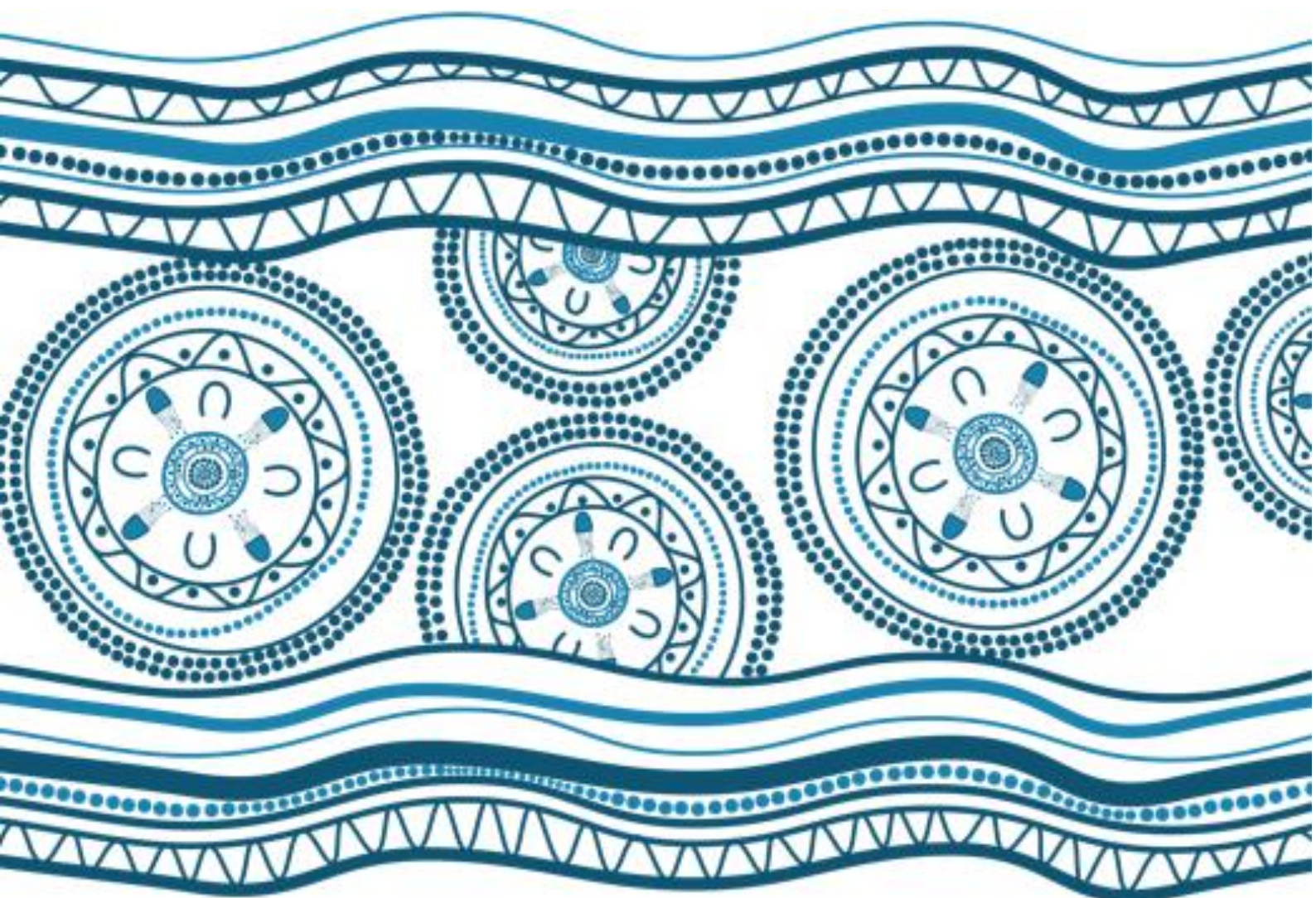


Appendix L

Navigational Safety Assessment



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Kamay Ferry
Wharves Project -
Navigational Safety
Assessment

September 2020



**THOMPSON
CLARKE**

ARUP DOC Number: KFW01-ARUP-BPW-SF-RPT-000001

Sydney CBD

Port Botany Hayes Dock

Wentworth Le Sands

Botany Bay

★ Proposed wharf
La Perouse

★ Proposed wharf
Kurnell

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1 Introduction

1.1 Background

On 28 April 2018, the Prime Minister and Federal Treasurer announced funding for stage 1 of the Kamay Botany Bay National Park Master Plan. Stage 1 includes the re-establishment of the wharves at La Perouse and Kurnell.

Subsequently, Transport for NSW (TfNSW) established a project team to undertake the necessary studies for the procurement and delivery of the reinstatement of the wharves and associated infrastructure – referred to as the Kamay Ferry Wharves Project.

The project has been classified as State Significant Infrastructure for the purposes of the statutory planning approvals process and as such an Environmental Impact Statement (EIS) is required.

Certain sensitivities have been identified as important for the project requiring assessment and inclusion in the EIS. One such sensitivity is the impact of the project on maritime traffic and transport in Botany Bay. This Navigational Safety Assessment (NSA) will form the basis of the Maritime Traffic and Transport Assessment contribution to the EIS, considering the following specific requirements of the SEARs:

- The safety and efficiency of the transport system in the vicinity of the project are managed to minimise impacts.
- The safety of transports system customers is maintained.
- Impacts on network capacity and the level of service are efficiently managed

To address the aforementioned requirements the following aspects of the project have been included in this assessment:

- Maritime construction vessel transport and traffic impacts including, but not necessarily limited to:
 - The indicative number, frequency and size of construction related maritime vessels; and
 - Temporary and / or permanent relocation of swing moorings at La Perouse within Frenchmans Bay.
- Maritime based assessment of operational maritime transport and traffic impacts including, but not necessarily limited to:
 - Vessel traffic generated by the operation of the project; and
 - Volume and type of vessels (commercial and recreational) expected to use the infrastructure on weekdays, weekends and public holidays.
- Navigation Risk Assessment detailing vessel movements within Botany Bay shipping channel and any potential impacts on port operations and commercial shipping movements.

1.2 Study Objectives

Thompson Clarke Shipping (TCS) was engaged by TfNSW via the lead professional services provider Arup, to provide a specialist study for the NSA of the Kamay Ferry Wharves Project. The NSA objectives are to undertake an independent assessment of the cumulative impacts on the Botany Bay waterway resulting from the proposed construction, and subsequent on-going operation, of the two wharves at La Perouse and Kurnell.

1.3 Relevant Definitions

As documented in the Harbour Master's Directions (HMD) July 2016, the following definitions are relevant to this assessment:

- **Botany Bay port limits** means the waters of Botany Bay and all bays, rivers and their tributaries connected or leading to Botany Bay bounded by mean high water mark and by, as upstream boundaries, the eastern side of the Endeavour Bridge in Cooks River and the eastern side of the Captain Cook Bridge in Georges River together with that part of the Tasman Sea below mean high water mark enclosed by the arc of a circle of radius four nautical miles having as its centre the navigation light at Henry Head.
- **Charter vessel** means a vessel to which the *Marine Safety (Domestic Commercial Vessel) National Law Act 2012* applies normally engaged in tourist, passenger charter or related activities.

- **Commercial vessel** means a vessel to which the *Marine Safety (Domestic Commercial Vessel) National Law Act 2012* applies normally engaged in non-passenger carrying activities.
- **Ferry** means a vessel which seats more than eight adult persons and includes a vessel of any class prescribed by the regulations for the purpose of this definition.
- **Participating vessels** means all vessels of 30 m LOA (length overall) or over and vessels towing or pushing a tow, where the combined length of the tug and tow is equal to or greater than 30 m. These vessels are required to participate in the Vessel Traffic Service.
- **Recreational vessel** means a vessel other than a commercial vessel. It is used solely for recreation and which is not used or allowed or authorised to be used in the course of any business or in connection with any commercial transaction.
- **Seagoing ship** means a vessel of more than 45.72 m in length that is used or intended to be used to carry cargo or passengers for hire or reward and that normally operate on voyages between ports.
- **Vessel Traffic Service (VTS)** means a vessel traffic service as a navigational service implemented under a law of the Commonwealth or of a State or Territory and in accordance with guidelines for vessel traffic services adopted by the International Maritime Organisation on 27 November 1997 to improve the safety and efficiency of vessel traffic and to protect the environment, as in force from time to time.



2 Navigational Safety Assessment Methodology

To achieve the objectives of this assessment TCS applied the following methodology.

2.1 Literature Review

The purpose of the literature review was to gain a thorough appreciation of existing rules and regulations governing operational parameters in Botany Bay and specifically the locations proposed for the new wharves and other associated studies and reports.

The following relevant documentation was reviewed:

- Kamay Ferry Wharves Project – Strategic Design Report, TfNSW, 02 April 2020.
- Kamay Ferry Wharves, Project Fact Sheet, NSW Government, April 2020 and May 2020.
- Ferry Wharves at La Perouse and Kurnell, Final Feasibility Study Report, Transport for NSW, 2016.
- 2018 – 2019 Annual Report, Port Authority of NSW (PANSW).
- Information for Recreational Boaters – Botany Bay Vessel Movements at <https://www.portauthoritynsw.com.au/sydney-harbour/port-services-facilities/information-for-recreational-boaters-landing-page/>
- Notices to Mariners at <https://www.portauthoritynsw.com.au/sydney-harbour/notices/notices-to-mariners/>
- Harbour Master's Directions – Sydney Harbour & Botany Bay, PANSW, July 2016 at https://www.portauthoritynsw.com.au/media/1100/harbour_masters_directions_2016_final_v01_19_07_16.pdf
- [Chart] Aus 196 – Port Botany Nautical Chart: Australian East Coast – New South Wales – Port Botany, 07 September 2012.
- Wind, Wave and Current information at <http://wavewindtide.portauthoritynsw.com.au/>
- Information on Certificates of Local Knowledge at <https://www.portauthoritynsw.com.au/sydney-harbour/pilotage-navigation/certificate-of-local-knowledge/>
- Yarra Bay Sailing Club events at: <https://yarrabaysailingclub.com.au/>

2.2 Consultation with Government Stakeholders

During this assessment TCS consulted with key government stakeholders to gather feedback on navigational safety concerns and any navigation safety requirements perceived necessary, or that might be imposed by their organisation, in light of the proposed construction of the wharves, and operation of a ferry service between the wharves.

The feedback from these consultations is considered in section 5, below.

2.3 Consultation with Maritime Industry Stakeholders

Additionally, TCS consulted with a selection of key industry stakeholders based on the extent of their activities and knowledge of maritime operations within Botany Bay. The primary objective was to gain an appreciation from operators of likely navigation safety issues or challenges resulting from the construction of the Kamay Ferry Wharves, and ferry operations between the wharves.

The feedback from these consultation is considered in section 6, below.

In preparation, and by way of a briefing on the Kamay Ferry Wharves Project, TCS provided stakeholders with a Project Fact Sheet prior to the individual consultation sessions. A copy of the Project Fact Sheet issued is provided at Annex 1 of this report.

Extensive comments were provided by stakeholders during the consultations, including general comments not specifically related to the NSA, and these have been noted by the project team. Only commentary specifically relating to the NSA are included in this report.

3 Botany Bay

Botany Bay is a place of historical and cultural importance for all Australians, with Aboriginal cultural sites dating back thousands of years and the location of the first landing of Captain James Cook in 1770. The relatively shallow bay is located approximately 13 km south of the Sydney CBD and is enclosed on its eastern side by the northern headland at Cape Banks and its southern headland at Cape Solander. Approximately 10 km across the bay to the west is the source of Botany Bay at the confluence of the Georges River at Taren Point and the Cooks River at Kyeemagh. The entrance to the bay from the Tasman Sea sits at the midpoint between the suburbs of La Perouse in the north and Kurnell in the south.

Today Botany Bay is home to Port Botany which is host to one of Australia's largest container ports and specialises in trade in containerised manufactured products and bulk liquid imports including petroleum and natural gas.

Caltex (now Ampol) operates an oil terminal at Kurnell on the south side of Botany Bay. The terminal receives and stores refined oil products such as petrol, diesel and aviation fuel for the NSW market.

The bay is also the site of Sydney's international airport with its two runways extending in a south-westerly direction into the bay and a popular waterway for small commercial boating operations as well as recreational boating activities.

From 1890 a ferry service operated between wharves at La Perouse and Kurnell but this service was brought to an abrupt end in 1974 when severe storm damage to the wharves resulted in both being decommissioned.

The bay is also home to a diverse and unique marine population including protected sea grasses and the world's largest population of weedy sea dragon.

4 Existing Arrangements

4.1 Description of Maritime Activities

The main maritime activities in Botany Bay are those associated with seagoing ship operations in Port Botany and Kurnell, smaller commercial vessel, charter vessel and recreational water user activities. Each of these is described in more detail below.

4.2 Shipping Operations

Seagoing ship operations at Port Botany include the following activities:

- Container ship visits to three container terminals operated by Hutchinson Ports (Hayes Dock), Patrick Stevedores (Brotherson Dock – North side) and DP World Australia (Brotherson Dock – South side). Collectively the three operations service 12 container vessel berths; and,
- Oil tanker visits to two Bulk Liquids Berths which handle a variety of bulk liquid products. The two facilities handle 100% of NSW's bitumen requirement, 90% of the bulk chemical requirement, 70% of the NSW demand for LPG and 28% of the jet fuel requirement.

Additional seagoing ship activities include Caltex's tanker operation at Kurnell which is Australia largest fuel import terminal, serviced via three tanker berths. In 2019 Caltex received 143 tankers on the fixed wharves and 23 on the buoy moorings.

As reported in PANSW's 2018-19 Annual Report, there was a total of 1,660 seagoing ship visits to Botany Bay. This equates to an average of nine vessel movements per day to or from Port Botany or Kurnell terminals.

In accordance with NSW Ports' 30 Year Master Plan – Navigating the Future, October 2015 – forecast trade through the Port will be handled by larger vessels, with more product carried on each vessel and with more vessel visits to the port. Total vessel numbers are expected to grow by approximately 45%.

Seagoing ships visiting Port Botany or Kurnell are required to take a pilot and, generally, to take tugs to assist with manoeuvring and are escorted by a Port Authority vessel¹ that displays flashing red and blue lights to warn other vessels in the waterway of the shipping movements. Other vessels are required to remain at least 30 m clear of the ship² and not pass between the ship and the escort vessel.

Port Botany is serviced by a deep-water shipping channel with a short transit to and from the berth facilities. The limits of the seagoing shipping zone and the associated channel, as depicted on the chart-let in Figure 1 below, are provided on the PANSW website, as are the seagoing shipping movements scheduled for the port.

¹ In accordance with s2.38.2 of HMD, seagoing ships of LOA 100 m or greater are escorted by Authority vessels, displaying flashing red and blue lights.

² s2.38.4 of HMD

Figure 1 – Port Botany Chart-let

Source: PANSW website

4.3 Commercial Boating Activities

Commercial boating activities in Botany Bay involve a combination of charter and commercial vessels, as per the definitions at section 1.3. Statistics for the last nine years indicate the number of commercial vessels in Botany Bay and on the Georges River have remained fairly static during that period, at about 350, although charter boating activities have dropped off over the years with most remaining activities primarily undertaken by Bass and Flinders.

TCS is advised approximately 80% of activities (commercial and recreational) are conducted well away from the locations of the proposed wharves at La Perouse and Kurnell and the potential ferry operation (Boating Industry Association, 2020).

Specific commercial boating activities include:

- Approximately six 'hire and drive' vessel operators that operate predominately in the Georges River.
- Two existing Fishing Charter boat operators that launch from the Foreshore boat ramps. A typical track used by vessels to and from the Foreshore boat ramp and the ocean is illustrated on the chart-let at Annex 2.
- Georges River Cruises conducted by Bass and Flinders.

4.4 Recreational Boating Activities

- Licences awarded for rowing, sailing and boat racing activities primarily to the main sailing and motorboat clubs in the Botany Bay and Georges River areas.
- Recreational based fishing represents a large percentage of the recreational boating activities in the bay. A typical track used by vessels to and from Georges River and the ocean is also illustrated on the chart-let at Annex 2.
- The south side of the bay is popular with kite surfers.
- Personal Watercraft³ (PWC) users tend to also frequent the south side of the bay, the Georges River and off the beach at Brighton Le Sands. PWC activity is estimated to be growing by approximately 8% per annum (Boating Industry Association, 2020).

³ A personal watercraft (PWC) is a vessel with a fully enclosed hull that may be driven standing up, lying down, sitting astride or kneeling, and includes jet powered surfboards.

- Bare Island is a popular dive and snorkelling destination and the waters off La Perouse are a well-known spear fishing site.
- There are numerous vessel moorings in Yarra Bay – both club and NSW Maritime owned. These are either prioritised for club member use or allocated on first come first served basis, respectively.
- Other recreational events in the area include swimming races, triathlons and other types of aquatic events which predominantly take place on the west side of the bay and clear of the wharves' locations.
- During summer, numerous boats exit from the Georges River, ranging from dinghies to 40 footer vessels.
- Georges River Motorboat Club own approximately 6-8 buoy moorings in Frenchman's Bay and 1 in Yarra Bay. Frequently on a Sunday, all the moorings will be occupied by their members.



5 Consultation with Government Stakeholders

The following Government stakeholders were consulted as part of this assessment:

- PANSW, Harbour Master – teleconference;
- PANSW, Manager, Compliance and Planning – teleconference;
- PANSW, Pilot Manager and Deputy Harbour Master – teleconference;
- TfNSW, maritime operations – teleconference.

A summary of these consultations and the key points raised, in each case, is provided below. It should be noted these are TCS' interpretation of stakeholder feedback not a precise transcript of what was said.

5.1 PANSW, Harbour Master

The teleconference with the Harbour Master was held on 05 May 2020 and the key points discussed during the consultation include:

Rules, Regulations or HMD that apply in the area:

1. HMD 16 July 2016 (for Botany Bay) are still valid although PANSW is currently working on updating these.
2. Some Harbour Master Instructions and Notices to Mariners will be relevant both during construction and operation of the wharves.
3. There will be specific requirements to keep the seagoing shipping channel clear, and the OLS (Obstacle Limitation Surface) requirements associated with the airport also need to be considered during construction.
4. Kurnell tidal restricted (deep draft) tankers must not be impeded or restricted by other vessels.
5. Any movements during construction phase will be under the delegation of VTS (for HM) in accordance with a Vessel Traffic Management Plan (VTMP) which will need to be developed and approved as part of the overall approvals process (EIS).
6. A Section 67ZN application will need to be submitted and approved for intended 'Disturbance of the Seabed'.
7. Consideration of times of construction due to noise pollution. Noise of any type, particularly at the La Perouse side, will cause a lot of disruption with local residents – screw pile installation methodology is preferable to hammer. Any noise reports, particularly after hours, usually come back to PANSW through the VTS Centre.
8. For the operation – consideration should be given to lighting and Aids to Navigation (AtoN). Wharves to be lit at their ends. Edges of jetties to be lit along their length to illuminate their extent. It is important jetties do not create excessive back scatter light which will impact on pilots' night vision and pilotage of seagoing vessels at night.

Opinion of wharves' design and location from a navigation safety perspective:

9. The detail of the Project Fact Sheet is high level and insufficient to enable a determination to be made on this point. Based on what is included, the proposed wharves will be out of the way of other users and navigation through the bay. Otherwise cannot comment on the locations.

Requirements regarding submerged cables and no anchoring zone:

10. Submerged cable corridor includes both the cables and a 'no anchoring' zone. The location of the cable corridor is depicted in the chart-let at Annex 3.
11. The requirements will necessitate special consideration regarding proximity to the cable. Depending on what precisely is intended, proposal will need to be submitted for the approvals process. Proposed location seems to be on the very edge of the area and therefore shouldn't be too problematic.

Procedures that might be required for a new ferry operation between the new wharves include:

12. Ferries will be required to call and report to VTS in accordance with protocols for Sydney Harbour Ferries in Port Jackson.
13. In this case, size of the vessel doesn't matter, it's the number of persons on board a ferry that dictates the need to communicate with VTS.

14. Vessels will be required to make immediate contact with VTS during an incident or emergency.
15. Information and updates on the project will be promulgated via HMD and / or Notices to Mariners to advise of the work and any new operations.

Other general comments:

16. Some areas are earmarked for Aqua Culture – these need to be considered and perhaps consultation with Department of Fisheries is necessary.
17. Also, consider sewer and outfalls in the area.
18. Proposed wharves are in open exposed water – less so the La Perouse wharf. Water is also shallow in these areas. This, and the swells, will create frequent rough conditions for boat operation. Will need to be aware of rough weather. May need to look at wharves with multiple berth faces and attenuators.
19. The envisaged ferry route between La Perouse to Kurnell will cross the ‘official’ shipping channel. Before ferries enter and exit the channel they’ll be required to communicate with VTS.
20. Occasionally ferries may be required to wait for large vessels in the channel. These vessels will have tugs made fast or in attendance close to where ferry will cross the channel. This may create congestion and localised adverse turbulence / sea conditions.
21. Schedules for seagoing ships change unexpectedly and will potentially impact ferry timetables while they wait for a transiting ship.

5.2 PANSW, Manager, Compliance and Planning

The teleconference with the Manager, Compliance and Planning was held on 12 May 2020 and the key points discussed during the consultation include:

Rules, Regulations or HMD that apply in the area:

1. There will be a need for VTMP for ferries crossing the bay.
2. VTS will have authority to hold back ferries if a commercial vessel is moving in the bay.
3. In Kurnell, particularly, pilots must be able and comfortable to go outside the channel if necessary, to deal with an unforeseen event or emergency. Therefore, ferries and recreational vessels will need to be aware and keep clear.
4. Any activity or event likely to impact navigation safety must go through the Harbour Master for consideration and approval. All Harbour Master approvals are coordinated and approved through the Manager, Compliance and Planning.
5. It is likely both NSW Maritime and PANSW will require a formal VTMP to be developed for the operation, like Circular Quay (CQ) where traffic arrangements and reporting requirements are in place. Such arrangements will probably start as HMD. Segregation between small vessels and shipping will be necessary.
6. Management of the interaction between ferries and cruise ships will need to be very strict from the outset. There’s been some issues in CQ with, for example, close quarter situations between ferries and cruise ships and this will need to be avoided in Botany Bay.

Other general comments:

7. Regarding the submerged cables, there will be a need for approvals from PANSW and a better understanding of what cables are there, how they are protected, their age etc. to comment further.
8. It is possible a concession may be granted for the construction phase however the implications of the no anchoring zone, once operations commence, is another matter that needs to be considered.
PANSW is likely to take a tough stance on the approvals process associated with the new wharves. Standards in 2020 are higher (and approvals more difficult) than what used to happen in Sydney, so PANSW will want to be assured through this process.

5.3 PANSW, Pilot Manager / Deputy Harbour Master

The teleconference with the Pilot Manager / Deputy Harbour Master was held on 17 June 2020 and the key points discussed during the consultation include:

Opinion of the wharves' design and proposed location:

1. Proposed location at Kurnell is exposed to significant swell. A few hundred metres to the east of the proposed location is a popular surf spot where surfers often ride 2 to 3 m waves.

Anticipated challenges for pilot operations resulting from the wharves' location and potential future vessel operations:

2. The proposed location of the wharves will have no impact on pilotage operations in the bay.
3. A VTMP will need to be developed that clearly identifies ferries as the second priority to sea going ships. The Plan will need to address:
 - Ferry communications with VTS;
 - The hierarchy of vessel movement – who has right of way and when; and
 - Protocols for interactions between different vessel types.
4. Pilots don't anticipate any difficulties between recreational and charter vessels and sea going ships provided the VTMP is established and deals with all eventualities. All users of the bay must be aware of the requirements of the VTMP and their associated responsibilities.

Other areas of concern regarding navigation safety, generally:

5. There will be days when sea and swell conditions are too rough for ferry and other operations to safely take place. This will need to be monitored to ensure poor conditions don't impact on safe operations at the new wharves.

Initiatives that should be considered to mitigate any concerns:

6. Ferries will need to be included as participating vessels in VTS in the same way as ferries in Sydney harbour. They will also need to be fitted with AIS so that their position can be monitored by VTS and other vessels in the area.
7. It may be possible to manage interaction between seagoing ships and ferries through scheduling given that ships usually pass the area where interactions are most likely at fairly consistent times. Ferries could be scheduled to pass this area at times when ships are not present or expected. This should be considered within the VTMP.
8. The VTMP might include the requirement for ferries to remain at their berth until seagoing ships are clear of the crossing point as a way to minimise interactions between the two vessel types.

Other general comments:

9. The end of the wharves should be lit with appropriate AtoNs for navigation safety purposes. Other than that, lighting of the wharves shouldn't present a problem for navigation safety or pilotage in the bay. Modern LED lights shouldn't create excessive back scatter or impact pilots' night vision during pilotage in the area.
10. Watt's Reef is marked with a spar aid to navigation at its northern end. The spar is conspicuous and used by pilots to line up their approach when mooring a seagoing ship at Kurnell #3 berth. Pilots haven't seen any fishing activity at the reef for some time and do not believe the reef, or associated fishing activities, will be impacted by or have an impact on the proposed new wharves and/or any associated marine activities.

5.4 TfNSW, Maritime Operations

The teleconference with TfNSW, Maritime Operations was held on 11 May 2020. The key points discussed during the consultation include:

Opinion of wharves' design and location from a navigation safety perspective:

1. A lot of swell comes into the bay in the locations proposed.
2. Tide range is notable. Wharves need to be designed to provide ferry captains with options for manoeuvring alongside at different states / heights of tide.
3. Wharf at Kurnell should be configured in a north / south or NNE SSW configuration to enable vessels to go alongside and remain safe when embarking / disembarking passengers. In the proposed locations the wharves will be hit hard by prevailing sea and swell conditions.

4. Conditions are generally too rough for vessels to remain alongside the wharves for any length of time (i.e. overnight or cribbing), therefore alternative options need to be identified where the vessels can stay. There are options in Botany Bay where this could be done.

Requirements regarding submerged cables and no anchoring zone:

5. Any proposed impact on the seabed will have to be considered and approved by TfNSW's Maritime Property department. They are the land holders and will make the ultimate decision having considered all factors.
6. Any submission to Maritime Property will also be referred to the Harbour Master for his / PANSW's input and comment.
7. The no anchoring zone around the submerged cables is designed with large commercial ships in mind. It is possible (and likely) that special dispensation / approvals could be given for this project in relation to wharf piles and heavy construction equipment which need to be secured to the seabed during the construction phase.
8. Also need to consider arrangements for vessels operating in the no anchoring zone, and under what conditions and in what locations it would be acceptable to anchor. This will also need to be approved.
9. Unlikely that sufficient detail of the design, construction and operation will be available at the EIS submission stage, but that this information will come to light as the project progresses and therefore applications and approvals will follow.
10. In any case, Harbour Master will have input into that process.

Other general comments:

11. Recreational vessel use of the wharves is likely to be quite high especially if they are designed to be attractive destinations.



6 Consultation with Marine Industry Stakeholders

The following marine industry stakeholders were also consulted as part of this assessment.

- Boating Industry Association (BIA) – teleconference;
- Yarra Bay Sailing Club – teleconference;
- Commercial Vessel Association (CVA) – teleconference; and
- Caltex – teleconference.

A summary of these consultations and the key points raised, in each case, is provided below. It should be noted these are TCS' interpretation of stakeholder feedback not a precise transcript of what was said.

6.1 Boating Industry Association

The teleconference with BIA was held on 06 May 2020. Key points discussed during the consultation include:

Navigation safety concerns in relation to new wharves and potential future ferry operations:

1. Boating activity from Foreshore Boat Ramp will be the primary issue – boats and anglers launching and heading into the bay or offshore. There will need to be an Education Campaign to inform boaties about the new wharves and activities.
2. Safety issues – gets very rough in the bay. Not a great place to go for recreational boating.
3. Large seagoing vessels inbound and outbound from the bay will be the main issue for a ferry operation.
4. It's demanding for trailer boat fisherman / anglers during hours of darkness and sunrise and sunset, when the sun is low in the sky and visibility can be impaired. Ferries crossing the bay will add to the confusion, so an Education Campaign is important.
5. Yarra Bay Sailing Club conducts sailing and dingy races. These tracks will cross the ferry route between La Perouse and Kurnell. It is recommended the project team consults regularly with them.
6. There's a need for some AtoNs to guide / direct recreational vessels onto and off the jetties.
7. Notification of No Anchoring in the area and warning of shoal areas – make it obvious and simple for vessel operators.

Other general comments:

8. Recreational facilities on the wharves is a good idea. They should be designed to assist vessels operating on and off the wharves, so they do not put themselves at risk. Then they will utilise the wharves more.
9. There is a need to reduce the pinch point where ferries and recreational vessels interact.
10. Mandatory requirement for recreational vessels – the berths must be floating pontoons particularly for smaller craft. Craft will not be able to deal with fixed berths and hard piles due to likely sea conditions in the areas. The wharves must be simple to use if recreational vessels are going to use them, noting that approximately 80% of recreational vessels are <6 m LOA.
11. Berths for recreational vessels should be on the other side of the jetties from the ferry berths and fitted with some form of wave attenuator. This will keep small vessels away from the ferry operation and the transit path of the ferries.

6.2 Yarra Bay Sailing Club

The teleconference with Yarra Bay sailing club was held on 21 May 2020. Key points discussed during the consultation include:

Perceived challenges for new wharves and potential ferry operation:

1. The bay experiences rough seas in the proposed wharf locations and waves can get up to 2 m waves which would present problems for a ferry operation and other vessel activities.
2. A fixed wharf would be necessary as pontoon wharf wouldn't withstand the sea conditions.
3. Generally, the south-easterly swell bounces off the breakwater wall back into Yarra and Frenchman's Bays.



4. At least twice a year the waves are large enough to go over the sea wall in front of the sailing club.

Opinion of proposed La Perouse wharf location:

5. Proposed wharf location in Frenchman's Bay shouldn't be a problem. It offers the most sheltered spot in the area but will still have issues in large seas and swell.

Likely activities on the new wharf:

6. Motorboat club activities.
7. Private vessel access.
8. Charter activities – e.g. whale watching.
9. A wharf will be popular and will be used if there are facilities, particularly smaller boats, not necessarily commercial vessels.

Other general comments:

10. Will be a requirement for buoys and signage to direct recreational vessels including, for example no anchoring, no staying overnight, and the channel to the berth.

6.3 Commercial Vessel Association

The teleconference with CVA was held on 14 May 2020. Key points discussed during the consultation include:

Navigation safety concerns in relation to new wharves and potential future ferry operations:

1. It is important to ensure segregation of small commercial vessels and large ships but also to separate recreational vessels that might use the new wharves from commercial operators also using the wharves.
2. All operators (ferries included) must be mindful of the pilots' role on the large commercial ships. Activities and interactions need to be coordinated. Note, vessels >30 m are currently obliged to communicate with VTS on CH12 in Botany Bay.
3. Peaks for small commercial vessel activity will be weekends and public holidays. Appropriate guidelines and procedures will need to be developed to deal with these peaks.
4. Botany Bay has a weather problem. Wharves need to be sheltered from swell and waves as it can get very rough in the bay.
5. Vessels must have safe access to and from the wharves. Ferries will be beam on to seas during crossing between wharves making for a rough and uncomfortable passage.
6. Container ships work Just In Time; pilots go from one outbound vessel to one inbound which will make scheduling ferry operations around commercial shipping activities difficult.
7. Orientation of wharf faces must be such that they facilitate efficient on time ferry services.

Other general comments:

8. Boat trip between La Perouse and Kurnell will only take about five minutes once off the wharf. The design ferry vessels will likely have a speed of between 15 and 25 knots and there are currently no speed restrictions in the area.

6.4 Caltex

The teleconference with Caltex was held on 14 May 2020. Key points discussed during the consultation include:

Opinion of wharves' design and location from a navigation safety perspective:

1. Considering the depth of water at the proposed location there won't be any concern for Caltex's operation regarding location of the wharves. It's too shallow and neither ships nor tugs will go near those locations.
2. No Anchoring Zone – all operators will need to be mindful of the location of the cable.



Impact of wharf and associated boating activities on Caltex's Kurnell operation:

3. There is an assumption ferry won't be very busy; not multiple movements occurring at the same time or constantly throughout the day, therefore unlikely to have much impact on Caltex's operation.
4. However, it's important all operators remain mindful of the shipping channel and the limited manoeuvrability of the deep draft vessels, and to keep clear of seagoing ships.
5. Small vessels crossing the shipping channel and impeding the safe passage of large vessels is the single biggest potential problem for Caltex's operation.
6. There is likely to be a need for local AtoNs to direct ferries, small commercial and recreational vessels. But assume these will be consistent with the International Association of Lighthouse Authorities (IALA) standards and therefore shouldn't cause any confusion or problem, with regard to location, for Caltex.
7. Important during both construction and operation phases nothing is done (e.g. positioning of equipment, barges, rigs etc) to obstruct existing AtoNs or lights, such as lead lights, used by pilots to navigate and manoeuvre seagoing ships.



7 Consolidation of Findings

7.1 Key Findings

Based on research and consultations undertaken for this NSA, the key findings are as follows:

- Seagoing ships will continue to have priority when moving through Botany Bay in accordance with the requirement of section 2.38.1 of the HMD which states vessels are not to impede the passage of seagoing ships, vessels under the conduct of a pilot or exempt master or naval vessels inside the shipping channel or fairway.
- Most seagoing ships are also required, for various reasons, to take tugs when manoeuvring and be escorted by a Port Authority vessel. This can result in a congested waterway and the need for precise manoeuvring operations.
- All other vessels are required to remain at least 30 m clear of a seagoing ship and not pass between the ship and the escort vessel.
- Procedures on how marine activities (including ferries) associated with the Kamay wharves will be segregated from the operations of seagoing vessels will need to be developed as part of the VTMP to the satisfaction of PANSW and NSW Maritime. It is critical that small vessel operators understand the challenges associated with seagoing ship operations and the importance of staying clear of ships manoeuvring in Botany Bay.
- Recreational boating activities in Botany Bay predominantly consist of recreational based fishing, personal watercraft users and sail boating/racing. The findings of this assessment suggest that none of these activities, as they currently exist, is likely to have a notable impact on or be impacted by the new wharves or a potential future ferry operation. However, the additional recreational activities resulting from the new wharves will likely increase the number of vessels in the eastern area of the bay which will necessitate the development of new operating procedures (and potentially rules and regulations) and the installation of new signage and aids to navigation to provide unambiguous advice to all types of vessel operator to ensure safe operations in the areas.
- The boating industry has requested that all guidance and advice relating to the construction and subsequent use of the wharves is thorough, clear and concise. Industry representatives accept there is potential for confusion and misuse of the wharves, resulting in compromised safety, if guidance is not clearly understood by small boat operators.
- Generally, other aquatic licenced events within Botany Bay, such as swimming races and triathlons, take place on the west side of the bay and are unlikely to interact with the Kamay wharves or vessel operations associated with either wharf.
- The Kamay wharves and all associated vessel operations will be subject to existing, and potentially new, rules, regulations and operating procedures for Botany Bay and the specific types of vessels involved. This will include, inter alia, various Acts, HMD, Notices to Mariners etc.
- The management of vessel traffic during both construction and operations phases will need to be managed to the satisfaction of the Port Authority and NSW Maritime. The process and the associated procedures for managing vessel traffic will need to be developed, documented in a VTMP and approved as part of the wider project approvals process.
- Construction of the wharves will involve disturbance of the seabed. Any disturbance of the seabed requires a s67ZN (of Ports and Maritime Administration Regulations 2012) application to be submitted for the consideration of and approval by the Harbour Master. Any proposal will also have to be considered and approved by TfNSW's Maritime Property department, who are the land holders and will make the ultimate approval decision.
- The location of the proposed Kurnell wharf is in close proximity to a submerged cable and no anchoring area. The extent to which the area, the restriction on anchoring and the expectations of the authorities affects both the construction works and subsequent vessel operations at the wharf will need to be investigated and addressed in the application process.
- The wharves will need to be fitted with appropriate navigation lights, in accordance with IALA standards, to warn mariners of their extent and location. Other lighting used to illuminate the wharves will need to be such that it does not impact on the night vision of pilots manoeuvring seagoing ships within the bay.
- Any ferry operations associated with the Kamay wharves will likely be required to participate in the Port Authority's VTS system. The system will require ferries to report to VTS, via VHF, at certain times during their daily operation, for example, when departing and arriving at a wharf or when crossing the seagoing shipping channel.

- The wharves and associated vessel operations will be exposed to occasions of extreme weather and sea conditions. Wharf design and vessel operations will need to be planned to cater for the prevailing conditions. Conditions are generally too rough for vessels to remain alongside the wharves for any length of time and therefore alternative options for cribbing and overnight stays need to be identified in the Botany Bay area.
- There is a requirement for ongoing consultation between the project team and existing Botany Bay users to ensure the requirements and expectations of stakeholders are considered throughout the project.

7.2 Other Considerations

Through this assessment TCS has identified other navigational safety related matters, associated with the new wharves, and a future ferry operation, that should be considered during this project. These include:

7.2.1 Submerged Cables

The proposed location of the Kurnell wharf will be in close proximity to Ausgrid 132 kV cables running between La Perouse and Kurnell. The 'no anchoring' area is aligned with the submerged cable corridor and whilst not specifically depicted on the chart-let at Annex 3, it is represented by 'no anchoring' symbols on the NSW Maritime Boating Chart provided at Annex 4.

There are existing requirements and restrictions in Marine Safety Regulation 2016 in relation to securing vessels near submarine cables. Specifically, these include:

- A person must not cause a vessel to be anchored within 200 m of a line indicated on a submarine cables line warning sign.
- A person must not cause a vessel to be anchored within 200 m of a submarine cable marked on:
 - An appropriate chart that meets the minimum standards specified in Schedule 7, or
 - An appropriate map that meets the minimum standards specified in Schedule 7.
- For the purposes of this clause, a "submarine cables line warning sign" means any sign in or adjacent to any navigable waters which states in a legible manner that submarine cables are laid in or under those waters on a line indicated.

These cables may be buried or protected by rock armour. The condition of any protection will need to be reviewed and there is likely to be a number of conditions that will need to be met, during both the construction and operations phases, to achieve the necessary approvals. For example, the location of the cable may need to be marked by buoys in the approach area to indicate where anchoring is prohibited. Additionally, there will need to be procedures / guidance for ferries in the event of a failed approach to the wharf and course of action if prohibited from anchoring.

7.2.2 Impact on Swing Moorings in Frenchmans Bay, La Perouse

There are numerous recreational vessel swing moorings located in Frenchmans Bay, some of which are in close proximity to the proposed wharf construction zone and likely operating footprint of the completed wharf. The actual construction zone will be dependent on the selected contractor's approach, however it is anticipated that approximately four of the moorings (including potentially club, private and emergency moorings) will need to be relocated during the construction phase.

It is anticipated that four moorings will need to be temporarily relocated during the construction phase and that two of those moorings will need to be permanently repositioned so as not to impact on the everyday operations of the new wharf. The moorings in question are depicted on the map in Annex 5.

7.2.3 Segregation of Vessel Traffic

The priority given to seagoing ships within Botany Bay is critical for their safe navigation and is recognised and reinforced by section 2.38 of the HMD. This will need to be monitored and maintained during both the construction and operations phases of the project. The project will likely need to demonstrate how segregation will be managed during construction and procedures will need to be developed for the ferry operation, and the potentially increased numbers of other vessel operators, that demonstrate that vessels will remain clear of seagoing vessels and outside the shipping zone when seagoing ships are between Henry Head and Molineux Point.

7.2.4 Storm Protocol

The berths at Brotherson Dock, Hayes Dock and Kurnell (Caltex) in Botany Bay are subject to a storm protocol⁴ which require certain action from the terminal operators, the agents and masters of ships alongside the berths during various wind strengths and conditions. It is likely that any commercial operation associated with the new wharves will be required to comply with similar protocols, as approved by the Harbour Master.

7.2.5 Kurnell Tankers

Tankers berthing at Kurnell berths 1 and 2 moor alongside bow out. To achieve this, vessels swing with the aid of tugs in the area north of the Captain Cook buoy and proceed into the berth, stern first.

Similarly, tankers berthing at berth 3 – mooring buoys – secure to the buoys with bow out (i.e. heading east). To achieve this vessels swing to port, with the aid of tugs, in the area north of the berth, let go the port anchor and proceed astern into position at the mooring buoys.

Both these manoeuvres are complicated and consume a lot of time and water area. Ensuring there is no interference from other vessels associated with the new Kurnell ferry wharf and the seagoing ship operations remain safe throughout will be critical. The project will need to demonstrate how Kurnell operations will remain unaffected during both the construction and operations phases of the project.

7.2.6 Vessel Traffic Service (VTS)

Botany Bay – from Port Limits to a line from Bonna Point to the Georges River Channel Pile – is a designated VTS area in accordance with the HMD, July 2016.

The Harbour Master, under section 88 of the *Marine Safety Act 1998*, directs that all vessels of length overall (LOA) 30 m or over are required to participate in the VTS. On the Port Authority's website it states, *All participating vessels, except ferries and commercial vessels on passenger carrying services running to scheduled time, shall seek clearance to enter or move within the VTS area from Sydney VTS 15 minutes before being removed from a berth, buoy or anchorage within the VTS areas.*

Therefore, in the current HMD and on the Port Authority's website it indicates ferries operating on scheduled routes are exempt from the VTS requirements. However, the HMDs are continuously reviewed and updated to address current and anticipated needs. It is to be expected that any potential ferry traffic crossing the shipping channel in Botany Bay would be subject to a requirement to participate in VTS. Such a requirement would likely be established by an update to the existing HMD.

7.2.7 Aids to Navigation

A requirement for appropriate lighting and aids to navigation (buoys / channel markers etc.) will be required by NSW Maritime and / or the Harbour Master.

The new wharf structures will require suitable navigation lighting that illuminates the extent and extremities of the wharf but doesn't create excessive back scatter lighting that will impact the 'night vision' of pilots navigation seagoing ships through the bay.

Additionally, there will be a requirement for appropriate buoyage to mark the safe channel/s for vessels accessing the new wharves (ferries and other vessels), and potentially areas that vessels are prohibited from entering to avoid seagoing ships and the areas of the submerged cables.

7.2.8 Emergency Towage Arrangements

Given the proximity of the proposed wharves and ferry route to reefs and rocky shores and the unsheltered waterway which is exposed to ocean seas and swells, there will likely be a need for a commercial arrangement to provide emergency towage at short notice in the event of a ferry incident.

⁴ Storm Protocols are documented at section 2.92 of the HMD, July 2016.

7.2.9 Certificate of Local Knowledge

Certificates of Local Knowledge are issued under the *Marine Safety Act 1988* by the Port Authority. Certificates are required for masters of commercial vessels between 30 m and 80 m LOA.

If commercial vessels over 30 m LOA are anticipated, at any stage, to operate from the Kamay wharves there will be a requirement for the masters to hold a Certificate of Local Knowledge.

7.2.10 Floating Pontoons

The BIA has stated that a mandatory requirement for recreational vessels is the installation of suitable floating pontoons for use by this type of vessel. Small craft (noting that 80% of recreational vessels in the area are <6 m LOA) will be restricted in utilising fixed wharves given the prevailing weather and sea conditions in the location proposed for the Kamay wharves. Furthermore, it is suggested berths allocated to recreational vessels should be located on the opposite side of the jetties from ferries and other commercial vessels so as to minimise interactions between the two types of users.

7.2.11 Increase in Recreational Vessel Traffic

In the opinion of the boating industry, the development of ‘successful wharves’ will see an increase in recreational vessel numbers in Botany Bay seeking to use the facilities provided by the new wharves. The increase will bring with it challenges associated with monitoring and compliance which is likely to require the relocation of existing on water and on land resources or the introduction of new resources to meet this additional demand.



8 Assessment of Project Vessel Activity

Some assumptions on the levels of vessel activity for both the construction and the wharves' operational phases of the project have been made to inform the business case. The activities and vessel movements associated with each phase of the project are discussed in this section.

8.1 Construction Phase

Vessels utilised during the construction phase will ultimately depend on the methodology selected for the construction however TCS is advised it is likely to consist of a combination of Jack-up Barges, crane barge/s and a selection of support vessels as listed in the excerpt from the reference document (KFW01-ARUP-BPW-CX-TAN-000001) provided at Annex 6. In summary this is likely to include:

Type of Equipment	Size / Capacity	Description
Jack-up Barge	90t	Used to install piles – inshore
Jack-up Barge - Piling	250t	Piling
Crane	150t	Lift and install piles
SR20 Drill Rig	N/A	Install piles if screwed piles used
Piling Leader	N/A	If driven piles used
Crane Barge	250t	Provides deck space for material storage / handling
Crane	50t	Support preparation work in localised areas
Crawler Crane	200t	Service inshore piling and PCC installation at La Perouse end.
Piling Hammer	7t	Used to set piles into rocks if screwed pile used.
Material Storage Barge	20 – 22m LOA	Used to store and deliver materials

The daily movement of vessel traffic will be determined based on the contractor's proposed temporary loadout facilities which could be either to the west, inside the bay or east, if outside the bay.

The table at Annex 7 provides the estimated number of vessel movements across the range of likely vessel traffic modes during the eight month period of the construction phase of the project. It is anticipated the majority of the project materials (pile, pre-cast concrete units, planks, roof structures, access trusses etc) will be delivered to site by water and, in summary, it is estimated there will be approximately 1,530 vessel movements during the course of the project or an average of seven daily movements between the construction site and the temporary loadout facilities.

The movement and coordination of project vessel traffic will require careful management during all phases of the project in accordance with the specific requirements of the Harbour Master and TfNSW Maritime Operations. Early consultation with both entities and the development of a VTMP will be required to satisfy them that appropriate arrangements will be in place to ensure the project's vessel activities has minimal, if any impact on the normal safe operations of the port.

TCS anticipates the content of the VTMP will also be detailed in the project's Marine Works Management Plan.

8.2 Operational Phase

The project Business Case has made indicative assumptions with regard to the number of recreational and charter vessels anticipated to use the wharves once constructed. These are as follows:

- Average of two recreational vessels per day per wharf;
- Average of four charter / tour vessels per day per wharf.

It is anticipated each of these numbers will double during weekends and public holidays.

With regard to ferries, the Business Case has categorised vessels movements (including passenger embarkation and disembarkation time) into the following three categories:

1. Peak vessel movements
Ferry crossing between La Perouse and Kurnell anticipated to take place every 20 minutes during a 12 hour period between 0700 and 1900 daily - resulting in 36 ferry movements per day.

2. Average vessel movements under minimum subsidy model
Ferry crossing between La Perouse and Kurnell anticipated to take place every 20 minutes during a 12 hour period but with a reduced likelihood of additional services outside of minimum required hours – resulting in a yearly average of approximately 24 vessel movement per day.
3. Average vessel movements under no subsidy model
Ferry crossing between La Perouse and Kurnell anticipated to take place every 20 minutes during a 12 hour period but with a very low likelihood of occurrence – resulting in a yearly average of approximately four vessel movements per day.

It is further anticipated ferry movements will increase during weekends to meet the demand, however this increase has not yet been quantified.



9 Potential Positive Safety Impacts

A NSA considers and assesses the cumulative impacts of a project on a waterway and the impacts of existing infrastructure and services on the project. Invariably such assessments focus on the negative safety aspects of such impacts and suggest possible mitigating actions.

This assessment has followed this focus in identifying the impacts of either the Kamay wharves and potential subsequent ferry operations on existing and future marine activities in Botany Bay or the impact of existing and future marine activities on the wharves and / or potential associated ferry service.

However, the assessment has also highlighted some potential positive safety impacts of the project on marine activities in Botany Bay which are worthy of further consideration in a Business Case going forward. These include:

1. The wharves will provide a secure berth for potential forward operating bases for Marine Rescue NSW, NSW Police Marine Area Command or NSW Maritime vessels during periods of increased recreational waterborne activities when the risk of incidents is likely to be higher. Such use will provide a timelier response to on water incidents or accidents.
2. With appropriate arrangements in place, the wharves will provide landside emergency services, including Police, Ambulance and Fire, with safe access to the waterway. Persons or vessels in need of assistance will use the wharves to enable embarkation of emergency services personnel or efficient disembarkation of persons needing medical assistance.
3. The introduction of a ferry service will introduce professional seafarers into the area on a more regular basis. This will result in professional mariners, who are well trained and adequately resourced, to assist with the communications needed to initiate and coordinate a response and also respond in their own right in an otherwise fairly remote part of the waterway. Commercial vessels and ferries are on record for providing such services in Sydney Harbour
4. The proposed locations for both wharves are relatively close to the entrance to Botany Bay. This will provide safe havens for small vessels that get into trouble in the outer area of the bay, and outside the heads, which will be closer than the alternative options of Foreshore boat ramps or those situated to the west of the bay.

10 Identified Hazards and Risk Assessment

This NSA, and the associated industry consultation, has provided the opportunity to identify a range of anticipated marine hazard associated with both the construction and operational phases of the project.

TCS has adapted the hazard identification process to conduct an internal risk assessment based on AMSA guidelines and its own knowledge of maritime operations and understanding of the Kamay Ferry Wharves project.

A project risk assessment is a live document that will need to be developed by the contractor before commencement of work and remain updated for the duration of the project. Additionally, an operational risk assessment will need to reflect the maritime risks associated with the marine operation of the wharves and will need to be development and maintained by the operator in conjunction with the Port Authority and TfNSW Maritime Operations.

Included here is an initial assessment of the anticipated hazards / risks which, nevertheless, is considered to be thorough and to meet the requirement of the SEARs, as outlined in section 1.1. above.

The risk assessment including identified hazards, risk ratings pre-controls, proposed risk controls and risk re-ratings post controls is provided in the spreadsheet at Annex 8. However, a summary of the risk assessment output is provided below:

During Construction Phase:

Pre-control: The following risk ratings were identified - 10 Extreme Risks, 6 High Risks and 2 Moderate Risks.

Post-controls: The following residual risk ratings were identified - 2 Extreme Risks, 6 High Risks and 10 Moderate Risks.

During Operational Phase:

Pre-control: The following risk ratings were identified - 6 Extreme Risks, 11 High Risks and 1 Moderate.

Post-control: The following residual risk ratings were identified - 5 High Risks, 11 Moderate Risks and 2 Low Risks.

Generally, residual risk ratings of Moderate or less are considered 'Acceptable' whereas any rated above Moderate will require consideration of additional or alternative risk controls which might include:

- Elimination;
- Substitution;
- Isolation, etc.

The table below shows the residual risk ratings that score High or Extreme and which will require additional or alternative risk controls.



Table 1 – Residual Risk Ratings

Hazard / Risk	Residual Risk Rating
Construction (C)	
Non-compliance with section 67ZN application process for Disturbance of the Seabed.	Extreme
Proximity of works to submerged cable area and approval process.	High
Location of No Anchoring Zone impacting approvals process and construction phase.	High
Vessel traffic congestion / interaction with seagoing vessel and tugs on crossing between La Perouse and Kurnell.	High
Seagoing ships changing schedules impacting construction vessel scheduling.	High
Construction vessel activities restricted / delayed by VTS / HM Instructions due to seagoing ship priorities.	High
Exposure, resulting in potential cessation of works, of construction sites and vessels to adverse swell and sea conditions.	Extreme
Tidal range in the construction area impacting safety and project construction.	High
Operational (O)	
Seagoing ships changing schedules / priorities impacting ferry activities and schedules.	High
Exposure of wharves and ferry operations, alongside, to adverse swell and sea conditions and potential cessation of operations.	High
Tidal range in the wharf operating area impacting vessel and passenger safety.	High
Safety of passengers embarking and disembarking ferries at wharves impacted by large swells / seas.	High
Wharves difficult for recreational vessels to use safely.	High

11 Conclusions

TCS has sought to interpret and comment on the findings of this assessment on an ongoing basis throughout the relevant sections of this report. Nevertheless, these conclusions are intended to pull the findings together and to assist the reader to fully understand the details of this subject matter and reiterate the key conclusions from this assessment.

1. Botany Bay is home to Port Botany, one of Australia's largest container ports and two bulk liquid berths, and the Caltex terminal at Kurnell. Trade includes manufactured products, bulk liquid, bitumen, liquified natural gas and petroleum products.
2. As reported in PANSWs 2018-19 Annual Report there were a total of 1,660 seagoing ship visits to Botany Bay. This equates to nine vessel movements a day to or from the Port Botany or Kurnell terminals. Port Botany is serviced by a deep-water shipping channel with a short transit to and from the berth facilities.
3. Other waterborne activities in Botany Bay include a mix of commercial and recreational boating activities which have generally declined in the last 5 to 10 years, with the exception of personal watercraft (PWC) which have recently grown at a rate of approximately 8% per annum. Of the existing activities in the bay approximately 80% are conducted well away from the locations of the proposed wharves and potential ferry operations.
4. HMD (July 2016) require other vessels to remain at least 30 m clear of seagoing ships and not pass between the ship and its escort vessel. This will apply during both the construction of the wharves and once the wharves are constructed, to the operation of the future ferry service. The scheduling of future ferry services will have to take into consideration the requirements of the HMD not to impede the passage of seagoing ships.
5. All vessel movements during the construction phase will be under the delegation and approval of VTS (on behalf of the Harbour Master) in accordance with a VTMP which will need to be developed and approved as part of the project approvals process.
6. During summer months the level of recreational waterborne activities in Botany Bay increases particularly with vessels coming out of the Georges River and using buoy moorings in the various bays including Frenchman's and Yarra Bays, which are in fairly close proximity to the proposed La Perouse wharf location.
7. The proposed location of the wharves will have no impact on pilotage operations in the bay and the associated ferry and / or other vessel operations are unlikely to create difficulties for seagoing ships provided a suitable VTMP is established that addresses all the potential scenarios that might be encountered.
8. The wharves, approach channels and any associated navigation hazards will require day and night markings in accordance with IALA standards to ensure unambiguous guidance and warnings are provided to all users of Botany Bay.
9. Any future passenger ferries operating between La Perouse and Kurnell will be required to participate in the VTS system operated by PANSW and report their activities, in the same way as Sydney ferries. National legislation will require the ferries to be fitted with an AIS transponder to enable monitoring by VTS and other AIS fitted vessels in the area.
10. Botany Bay is frequently subjected to extreme swell and wave conditions that enter the bay during east coast lows and associated easterly winds. The wharves and any associated vessel operations will experience rough conditions which will generally be too rough for vessels to remain alongside berths for any length of time. Amongst other things, the prevailing conditions will have a bearing on the safe transfer of ferry passengers, safe ferry operations generally and the options for cribbing or overnighting vessels in the bay. All of these issues require careful consideration and refinement in the design and planning stages of the project.
11. Any planned disturbance of the seabed will require an application under section 67ZN of Ports and Maritime Administration Regulations (2012) and approval from the Harbour Master and from TfNSW Maritime Property department, as land holders.

12. A 132 kV electrical cable corridor on the seabed, in close proximity to the proposed wharf locations, runs from La Perouse to Kurnell roughly along the ferry route between the two locations. The corridor is protected by a no anchoring zone which will have an impact on vessel operations both during construction of the wharves and once the wharves are in use.
13. This assessment has also identified a number of potential positive impacts of the proposed new wharves, and the potential associated ferry service, in relation to the safety of navigation and boating activities in Botany Bay.



12 Recommendations

This assessment makes the following recommendations considered necessary to enhance the safety of navigation and ensure safe operations in Botany Bay during and following the construction of the Kamay Ferry Wharves. TCS recommends:

1. The development of a VTMP to provide guidance for vessels, to enhance marine and navigation safety, when entering, exiting and operating in Botany Bay, as agreed by NSW Maritime and the PANSW in conjunction with representatives from the commercial and recreational vessel operators. Report references: 5.1(5); 5.2(1); 5.2(5); 5.3(3&4); 5.3(7&8); 6.3(2); 6.3(3); 7.2.2; 7.2.3.
2. Early consideration be given to the requirement of a s67ZN application under the Ports and Maritime Administration Regulations 2012 for proposed construction work where disturbance of the seabed is anticipated. Report reference: 5.1(6); 5.4(5&6).
3. Further consultation with PANSW and NSW Maritime be undertaken, as part of the wharf design process, to determine their specific requirements for lighting and AtoNs. Report References: 5.1(8); 5.3(9); 6.1(6); 6.4(6&7).
4. An investigation into the precise location, protection and extent of the submerged cable/s in the vicinity of the wharves, and their proposed locations, be undertaken to accurately inform the development of the EIS submission. Report references: 5.1(10); 5.2(7); 5.4(7); 7.2.1.
5. An assessment be undertaken of the implications of the no anchoring restrictions associated with the cable corridor in close proximity to the proposed Kurnell wharf, both during construction of the wharf and once vessel operations commence. Report references: 5.1.(10); 5.2(8); 5.4(7&8); 6.1(7); 6.2(10); 6.4(2).
6. The wharves are designed and constructed to provide vessels with options for manoeuvring alongside at different states / heights of tide and to ensure access for recreational and commercial vessels on and off the wharves is as simple as possible so that they don't put themselves and others at risk. Report references: 5.4(2); 6.1(8); 6.1(10).
7. A review be undertaken to identify alternatives for overnight and cribbing berths for ferries within the Botany Bay and Georges River areas. Report reference: 5.4(4).
8. The development of an Education Campaign to inform all vessel users about the new wharves, the potential associated activities and their responsibilities to ensure safety of navigation within the bay. Report references: 6.1(1&4).
9. The need for clear signage and advice for recreational vessel users, to facilitate ease of use, be considered as part of the wharves design. This includes, for example, no anchoring, no overnight stay, and highlighting hazards associated with using the wharves etc. Report references: 6.2(10).
10. Considering locating recreational vessel berths, and the approach channels, on the opposite side of the jetties from the ferry berths to segregate the different vessel types. Report reference: 6.1(11); 6.3(1) and 7.2.9.

Some additional recommendations, not specifically associated with navigation safety, can also be made from this assessment, as follows:

11. The project team develops and maintains a communication strategy to engage key stakeholders and Botany Bay users, provide regular project and progress updates and opportunities to hear and manage stakeholders' questions and concerns. Report references: 6.1(5); 7.1 last bullet.
12. Further consideration be given to the benefits of the potential positive safety impacts identified in this report in support of and justification for the construction of the new wharves. Report reference: section 8.



Annex 1 – Project Fact Sheet

The Kamay Ferry Wharves Project Fact Sheet issued by the NSW Government on May 2020 is on the following pages.

Background

La Perouse and the Kurnell Peninsula are located at the northern and southern sides of the ocean entrance to Botany Bay respectively, which lies approximately 14 km south of the Sydney CBD. Both sites have a diverse variety of land uses including residential, commercial and industrial precincts, as well as the Kamay Botany Bay National Park.

Both sites contain a rich array of historical, cultural and environmental value. The two peninsulas form the entrance to Botany Bay, a place of historical and cultural importance for all Australians. Aboriginal cultural sites date back thousands of years. The Kurnell site is the first meeting place between Aboriginal peoples and the crew of the Endeavour in 1770.

A passenger ferry service between La Perouse and Kurnell had previously operated between 1890 and 1974 when services ceased following severe damage to both wharves after a major storm event. As a result the wharves were decommissioned.

In 2016, Transport for NSW (TfNSW) completed a [Feasibility Study](#)¹ which investigated the viability of reinstating the wharves. The study concluded that reinstating the wharves would provide numerous indirect social, economic, cultural and tourism benefits for La Perouse, Kurnell and the wider Sydney area.

Separately, in 2018 the Office of Environment and Heritage (now the Department of Planning, Industry and Environment) completed the [Kamay Botany Bay National Park Master Plan](#)² (Master Plan) which looks to deliver on the vision to make the 'Kurnell Precinct' of Kamay Botany Bay National Park 'a place of significance to all Australians that contributes to their sense of identity as Australians.'

On 28th April 2018, the Prime Minister and Federal Treasurer announced \$50 million in funding towards Stage 1 of the Master Plan with contributions coming from both the Commonwealth (\$25 million) and NSW (\$25 million) Governments. Stage 1 of the Master Plan includes the re-establishment of the wharves at La Perouse and Kurnell.

TfNSW has established a project team to undertake the planning, design, assessment (business case and environmental impact assessments), procurement and delivery of the reinstatement of the La Perouse and Kurnell wharves and associated infrastructure (the Kamay Ferry Wharves Project).

¹ <https://www.transport.nsw.gov.au/sites/default/files/media/documents/2017/ferry-wharves-la-perouse-kurnell-feasibility-study-report.pdf>

² <https://www.environment.nsw.gov.au/research-and-publications/publications-search/kamay-botany-bay-national-park-kurnell-master-plan>

The Project

A range of site investigations will be undertaken to better inform the design and environmental assessment, and key stakeholders and the community will be consulted throughout the project phases.

The Project scope of work includes:

- the reconstruction of wharf infrastructure at La Perouse and Kurnell suitable for the berthing of passenger ferries, tourism-related commercial vessels and recreational vessels
- construction of land side amenities which are specifically required to facilitate the safe and efficient operation of the wharf infrastructure. This may include additional car and bus/coaches parking spaces, passenger waiting areas, ticketing facilities, toilets, crew facilities, bike storage facilities, pathways to/from other transport connections, and security provisions.

At this stage the Project does not involve the specific procurement of a passenger ferry service between the wharves.

The replacement wharves and associated infrastructure are expected to be available for operational use in early 2024.

Potential Users

The replacement wharves at La Perouse and Kurnell would attract a number of different users. The core use is expected to be a ferry service for tourists/visitors to the area, and by the local community, for cultural and recreational purposes.

Commuters are another potential user of a ferry service enabled by the wharves, with the majority of commuter users expected to originate from Kurnell and travel to the eastern suburbs and Sydney CBD for work.

The wharf infrastructure would also be available to be used by non-ferry commercial vessel operators and recreational boat users.

Expected Benefits

The Project is expected to deliver significant social, economic, cultural and tourism benefits and opportunities for the local community and wider Sydney.

The reinstatement of the wharves creates a waterborne connection between the La Perouse and Kurnell sites which will allow a greatly-improved physical and cultural link between the two places, which is of particular importance to the local Aboriginal community.

The Project will reintroduce the experience of the crossing of Botany Bay and a sense of arrival to both sides of the Kamay Botany Bay National Park which holds immense National historical and cultural significance. This will unlock the visitation potential of the National Park, and enable the planned improvements to the Kurnell side of the National Park to deliver upon its objective of improving the site's attraction, appreciation and experience.

A waterborne crossing of the heads of Botany Bay will also introduce the missing link for walking and cycling routes around the bay and along Sydney's southern coastline. The community of Kurnell will be better connected to the rest of Sydney through an attractive and unique mode of transport which creates another gateway to for visitors to the Sutherland Shire.

The potential direct and indirect economic benefits from the Project are expected to include:

- Jobs generated by the construction, maintenance and operation of the wharves and any associated ferry or commercial services implemented. There is an opportunity for the active economic participation of local Aboriginal organisations and the community across the Project lifecycle.
- Economic stimulus for La Perouse and Kurnell local businesses through increased visitation to the areas (e.g. food and drink, retail)
- Further private investments to service the visitor economy such as Bay tours, whale watching, charter vessels and food and beverage offerings.
- Wider indirect economic benefits from tourism as a result of improved links to Cronulla and the Royal National Park.

Design Development

The design of the replacement wharves and associated infrastructure has been progressed to a preliminary level, building on work undertaken during the 2016 Feasibility Study. The focus areas of design development completed to date include:

- Site constraints and opportunities mapping
- Early engagement with potential infrastructure contractors and users
- Baseline site investigations/surveys e.g. topographic (land) surveys, hydrographic (overwater) surveys, traffic and parking survey, seabed geophysical survey
- Establishing the end-user requirements and basis of design
- Specialist technical studies e.g. coastal modelling, assessment of vessel motions at berth
- Selection of preferred locations and assessment of design form options
- Consideration of architectural and urban design opportunities
- Constructability assessment and planning

The optioneering assessment resulted in a decision to locate the wharves at their original locations at both La Perouse and Kurnell, in agreement with previous studies.

The design is currently being further developed to confirm the end-user requirements with stakeholders, and further assess engineering and architectural options to identify the preferred designs to take forward.

Further technical studies and an offshore and onshore geotechnical investigation are planned to be carried out to inform the design development.

Environmental Assessment

The Project team has completed a Preliminary Environmental Investigation (PEI) to identify environmental and social issues and opportunities, and to make recommendations for the more detailed environmental impact assessment to be carried out later this year. The PEI has been informed by previous studies, as well as recently-completed site investigations including a traffic and parking survey, noise data collection and biodiversity surveys.

The following environmental sensitivities have been identified to be important for the Project requiring assessment in more detail:

- Biodiversity, including potential for threatened ecological communities and threatened species within the proposal study area such as Posidonia Australia seagrass.
- Aboriginal heritage, including high potential for unknown and unrecorded archaeological sites (including burial sites and middens) throughout the proposal study area.
- Non-Aboriginal heritage, including potential for known and unknown buried archaeological and potential for issues related to the setting and views of heritage items.
- Maritime archaeology, including both known and potential maritime sites within the proposal study area.
- Other environmental impacts being considered are: construction impacts, traffic, hydrology, groundwater, noise & vibration, socioeconomics, landscape and visual, contamination, coastal processes, climate change, air quality and cumulative impacts.

Planning Approval Process

The Project has been classified as State Significant Infrastructure (SSI) for the purposes of the statutory planning approval process, and as such an Environmental Impact Statement (EIS) will be prepared this year.

The first step of this process will be the lodging of a SSI Scoping Report and Application which will allow the Secretary of the Department of Planning, Industry and Environment to set out the requirements of the environmental impact assessment informing the EIS.

Stakeholder and Community Consultation

The Project has detailed plans in place to actively and respectfully engage with relevant stakeholders and the wider community during the progression of the project. This will build on stakeholder and community engagement activities undertaken for the 2016 Feasibility Study, and include:

- Regular notifications – general project updates & site activities (leaflets, letters, doorknocking, advertisements)
- “Have Your Say” online portal to gather stories, surveys and comments.
- Community information sessions, briefings and events
- Targeted engagement with key stakeholders and interest groups
- Formal public display of the Environmental Impact Statement (EIS)

There continues to be broad government and community support on both sides of Botany Bay for the Project.



Figure 1: Locality Plan showing the proposed sites of the La Perouse and Kurnell wharves and associated infrastructure

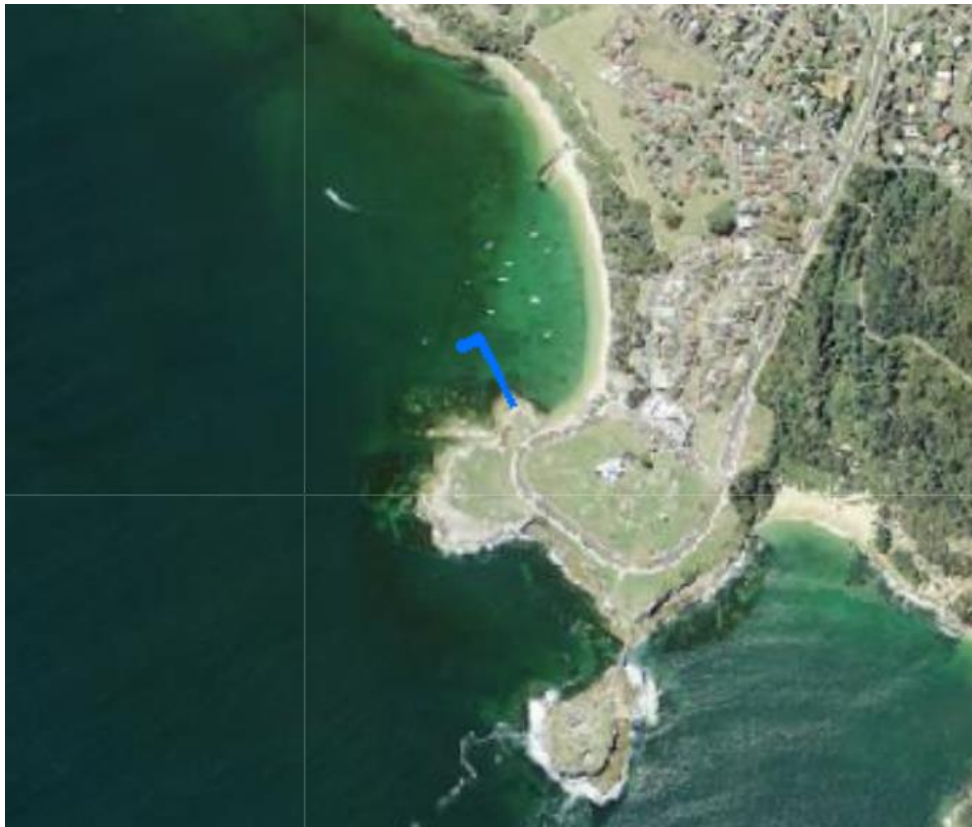


Figure 2: Proposed Wharf Location at the La Perouse site



Figure 3: Proposed Wharf Location at the Kurnell site

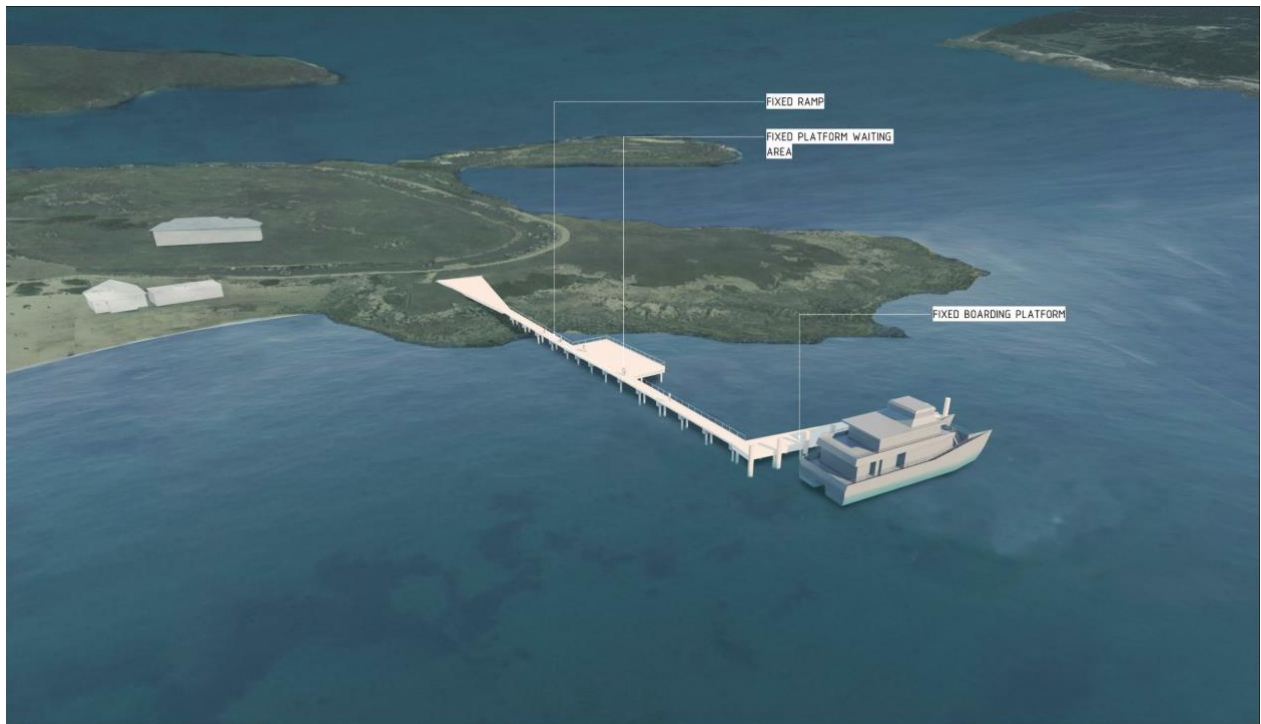


Figure 4: Indicative schematic of the proposed wharf at the La Perouse site
(note: design development still in progress)

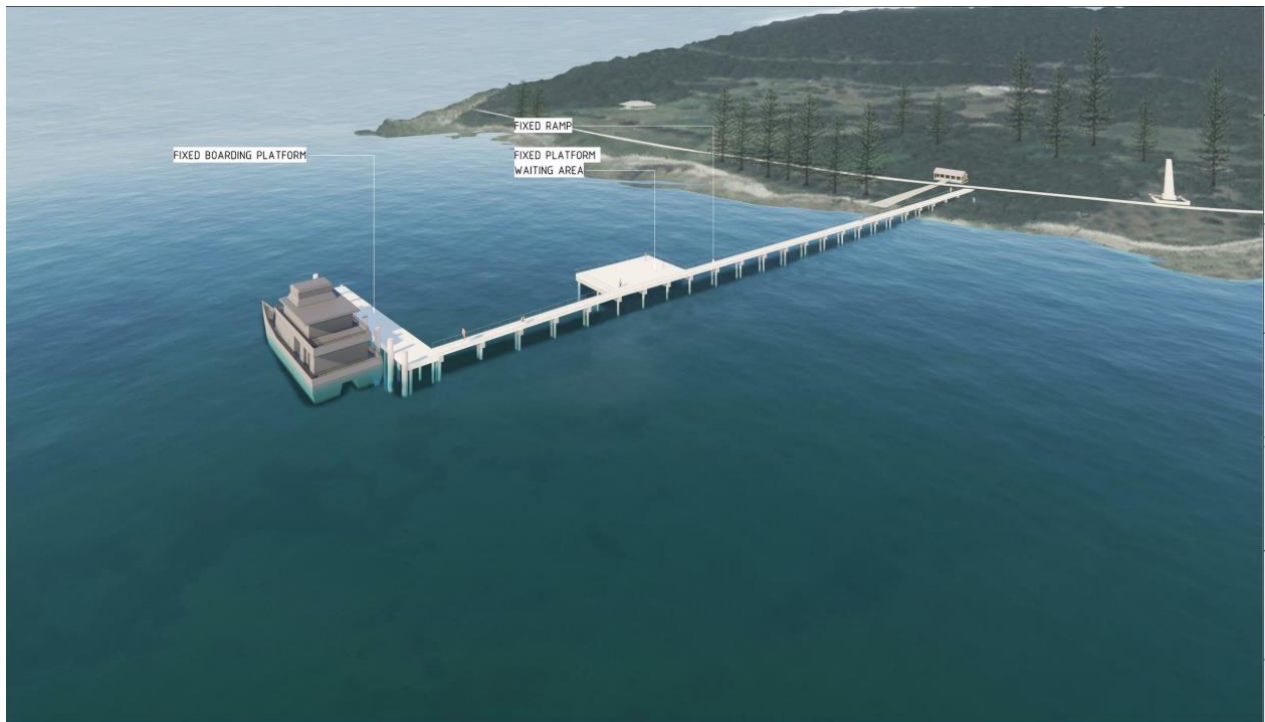
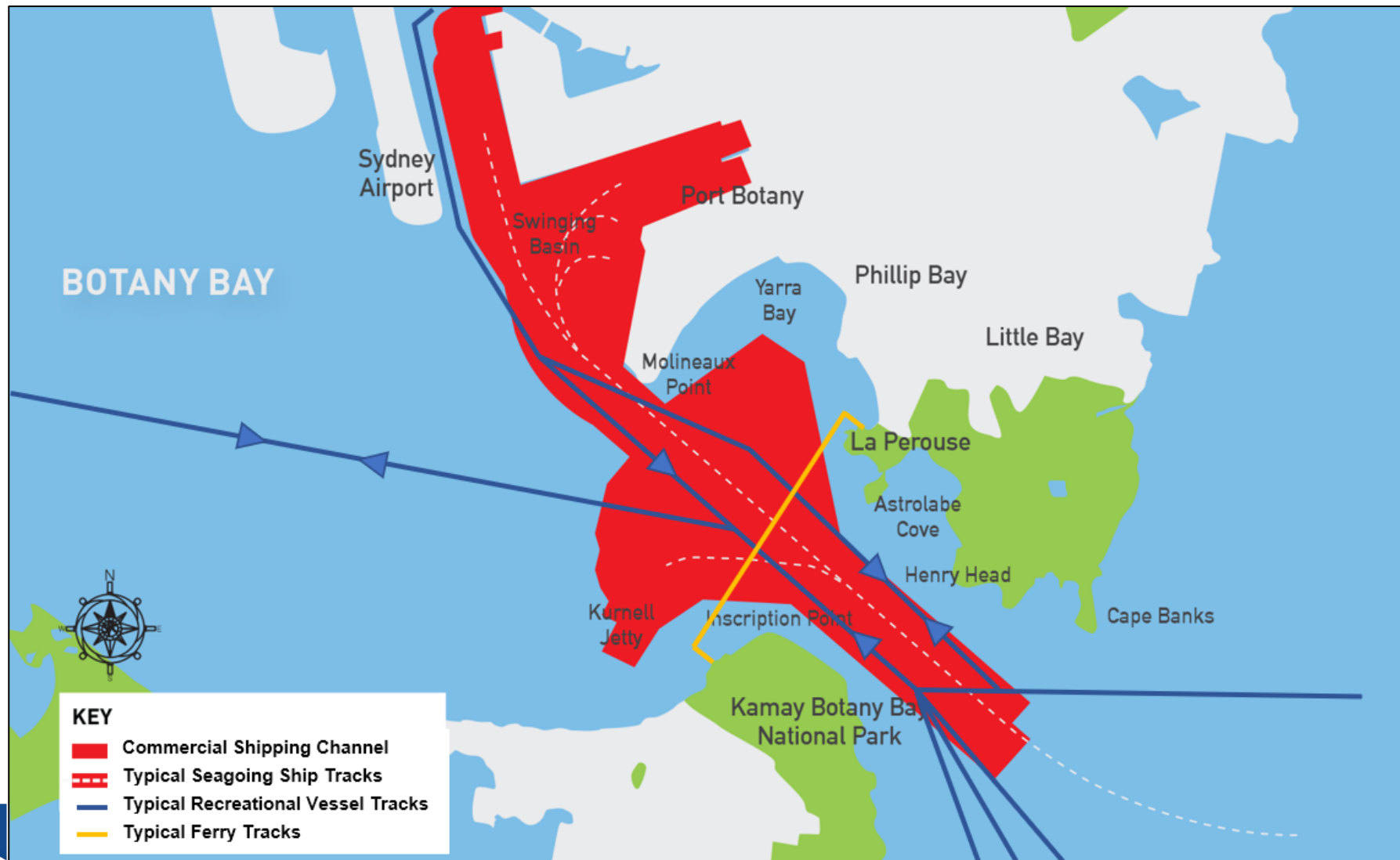


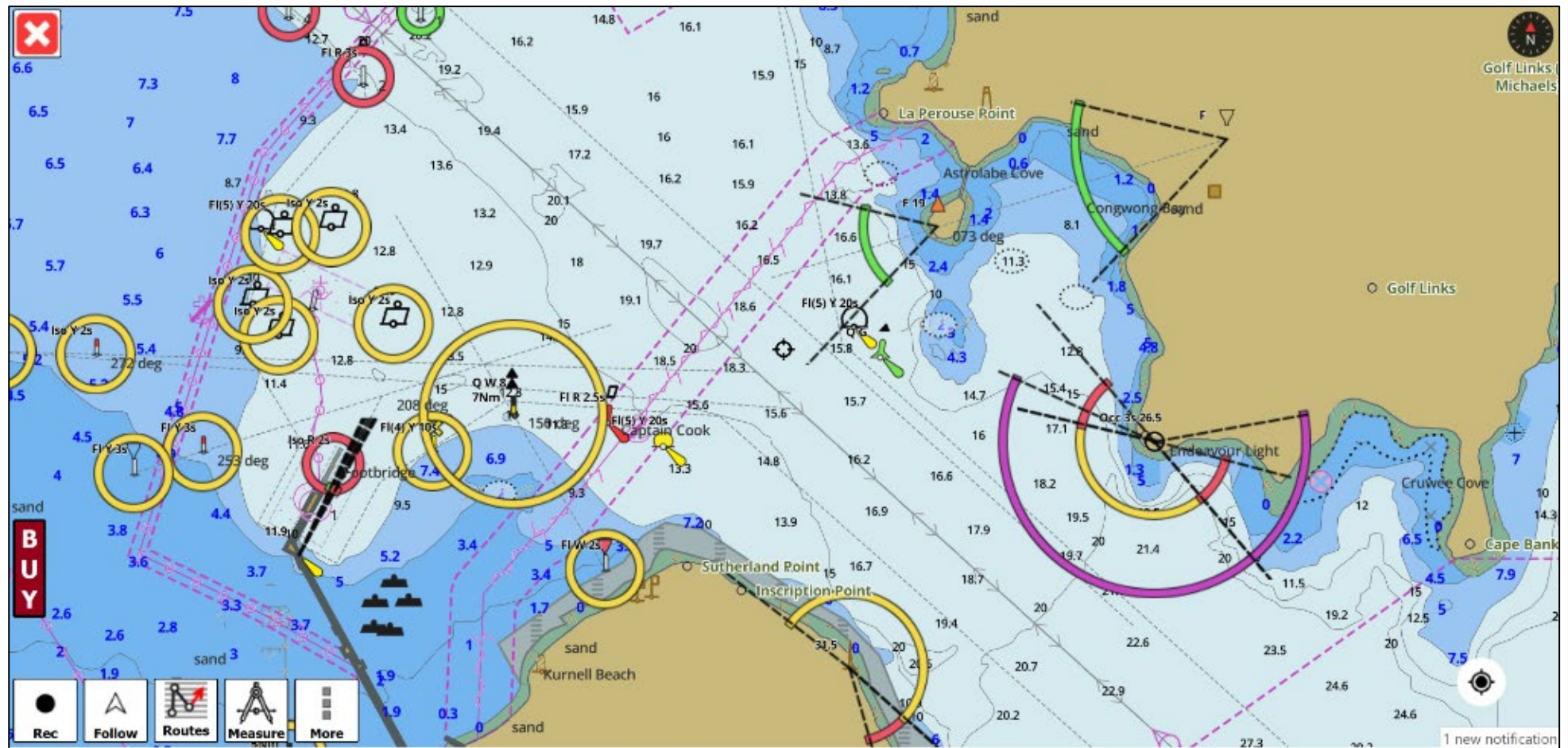
Figure 5: Indicative schematic of the proposed wharf at the Kurnell site (note: design development still in progress)

Annex 2 – Typical Recreational Vessel and Ferry Tracks



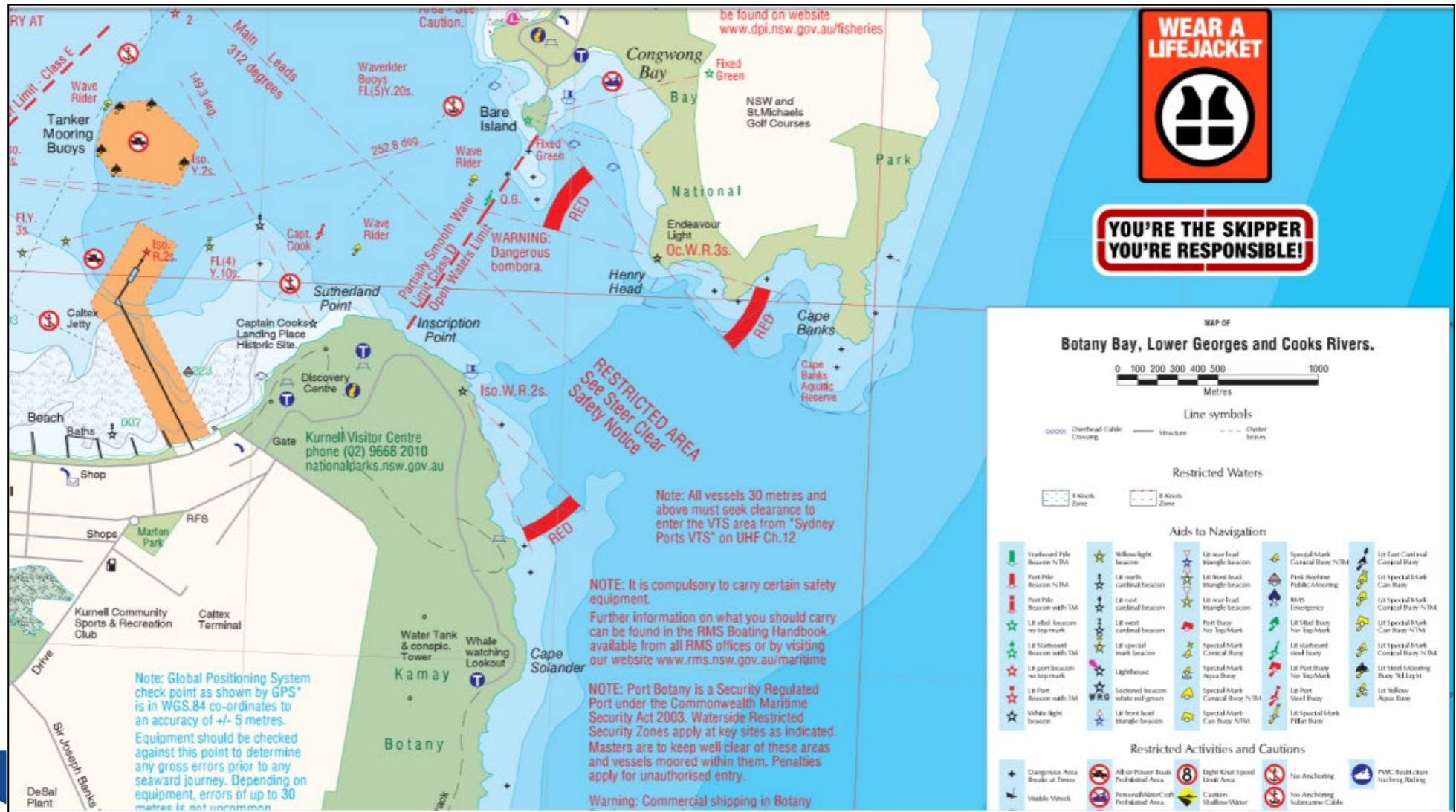
Source: Typical Recreational and Ferry Tracks as interpreted by TCS (Refers to Figure 1 in section 4.2 above)

Annex 3 – Submerged Cable Corridor / No Anchoring Zone



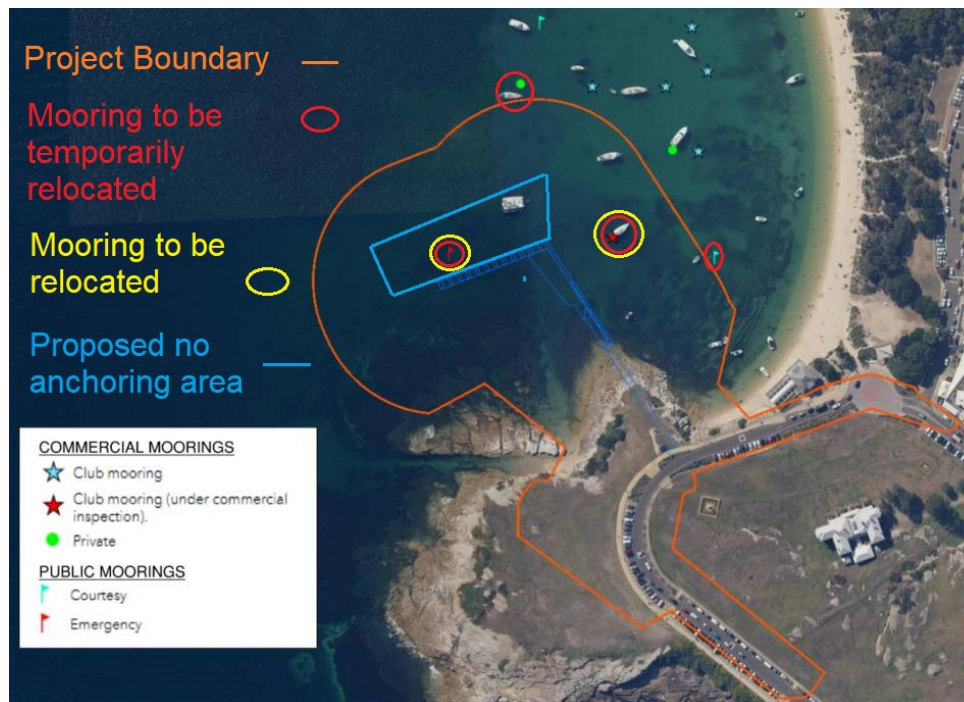
Source: NSW Maritime Boating Chart

Annex 4 – No Anchoring Symbol



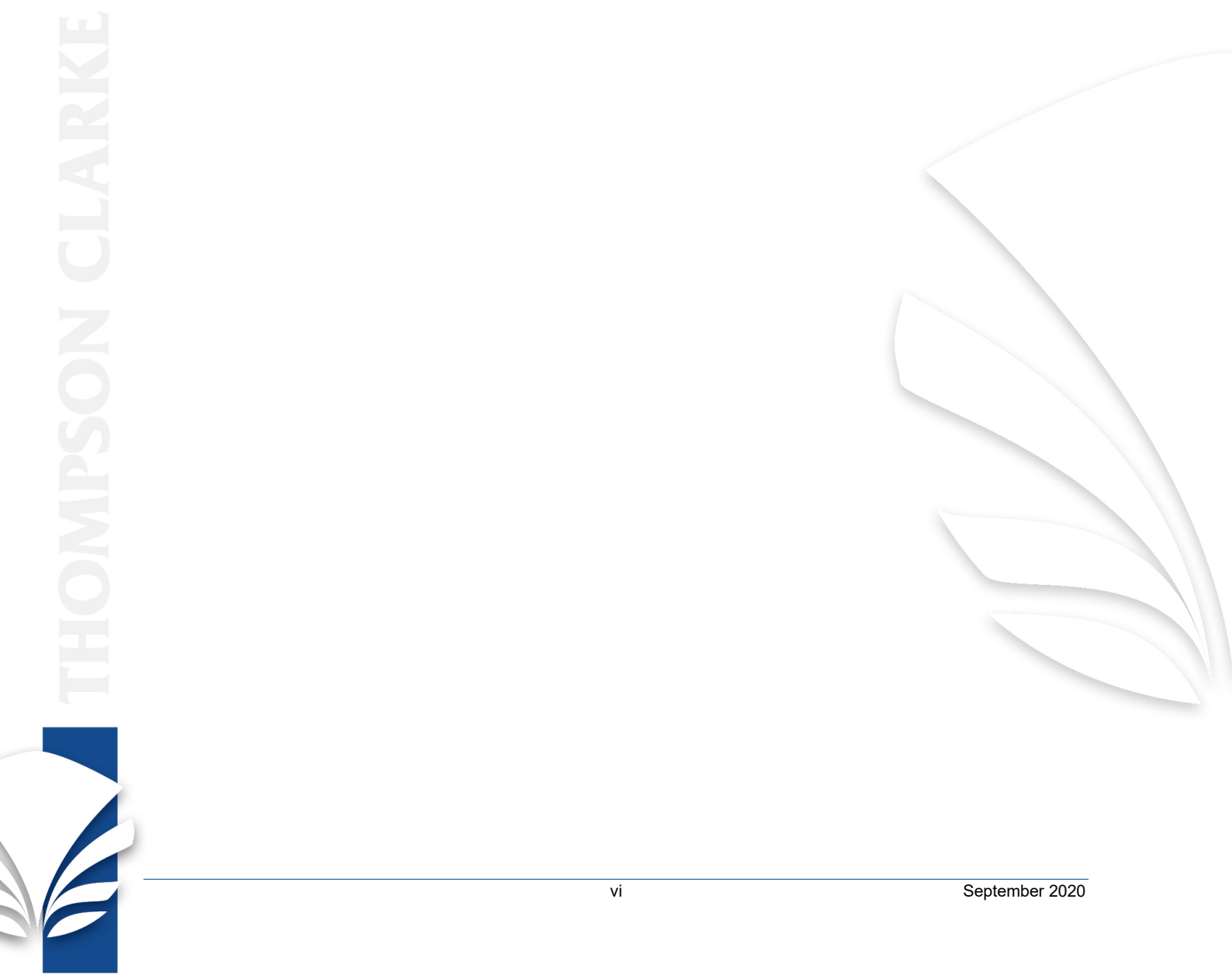
Source: NSW Maritime Boating Chart

Annex 5 – Moorings in Frenchmans Bay



Source: Arup

Annex 6 – Construction Phase Vessels






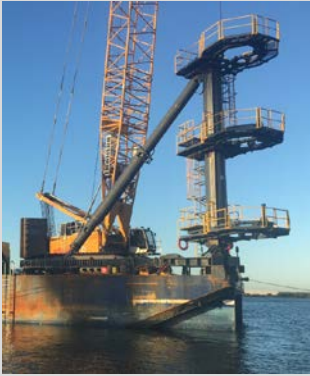
KAMAY FERRY WHARVES

Constructability Assessment TAN: Strategic Phase



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Type of Equipment	Commentary & Consideration	Photograph
Jack-up Barge (90t)	A number of local options (up to 90t capacity) are available, which would lower the mobilisation cost and provide ideal work platforms for isolated work fronts (pile preparation). This option could also support equipment to install the piles (pending confirmation of size) at the inshore La Perouse area where the land-based crane can feed it piles.	
JUB (250t) – Piling	This option creates a stable operating platform for the installation of piles and benefits from a small footprint and limited impact from swell/surge (only during moves). However, there is limited deck storage space and the seabed conditions would need to be considered (i.e. presence of shallow uneven rock). High mobilisation costs are likely as no 250t JUBs are currently locally based.	
150t Crane on the 250t JUB	Used to lift and install piles plus also can support PCC installation and other operations.	See above photograph.
SR20 Drill Rig (if Screwed Pile Method is used)	The SR20 Drill Rig may be used for the installation of piles (if screwed method is adopted) and is the ideal size to work off the 90t and 250t JUB's. However, the SR20 Drill Rig would need to be supported by a separate crane to lift piles into vertical position to install. The Drill Rig can also be used for the land-based piles at La Perouse and also inshore section at Kurnell (if temporary causeway is installed).	
Piling Leader (if driven piles)	Piling Leader frame (raking capability) barge mounted to assist with pile support and positioning during installation. This can be JUB or Crane Barge mounted.	

KAMAY FERRY WHARVES

Constructability Assessment TAN: Strategic Phase



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Crane Barge (250t) - Support	Providing the flexibility of reach, manoeuvrability and deck space for material storage. Surge and swell will at times impact the operation of the crane barge. The required anchor spread will also create a larger footprint of operation.	
50t Crane (on 90t JUB after piling)	Ideal sized crane to support preparation works in localised areas from a fixed platform.	
200t Crawler Crane	Land-based at La Perouse to service the inshore piling and PCC installation works. Reduces risk of weather downtime (swell) for the construction of the first section of the ramp (circa 40m). Would require a crane platform to be established on the rock outcrop to be of benefit.	
7t Piling Hammer	Used to 'set' the piles into rock if a screwed pile installation is adopted, or to drive piles to toe level if rock not encountered (driveability analysis by Contractor required to confirm hammer size).	
Material Storage Barge	Barge to store & deliver materials such as piles, PCC units, gangway structures, platforms etc. Small barge circa 20 - 22m length would be large enough.	

Annex 7 – Estimated (Construction) Marine Movements

Reason for Vessel Move	Comments/Assumption	Est. No. of Vessel Moves
Mobilisation & Demobilisation of Marine Based Equipment	⇒ JUB's x 2, Crane Barge x 1 & Service Barges x 2	10
Demobs & Remobs of Marine Based Equipment due to Weather Event	⇒ Single Occasion - JUB's x 2, Crane Barge x 1 & Service Barges x 2	10
Movement of Marine Based Equipment between Kurnell & La Perouse	⇒ Four Occasions: JUB's x 2, Crane Barge x 1	12
Supply Barge – Delivery of Piles to the Project Area (Barge to & from site)*	⇒ Assumed delivery of 4 piles/time to JUB due to no storage space (170 x piles estimated)	85
Supply Barge – Delivery of PCC Units to the Project Area (Barge to & from site)*	⇒ Assumed delivery of 2 Headstocks at a time to JUB. Assumed delivery of 2 Spans of Planks at a time.	80
Supply Barge – Delivery of lower landing decking modules to the Project Area (Barge to & from site) *	⇒ Assumed delivery of 3 at a time	31
Relocation of Barge to load and collect roof structures (Barge to & from site) *	⇒ La Perouse x 1, Kurnell x 2	4
General Supply Barge Moves not included in the above	⇒ Assumed allowance of 1/week**	34
Tug movements for Bunkering of Marine Plant	⇒ Assumed 1 per Week**	34
Workpunt moves (to & from the site) *	⇒ 2 x AM & 2 x PM (daily mob/demob from boat ramp)**	820
Workpunt moves between Kurnell & La Perouse	⇒ 1 per workpunt per day **	410
Workpunt moves between vessels within the same site construction zone	⇒ Excluded from assessment as not transiting outside of designated work zone	-

Table D – Estimated Marine Traffic Movements

*Please note where the description notes a barge move to and from site this equates to 2 moves in the estimated number column

**assumed approx.. 8 month marine construction period

Source: Tony Matthews, TLM Project Services, *Constructability Info to Support EIS Preparation*, Memorandum, Page 17, 3 July 2020

Annex 8 – Initial Assessment of Anticipated Hazards / Risks

Hazards / Risks	Risk Analysis Likelihood x Severity = Risk			Mitigations	Residual Risk Rating Likelihood x Severity = Risk			Risk Owner
	L	S	R		L	S	R	
Construction (C)								
1. Construction vessels interacting with seagoing ships.	3	D	Ex	<ul style="list-style-type: none">▪ Consultation with Harbour Master's (HM) Office / PANSW.▪ Development of Vessel Traffic Management Plan (VTMP) for construction phase.▪ Incorporate VTMP into the Marine Works Management Plan (MWMP).▪ Ensure construction vessel crews are appropriately trained▪ Construction vessel participation in VTS.▪ Monitor and coordinate construction vessel movements via project team 'Marine Coordinator'.	1	D	M	Main Contractor Marine Contractor Vessel Master Duty VTS Manager
2. Impact on construction of OLS (airport requirements).	2	C	M	<ul style="list-style-type: none">▪ Thorough review of Sydney Airport OLS requirements.▪ Consultation with Airport representative/s.▪ Incorporate OLS requirements, as applicable, into VTMP & MWMP.▪ Monitor and coordinate construction vessel movements via project team 'Marine Coordinator'.▪ Implementation of routes between La Pouse and Kurnell outside shipping channels (e.g. to west of existing channels).	1	C	M	Main Contractor Marine Contractor Construction Supervisor
3. Non-compliance with requirements of VTS / HM, impacting safety and project.	5	C	Ex	<ul style="list-style-type: none">▪ Consultation with HM Office / PANSW.▪ Development of VTMP.▪ Incorporate VTMP into the MWMP.▪ Ensure construction vessel crews are appropriately trained.▪ Construction vessel participation in VTS.▪ Monitor and coordinate construction vessel movements via project team 'Marine Coordinator'.	2	C	M	Main Contractor Marine Contractor Vessel Master
4. Non-compliance with section 67ZN application process for Disturbance of the Seabed.	5	E	Ex	<ul style="list-style-type: none">▪ Understanding of specific requirements of Section 67ZN application process.▪ Consult with HM's Office and TfNSW's Maritime Property Department.▪ Specifically, construction works proximity to seagrass, cable corridor and no anchoring zone; and nature and extent of cable protection.▪ Undertake comprehensive due diligence to ensure all requirements are addressed in application.	2	E	Ex	Main Contractor Marine Contractor

Likelihood

Almost Certain / Frequent = 5
Likely = 4
Possible = 3
Unlikely / Remote = 2
Rare / Improbable = 1

Severity / Consequence

Catastrophe = E
Major = D
Moderate = C
Minor = B
Insignificant = A

Risk

Extreme = Ex
High = H
Moderate = M
Low = L

Hazards / Risks	Risk Analysis Likelihood x Severity = Risk			Mitigations	Residual Risk Rating Likelihood x Severity = Risk			Risk Owner
	L	S	R		L	S	R	
5. Proximity of works to submerged cable area and approval process.	5	D	Ex	<ul style="list-style-type: none"> Undertake research to determine precise location and extent of the cable area, also the nature and extent of cable protection. Consult with HM's Office and TfNSW's Maritime Property department, as necessary. Embark on Section 67ZN application process Undertake comprehensive due diligence to ensure all requirements are addressed in application. Develop operating procedures to ensure authorities' requirements are complied with. Incorporate 'Working in Close Proximity to Submerged Cable' requirements / procedures in the MWMP. Ensure construction vessel crews are appropriately trained. Monitor and coordinate construction vessel movements via project team 'Marine Coordinator' to ensure compliance. 	2	D	H	Main Contractor Marine Contractor Vessel Master Plant Supervisor
6. Location of No Anchoring Zone impacting approvals process and construction phase.	5	D	Ex	<ul style="list-style-type: none"> Consult with HM's Office and TfNSW's Maritime Property department to fully understand constraints and restrictions associated with no anchoring zone. Develop Exemption Application, as required, to meet expectation of authorities' and gain approval to anchor / secure construction vessel as necessary during construction phase. Develop procedures to ensure compliance with exemption / approval criteria. Ensure construction vessel crews are appropriately trained. Monitor and coordinate construction vessel movements via project team 'Marine Coordinator' to ensure compliance. 	2	D	H	Main Contractor Marine Contractor Vessel Master
7. Vessel traffic congestion / interaction with seagoing vessel and tugs on crossing between La Prouse and Kurnell.	4	D	Ex	<ul style="list-style-type: none"> Consultation with HM Office / PANSW. Development of VTMP for construction phase. Incorporate VTMP into the MWMP. Ensure construction vessel crews are appropriately trained Construction vessel participation in VTS. Monitor and coordinate construction vessel movements via project team 'Marine Coordinator'. 	2	D	H	Main Contractor Marine Contractor Vessel Master Duty VTS Manager
8. Seagoing ships changing schedules impacting construction vessel scheduling.	5	C	Ex	<ul style="list-style-type: none"> Develop procedures for coordinating construction vessels to changing schedules and incorporate into MWMP. Ensure construction vessel crews are appropriately trained. Monitor and coordinate construction vessel movements via project team 'Marine Coordinator' to ensure compliance. 	3	C	H	Marine Contractor

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Severity / Consequence

Catastrophe = E
Major = D
Moderate = C
Minor = B
Insignificant = A

Risk

Extreme = Ex
High = H
Moderate = M
Low = L

Hazards / Risks	Risk Analysis Likelihood x Severity = Risk			Mitigations	Residual Risk Rating Likelihood x Severity = Risk			Risk Owner
	L	S	R		L	S	R	
9. Construction vessel activities restricted / delayed by VTS / HM Instructions due to seagoing ship priorities.5	5	C	Ex	<ul style="list-style-type: none"> Develop clear and concise protocols in concert with HM's Office and VTS on conduct of construction vessel activities. Document protocols in VTMP and MWMP. Ensure construction vessel crews are appropriately trained. Monitor and coordinate construction vessel movements via project team 'Marine Coordinator' to ensure compliance. Maintain regular dialogue with HM and VTS. 	3	C	H	Main Contractor Marine Contractor
10. Exposure, resulting in potential cessation of works, of construction sites and vessels to adverse swell and sea conditions.	5	D	Ex	<ul style="list-style-type: none"> Develop operating parameters for adverse weather / sea conditions considering the Storm Protocols documented at section 2.92 of the HMD, July 2016 and in consultation with HM's Office. Establish appropriate 'safe havens' for sheltering construction vessels in the event of adverse conditions. Incorporate contingency plans - protocols and associated operating procedures - in VTMP and MWMP. Ensure construction vessel crews are appropriately trained. Exercise contingency to ensure effectiveness of and crews' familiarity with the Plan. Access weather and sea condition data to inform decision making. 	3	D	Ex	Main Contractor Marine Contractor
11. Construction vessel and other construction equipment / materials hazardous to other waterway users.	4	C	H	<ul style="list-style-type: none"> Development of VTMP. Incorporate VTMP into the MWMP. Ensure construction vessel crews are appropriately trained. Construction vessel participation in VTS. Monitor and coordinate construction vessel movements via project team 'Marine Coordinator'. Maintain regular dialogue for other users' representative groups. 	2	C	M	Main Contractor Marine Contractor
12. Tidal range in the construction area impacting safety and project construction.	5	C	Ex	<ul style="list-style-type: none"> Maintain daily awareness of tidal predications and incorporate into MWMP. Develop safe operating procedures that consider tidal range and conditions and incorporate into VTMP and MWMP. 	3	C	H	Main Contractor Marine Contractor
13. Impact on safety of construction workers on vessels in large swells.	4	C	H	<ul style="list-style-type: none"> Ensure safe working protocols for working in large swells included in MWMP. Ensure safe working limits for swell included in MWMP. Establish which source of swell or wave height to be used. 	2	C	M	Main Contractor Marine Contractor Marine Supervisor Vessel Master

Likelihood

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Severity / Consequence

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Major = D
Moderate = C
Minor = B
Insignificant = A

Risk

Extreme = Ex
High = H
Moderate = M
Low = L

x

Hazards / Risks	Risk Analysis Likelihood x Severity = Risk			Mitigations	Residual Risk Rating Likelihood x Severity = Risk			Risk Owner
	L	S	R		L	S	R	
14. Impact of construction vessels and infrastructure on existing AtoNs, navigation lights etc. used by pilots to navigate & manoeuvre seagoing ships.	3	C	H	<ul style="list-style-type: none"> Identify critical AtoNs, buoys, lights etc not to be impacted by construction vessels and activities. Development work procedures that ensure impact is prevented and incorporate into VTMP and MWMP. Ensure construction vessel crews are appropriately trained. Monitor and coordinate construction vessel movements via project team 'Marine Coordinator'. 	1	C	M	Main Contractor Marine Contractor Marine Supervisor Vessel Master
15. Impact on construction works from recreational vessels entering construction zone.	3	C	H	<ul style="list-style-type: none"> Ensure construction zone is well marked with buoys. TfNSW and HM to issue Notices to Mariners advising of construction zone. Conduct an education campaign and information distribution with recreational vessel owner associations TfNSW to monitor construction zone during high recreational traffic periods. 	1	C	M	Main Contractor Marine Contractor Supervisor
16. Impact on construction works at La Perouse due to lack of agreement/delays in relocating moorings.	3	C	H	<ul style="list-style-type: none"> TfNSW to ensure negotiations on relocating moorings are completed before marine works commence. 	1	C	M	Main Contractor TfNSW Maritime Mooring Owner
17. Impact on seagoing ship movements from construction vessels foundering in the channel.	2	D	H	<ul style="list-style-type: none"> Develop safe working limits for inclusion in construction VTMP and MWMP. Ensure vessel crews are appropriately trained and certificated. Establish agreement for emergency assistance. Establish which source of weather and sea conditions will be used to inform decision making. 	1	D	M	Main Contractor Marine Contractor Vessel Master
18. Impact on seagoing ship movements on construction vessels breaking down in the channel.	2	C	M	<ul style="list-style-type: none"> Develop inspection and maintenance procedures for inclusion in construction VTMP and MWMP. Ensure vessel crews are appropriately trained and certificated. Establish agreement for emergency assistance. 	1	C	M	Main Contractor Marine Contractor Vessel Master

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Risk

Extreme = Ex
High = H
Moderate = M
Low = L

Hazards / Risks	Risk Analysis Likelihood x Severity = Risk			Mitigations	Residual Risk Rating Likelihood x Severity = Risk			Risk Owner
	L	S	R		L	S	R	
Operational (O)								
1. Ferry / commercial vessels impacting seagoing ships.	3	C	H	<ul style="list-style-type: none">Consult with HM Office / PANSW.Confirm VTS participation requirements.Develop VTMP for ferry operation in concert with HM's Office.Conduct education campaign with Botany Bay motorboat and yacht clubs, and representatives of BIA and CVA.	1	C	M	TfNSW Service Operator VTS
2. Increased recreational vessel numbers impact on seagoing ship.	3	C	H	<ul style="list-style-type: none">Consult with HM Office / PANSW.Confirm VTS participation requirements.Develop VTMP for ferry operation in concert with HM's Office.Conduct education campaign with Botany Bay motorboat and yacht clubs, and representatives of BIA and CVA.	2	C	M	TfNSW Service Operator VTS
3. Angling vessels fishing in close proximity to ferry route.	4	B	H	<ul style="list-style-type: none">Develop VTMP for ferry operation in concert with TfNSW and HM's Office.Ensure vessel crews are appropriately trained and certificated.Conduct education campaign with anglers / fishermen.	3	B	M	Service Operator Harbour Master VTS
4. Anticipated growth in personal watercraft and other recreational vessels as a result, inter alia, of available wharf facilities.	4	C	H	<ul style="list-style-type: none">Develop VTMP for ferry operation in concert with TfNSW and HM's Office.Ensure vessel crews are appropriately trained and certificated.Conduct education campaign with Botany bay motorboat and yacht clubs and representatives of BIA and CVA.	2	C	M	TfNSW Harbour Master VTS
5. Ongoing dive / snorkelling activities interacting with wharf related vessel traffic.	3	B	M	<ul style="list-style-type: none">Develop VTMP for ferry operation in concert with TfNSW and HM's Office.Ensure vessel crews are appropriately trained and certificated.Conduct education campaign with diving associations and companies conducting diving activities.	2	B	L	TfNSW Service Operator Activity Manager Vessel Master
6. Aquatic events / races impacted by, or impacting on, wharf related activities.	3	C	H	<ul style="list-style-type: none">Develop VTMP for ferry operation in concert with TfNSW and HM's Office.Include a condition in aquatic licence for participants not to impede or interfere with the movement of seagoing ships, commercial vessels or ferries.Ensure vessel crews are appropriately trained and certificated.Conduct education campaign with organisations conducting aquatic licence activities.	1	C	M	TfNSW HM Service Operator Vessel Master
7. Vessel traffic congestion / interaction with seagoing vessel and tugs on crossing between La Perouse and Kurnell.	3	C	H	<ul style="list-style-type: none">Develop VTMP for ferry operation in concert with TfNSW and HM's Office.Ferries to participate in VTS.Ensure vessel crews are appropriately trained and certificated.	2	C	M	Service Operator Vessel Master VTS

Likelihood

Almost Certain / Frequent = 5
Likely = 4
Possible = 3
Unlikely / Remote = 2
Rare / Improbable = 1

Severity / Consequence

Catastrophe = E
Major = D
Moderate = C
Minor = B
Insignificant = A

Risk

Extreme = Ex
High = H
Moderate = M
Low = L

Hazards / Risks	Risk Analysis Likelihood x Severity = Risk			Mitigations	Residual Risk Rating Likelihood x Severity = Risk			Risk Owner
	L	S	R		L	S	R	
8. Proximity of vessel moorings / buoys to wharf activities impacting vessel and passenger safety.	4	C	H	<ul style="list-style-type: none"> Develop VTMP for ferry operation in concert with TfNSW and HM's Office. Relocation of rec vessel mooring buoys. Establish clearing marks ashore. Ensure vessel crews are appropriately trained and certificated. 	1	C	M	TfNSW
9. Navigational hazards to vessels using wharves - jetties, shallows etc.	4	C	H	<ul style="list-style-type: none"> Develop VTMP for ferry operation in concert with TfNSW and HM's Office. Ensure vessel crews are appropriately trained and certificated. Conduct education campaign with Botany Bay motorboat and yacht clubs, and representatives of BIA and CVA. 	2	C	M	Service Operator Vessel Master
10. Seagoing ships changing schedules / priorities impacting ferry activities and schedules.	5	C	Ex	<ul style="list-style-type: none"> Develop VTMP for ferry operation in concert with TfNSW and HM's Office. Vessel masters/ service coordinator to monitor shipping schedule on PANSW web site. Develop literature for passengers on possible delays. Conduct education campaign for potential users of the service. Ensure vessel crews are appropriately trained and certificated. 	3	C	H	TfNSW Service Operator
11. Exposure of wharves and ferry operations, alongside, to adverse swell and sea conditions and potential cessation of operations.	5	C	Ex	<ul style="list-style-type: none"> Develop VTMP for ferry operation in concert with TfNSW and HM's Office. Establish safe operating criteria for inclusion within VTMP. Establish which source of weather and sea conditions to be used to monitor conditions. Ensure vessel crews are appropriately trained. 	3	C	H	TfNSW Service Operator Vessel Master
12. Tidal range in the wharf operating area impacting vessel and passenger safety.	5	C	Ex	<ul style="list-style-type: none"> Develop VTMP for ferry operation in concert with TfNSW and HM's Office. Establish safe operating criteria for inclusion within VTMP. Establish which source of tidal information to be used to monitor conditions. Ensure vessel crews are appropriately trained. 	3	C	H	TfNSW
13. Safety of passengers embarking and disembarking ferries at wharves impacted by large swells / seas.	5	C	Ex	<ul style="list-style-type: none"> Develop VTMP for ferry operation in concert with TfNSW and HM's Office. Establish safe operating criteria for inclusion within VTMP. Ensure vessel crews are appropriately trained. Provide additional personnel on the jetties to assist passengers. 	3	C	H	TfNSW Service Operator Vessel Master
14. Conditions too rough for vessels to remain alongside for prolonged period of time (i.e. overnight and cribbing).	5	D	Ex	<ul style="list-style-type: none"> Develop VTMP for ferry operation in concert with TfNSW and HM's Office. Establish lay-up / safe haven berths. Establish safe operating criteria for inclusion within VTMP. Establish which source of weather and sea conditions to be used to monitor conditions. Ensure vessel crews are appropriately trained. 	1	A	L	TfNSW Service Operator Vessel Master

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Hazards / Risks	Risk Analysis Likelihood x Severity = Risk			Mitigations	Residual Risk Rating Likelihood x Severity = Risk			Risk Owner
	L	S	R		L	S	R	
15. Wharves difficult for recreational vessels to use safely.	4	D	Ex	<ul style="list-style-type: none"> TfNSW to include BIA in consultation on wharf design. Incorporate BIA design preferences in wharf design. Conduct education campaign with BIA. 	2	D	H	TfNSW
16. Impact of ferries crossing the bay on commercial / recreational and fishing vessels.	3	C	H	<ul style="list-style-type: none"> Develop VTMP for ferry operation in concert with TfNSW and HM's Office. Ensure vessel crews are appropriately trained. Conduct education campaign with BIA and CVA. 	2	C	M	TfNSW HM
17. Recreational user non-compliance with procedures and requirements.	4	C	H	<ul style="list-style-type: none"> TfNSW and HM to conduct education campaign with BIA and CVA. TfNSW to monitor compliance during high recreational vessel traffic periods. Develop VTMP for ferry operation in concert with TfNSW and HM's Office. Establish procedures for advising authorities of large number of rec. vessels within VTMP. 	2	C	M	TfNSW HM
18. Injuries to passengers during ferry operation in adverse sea conditions.	3	C	H	<ul style="list-style-type: none"> Develop VTMP for ferry operation in concert with TfNSW and HM's Office. Include protocols for passenger safety in adverse weather for inclusion within VTMP. 	2	C	M	Service Operator Vessel Master

In Summary

During Construction Phase:

Pre-control: 10 Extreme Risks, 6 High Risks and 2 Moderate Risks.

Post-controls (Residual Risk ratings): 2 Extreme Risks, 6 High Risks and 10 Moderate Risks.

During Operational Phase:

Pre-control: 6 Extreme Risks, 11 High Risks and 1 Moderate.

Post-control (Residual Risk ratings): 5 High Risks, 11 Moderate Risks and 2 Low Risks.

Generally, Residual Risk ratings of Moderate or less are considered 'Acceptable' whereas any rated above Moderate will require consideration of additional or alternative risk controls which might include:

- Elimination;
- Substitution;
- Isolation etc.

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