland (National Heritage Place ID 105812).
2. Kamay Botany Bay (Nominated National Heritage Place ID 106162).

Further details on these two places of national significance can be found on Figure 20 and **Appendix A** [10].

The Kurnell Peninsula Headland is listed on the National Heritage Register as the site where Lieutenant (later Captain) James Cook first set foot on Australian soil in 1770.

The landing site is marked by a monument, as illustrated in Figure 19. Whilst exploring the area, contact with the aboriginal inhabitants of the peninsula was made with Cook's journal making the following observation:

"I thought that they beckoned us to come ashore, but in this we were mistaken, for as soon as we put the boat in they again came to oppose us I fired a musket between the two which had no effect one of them took up a stone and threw at us".

Figure 19 Monument at the location of Captain Cook's landing

It should also be noted that the Australian Heritage Council (AHC) is presently assessing the possibility of listing the Kamay Botany Bay National Park (North and South) and Towra Point Nature Reserve (within Sutherland Shire) on the National Heritage List.

[10] Artefact, (2016), *La Perouse to Kurnell Ferry Service – Aboriginal and Historic Heritage Constraints Analysis*.

Figure 20 National Heritage Register Items in study area (source: Artefact)

4.4.1.2 State Heritage Register

There are currently five State Heritage Registered items listed items of National significance are located within the study area:

1. Chinese Market Gardens (SHR ID 012999).
2. La Perouse Mission Church (SHR ID 01893).
3. Bare Island Fort (SHR ID 00978).
4. Kamay Botany Bay National Park (North and South) and Towra Point Nature Reserve (SHR ID 01918).
5. Prince Henry Site (SHR ID 01651).

These five heritage items are further described in Appendix A. Kamay Botany Bay National Park and Towra Point Nature Reserve are listed on the State Heritage Register as a rare place demonstrating the continuous history of the occupation of the east coast of Australia. In addition to being the first landing point of Captain Cook, it is also significant for its historical association with European explorers including Joseph Banks, Daniel Solander, Compte De Laperouse, Pere Receveur and Joseph Lepaute Dagelet. It is also associated with the First Fleet and the first Governor of NSW, Arthur Phillip.

The La Perouse part of the National Park provides evidence of the history of French exploration in the Pacific in the late 19th century and continues to have ongoing cultural associations with the French community today. The La Perouse Headland contains significant European historical items including the Macquarie Watchtower, Laperouse Monument, Pere Receveur's grave, the Cable Station, the Coast Cemetery, fortifications and the site of the Happy Valley Settlement which was a collection of shacks erected during the Depression years.

The southern section contains a number of monuments and memorials to Cook, the botanist Solander, Sir Joseph Banks and Forby Sutherland. A stream that flows to the bay near the landing place is also important as the place where Cook restocked fresh water supplies and has high archaeological potential.

Both the northern and southern sections of the park also contains a large number of sites relating to the pre-contact history of indigenous people, including rock engravings, shell middens, burial sites, a bora ring, birthing tree and other items.

Bare Island and the causeway joining it to the mainland are listed separately on the State Heritage Register. It holds significance as an almost completely intact example of late nineteenth century coastal defence technology.

Figure 21 shows correlation of State heritage register items in relation to the project study area.

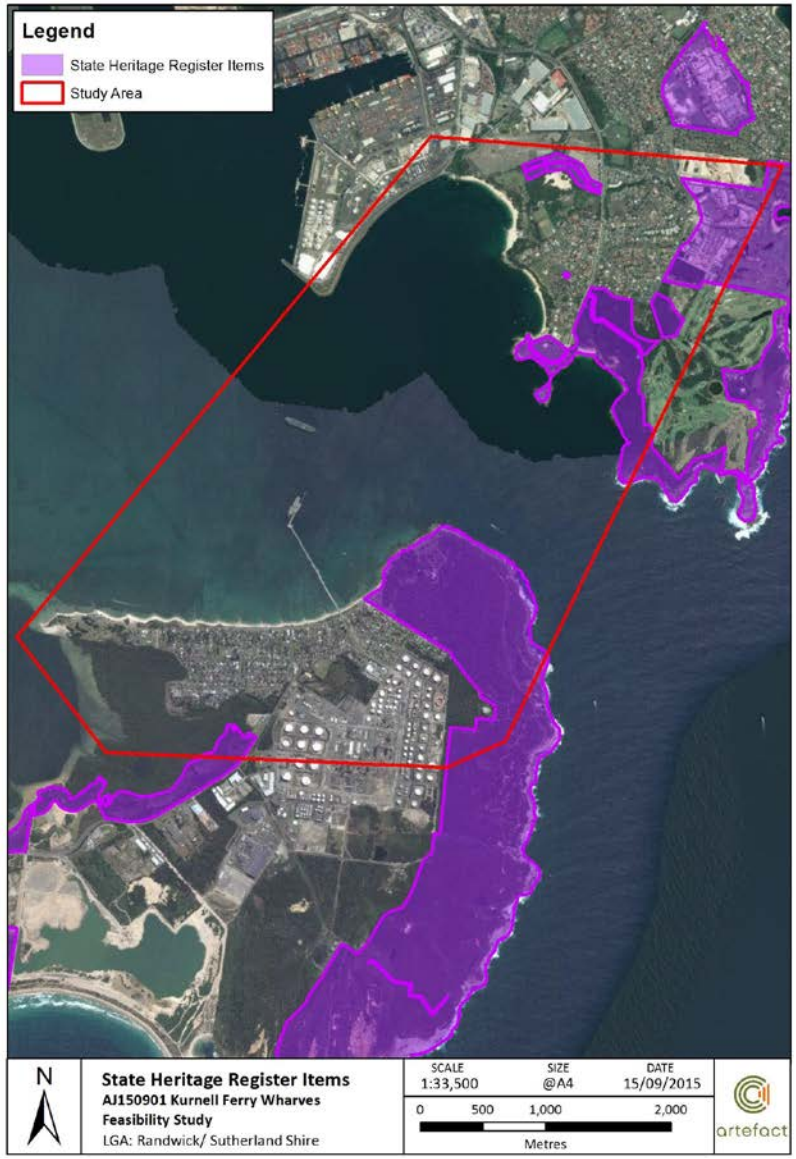


Figure 21 State Heritage register items in study area (source: Artefact)

4.4.1.3 Local Heritage Register

There are 21 heritage items located within the study area listed on the Sutherland Shire Local Environment Plan 2015 and Randwick Local Environment Plan's. These items are listed in Appendix A.

Three heritages listings on the Randwick LEP (2012) are located within 500 metres of the study area:

1. Long Bay Correctional Centre (Randwick LEP 2012 listing 18670), located approximately 200 metres north of the study area.
2. Eastern Suburbs Crematorium (Randwick LEP 2012 listing 15794), located approximately 100 metres north of the study area.
3. Pioneers Memorial Park, Botany Cemetery (Randwick LEP 2012 listing 15795), located approximately 50 metres north of the study area.

There are no heritage listings on the Sutherland Shire LEP are located within 500 metres of the study area.

Figure 26 shows location of local historical heritage items in relating to the project study area.

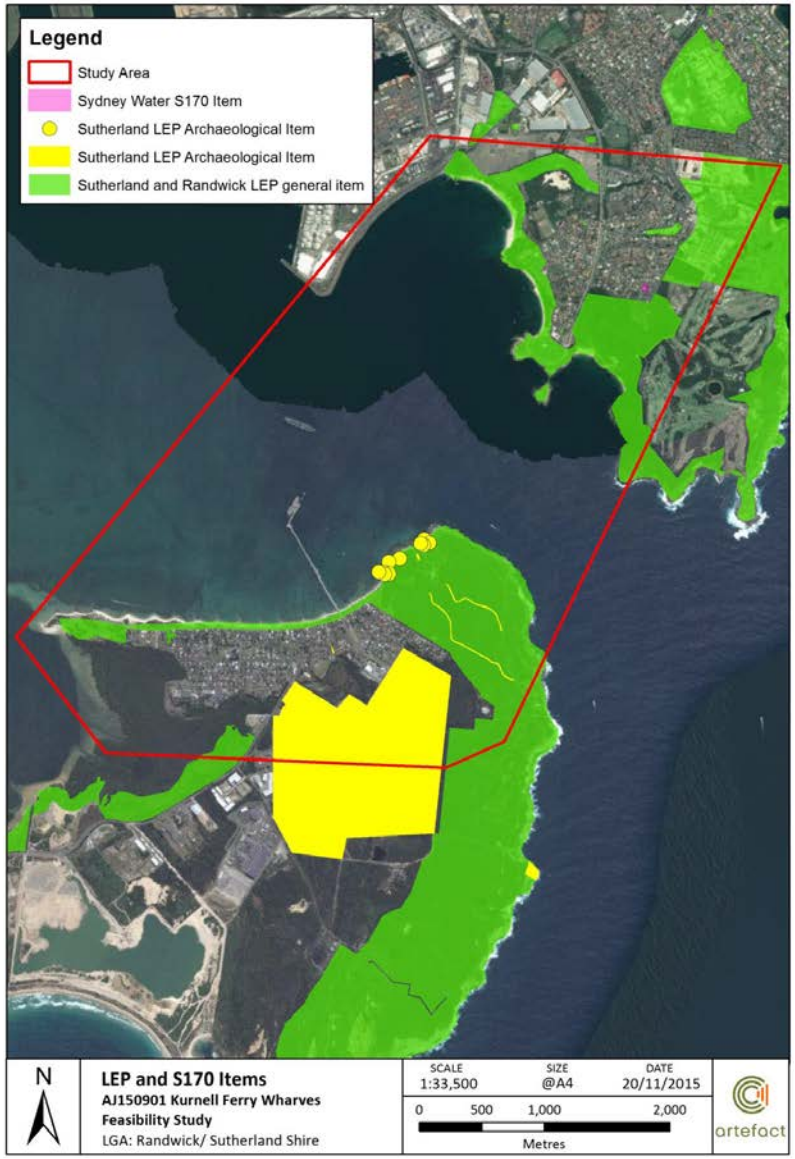


Figure 22 Local historic heritage items in study area (source: Artefact)

4.4.1.4 Matters of National Environmental Significance

National Heritage places are considered a Matter of National Environmental Significance (MNES), and should the project be likely to have a significant impact on the heritage values of the listing, referral to the Federal Department of Environment (DoE) under the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) would be required. A significant impact is considered to include:

- Construction of buildings, roads or other structures, vegetation clearance, or other actions with substantial and/or long term impacts on relevant values.
- Introduce noise, odours, pollutants or other intrusive elements with substantial and/or long-term impacts on relevant values.
- Permanently remove, destroy, damage or substantially disturb archaeological deposits or artefacts.
- Construction of buildings or other structures within, adjacent to, or within important sight lines of, a National Heritage place which are inconsistent with relevant values.
- Restrict or inhibit the continuing use of a place as a cultural or ceremonial site causing its values to notably diminish over time.
- Alter the setting of a place in a manner which is inconsistent with relevant values.

Under Section 60 of the Heritage Act 1977, approval from the NSW Heritage Council will be required if works will involve the disturbance or excavation of any land that is likely to contain archaeological material. An approval to carry out activities to a place listed on the State Heritage Register may also be needed for any works, particularly at Kurnell. The application should be accompanied by a Statement of Heritage Impact.

Providing that the wharf at Kurnell (or associated infrastructure) does not have a visual impact on site lines to the Captain Cook monument, the provision of better access to the area would be considered to enhance the national heritage values of the area and should not be a constraint to the project. Landside infrastructure would also have to be positioned to avoid any known archaeological areas of significance.

4.4.2 Aboriginal Heritage

Both La Perouse and Kurnell sides of Botany Bay are of very high significance to local Aboriginal communities. The Kurnell site is of significance at a national level to Aboriginal communities as the site of first dispossession. The entirety of the study area is situated within the boundaries of the La Perouse Local Aboriginal Land Council (LPLALC). Elders and the LPLALC have critical roles in assessing the appropriateness of any proposals involving the two sides of the bay.

The Office of Environment and Heritage Aboriginal Heritage Information Management System contains details of Aboriginal objects and places in NSW. The Appendix A identifies a number of sites of interest within the study area including a potential archaeological deposit (Kurnell), burial sites (Kurnell), middens, artefacts and rock art (La Perouse).

The National Parks and Wildlife Service undertook targeted archaeological surveys at Kurnell in 2007 (Context, 2008) to assist in determining a site for potential visitor facilities. Excavations were undertaken near the freshwater stream and the former wharf, amongst other locations.

It found that the majority of the monument area has high aboriginal archaeological potential, with numerous items having been located in the past. Much of the area remains untested; any excavations within this area (including the foreshore edge and coastal waters) will require archaeological investigations to be undertaken prior to disturbance. Consultation with aboriginal groups will also be necessary to help guide decisions about siting and design of infrastructure.Ecology

4.5 Ecology

4.5.1 Protected Areas

Botany Bay includes a number of areas that are recognised as having exceptional natural heritage values. The internationally listed Towra Point Ramsar Wetlands are located approximately four kilometres from the heads of Botany Bay.as illustrated in Figure 23. There are three Aquatic Reserves inside and near the bay, at Towra Point,Cape Banks and Boat Harbour. The Kurnell and La Perouse foreshore areas are gazetted as part of Kamay Botany Bay National Park.

Figure 23 Towra Point Ramsar Wetland (Source: National Parks and Wildlife Services)

4.5.2 Terrestrial Flora

4.5.2.1 General

The original vegetation within the immediate study area around potential wharf sites has largely been cleared, although some patches remain within the Kurnell section, which has significant mature landscape plantings, mostly of native species. Both the Kurnell and La Perouse sections of the study area are bordered by heavily vegetated sections of Kamay Botany Bay National Park.

4.5.2.2 Ecological Communities

The Kurnell Dune Forest, is listed as an Endangered Ecological Community under the NSW *Threatened Species Conservation Act 1995*; it is not listed at a national level. It is described as a low open sclerophyll forest community with a distinctive moist forest component in its flora. It occurs only within the local government areas of Sutherland and Rockdale, with major occurrences found at the Kurnell Peninsula and the Leo Smith Reserve. Threats to its survival include habitat loss and fragmentation, weed invasion, physical damage from access by people and vehicles, fire and inappropriate plantings (OEH, 2015).

An endangered Ecological Community (Coastal Upland Swamps in the Sydney Basin Bioregion) listed at both National (under the *Environmental Protection and Biodiversity Act 1999* (EPBC Act)) and State levels is also recorded within the study area at La Perouse. It is described as open graminoid heath, sedgeland and tall scrub, associated with periodically waterlogged soils on the Hawkesbury sandstone plateaux. This community is associated with a number of threatened species, including the Green and Gold Bell Frog, of which records exist within the study area. The community does not occur within the likely area of disturbance however.

4.5.2.3 Flora species

The Atlas of NSW Wildlife (accessed 29th September, 2015) records 850 native plant species as occurring within the study area, although there is only one recording of an (Endangered, Vulnerable or Near Threatened (EVNT) species as defined by the *Threatened Species Conservation Act 1995* within close proximity to the likely area of disturbance. There is a singular record of the Magenta Lilly Pilly (*Syzgium paniculatum*), which is listed as Endangered at a State level, and is also listed as Vulnerable under the EPBC Act. Given the heavy disturbance to the study area, it is unlikely, but possible that further isolated EVNT species are present and may be disturbed by works.

Although not legislatively listed, the Conservation Management Plan for the Kurnell region of the study area refers to a number of historic plantings which have heritage significance. These include:

- Plantings situated between Alpha House and the freshwater stream planted by the Royal Botanic Gardens.
- Flax plants within scrub on sand stone vegetation east of commemoration flat.
- The mature African Olive (Olea Africana) to the west of the Cook Obelsik.

Historical plantings are illustrated on Figure 24.

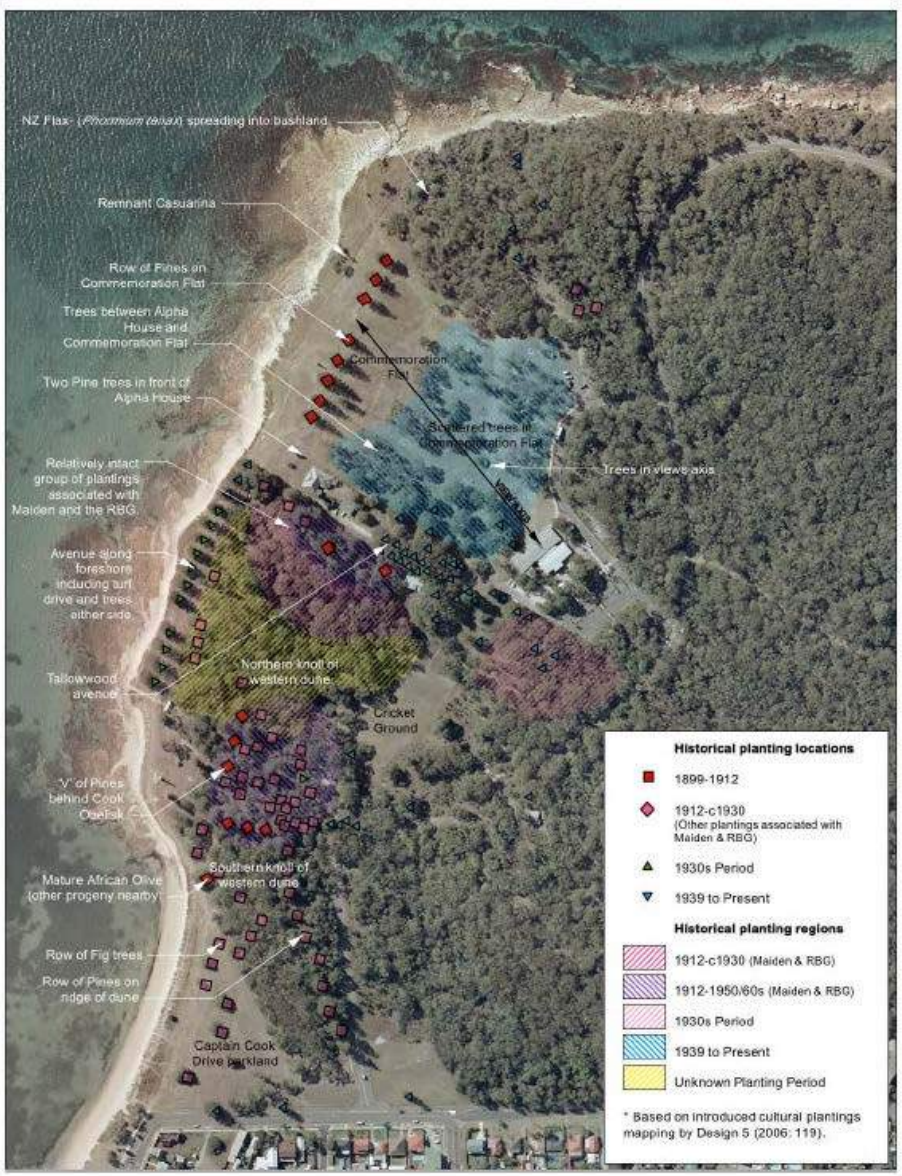


Figure 24 Cultural Vegetation plantings (Context, 1997)

4.5.3 Terrestrial Fauna

The Atlas of NSW Wildlife Records (accessed on 29th September, 2015) records the threatened fauna listed in Table 1 as having been observed within the study area, almost entirely at Kurnell.

The only threatened fauna species that is likely to occupy the disturbed habitat within the immediate study area is the Sooty Oystercatcher. This species forages on rocky shores and is regularly seen on both sides of the bay. It nests on offshore islands and the areas within the study area represent a very small portion of the available local foraging habitat.

The shoreline may provide occasional habitat for some migratory bird species, although there were no roosting or breeding sites identified in a site visit, ecological databases or in discussions with the NSW National Parks.

Table 1: Listed terrestrial fauna species within the study area

Common Name	Scientific Name	NSW Status	Commonwealth Status	Observations
Avifauna				
Sooty Oyster Catcher	*Haematopus fuligninosus*	Vulnerable	-	Several observations along the shoreline at Kurnell
Powerful Owl	*Ninox strenua*	Vulnerable	-	3 records between 1995 and 1997 at Kurnell
Mammals				
Grey-headed Flying Fox	*Pteropus poliocephalus*	Vulnerable	Vulnerable	4 records between 2007 and 2010 at Kurnell
Eastern Bentwing Bat	*Miniopterus schreibersii*	Vulnerable	-	1 record in 2010 at Kurnell
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*	Vulnerable	-	1 record in 2000 at Kurnell
Amphibians				
Green and Golden Bell Frog	*Litoria aurea*	Endangered	Vulnerable	1 record in 1997 in Kurnell and 1 record at La Perouse in 1950.

4.5.4 Aquatic Ecology

Botany Bay supports extensive seagrass beds and intertidal mangrove stands, which play an important role in supporting aquatic wildlife in the Bay. Seagrass beds are present within the study area, with sizable patches of *Posidonia australis* beds at Kurnell and *Halophila spp*. off Frenchman's Bay at La Perouse. Seagrass beds off the Kurnell foreshore have been previously disturbed by a number of construction activities including construction of the Caltex refinery jetty and electricity cables.

The beds of *Posidonia australis* may form part of the EPBC-listed Endangered Ecological Community *Posidonia australis seagrass meadows of the Manning-Hawesbury ecoregion* which was listed earlier this year by the Department of Environment (DoE). This ecological community is also listed as endangered under the NSW *Fisheries Management Act 1994*. P. Australis is a slower growing species of seagrass, and can be slow to recover from damage. A condition survey would be required to confirm whether this patch would meet the criteria for inclusion in the listing (e.g. percent coverage and shoot density). The *Approved Conservation Advice for Posidonia australis seagrass meadows of the Manning-Hawkesbury ecoregion ecological community* (DoE, 2015) recommends that a buffer zone of 50m is enforced to protect seagrass beds from activities such as boat moorings and propeller wash.

The Botany Bay Cable Project Environmental Assessment (Energy Australia, 2009) describes eight main habitat types across the Bay which support approx. 229 fish species. The Bay is primarily a fish nursery area, with juveniles accounting for two-thirds of the commercial and recreation catches. A number of whale and dolphin species are known to occur, and the Bay also provides habitat for migratory birds, particularly at Towra Point, which is listed as internationally significant wetland under the RAMSAR Convention.

The Cable Project EIA reports that surveys conducted at Silver Beach off Kurnell did not identify significant use of the area by migratory birds, which does not provide suitable roosting areas.

A search of the EPBC Protected Matters Database identifies a number of Listed Threatened Species as potentially occurring within the marine environment of Botany Bay within the study area. These include the Black Rockcod (*Epinephelus daemelii*), Humpback Whales (*megaptera novaeangliae*) and a number of turtle and shark species. The majority of these species would be expected to be occasional visitors to the study area and there are no known breeding or roosting sites within the vicinity of works.

Direct impacts to the study area's ecology are mostly confined to the marine environment, although there is potential for some minor works on land at the jetty interface and to provide access e.g. pathways, car parks. A ferry service operated between La Perouse and Kurnell historically, although the jetties are believed to have been damaged during a storm and subsequently removed in the 1970's. If technically feasible, it would be beneficial to locate infrastructure within the footprint of these previously disturbed areas to avoid additional impact.

Dependant on final siting of the wharf infrastructure at Kurnell and La Perouse, direct and indirect impacts on seagrass are possible, including the direct loss of potentially threatened ecological community and also the indirect impact resulting from sedimentation arising from construction piling and boat propeller wash or a deterioration of water quality as a result of spills.

There is a low risk that a ferry collision or grounding could cause a fuel spill to Botany Bay during crossings, having an impact on marine fauna. There is also a low risk of a ferry striking marine fauna, particularly less visible or species such as turtles. There have been recorded incidences of ferries striking whales in Sydney Harbour, including one in 2012. Placing speed controls on vessels and training staff as spotters during whale season can significantly reduce this risk. The preparation and implementation of an operational environmental management plan and emergency response plan will assist in reducing the risk of these events occurring and reduce the impact in the event that it does occur. There have been incidents with ferries in the past in Sydney Harbour, and the risk cannot be completely eliminated however. Given the amount of boat traffic (including large container vessels from the Botany Port) that already occurs in Botany Bay the introduction of a ferry service is not expected to increase the risk of indirect impacts to wildlife occurring.

The footprint of disturbance for landside infrastructure is expected to be minimal, and should be easily accommodated within existing cleared areas. Therefore no significant impact on terrestrial ecology values are anticipated. Should landscaping be installed as part of the project, there is an opportunity to utilise native species of the area to increase habitat values.

4.6 Shoreline Form and Geology

Within the study area on both sides of the bay the shoreline is generally characterised by rocky shallow platforms exposed at low tide (refer Figure 25 and Figure 26). The exception are the stretches of marine sands forming the beaches of Silver Beach to the west of the Kurnell National Park, and Frenchman's Bay and Yarra Bay on the La Perouse side of the bay.

Figure 25 Shoreline at La Perouse side of bay at southern end of Frenchman's Bay showing rock platform at heads with stretch of marine sands forming the beach in background.

Figure 26 Shoreline at Kurnell side of bay within National Park showing rock platform with overlaying marine sands.

The Sydney region Geological Map[11] identifies the rock geology in the study area as Hawkesbury Sandstone described as medium to coarse-grained quartz sandstone with minor shale and laminite lenses.

A more detailed geotechnical site survey of the study area would likely be required to inform later design stages of the project, particularly near proposed wharves.

[11] NSW Department of Primary Industries – Mineral Resources (1983), 1:100,000 scale.

4.7 Coastal Conditions

4.7.1 Seabed Levels

The bathymetry (seabed surface level profile) along the coastline within the study area is an important consideration for selecting wharf locations and the required approach jetty length for safe vessel access. The Navigation Chart AUS198 Botany Bay and Port Hacking provides sufficient bathymetric information to draw upon for this study. A more detailed hydrographic survey of the study area would likely be required to inform later design stages of the project, particularly near the proposed wharves.

At the Kurnell side, the seabed gradient offshore generally becomes shallower moving from Sutherland Point towards the Kurnell Refinery wharf with the low tide 2m contour approximately 300m and 75m from the shoreline respectively). At the La Perouse side, the seabed drops relatively more steeply around Congwong Bay and the heads of Astrolabe Cove, with the gradient becoming more shallow around to Frenchman's Bay beach.

4.7.2 Water Levels

Tidal plane levels within Botany Bay are presented in Table 2:

Table 2 Astronomical Tidal Plane Levels at Port Botany, Sydney[12]

Tidal Levels	(m CD[1])	(m AHD)
Highest Astronomical Tide (HAT)	2.10	1.17
Mean High Water Springs (MHWS)	1.60	0.67
Mean High Water Neaps (MHWN)	1.40	0.47
Mean Water Level (MWL)	1.00	0.07
Mean Low Water Neaps (MLWN)	0.60	-0.33
Mean Low Water Springs (MLWS)	0.40	-0.53
Lowest Astronomical Tide (LAT)	0.00	-0.93

1. Chart Datum (CD) approximates to LAT and is 0.925m below Australia Height Datum (AHD).

The 100 year Average Recurrence Interval (ARI) extreme water level is predicted to be 2.37mCD (1.45m AHD), which incorporates storm surge but excludes wave setup[13].

For a typical design life of the wharf structures of 50 years, an allowance for predicted future sea level rise is recommended to be considered in the design of approximately 0.4-0.5m[14].

4.7.3 Waves and Currents

The wave climate is an important consideration for the choice of vessels and wharf infrastructure required for the ferry service.

In accordance with design guidance (AS 4992 Maritime Structures), the structural design of the wharf infrastructure would typically need to be designed to withstand up to a 200 year extreme storm event (ultimate condition). The wharf would also need to consider more-regular wave and current operational conditions to ensure adequate

[12] Australian National Tide Tables, 2015

[13] Watson P.J and D.B Lord (2008), *"Fort Denison Sea Level Rise Vulnerability Study"*, a report prepared by the Coastal Unit, NSW Department of Environment and Climate Change

[14] Based on the NSW State Government Sea Level Rise Policy Statement (2009) and the latest CSIRO and IPCC guidance.

availability for safe and functional berthing, mooring and boarding (serviceability condition). Waves affecting the study area consist of a combination of long-period swell waves generated from the ocean entering the heads of Botany Bay, and shorter-period, locally wind-generated waves within the bay.

Based on a high level 1D wave hindcasting analysis using establish industry methods, Arup predicts that extreme wind waves at the coastline within the study area could potentially reach between 0.5m and 1m significant wave height (H_s[15]) with peak wave period (T_p) of around 1-3 seconds. This aligns with estimates from previous wave climate studies in Botany Bay.

The most significant direction of swell waves approaching the heads of Botany Bay in terms of magnitude is from the south-easterly direction. Offshore of Botany Bay, extreme offshore significant wave heights can reach up to 8-9m. However, through refraction and wave breaking the swell waves penetrating the heads dissipate rapidly towards the La Perouse and Kurnell shorelines of the bay. Within the study area for the potential wharf locations considered, extreme swell waves could potentially reach significant wave heights of up to around 1-2m, and with a much higher peak wave period than for wind-generated waves (i.e. in the order of 6-12 seconds).

Along the ferry transit route between La Perouse and Kurnell the water surface can become very rough due to its direct exposure to swell waves entering the bay. The 1999 Feasibility Study estimated that a ferry service could experience in the order of 10% downtime as a result of high wave activity between the heads.

A more detailed wave climate assessment, likely involving project-specific numerical wave modelling, will be required to inform the next stages of this project should it proceed further, in particular for the wharf structures design.

Currents in Botany Bay and within the study area are predominantly tidally driven and are relatively small with a velocities less than 0.5 m/s magnitude.[16]

4.7.4 Sediment Transport & Coastal Stability

Most of the shoreline of Botany Bay has formed over the last 10,000 years of the Holocene period during a period of sea level rise. Relative to that period, the sea level is now stable. However, natural changes to some nearshore areas continue and are caused by storm waves, especially when they occur during periods of higher water level.

Within the study area, although the majority of Silver Beach has experienced shoreline instability requiring protection from storm erosion by the installation of rock groynes, the more naturally protected eastern end near Captain Cook's Landing Place remains in a more natural state. Similarly, the beach of Frenchman's Bay is also considered to be relatively stable from storm erosion[17]. Yarra Bay has previously experienced some shoreline instability as a result of the 3rd airport runway and Port Botany constructions, however the beach is now relatively stable following coastal improvement works.

[15] *Significant wave height (H_s)* is equivalent to the wave height corresponding to the average of the upper 1/3 of waves in a storm event. Individual waves in a storm event can be of greater height up to between 1.4 and 1.6 x H_s.

[16] *Energy Australia's Proposed Botany Bay 132kV Cable Project – Wave and Hydrodynamic Issues* (Cardno, 2007)

[17] Kurnell Refinery Port and Berthing Project EIS (Cardno, 2013)

5 Potential Users and Demand

5.1 General

A ferry service between La Perouse and Kurnell could accommodate a number of different users. The core users of the service are expected to be commuters and tourists/visitors to the area. The associated wharf infrastructure would provide for supplementary uses potentially including commercial vessels and recreational boating. The different users of the ferry service (and associated wharf infrastructure) are outlined in the following sections.

5.2 Tourists

A ferry service between La Perouse and Kurnell would create significant opportunities for water based tourism. Already a significant number of tourists are attracted to La Perouse and Kurnell (particularly on weekends and school holidays), and a ferry service is likely to enhance this number. It is also likely a high number of existing tourists at La Perouse and Kurnell would utilise the ferry service if available.

Kurnell is home to a number of tourist attractions such as Captain Cook's first landing place, however its relatively isolated location limits its attractiveness as a tourist destination. Importantly, a ferry service would enhance the arrival experience for tourists visiting the site. The existing route requires a circuitous route of travel along Captain Cook Drive and past the Caltex Oil Refinery. A ferry service to Kurnell could potentially create opportunities for onward journeys to nearby sites such as Towra Point Nature Reserve.

Although La Perouse already attracts a high number of visitors and tourists due to its more accessible location, a ferry service would only increase this figure. It would also open up opportunities for residents of the Sutherland Shire to visit the area travelling south from Kurnell.

Case Study – Cronulla to Bundeena Ferry Service

A ferry service between Cronulla to Bundeena Ferry runs daily, with services running every hour from each wharf. The ferry serves both commuters who travel from Bundeena to Cronulla and then make use of the Cronulla bus and rail interchange, as well as tourists visiting the Royal National Park. The journey between the two locations takes approximately 20 minutes and provides convenient access for people travelling to the Royal National Park via public transport.

The service attracts significant demand on weekends, particularly during the warmer months as people travel to the beaches of the Royal National Park. Between July 2014 and June 2015 the service attracted more than 213,000 passengers. The vessel used has capacity to accommodate 133 passengers, and it is understood from discussions with the operator that the service is at capacity most weekends. It is understood the NSW Government partially subsidises concession tickets on this service

Figure 27 Passengers at Cronulla wharf travelling to Bundeena

For the purposes of this preliminary investigation, a high level assessment of the maximum tourist demand generated by the ferry service (for a busy weekend) has been undertaken. Tourist demand is expected to be highest for people travelling from La Perouse into Kurnell, given La Perouse is more accessible by road and public transport as well as its proximity to the Sydney CBD. It would also be attractive for tour group operators to run coaches to La Perouse allowing groups to visit both La Perouse and Kurnell in the same visit. This would require coach parking to be located nearby to La Perouse for 3 to 4 hour duration.

The assumptions and outcomes of the analysis are outlined below:

Assumptions

- Vessel capacity: 150 passengers
- Service frequency: hourly from each wharf
- Typical visitor length of stay while on-site:
  - 0 -1 hour: 20%
  - 1 -2 hours: 50%
  - 2 – 3 hours: 30%
- Hours of operation: 9am to 6pm

Findings

The findings of the preliminary assessment are illustrated in Figure 28 opposite. This indicates as many as 270 people may be on-site at Kurnell at any one time (having travelled from La Perouse). The number of tourists travelling from Kurnell to La Perouse is expected to peak at just under 50 at any one time.

It should be noted that during non-peak periods (e.g. winter months and weekdays) the demand generated by the ferry service will likely be lower than that indicated.

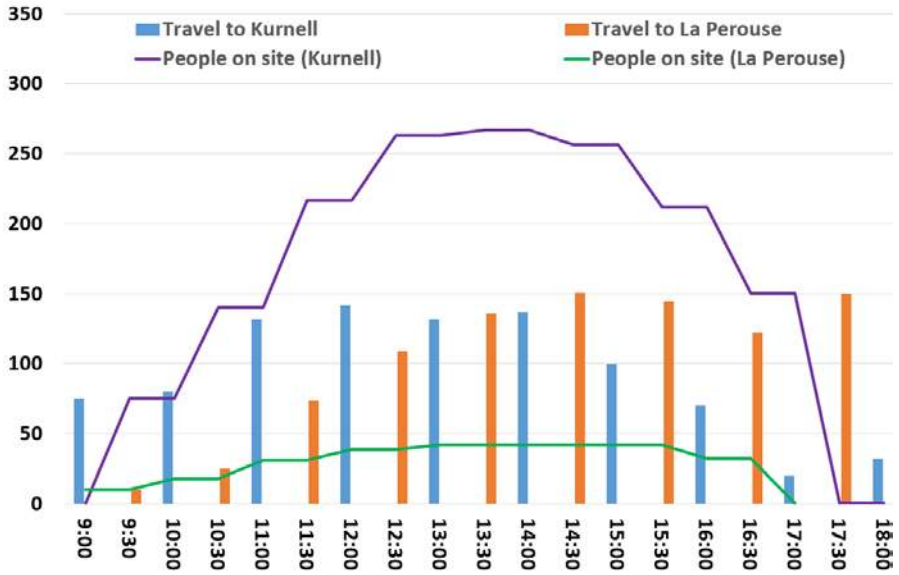


Figure 28 Indicative tourist demand daily profile

5.3 Commuters

5.3.1 General

Historically, commuters using the ferry service that previously ran between La Perouse and Kurnell were typically Kurnell residents isolated from the eastern suburbs. With improved car access and rising car ownership, residents became less reliant on the ferry service as a mode of travel to and from work.

Should a ferry service be reintroduced, it is likely the majority of commuters would originate from Kurnell and travel northwards to the eastern suburbs and Sydney CBD for work. Employment opportunities in these areas are far greater than those available for eastern suburbs residents in Kurnell and Cronulla travelling in the opposite direction (refer Section 4.2.2).

Existing public transport connections from La Perouse and Kurnell are also important to consider when determining potential demand. From Kurnell, the 987 bus route runs only once an hour and provides a connection to Cronulla, and is therefore unlikely to be of use to commuters. However, numerous bus services currently run from La Perouse and provide connection to key employment areas in the eastern suburbs and Sydney CBD.

To maximise patronage potential, consideration should be made to amending the existing bus timetabling at both ends of the route to ensure as seamless inter-model bus-ferry transfers as possible.

2011 Census data has been used to identify the potential number of commuters likely to use the ferry service. This data has been disaggregated into home location of workers, destination of workers and current travel patterns to understand potential demand. For example, the ferry service may be attractive to an existing resident of Kurnell working in the Sydney CBD who takes the train to work. This methodology is illustrated in Figure 29 .

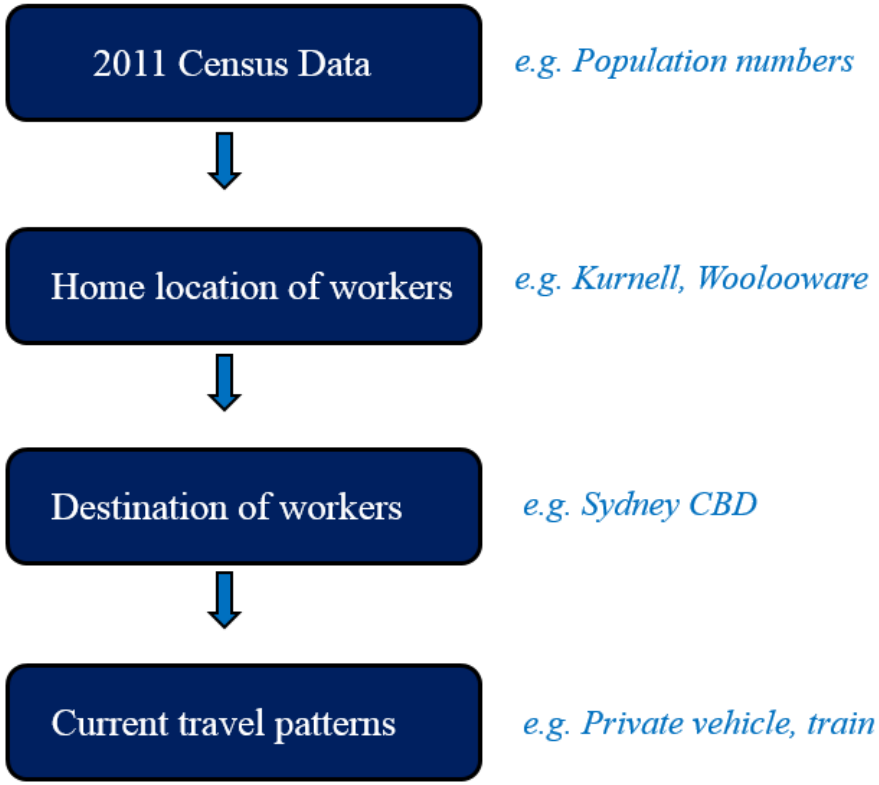


Figure 29 Commuter demand calculation methodology

5.3.2 Kurnell to La Perouse Demand

Census data indicates only 4% of employed Kurnell residents (shown in the immediate study area in Figure 30) work in the eastern suburbs and Sydney CBD, with the majority working in the Cronulla – Sutherland area. Of these workers, only a small proportion (less than 5%) currently utilise public transport. Even with an assumed 10% mode shift from car to public transport, this equates to only 65 ferry trips during the morning peak.

In the wider study area considered (Figure 31), there are a higher number of trips to the CBD and eastern suburbs by public transport, however the number of people potentially using the ferry service from these areas would not be as great given the travel time requirements to drive to Kurnell ferry wharf. It is estimated a further 70 ferry trips during the morning peak may be undertaken from commuters of this area.

Therefore it is estimated that a total of 135 commuter ferry trips from Kurnell to La Perouse may be undertaken over a typical morning peak period.

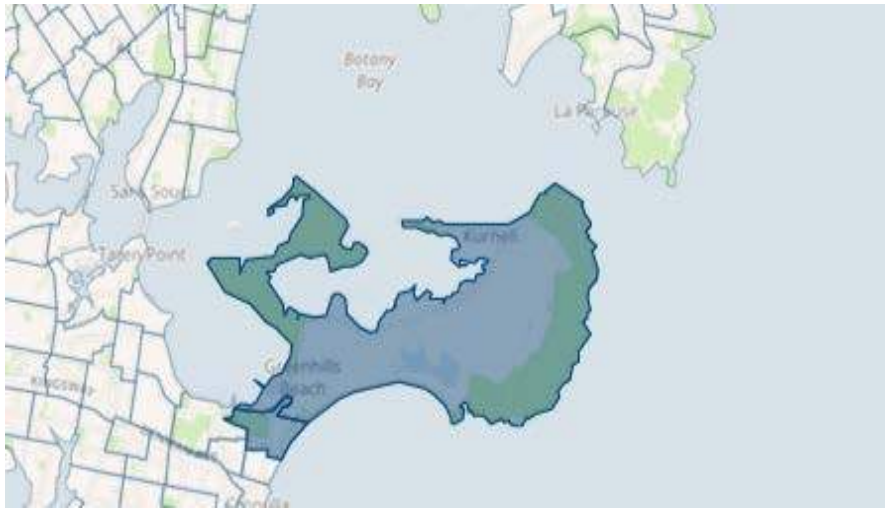


Figure 30 Kurnell immediate study area for commuter demand assessment

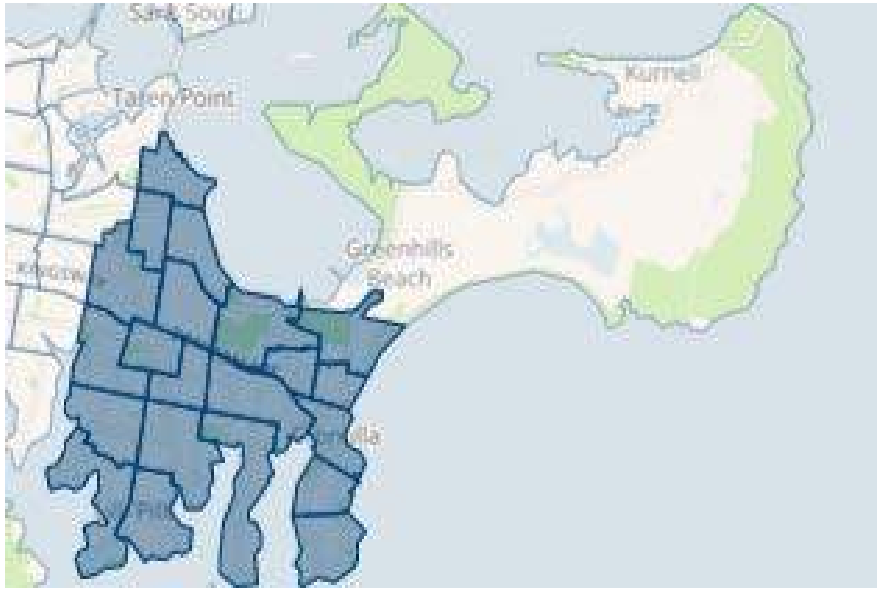


Figure 31 Kurnell wider study area for commuter demand assessment

5.3.3 La Perouse to Kurnell Demand

Largely due to the low employment density around Kurnell and limited public transport connectivity from the peninsula, there is not expected to be high commuter demand from La Perouse into Kurnell.

Census data indicates only 25 people travel to work from the immediate La Perouse study area (Figure 32) to work in Sutherland and Cronulla. None of these trips are currently made by public transport.

In the wider study area (Figure 33) close to 150 trips are made to Sutherland and Cronulla, with 16 of these made by public transport.

Given the majority of existing trips from La Perouse into the Kurnell, Cronulla and Sutherland areas are made by private vehicle, and the limited public transport connections from Kurnell, it could be expected no more than 30 commuter trips by ferry would be made from La Perouse to Kurnell in the morning peak period.

With increased demand generated potentially between Cronulla and Kurnell from recreational trips, which includes the Regional Skate Park and sporting facilities, bus service frequency may increase for commuters also.

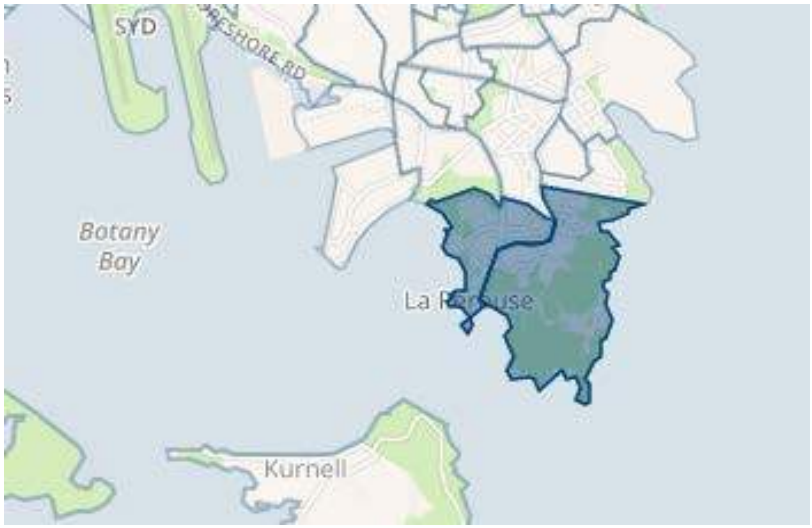


Figure 32 La Perouse immediate study area for commuter demand assessment

Figure 33 La Perouse wider study area for commuter demand assessment

5.3.4 Total Commuter Demand

The total expected demand generated by commuters on a new ferry service between La Perouse and Kurnell is presented in Table 3.

Table 3 Forecast commuter demand

Direction	Forecast trips (AM peak period)	Forecast trips (Daily)
Kurnell to La Perouse	135	270
La Perouse to Kurnell	30	60
Total	**165**	**330**

In the context of similarly sized ferry wharves across the Sydney ferries network, this forecast demand is relatively low. Figure 34 opposite illustrates the existing entries at different ferry wharves for the AM peak period, with the forecast demand at La Perouse and Kurnell also indicated.

It should be noted that the above forecasts are based on current population and employment data. When considering new and potential developments around the Kurnell area (e.g. Greenhills) this demand would increase as a result of additional employment trips generated by these sites. With the introduction of a new ferry service providing improved access to the eastern suburbs, the Kurnell area could become more attractive as a residential location and potentially increase commuter patronage.

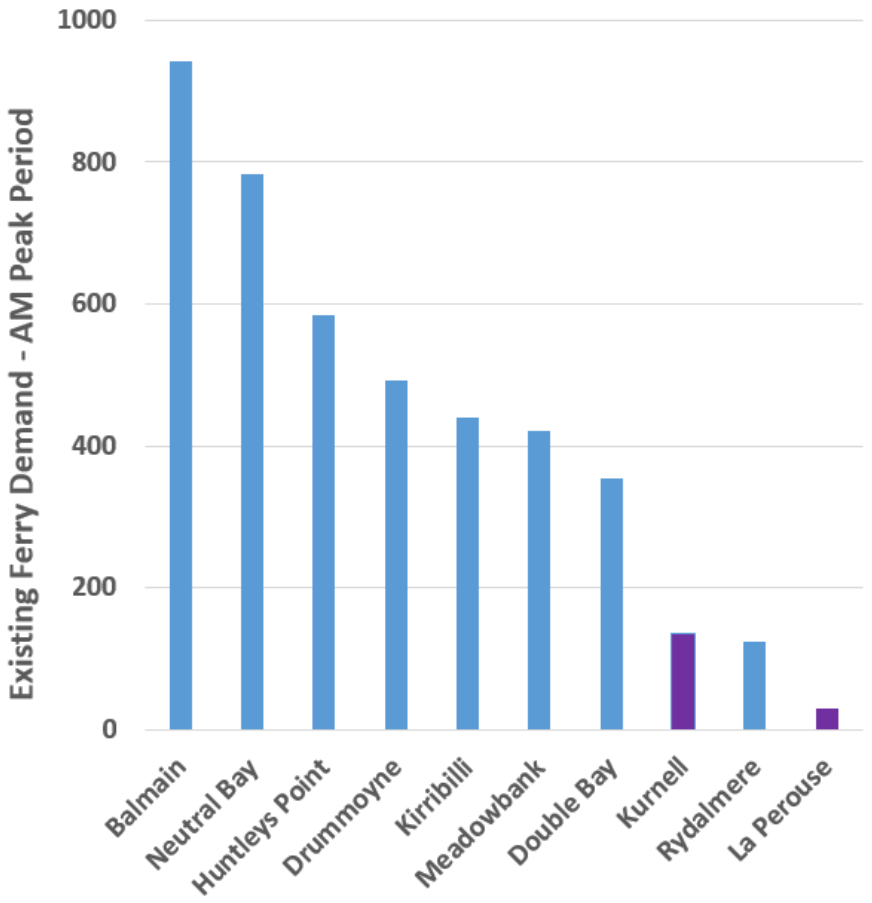


Figure 34 Forecast commuter demand (morning peak period)

5.4 Commercial Vessels

The introduction of a ferry wharf at either La Perouse or Kurnell would create the opportunity for commercial vessels to operate out of these areas. Larger operators such as Bass and Flinders Cruises and Captain Cook Cruises generally operate currently out of Circular Quay, Manly, Darling Harbour, and Sans Souci. Some smaller operators run leisure cruises out of Rose Bay.

With the provision of new ferry wharf infrastructure, as well as landside facilities such as car parking and adjacent retail, there is the potential for commercial ferry operators to operate directly out of La Perouse or Kurnell. These locations offer direct access outside Sydney Heads for whale watching / dolphin watching cruises, or alternatively leisure cruises up the Georges River. Operators may also choose to take tourists towards the nearby (Ramsar listed) Towra Point Nature Reserve.

Initial consultations have indicated that new ferry wharves at La Perouse and Kurnell would attract interest from commercial operators - predominantly transporting tourists from La Perouse to Kurnell, and other commercial activities such as offshore whale watching and excursions around the bay.

There is the potential to generate revenue from short-term use of the wharves by commercial vessel operators (in addition to the ferry service operator) that run day-trips/boat cruises. As an example, the Roads and Maritime Services utilises a wharf booking system at a number of Sydney Harbour wharves charging between $15-50 per 15-30 minute stay.

Figure 35 Bass and Flinders whale watching cruises

Source: Bass and Flinders website

5.5 Private Recreational Vessels

As previously identified in Section 3.1, consideration should be given to encouraging private recreational boat access and use of the new ferry wharves. To facilitate this, a dedicated length of the wharves would need to be dedicated and designed for the short-term mooring of recreational craft.

Private recreational vessel usage of the ferry wharves might consist of the following:

- Use as a formal water access point for boats on trailers. This would require a new boat ramp and trailer car parking area to be provided in close proximity to the wharf. In this scenario the boat is launched via the boat ramp and the wharf is used for loading/unloading of passengers and provisions.
- A short-term mooring for private vessel day-trippers arriving by water. This might include trailer vessels launched from existing boat ramps or wet-berthed (e.g. marina) vessels in Botany Bay, the Georges River, or potentially further afield such as Sydney Harbour or Port Hacking. Currently recreational vessels visiting La Perouse or Kurnell from other location have to moor offshore.

As well as for short-term stay commercial vessels, there is the potential for additional revenue generation by charging recreational vessels a mooring fee at the new wharves.

Some large yachts and power boats with deeper draughts may be restricted from using the wharves at all tides unless special provision is made for locating the wharves in deeper water than necessary for the main ferry vessels.

5.6 Supplementary Bay Connections

5.6.1 General

Consideration has been given to the possible expansion of the core ferry service being considered between La Perouse and Kurnell to other locations in Botany Bay. It should be noted that these supplementary options have not been explored in as much detail as the proposed core service.

5.6.2 Brighton-Le-Sands

The suburb of Brighton-Le-Sands is located on the western side of Botany Bay fronted by Lady Robinson Beach (refer Figure 1). The area along The Grand Parade and Bay Street is popular with locals and tourists with access to the shoreline amenity and views across Botany Bay, as well as shops, restaurants and bars.

The Grand Parade has bus connections to the city and the southern suburbs, and there is public car parking along the Parade and adjacent streets.

Historically, Brighton-Le-Sands had a public jetty which has since been removed. A proposal for the construction of a new public timber jetty in the same location as the historical jetty with vessel berthing access was made by Rockdale Council in 2001, however this did not go ahead. In the mid to late 2000’s, concepts were proposed for a major new pier/jetty with commercial vessel berthing and marina at the site as part of a multimillion dollar revitalisation development which was ultimately not realised. In 2015, Rockdale

Council reportedly approached the NSW Government to gauge interest in progressing and funding such a development[18].

Given Brighton-Le-Sand's relatively long over-water distance from Kurnell and La Perouse, midway proximity between the city and the Sutherland Shire, and being positioned on a main road connection, it is not expected that there would be strong demand for water-based commuters.

However, there could be benefits to an operator to include a convenient wharf stop at Brighton-Le-Sands to pick-up/drop-off tourists for day trips or commercial activities such as whale watching, or include this location as part of a return bay-wide excursion from La Perouse around Botany Bay. To facilitate this, a dedicated new wharf would need to be built at Brighton-Le-Sands, perhaps as part of a larger development for the waterfront.

5.6.3 Sydney Airport

There are a number of people living in the eastern region of the Sutherland Shire LGA that are employed at Sydney Airport that may present demand for a direct commuter ferry service between a potential Kurnell wharf to a new wharf location in the vicinity of the airport as a faster alternative to driving or catching a bus. To be attractive to airport commuters, such a service would likely require a dedicated connecting shuttle bus to run workers from the wharf to the airport precinct which could potentially be provided by Sydney Airport to its staff.

Two potential options for an additional wharf location are: near the mouth of the Cooks River; or, near the existing public Foreshore Road Boat Ramp (owned by the NSW Roads and Maritime Services). Should the Foreshore Road Boat Ramp site be considered, its location and function will need to not adversely impact existing and planned future operations at Port Botany). Shuttling commuters from the primary La Perouse ferry wharf to the airport could also be an option although presents a less attractive option for reducing travel times compared to other transport modes.

[18] *Council backs 'Brighton Riviera'*, St George & Sutherland Shire Leader, June 9, 2015.

6 Design Vessel

6.1 General

This section summarises a preliminary assessment undertaken for the study of the vessel type and particulars that would likely be adopted for a potential La Perouse to Kurnell ferry service.

The assessment has been undertaken by Arup with specialist input provided by Thompson Clarke Shipping. It should be noted that ultimately the choice of vessel will be determined by the ferry service operator to best suit their requirements.

6.2 Vessel Classification

Classification of the vessel will be important to consider. Any vessel being utilised for this service will be required to comply with the National Standard for Commercial Vessels (NSCV). In particular, the NSCV will apply to the design and construction of the vessel, the competencies of the crew and the operational practices on board the vessel.

The NSCV categorises vessels on the basis of their type of operation or use (i.e. passenger vessel, non-passenger, fishing etc.) and its area of operation (i.e. seagoing or sheltered waters etc.) The Standards that apply to each vessel, in accordance with the NSCV, therefore depend on the category of the vessel.

It is envisaged that vessels involved in this service will be categorised as either 1D (i.e. a passenger vessel carrying more than 12 passengers and operating in partially smooth waters[19]) or 1C (i.e. a passenger vessel carrying more than 12 passengers and operating, or with the ability to operate, in restricted offshore waters[20]).

As a relevant example, Manly Ferries permitted to access Manly Wharf from Sydney Harbour in all sea conditions are categorised as 1C due to the size of sea/swell that often runs into Sydney Harbour through the heads. Whereas 1D vessels are restricted to crossing the heads to Manly with wave heights <1.5 metres.

Considering the above, for this study it would be prudent to assume 1C vessels would apply, particularly considering they will likely need to go out of the heads to Sydney Harbour for dry-dock repairs periodically (e.g. every 3 years). The 30nm navigation limit will also allow the vessel to engage in whale watching and charter fishing expeditions from Botany Bay when not ferrying passengers (or for a second vessel).

6.3 Navigation Regulations

Part E of the NSCV applies to all domestic commercial vessels other than ‘special vessels’. Therefore, Part E will apply in this case. Part E defines the requirements concerning crew numbers and competencies and the operational requirements of the service. In addition, the Port Authority of NSW publish Port Information and Harbour Master’s Directions that must be taken into consideration by vessels operating in both Sydney Harbour and Botany Bay.

[19] In the NSCV Partially smooth waters are defined as “waters where the significant wave height does not exceed 1.5m from trough to crest for at least 90 per cent of the time”.

[20] In the NSCV Restricted Offshore operations are within 1) 30 nautical miles from the seaward limit of a safe haven, including designated smooth or partially smooth waters (i.e. sheltered waters), or within such lesser limits as may be specified; or 2) specific waters designated by the Authority as ‘restricted offshore’.

Ferries and small commercial vessel are generally pilotage exempt, although masters are required to hold a Certificate of Local Knowledge.

The Port Authority of NSW manages and operates as port communications and control system (officially known as a Vessel Traffic Services system) from its centre in Brotherson Dock, Botany Bay. Only vessels 30m LOA or more are required to participate in the VTS system.

In accordance with NSCV vessels greater than 35m length are required to be classed by a Classification Society. For a classed vessel, the class society requires items such as main and auxiliary engines to be type approved which adds a cost premium to an engine that is otherwise identical. Vessels less than 35m are not required to be classed and can be designed and constructed to NSCV standards only however class rules are freely available for use and therefore designers often reference these rules, especially for anything regarded as controversial such as structure, shafting, windows and rudders etc.

Therefore, keeping vessels LOA less than 35m is considered advantageous for the owner and operator as it overcomes the need for attaining the higher design and construction specifications required by a Classification Society.

There are no speed restrictions within the study area, with the exception of an 8 knot limit approaching Frenchman's Bay near La Perouse (defined in the Harbour Master's Directions as the area north of Molineux Point).

6.4 Vessel Particulars

To identify vessel-specific design criteria, a database of potential modern ferry vessel designs was compiled for assessment and this is summarised in Table 4. This information has been sourced from two major contemporary shipbuilding companies, Austal and Incat Crowther, specialising in commercial passenger-going vessels appropriate for the proposed La Perouse to Kurnell ferry service. The database consists of ferry vessels with the following characteristics:

- Monohull or Catamaran hull form (refer Figure 36 and Figure 37 respectively).
- Passengers of 95 to 200 typically, but as much as 522.
- NSCV (USL) Class 1C / 1D for operations up to restricted offshore with a design significant wave of 4.5m.

Figure 36: Typical Ferry Monohull type (copyright austal.com)

Figure 37: Typical Ferry Catamaran type (copyright austal.com).

Other particulars such as length, draft etc. were not fixed as the purpose of the database was to define these limits.

Consideration has also been made for the potential for the ferry operator to also undertake non-ferry commercial operations (such as whale watching tours) either outside ferry demand peak times or concurrently with a second vessel. Commonly, whale watching and other commercial/tourist vessels utilise existing ferry vessels or ferry vessels with a slightly modified general arrangement, such as the inclusion of an upper viewing deck. Therefore, the ferry database presented is considered to also represent typical non-ferry commercial vessels of similar length / passenger numbers.

Table 4: Compiled Ferry Vessel Database

Vessel Name	Type	Pax	Speed (kts)	Propulsion	Length (OA)	Breadth (OA)	Draft (hull)	Draft (OA)	Depth	Weather Deck Level
Mary D Odessey [1]	Mono	138	36	Jets	35.2		1.3	1.3	2.7	1.4
Aksemseddin [1]	Mono	155	25		30					
Equator Triangle [1]	Cat	216	27		40.1					
Evercrest [1]	Cat	100	31							
Marineview [1]	Cat	140	33		30					
Mary D [1]	Mono	184	30		30					
Patriot [1]	Cat	189	28		26.3					
Salten [1]	Cat	214	33		41.5					
Kilimanjaro V [2]	Cat	522	30	Props	39	11	1.48	2.25	3.9	2.42
Singapore Ferry [2]	Cat	200	28	Props	33	8.5	1.2	1.96	2.8	1.6
D6 [2]	Cat	196	25	Props	26	8	1.2	1.8	2.5	1.3
Macoco [2]	Cat	136	25	Props	30	8.5	1.2	1.6	3.25	2.05
Red Hook 1 [2]	Cat	200	27	Props	26.4	7.75	1.3	2.05	2.95	1.65
Princetown IV [2]	Cat	149	30	Props	30	9.1	1.55	2.03	3.85	2.3
Riverside Catalina [2]	Cat	399	25	Props	33.4	9.5	1.25	2.05	2.75	1.5
Ava Pearl [2]	Cat	150		Props	33.1	9.65		2		0
Riverside Avalon [2]	Cat	246	25	Props	24	8.5		1.8	2.75	2.75
Cat Cocos Isle of Le Digue [2]	Cat	227	26	Props	26.6	8		1.7	2.8	2.8
MV James Grant [2]	Cat	100	25	Props	18	6	1.15		2.2	1.05
Reff Voyager [2]	Cat	200	29	Props	34.25	9.5		1.7		
Taino Dancer [2]	Cat	149	22	Props	22.15	8.53		1.4		

Vessel Name	Type	Pax	Speed (kts)	Propulsion	Length (OA)	Breadth (OA)	Draft (hull)	Draft (OA)	Depth	Weather Deck Level
Peppermint Bay II [2]	Cat	167	26	Props	22	7.5		1.5		
George Bass II [2]	Cat	95	25	Props	16.5	6		1.33		
Marthas Vineyard Express [2]	Cat	149	32	Props	28.05	8.53		2		
Provincetown III [2]	Cat	149	30	Props	29.74	9.1		1.85		
Ocean State [2]	Cat	149	32	Props	20.3	7.3		1.78		
Park Island 7 [2]	Cat	223	28	Props	26	8.5		1.8		
MINIMUM		**95**	**22**		**16.5**	**6**	**1.15**	**1.3**	**2.2**	**0**
MAXIMUM		**522**	**36**		**41.5**	**11**	**1.55**	**2.25**	**3.9**	**2.8**
AVERAGE		**190**	**28**		**29**	**8.4**	**1.3**	**1.8**	**3.0**	**1.7**

Sources:

[1] http://www.austal.com/en/products-and-services/commercial-products/ferries-passenger/mary-d-odyssey.aspx?source=category

[2] http://www.incatcrowther.com/product-details/26m-catamaran-passenger-ferry/CD561/nprod-0

6.5 Vessel-Specific Design Criteria

6.5.1 Seabed Depth

The vessel draft overall depends largely on the propulsion source with the standard propeller configuration requiring the most draft. The typical draft overall expected is in the range of 1.3 to 2.0m, with the deepest vessels marginally exceeding 2.0m draft.

To accommodate the deepest draft vessels, on the seaward side the wharf should provide for a seabed depth of at least 2.5m LAT. A marginal reduction on the landward side for a shallower draft vessel may be acceptable but should still generally exceed 2.0m LAT.

6.5.2 Wharf Head/Berth Length

For a commercial passenger vessel of capacity 100 to 200 pax, vessel length is typically in the order of 20-25m, but up to as much as 40m for select single-level catamaran vessels. However, as suggested above it would be prudent to limit vessel length to 35m to avoid the need for the vessel to be classed.

As such, to maximise the versatility of the wharf, it is proposed to adopt a 40m wharf head for the purposes of conceptual design. This will accommodate an extreme 35m vessel, or two more-typical 20m vessels at the same time (with outside mooring piles). The landward side of the wharf head may be utilised for smaller commercial vessels with lesser draft / length or recreational vessel berthing as required.

6.5.3 Vessel Manoeuvring

The wharf siting and geometry will need to provide adequate space to allow for safe vessel manoeuvring when approaching the wharf and berthing/un-berthing procedures. This will best be achieved by orientating the berthing line (and wharf head) parallel to the design depth seabed contour, while also considering facing the moored vessels head into the prevailing waves and swell as much as possible.

6.5.4 Freeboard

Should a pontoon solution be adopted for the wharves, for the range of potential design vessel particulars considered a pontoon freeboard of between 800mm and 1000mm is likely required. To provide safe access for small and low freeboard recreational vessels, the final pontoon design will need to provide recessed ladders or some other form of equivalent access safe access/landing to these smaller vessels.

6.5.5 Vessel Speed

Maximum vessel speeds for vessels in the database range is between 22 and 36 knots (nautical miles per hour), with an average 28 knots.

However, accounting for reduced speeds when approaching and departing the wharves, and speed limitations during rough seas conditions for passenger comfort, an average vessel speed during the transit between La Perouse and Kurnell of 10-15 knots might be assumed.

Depending on the exact wharf locations, assuming an approximate transit distance of 2.5km (1.34 nautical miles), and allowing for 5 minutes of boarding/unboarding time at each end, a single trip time is estimated to be around 15-20 minutes. This suggests a trip timetable every hour would be easily achieved with a single vessel (similar to the existing Cronulla-Bundeena service).

6.6 Vessel Servicing & Maintenance

Vessels will need a 'home' wharf/facility for layup overnight or when out of service. It will likely not be practical to use the new ferry wharves as they will be exposed to the elements and will lack the degree of security necessary for overnight layup.

Existing berths at Sans Souci or further upstream of the Georges River may be available to the operator for use as a home wharf.

A potential alternative home wharf location could be near the existing public Foreshore Road Boat Ramp (potentially in addition to being a ferry stop to service Sydney Airport commuters as discussed in Section 5.6.3). Advantages of this location are that it is relatively well sheltered from waves and it is close to port services provisioning (e.g. water, fuel). Should an operator wish to explore this option further, the integration with active port activities and potential sharing of amenities would need additional consideration in consultation with NSW Ports and the Port Authority of New South Wales. Its location and function would need to not adversely impact existing and planned future operations at Port Botany.

Likely vessel maintenance requirements would include minor ongoing repairs (at the home wharf), and approximately every 3 years the vessel will also need to dry dock for a full out of water inspection. There are currently no dry-dock facilities in Botany Bay so the vessel would need to transit to Sydney Harbour for this.

There is the potential to use Port Botany facilities which are available for bunkering (refuelling) and sewerage pump-out.

Figure 38: Potential location for ferry vessel servicing and maintenance berth near the Foreshore Road Boat Ramp (*image source: Google Maps*)

7 Wharves Siting

7.1 Criteria

The optimal wharf location for the La Perouse and the Kurnell sides of a potential ferry service is influenced by a range of criteria.

The following criteria has been considered by Arup in assessing the preferred wharf locations:

a) **Proximity to the existing road and public transport network**. Currently public transport options in the study area are limited to the Sydney Bus network. While there have been proposals for extending a light rail service to the southern end of Anzac Parade (as existed in the past) if this was implemented it would not be in the short-medium term so has not been considered in this study.

b) **Available area available for landside infrastructure** (e.g. car parking).

c) **Proximity to key social, cultural and historical features,** for example Captain Cook's Obelisk on the Kurnell side, and the National Parks.

d) Protection offered from waves and currents. This impacts utilisation and serviceability of vessels at berth and necessary structural robustness of the wharf. A certain level of protection is necessary for a viable wharf location.

e) **Impact on sensitive ecological areas**. The study area contains a rich array of ecologically-important species to consider.

f) **Impact on sensitive heritage areas**. The study area contains a rich array of Aboriginal and European heritage sites to consider.

g) **Distance offshore to the required water depth** (adopted as 2.5m CD as determined in Section 5.4). This influences the length of approach jetty needed and therefore whole of life infrastructure costs and access distance for passengers (less length is better). For the purposes of this study it has been assumed that dredging of the seabed to create closer access to the shoreline is to be avoided. Although dredging could be deemed beneficial at further design stages of the project, dredging would likely trigger significant environmental, approvals, and ongoing maintenance challenges to manage.

h) **Flexibility for potential recreational boating launching usage.** Minimum requirements for recreational boat launching (small craft on trailers) includes an adequate launching ramp near the wharf, and space available for car and trailer parking. This criterion does not consider short-term recreational boat mooring at the ferry wharf by water as this would be possible for all options.

7.2 Options Considered

7.2.1 La Perouse

Three wharf location options have been considered at La Perouse:

Option LP1: At the northern end of Frenchman's Bay.

Option LP2: At the southern end of Frenchman's Bay within the site of the old ferry wharf.

Option LP3: Within Astrolabe Cove north of Bare Island.

These locations are shown conceptually on Figure 39.

The following options were discounted through initial inspection without further consideration:

- **Locations south of Bare Island:** This length of coastline is significantly exposed to southerly swell waves and a steep rocky shoreline. There are also limited connections to existing road network south of northern end of Congwong Bay.

7.2.2 Kurnell

Three wharf location options have been considered at Kurnell:

Option K1: At the eastern end of Silver Beach, near the corner Prince Charles Parade & Captain Cook Drive.

Option K2: At the site of the old wharf and existing viewing platform near Captain Cook's Obelisk.

Option K3: Near Sutherland Point and approaching the open parkland fronting the National Park Visitor's Centre.

These locations are shown conceptually on Figure 42.

The following options were discounted through initial inspection without further consideration:

- **Extending off the existing Kurnell Refinery Jetty structure.** This option would assist in reaching deep water over a relatively short length of approach jetty potentially saving on construction costs. However, previous studies have concluded (and Arup considers this still to be the case) that this proposal would not likely be acceptable to Caltex or the Harbour Master given it would be located in unacceptably-close proximity to hazardous fuel pipelines/operations, and sharing this facility would raise security concerns.
- **Silver Beach west of Kurnell Refinery Jetty**. This option is deemed too great a distance away from the key cultural and heritage features at the National Park and bus connections.

7.3 Options Assessment

A semi-quantitative multi-criteria assessment of the wharf location options for both sides of the bay has been undertaken to determine the most suitable for the project. This assessment has considered each option against the criteria described in Section 7.1, and has been informed by a comprehensive GIS developed for the project which includes a range of relevant spatial data to draw upon. Maps showing some key spatial opportunities and constraints are provided in figures below.

The outcomes of this assessment are presented in Table 5. In summary, the following wharf locations have been identified as preferred:

La Perouse: At the southern end of Frenchman's Bay within the site of the old ferry wharf (Option LP2).

Kurnell: At the site of the old wharf and existing viewing platform near Captain Cook's Obelisk (Option K2).

As well as being identified as the most optimal for the various criteria considered, the fact these locations are at the original ferry service sites gives historical significance to a reinstated service. In addition, siting the Kurnell wharf at the location of the existing viewing platform prevents the opportunity to extend off this existing structure.

At a meeting with the Project Control Group (PCG) in October 2015 it was agreed that these locations appear to be the preferred for a proposed reinstated ferry service.

Figure 39 La Perouse wharf siting options

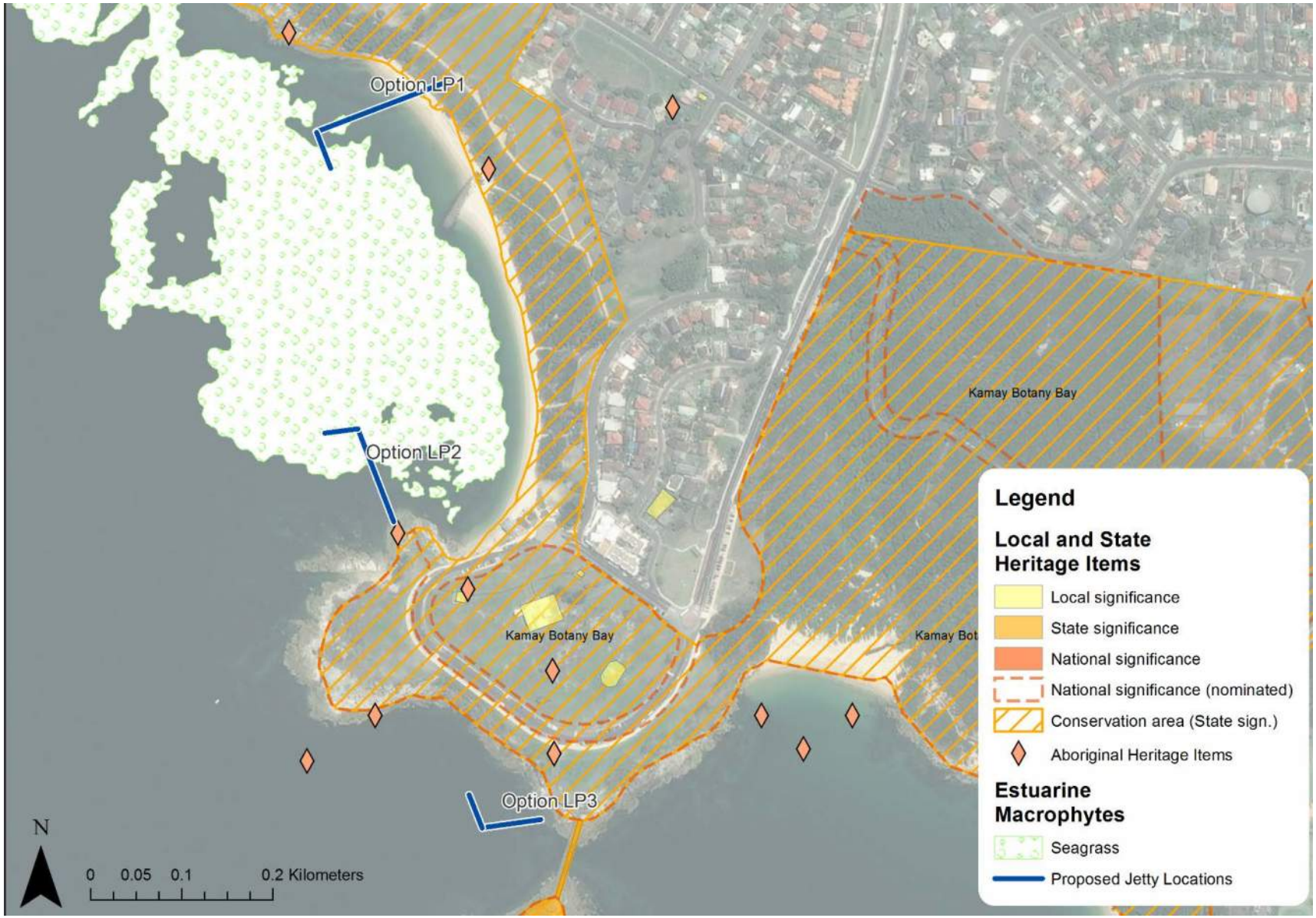


Figure 40 Constraints map (Seagrass and Heritage) – La Perouse

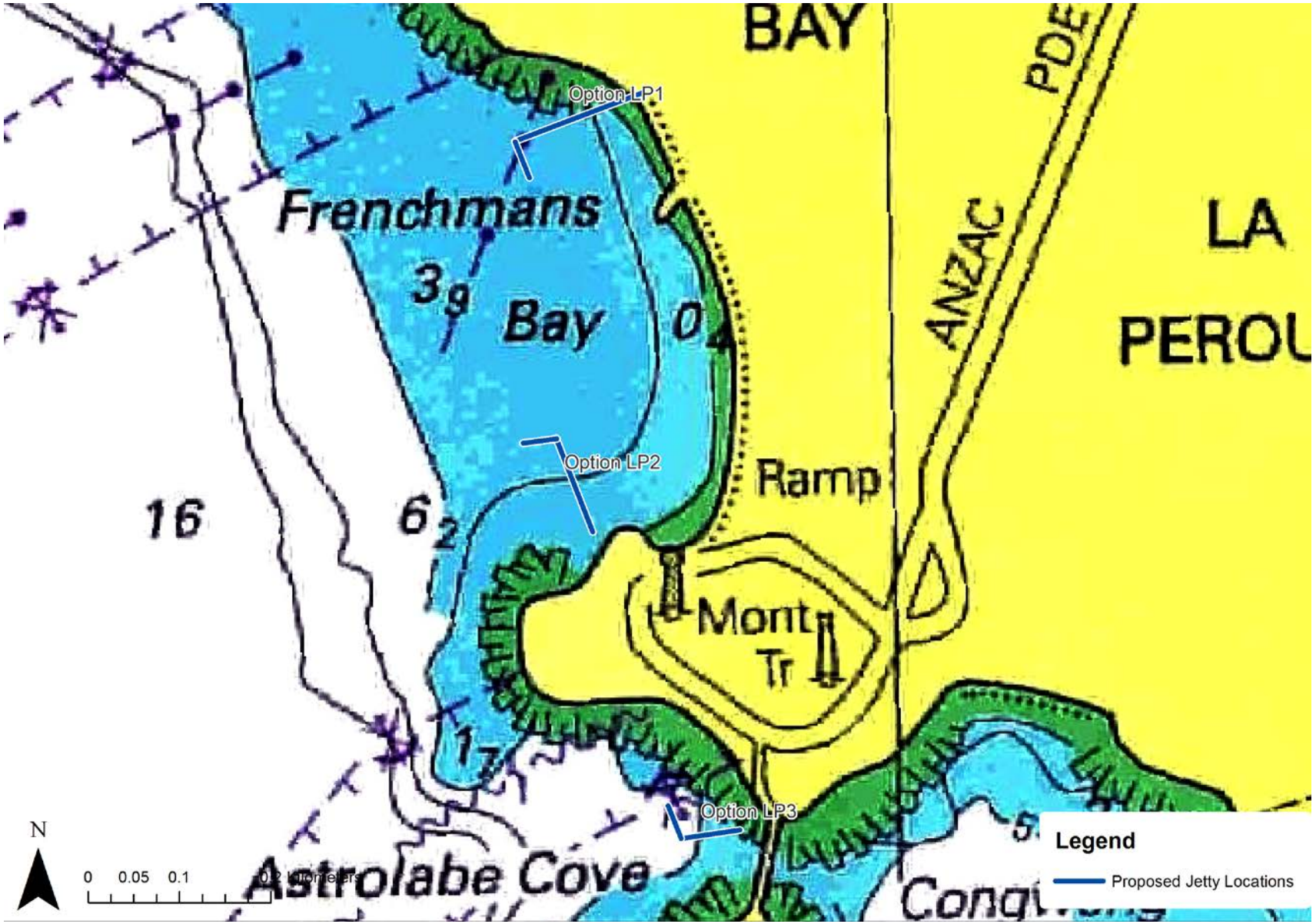


Figure 41 Sea bed levels – La Perouse

Figure 42 Kurnell wharf siting options

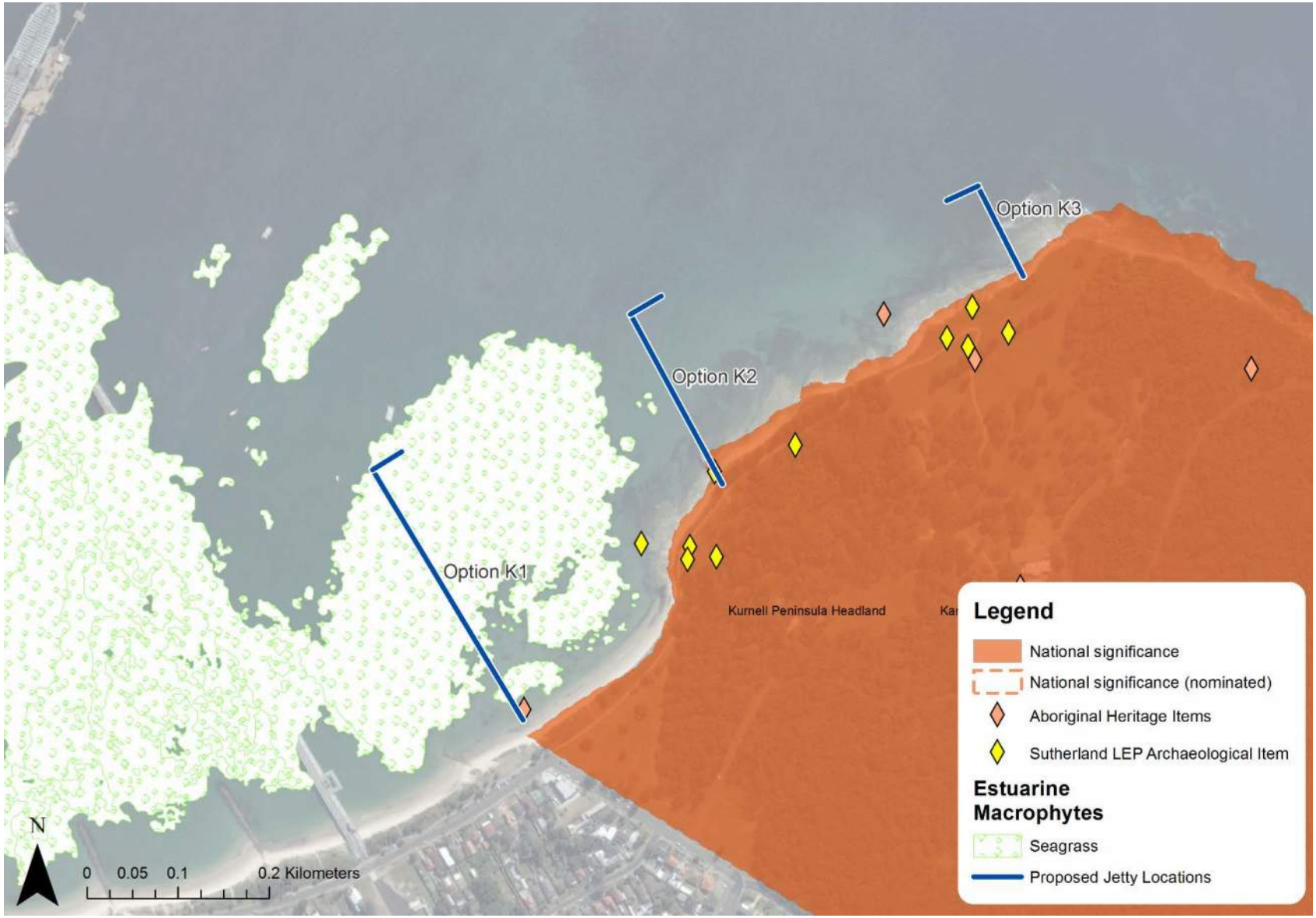


Figure 43 Constraints map (Seagrass and Heritage) – Kurnell

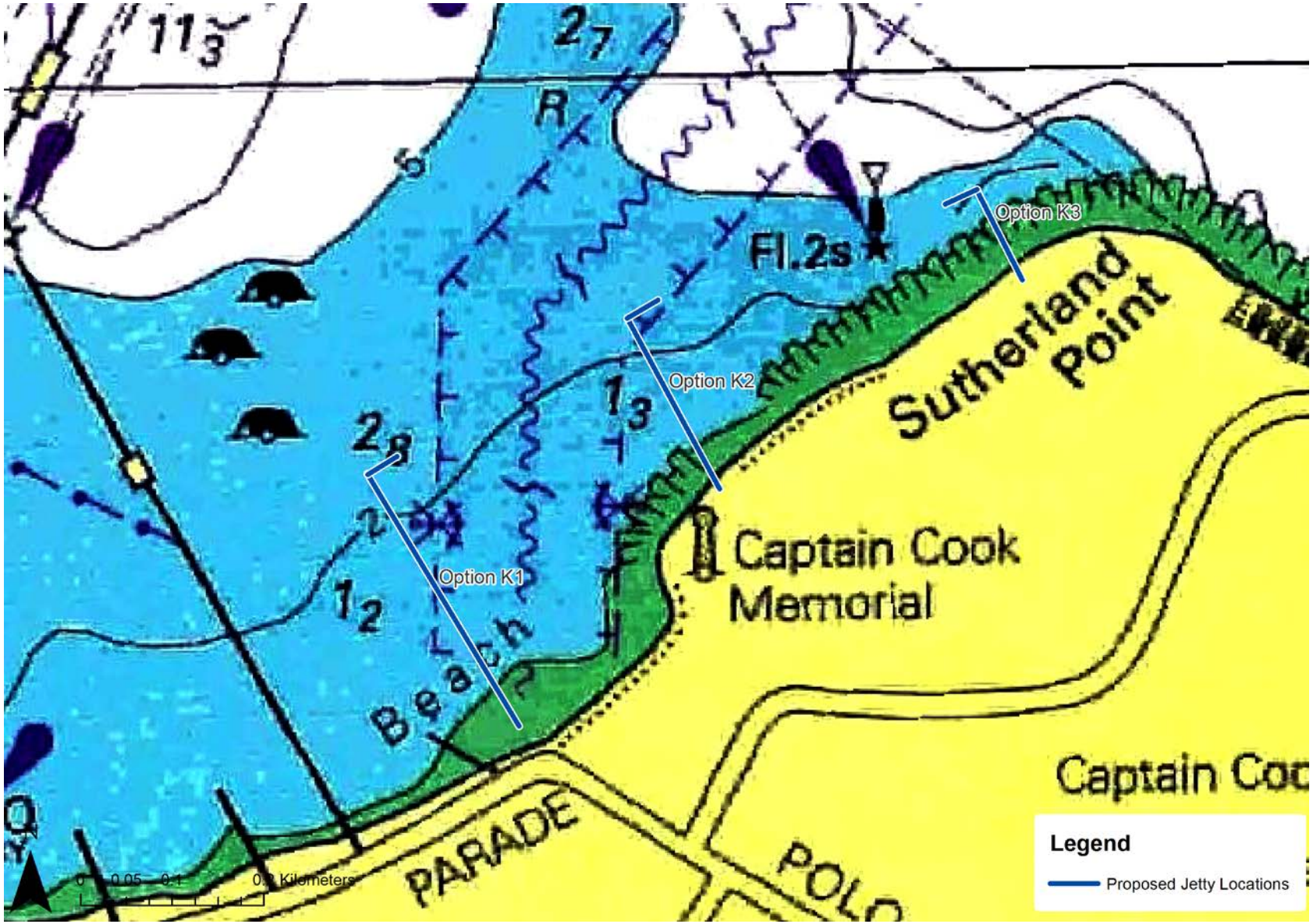


Figure 44 Sea bed levels – Kurnell

Table 5: High Level Multi-Criteria Analysis of wharf siting options

	La Perouse			Kurnell		
Criteria	**Option LP1**	**Option LP2**	**Option LP3**	**Option K1**	**Option K2**	**Option K3**
	Northern end of Frenchman's Bay	Southern end of Frenchman's Bay	Astrolabe Cove	Corner Prince Charles Parade & Captain Cook Drive	Near Captain Cook's Obelisk	Near Sutherland Point
a) Proximity to existing road and public transport network	3	1	1	1	2	3
	Relatively close road access but far from bus connections.	In close proximity to main Anzac Parade southern terminus with direct bus network connectivity to city.	In close proximity to main Anzac Parade southern terminus with direct bus network connectivity to city.	Close road access with direct bus network connectivity to Cronulla.	Approx. 350m walking distance from main road and bus connections.	Approx 700m walking distance from main road and bus connections. 250m from National Park Visitor's Centre carpark and road.
b) Available area for landside infrastructure	1	2	2	1	1	2
	Landside space potentially available for new car park with access from Elaroo Avenue.	Existing car parking with potential adjacent available Randwick City Council reserve land for expansion.	Existing car parking with potential adjacent available Randwick City Council reserve land for expansion.	Existing Sutherland Shire car parking with potential adjacent available National Park land for expansion along Burrawang Walk .	Limited immediate landside space limited, adopt remote car-parking strategy for Option K1.	Limited immediate landside space limited, option to utilise expanded existing National Park Visitor's Centre carpark.

	La Perouse			Kurnell		
Criteria	**Option LP1**	**Option LP2**	**Option LP3**	**Option K1**	**Option K2**	**Option K3**
	Northern end of Frenchman's Bay	Southern end of Frenchman's Bay	Astrolabe Cove	Corner Prince Charles Parade & Captain Cook Drive	Near Captain Cook's Obelisk	Near Sutherland Point
c) Proximity to key social, cultural and historical features	3	1	1	3	1	2
	Relatively long distance from National Park.	Close to National Park.	Close to National Park.	Relatively long distance from National Park Visitor's Centre.	Close to National Park Visitor's Centre and Captain Cook's Obelisk.	Close to National Park Visitor's Centre and Captain Cook's Obelisk. Furthest from Kurnell town centre.
d) Protection offered from waves and currents	1	1	3	1	1	3
	Relatively protected from offshore swell waves and currents.	Relatively protected from offshore swell waves and currents.	Most exposed to offshore swell waves and currents.	Relatively protected from offshore swell waves and currents.	Relatively protected from offshore swell waves and currents.	Least exposed to offshore swell waves and currents (closest to Bay entrance).
e) Impact on sensitive ecological areas	2	2	1	3	1	1
	Low-Moderate risk of impact on inshore scattered seagrass (*Halophila* and *Zostera*) beds but given the generally scattered nature of the beds, the	Moderate risk of impact on inshore scattered seagrass (*Halophila* and *Zostera*) beds but given the generally scattered nature of the beds, the	There are no seagrass beds in Astrolabe Bay and the inshore reef is relatively short, so there are low risks to aquatic ecosystems	Potential loss of up to 0.06 ha of threatened ecological community.	Avoidance of the direct loss of mapped seagrass beds.	No identified impact on mapped seagrass beds.

	La Perouse			Kurnell		
Criteria	**Option LP1**	**Option LP2**	**Option LP3**	**Option K1**	**Option K2**	**Option K3**
	Northern end of Frenchman's Bay	Southern end of Frenchman's Bay	Astrolabe Cove	Corner Prince Charles Parade & Captain Cook Drive	Near Captain Cook's Obelisk	Near Sutherland Point
	impact is likely to low and manageable.	impact is likely to low and manageable.	arising from the siting of this option.			
f) Impact on sensitive heritage areas	1	2	2	3	2	1
	No identified impact on potential sensitive heritage items.	Potential impact on Aboriginal heritage art (Pigment or Engraved).	Siting in the vicinity of Bare Island (State Significance). Any impact is likely to low and manageable.	Impact on potential Archaeological Deposit 1 (K PAD 1).	Impact on LEP listed Landing place wharf abutment. Impact could be mitigated through including wharf abutment into design.	No identified impact on potential sensitive heritage items.
g) Distance to required 2.5m LAT deep water contour (whole of life cost and pedestrian access)	2	2	1	3	2	1
	~130m	~130m	Shortest (~100m)	Longest (~350m)	~200m, with opportunity to extend off existing viewing wharf of ~35m length.	Shortest (~125m)
h) Flexibility for potential	1	1	3	1	3	3

	La Perouse			Kurnell		
	Option LP1	**Option LP2**	**Option LP3**	**Option K1**	**Option K2**	**Option K3**
Criteria	Northern end of Frenchman's Bay	Southern end of Frenchman's Bay	Astrolabe Cove	Corner Prince Charles Parade & Captain Cook Drive	Near Captain Cook's Obelisk	Near Sutherland Point
recreational boating usage	Potential boat ramp access (from beachside) and space available for car and trailer parking within ringroad land area.	Potential boat ramp access (from beachside) and space available for car and trailer parking within ringroad land area.	Difficult (steep) boat ramp access conditions.	Good boat ramp access and space available for car and trailer parking.	Limited access and space available for car and trailer parking.	Limited access and space available for car and trailer parking.
TOTAL (lowest score best)	**14**	**12**	**14**	**16**	**13**	**16**

Figure 45: Preferred new wharf location at the La Perouse side at the southern end of Frenchman's Bay within the site of the old ferry wharf (Option LP2)

Figure 46: Preferred new wharf location at the Kurnell side at the site of the existing viewing platform (Option K2)

8 Infrastructure

8.1 Wharves

8.1.1 Concept Layout and Structural Form

For both preferred wharf locations, consideration of the conceptual layouts and design has been made to a sufficient level to inform this feasibility study.

The wharves will likely consist of two main components discussed below:

- A wharf head that is utilised for vessel berthing/mooring and passenger transfer (seaward side for large vessels, landward side for smaller craft).
- A jetty/trestle structure connecting the shoreline to the wharf head.

Ideally, modern ferry wharves utilise a floating pontoon for vessel mooring and boarding where metocean conditions allow (refer Figure 47 for example). The advantage of a floating pontoon is that it can be designed to be at approximately the same level as (or slightly lower than) the ferry weather deck at all tides, thus providing safer and more space efficient access without the need for a steep gangplank or steps. This is also much preferred for the provision of disability access in accordance with modern community expectation and design guidelines.

However, a floating pontoon generally presents a less structurally robust and durable solution than a fixed wharf. Typically, floating pontoons are utilised in sheltered waters, however, Botany Bay presents a considerable fetch of water and wave action requiring the pontoon and supporting piles to be of custom design and of particularly robust construction.

Figure 47: Example of a floating pontoon wharf structural type (Gunnamatta Bay, used for Cronulla-Bundeena ferry service)

For these reasons, it is expected that a fixed wharf structure will be the most appropriate form for the proposed new La Perouse and Kurnell wharves in terms of whole of life cost and minimising the risk of structural damage during storm events. To provide flexibility for vessel access over all tide levels ramps from the approach jetty level down to a number of lower landings will be required (refer to Figure 48 for example).

To accommodate the expected design vessels and low-level landings, and provide sufficient structural capacity for vessel loadings, the

wharf head is assumed to be approximately 40m x 10m in overall dimension.

Figure 48: Example of a fixed ferry wharf with multiple landings to allow vessel access over the tidal range – shown at high tide (Bundeena, used for Cronulla-Bundeena ferry service)

The approach jetty/trestle component of the wharf would typically consist of a 2.5-3m-wide deck (assuming emergency service vehicles are not required to access the wharf, whereby the width may need to be wider) founded on a pair of piles spaced 4-5m apart along the jetty length, with handrailing provided both sides. The piles would likely be driven to the top of rock level.

Conceptual layouts for each of the proposed new wharves are provided in Figure 51 and Figure 52**.**

8.1.2 Materials

The choice of materials for the new wharves construction will be governed by durability, aesthetic and cost considerations.

Timber is generally considered more-aesthetically pleasing and historically consistent than concrete or steel. However, unless special treatments are introduced it is expected that timber elements, (particularly decking) would need more regular maintenance than other materials. The design life of timber piles in particular would be expected to be less than steel or concrete due to the mechanism of erosion from marine borers over time, unless wrapping or other protective measures are introduced. Fibre reinforced composites are proposed by suppliers as an aesthetically pleasing and durable alternative to conventional materials.

Further work will be needed at the next design stages in determining the optimum wharf materials based on maintenance expectations for the wharf owner and other stakeholder requirements.

Figure 49: Example of a fixed timber ferry wharf structural type with approach jetty and fixed wharf head. Note: non-DDA compliant step boarding access at lower tides (Currawong Wharf, Pittwater)

8.1.3 Disability Access Provisions

The new wharves will be required to be designed to meet the relevant legislation and guidance for disability access, including:

- The Disability Discrimination Act (1992).
- Disability Standards for Accessible Public Transport 2002.
- AS 1428.1, .2 & .4.
- Disability (Access to Premises – Buildings) Standards 2010, Schedule 1.
- BCA - Building Code of Australia.

In the context of the fixed wharf structural type anticipated, a key requirement is for any ramps leading to the approach jetty and along the wharf head to have a gradient of no steeper than 1 in 14 (vertical: horizontal) and minimum landing widths between ramps.

Passenger transfer from the wharf deck to the vessel is expected to be via mobile gangways from the vessel itself. It is expected that wheelchair-bound or other less-mobile passengers will require physical assistance from ferry operator staff during boarding and disembarking the vessel over the gangway (refer Figure 50).

Figure 50: Example of assisted access from a fixed wharf to ferry vessel via gangway (Redcliffe Jetty, QLD).

Figure 51: Concept plan of proposed new La Perouse wharf

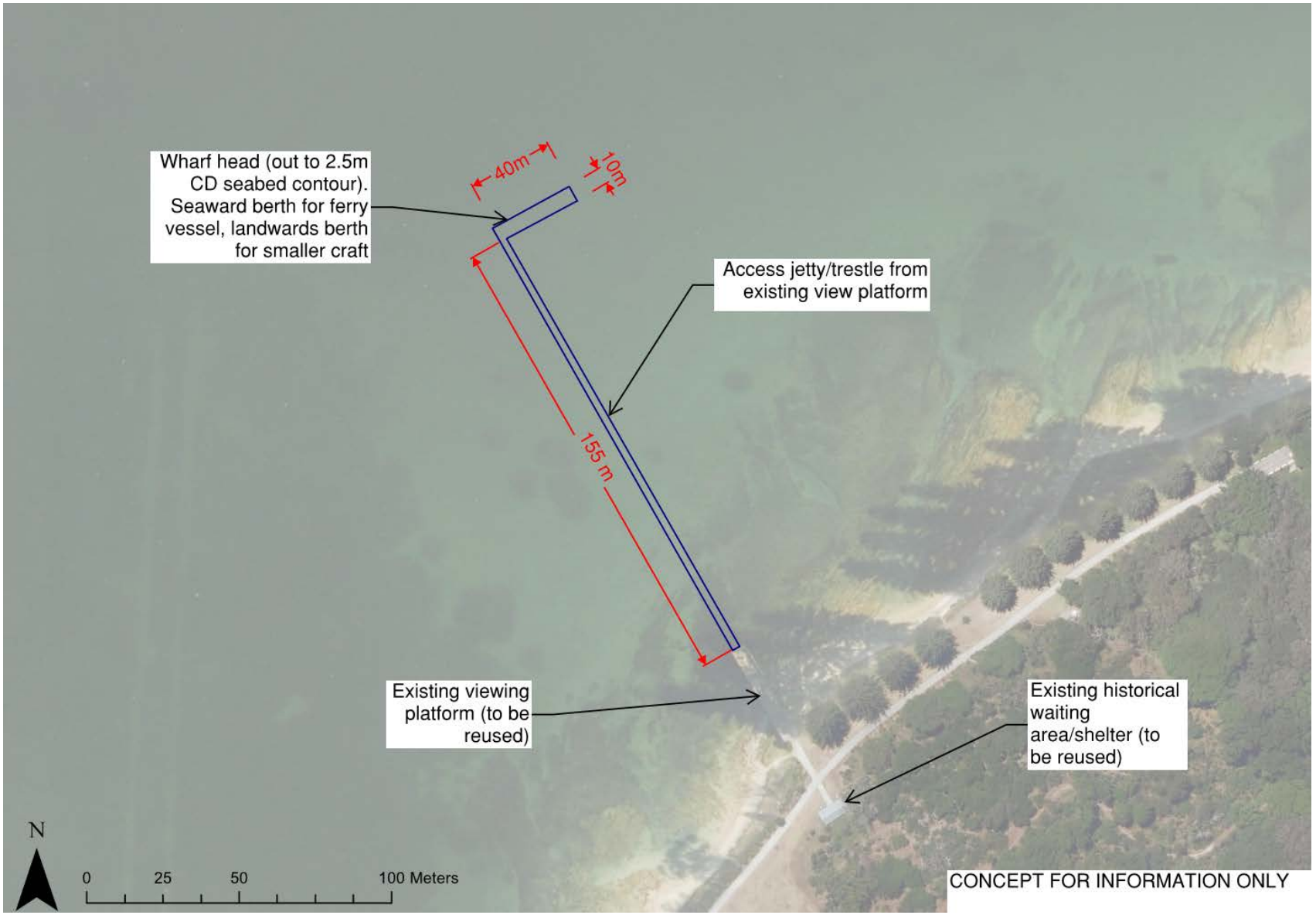


Figure 52: Concept plan of proposed new Kurnell wharf

8.2 Car Parking

Availability of nearby car parking will be an important consideration should new ferry wharves at La Perouse and Kurnell be introduced. Feedback received from passengers on Sydney Harbour ferry services is that a lack of close car parking space is a significant complaint and reason for not using ferry services.

The need for additional car parking will vary at La Perouse and Kurnell according to the user types expected to embark their ferry journey at these locations.

For the proposed wharf locations it is not expected at this stage that they would be augmented by small craft launching ramp access necessitating new parking for boat trailers.

Kurnell

Kurnell will experience the greatest demand on weekdays associated with commuter car parking. Up to 135 people are expected to travel to Kurnell in the morning peak period to use the ferry service. Discounting those that walk / dropped off at the wharf, it is estimated that there will be demand for approximately 85 car parking spaces.

Of the 100 existing on-street parking spaces at Kurnell, it is estimated approximately half of these are typically occupied on a weekday. Therefore the ferry wharf may require the addition of 35 additional parking spaces in close proximity (ideally within 400m) of the wharf.

An area of open space adjacent to Captain Cook Drive has been identified as a potential location for these additional parking spaces. This area is indicatively illustrated in Figure 53 opposite. Further consultation with Sutherland Shire Council and NPWS (owner of the affected land) will need to be undertaken to confirm the suitability of this location for additional off-street parking.

Figure 53 Parking opportunities - Kurnell

La Perouse

As previously noted, despite the availability of more than 450 on-street spaces at La Perouse, observations over a number of weekends indicate these spaces are typically occupied during the day. The introduction of a ferry wharf is likely to induce additional parking demand (predominately by tourists/visitors) on weekends when parking at La Perouse is already at capacity.

It has previously been identified in section 5.2 of this study that there may be up to 270 people on-site at any one time at Kurnell having travelled by ferry from La Perouse. In determining the number of additional parking spaces required, it is reasonable to assume that:

- 20% of the 315 people using the ferry service would already be at La Perouse, regardless of the ferry service being in place.
- 20% of those arriving to La Perouse do so via public transport, walking and/or cycling or are in tour groups.
- There is an average car occupancy of two people / car.

Based on the above assumptions, there would be a need to provide an additional 86 car parking spaces at La Perouse. Options to accommodate this additional demand at La Perouse are limited given the already developed nature of the area. Some potential options (requiring further consultation with Council, National Parks and Wildlife Services and the Aboriginal Land Council) include:

- Conversion of existing parallel parking bays to 90 degree angle parking on the loop road and Anzac Parade (Figure 54).
- Extension of existing 90 degree angled parking bays on the eastern side of Anzac Parade (Figure 55).
- Introduction of time restrictions to increase turnover of spaces – therefore increasing the effective car parking capacity.

Figure 54 90 degree parking bays on loop road

Figure 55 Angled parking on Anzac Parade

8.3 Other Amenities & Provisions

In addition to the major wharf and car parking infrastructure components, the following other amenities and provisions are expected to be required as part of the service:

- **Passenger waiting area/shelter.** This is expected to be provided at the landward end of the wharf before entering the approach jetty. It is proposed that the existing historical shelter at the location of the proposed Kurnell wharf be utilised, and a new one would be required at the La Perouse wharf.
- **Ticketing area.** The arrangement for this will depend on the preference of the operator. Ticketing may be performed from a manned booth or electronic ticket machine, and would be expected to be located near the waiting area/shelter. Alternatively, the operator may choose to undertake ticketing on the vessel itself.
- **Toilet amenities.** On the Kurnell side, the closest toilet amenities are at the National Park Visitor's Centre approximately 350m away from the proposed wharf location. On the La Perouse side, the closest public toilet amenities are approximately 350m away from the proposed wharf location on the eastern side of Anzac parade at the entrance to the loop road. Notwithstanding this, it is assumed that dedicated toilet facilities would be provided at each end of the ferry route. Consideration should be given to positioning these toilet amenities near the carparking areas away from the wharves to reduce visual and other impacts at these locations.
- **Pathway from car parking and transport connections.** At Kurnell, the pathway of Burrawang walk leading along the shoreline to the viewing platform and shelter is likely already sufficient. On the La Perouse side, the existing pathway leading off Anzac Parade towards the wharf location will need extending to the site.
- **Gate/security provisions.** The operator may require a security gate at the head of the wharf for passenger safety control and security.

Figure 56: Existing historical shelter immediately landside of the preferred wharf location proposed for reuse.

8.4 Indicative Cost Estimate

An indicative cost estimate for the provision of the wharf infrastructure at La Perouse and Kurnell is provided below.

This high-level, top-down estimate has been made based on Arup's experience, supplemented with construction industry benchmarks and guidance. The actual capital cost will depend on a number of factors that are liable to vary with time including contractor methods and prevailing construction market conditions. Typically there is a particular variability in maritime construction costs per project due to the limited number of marine contractors and availability of specialist plant and equipment.

A total infrastructure capital cost for the two wharf locations is estimated to be in the order of **$17 million (**present day estimate). A breakdown of this estimate is provided below.

La Perouse Wharf

	Rate ($/Unit)	Unit	Quantity	Amount ($)
Wharf access jetty	4,000	m^2	390	1,560,000
Wharf head structure	5,000	m^2	400	2,000,000
Car parking	10,000	Space	86	860,000
Other	500,000	Allow	1	500,000
		Sub total (direct costs)[1]		***4,920,000***
Indirect costs[2]		35	%	1,722,000
		Sub total (incl. indirect costs)		***6,642,000***
Contingencies		30	%	1,992,600
		TOTAL (incl. contingencies)		**8,634,600**

Kurnell Wharf

	Rate ($/Unit)	Unit	Quantity	Amount ($)
Wharf access jetty	4,000	m^2	465	1,860,000
Wharf head structure	5,000	m^2	400	2,000,000
Car parking	10,000	Space	35	350,000
Other	500,000	Allow	1	500,000
		Sub total (direct costs)[1]		***4,710,000***
Indirect costs[2]		35	%	1,648,500
		Sub total (inc. indirect costs)		***6,358,500***
Contingencies		30	%	1,907,550
		TOTAL (incl. contingencies)		**8,266,050**

Notes:
1. *Direct costs* includes contractor materials, labour and margin
2. *Indirect costs* includes investigations and studies, environmental impact assessment and approvals, design, project/construction management, client costs and contractor preliminaries.

In addition, the following typical asset maintenance costs could be in the order of:

Wharves:	0.5% of capex per annum on average over the serviceable life of the asset (50 years) plus 10-15% for one-off refurbishment/repair works at 25 years.
Car parking & other:	1-2% of capex per annum on average over the serviceable life of the asset.

9 Preliminary Assessments

9.1 Social, Tourism and Economic Benefits

9.1.1 Social benefits

Although La Perouse and Kurnell are only 1.5 km apart, Kurnell is only connected to the city via a large detour around Botany Bay. The ferry would add the missing link for walking routes around Botany Bay and along the coastline, opening up possibilities for recreational walking and cycling routes (the ferry vessel should be flexible enough to accommodate bicycles).

Additionally, the community of Kurnell would feel better connected to the rest of Sydney through an attractive and unique mode of transport. A La Perouse to Kurnell service would also close the missing link to the south coastline corridor, linking Cronulla to Bundeena and the Royal National Park. It would be another gateway to the Sutherland Shire for visitors.

The Conservation Management Plan for the Botany Bay National Park Kurnell[21] highlights that when the historical ferry service ceased in 1974, the significant historic, aesthetic and social values associated with a water connection between La Perouse and Kurnell was lost. A new ferry service would reintroduce the physical experience of the crossing and the view of the sites, providing a heightened visitor experience with these places. The ferry service would greatly enhance the significance of the former landing place of Captain Cook and create a similar arrival experience to Kurnell as the historic event itself. A ferry service would also provide an important physical and cultural water link between the two places for the Aboriginal community.

The new wharves would be an attractive launching point for divers and fishing boats.

9.1.2 Tourism benefits

The introduction of the ferry service and particularly the increase of access to Kurnell that it brings adds a potential additional tourist hotspot to Sydney. The Kurnell Meeting Place is historically a highly significant site to both Sydney and Australia in general, and increasing the access to the site could develop the area into a more popular and better known tourist attraction, similar to other Sydney icons like Sydney Harbour, the Blue Mountains, the Opera House and Taronga Zoo.

Additionally, a new connection would increase the accessibility of Kamay Botany Bay National Park on either end, most likely increasing visitors to the Kurnell side.

To maximise the potential tourism demand for the ferry service, complementary measures for revitalising La Perouse and Kurnell tourist attractions should be considered. Future revitalisation plans for the National Parks should reflect the ferry service's history, social/cultural significance and function. As an example, the 2014 amended Kamay Botany Plan of Management provides for new uses in the La Perouse precinct and the La Perouse Museum that will allow this area to be revitalised.

[21] Context Pty Ltd, 2008

9.1.3 Economic benefits

The increase of tourists and commuters on either end of the connection is likely to induce both direct as well as indirect economic benefits, both locally as well as city wide.

Direct possible economic benefits would consist of revenue from ferry fares and refreshments serviced onboard, as well as economic stimulus for La Perouse and Kurnell local businesses (e.g. food and drink, retail). The increased accessibility of tourist destinations and suburbs could bring indirect economic benefits in the longer term, such as an increase in house prices and an increase of tourists to the Sydney region.

Indirect economic benefits from tourism as a result of an improved links to Cronulla and the Royal National Park would also be expected. Overnight visitations have the potential to increase as a result of the new linkage, which would place a greater demand for and viability to providing more accommodation in the area,

A quantitative economic cost-benefit analysis considering direct and indirect benefits is not part of the scope for this feasibility study, however should the project progress such an analysis should be considered as part of an overall business case.

9.2 Environmental Assessment

9.2.1 Cultural Heritage

A high-level overview of Aboriginal and non-Indigenous (historical) heritage constraints was undertaken by Artefact Heritage (Artefact) on the project study area and in considering the wharf options proposed at La Perouse and Kurnell. Findings of the primary Heritage study and identification of constraints conducted by Artefact can be found in Appendix A.

Ta Artefact's report identifies a number of key heritage constraints within the study area.

The high level constraints analysis conducted by Artefact did not include predictive statements regarding archaeological potential within the study area. A detailed archaeological assessment and field survey would be required in order to accurately assess archaeological potential for the project. Of key interest, and close proximity (within 500 meters) to the preferred wharf options at La Perouse and Kurnell, a summary of heritage sites and items is provided below:

Table 6 Identified heritage sites within vicinity of preferred wharf locations

ID	Heritage register	Site type	Proximity to proposed works
La Perouse Option 2			
1144	AHIMS	Shell, Artefact	140 metred north of La Perouse Option 2. Adjacent parking places and road on La Perouse peninsula
45-6-0652	AHIMS	Art (Pigment or Engraved)	200 metres northwest of La Perouse Option 2
45-6-0648	AHIMS	Art (Pigment or Engraved)	200 metres northwest of La Perouse Option 2. Note that

ID	Heritage register	Site type	Proximity to proposed works
			location is likely in error, may be closer to proposed works
45-6-0651	AHIMS	Art (Pigment or Engraved)	30 metres north of La Perouse Option 2, immediately adjacent road and parking places
45-6-0649	AHIMS	Art (Pigment or Engraved)	30 metres north of La Perouse Option 2, immediately adjacent road and parking places
45-6-0650	AHIMS	Art (Pigment or Engraved)	30 metres north of La Perouse Option 2, immediately adjacent road and parking places
Kurnell Option 2			
105812	National Heritage database	Kurnell Peninsula Headland	0 metres from all options
(Nominated) 106162	National Heritage database	Kamay Botany Bay	0 metres from all options
00978	SHR	Bare Island Fort	100 metres south of La Perouse Option 2
01918	SHR	Kamay Botany Bay National Park (North and South) and Towra Point Nature Reserve	0 metres from all options
C5	Randwick LEP 2012	Botany Bay Conservation area	0 metres from all La Perouse options
A2512	Sutherland LEP 2015	Banks Memorial	70 metres east of Kurnell Option 2
A2516	Sutherland LEP 2015	Landing Place Wharf Abutment	0 metres from Kurnell Option 2
A2514	Sutherland LEP 2015	Captain Cook Monument	70 metres southwest of Kurnell Option 2
A2519	Sutherland LEP 2015	Captain Cook Watering Well	70 metres southwest of Kurnell Option 2
A2518	Sutherland LEP 2015	Captain Cook Watering Hole	70 metres southwest of Kurnell Option 2
A2521	Sutherland LEP 2015	Yena Track	400 metres southeast of all Kurnell options
2522	Sutherland LEP 2015	Muru Track	400 metres southeast of all Kurnell options
A2521	Sutherland LEP 2015	Yena Track	400 metres southeast of all Kurnell options
2522	Sutherland LEP 2015	Muru Track	400 metres southeast of all Kurnell options
2509	Sutherland LEP 2015	Towra Point Nature Reserve & Quibray Bay	0 metres from all Kurnell options
2528	Sutherland LEP 2015	Towra Point Nature Reserve & Quibray Bay	0 metres from all Kurnell options
2504	Sutherland LEP 2015	Kurnell Historic Site	0 metres from all Kurnell options

9.2.2 Ecology

9.2.2.1 Terrestrial Ecology

The footprint of disturbance for landside infrastructure is expected to be minimal, and should be easily accommodated within existing cleared areas. Therefore no significant impact on terrestrial ecology values are anticipated. Should landscaping be installed as part of the project, there is an opportunity to utilise native species of the area to increase habitat values.

9.2.2.2 Aquatic Ecology

A preliminary aquatic ecological study was conducted by Marine Pollution Research Pty Ltd (MPR) to identify the main constraints and opportunities associated with the proposed project (see associated report in **Appendix B**).

The MPR study identified the following aquatic ecological constraints for the preferred siting options of the ferry wharve requiring further investigation and management:

La Perouse Preferred Wharf Location:

- There is a low to moderate risk of construction impact on inshore scattered seagrass (*Halophila* and *Zostera*) beds but given the generally scattered nature of the beds, the impact is likely to low and manageable.
- There is likely to be some construction impact on inshore rocky reef - generally low profile kelp reef that is not known (or expected) to support large numbers of weedy sea dragons or seahorses (i.e. there is a low construction risk to syngnathids and other cryptic fish).
- The placement of the wharf over rock reef habitat will shade the habitat and some shading impact on rocky reef could be expected although it is most likely to be low risk.
- Whilst generally sheltered from direct long-period storm waves entering Frenchmans Bay, the site is still open to a long wind wave fetch to the north-west through to west which makes use of the wharf difficult during north-westerly gales. However, it would not be expected to cause wave scour around the wharf piles.
- In relation to the above the proximity of shallows to the north-east would make ferry manoeuvring difficult during on-shore winds with a consequent greater risk of bottom scouring inshore creating water column sedimentation.

Kurnell Preferred Wharf Location:

- There would be a low risk of some impact to inshore mixed seagrass patches from pile placement that include some *Posidonia australis* cover but which are not likely to be classified as EEC (due to their patchiness and size). The risk would relate primarily to the positioning of jetty support piles.
- Whilst there would be some impact on inshore plus offshore rocky reef expected from jetty and wharf pile placement the risk to the aquatic ecological attributes at this location are considered low due mainly to the relative low diversity of the low profile kelp reef. This reef is unlikely to support large numbers of weedy seadragons (i.e., there is a low risk to syngnathids).
- There is some potential disturbance risk for listed shore birds and for the occasional hauling-out seals but this risk is considered manageable and a low risk for the species concerned.

- There would be some shading impact on rocky reef but this would be a low risk as the waters along this shoreline are generally very clear and also generally well agitated ensuring adequate refracted and reflected light for the shaded reef sections.
- There is some potential for storm wave scouring of sediments around piles but as the coarse marine sand in this location forms a veneer over basement rock, the impacts are likely to be considered low risk.
- There is some potential for ferry induced bottom scouring of sediments during low tide manoeuvres. However, given the mobility of sand plus its character (coarse to fine marine sands with low silt content) there is low risk of turbidity and/or mobilisation of contaminants from this bottom scouring.

Additional Aquatic Ecological Requirements for Environmental Assessment

Whilst the overall availability of information on the aquatic ecology of Botany Bay is generally good, the assessment of the preferred wharf options at La Perouse and Kurnell will require additional field aquatic ecological assessment to delineate the actual aquatic habitats and confirm and/or extend the information on the value of these habitats for the aquatic biota utilising the habitats.

Assessment of aquatic ecology impact will require more detailed information on the actual layout and location of the wharves, the construction methods and materials, and the characteristics of the vessels that are expected to use the facilities. In this latter respect the relationship between vessel propulsion method and distance off the seabed of the propulsion gear under both quiescent and various sea and swell conditions will be critical for determining the potential impact of vessel propulsion scour on seabed habitats. This assessment will also require a detailed bathymetric survey of the seabed at and around the wharf and over the ferry entry and exit paths under varying environmental (wind, tide, current, wave and sea state) conditions.

It is recommended that adequate commitment to mitigating and minimising any direct and indirect impacts on seagrass is made during the design, construction and operation of the project. Potential construction methods could include the transplanting of seagrass where no other mitigation option exists.

9.2.3 Air Quality

The Office of Environment and Heritage (OEH) monitors air quality at a number of locations across Sydney, with the closest station being at Randwick. The Sydney East region has only recorded occasional exceedances of the National Environmental Protection Measures (NEPM) which set maximum goals for air pollution. There were no exceedances of the guidelines recorded in 2014 for all air quality pollutants in the Sydney East region (OEH, 2015).

The National Pollution Inventory records a number of industrial facilities within proximity to the study area which generate air emissions, mostly based at the Botany Bay Port.

The nearest sensitive receptors to air emissions from the project would be residents at Kurnell and La Perouse. There are also a small area of shops which include dining areas at La Perouse which would be sensitive to potential nuisance emissions. The closest of these is the Boatshed Cafe, which would be approximately 75m from the wharf.

The construction phase of works are unlikely to disturb significant surface areas, and would not be expected to create nuisance dust emissions at sensitive receptors.

During operations, the main source of air emissions would be exhaust emissions from the ferry. Ferry traffic is not expected to be frequent, and the size of vessel likely to be utilised would not be expected to generate significant nuisance emissions.

9.2.4 Noise and Vibration

Both Kurnell and La Perouse are relatively quiet during the week, but can be extremely busy on the weekend, particularly at La Perouse, with noise generated from recreational users, traffic and businesses. Botany Bay in general has a number of industrial facilities which generate noisy activity, including the Sydney Airport and Port.

Construction noise would mostly be generated by piling activities to install wharf infrastructure, which can generate intermittent nuisance noise. The Interim Construction Noise Guideline (ICNG) (DECCW, 2009), sets noise management levels for construction activity, which are Rating Background Levels (RBL) plus 10dB (A) during standard working hours or RBL plus 5dB (A) outside of standard working hours.

It is anticipated that piling activity will be undertaken in daylight hours between standard operating hours (7:00am to 6:00pm Monday to Friday and 8:00am to 1:00pm on Saturday) which would limit nuisance to residential receptors as the potential for sleep disturbance would be minimal. The restaurants at La Perouse, which are closer to the proposed works area may experience additional noise impacts above the limits outlined in the ICNG, however the temporary nature of the noise source, relatively high background noise levels and the limitation of operating hours should minimise disruption.

Once the ferry service is operational, the noise impact will somewhat depend on operating hours, vessel size and the number of services. Potential nuisance noise sources would be the movement and mooring of the vessel itself, passengers and their vehicles at parking areas. The service is expected to be most heavily utilised during weekends during daylight hours by recreational users and tourists, when boat traffic on Botany Bay and recreational use of the La Perouse Headland and Kurnell foreshore is already significant. The additional traffic (and hence, noise generated) is not anticipated to be significantly greater than that already experienced at these locations.

Whilst it is not expected that significant nuisance noise would occur during either construction or operation of the ferry service, should the project proceed to a more detailed assessment, a noise study should be undertaken to quantify the potential noise impact and identify mitigation measures.

9.2.5 Water Quality

The Botany Bay catchment is approximately 1165km^{2,} of which 40% is used for urban, industrial or commercial purposes. The Cooks and Georges River flow into the bay. Overall, a large proportion (47%) is still bushland or parkland.

The OEH undertakes regular water quality monitoring at recreational beaches within Sydney, including those in the Botany Bay. In 2012-13, 75% of swimming sites were graded as Good or Very Good in terms of water quality. Microbial water quality was generally suitable for swimming, although the annual report recommends that swimming should be avoided at sites in Botany Bay for up to three days following rainfall. Foreshore Beach near the Sydney Airport regularly receives the title of Sydney's most polluted beach due to its location next to sewage outfalls and heavy industry.

The Environmental Impact Statement (EIS) undertaken in 2013 for the nearby Kurnell Port and Berthing Facility Upgrade (URS, 2013) reports that Botany Bay experiences high levels of suspended sediments following heavy rainfall (up to 25mg/L), with improved

conditions in calmer conditions (average of 5mg/l). TBT, (which is commonly found in sediments of ports due its use as an antifouling agent in much of the world's shipping fleet until its ban) is present in sediment samples taken from the Bay, particularly areas close to the Port Botany Port. Samples undertaken near the Kurnell jetty in 2004 by the Natural Heritage Trust did not detect levels of TBT above detection limits.

Water quality at the two proposed wharf locations is visibly clear; the presence of seagrass beds at both locations indicates that water quality is reasonable.

The construction phase will potentially generate a number of water quality pollutants, although the one with the most potential to have an adverse impact is sediment produced during piling activities to install wharf infrastructure. Piling can result in localised visible sediment plumes being produced for a short period. The short duration of the piling activity means that there is unlikely to a significant impact on water quality and nearby seagrass beds would not be expected to experience permanent or even short term impact. It is recommended that the wharf be placed at least 50m from the boundary of the nearest seagrass bed as a precautionary measure. Sediment impacts can also be controlled and or reduced by the piling method chosen, the installation of sediment controls (e.g. silt curtains) and the timing of activity (i.e. avoid incoming tides). Other potential pollutants include spills from piling barges and the disturbance of surface soils for any land-based works. These are considered low risks given the scale of works, which can be easily managed through construction controls such as applying erosion and sediment controls.

Provided construction controls are appropriately applied and managed, construction activity is unlikely to have a significant impact on water quality of the surrounding marine environment.

Potential pollutants generated during operation of the ferry service include loss of fuel from the ferry from a grounding or collision with another vessel, sedimentation from propeller wash, stormwater runoff from car parking areas (if required) and the production of litter from ferry users. The wharf should be designed to allow sufficient Under Keel Clearance for vessels using the wharf to minimise propeller wash. Ferry vessels are proposed to be fuelled and serviced (i.e. cleaning, painting and other maintenance) at an appropriate facility (e.g. facility within the Botany Port) with the necessary stormwater and pollution controls. Any vessel would be required to maintain adequate spill equipment and train staff in spill response and notifications.

9.2.6 Contaminated Soils

Acid sulphate or contaminated soils are considered low risk considering no dredging or significant excavation will be undertaken in the construction of the infrastructure. .

9.2.7 Landscape Character and Visual Impact

The immediate environment at both Kurnell and La Perouse is scenic, with views across water and to beaches and the naturally vegetated areas within the Botany Bay National Park. Botany Bay does have an industrialised backdrop however, with views to the Port, Airport and the Caltex Refinery on the near horizon. The built environment contains a number of historic monuments, buildings and fortifications to which viewing corridors should be maintained to protect heritage values.

The design of the wharf and associated infrastructure should minimise impacts to heritage values. This lends itself to a modest built form that blends into the existing environment as much as possible. It may be possible to include viewing platforms to sites of

significance (e.g. Cook's monument) to complement existing viewing opportunities and interpretive materials. It is recommended that a more detailed visual assessment using photo montages is prepared should the project proceed, to inform the ferry terminal design. Any landscaping undertaken as part of works should utilise native species, potentially highlighting some of the historic plantings and/or those recorded by Banks during his exploration of the area. Overall, with sensitive design, the project could enhance opportunities to view the heritage values of both Kurnell and La Perouse, and would be in keeping with the existing landscape character of the study area.

9.2.8 Climate Change

Climate change projections for the Sydney Metropolitan region are provided by the NSW DEH, through their NSW and ACT Regional Climate Modelling (NARCLiM) project. By 2030 they include:

- An average annual maximum temperature rise of 0.7ºC.
- 5-10% increased autumn rainfall.
- Increased severe summer Severe Fire Weather (additional 1 day).
- An average of 4 more days above 35 º C per year.
- An average of 5 fewer nights below 2 º C per year.

The NSW Government had previously adopted a Sea Level Rise Policy which supported using a projected sea level rise of 0.4m by 2050 and 0.9m by 2100 to make planning decisions. This policy has since been withdrawn, with the State preferring local government to adopt their own local policies.

These impacts should be considered as sensitivity scenarios during the design stages and should be able to be adequately managed.

9.3 Road Transport Impacts

9.3.1 General

Should the project be progressed to next development stages it is envisaged that project-specific traffic and parking investigations and impact assessment would be undertaken. A high level assessment of this issue for this study is provided below.

9.3.2 Traffic Impacts

There are no major signalised intersections in the vicinity of either the potential La Perouse or Kurnell ferry wharves. The road network supporting these areas typically operates satisfactorily at most times of the day and week, with the exception of some localised traffic congestion occurring on the loop road at La Perouse on weekends.

The addition of new ferry wharves will generate additional traffic movements at both La Perouse and Kurnell – however these movements are expected to be less than 100 vehicles in the peak hour. This is not expected to result in a noticeable deterioration in performance of the local road network.

9.3.3 Parking Impacts

Section 8.2 identified the future indicative parking requirements generated by the ferry wharves at both La Perouse and Kurnell (86 and 35 additional spaces respectively).

This study has identified potential locations for additional parking to service the future demand. Should this parking not be provided, there may be impacts on existing users of each area – resulting in visitors having to park further away from their desired destination.

9.3.4 Coaches and Buses

A ferry service at La Perouse would be attractive for tour group operators to run coaches to the site - allowing groups to visit both La Perouse and Kurnell in the same visit. This would require coach parking to be located nearby to La Perouse for 3 to 4 hour duration. Currently no dedicated coach parking is provided at La Perouse, only a drop off / pick up point on the loop road. This will need to form part of considerations in terms of landside infrastructure.

The existing bus stop at La Perouse is currently located approximately 350m from the preferred ferry wharf location. To provide for seamless interchange between modes, consideration could be given to relocating the bus stop to the loop road near the wharf. This would require further consultation with TfNSW.

9.4 Impact on Bay Users

There will likely be no issue with exiting port shipping traffic on the ferry service. Port Botany and Kurnell Refinery vessel call frequency is typically only a few vessels per day maximum.

Generally, the navigation convention is that smaller vessels are required to avoid impeding the safe passage of larger vessels constrained by their draft or operating within a narrow channel etc. This is reinforced by the Harbour Master’s directions. Therefore ferries and commercial vessels will be required to stay clear of large vessel transiting and manoeuvring within Botany Bay, however this should not significantly affect the route transit or travel times.

The ferry route will be kept clear of the Kurnell Refinery jetty so it is not expected to significantly impact these operations.

Existing recreational boating traffic in the Bay is not expected to significantly impact the proposed ferry service, especially

considering the example of Sydney Harbour where ferry operations and recreational boating is adequately managed and where vessel numbers are relatively much higher than in the open waterbody of Botany Bay. The inshore reefs in the vicinity of the preferred wharf locations are also used by spear-fishers, and has a relatively high use by recreational divers.

Should the project proceed to the next stages impacts on shipping and management requirements will be required to be considered further.

9.5 Impact on Coastal Processes

The impact on coastal processes, including waves and sediment transport, within Botany Bay as a result of the construction of the proposed ferry wharves is expected to be negligible for the following reasons:

- The foundations of the approach jetty and wharf head will be formed by widely-spaced piles of 5m centres or more. This will effectively mean that a significant amount of wave energy and sediment movement will be able to transmit under the wharf. Wave energy reflecting off the piles is expected to be relatively small and isolated. The design of the foundation piles will need to make allowance for localised scour effects.
- The wharf is proposed to be extended out to sufficiently deep water for operations to negate the need for dredging of the seabed which might affect inshore wave transformation and sediment transport.
- The preferred Kurnell Wharf site has an existing (albeit short) viewing platform of a similar construction to the new wharf, with no apparent impact on coastal process.

This preliminary assessment may need to be confirmed at later stages of the project, potentially with the assistance of numerical modelling, however it is expected that any impacts can be adequately managed.

10 Planning Approvals

The wharves and associated infrastructure will be subject to environmental assessment and planning approval processes.

The *NSW Environmental Planning and Assessment Act 1979* (EP&A Act) and the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) provides the framework for development and environmental assessment in NSW. The EP&A Act contains a number of different planning approval pathways for the assessment of development proposals in NSW, including Part 5 (typically public infrastructure developments).

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) is the key environmental planning instrument which determines the permissibility of the proposed project.

Clause 68(4) of the ISEPP allows for the development permits development on any land for the purpose of wharf or boating facilities to be carried out by or on behalf of a public authority without consent.

If the wharf infrastructure is to be delivered by TfNSW or the Roads and Maritime Services as the proponent, it can likely be assessed and determined under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act), usually by a Review of Environmental Factors (REF).

Dependant on the final siting location of the wharves and the subsequent environmental impacts posed, a referral to the Commonwealth under the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) might also be required. The determining authority, in this case TfNSW or RMS, must also consider if the project will likely have any impact on threatened species, populations or ecological communities, or their habitats. A preliminary assessment of the potential impacts must be conducted under section 5A of the EP&A Act, which sets out the factors which must be considered in making this decision, known as the 'Assessment of Significance' or '7 part test'.

Key stakeholders that should be considered to be included in the planning approvals consultation process include (in no particular order):

- Roads and Maritime Services.
- NSW Environment Protection Agency.
- NSW Office of Environment and Heritage.
- NSW Heritage Council.
- Greater Sydney Local Land Services.
- Randwick City Council (La Perouse).
- La Perouse Local Aboriginal Land Council.
- Sutherland Shire Council (Kurnell).
- NSW Ports.
- Port Authority of New South Wales.
- Local community associations (e.g. local boating groups, Friends of the La Perouse Museum).
- Local general community.

Issues that are raised during the consultation process should be addressed in the environmental assessment. Consultation with the stakeholders should continue prior to and during construction of the proposed development.

11 Infrastructure Funding and Operating Model Options

11.1 Infrastructure Funding

It is likely that the wharf infrastructure would need to be Government funded and owned by either the relevant state or local Government authority. The alternative option of the wharf infrastructure being privately built and owned is unlikely given the uncertainty in actual passenger patronage and commercial viability at least in the short term to justify a reasonable rate of return.

Given the demonstrated benefits to the local community from the wharves, there may be a case for negotiating a local Government contribution (i.e. Randwick City Council and Sutherland Shire Council) to the funding of the infrastructure.

Commonwealth Government grant funding could also be explored given the national and cultural (Aboriginal and non-Aboriginal) significance of the sites, in particular the Kurnell Meeting Place and the enhanced arrival experience a wharf there would bring.

11.2 Operating Model

11.2.1 Wharves

It is expected that the Government owner of the wharf infrastructure would be able to offset a proportion of operating and maintenance costs by charging a fee to ferry and other commercial users of the wharves (e.g. offshore whale watching, bay and up-river excursions). This might take the form of charges from one-off visits through a wharf booking system (as previously discussed in Section 5.4) or longer-term arrangements.

11.2.2 Potential Ferry Service

The preliminary analysis of passenger demand suggests that it is not likely that a commercial ferry service between the two wharves would be viable on a stand-alone basis. It is likely that some form of Government intervention would be required. The NSW Passenger Transport Act requires that any regular ferry service must operate under a contract with TfNSW unless TfNSW issues an exemption from this requirement.

If issuing a service contract were to be contemplated a range of issues would need to be considered including the degree to which the service is subsidised by Government, if any, and the level of Government control over key service aspects such as service frequency, fare levels, and performance benchmarks.

12 Study Consultation Process

12.1 Stakeholder Consultation

The study has been directed by a Project Control Group (PCG) which includes the following key government stakeholders (in no particular order):

- Transport for NSW (the study proponent).
- NSW National Parks and Wildlife Service.
- Randwick City Council.
- Sutherland Shire Council.

All members of the PCG were active in jointly establishing the study terms of reference, and attending and contributing to regular PCG progress meetings over the development of the study. The PCG members also formally reviewed initial drafts of the Feasibility Study Report and provided comments that were addressed in the Draft Report.

A preliminary meeting with the La Perouse Local Aboriginal Land Council (LPLALC) to discuss the proposed ferry service was held on Thursday 17 December 2015. The meeting included an overview of the project by TfNSW and Arup representatives, as well as a preliminary discussion of proposed wharf locations in relation to Aboriginal sites. At the meeting initial comments were received from the LPLALC on the study and it was agreed that the draft study report will be forwarded to the LPLALC for review and formal comment.

In addition, a number of commercial vessel passenger service companies with existing operations in the Greater Sydney region were contacted to obtain initial comments and gauge interest in a prospective ferry service between La Perouse and Kurnell.

Formal feedback on the Draft version of this study report was also sought and obtained directly from key agencies and stakeholders during the public comment period:

- National Parks and Wildlife Service.
- Randwick City Council.
- Sutherland Shire Council.
- La Perouse Local Aboriginal Land Council.
- NSW Ports.
- Port Authority of New South Wales.

12.2 Community Consultation

The Draft version of this study report was made available for public comment from 5 July to 12 August 2016. Details of the engagement activities undertaken and the feedback received during the public comment period is contained in a Submissions Report provided in **Appendix C**. An overview of this report is provided below.

During the public comment period, community consultation activities included:

- placement of information on TfNSW's website to make information readily available to the public;
- distribution of project flyers to residents and businesses in areas adjacent to the potential ferry wharf locations to publicise community information sessions and the project webpage

- advertising in local newspapers to notify the public of the project details, webpage and public information sessions;
- a media release to publicise the public comment period; and
- two community drop in sessions to allow the public to view the draft feasibility report and talk to members of the project team.

A total of 111 submissions were received during the public comment period which ran from 5 July to 12 August 2016.

Of the 111 submissions received:

- 82 (74%) expressed support for potential new ferry wharves at Kurnell and La Perouse.
- 12 (11%) were unsupportive of potential new ferry wharves at Kurnell and La Perouse.
- 17 (15%) were neutral.

The main reasons given for supporting the potential new ferry wharves were:

- Economic development and tourism opportunities;
- Improved access to Kamay Botany Bay National Park.
- Providing an alternative to driving to travel between La Perouse and Kurnell.

The main reasons given for not supporting the potential new ferry wharves were:

- Traffic and parking impacts.
- Unsupportive of government subsidising a ferry service.
- Social impacts on local residents.

12.3 Further Consultation

The consultation process would be continued at further stages, particularly during the planning approval stage, should the project proceed beyond this study.

Feedback received from the community and stakeholders on the Draft version of the study report was considered and amendments made where applicable in this Final version. Where appropriate, key issues raised during the public comment period will be investigated in more detail during future stages.

13 Conclusions

13.1 Key Outcomes and Recommendations

- A multi-criteria siting assessment has identified the preferred wharf locations to be: at the southern end of Frenchman's Bay within the site of the old ferry wharf (La Perouse); and at the site of the old wharf and existing viewing platform near Captain Cook's Obelisk (Kurnell).
- A total infrastructure capital cost for the two wharf locations is estimated to be in the order of $17 million. Whole of life asset maintenance costs will also apply.
- A preliminary environmental assessment suggests that there is likely to be no significant environmental impacts from the construction and operation of the La Perouse and Kurnell wharf and associated infrastructure that cannot be appropriately managed and mitigated. Potential heritage and aquatic ecology impacts will be particularly important to assess in further detail and manage. Similarly, impacts on existing traffic, bay users and coastal processes with Botany Bay are not expected to be significant with adequate management.
- If the wharf infrastructure was to be delivered by TfNSW or Roads and Maritime Services as the proponent, it can likely be assessed and determined under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act), usually by a Review of Environmental Factors (REF). Referral to the Commonwealth might also be required.
- A ferry service between La Perouse and Kurnell will probably primarily need to be a tourist shuttle as it is not likely to be commercially viable for commuters only. Some form of Government assistance would likely be required to facilitate establishment of a ferry service.
- Establishing a ferry service is expected to provide numerous indirect social, economic and tourism benefits for La Perouse, Kurnell and wider Sydney that could provide a compelling case for justifying any direct economic revenue shortfall associated with its implementation and operation. Should the project be progressed, it is recommended that a Business Case is undertaken to better quantify these indirect benefits.
- Complementary measures to maximise the patronage potential of a ferry service could be considered, including improving intermodal links to the wharves (e.g. synchronising timetabling, increase frequency of buses), revitalising La Perouse and Kurnell tourist attractions, and effective marketing engagement.
- A core La Perouse to Kurnell ferry service could benefit from the establishment of supplementary water linkages to other locations in Botany Bay (e.g. at Brighton-Le-Sand's and near Sydney Airport) to create a wider network. Such supplementary services would also require new wharf infrastructure, the feasibility of which is outside the detailed consideration of this study.
- In addition to targeted stakeholder consultation, a total of 111 submissions were received during the public comment period when the Draft version of this report was exhibited. Of the submissions received, 74% expressed support for potential new ferry wharves at Kurnell and La Perouse, 11% were unsupportive, and the remaining submissions were neutral in nature. Feedback received during the consultation process will be considered in further stages of the project should it proceed.

13.2 Next Steps

Should the project be progressed beyond this current study, the next steps are expected to generally consist of the following within the TfNSW Project Development Framework:

1. Preparation of a Business Case. This should consider direct economic revenue, indirect socio-economic benefits, whole of infrastructure life costs, and operating costs.
2. Undertake further investigations, preliminary wharf infrastructure design and Environmental Assessment pursuant to obtaining planning approvals.
3. Securing of funding/investment sources for the wharf infrastructure capital costs.
4. Detailed design and documentation of wharf infrastructure.
5. Construction of wharf infrastructure.
6. Operator procurement (where required).
7. Marketing and service implementation.

Appendix A

Heritage Report (Artefact)

La Perouse to Kurnell Ferry Service

Aboriginal and Historic Heritage Constraints Analysis

Report to Arup
October 2016

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1.0 INTRODUCTION

1.1 Introduction

Arup was commissioned by Transport for New South Wales (TfNSW) to undertake a feasibility study into the re-establishment of wharves and a ferry service between La Perouse and the Kurnell Peninsula for commercial and recreational use. The study has been identified as a Priority Regional Project within the Botany Bay, Georges River and Port Hacking Regional Boating Plan released by Transport for NSW in March 2015. It has also been initiated in the context of the impending 250th anniversary of Captain Cook's landing at the Kurnell Meeting Place in 2020.

The study has been directed by a Project Control Group (PCG) established by TfNSW which also includes the NSW National Parks and Wildlife Service (NPWS), Randwick City Council, and Sutherland Shire Council.

Artefact Heritage (Artefact) has been engaged by Arup to prepare a high-level overview of Aboriginal and non-Indigenous (historical) heritage for the proposal. The purpose of this document is to outline listed Aboriginal and historical heritage items within or in the vicinity of the proposal and outline requirements for further heritage investigation and permits.

1.2 Study area

The study area spans the mouth of Botany Bay, centred upon the La Perouse peninsula to the north, and the Kurnell Peninsula to the south (Figure 2). The northern portion of the study area takes in Yarra Bay, Frenchmans Bay and Congwong Bay, as well as up to two kilometres of land that abuts these bays. The southern portion of the study area takes in between one and two kilometres of the Kurnell headland.

The northern (La Perouse) portion of the study area falls within the Randwick Local Government Area (LGA) and the southern (Kurnell) portion of the study area falls within the Sutherland LGA.

The entirety of the study area is situated within the boundaries of the La Perouse Local Aboriginal Land Council (LPLALC).

1.3 Proposed works

Three potential sites for siting of a jetty have been identified at La Perouse (Figure 1) and at Kurnell (Figure 2).

1.4 Consultation with La Perouse Local Aboriginal Land Council (LPLALC)

A preliminary meeting with LPLALC to discuss the proposal was held on Thursday 17 December 2015. Attendees at the meeting included David Ingrey (LPLALC), Chris Carmichael (TfNSW), Nam Tran (TfNSW), David Dack (Arup) and Josh Symons (Artefact).

The meeting included an overview of the project by TfNSW and Arup representatives, as well as a preliminary discussion of proposed wharf locations in relation to Aboriginal sites. The key outcome of the meeting was that further consultation between LPLALC, TfNSW and Arup would be conducted. That consultation would include forwarding feasibility study reporting, including this report, to LPLALC for review and comment.

In their submission on the feasibility study, LPLALC noted that:

Both of the recommended wharf locations (and surrounds) are of great significance to Aboriginal people in particular Aboriginal people belonging to the Gweagal or Bideegal (Bidjigal) clan groups.

The La Perouse LALC and Elders of both clan groups mentioned above should be consulted to determine the impact (if any) the project may have on Aboriginal heritage. Aboriginal sites or objects may be present in the area but not recorded on the Aboriginal Heritage Information Management Systems held by the Office of Environment and Heritage.

Although the recommended wharf locations have had wharves constructed, consideration needs to be given to the impact on Aboriginal heritage or objects. The La Perouse LALC recommends that consultation with the above mentioned groups needs to be undertaken in the preliminary planning and design stages of the project. (LPLALC 2016)

Figure 1:Study area in its regional context

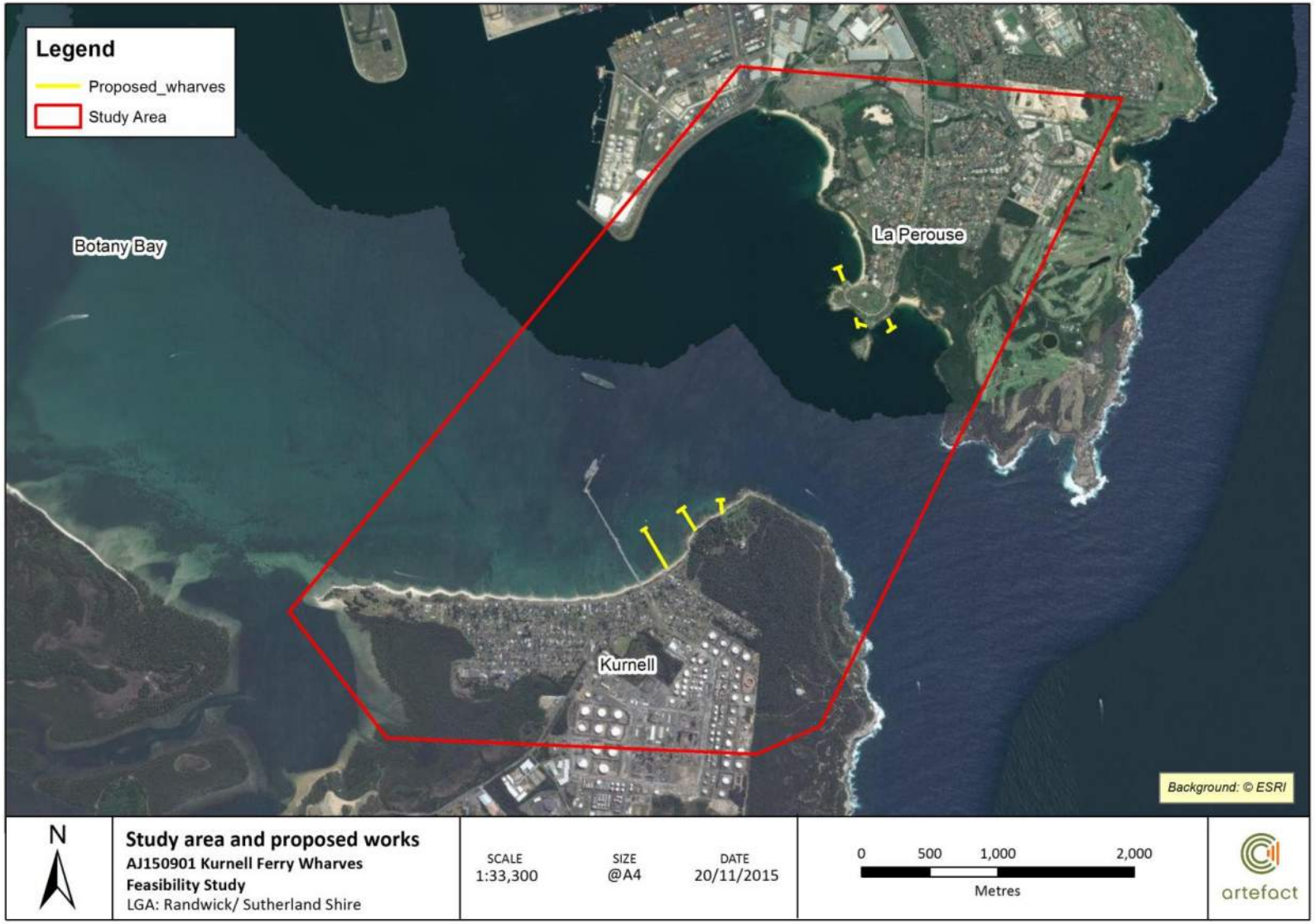


Figure 2: Proposed jetty locations, La Perouse (source: Arup)

Figure 3: Proposed jetty locations, Kurnell (source: Arup)

1.5 Constraints analysis methodology

The following high level constraints analysis aims to give an overview of potential heritage issues related to the proposed works and to identify further heritage assessments or approvals that are likely to be required prior to works commencing.

Heritage items in the vicinity of the proposed works were identified through a search of the following heritage registers and schedules:

- World Heritage List
- National Heritage List
- Commonwealth Heritage List
- State Heritage Register (SHR)
- Sydney Harbour Foreshore Authority (SHFA) s170 Register
- Sutherland Shire LEP 2015
- Draft Sutherland Shire DCP 2015
- Randwick LEP 2012
- Randwick DCP 2013
- Aboriginal Heritage Information Management System (AHIMS)

There is a significant degree of overlap between the different heritage registers, with numerous items listed on more than one register.

This high level constraints analysis does not include predictive statements regarding archaeological potential within the study area. Detailed archaeological assessment and field survey would be required in order to accurately assess archaeological potential.

2.0 LEGISLATIVE CONTEXT

This study has been undertaken within the context of several pieces of legislation that relate to Aboriginal and historic heritage:

- *Environmental Planning and Assessment Act 1979* (EP&A Act).
- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Commonwealth)
- *Aboriginal Land Rights Act 1983*
- *Native Title Act 1994*
- *National Parks and Wildlife Act 1974* (NPW Act).
- *New South Wales Heritage Act 1977* (Heritage Act).
- *Australian Heritage Council Act 2003*
- *Australian Heritage Commission Act 1975*
- *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act) (Commonwealth)

State Heritage Register (SHR)

The SHR was established under Section 22 of the Heritage Act and is a list of places and objects of particular importance to the people of NSW, including archaeological sites. The SHR is administered by the Heritage Division of the Office of Environment and Heritage (OEH) and includes a diverse range of over 1500 items, in both private and public ownership. To be listed, an item must be deemed to be of heritage significance for the whole of NSW.

Section 170 Registers

The Heritage Act requires all government agencies to identify and manage heritage assets in their ownership and control. Under Section 170 of the Heritage Act, government instrumentalities must establish and keep a register which includes all items of environmental heritage listed on the SHR, an environmental planning instrument or which may be subject to an interim heritage order that are owned, occupied or managed by that government body.

Local Environmental Plans (LEP)

The EP&A Act requires that environmental impacts are considered prior to land development; this includes impacts on cultural heritage items and places as well as archaeological sites and deposits. The EP&A Act also requires that Local Governments prepare planning instruments (such as LEPs and Development Control Plans [DCPs]) in accordance with the Act to provide guidance on the level of environmental assessment required.

The northern (La Perouse) portion of the study area falls within the Randwick LGA and the southern (Kurnell) portion of the study area falls within the Sutherland LGA. The northern portion of the study area is therefore subject to the Randwick LEP (2012) and Randwick DCP (2013). The southern portion of the study area is subject to the Sutherland Shire LEP (2015) and the Draft Sutherland Shire DCP (2015)

Aboriginal Land Council

The entirety of the study area falls within the boundaries of the La Perouse Local Aboriginal Land Council (LPLALC).

3.0 ENVIRONMENTAL CONTEXT

3.1 Landforms, hydrology and soil landscapes

The study area is located at the opening of Botany Bay to the Tasman Sea, approximately 12 kilometres south of the Sydney CBD. The geology of this area consists of Triassic Hawkesbury sandstone partially overlaid with Quaternary marine sand and sand dune formations[1].

During the late Pleistocene, the Botany Bay area was a swampy sand plain surrounded by higher sandstone hills. With the rise in sea levels at the end of the ice age, marine sand was deposited onto the advancing shore line. These beach sands were then wind-blown onto the surrounding sandstone outcrops, forming into coastal barrier sand dunes. When the sea level stabilised approximately 7,000 years ago, these barrier dunes had altered the flow of local rivers to the present courses of the Cooks and Georges Rivers[2].

The Georges River rises in the Illawarra Plateau and travels 96 kilometres before it flows into Botany Bay from the southwest. The Cooks River flows into Botany Bay from the northwest. It is partially canalled and operates as the primary stormwater runoff for residential suburbs in south Sydney. Botany Bay is a relatively shallow sand-floored inlet, with most of the bay floor being ten metres or less in depth. The tidal accumulation of sand and riverine deposition of silt on the bay floor requires frequent dredging to ensure safe navigation for shipping.

The natural soil landscapes on these two peninsulae are mostly associated with the marine- and wind-deposited sand deposits at lower elevations, with sand dune formations stabilised against erosion with natural and re-planted vegetation. Marine-deposited siliceous and calcareous sands fringe the foreshore of Botany Bay. Hawkesbury sandstone predominates on the higher elevations in the study area, with thin layers of coarse sand and loam in areas resistant to erosional effects from vegetation cover. In the south-western part of the study area, estuarine soil landscapes have accumulated from the low energy silt discharge of the George's River on the tidal sand-banks of the southern floor of Botany Bay[3].

These soil landscapes have been significantly disturbed from European agricultural and industrial activities. Vegetation clearance in some parts of the study area has exacerbated sand dune erosion. Dredging of the entrance to Botany Bay and foreshore stabilisation for navigation has altered the original shape of the headlands. Industrial facilities in the study area have also significantly disturbed the soil profile with deep ground excavation and the introduction of modern fill.

3.2 Land use history pre-1770

Aboriginal people have been living in the Sydney Basin and surrounding areas for at a minimum of 36,000 years, based upon evidence from archaeological sites located on the Parramatta and Nepean Rivers[4]. Before the sea reached its present level around 7,000 years ago, the Botany Bay area would have been freshwater valleys and swamplands[5], with Aboriginal people subsisting on a diet of land animals and plants, supplemented with freshwater fish resources[6]. Following the inundation of the coast line, Aboriginal people in the study area primarily utilised marine foods of sea fish and shell-fish for their subsistence needs[7]. The majority of archaeological evidence in the Sydney Basin has been

[1] Herbert 1983, Stroud 1985.
[2] Attenbrow 2010, p39.
[3] AMBS 2013, pp 21 – 22; Sheppard 2009,11 – 14.
[4] JMCHM 2005; AHMS 2013
[5] Attenbrow 2012, pp 1 – 2.
[6] Attenbrow 2010: pp 70 -79.
[7] *ibid*

dated as occurring within the last 3,000 to 5,000 years, probably reflecting the increased use of the foreshore areas by Aboriginal people who occupied areas around the modern coastline. Older occupation sites are likely to exist along the now submerged coastline, consistent with a pattern of higher intensity utilisation of marine resources in supporting Aboriginal populations[8].

Ethnographic accounts written by European explorers and settlers in the late 18th century emphasise the maritime way of life of the Aboriginal people around Botany Bay. Small groups of Aboriginal people were recorded to camp near freshwater sources, often residing in rock shelters or occasionally utilising bark huts. Bark canoes were regularly used for line fishing and spear fishing in Botany Bay. Collecting shell-fish on the tidal banks of the bay was also recorded by Europeans[9].

These accounts of Aboriginal diets have been corroborated by archaeological evidence from the numerous midden sites which are located on the foreshores of Sydney Harbour and Botany Bay. The shell midden site at Captain Cook's Landing Place in Kurnell, on the south-eastern foreshore of Botany Bay, was excavated between 1968 and 1971. Deposits at this site have been dated and show that they have been accumulating for at least 1,200 years. Based upon the large extent of materials recovered, it is likely that this shell midden site, and other nearby rock art and burial sites, extends for much of the Kurnell foreshore on either side of Cook's Creek[10].

Large quantities of Aboriginal artefacts, including shell fish-hooks (Figure 4), retouched stone artefact flakes, ground stone hatchets and bone points (Figure 5) were recovered. Fish bones and shell comprise the majority of food resource remains, including snapper, bream, mud oyster and Sydney cockle. Lesser quantities of land and sea animal bones, including dingo, seal, whale, dolphin, wallabies and mutton birds are also present in the midden site[11].

Aboriginal people were also recorded as burying their dead in coastal sandy environments, in middens and in rock shelters. Archaeological evidence in the study area further substantiates this practice, with a number of Aboriginal burials along the Botany Bay foreshore having been discovered. One rock shelter near Inscription Point on the south head of Botany Bay has revealed up to 18 complete or partial sets of human remains, all of which have been reburied at the site at the request of the local Aboriginal community. Grave goods of stone artefacts and bone points were present in many of these burials, as well as midden deposits of discarded fish and animal bones.[12]

Aboriginal people often utilised the exposed Hawkesbury sandstone rock faces around Sydney Harbour and Botany Bay to engrave and draw art. These sites are well-recorded and comprise 40% of all Aboriginal sites in the Sydney Basin[13]. Several rock art sites have been recorded on the exposed sandstone faces and caves at La Perouse near Bare Island, as well as on the Kurnell foreshore. Motifs on rock art in the area show frequent engravings of footprints and fish[14].

The landscape at Botany Bay prior to the arrival of Europeans in the 18th century was significantly more forested than it is today. Sclerophyll woodland vegetation, consisting of eucalypts, angophoras and banksias, were pivotal in securing the barrier dunes of the Kurnell and Brighton-Le-Sands area from erosion. It is possible that the increase in the proportion of salt-tolerant shrubs such as *Leptospermum laevigatum* and *Monotoca elliptica* was the result of more intense Aboriginal settlement and human initiated fire-regimes around the shores of Botany Bay from around 2,000 years ago[15].

[8] AMBS 2013, p25.
[9] *ibid*
[10] Attenbrow 2010, p 172; Irish 2007, 11 – 18.
[11] Attenbrow 2010, pp 172 – 173.
[12] Irish 2007, p 19.
[13] Attenbrow 2010, pp 146 – 147.
[14] Irish 2007, p.20
[15] Benson & Eldershaw 2007, p 114.

Figure 4: Shell fish hooks recovered from Captain Cook's Landing Place Midden site, image reproduced from Irish 2007, p 16.

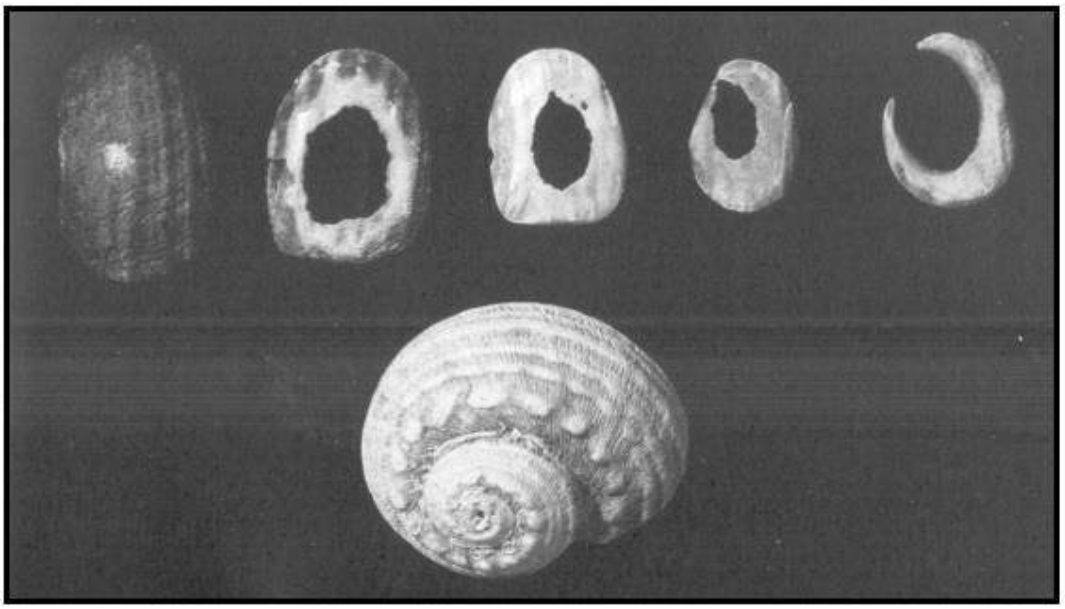
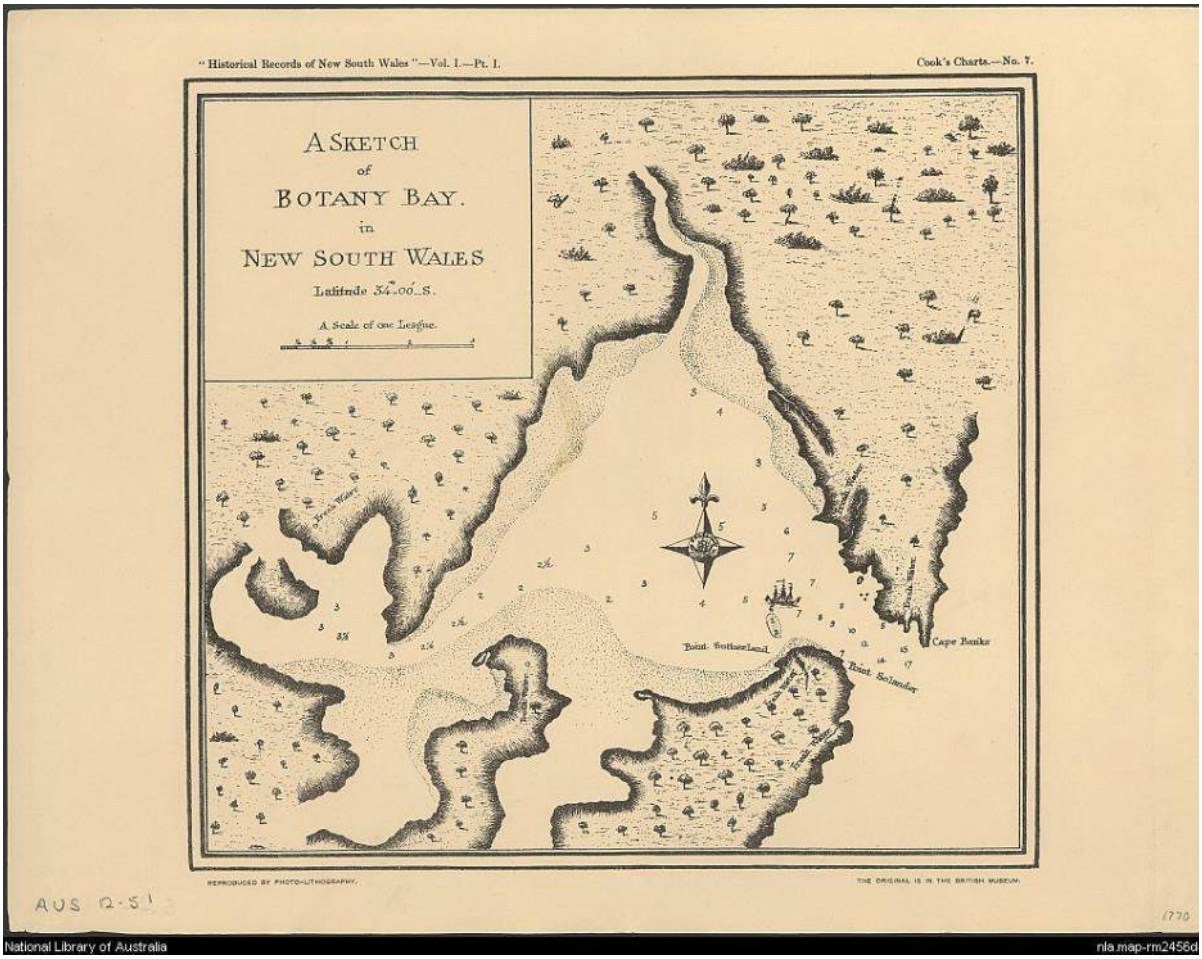


Figure 5: Bone points recovered from Captain Cook's Landing Place Midden site, image reproduced from Irish 2007, p17.

3.3 Land use history post-1770

Lieutenant James Cook anchored the *Endeavour* in Botany Bay on the 29th of April 1770 and made several land expeditions in the area over the following eight days (Figure 6). On the first day he made contact with the Gweagal Aboriginal community of the Dhawaral nation at a place now commemorated in Kurnell as "Captain Cook's Landing Place' in the Kamay Botany Bay National Park. During this expedition his crew collected wood and fresh water, gathered plant specimens, while documenting the activities of the Aboriginal people that they saw.

Figure 6: Lieutenant Cook's sketch of Botany Bay, 1770. Source: National Library of Australia.



After the British colony at Sydney Cove was established in 1788, the headlands around Botany Bay were slow to be settled by Europeans. The local environment was deemed as unsuitable for settlement and in 1812 Governor Macquarie closed the northern headland for settlement and established a government reserve (Figure 7). In 1815 a grant was made to James Birnie, a ship owner and merchant, of 700 acres of land along with 160 acres of saltwater marsh, on the western side of the Kurnell peninsular. In 1821 this estate was acquired by John Connell, another early pioneer, who added it to his large land holdings in the area (Figure 8). The eastern Kurnell sandstone headland was held as a government reserve[16].

Early agricultural efforts on the Kurnell peninsula were not overly successful. The most profitable enterprise up until the mid-19th century was timber-getting, which largely cleared the peninsular of its native vegetation. This forest clearing increased the rate of Aeolian erosion and resulted in the previously stable sand dunes to migrate across the area[17].

[16] Nugent 2005, pp 55 – 56.
[17] *ibid*

Figure 7: Botany parish map, 1830s, showing La Perouse government reserve. Source: LPI

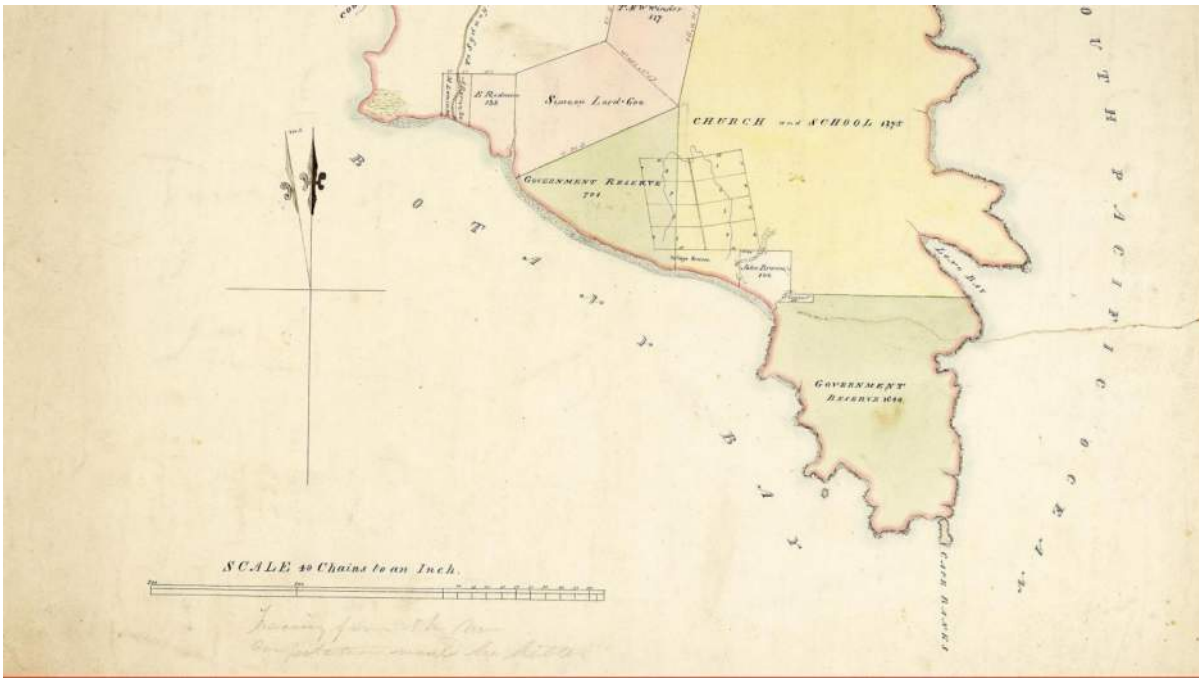
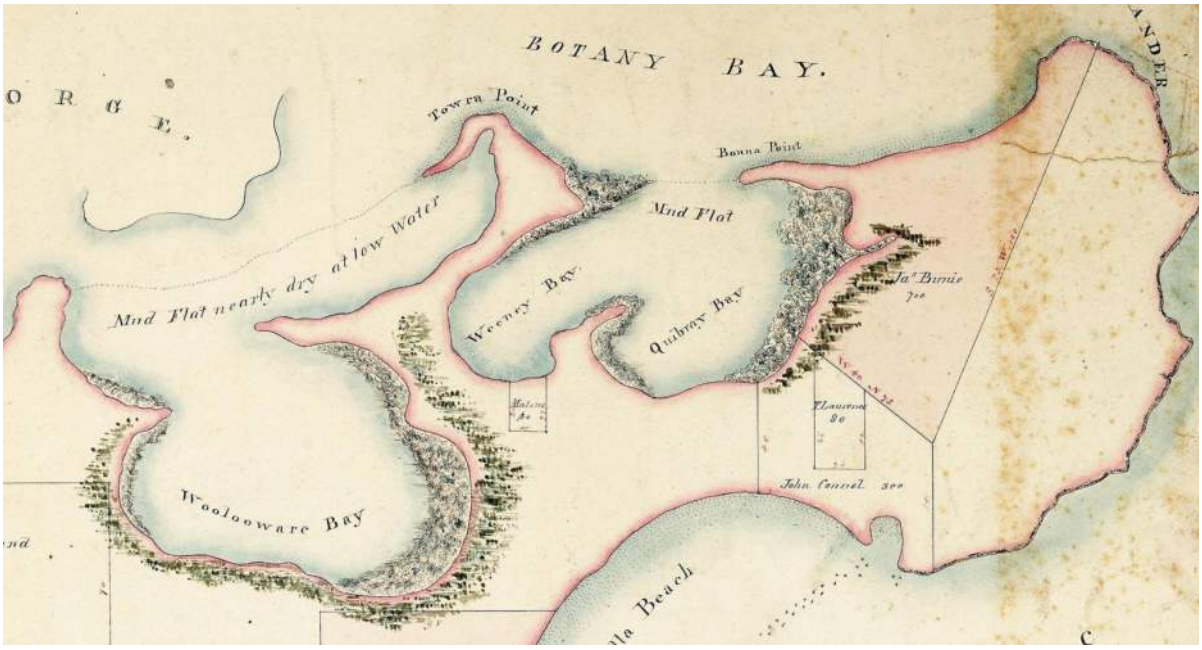


Figure 8: Sutherland parish map, 1830s, showing James Birnie's land grand. Area to the east of the Birnie land grant is a later government reserve. Source: LPI



Due to the low level of European settlement in the region, Aboriginal people continued to live around the Botany Bay foreshores. While their population had been drastically reduced from introduced diseases and violent encounters with the new settlers, numerous accounts of Aboriginal camps and communities were recorded by Europeans during the 19th century[18].

In order to safeguard against foreign threats and smugglers, a tower was erected at La Perouse called the Macquarie Watchtower between 1821 and 1822. This tower, with modifications, still exists

[18] Nugent 2005, pp 48 – 49.

today. For most of the 19th century, this was the only government building in La Perouse and Kurnell, with the ocean-facing parts of the headland both being reserved for government use.

During the late 19th century, British Imperial fears of under preparedness in the face of invasion in their colonies led to a wave of fortification construction. The entrance to Botany Bay was viewed as an open door to the growing Sydney colony and new fortifications in the area were devised. The small tidal promontory of Bare Island was chosen as the site for a new fortification. The mass concrete fortification and battery was completed in 1889. A number of modifications were made to the structure since its original construction and the facility has had a variety of uses, including as a returning war veterans home between 1912 and 1963[19].

Due to the relative abundance of open land in the Botany Bay area combined with its relative proximity to Sydney Harbour, the early twentieth century saw the introduction of noxious and polluting industries onto the Kurnell peninsular. The extensive sand dunes around the Kurnell peninsular resulted in the establishment of sand mining enterprises from the 1930s onward, which heavily altered the natural landscape of the region[20].

Following the Second World War, significant industrial development around Botany Bay continued to change the landscape and character of the area. In 1956 the Kurnell Oil Refinery was built, while the Port Botany Terminal was established in 1960. Other heavy industries, notably chemical and petroleum plants, were also opened at Kurnell during the 1960s and 1970s. These industrial facilities further increased the level of damage and disturbance to the natural landscape of Botany Bay.[21]

Throughout this period of industrialisation however, the headland foreshores of Botany Bay have largely remained undeveloped. Despite isolated areas of residential construction, most of these headland areas are encapsulated within the Kamay Botany Bay National Park. This area was held as government reserve until it was acquired by National Parks and Wildlife in 1967. Because of this relative lack of development and disturbance, many of the Aboriginal and historic sites remain in very good condition[22].

[19] Sheppard 2009, pp 70 – 76; 84 – 85.
[20] AMBS 2013, pp 47.
[21] AMBS 2013, pp 47 – 48.
[22] OEH database access November 2015: http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5061543

4.0 ARCHAEOLOGICAL CONTEXT

4.1 Aboriginal heritage

4.1.1 AHIMS search

The location and details of Aboriginal sites are considered culturally sensitive information. It is recommended that this information and associated maps are removed from the report if it is to be made publically available.

An extensive search of the Aboriginal Heritage Information System (AHIMS) database was conducted on 14 September 2015 for sites registered within the following parameters:

GDA 1994 MGA 56	331433mE – 339523mE 6233447mN – 6240157mN
Buffer	50 m
Number of sites	72
AHIMS Search ID	190307

A total of 72 registered Aboriginal sites were identified in the search area. Of these, 29 are located within the study area (Figure 9).

The frequency of recorded site types is summarised in Table 1. Midden (shell) sites with artefacts are the predominant site types within the AHIMS search area (n=29). Art (pigment or engraved) sites are the next most frequent site type (n=16). PAD, Burial, Artefact, Aboriginal Ceremony and Dreaming, Ochre Quarry, Grinding Groove and Aboriginal Resource Gathering sites were also identified within the study area, several sites including combinations of these features (Table 1).

Three restricted sites are also listed in the AHIMS search results. The location and details of restricted sites are not publically available. Restricted sites are generally of high cultural significance. The proximity of these sites to the study area would need to be investigated in a detailed archaeological assessment.

Table 1: Frequency of site types from AHIMS data

Site type	Frequency	Percentage %
Shell, artefact	29	40
Art (pigment or engraved)	16	22
PAD	6	8
Restricted site	3	4
Burial	3	4
Burial, Shell, Artefact	2	3
Artefact, Shell, Aboriginal Ceremony and Dreaming	3	1
Artefact, Shell, Potential Archaeological Deposit (PAD)	1	1

Site type	Frequency	Percentage %
Burial, Aboriginal Ceremony and Dreaming	1	1
Ochre Quarry	1	1
Grinding Groove	1	1
Aboriginal Resource and Gathering, Shell	1	1
Total	**72**	**100**

The 29 sites which are located within the study area are detailed in Table 2:

Table 2: Sites within the study area

AHIMS site #	Site name	Site type
45-6-0639	Botany Bay;Bumborah Point;	Art (Pigment or Engraved)
45-6-1237	Yarra Bay;Captain Phillip Monument;	Shell, Artefact
45-6-2658	Little Bay Road PAD1	PAD
45-6-0886	Bare Island;Yarra Bay;	Shell, Artefact
45-6-0292	Yarra Point;Botany Bay	Shell, Artefact
45-6-0659	La Perouse	Art (Pigment or Engraved)
45-6-0873	La Perouse Reserve	Art (Pigment or Engraved)
45-5-2587	Frenchmans Bay Foredune	Shell, Artefact
45-6-0653	Site 6, La Perouse	Art (Pigment or Engraved)
45-6-1403	La Perouse,	Art (Pigment or Engraved)
45-6-1144	La Perouse;	Shell, Artefact
45-6-0652	Site 5, La Perouse	Art (Pigment or Engraved)
45-6-0648	Site 1, La Perouse	Art (Pigment or Engraved)
45-6-0651	Site 4, La Perouse	Art (Pigment or Engraved)
45-6-0649	Site 2, La Perouse	Art (Pigment or Engraved)
45-6-0650	Site 3, La Perouse	Art (Pigment or Engraved)
45-6-1145	La Perouse;	Shell, Artefact

AHIMS site #	Site name	Site type
45-6-1146	Congwong Cave, La Perouse	Art (Pigment or Engraved)
45-6-1762	Congwong Beach;	Shell, Artefact
45-6-0561	Congwong Beach	Shell, Artefact
45-6-0556	La Perouse;BBNP Proposal	Shell, Artefact
52-3-1223	Kurnell Meeting Place Precinct	PAD
52-3-1381	Cundlemongs grave	Burial
52-3-0219	Captain Cook's Landing Place.	Shell, Artefact, Burial
52-3-0221	Captain Cook's Landing Place,	Art (Pigment or Engraved)
52-3-1366	Kurnell Potential Archaeological Deposit 1 (K PAD 1)	PAD
52-3-0525	Tasman St-	Burial, Shell, Artefact
52-3-1947	Quibray Bay Sandflat Midden	Aboriginal Resource and Gathering, Shell
52-3-0212	Kurnell Peninsula;Captain Cook Drive;	Shell, Artefact

Due to discrepancies in the AHIMS system, particularly in older site recordings, the location of sites may be in error of up approximately 200 metres. There are a further 7 sites within approximately 200 metres of the study area. The location of these sites would need to be confirmed through further research or field survey as part of a detailed archaeological assessment. Table 3 details sites which are located within an approximately 200 metre buffer zone of the study area.

Table 3: Sites within an approximately 200 metre buffer zone of study area

AHIMS site #	Site name	Site type
45-6-2670	Little Bay Ochre Site	Ochre Quarry
45-6-2158	Little Bay 7;	Grinding Groove
45-6-2159	Little Bay 10;	Burial, Aboriginal Ceremony and Dreaming
45-6-2157	Little Bay 6;	Artefact
45-6-2243	Little Bay Cave;	Shell, Artefact
52-3-0689	CS1, Cape Solander 1-	Artefact
52-3-1232	Kurnell Lot 101 Captain Cook Drive#1	Artefact

Figure 9: AHIMS extensive search results

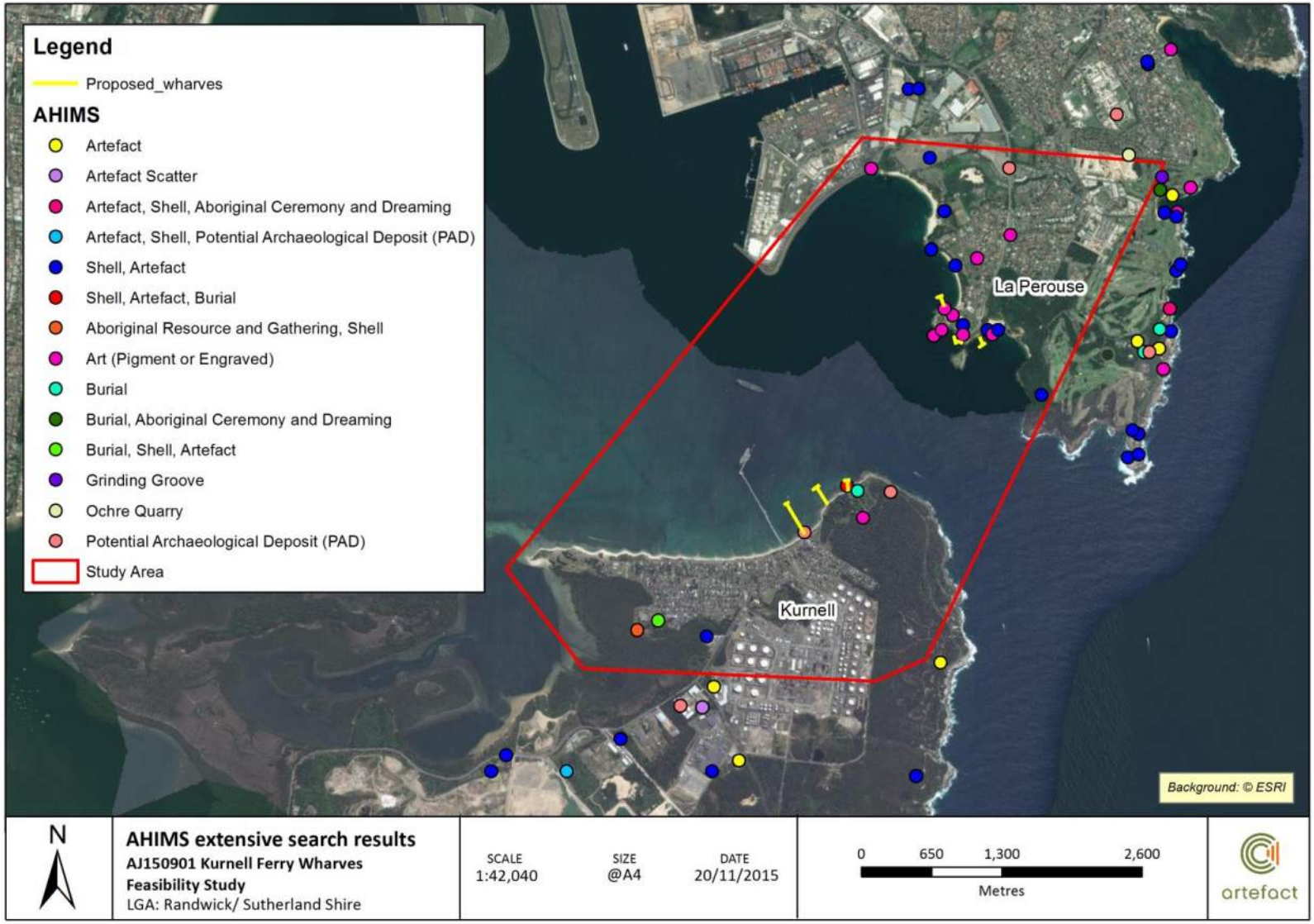


Figure 10: AHIMS sites in detail- La Perouse

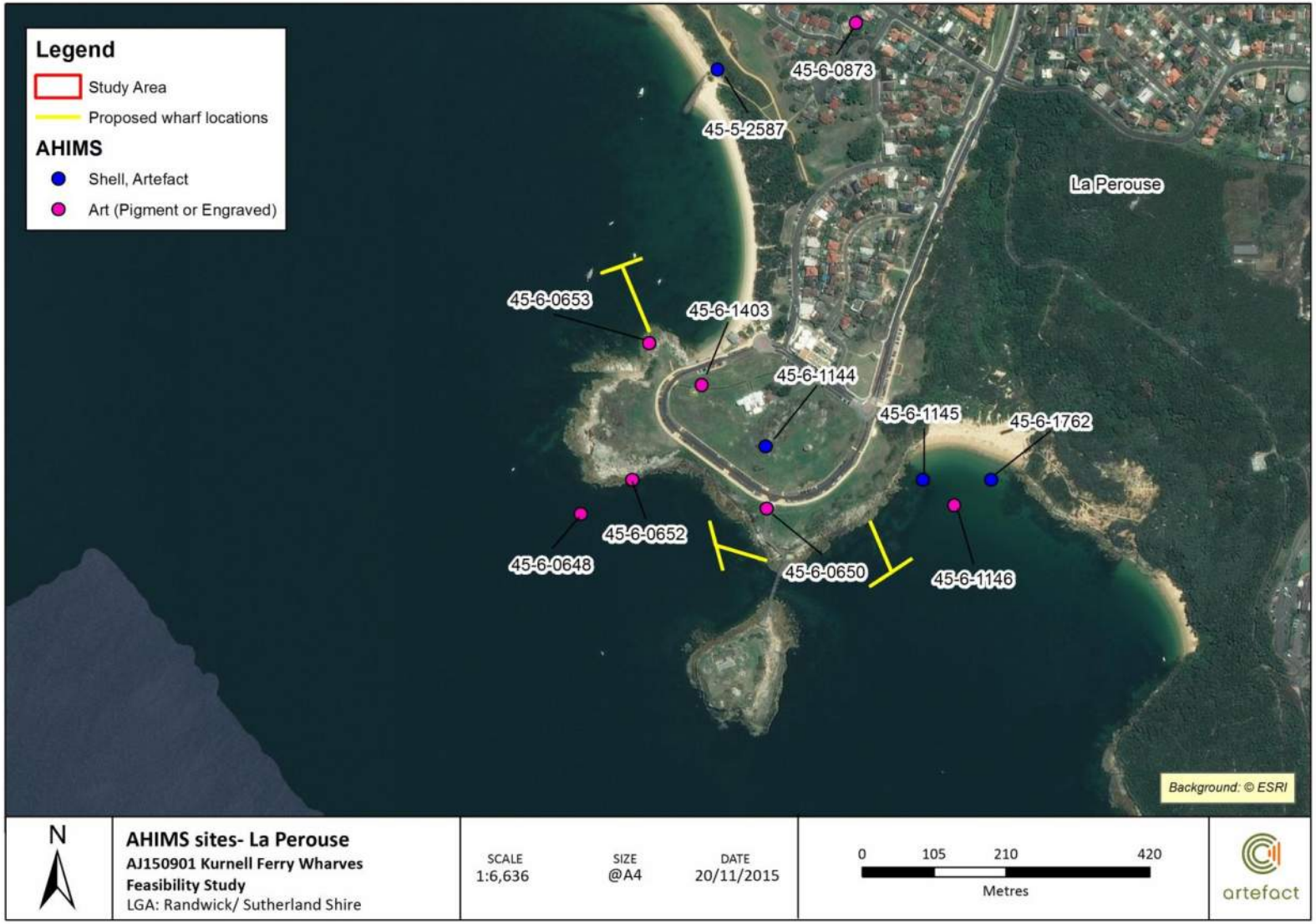
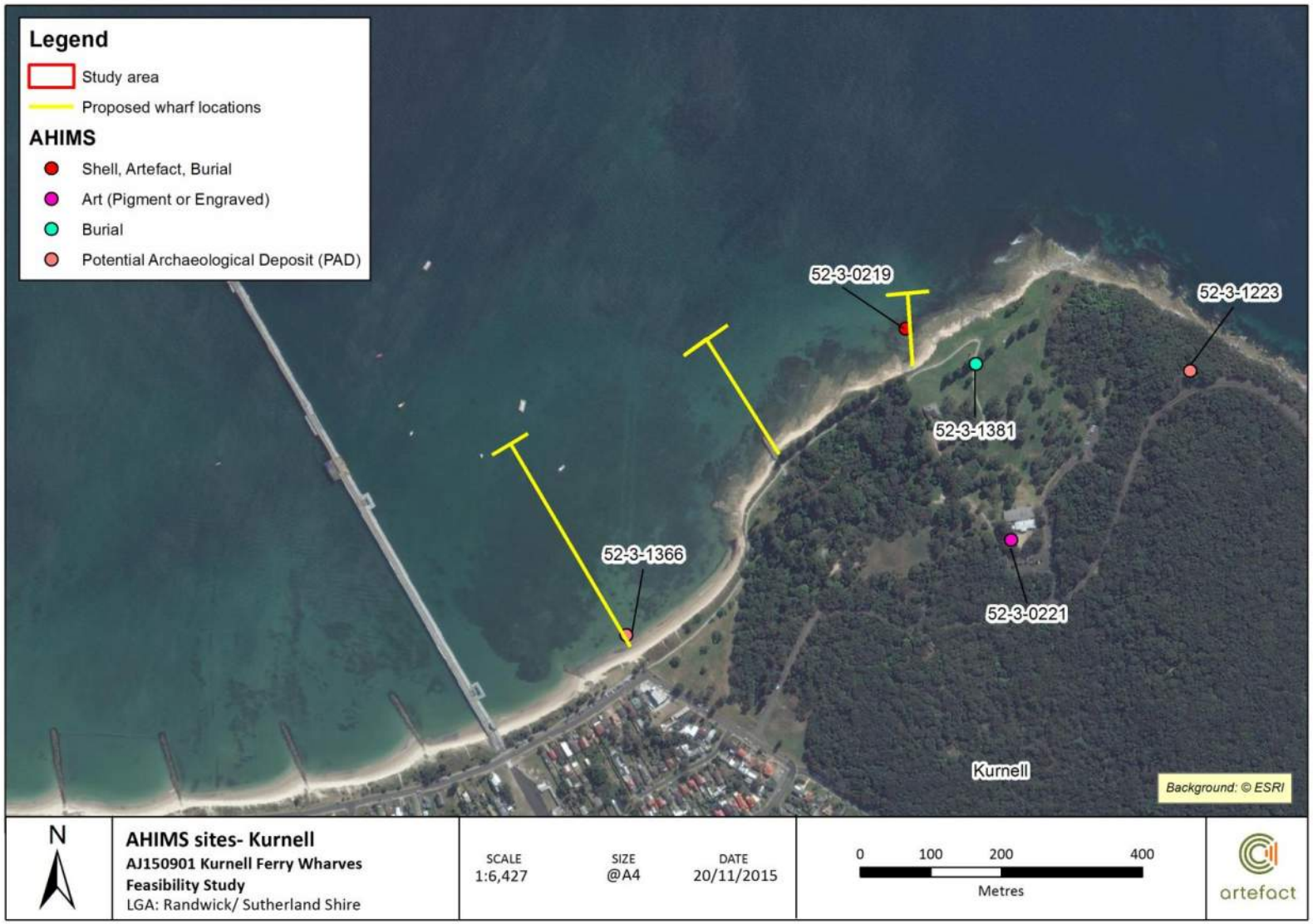


Figure 11: AHIMS sites in detail- Kurnell



4.2 Cultural significance

A preliminary meeting with LPLAC regarding the proposal indicated that the La Perouse and Kurnell area are highly significant to the local Aboriginal community.

Further consultation with Aboriginal stakeholders would be required to prepare information on the cultural significance of the area.

4.3 Historical heritage

4.3.1 National Heritage

Two places of National Heritage significance are located within the study area:

Kurnell Peninsula Headland (National Heritage Place ID 105812)

The Kurnell Peninsula, extending from the headland and along the eastern margin of the peninsula, is recognised as having outstanding heritage value to the nation. The national heritage listing details the manifold significance of the place, as an Aboriginal site, the location of Lt James Cook's first landing on Australia, and the subsequent dispossession of Aboriginal people (Australian Heritage Database online November 2015).

The listing covers an area of approximately 400 hectares, including Botany Bay National Park, Lot 1 DP91704, the road reserve extending from Cape Baily Lighthouse in the east to the Park boundary in the west and the area between the seaward boundaries of the National Park and Lot 1 DP91704 and the Low Water Mark (Australian Heritage Database accessed online November 2015).

Kamay Botany Bay (Nominated National Heritage Place ID 106162)

This nomination would include the entirety of the above Kurnell Peninsula Headland National Heritage place (ID 105812).

"The nomination seeks to include all the values encompassed in the above Kurnell Peninsula Headland NH place (ID 105812) within a broader boundary and recognise additional associative values that:

- reflect the significance of the first meeting place between the traditional Aboriginal owners of the Botany Bay area and British explorer James Cook in 1770, ahead of the establishment of the colony by the First Fleet at Sydney Cove in 1788;

- recognise the international significance of Botany Bay, as the place where Joseph Banks and Daniel Solander first collected botanical specimens from the Australian continent, as part of the further development of Linnaean systematic biology;

- encompass the waters into which explorer James Cook's HM Bark Endeavour, the ships of the Governor Phillip's First Fleet, and French explorer the Comte de La Perouse sailed and anchored in 1770 and 1788 respectively; and

- more fully recognise the association of Botany Bay with convict transportation in sentencing and the popular imagination, notwithstanding the fact that no convicts were landed at Botany Bay."23

The nomination includes approximately 900ha including Kurnell, the whole of Botany Bay National Park (National Park ID 1810) at Kurnell Peninsula and La Perouse, and the whole of Towra Point Nature Reserve (National Park ID 1808).

The Towra Point Nature Reserve supports the largest wetland of its type in the greater Sydney region. It is located on the southern side of Botany Bay. The Towra Point Reserve is also listed with the International Union for Conservation of Nature (IUCN) due to its importance in maintaining biodiversity in the Sydney Region. The reserve is categorised as 'La- Strict Nature Reserve' by the IUCN.

The listing overlaps with the SHR listed Kamay Botany Bay National Park (North and South) and Towra Point Nature Reserve (SHR ID 01918), the Botany Bay National Park (National Park ID 1789) and the Botany Bay Conservation Area (Randwick LEP listing 26302).

4.3.2 State heritage

There are five SHR listed items located within the study area, and one SHR listed item located within 500 metres of the study area. The five listing within the study area are:

Chinese Market Gardens (SHR No 012999)

"The Chinese Market Gardens at La Perouse are of State significance for their history, associations, research potential, representative value and rarity as a site of the continuous cultivation of food for the Sydney metropolitan area by Chinese market gardeners at least since 1909.

…Offering a living demonstration of one of the few occupations available to Chinese men in the nineteenth century and during the discriminatory period of the White Australia Policy (between Federation and the 1970s) the gardens are significant for their association with the history of Chinese immigration to Australia and the influence of ethnic communities on local industry. The Chinese Market Gardens are also significant because of historic inter-relations between the Chinese market gardeners and the La Perouse Aboriginal community and the depression era camps at Hill 60, contributing unique insights into the history of marginalised people in Sydney. The Chinese Market Gardens La Perouse are also of State social significance for the esteem with which they are held by the Chinese community in NSW.

…There is also archaeological potential to learn about traditional Aboriginal cultural use of the land before colonisation and its transformation from Indigenous occupation to a place adapted to provide food for the European colony. Filling of the swamp may have served to protect pre-contact archaeological remains. There

[23] National Heritage database accessed on https://www.environment.gov.au/cgi-bin/ahdb/search.pl?mode=place_detail;search=place_name%3Dkamay%2520botany%2520bay%3Bkeyword_PD%3Don%3Bkeyword_SS%3Don%3Bkeyword_PH%3Don%3Blatitude_1dir%3DS%3Blongitude_1dir%3DE%3Blongitude_2dir%3DE%3Blatitude_2dir%3DS%3Bin_region%3Dpart;place_id=106162

> *may also be remnants of activity associated with the mid twentieth century depression camp on the adjacent Hill 60."*[24]

The listing is a landscape heritage item, covering an area of approximately seven hectares, including Lots 1077, 1078 and 1079 DP 752015. The Chinese Market Gardens were gazetted on the 13 August 1999.

The SHR listing overlaps with the Randwick LEP listing for the Chinese Market Gardens (I246) and the National Trust of Australia register for the same listing.

La Perouse Mission Church (SHR ID 01893)

> *"La Perouse Mission Church is significant in the history of the Aboriginal Christian movement in NSW. It is an important antecedent to the Indigenous Christian organisation that exists today, such as Australian Indigenous Ministries.*
>
> *As an early church establishment, the La Perouse Mission Church was held to be the mother church of the United Aborigines Mission, from which centre the Mission spread to all parts of Australia.*
>
> *Within the Aboriginal Christian movement, the La Perouse Church demonstrates the critical and successful role of female missionaries, both Aboriginal and European, in evangelising the Aboriginal people.."*[25]

The listing is a built heritage item and includes the church building and the grassed area outside the structure, where sandstone outcrops in places and features several Aboriginal engravings. The church building is a small, gothic, weatherboard church, gazetted on the 15 March 2013. The listing specifies that the adjacent manse building is not considered to have heritage significance, with the exception of a memorial plaque from 1934 (located on one exterior wall) and a mosaic entrance step.

Bare Island Fort (SHR ID 00978)

> *"Bare Island is nationally significant as an almost completely intact example of late nineteenth century coastal defence technology. Designed by Sir Peter Scratchley to a specification by William Jervoise, it represents one of the more substantial and impressive of the many fortifications built around Australasia. The Fort reflects the evolution of the relationship between New South Wales as an increasingly independent colony and Britain. It shows the way that strategic defence policy was operating in Australia on the eve of Federation. The Fort is also nationally significant as the site of the first War Veterans Home founded in Australia.."*[26]

The listing is a defence fortification, located on a low sandstone island approximately 30 metres south of the La Perouse Headland. Bare Island Fort was gazetted for inclusion on the SHR on the 2 April 1999. The SHR listing notes that the island has been completely altered from its natural profile[27].

The SHR listing overlaps with the s170 NSW State agency heritage register, the National Trust of Australia register (Listing ID 6721) and the Register of the National Estate (Listing ID 1758). The

[24] SHR accessed on http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?id=5044696
[25] SHR accessed on http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?id=5061399
[26] SHR accessed on http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?id=5045621
[27] *Ibid*.

listing is within the curtilage for the Kamay Botany Bay Nominated National Heritage Place (ID 106162), the Botany Bay National Park (National Park ID 1789) and the Botany Bay Conservation Area (Randwick LEP listing 26302).

Kamay Botany Bay National Park (North and South) and Towra Point Nature Reserve (SHR ID 01918)

> *"Kamay Botany Bay National Park and Towra Point Nature Reserve are of outstanding state heritage significance as a rare place demonstrating the continuous history of occupation of the east coast of Australia. The place holds clear and valuable evidence of Indigenous occupation prior to European settlement and the natural history of the state. It is also the place where the shared history of Indigenous and non-Indigenous Australia began. It was the place where Lieutenant James Cook first stepped ashore to claim the country for Britain and plays a central role in the European history of arrival, the history of Indigenous resistance, dispossession and devastation through illness, land grants, cultivation and development."*[28]

The listing is a historical and Aboriginal site, encompassing a total of 892 hectares on the headlands, north and south of the mouth of Botany Bay. The listing was gazetted on the 29 November 2013.

This listing is within the curtilage for the Kamay Botany Bay Nominated National Heritage Place (ID 106162), the Botany Bay National Park (National Park ID 1789) and the Botany Bay Conservation Area (Randwick LEP listing 26302).

Prince Henry Site (SHR ID 01651)

> *"The Prince Henry site was the most important site for the treatment of infectious diseases in New South Wales from its inception in the 1880s, when, as the Coast Hospital, it became the first public hospital in New South Wales in the post-convict era. The Hospital played a prominent role in treating and overcoming infectious diseases and later as a general hospital and teaching hospital for the University of NSW, until its closure was announced in 1988. Its isolation led to the establishment of the first ambulance service in New South Wales from within its grounds*[29]*.*
>
> *The Prince Henry site contains both identified archaeological features and areas of known archaeological potential. These elements are part of the total physical record of the first post-convict era hospital in New South Wales.*
>
> *The physical evidence at the site documents, and therefore provides opportunities to investigate, evolving medical practice associated with the treatment of infectious disease. In a wider context the site reflects changes and development in state health policy for more than 100 years.*
>
> *The research value of the site's historical archaeological resource is only moderate, however, because of the physical impact of ongoing development. Although the extant archaeological resource is therefore not intact, and there are extensive documentary sources available, the place has potential to yield information about site use and occupation. The spectrum of archaeological*

[28] SHR accessed on http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5061543
[29] SHR accessed on http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=505103

features across the site also provides a rare opportunity to use archaeology as an investigative tool on a wide scale.

The historical archaeological resource at the Prince Henry site also contributes to the total ensemble providing an indication of former activities or features. They are therefore part of the site's wider social and historic value and have educational and interpretive potential."[30][31]

The Prince Henry site is located in Little Bay, La Perouse. The curtilage is bounded by Anzac Parade to the west, the University of NSW Little Bay Campus and residential housing to the north, the Little Bay coastline to the east and St Michael's golf club to the south. The listing was gazetted on the 2 May 2003.

This listing overlaps with the National Trust of Australia register listing and the Register of the National Estate Conservation area, as well as the LEP 'Former Prince Henry Hospital site and Aboriginal heritage place' (Randwick LEP 2012 listing 21611).

One SHR listed item is located within 500 metres of the study area:

Long Bay Correctional Centre (SHR ID 00810)

"The former State Penitentiary is of considerable significance. It was the first purpose-built Penitentiary in NSW and includes a rare example of back-to-back cells. In conjunction with the former Female Reformatory, it is an important development in Australian penal design and is the most complete expression of Frederick Neitenstein's philosophy of reform. The siting of the Penitentiary has a strong visual impact in the surrounding landscape. The original buildings are of a unified scale and materials resulting in a harmonious appearance. The place has been used continuously as the principal prison complex in NSW and as Sydney's major metropolitan gaol for over 80 years. It has research potential in penal practices and building technology of the time."[32]

The listing is a gaol complex located off Anzac Parade in La Perouse, including Lot 132 and Lot 133 DP 1142190.

4.3.3 Local heritage

21 listings on the Randwick and Sutherland Shire's LEPs are located within the study area:

- Botany Bay Conservation Area (Randwick LEP 2012 listing 26302). This listing has both State and Local significance in parts (partially within the curtilage of the Kamay Botany Bay (Nominated National Heritage list ID 106162), Kamay Botany Bay National Park and Towra Point Reserve (SHR listing 5061543) and the Botany Bay National Park (National Park ID 1810)).
- Former Prince Henry Hospital site and Aboriginal heritage place (Randwick LEP 2012 listing 21611)
- Chinese Market Gardens (Randwick LEP listing I246)

[30] *Ibid*.
[31] Godden Mackay Logan (2002)
[32] SHR accessed on http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=504013

- Bunnerong Power Station (Randwick LEP 2012 listing 21355)
- 1920s Bungalow (Randwick LEP 2012 listing I173)
- Captain Cook's Landing Place (Sutherland LEP 2015 listing A2510)
- Flagpole (Sutherland LEP 2015 listing A2520)
- Kurnell Monuments (in Kamay Botany Bay National Park) (Sutherland LEP 2015 listing A2503)
- Solander Monument (Sutherland LEP 2015 listing A2513)
- Forby Sutherland Monument (Sutherland LEP 2015 listing A2515)
- Banks Memorial (Sutherland LEP 2015 listing A2512)
- Alpha Farm Site (Sutherland LEP 2015 listing 2517)
- Landing Place Wharf Abutment (Sutherland LEP 2015 listing A2516)
- Captain Cook's Landing Site (Sutherland LEP 2015 listing A2511)
- Captain Cook Monument (Sutherland LEP 2015 listing A2514)
- Captain Cook Watering Well (Sutherland LEP 2015 listing A2519)
- Captain Cook Watering Hole (Sutherland LEP 2015 listing A2518)
- Yena Track (Sutherland LEP 2015 listing A2521)
- Muru Track (Sutherland LEP 2015 listing 2522)
- Former Church (Sutherland LEP 2015 listing 2501)
- Australian Oil Refinery (Sutherland LEP 2015 listing 2524)
- Towra Point Nature Reserve and Quibray Bay (Sutherland LEP 2015 listing 2509)
- Towra Point Nature Reserve and Quibray Bay (Sutherland LEP 2015 listing 2528)
- Kurnell Historic Site (in Kamay Botany Bay National Park) (Sutherland LEP 2015 listing 2504)

No additional listings on the Sutherland Shire LEP are located within 500 metres of the study area Three listings on the Randwick LEP (2012) are located within 500 metres of the study area:

- Long Bay Correctional Centre (Randwick LEP 2012 listing 18670), located approximately 200 metres north of the study area.
- Eastern Suburbs Crematorium (Randwick LEP 2012 listing 15794), located approximately 100 metres north of the study area
- Pioneers Memorial Park, Botany Cemetery (Randwick LEP 2012 listing 15795), located approximately 50 metres north of the study area.

4.3.4 Sydney Water s170 register

Randwick South Reservoir (Elevated) (WS 0102) (Sydney Water s170 Listing No 4575741)

> *"Randwick South Reservoir (Elevated) (WS 102) is one of a small group of reinforced concrete reservoirs on concrete piers. The reservoir demonstrates the*

growing demand for water in Sydney suburbs. The listing includes the reservoir and all associated pipework, valves and valve houses to the property boundary..”[33]

The curtilage of the listing is defined by the boundary of Lot 1 in DP no.88190. The listing is endorsed as local significance and was added to the Sydney Water s170 register on the 1 January 2000.

[33] Sydney Water s170 accessed on https://www.sydneywater.com.au/SW/water-the-environment/what-we-re-doing/Heritage-search/heritage-detail/index.htm?heritageid=4575741&FromPage=searchresults

Figure 12: National Heritage register items

Figure 13: SHR items

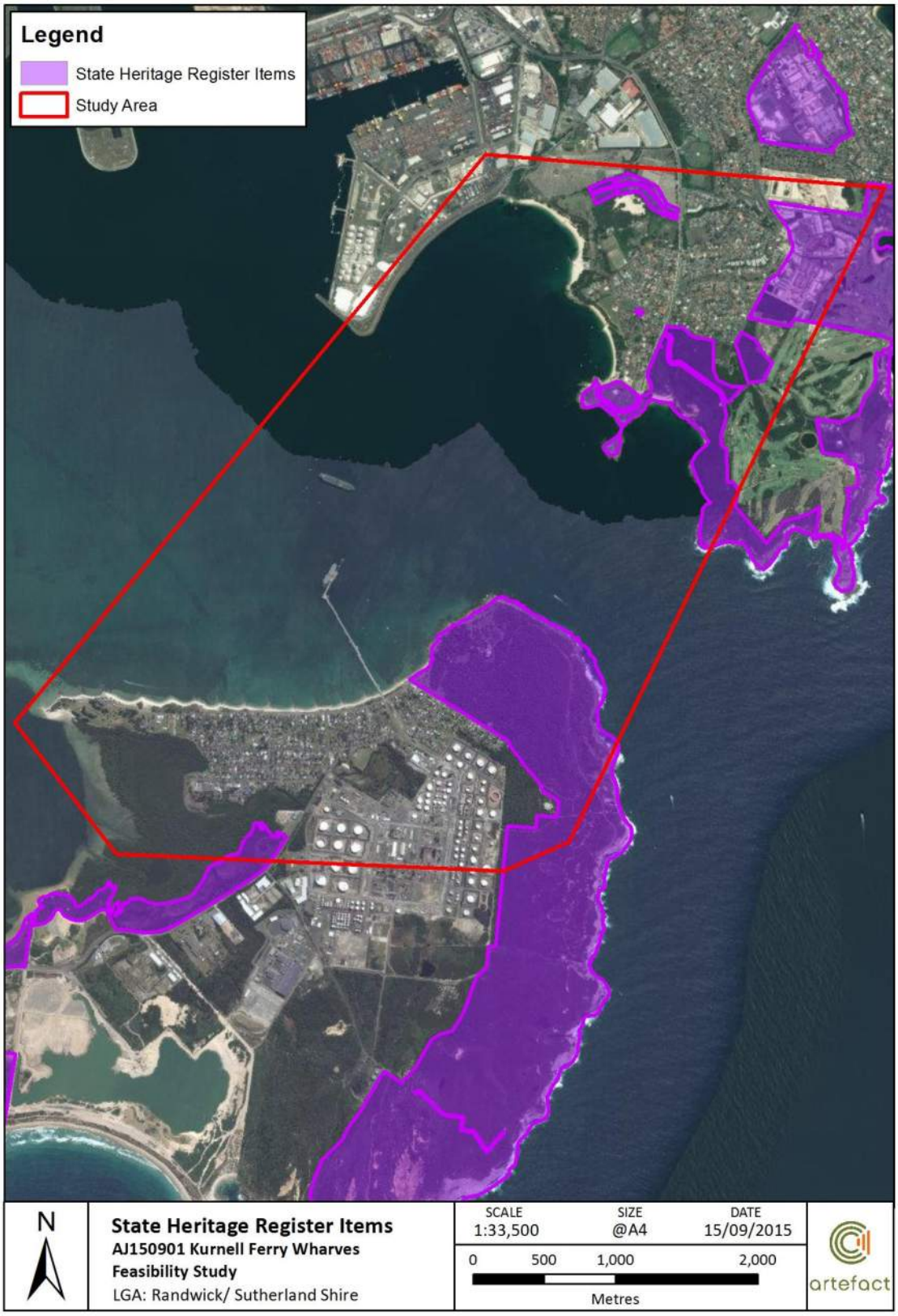


Figure 14: Local historic heritage items

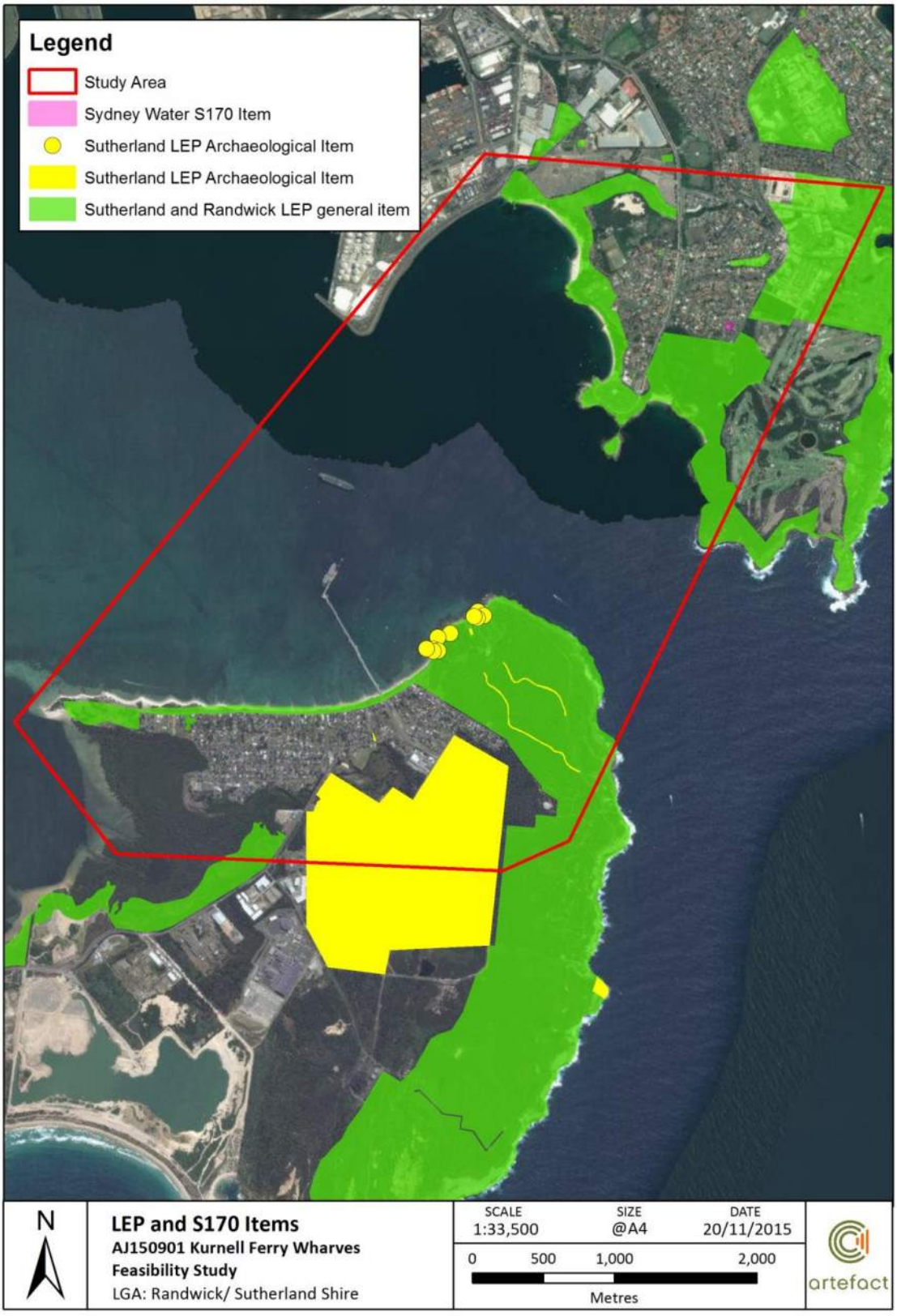


Figure 15: Historic heritage items detail- La Perouse

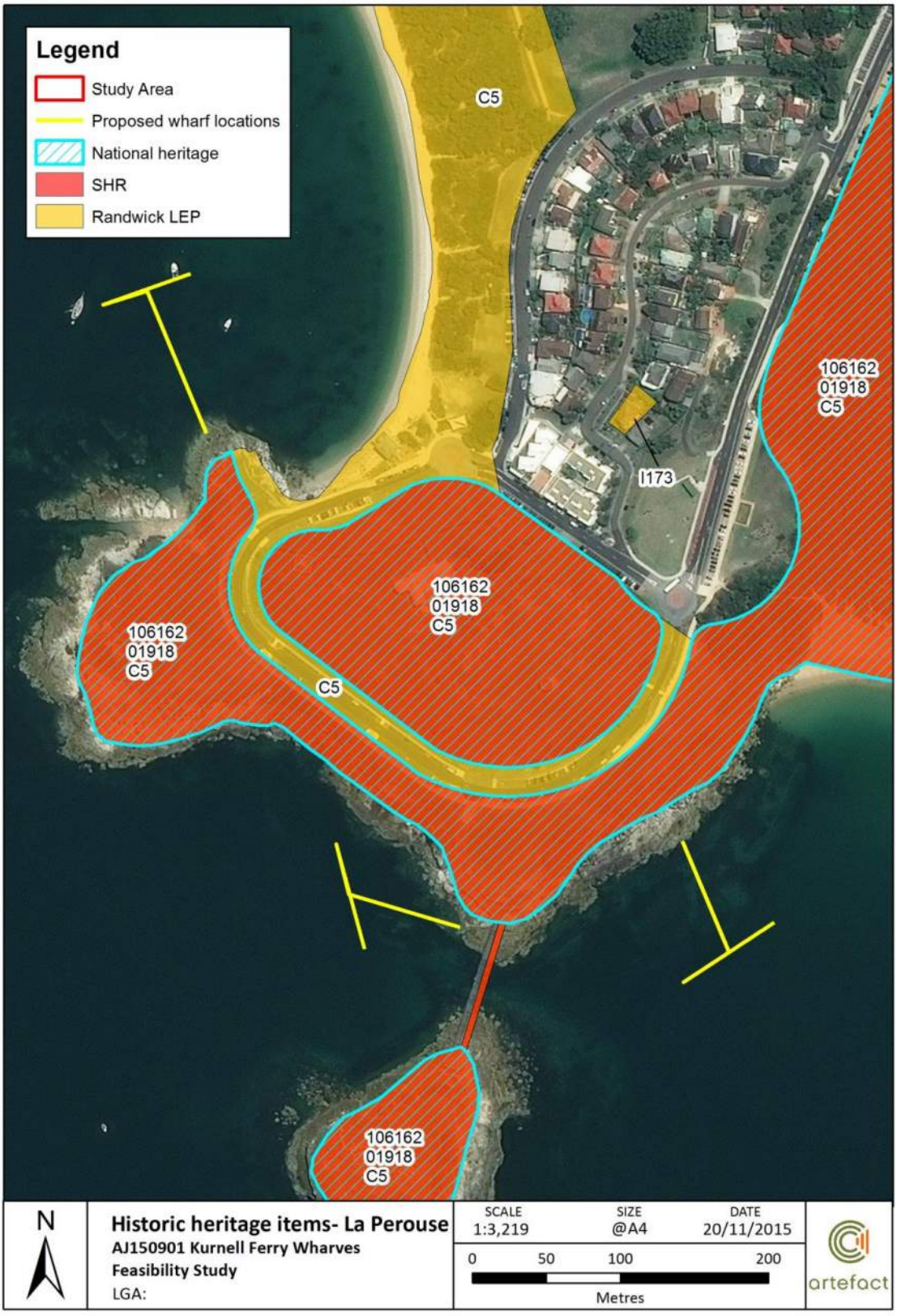


Figure 16: Historic heritage items detail- Kurnell

4.4 Key constraints

The following table summarise the key constraints within the study area with regards to heritage. Each site within the study area and its proximity to the proposed works is detailed. At the time of writing information regarding ancillary works, such as access to wharves and car parking, was not available. Impacts of ancillary works to known heritage sites would need to be included in a detailed archaeological assessment.

The study area is highly significant to the local Aboriginal community. Further information on cultural significance would be prepared following comprehensive Aboriginal stakeholder consultation.

Table 4: Summary of sites and proximity to proposed works. Sites that are likely to be directly impacted by the proposed works are highlighted in red

Site ID	Heritage register	Site type	Proximity to proposed works
45-6-0639	AHIMS	Art (Pigment or Engraved)	Greater than 500 metres
45-6-1237	AHIMS	Shell, Artefact	Greater than 500 metres
45-6-2658	AHIMS	PAD	Greater than 500 metres
45-6-0886	AHIMS	Shell, Artefact	Greater than 500 metres
45-6-0292	AHIMS	Shell, Artefact	Greater than 500 metres
45-6-0659	AHIMS	Art (Pigment or Engraved)	Greater than 500 metres
45-6-0873	AHIMS	Art (Pigment or Engraved)	Greater than 500 metres
45-5-2587	AHIMS	Shell, Artefact	400 metres northeast of La Perouse Option 1
45-6-0653	AHIMS	Art (Pigment or Engraved)	0 metres from La Perouse Option 1
45-6-1403	AHIMS	Art (Pigment or Engraved)	100 metres southeast of La Perouse Option 1, immediately adjacent parking places and road on La Perouse peninsula
45-6-1144	AHIMS	Shell, Artefact	140 metred north of La Perouse Option 2. Adjacent parking places and road on La Perouse peninsula
45-6-0652	AHIMS	Art (Pigment or Engraved)	200 metres southwest of La Perouse Option 1and 200 metres northwest of La Perouse Option 2
45-6-0648	AHIMS	Art (Pigment or Engraved)	200 metres northwest of La Perouse Option 2. Note that location is likely in error, may be closer to proposed works

Site ID	Heritage register	Site type	Proximity to proposed works
45-6-0651	AHIMS	Art (Pigment or Engraved)	30 metres north of La Perouse Option 2, immediately adjacent road and parking places
45-6-0649	AHIMS	Art (Pigment or Engraved)	30 metres north of La Perouse Option 2, immediately adjacent road and parking places
45-6-0650	AHIMS	Art (Pigment or Engraved)	30 metres north of La Perouse Option 2, immediately adjacent road and parking places
45-6-1145	AHIMS	Shell, Artefact	30 metres northeast of La Perouse Option 3
45-6-1146	AHIMS	Art (Pigment or Engraved)	50 metres east of La Perouse Option 3. Note that location is likely in error, may be closer to proposed works
45-6-1762	AHIMS	Shell, Artefact	100 metres northeast of La Perouse Option 3. Note that location is likely in error, may be closer to proposed works
45-6-0561	AHIMS	Shell, Artefact	100 metres northeast of La Perouse Option 3. Note that location is likely in error, may be closer to proposed works
45-6-0556	AHIMS	Shell, Artefact	Greater than 500 metres
52-3-1223	AHIMS	PAD	400 metres southeast of Kurnell Option 3, immediately adjacent foot track
52-3-1381	AHIMS	Burial	80 metres southeast of Kurnell Option 3, immediately adjacent foot track
52-3-0219	AHIMS	Shell, Artefact, Burial	0 metres from Kurnell Option 3
52-3-0221	AHIMS	Art (Pigment or Engraved)	300 metres south of Kurnell Option 3
52-3-1366	AHIMS	PAD	0 metres from Kurnell Option 1
52-3-0525	AHIMS	Burial, Shell, Artefact	Greater than 500 metres
52-3-1947	AHIMS	Aboriginal Resource and Gathering, Shell	Greater than 500 metres
52-3-0212	AHIMS	Shell, Artefact	Greater than 500 metres

Site ID	Heritage register	Site type	Proximity to proposed works
105812	National Heritage database	Kurnell Peninsula Headland	0 metres from all options
(Nominated) 106162	National Heritage database	Kamay Botany Bay	0 metres from all options
012999	SHR	Chinese Market Gardens	Greater than 500 metres
01893	SHR	La Perouse Mission Church	Greater than 500 metres
00978	SHR	Bare Island Fort	100 metres south of La Perouse Option 2
01918	SHR	Kamay Botany Bay National Park (North and South) and Towra Point Nature Reserve	0 metres from all options
01651	SHR	Prince Henry Site	Greater than 500 metres
00810	SHR	Long Bay Correctional Centre	Greater than 500 metres
C5	Randwick LEP 2012	Botany Bay Conservation area	0 metres from all La Perouse options
A3-A19, AH1 and I175, I176, I182, I179-I181, I177, C6	Randwick LEP 2012	Former Prince Henry Hospital site and Aboriginal heritage place	Greater than 500 metres
I246	Randwick LEP 2012	Chinese Market Gardens	Greater than 500 metres
C8	Randwick LEP 2012	Bunnerong Power Station	Greater than 500 metres
I173	Randwick LEP 2012	1920s Bungalow	240 metres east of La Perouse Option 1
A2510	Sutherland LEP 2015	Captain Cook's Landing Place	60 metres east of Kurnelll Option 3
A2520	Sutherland LEP 2015	Flagpole	100 metres east of Kurnell Option 3
A2503	Sutherland LEP 2015	Kurnell Monuments (in Kamay Botany Bay National Park)	40 metres southeast of Kurnell Option 3
A2513	Sutherland LEP 2015	Solander Monument	50 metres southeast of Kurnell Option 3
A2515	Sutherland LEP 2015	Forby Sutherland Monument	40 metres southeast of Kurnell Option 3

Site ID	Heritage register	Site type	Proximity to proposed works
A2512	Sutherland LEP 2015	Banks Memorial	70 metres east of Kurnell Option 2
2517	Sutherland LEP 2015	Alpha Farm Site	90 metres south of Kurnell Option 3
A2516	Sutherland LEP 2015	Landing Place Wharf Abutment	0 metres from Kurnell Option 2
A2511	Sutherland LEP 2015	Captain Cook's Landing Site	90 metres south of Kurnell Option 3
A2514	Sutherland LEP 2015	Captain Cook Monument	70 metres southwest of Kurnell Option 2
A2519	Sutherland LEP 2015	Captain Cook Watering Well	70 metres southwest of Kurnell Option 2
A2518	Sutherland LEP 2015	Captain Cook Watering Hole	70 metres southwest of Kurnell Option 2
A2521	Sutherland LEP 2015	Yena Track	400 metres southeast of all Kurnell options
2522	Sutherland LEP 2015	Muru Track	400 metres southeast of all Kurnell options
2501	Sutherland LEP 2015	Former Church	450 metres southwest of Kurnell Option 1
2524	Sutherland LEP 2015	Australian Oil Refinery	Greater than 500 metres
2509	Sutherland LEP 2015	Towra Point Nature Reserve and Quibray Bay	0 metres from all Kurnell optio
2528	Sutherland LEP 2015	Towra Point Nature Reserve and Quibray Bay	0 metres from all Kurnell optio
2504	Sutherland LEP 2015	Kurnell Historic Site (in Kamay Botany Bay National Park)	0 metres from all Kurnell option

5.0 FURTHER INVESTIGATION AND SUMMARY OF KEY CONSTRAINTS

This high-level heritage constraints assessment has identified that there are a number of Aboriginal sites and listed heritage items within or in the immediate vicinity of the proposed jetty location sites. A preliminary outline of suitable management measures is outlined below.

5.1 Further investigation

Further heritage investigations of the study area is required to determine the exact nature of the likely impacts on identified Aboriginal sites and heritage items within the proposed jetty location sites. These investigations could commence during the selection process for the preferred jetty location at both La Perouse and Kurnell. More detailed investigation of impacts would then occur once the preferred jetty location has been selected.

5.1.1 Historical heritage assessment and Statement of Heritage Impacts (SoHI)

A comprehensive heritage assessment should be prepared for the project. The aim of the heritage assessment would be to outline listed and unlisted heritage items within the study area and provide a detailed significance assessment for each item based on background research, inventory sheets, and GIS mapping.

A SoHI would be prepared where it is identified that items of local, state and national significance would be impacted by the proposal. The SoHI would include a detailed impact assessment based on detailed impact drawings for the proposal. The SoHI would also outline detailed mitigation and management measures required both before and during the construction stage, including any requirements for permits and approvals.

Historical archaeological assessment

As part of the heritage assessment process, a detailed historical archaeological assessment should be prepared. An archaeological assessment would conduct primary research and information from listed item inventory sheets to identify where there is potential for relics within the proposed jetty location sites, and outline any requirements for archaeological excavation. The assessment would also include investigation of any underwater (maritime) archaeological constraints.

Approvals and consultation

Approvals that are likely to be required under the Heritage Act include Section 60 and Section 139/140. Consultation with Sutherland and Randwick Councils as well as NPWS would also be required prior to impacts. Following preparation of the SoHI, referral to the Federal Minister for the Environment may be required where items on the National Heritage list are impacted.

5.1.2 Aboriginal heritage assessment and Aboriginal stakeholder consultation

An outline of the Aboriginal heritage assessment and Aboriginal stakeholder consultation required for further investigation within the proposed jetty location sites includes survey reporting, test excavation (where required), preparation of an Aboriginal Cultural Heritage Assessment Report (ACHAR), submitting an AHIP application to OEH and archaeological salvage excavation (where required).

Aboriginal stakeholder consultation

Comprehensive Aboriginal stakeholder consultation conducted in accordance with the OEH 'Aboriginal cultural heritage consultation requirements for proponents 2010' should be conducted as part of any further Aboriginal heritage assessment within the proposed jetty location sites. The stakeholder consultation process involves a one-month stakeholder registration process.

Once a list of registered stakeholders has been compiled for the proposal, stakeholders would be provided project information and invited to participate in fieldwork. Aboriginal stakeholder consultation is an integral component of Aboriginal heritage reporting, particularly the ACHAR (see below).

Archaeological survey report (ASR)

The first stage of Aboriginal heritage reporting and field survey would include preparation of an ASR in consultation with registered Aboriginal stakeholders. The ASR would be prepared in accordance with the OEH 'Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales' (2010).

Preparation of the ASR would include a field survey of the proposed jetty location sites and reporting that includes background context, survey description, results, significance assessment, impact assessment, and an outline of recommended mitigation and management measures. The ASR would outline levels of impacts to identified Aboriginal sites and areas of archaeological potential and whether archaeological test excavation would be required.

Archaeological test excavation

Archaeological test excavation may be required where further information on the nature and extent of Aboriginal sites or areas of identified archaeological potential is recommended in the ASR. Archaeological test excavation generally involves an excavation without an AHIP and in accordance with a methodology established by the OEH code of practice. However, code of practice test excavation without an AHIP is extinguished in certain situations, such as areas where shell midden has been, or is likely to be, identified. An AHIP for test excavation would be required in that circumstance.

Preparation of an ACHAR

The ACHAR is the final document prepared prior to submitting an AHIP application to OEH. This includes an AHIP application for test excavation or for impacts. The ACHAR is prepared in consultation with Aboriginal stakeholders, and includes an assessment of cultural significance based on that consultation. Where the ACHAR will accompany an AHIP for impacts, detailed management and mitigation measures would be included, including whether salvage excavation would be required, long-term keeping place for any Aboriginal objects retrieved from excavation, and establishment of no-harm areas to protect Aboriginal heritage during construction works.

5.2 Opportunities

Positive outcomes for heritage from the proposal may include:

Heritage interpretation – there is an opportunity to prepare a Heritage Interpretation Plan (HIP) to identify key areas where heritage interpretation could be implemented as part of the proposal. This should include consultation with Aboriginal stakeholders to identify suitable Aboriginal heritage interpretation opportunities.

The opportunity to re-establish the ferry route between Kurnell and La Perouse and highlight through interpretation the history of ferry services between those areas.

5.3 Summary of key constraints

Key constraints identified by this high-level assessment include:

- The potential for Aboriginal burials to occur within the proposed jetty location sites, including at least one recorded burial location (AHIMS site 52-3-0219)
- The large number of recorded Aboriginal sites within, and in the immediate vicinity of, the proposed jetty location sites. These sites include shell middens, potential archaeological deposit (PAD), art (pigment or engraved) and burials
- Aboriginal sites with inaccurate coordinate locations. Further investigation would be required to accurately determine the location of those sites with regard to the proposed jetty location sites
- Identification of additional areas of archaeological potential during further study is likely with a high probability of extensive archaeological excavation being required for any of the options.
- There are two National Heritage items that overlap with the proposed jetty location sites, including the Kurnell Peninsula Headland and Kamay Botany Bay. Approvals from the Federal Minister for the Environment may be required where these items are impacted.
- SHR items that overlap with the study area, including the Kamay Botany Bay National Park (North and South) and Towra Point Nature Reserve
- A number of Sutherland and Randwick LEP items within, and in the immediate vicinity of, the proposed jetty location sites. This includes items associated with Captain Cook's landing place and the Botany Bay conservation area.
- One of the aims of Aboriginal stakeholder consultation would be to identify Aboriginal cultural significance values within the study area.

6.0 REFERENCES

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Appendix B

Aquatic Ecology Report (Marine Pollution Research)

MARINE POLLUTION RESEARCH PTY LTD

Marine, Estuarine and Freshwater Ecology, Sediment and Water Quality Dynamics

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BOTANY BAY FERRY SERVICE FEASIBILITY STUDY

1 Introduction

Marine Pollution Research Pty Ltd (MPR) was contracted by Arup to advise on aquatic ecological constraints and opportunities relating to a proposal for a public ferry service between La Perouse and Kurnell. At the initiation of the study project Arup provided a defined study area (Figure 1).

Figure 1 Botany Bay Ferry Service Study Area

2 General Aquatic Ecology of the Study Area

The main aquatic habitats that require protection are the rocky reef systems around the mainland coast-lines and offshore (Bare Island Bombora off Bare Island and Watts Reef off Kurnell) and the seagrass beds in the shallows offshore from the mainland coastline. The rest of the study area seabed and the bay entrance seabed between Kurnell and La Perouse is predominantly marine sand habitat. Aquatic habitats of the study area are described as follows:

Rocky Reef Habitat:

- The western side of Yarra Bay comprises the rock revetment for the Port, which is a complex shallow to deep reef system that supports a diverse reef fish assemblage including protected species.
- The inshore shallow reef complexes around Yarra Bay, Congwong Bay, Bare Island and along the Kurnell shoreline are kelp-based and high quality reef systems that support protected fish species such as syngnathids (seahorses, pipefish and the like) including weedy sea dragons, and are likely to support juvenile Black Rock Cod (listed as Threatened under the FMA).
- Watts Reef off the National Park at Kurnell is a high quality kelp-based algae reef that supports a variety of protected fish species including Blue Grouper plus syngnathids (seahorses, pipefish and weedy sea-dragons).
- The deep-reef complex towards the heads at Kurnell and around Bare Island (including the bombora) also support protected fish, and the reef structure provides suitable habitat for Black Rock Cod (a threatened species listed under the FMA). The deep- reef systems towards the heads also provide feeding habitat for local Grey Nurse Shark populations (listed as Critically Endangered under the FMA).

Seagrass Beds and Habitat:

- The scattered seagrass in Frenchmans Bay comprises relatively low density and scattered beds or patches of the protected seagrasses *Zostera* capricorni and *Halophila* spp. These species are seasonally abundant with occurrence generally related to both wet to dry weather cycles and seasonal water temperature variation
- Whilst there are no seagrass beds in Congwong Bay, there are small patches of *Halophila* along the shallow reef fringes from time to time.
- The seagrass beds off Silver Beach and Towra Point (west of the Kurnell Caltex Wharf) support a complex seagrass assemblage from inshore to around -3m depth offshore comprising mixed *Posidonia australis*, *Zostera capricorni* and *Halophila spp*.
- The seagrass bed east of the Refinery Wharf off Kurnell is a *Posidonia* seagrass bed with an understory of *Halophila* and *Zostera* seagrass.

- *Posidonia* seagrass beds are listed as *Endangered Ecological Communities (EEC)* under both State (FMA) and Federal (EPBC Act) legislation and the whole seagrass complex from Kurnell to Towra Point meets the listing criteria under both the FMA and EPBC Act.

Sand and soft sediment habitat:

- These habitats provide little direct protection from predators and therefore the majority of fauna within this habitat are either buried under the surface (the benthos - comprising a vast multitude of worms, crustaceans and bivalve molluscs) or rely on cryptic colouration or hard shells (many fish, pipefish, prawns and gastropod molluscs).

Habitat Utilisation:

- The fauna of soft sediment habitats are consumed by predators (mainly fish and crustaceans) with attributes such as good eyesight or sensitivity to minute electric fields (to detect buried fauna). The fauna of intertidal soft sediment habitats are also consumed by a variety of shore and wading birds.
- Both the rocky reef and seagrass complexes provide nursery, protection and feeding habitat for a large proportion of the fish species found in Botany Bay with many of the specialist rocky reef fish utilising seagrass beds as juveniles before moving permanently onto three rocky reef habitats.
- Some of the many species protected under the FMA and EPBC have distinct habitat preferences including a number of rocky reef fish that require cave, crevice and cavern habitat for their establishment. Other fish that depend on camouflage for protection from predators (the cryptic fish that include many of the syngnathids) require dense kelp beds, complex deep water sponge dominated habitats and dense seagrass beds.
- Pipefish occur throughout the various habitat types with various species widely but sparsely distributed throughout the soft sediment habitats. Others are concentrated in large numbers in the smaller but denser *Zostera* seagrass habitats.
- There are large numbers of fishing birds that exploit the shallow water habitats foraging for schooling fish in the shallows and for fish around or over the reef and seagrass habitats.
- The waters and shorelines of the bay entrance provide habitat for marine mammals (dolphins, humpback and southern right whales are regularly reported from the bay entrance - in season), seals (also commonly reported from the shorelines and from the Caltex Wharf) and a variety of listed shore, wading and fishing birds (including oyster catchers, little terns and little penguins). Turtles are also known form the bay with the Green Turtle most common.
- There are reports of rare (listed) vagrants such as dugongs, a variety of whale and seal species and a variety of ocean birds. These are generally noted during or after inclement weather or are way out of their natural range (such as the dugongs).

3 Aquatic Ecological Constraints for the Proposed Ferry Wharf Options

The Final Preliminary Feasibility Study includes three ferry wharf site options at La Perouse and three at Kurnell (Figures 37 and 38 in the Feasibility Report). The aquatic ecological constraints for these sites are summarised as follows:

La Perouse Option LP1:

- There is a low to moderate risk of construction impact on inshore scattered seagrass (*Halophila* and *Zostera*) beds, but given the generally scattered and seasonal nature of the beds, the impact is likely to be low and manageable.
- Whilst sheltered from direct long-period storm waves entering Frenchmans Bay, the site is open to a long wind-wave fetch to the south-east, and is also susceptible to reflected swell from the Port Revetment Wall from time to time. However, for the latter conditions the ferry service would most probably be suspended owing to direct adverse swell entering the bay. Notwithstanding, this latter reflected swell could cause wave scour and loss of seagrass around the wharf piles.
- Given the orientation of the wharf there is only low risk of shading impact on seagrass.

La Perouse Option LP2:

- There is a low to moderate risk of construction impact on inshore scattered seagrass (*Halophila* and *Zostera*) beds but given the generally scattered nature of the beds (see Figure 2), the impact is likely to low and manageable.
- There is likely to be some construction impact on inshore rocky reef - generally low profile kelp reef that is not known (or expected) to support large numbers of weedy sea dragons or seahorses (i.e., there is a low construction risk to syngnathids and other cryptic fish).
- The placement of the wharf over rock reef habitat will shade the habitat and some shading impact on rocky reefcould be expected although it is most likely to be low risk.
- Whilst generally sheltered from direct long-period storm waves entering Frenchmans Bay, the site is still open to a long wind wave fetch to the north-west through to west which makes use of the wharf difficult during north-westerly gales but would not be expected to cause wave scour around the wharf piles.
- In relation to the above the proximity of shallows to the north-east would make ferry manoeuvring difficult during on-shore winds with a consequent greater risk of bottom scouring inshore.
- The site is less susceptible to reflected long-period storm waves that are bounced off the Port Revetment under some storm conditions, and these waves most probably would not result in scour around wharf piles.

La Perouse Option LP3:

- There are no seagrass beds in Astrolabe Bay and the inshore reef is relatively short. Notwithstanding, this low inshore reef is characterised by high crevice complexity and therefore supports a greater variety of reef fish than would be expected for its size. It is also located close to high value deep reef extending to the north and north-east from Bare Island.
- As a consequence of the habitat values of the reefs the bay also has a moderate to high usage by snorkelers, divers and dive clubs.
- Whilst construction impacts would be low and manageable great care would be required in locating the support piles to minimise impact on crevice habitat.
- The site is highly susceptible to long-fetch wind waves and also to refracted long-period waves, resulting in relatively high and variable wave-induced currents within the bay that would significantly affect manoeuvrability for ferry masters, resulting in a high risk of damage to reefs, the wharf and to ferries from ferry collisions.

Kurnell Option K1:

- This option would require placement of the wharf through and across the *Posidonia* bed and construction would result in the direct loss of *Posidonia* EEC to pile placement.
- There would be a moderate to high risk of additional indirect loss of *Posidonia* EEC to construction related impacts (vessel mooring, anchoring and propeller scour).
- There would be a high risk of shading impact on *Posidonia* EEC from wharf structure and an additional high risk of *Posidonia* EEC loss to wave-induced scour around the wharf piles.
- There is a low to moderate risk of additional *Posidonia* EEC loss to ferry propeller wash when utilising the wharf during low tides and a moderate to high risk of damage to Posidonia EEC from vessels mooring to the Jetty or crossing the seagrasss bed to moor at the jetty.
- There is a moderate risk of storm damage to the wharf structure from wave action with resulting debris washed across the *Posidonia* EEC.
- This option will require a referral to the Commonwealth under the EPBC Act and will require an SIS under the NSW FM plus EP&A Acts

Kurnell Option K2:

- There would be a low risk of some impact to inshore mixed seagrass patches from pile placement that include some *Posidonia australis* cover but which are not likely to be classified as EEC (due to thier patchiness and size). The risk would relate primarily to the positioning of jetty support piles.
- Whilst there would be some impact on inshore plus offshore rocky reef expected from jetty and wharf pile placement the risk to the a=quatic ecological attributes at this location are considered low due mainly to the relative low diversity of the low profile kelp reef.

This reef is unlikely to support large numbers of weedy seadragons (i.e., there is a low risk to syngnathids).

- There is some potential disturbance risk for listed shore birds and for the occasional hauling-out seals but this risk is considered manageable and a low risk for the species concerned.
- There would be some shading impact on rocky reef but this would be a low risk as the waters along this shoreline are generally very clear and also generally well agitated ensuring adequate refracted and reflected light for the shaded reef sections.
- There is some potential for storm wave scouring of sediments around piles but as the coarse marine sand in this location forms a veneer over basement rock, the impacts are likely to be considered low risk.
- There is some potential for ferry induced bottom scouring of sediments during low tide manoeuvres. However, given the mobility of sand plus its character (coarse to fine marine sands with low silt content) there is low risk of turbidity and/or mobilisation of contaminants from this bottom scouring.
- There is a moderate risk from storm damage to the wharf structure from wave action with resulting debris washed across the in-shore reef.
- This wharf option is susceptible to storm-induced waves and is also closer to Watts Reef (located directly north-east, in-line with the wharf (see Figure 3) which can result in a heightened navigation hazard during the combination of poor visibility and high seas.
- The inshore reefs are also used by spear-fishers, and has a relatively high use by recreational divers.

Kurnell Option K3:

- This option would have a moderate to high construction impact on high aquatic habitat value inshore plus offshore rocky reef ranging from low profile kelp reef inshore to complex sponge reef off-shore) and which is known to support large numbers of weedy sea dragons (i.e., high risk to syngnathids).
- There is some potential disturbance risk for listed shore birds and for the occasional hauling-out seals but this risk is considered manageable and a low risk for the species concerned.
- There would be some shading impact on rocky reef but this would be a low risk as the waters along this shoreline are generally very clear and also generally well agitated ensuring adequate refracted and reflected light for the shaded reef sections.
- This site is highly susceptible to high energy/long period wave action and there is a moderate to high risk from damage to the wharf structure arising from storm-wave action with resulting debris washed across the in-shore reef.
- There is an in-shore reef surfing location in the general vicinity of this option that is utilised in high swell conditions and placing a jetty in this location could interfere with or affect this surfing site.

3.1 Ferry Servicing and Maintenance Berth

The Final Preliminary Feasibility Study includes a possible location for a Ferry Servicing and Maintenance Berth (Figure 36). This site is located between the Airport Third Runway and the new Public Boat Ramp along Foreshore Road at Botany. In terms of the possible aquatic ecology of the site the seabed comprises a fine marine sand habitat beach with planted native vegetation between the beach and Foreshore Road that includes a boardwalk/path along the beach. The shallow intertidal to sub-tidal sediments supported an extensive *Zostera* seagrass bed prior to the construction of the Port Botany Extension and of the Public Boat Ramp. This bed also supported isolated clumps and individual shoots of *Posidonia* seagrass. The scarcity of the *Posidonia* seagrass was such that it is unlikely that the bed would have been considered part of the *Posidonia* EEC complex listed under the FMA and EPBC Act. It is not know whether any of this bed remains. The *Zostera* component of the bed was no longer there at the commencement of the Port Botany extension works whilst the *Posidonia* plants remained. Construction of the berth would require dredging and reclamation, which would remove any remaining or recovering seagrass beds and plants in the dredging and reclamation footprint.

As construction of the maintenance berth requires dredging and reclamation, this part of the project is not likely to be able to be assessed via a Review of Environmental Assessment and will require a full EIS. However, as the area is contained within the overall footprint of the Port Botany Extension Project, there is a large amount of relevant information for aquatic ecology impact assessment directly available from the Port Botany Extension Environmental Assessment and associated Construction plus post Construction monitoring reports.

4 Additional Aquatic Ecological Requirements For Environmental Assessment

Whilst the overall available information on the aquatic ecology of Botany Bay is generally good, the assessment of the preferred jetty and wharf/pontoon options LP2 and K2 and of the maintenance berth option will require additional field aquatic ecological assessment to delineate the actual aquatic habitats and confirm and/or extend the information on the value of these habitats for the aquatic biota utilising the habitats (see Figures 2 and 3).

Assessment of aquatic ecology impact will require more detailed information on the actual layout and location of the wharves, the construction methods and materials, and the characteristics of the vessels that are expected to use the facilities. In this latter respect the relationship between vessel propulsion method and distance off the seabed of the propulsion gear under both quiescent and various sea and swell conditions will be critical for determining the potential impact of vessel propulsion scour on seabed habitats. This assessment will also require a detailed bathymetric survey of the seabed at and around the wharf and over the ferry entry and exit paths under varying environmental (wind, tide, current, wave and sea state) conditions.

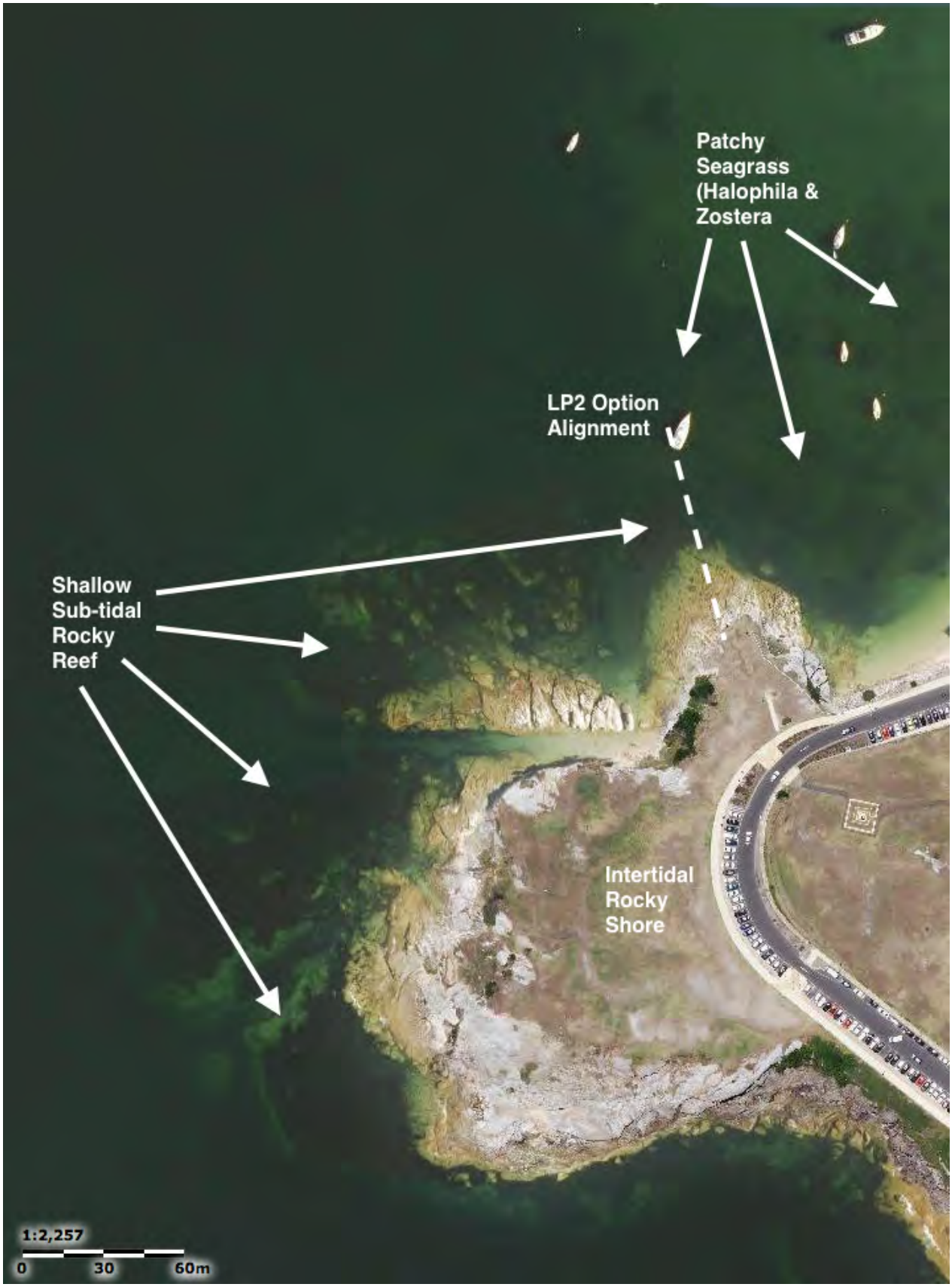

Figure 2 Aquatic Habitats around the LP2 Preferred Wharf Option

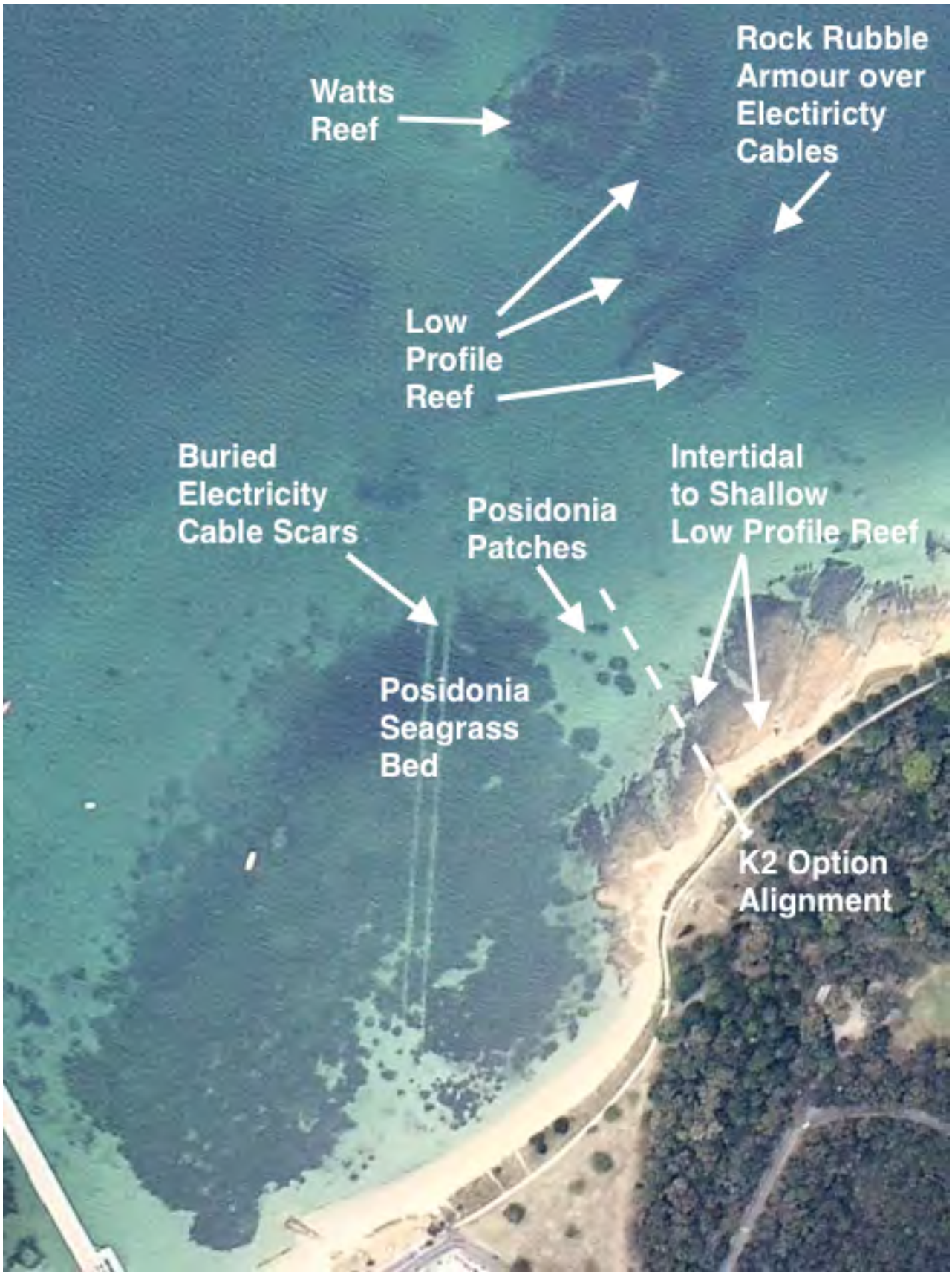

Figure 3 Aquatic Habitats around the K2 Preferred Wharf Option

Appendix C

Submissions Report

Transport for NSW

Ferry Wharves at La Perouse and Kurnell Draft Feasibility Study

Submissions Report

245379-REP-02

Final |

Job number 245379-00

Arup
Arup Pty Ltd ABN 18 000 966 165

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NSW GOVERNMENT Transport for NSW

ARUP

Contents

1 Introduction

1.1 Background

Transport for NSW (TfNSW) commissioned Arup to conduct a study on the re-establishment of the La Perouse to Kurnell Ferry Wharves in 2015. The intent of the study was to undertake preliminary economic, environmental, social and transport investigations and assessments to inform decision-makers on the feasibility of introducing new wharves at La Perouse and Kurnell for a passenger ferry service.

The *Draft Feasibility Study Report for Ferry Wharves at La Perouse and Kurnell* was made available for public comment from 5 July to 12 August 2016. This report has been prepared to provide an overview of engagement activities undertaken during this time. It also provides details of the feedback received during the public comment period.

1.2 Locality and context

La Perouse and Kurnell are located on the northern and southern sides of the entrance to Botany Bay. Both La Perouse and Kurnell have a variety of land uses encompassed by suburban communities, commercial and industrial precincts, and the Kamay Botany Bay National Park (refer to Figure 1).

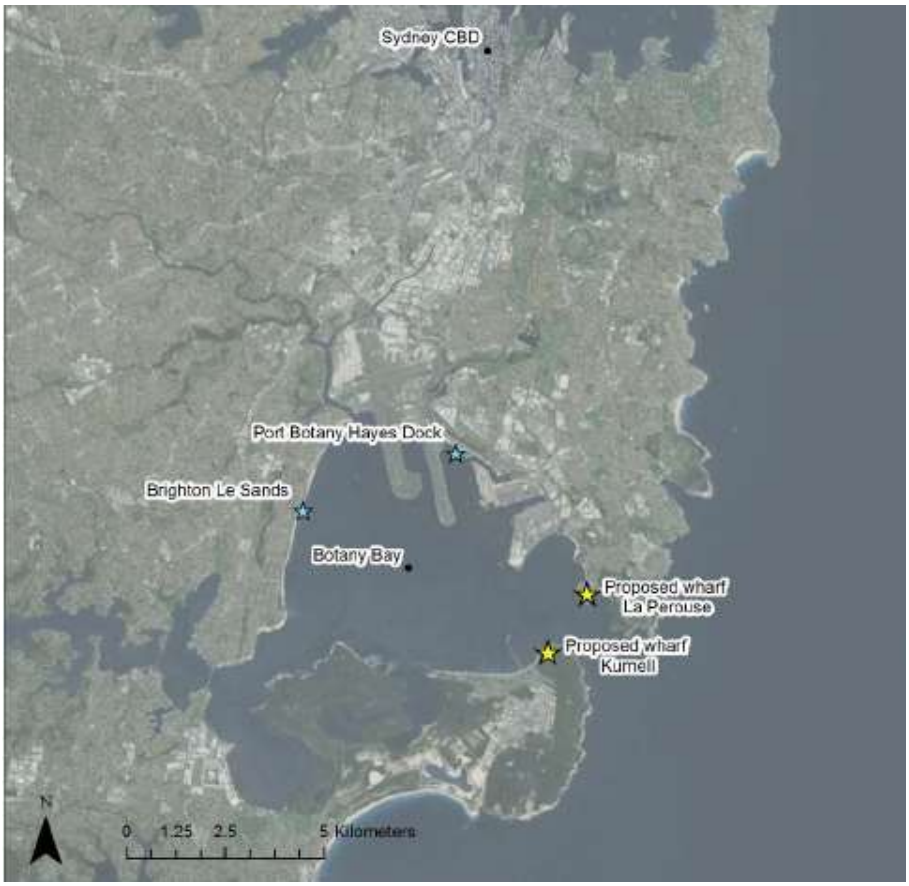

Figure 1: Locality plan showing La Perouse and Kurnell study area

1.3 History

Between the 1890s and 1974, a passenger ferry service operated between La Perouse and Kurnell. The service provided access to the city and the eastern suburbs, as well as providing an affordable day trip activity, popular with families during weekends and holidays. The trip was a short 20 minute crossing. The service stopped operating in 1974 after the wharves were severely damaged during a major storm event.

Since the discontinuation of this ferry service, various local governments and members of the community have proposed the reintroduction of the service.

In the late 1990s, a task force comprising local government, the NSW National Parks and Wildlife Service and other community groups formally commissioned a feasibility study for reintroducing such as service. The project did not proceed after completion of the study.

1.4 Project overview

In 2015, TfNSW released *The Botany Bay, Georges River and Port Hacking Regional Boating Plan*. The Plan identifies priority projects and actions to keep the waterways of Botany Bay and its upstream tributaries including the Georges River safe, improve accessibility, and enhance the overall boating experience.

The Plan identifies this study as a Priority Regional Project. The study coincides with the impending 250th anniversary of Lieutenant Cook's landing at the Kurnell Meeting Place in 2020.

Wharves at La Perouse and Kurnell could potentially be used for a variety of purposes including tourism and commuting. The wharf infrastructure could also potentially be used by other commercial and recreational vessels.

A copy of the *Draft Feasibility Study Report for Ferry Wharves at La Perouse and Kurnell* is available at http://www.transport.nsw.gov.au/projects-laperouse-and-kurnell-ferry-wharves.

2 Consultation to Date

The study has been directed by a Project Control Group (PCG) which includes the following key government stakeholders (in no particular order):

- Transport for NSW (the study proponent)
- NSW National Parks and Wildlife Service
- Randwick City Council and
- Sutherland Shire Council.

All members of the PCG were active in jointly establishing the study terms of reference, and attending and contributing to regular PCG progress meetings over the development of the study. The PCG members also formally reviewed initial drafts of the Feasibility Study Report and provided comments that were addressed in the *Draft Feasibility Study Report*.

A preliminary meeting with the La Perouse Local Aboriginal Land Council (LPLALC) to discuss the proposed ferry service was held on Thursday 17 December 2015. The meeting included an overview of the project by TfNSW and Arup representatives, as well as a preliminary discussion of proposed wharf locations in relation to Aboriginal sites. At the meeting initial comments were received from the LPLALC on the study and it was agreed that the draft study report will be forwarded to the LPLALC for review and formal comment.

In addition, a number of commercial vessel passenger service companies with existing operations in the Greater Sydney region were contacted to obtain initial comments and gauge interest in a prospective ferry service between La Perouse and Kurnell.

The wider public engagement on the *Draft Feasibility Study Report* is the most recent consultation completed for the project and is the subject of this report.

3 Public consultation

In February 2015, the NSW Government announced that the NSW government would investigate the feasibility of reinstating ferry wharves at La Perouse and Kurnell for tourism, commercial and recreational uses.

The announcement generated interest in the community and media, with information available in the St George and Sutherland Shire Leader (http://www.theleader.com.au/story/2876762/70k-for-ferry-study-kurnell-to-la-perouse-link-explored/) and on the Member for Cronulla's website (https://www.markspeakman.com.au/media/media-releases/kurnell-wharf-study).

A commitment was made to seek public feedback on the draft report. Feedback received from the community has been used to prepare a final version of the feasibility study.

This feedback has also identified potential issues and opportunities for investigation as part of any further planning completed for new ferry wharves at La Perouse and Kurnell.

During the public comment period community consultation activities included:

- placement of information on TfNSW's website to make information readily available to the public
- distribution of project flyers to residents and businesses in areas adjacent to the potential ferry wharf locations to publicise community information sessions and the project webpage
- advertising in local newspapers to notify the public of the project details, webpage and public information sessions
- a media release to publicise the public comment period
- community drop in sessions to allow the public to view the draft feasibility report and talk to members of the project team.

This was supported by two community sessions where people were invited to come and speak to the team about the project.

Feedback was also sought directly from key agencies and stakeholders including:

- Randwick City Council
- Sutherland Shire Council
- National Parks and Wildlife Service
- NSW Ports
- Port Authority of New South Wales
- La Perouse Local Aboriginal Land Council.

3.1 Website

A copy of the *Draft Feasibility Study Report for Ferry Wharves at La Perouse and Kurnell*, information about the project and details of how to provide feedback were made available on dedicated project page on TfNSW's website (see Figure 2)

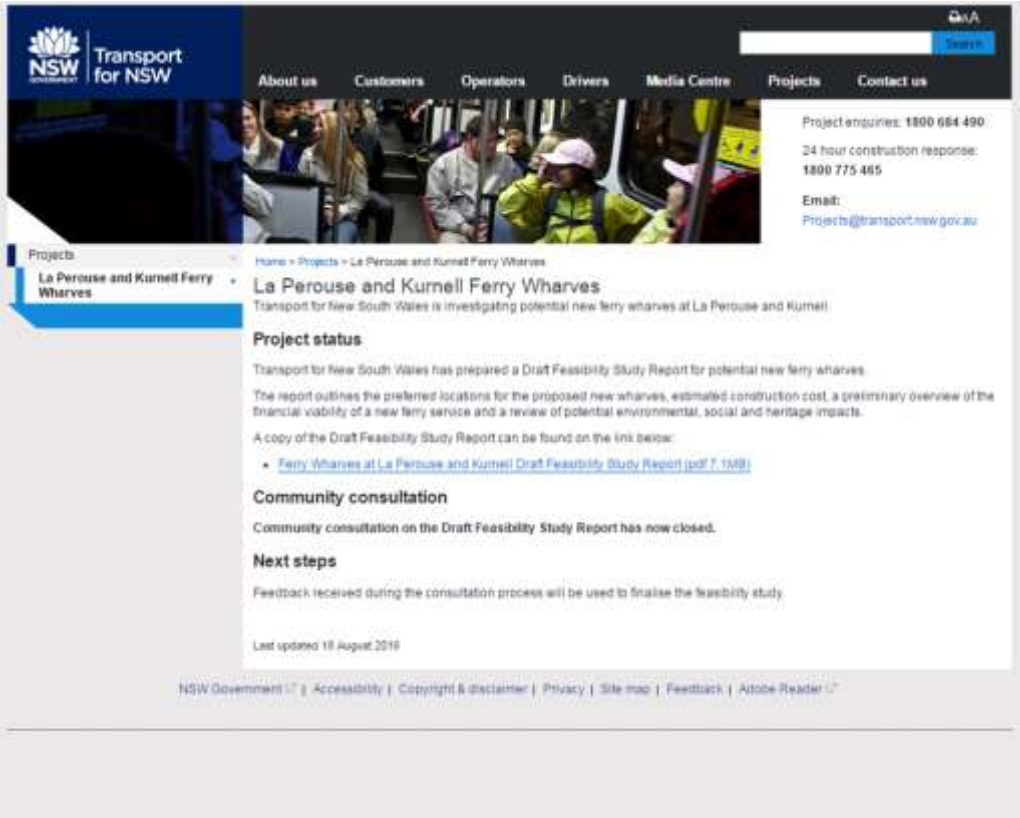

Figure 2: TfNSW project website - www.transport.nsw.gov.au/projects-laperouse-and-kurnell-ferry-wharves

3.2 Project flyers

A flyer (Figure 3) providing information about the Draft Feasibility Study Report and details about the community information sessions were distributed to more than 2,500 residents and business in areas adjacent to the proposed ferry wharf locations:

- Kurnell - 960 businesses and residential dwellings in the suburb of Kurnell
- La Perouse - 1,646 businesses and residential dwellings in the suburbs of Phillip Bay, Little Bay and La Perouse.

Figure 3: Community flyer for public consultation

3.3 Advertising

Advertisements were placed in the Southern Courier (Tuesday 2 August 2016 - Figure 4) and the St George and Sutherland Shire Leader (Wednesday 3 August 2016 - Figure 5) to inform the community about the Draft Feasibility Study Report, the community information sessions and encourage them to find out more and provide feedback.

Figure 4: Public consultation advertising in Southern Courier (Tuesday 2 August 2016)

Figure 5: Public consultation advertising in St George and Sutherland Shire Leader (Wednesday 3 August 2016)

3.4 Media Relations

TfNSW distributed a media release on Tuesday 5 July 2016 about the ferry wharves project (see Figure 6).

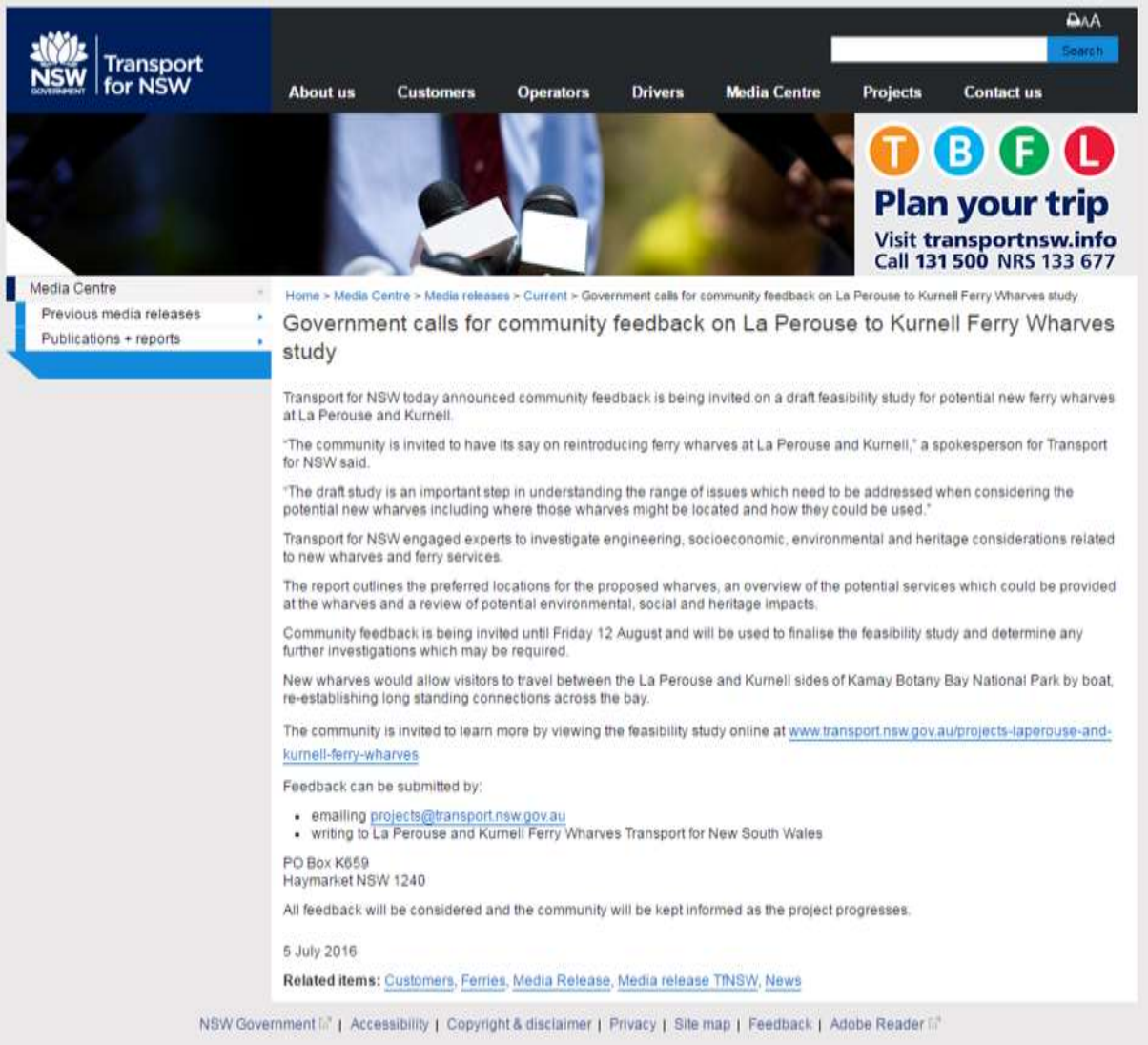

Figure 6: TfNSW media release requesting community feedback

The media release generated a number of media stories, including a news story shown on Channel 7 news, as shown in Figure 7.

Figure 7: Media story on Channel 7 News – 9 June 2016
https://au.news.yahoo.com/nsw/a/32091136/ferry-plan-for-sydneys-botany-bay/#page1

Other articles included

- St George and Sutherland Shire Leader published on 6 July 2016 (see Figure 8).
- The Daily Telegraph published on the 18 July 2016 (see Figure 9).
- The Daily Telegraph – 18 July 2016 (see Figure 10)
- St George and Sutherland Shire Leader published on 31 August 2016 (see Figure 11).

Articles about the Draft Feasibility Study Report were also included on

- Member for Cronulla's website (https://www.markspeakman.com.au/media/media-releases/community-invited-have-its-say-kurnell-and-la-perouse-wharves)
- Bus Australia's website (http://www.busaustralia.com/forum/viewtopic.php?f=3&t=82844).

Many benefits from Kurnell to La Perouse ferry, says Transport for NSW study

Feasibility study: The old ferry wharf near the Cook obelisk is the preferred site for any new ferry wharf. Picture: supplied

A ferry service between Kurnell and La Perouse would require a government subsidy, and new wharves would cost $17 million, a draft feasibility study has found.

However, the study found "numerous indirect social, economic and tourism benefits...could provide a compelling case for justifying any direct economic revenue shortfall".

Figure 8: Media story in St George and Sutherland Shire Leader – 6 July 2015

All SELECT REGION FIND LOCAL TRADIES

Back in the day... the La Perouse to Kurnell ferry in action. Picture: supplied

City East

$17 million dollar proposal to revive La Perouse to Kurnell ferry

A $17 MILLION plan to bring back the La Perouse-to-Kurnell ferry could eventually include a stop near Sydney Airport.

New wharves could re-establish long standing connections across the bay for commuters and tourists in time for the 250th anniversary of Captain James Cook's landing at Kurnell in 2020.

There is also scope to establish a wider ferry network with new wharves at

Figure 9: Media story in The Daily Telegraph – 18 July 2016
www.dailytelegraph.com.au/newslocal/city-east/17-million-dollar-proposal-to-revive-la-perouse-to-kurnell-ferry/news-story/12b27901266c2ca6fc0393de648ab17a

The ferry Rose at Sans Souci wharf approximately 1900. Picture: City of Sydney Archives

NSW

Plans to resurrect BotanyBay ferry

Melissa Seiler, The Daily Telegraph
July 18, 2016 10:00pm

- Ferry services closed, Sydney flights delayed as fog blankets city
- Purpose-built ferries to join the fast Manly fleet; more to come

FERRIES could be plying the waters of Botany Bay under plans to resurrect a service between La Perouse and Kurnell that could eventually include a stop near Sydney Airport.

Figure 10: Media story in The Daily Telegraph – 18 July 2016
www.dailytelegraph.com.au/news/nsw/plans-to-resurrect-botanybay-ferry/news-story/ddfc34f795561b84b44880b3e52d13f5

Leader

TV Guide

Community

$70k for ferry study - Kurnell to La Perouse link explored

Murray Trembath
12 Feb 2015, 12:01 a.m.

Share Tweet Email

+3

Susan Davis and granddaughter Maya, 2, with Mark Speakman and Duncan Gay Picture: John Veage

Figure 11: Media story in the St George and Sutherland leader – 31 August 2016
www.theleader.com.au/story/2876762/70k-for-ferry-study-kurnell-to-la-perouse-link-explored/

3.5 Community drop-in sessions

Community information sessions were held in Kurnell and La Perouse on Sunday 7 August 2016. These locations were chosen as they are the suburbs where ferry wharves could be potentially be located.

3.5.1 Kurnell

The Kurnell session was held at Marton Community Hall from 9:00am to 11:30am with 12 people attending the ‘drop in style event. Key themes discussed included:

- Economic rationale for the project
- Car parking requirements
- Private vessel use of the ferry wharves.

3.5.2 La Perouse

The La Perouse session was held at Cann Park from 1:30pm to 3:00pm with around 30 people attending. Key themes discussed included:

- Traffic flows
- Car parking requirements
- Economic rationale for the project.

4 Submissions

A total of 111 submissions were received during the public comment period which ran from 5 July to 12 August 2016.

Of the 111 submissions received:

- 82 (74%) expressed support for potential new ferry wharves at Kurnell and La Perouse
- 12 (11%) were unsupportive of potential new ferry wharves at Kurnell and La Perouse
- 17 (15%) were neutral.

The main reasons given for supporting for the potential new ferry wharves were:

- Economic development and tourism opportunities
- Improved access to Kamay Botany Bay National Park
- Providing an alternative to driving to travel from La Perouse to Kurnell.

The main reasons given for not supporting the potential new ferry wharves were:

- Traffic and parking impacts
- Unsupportive of government subsidising a ferry service
- Social impacts on local residents.

The following table provides an overview of the key themes from the submissions received.

Summary of Feedback	TfNSW Response
Support for ferry service	
Submissions supporting the reintroduction of a ferry service between La Perouse and Kurnell.	Noted.
Submissions that are unsupportive of ferry services been reintroduced between La Perouse and Kurnell.	Noted.
Accessibility and connectivity	
Connections to existing public transport services including availability and timing of services.	Noted. Connections to other public transport services were considered in the wharf siting analysis and demand forecast. The Draft Feasibility Study Report recommends that improving intermodal links to the wharves (e.g. synchronising timetabling, increasing frequency of buses) be considered in future planning phases.
Suggestion to increase bus services from La Perouse to the City.	Noted. Supporting transport services would be considered further during future planning phases.
Suggestion to increase bus services from Kurnell to other areas with Sutherland Shire.	Noted. Supporting transport services would be considered further during future planning phases.
Suggestion for ferry services to integrate with Opal ticketing.	Noted.
Provide additional wharves in the South Sydney area.	The purpose of this study was to investigate the potential re-establishment of wharves at La Perouse and Kurnell. The potential to provide infrastructure additional to these wharves will be considered in future planning phases.
Provision of bicycle facilities on ferries and connectivity to cycle ways.	The Draft Feasibility Study Report highlights that ferry vessels should be flexible enough to accommodate bicycles. Opportunities to improve cycle ways to and from the proposed ferry wharves would be investigated during future planning phases.
Accessibility of ferry wharves and ferry vessels.	The NSW Long Term Transport Masterplan identifies that infrastructure needs to comply with national disability access standards. The new wharves will be required to be designed to meet the relevant legislation and guidance for disability access.

Summary of Feedback	TfNSW Response
Availability of ferry wharves for recreational users and other vessel operators.	The proposed ferry wharves would be public wharves available for commercial and recreational use. Suggestions for a boat ramp to be included with any new infrastructure have been noted and will be considered during future planning phases.
Recreational fishing from the new wharves.	Access arrangements for all wharf uses, including recreational fishing, will be investigated further during future planning phases.
Community and social	
Concerns about negative impacts on local residents in La Perouse.	Noted. Potential social impacts would be considered further during future planning phases.
Concerns about negative impacts on local residents in Kurnell.	Noted. Potential social impacts would be considered further during future planning phases.
Concerns about an increase in litter from more people visiting the area.	Noted. Potential social impacts would be considered further during future planning phases.
Concerns about an increase in crime from more people visiting the area and security of any new facilities.	Noted. Potential social impacts would be considered further during future planning phases.
Suggestion to implement an Indigenous training program during construction of the wharves.	Suggestion noted. Should the project proceed to the next development stages, construction and operation opportunities, including opportunities for apprentice or trainee programs will be considered further.
Consider interactions with existing local events, such as the Kurnell Triathlon Series.	Noted.
Traffic and parking	
Traffic impacts at La Perouse and Kurnell.	Noted. Further, more detailed investigation on potential traffic impacts and mitigation measures would be required during future planning phases.
Parking impacts at La Perouse and Kurnell.	Noted. The availability of nearby car parking will be an important consideration should new wharves at La Perouse and Kurnell be introduced. A preliminary assessment suggests that additional car parking spaces could be required to support the ferry service. Further investigations into traffic and parking impacts would need to be completed during future planning phases.

Summary of Feedback	TfNSW Response
Economics and business case	
Potential for new business opportunities such as restaurants and tourism services.	The Draft Feasibility Study Report highlights that direct possible economic benefits would consist of revenue from ferry fares and refreshments serviced on-board, as well as economic stimulus for La Perouse and Kurnell local businesses (e.g. food and drink, retail). The increased accessibility of tourist destinations and suburbs could bring indirect economic benefits in the longer term, such as an increase in house prices and an increase of tourists to the Sydney region. The economic benefits of the project would be considered in further detail during future planning phases.
Ferry wharves are not the best use of tax payer's money.	Noted. Preliminary studies have found that a ferry service between La Perouse and Kurnell is not likely to be commercially viable for commuters only and that some form of government assistance is likely to be required to facilitate establishment of a service. The economic costs and benefits of potential new ferry wharves at La Perouse and Kurnell would need to be explored further during future planning phases.
Suggestion for TfNSW to enter into for a public private partnership with La Perouse Local Aboriginal Land Council and Tribal Warrior Aboriginal Corporation.	Noted. Should the project proceed to the next development stages, construction and operation opportunities, including public private partnerships will be considered further.
Consider proposed local development in demand forecasts.	Noted. Population forecasts, including a potential population increase from developments in nearby areas would be considered further during future planning phases.
Environment	
Consideration of environmental impacts on the land and marine environment and migratory shorebirds.	The Draft Feasibility Study Report's preliminary environmental assessment suggests that significant environmental impacts are not likely with appropriate management measures. Further environmental assessments would be required during future planning phases.
Planning for the ferry wharves should be consistent with the Kamay Botany Bay Plan of Management.	Noted. TfNSW will continue to consult with National Parks and Wildlife during future planning phases.
Consideration of extreme weather conditions.	The wharf design will need to take account of extreme weather conditions particularly wave impacts. Requirements for addressing extreme weather conditions will be explored further in future planning studies.

Summary of Feedback	TfNSW Response
Culture and heritage	
Consideration of Aboriginal heritage and the Aboriginal Land Rights Act.	A high level review of Aboriginal and non-Indigenous (historical) heritage was undertaken to inform the Draft Feasibility Study Report. The impact on sensitive heritage areas (Aboriginal and European heritage) was considered in the wharf siting assessment. A detailed archaeological assessment and field survey would be required as part of any future planning, in order to accurately assess archaeological potential for the project. Further engagement with the La Perouse Local Aboriginal Land Council about heritage and design would be undertaken during any future planning phases.
Consideration of any impacts on Lieutenant Cook's Landing Place at Kurnell.	The Draft Feasibility Study Report highlights that the design of the wharf and associated infrastructure should minimise impacts to heritage values. It may be possible to include viewing platforms to sites of significance (e.g. Cook's monument) to complement existing viewing opportunities and interpretive materials. Incorporation of heritage elements into the design would be further considered during future planning phases. Further consultation would also need to be undertaken with Office of Environment and Heritage as part of this planning process.
Ferry service and infrastructure	
Consideration of a vehicular ferry.	The feasibility study has considered providing wharves to facilitate a passenger ferry service. A vehicular ferry service is not being considered by TfNSW.
Consider interactions with existing maritime traffic and shipping/port operations.	Noted. Feedback about maritime planning has been further considered and will be included in the final report. Further consultation with maritime stakeholders, such as the Port Authority of NSW, would be required during any further planning for potential new ferry wharves.
Concern about use of Hayes Dock for ferry layup and servicing.	Noted. Feedback about maritime planning has been further considered and will be a in the final report. Further consultation with maritime stakeholders, such as the Port Authority of NSW, would be required during any further planning for potential new ferry wharves.
Suggestions for additional wharves and ferry services at Sydney Airport, Brighton-Le-Sands, Cooks River, Dolls Point, Kyeemagh, Port Botany, Ramsgate, Taren Point, Tempe and Yarra Bay.	Noted. The feasibility study has primarily considered a ferry service between La Perouse and Kurnell. Suggestions to service other locations would be explored during future planning phases.

Summary of Feedback	TfNSW Response
Suggestion for a ferry service from Botany Bay to Sydney Harbour.	Noted. A Botany Bay to Sydney Harbour passenger ferry service connection has not been the focus of this study. The provision of new public wharves may be attractive to an operator for such a service. Further consultation with service operators would be required during future planning phases.
Suggestion for wharf facilities to accommodate larger vessels and include a swing mooring.	Noted.

5 Next steps

Feedback received from the community and stakeholders will be used to finalise the feasibility study.

Key issues raised during the public comment period will be investigated in more detail during future planning into potential new ferry wharves at La Perouse and Kurnell.