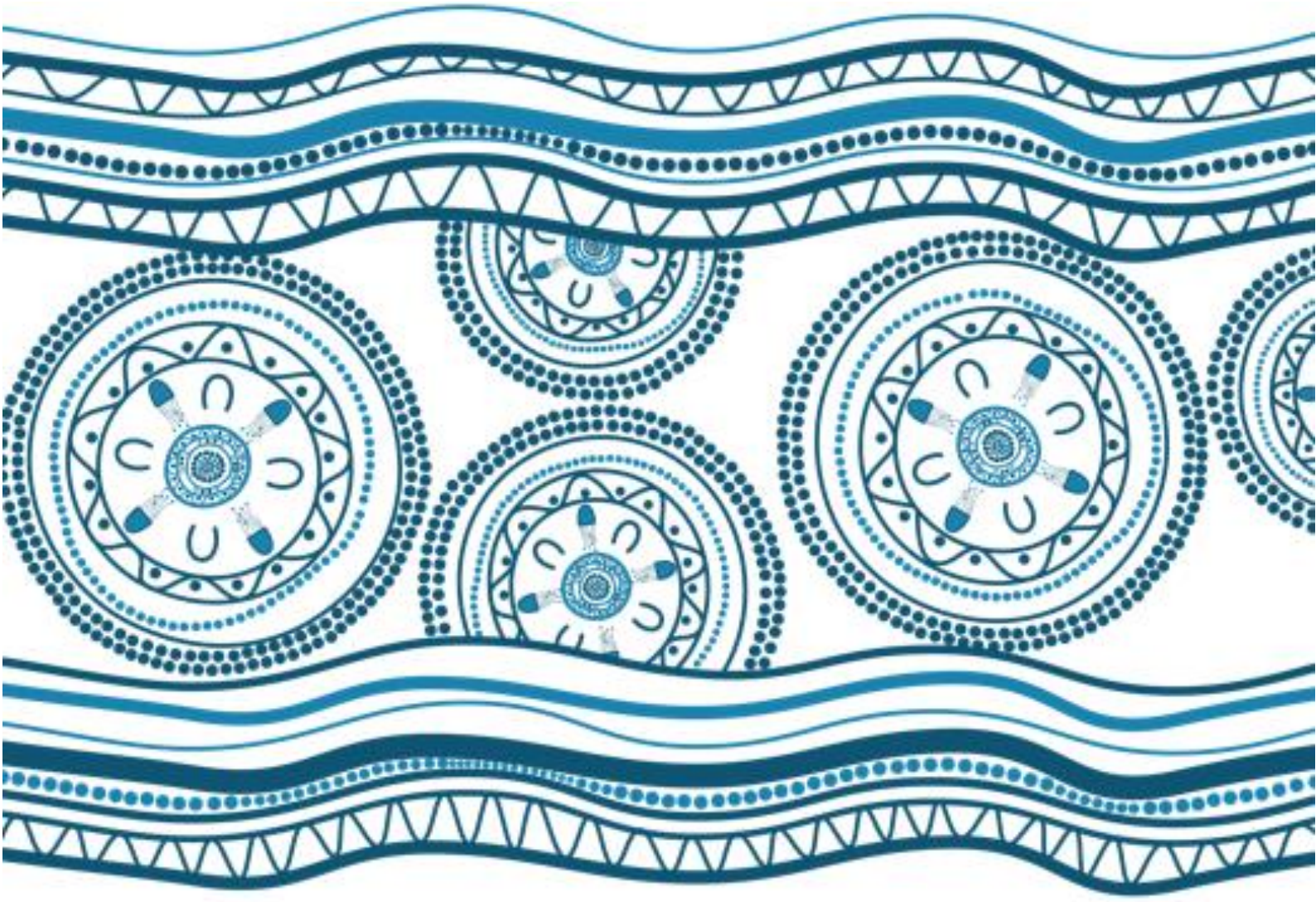
Chapter 5

Project description



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5 Project description

This chapter describes the project, its design and the construction methods that would be used to build the project.

5.1 Project scope

The project description presented in this EIS represents the project concept design. Sufficient flexibility has been provided in the concept design to allow for refinement during detailed design, or in response to any submissions received following the exhibition of the EIS, or to minimise environmental impacts. The final design may therefore vary from the project described in this chapter. Should the final design vary significantly from the concept design it would be subject to a modification application to the Department of Planning, Industry and Environment (DPIE).

5.1.1 The project

The project includes the reinstatement of two public ferry wharves and associated infrastructure to allow a ferry service to operate between La Perouse and Kurnell in Botany Bay.

Key features of the project include:

- Demolition of the existing viewing platform at Kurnell
- Construction of temporary ancillary works including access roads, compound areas, stockpiles, fencing and temporary building platforms (including a temporary causeway at Kurnell and temporary crane platform at La Perouse)
- Relocation of swing moorings at La Perouse
- Construction of two wharves on piles, one at La Perouse and one at Kurnell that would include:
  - A berth for ferries (to cater for ferries between 15 metres to 40 metres in length)
  - A multi-user berth for commercial and recreational vessels (to cater for vessels between 2 metres and 20 metres long)
  - Sheltered waiting areas and associated furniture located on the wharves
  - Signage and lighting
- Landside paving and landscaping at the entrance to the wharves
- New footpaths connecting the entrance of the wharves to the existing footpaths
- Reconfiguration of existing car parking area at La Perouse to increase the number of spaces, and associated footpath changes to accommodate these additional car parking spaces
- Bicycle racks near the La Perouse wharf
- Installation of utilities to service the wharves including power and water.

The construction program includes the following steps:

- Step 1: Site establishment
- Step 2: Main construction
- Step 3: Site demobilisation.

Construction of the project would take about 13 months and is expected to commence in the second quarter of 2022 depending on weather, contractor availability and planning approval timeframes. Details of construction activities are provided in section 5.5.

Throughout the EIS, the location and general area including the construction and operation of the project is called the ‘project area’, this is shown on Figure 5-1. The construction boundary and the key features of the project are shown in Figure 5-2 and Figure 5-3.

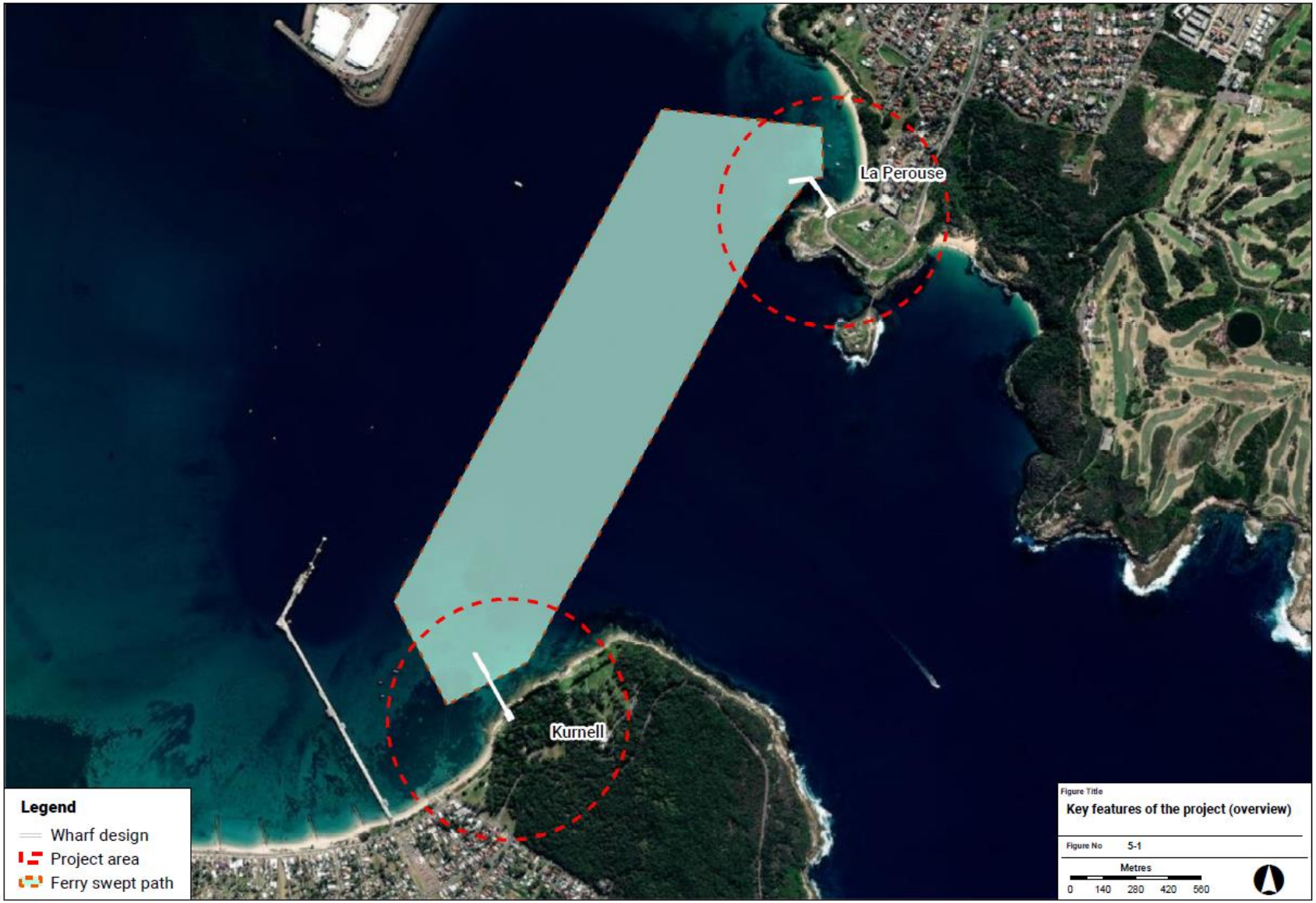

Figure 5-1: Project areas

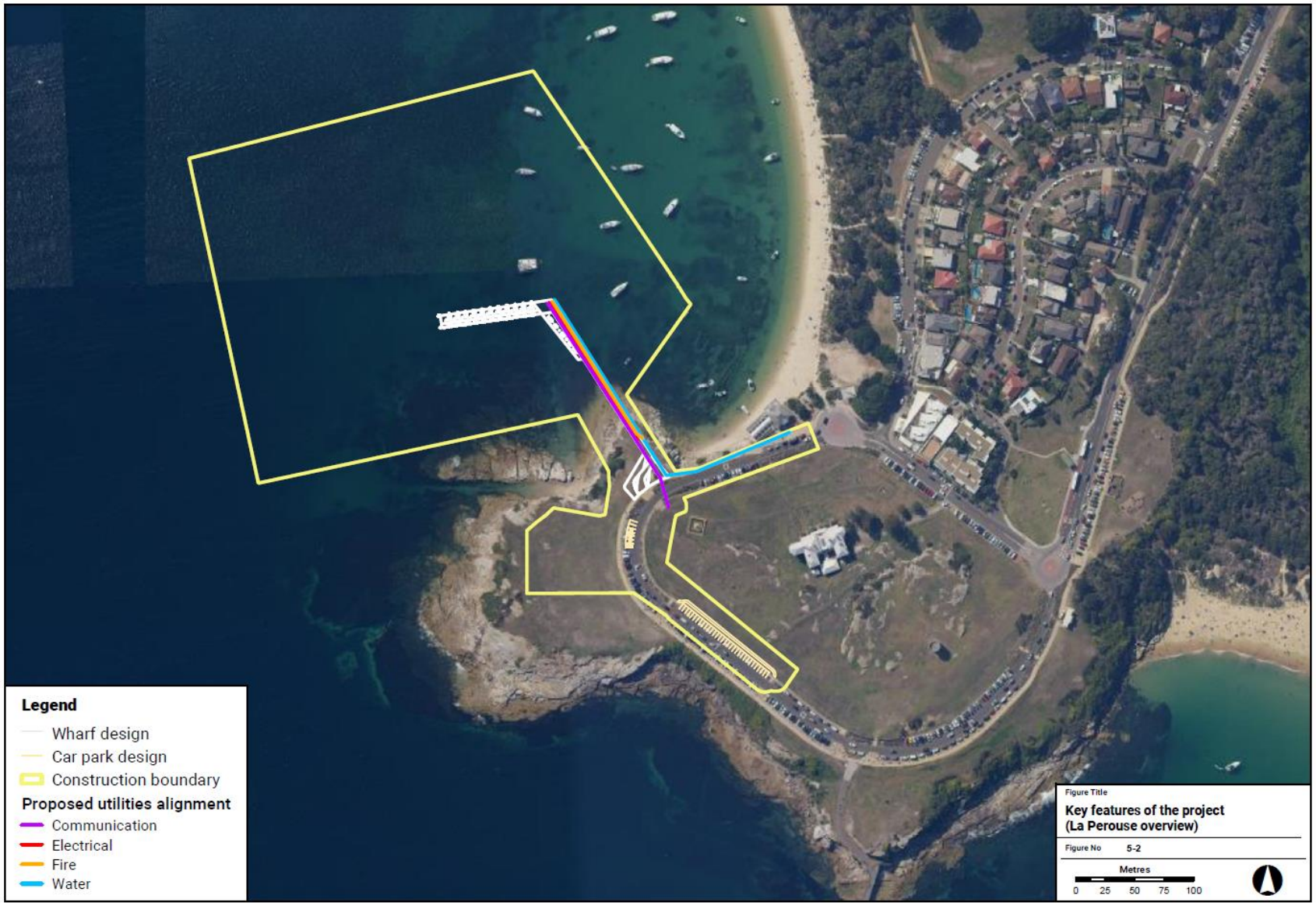

Figure 5-2: Key features of the project (La Perouse overview)

Figure 5-3: Key features of the project (Kurnell overview)

5.2 The completed project

5.2.1 Wharves

The wharves would provide berthing access for ferry vessels and commercial and recreational vessels. Each wharf would create a public space that services a range of users for differing mobility needs and interests. On approach to the wharves, there would be accessible paths to an open waiting area on landside. Wharf amenities such as signage and information boards would be placed at appropriate locations for clear wayfinding for passengers.

The wharves at La Perouse and Kurnell would extend about 180 metres and 230 metres from the shoreline respectively. The key features of the wharves are described in Table 5-1 and shown in Figure 5-4 and Figure 5-5.

Table 5-1: Wharf design features for both wharves

Design feature ID# (refer to Figure 5-4 and 5-7)	Design feature	Description
1	Berth structure	The end of each wharf (the berth structure) is designed as a multi-user space with separate berths on each side, one for ferry operations and the other for recreational and commercial boat users. The wharf ramps are fixed in place and have an open mesh flooring made of a fibre reinforced polymer (FRP). The deck is supported by a modular steel frame.
2	Waiting area	Both wharf structures contain a waiting area made of timber, concrete and steel. The waiting areas include fixed bench seating and a landing area with a roof design that reflects the movement of the water and allows for some sunlight to travel through. This helps to reflect the surrounding environment and improve the sense of place. The waiting areas are located as close to the berth structure as possible.
3	Approach jetty	The approach jetties allow for people to move in both directions and includes areas for seating, railings and lighting. To protect the wharves against storm events and sea level rise, the deck is located 4 m above the low tide level and includes a robust reinforced concrete and steel deck structure.
4	Entrance	The entrance to the wharves from the land integrates and grounds the wharves to the Kamay Botany Bay National Park (the National Park) context. It includes seating to foster interactions with the public and allows for a moment of pause in the visitor's journey to the ferry and within the National Park.

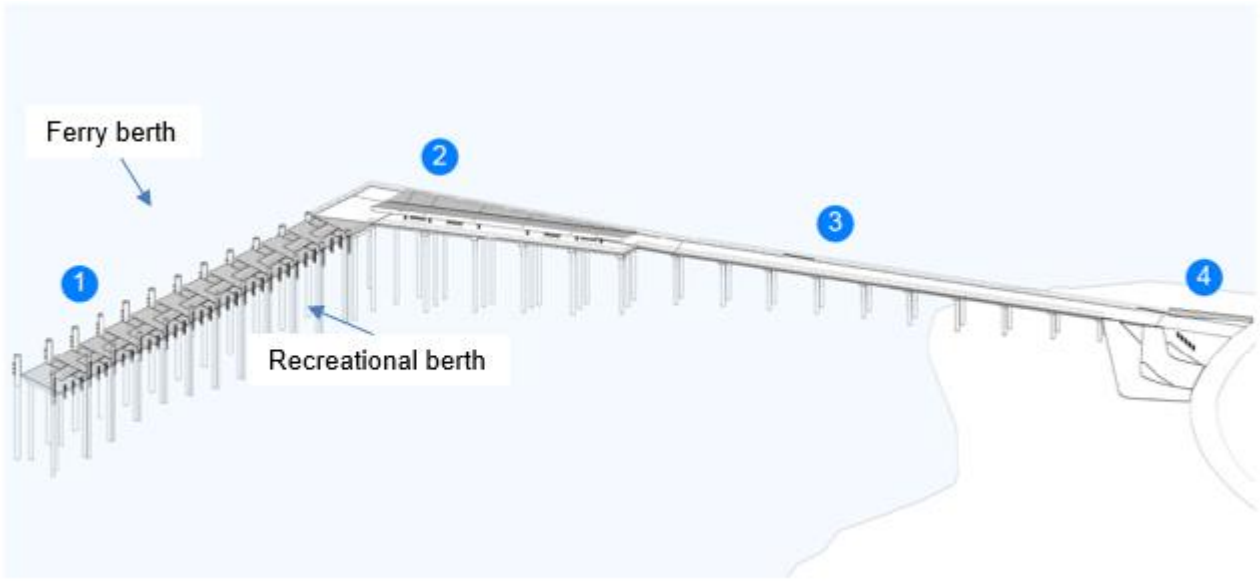

Figure 5-4: La Perouse wharf design features

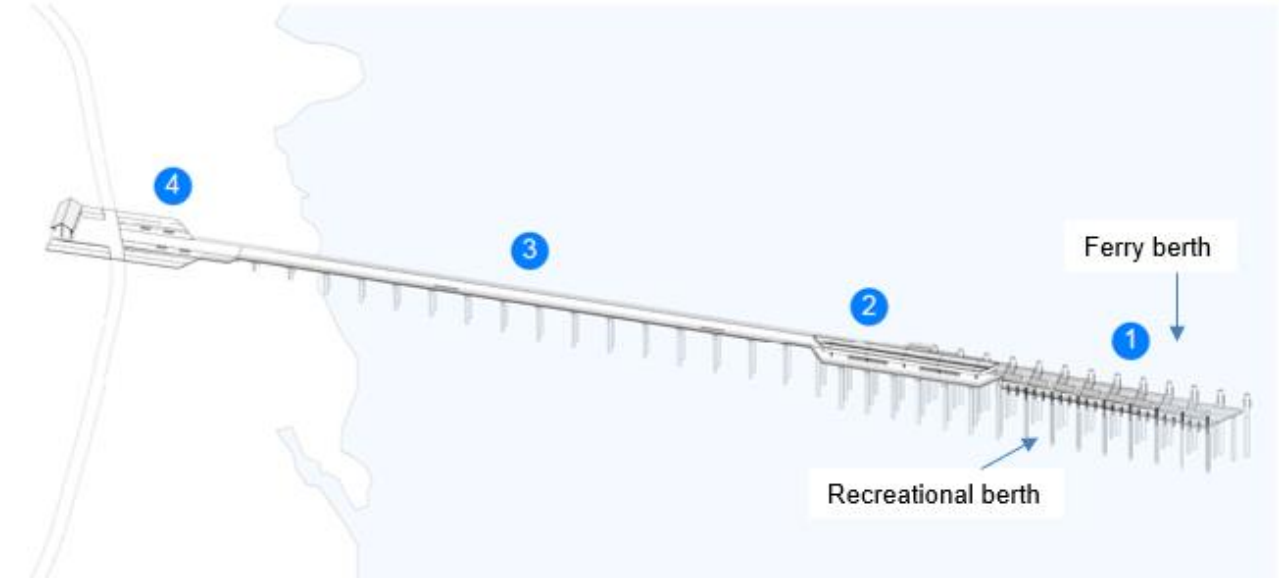

Figure 5-5: Kurnell wharf design features

Figure 5-6: Artists impression of La Perouse wharf

Figure 5-7: Artists impression of La Perouse wharf tie-in area

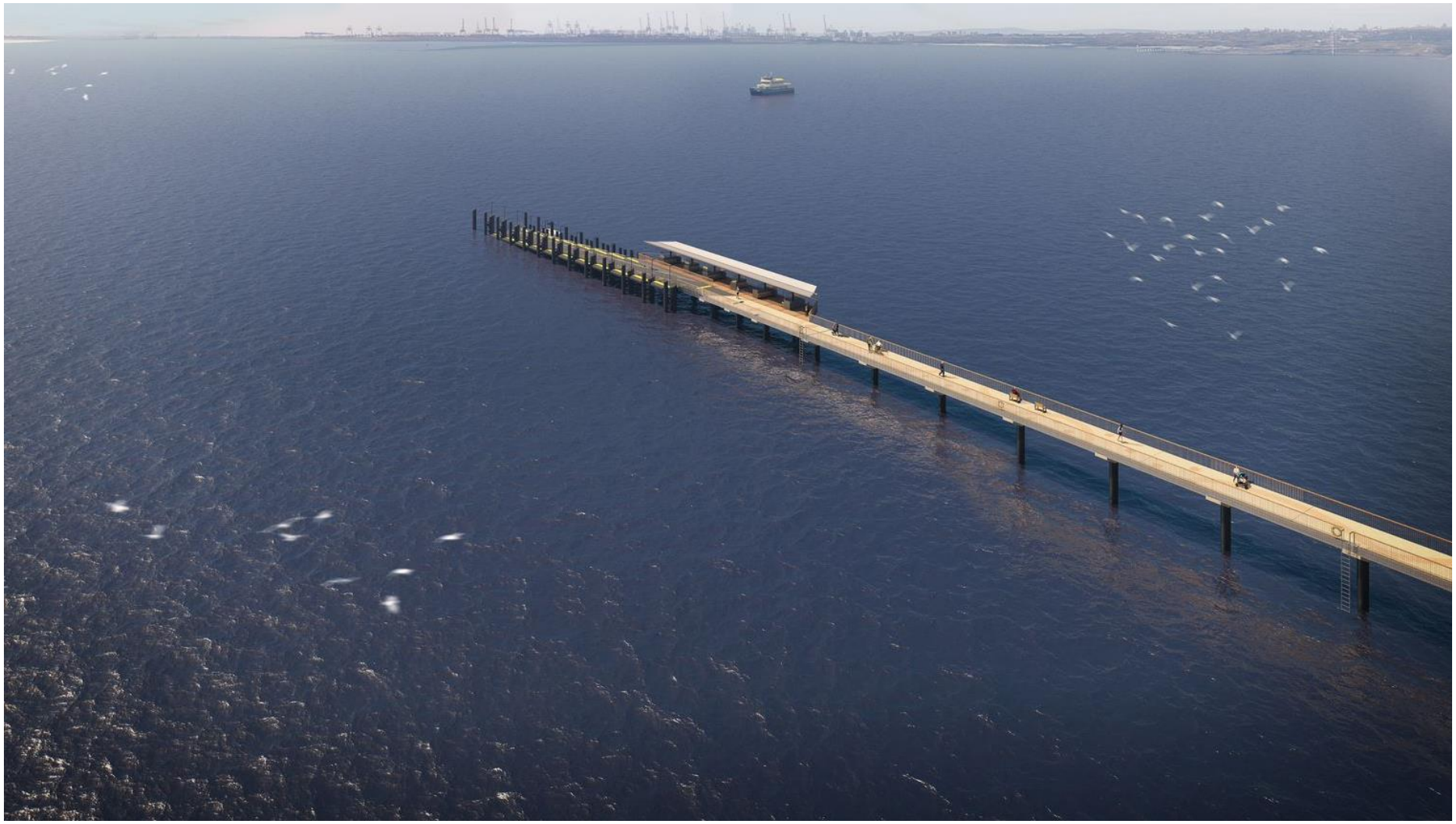

Figure 5-8: Artists impression of Kurnell wharf

5.2.2 Parking

La Perouse

On the southern side of Anzac Parade, the existing parallel car parking spaces would be reconfigured to 90-degree angle spaces to provide 13 additional car parking spaces. The existing footpath would also be extended and diverted around these proposed spaces.

On the western side of Anzac Parade, six existing car parking spaces would be reconfigured into three accessible car park spaces and two no-parking bays to meet *Disability Discrimination Act 1992* (Cth) (DDA) requirements and two kiss and ride spaces.

The proposed car parking reconfiguration and associated footpath diversions are shown on Figure 5-9.

Kurnell

Additional car parking at Kurnell would be developed as part of the Kamay Botany Bay National Park Kurnell Master Plan. This would be delivered by National Parks and Wildlife Services (NPWS) and include 34 car park spaces (including two kiss and ride, and two accessible car park spaces). The location of these car park spaces is proposed to be next to the Cricket Pitch, Visitor Centre, Commemoration Flat and adjacent parking areas as shown in Figure 5-10. This car parking is surplus to the future demand requirements generated by the National Park. The project required car parking spaces would be constructed and available prior to the operation of the wharves. The Kurnell car parking is not part of this EIS. Separate planning approval would be obtained by NPWS for these works.

Figure 5-9: Reconfigured car park spaces at La Perouse

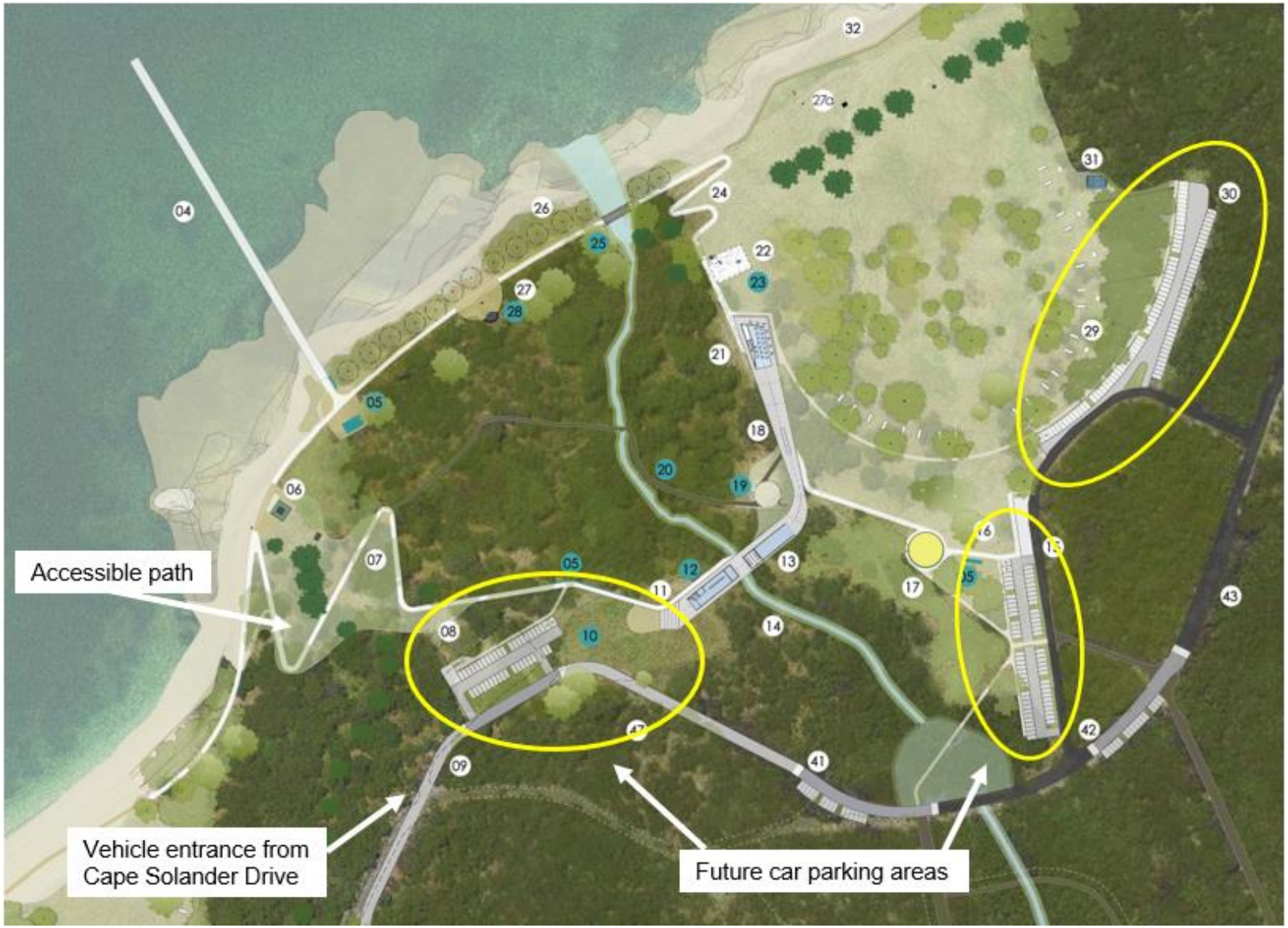

Figure 5-10: Proposed car parking within the National Park at Kurnell (NSW DPIE, 2019) (Not part of this EIS).

5.2.3 Provisions for pedestrians and cyclists

La Perouse

The footpath to the wharf would extend from the existing footpath along Anzac Parade. At La Perouse, there is space available to accommodate 10 bicycle rails, providing 20 bicycle spaces at the landside entrance to the wharf. The exact location of these rails would be further developed at detailed design.

Kurnell

Access to the Kurnell wharf would be via the existing pathways within the National Park. Monument Track which extends along the foreshore between Captain Cook Drive and the proposed wharf would be impacted during construction and reinstated prior to operation. This may include low level bollard lighting to facilitate access.

There is an existing pedestrian path from the parking area within the National Park and the proposed wharf. This would be upgraded as part of the wider Kamay Botany Bay National Park Kurnell Master Plan to provide DDA compliant access as identified in Figure 5-10.

There are no bicycle rails proposed at Kurnell, as bicycle parking would be explored as part of the Kamay Botany Bay National Park Kurnell Master Plan, which is being delivered by NPWS.

5.2.4 Other public transport interfaces

There would be no changes to the existing bus services or bus stops. Any existing bus stops at La Perouse and Kurnell would not be impacted by the project. The La Perouse ferry wharf would be serviced by bus stop 203622 on Anzac Parade which is 350 metres from the proposed wharf. The Kurnell ferry wharf would be serviced by bus stop 223134 on Captain Cook Drive which is 350 metres from the proposed wharf.

5.2.5 Utility services

The wharves would need to be serviced by water, electricity and telecommunication utilities. Connections from existing utilities are proposed at La Perouse and Kurnell as summarised in Table 5-2 and shown in Figure 5-11 and Figure 5-12. The removal of two existing light poles and associated cabling may be required at La Perouse, this would be confirmed in consultation with Randwick City Council and the utility provider during detailed design. The final location of the utilities would be confirmed during detailed design and in consultation with NPWS and the utilities providers.

Table 5-2: Service and utility connections

Service	Purpose	La Perouse	Kurnell
Potable water and fire main	The wharves require a connection for a drinking fountain and fire hose reel/hydrant*.	A water connection would be extended from the existing Sydney Water 100mm watermain on Anzac Parade/Endeavour Avenue to the end of the wharf.	A connection would be extended from the Sydney Water main at Captain Cook Drive to the end of the wharf.
Electricity	The wharves require electricity for berth-side charging facilities and wharf services which could include ticket machines, timetables, closed circuit television (CCTV), public	A low voltage electricity cable would be installed from the end of the wharf to the wharf tie-in.	A low voltage electricity cable would be extended from Captain Cook Drive to the end of the wharf.

Service	Purpose	La Perouse	Kurnell
	address systems (PA) and lighting.		
Telecommunications	The wharves require a connection for telecommunications.	A telecommunications connection would be extended from Anzac Parade to the end of the wharf.	A telecommunication cable would be extended from the existing services near Monument Track and Captain Cook's Landing Place to the end of the wharf.

*Potable water would only be used for cleaning of the wharves and firefighting, therefore the demands are very low and a water balance was not considered necessary for this development. Sydney Water would be consulted about this water connection during detailed design.

During construction water would be sourced from either the portable water supply or brought in by water tank for the use of typical activities such as dust suppression. An approval is not required under the Water Management (General) Regulation 2018 for any water taken by a public authority for dust suppression during construction. In addition, as the project is State Significant Infrastructure it is exempt from needing further water approvals (refer to Chapter 2 (Assessment process).

5.2.6 Stormwater drainage

There is existing stormwater drainage infrastructure at La Perouse that would be able to accommodate the changes to stormwater run-off as a result of the reconfiguration of car parking areas. The proposed car parking areas would not significantly alter the stormwater run-off requirements.

Stormwater from the wharves and landscaping areas would drain to grassed areas, or into the marine environment, the same as the current situation at both La Perouse and Kurnell. No additional stormwater drainage is required at Kurnell as the existing infrastructure is sufficient.

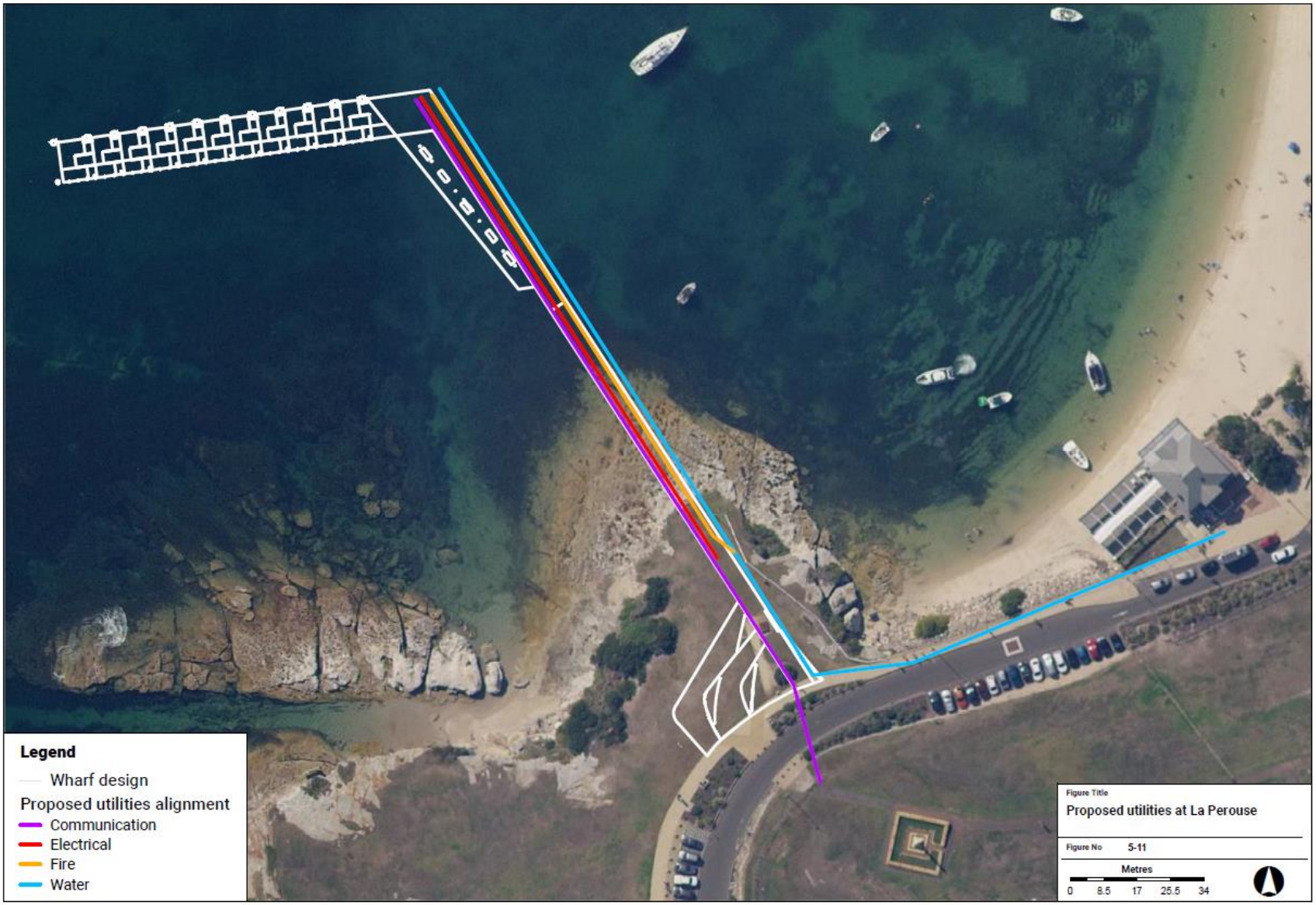

Figure 5-11: Proposed utilities at La Perouse

Figure 5-12: Proposed utilities at Kurnell

5.2.7 Property access and acquisition

The project would be built on State land that is owned and administered by various authorities depending on its purpose. It also includes areas of Crown Reserves which are areas set aside for public purposes managed by the State as outlined in Chapter 2 (Assessment process).

The project does not require any property acquisition. No existing private property access would be affected during construction.

Three existing moorings (including commercial/private and public moorings) at La Perouse would need to be permanently removed or relocated to enable construction and operation. A mooring relocation plan would be prepared and implemented. This is assessed in Chapter 12 (Traffic and transport) and Chapter 14 (Socioeconomic).

5.2.8 Emergency or incident facilities

Each wharf would be fitted with fire hydrants and may include PA and CCTV systems.

Emergency services would access the La Perouse wharf from Anzac Parade. At Kurnell, emergency service vehicles would use the existing Monument Track footpath than runs along the foreshore. Maritime emergency services would use the commercial and recreational berths when required.

5.2.9 Operation of the wharves

The ferry berths have been designed to cater for ferry vessels up to 40 metres in length and a draft of two metres. The berths would cater for vessels able to carry up to 450 people. However, it is anticipated that the operation of the ferry service would typically use a vessel between 15 and 24 metres in length, with a draft of two metres which would cater for about 140 passengers.

Each ferry berth would be capable of accommodating up to three vessels per hour and enable a turnaround time of around 15 minutes from berthing to departing. This would result in approximately 36 vessel movements a day during daylight hours. The actual vessel movements would depend on the operator. It is anticipated that vessels movements would be higher on weekends than on weekdays. Final timetables would be developed in consultation with relevant stakeholders.

The typical swept ferry path between La Perouse and Kurnell is shown in
Figure 5-13. This is the area within which ferries would likely move between the two wharves. The actual ferry swept path may differ to suit local wind, wave and current conditions at the time of crossing.

Ferries would only use the wharves for the boarding and alighting of passengers during daytime hours. The overnight layover, refuelling, cleaning and maintenance of vessels would be undertaken at an existing facility within Botany Bay.

Vessels would have loud speaker systems to notify passengers of loading and unloading procedures.

The recreational berths have been designed to cater for commercial and recreational vessels typically between two metres and six metres in length and no more than 20 metres in length. Berthing areas for commercial and recreational vessels are separate to the ferry vessel berthing areas to avoid conflict between the vessels. The use of the wharves for commercial and recreational vessels would not be restricted to daylight hours. The wharves would be lit by low level lighting at night time.

Once an operator is selected, decisions for how the wharves would operate for different user groups would be made in consultation with recreational user groups in the local community. This

would define how the different users can operate in and around the wharves, whilst avoiding conflict and maintaining safety. It would include but not be limited to:

- No anchoring zones (where the ferry needs to manoeuvre)
- Buoys which demarcate where recreational vessels can manoeuvre in (to avoid the shallow areas).

Fishing would be permitted on the wharves (except for the ferry vessel berth). Swimmers would still be able to explore the rocky shoreline under the approach jetty of the wharves (whilst avoiding the recreational and ferry vessel berth areas).

Figure 5-13: Indicative swept ferry path between La Perouse and Kurnell

5.3 Design criteria

The project has been designed to meet various international maritime, Australian and Transport for NSW standards to ensure the safe operation of the wharves. Design criteria for the project that is relevant to the EIS are outlined in Table 5-3.

Table 5-3: Key design criteria for both wharves

Design element	Design criteria
Ferry berth	• 15-24m length typical vessel • 40m length maximum vessel • 300 tonne maximum displacement • 2m maximum draft.
Recreational and commercial berth	• 2-6m length typical vessel • 20m length maximum vessel • 55 tonne maximum displacement • 1.8m maximum draft.
Wharf width and waiting area	• 4m wharf width • 200m^2 waiting area.
Scour allowance	1.6 times the pile diameter, or to top of rock
Access criteria	In accordance with the Australian Government *Disability Discrimination Act 1992*, Disability Standards Accessible Public Transport (DSAPT) 2002, Australian Standard 1428 (Design for access and mobility) including: • Gangway gradient: 1:14 or less for at least 80 per cent of high and low tide • Width of walkways, ramps and landings: Not less than 1200mm • Tactile warning strips • Walking surfaces to be slip resistant.
Lighting	In accordance with AS/NZS 1158 (Lighting for Roads and Public Spaces), including: • 150 lux illumination level • Emergency and exit lighting.
Communications	• Real time arrival and departure information • PA system • CCTV coverage • Help points.
Water	• Single drinking fountain per wharf • Water supply to wharf for cleaning and maintenance • Fire hose reel.
Waste	• At least two 120L recycling and general waste bins per wharf • Other bins for vessel operational waste required.

The design life of the wharves and associated elements is 50 years. Some of the design elements such as steel elements and fenders would need to be maintained within this 50 year period.

5.4 Design, place and movement principles and objectives

Design, place and movement principles have been used to inform project specific design objectives and shape the design development. Design principles and objectives have been considered from the following documents:

- Beyond the Pavement (Transport for NSW, 2020a)
- Better Placed – An integrated design policy for built environment of NSW (NSW Government Architect NSW, 2017)
- Better Placed – Aligning Movement and Place – Outline for understanding places in relation to movement infrastructure (NSW Government Architect, 2019)
- Kamay Botany Bay National Park Kurnell Master Plan (NSW DPIE, 2019)
- Kamay Botany Bay National Park Plan of Management (NSW DPIE, 2020a)

- Meeting Place Precinct Botany Bay National Park, Kurnell: Conservation Management Plan (NSW Department of Environment and Climate Change, 2008)
- Draft Connecting with Country (NSW Government Architect, 2020)
- NSW Sustainable Design Guidelines (Transport for NSW, 2017).

Table 5-4 presents a summary of how the design has responded to the design place and movement principles in Beyond the Pavement, Better Placed, Kamay Botany Bay National Park Kurnell Master Plan and Plan of Management documents. This table summarises how place designs, actions and outcomes for the project protect and facilitate improvements to the built environment in relation to public space, active and public transport and views and vistas.

Table 5-4: How the design has responded to design principles in key guiding documents

Design Principle	Design response
Beyond the Pavement Beyond the Pavement sets out Transport for NSW's urban design approach for road and maritime projects	
1. Contributing to urban structure, urban quality and the economy	• The wharves would provide a new connection across Botany Bay and act as a 'gateway' to La Perouse and Kurnell • High quality finishes are proposed to enhance the urban character at both sites • Public seating and waiting areas are proposed to enhance user experience • In alignment with the rich fishing history of the Botany Bay headland, the wharves would have adequate spaces to allow for recreational fishing • An Aboriginal artist/designer would be engaged to incorporate cultural narratives into the design of the wharves.
2. Fitting with the built fabric	• The orientation of the wharves allows for maximised views • The wharves are positioned to frame and maintain key views to significant built monuments and existing artwork. Lookouts and seating areas would be provided to further enhance views towards key built elements • Proposed materials would be complimentary to existing built elements.
3. Connecting modes and communities and promoting active transport	• The wharves would directly connect into the existing and proposed pedestrian, cyclist, car and public transport networks • The wharves would provide enhanced movement through Botany Bay by interconnection of waterway transport with other transport modes • Use of active transport would be encouraged through the interconnection with existing and proposed pedestrian and bicycle pathways. New bicycle parking facilities are proposed at La Perouse.
4. Fitting with the landform	• Both wharves have been positioned in response to the natural landscape. At La Perouse the wharf 'follows' the rock form. At Kurnell, the wharf extends directly from the land, with a light touch connection to the shore • New landscaping would follow the natural slope and would include indigenous species endemic to the area • Slim, linear and elongated roof structures proposed at both wharves would complement the natural landscape and waters' surface.
5. Contributing to green infrastructure and responding to natural systems	• Endemic, low lying coastal plants would be selected for the landscape design to protect heritage view corridors and to integrate with the natural systems of the area.
6. Connecting to Country and Incorporating heritage and cultural contexts	• Architectural details of the waiting area roof could incorporate Indigenous narratives through engagement with the local Aboriginal community • Existing heritage plaques would be considered in the landscape design with stakeholder's engagement

Design Principle	Design response
	• Cultural education opportunities would be explored through information plaques inlaid in the balustrades • Location of the wharves are aligned to, and acknowledge the old locations of the historic wharf infrastructure.
7. Designing an experience in movement	• The expanded entrance/approach helps to create a sense of threshold and enhances the 'gateway' experience. Shaded waiting areas are positioned to allow views to the destination wharf • The roof design reflects moving dappled sunlight and the FRP berth provides direct connection to the water, celebrating the land-water connection • Parts of the wharves would be submerged or exposed with the varying tides. Connection to the changing environment is celebrated.
8. Designing self-explaining roads that safely respond to their role and context	• Signage and information plaques would provide directional and cultural information for the National Park • Expanded entrance point, seating areas, landscaping and planting highlight the start of the wharf and the interconnection with the land.
9. Achieving integrated and minimal maintenance design	• Robust and hardwearing materials are proposed as a means of limiting maintenance requirements. Particular consideration is made of the harsh outdoor and marine environment • The project is designed for a 50 year design life • Once the project construction is completed, any residual land that is disturbed by the project would be rehabilitated in consultation with NPWS.
Better Placed - An integrated design policy for the built environment of NSW - Aligning movement and place	
1. Better Fit • Contextual, local and of its place.	• The wharves would provide a new conenction across Botany Bay and act as a 'gateway' to La Perouse and Kurnell • Both wharves would be positioned in response to the natural landscape. At La Perouse the wharf 'follows' the rock form. At Kurnell, the wharf extends directly from the land, with a light touch connection to the shore • Locations of the wharf acknowledges the old locations of the historic wharf infrastructure • Local identity and cultural interpretation is proposed to be embedded within the roof details of the wharves.
2. Better Performance • Sustainable, adaptable and durable.	• Material selection for the wharf would be sustainable, recyclable and sourced locally where possible • Shading, seating and lookouts would be provided for public use • Robust and hardwearing materials are proposed as a means of limiting maintenance requirements. Particular consideration is made of the harsh outdoor and marine environment.

Design Principle	Design response
	• The wharves are designed with a 50 year design life which is standard for infrastructure projects of this nature.
3. Better for community • Inclusive, connected, and diverse.	• Provision of a new ferry service, leisure boat mooring, fishing opportunities, seating, look-out areas, gathering space, shelters, landscaping, planting and educational elements • The design of the waiting area and landscape area maintain and frame existing views, particularly heritage views towards historic monuments, artworks and Aboriginal heritage sites • Local and cultural identity expression to be explored through ongoing engagement with the local community and the engagement of an Aboriginal artist/designer to input into the detail design stage • Increased accessibility through DDA complaint ramps, handrails and landings help create an inclusive wharf • Provision for active transport is achieved by providing bicycle parking at La Perouse.
4. Better for people • Safe, comfortable and liveable.	• Use of active transport is encouraged through the interconnection with existing and proposed pedestrian and bicycle pathways, new bicycle parking facilities are proposed at La Perouse • Material selected for the wharf would maintain standards for human comfort and safety • Roof is designed to provide weather protection • The open structure of the wharves in conjunction with the proposed lighting assist in crime prevention.
5. Better Working • Functional, efficient and fit for purpose.	• The wharves would function as new gateways into La Perouse and Kurnell thus connecting the two headlands • Wharves are designed to facilitate the seamless operation of ferries and boats • The design looks to minimise cleaning maintenance requirements.
6. Better value • Creating and adding value.	• The wharves would cater for a multitude of users, not just those using the ferry service • The design looks to minimise cleaning maintenance requirements • Education opportunities would be provided through information plaques and in the integration of Indigenous cultural narratives through artwork.
7. Better look and feel • Engaging, inviting and attractive.	• A rigorous design process has been undertaken to ensure excellent human experience. Consideration is given to materials, sunlight access and shading, views and durability • Composition of the materials palettes and detailing has been considered and would be further refined in the detail design stage.
Kamay Botany Bay National Park Kurnell Master Plan The Master Plan has seven defined design principles which underpin the direction for the Kurnell precinct.	
Respect • Respect for all cultures and heritage • Respect for landscape and environment • Make evident time past, time present, time future	• Design of the wharves are responsive to their unique local contexts. Orientation, position, scale, materials, use, planting • Minimised impact through careful planning of wharf locations and connection to the land • Potential for the integration of educational elements, telling the story of the sites

Design Principle	Design response
• Adopt a small footprint by building within disturbed areas.	• An Aboriginal artist/designer would be engaged to incorporate cultural narratives into the design of the wharves • Slim, linear and elongated roof structures on both wharves are complimentary to the natural landscape and waters' surface.
Reflect • Re-choreograph arrival via ferry and via land to create a sense of threshold and space for reflection.	• The wharves would provide a new conenction across Botany Bay and act as a 'gateway' to La Perouse and Kurnell • The expanded entrance/approach help create a sense of threshold and a reflection space before the journey.
Rebalance • An inclusive place • Greater Indigenous recognition • Balanced Indigenous and European presence and storytelling • Greater accessibility • Greater amenity.	• Increased accessibility through DDA complaint ramps, handrails and landings help create an inclusive wharf • Shading, seating and lookouts are provided for public use • An Aboriginal artist/designer would be engaged to incorporate cultural narratives into the design of the wharves. New and upgraded interpretation signage and informative plaques on the wharf would provide education opportunities supported by the Master Plan.
Heal • Acknowledge past actions, recognition • Bridge cultures • Create connections • Recover landscape • Give voices to stories not yet told.	• Architectural details of the waiting area roof and information plaques on the balustrades would incorporate Aboriginal narratives through engagement with the local communities and artists.
Amplify • Amplify the unique character of this place with new works and interventions, to allow more compelling storytelling and understanding of place • Amplify the many precincts within the park to give presence, identity and purpose to its many places.	• The design would incorporate cultural interpretation elements that tell untold Aboriginal stories of the site • Existing heritage plaque at Timbery Reserve at La Perouse would be incorporated into landscape design with stakeholder's engagement • Planting palettes and landscape design would reflect the local character and indigenous species endemic to the area thus strengthening local identity.
Enliven • Reinforce the park as a meeting place, with new facilities and programmed events that support the significance of the site • Alpha House as a place for interpretation and community • A new visitor building as a statement of identity, both quiet in the landscape and powerful in its material and form with permanent and changing exhibitions that speak to all • A variety of activities within different precincts	• Wharves facilitate access to the National Park, thus enlivening the park. The expanded approach area represents a threshold to enliven the journey experience • Connection to water and land would be established through framing views and materials selection.

Design Principle	Design response
• Connected precincts • Amenities and dedicated parking at each precinct.	
Sustain • Sustain culture, including indigenous practices • Sustain learning across the park as well as within the visitor building, collection garden and Alpha House • Sustain ecology through landscape restoration and re-vegetation • Sustain financial viability with a flexible visitor building and outdoor gathering spaces appropriate to a variety of programs and events sizes • A visitor building adaptable to various scales of use, optimizing access and views • Sustain employment opportunities for current and future generations, including Indigenous employment.	• New and upgraded interpretation signage and informative plaques on the wharf would provide education opportunities supported by the Master Plan • An Aboriginal artist/designer would be engaged to incorporate cultural narratives into the design of the wharves.
Kamay Botany Bay National Park Plan of Management The plan describes the desired outcomes for the park's values and actions that NPWS proposes to undertake to achieve outcomes in line with the Master Plan.	
1. Landscape setting	• The wharves are positioned to frame and maintain key views to significant built monuments and artwork. Lookouts and seating areas would be provided to further enhance views towards key built elements • Slim, linear and elongated roof structures on both wharves are complimentary to the natural landscape and waters' surface • Both wharves are positioned in response to the natural landscape. At La Perouse the wharf 'follows' the rock form. At Kurnell, the wharf extends directly from the land, with a light touch connection to the shore.
2. Look after our culture and heritage	• The waiting area and landscape area maintain and frame existing views, particularly heritage views towards historical monuments, artworks and Aboriginal heritage items • Architectural details of the wharves such as the waiting area roof and balustrades would incorporate artwork representing cultural narratives through engagement with the local Aboriginal communities and artists • Existing heritage plaque at Timbery Reserve La Perouse would be incorporated into landscape design with stakeholder's engagement • There are cultural education opportunities for information plaques to be inlaid in the balustrades • Location of the wharf acknowledges the old locations of the historic wharf infrastructure
3. Protecting the natural environment	• New landscaping follows the natural slope and would include indigenous species endemic to the area

Design Principle	Design response
	• Low-lying plants would be selected to protect view corridors.
4. Providing for visitor use and enjoyment	• The expanded entrance/approach would create a sense of threshold and a reflection space before the journey • Increased accessibility through DDA complaint ramps, handrails and landings help create an inclusive wharf • In alignment with the rich fishing history of the Botany Bay headland, the wharves would have adequate space to allow for recreational fishing • There are cultural education opportunities for information plaques to be inlaid in the balustrades.
5. Park infrastructure and services	• The wharves are positioned to frame and maintain key views to significant built monuments and artwork. Lookouts and seating areas would be provided to further enhance views towards key built elements.
6. Non-park infrastructure and services	• Use of active transport is encouraged through the interconnection with existing and proposed pedestrian and bicycle pathways. New bicycle parking facilities are proposed at La Perouse.

5.4.1 Urban design objectives for the project

The following three urban design objectives have been established for the project:

- Responding to historical and contextual place-making
- A wharf for people
- Celebration of past, present and future maritime use of the two sites.

The urban design objectives were informed by the principles in Beyond the Pavement, Better Placed, Kamay Botany Bay National Park Kurnell Master Plan and Plan of Management. They were developed following:

- Site analysis
- Contextual and historic analysis
- Development of the project brief
- Workshops with the community
- Transport for NSW workshops and meetings to define the project aspirations.

An assessment of how the project responds to these urban design objectives is provided in Appendix M (Landscape Character and Visual Impact Assessment Report).

5.4.2 Design reviews and consultation

A regular and formal process of design reviews has been adopted throughout the design development involving design experts and multidisciplinary teams. The design development process is summarised in Chapter 4 (Project development and alternatives).

A range of stakeholders and organisations were consulted as part of the design development and market sounding process. These included:

- Construction contractors
- Industry associations
- Investors
- Operators
- Agency stakeholders
- Community and recreational groups.

Refer to Chapter 6 (Consultation) for further detailed on consultation that has been carried out throughout the project.

Centre for Urban Design

To achieve design excellence, the Transport for NSW Centre for Urban Design has been involved throughout project development. This process follows the same principles as the NSW Government Architect State Design Review Panel process. The Centre for Urban Design aims to ensure that Transport for NSW infrastructure fits sensitively with the surrounding landform, environments and communities. The Centre for Urban Design has reviewed the design throughout various stages, and have reviewed Appendix M (Landscape Character and Visual Impact Assessment). The intent of these reviews is to ensure the project aligns with Beyond the Pavement (Transport for NSW, 2020a) which is the overarching design, place and movement document that Transport for NSW uses on all of their projects.

5.4.3 Aboriginal community involvement in design

In December 2020, the Government Architect Office released a draft Connecting with Country policy document which seeks to guide Aboriginal involvement in the design of projects. The local Aboriginal community have been involved throughout the project development as outlined in Chapter 6 (Consultation).

Feedback received from Aboriginal community has directly informed the design of the wharves, including setting the project design objectives. Numerous meetings have helped to inform the design objectives and outcomes, some of which included:

- A brainstorming session in March 2020 helped to define the design objectives and draw out key themes of importance to the Aboriginal community
- Cultural awareness training sessions lead by members of the La Perouse Local Aboriginal Land Council
- Attendance at the La Perouse Mens Group meeting in March 2021 where the design team presented and sought feedback on the design.

Throughout the design process, the established design objectives have been used as a framework to guide design and set parameters within which the design is critiqued.

Feedback from the local Aboriginal community has contributed to the proposed location, layout and design of the wharves. The key themes recorded during engagement included:

- The need to respect natural landscape which holds important cultural, spiritual and historic significance for the community
- Favourable perceptions of the historic wharves for people who grew up in the area and for whom they represent positive memories
- Capturing and embedding cultural narratives and Aboriginal history into the design of the wharves. Promoting education and sharing of culture and history
- Connection to Country - the cultural significance of the connection to land and sea
- Recognising the distinct and unique history/culture/identity/geography of the two sites as well as the connection between them
- Create a sense of ownership and belonging for the local Aboriginal community.

The following examples show how the design of the wharves has responded to feedback from the Aboriginal community:

- The proposed locations of the wharves are closely aligned to the position of the historic ferry wharves. In positioning the wharves in these locations, the project is envisaged as a reinstatement for the historic wharves and ferry service.
- The natural form of the landscape has been carefully considered in the positioning and design of the wharves. The approach jetty is kept narrow along its length, and the connection to the land is ‘light-touch’. The wharves are raised on piles which allows the natural coastline to continue uninterrupted underneath the elevated walkway:
  - At La Perouse, the wharf is envisaged as an extension of the natural rock form. Extending towards the north-east to continue the sheltered character of Frenchmans Bay.
  - At Kurnell, the wharf extends at a 90-degree angle from the beach. This positioning maximises the expanse of water between the coastline and the wharf.
- The position of the wharves are considered in the context of key views:
  - At La Perouse, an important viewing corridor was identified through engagement which extends from the Timbery Reserve, north-eastwards towards Frenchmans Beach. The proposed wharf is aligned with this view, maximising water and bay views.
  - At Kurnell, the position of the wharf and the location of an expanded viewing platform facilitates views towards artworks by Aboriginal artists, including the ‘Eyes of the Land and Sea’ by Alison Page and Nik Lachacjzak and ‘The Whales and Canoes’, by Theresa Ardler and Julie Squires. Placing emphasis on these artworks and the stories they represent has been a sentiment raised by members of the Aboriginal community.
- Specific areas of the sites which have been identified as holding special significance for the Aboriginal community (such as the Timbery Reserve) have been designed in close consultation with the local Aboriginal community. At La Perouse, steps have been taken to improve the amenity in Timbery Reserve, increase the prominence of the ‘Timbery Reserve plaque’ and introduce planting species which hold significance, as suggested by members of the community.
- Land-side and water-side ‘gathering places’ are provided on both wharves. On the land-sides, landscaped areas feature seating, new planting and lookout points where people can interact

with each other and engage with the environment. On the water-side, dedicated areas are provided with seating and shelter canopy.

- The expanded landscape zones at the threshold of the wharf platforms mark the commencement of the journey to the other side of the bay and enhance the 'gateway experience'. During engagement with the local Aboriginal community, the significance of this journey has been raised. In response, the wharves have been designed as the start of a journey, rather than a destination in themselves.
- A consistent theme which has been raised in conversation with the community is the importance of the connection to the land and the sea. This has been addressed in a variety of ways, including:
  - A fixed landing platform which steps down into the water. At different stages of the tide, the degree to which the platform is submerged or revealed changes.
  - A perforated flooring material is proposed for the landing platform. This material allows views into the water below and the sound of the lapping waves to reach visitors. This further establishes a sense of connection to the sea.
  - The soffits of the roof shelters are expansive and gently angled to reflect sunlight from the surface of the water, changing their appearance according to weather and wave conditions.
  - Views from the wharves to the land are intentionally unobstructed to enhance visual connection.
- Imbedding knowledge and leveraging the wharves as educational tools has been explored through the provision of meeting and gathering areas which facilitate conversation. The orientation of seating, walkways and the landscape design are orientated towards key views over the land and sea. The provision of the sheltered space also helps to frame important views and encourage visitors to look out and connect with the landscape.
- The existing timber waiting shelter at Kurnell has been highlighted through engagement as a significant historic feature. In response, the shelter is incorporated into the design through the wharf approach at Kurnell.

Cultural interpretation services

The Gujaga Foundation is a local, community-controlled, not-for-profit organisation leading language, cultural and research activities within the La Perouse Aboriginal community.

The Gujaga Foundation has been working with the architectural design team, key people with ancient links to Kamay, the La Perouse Aboriginal community, Elders, knowledge holders and local artists to translate stories into elements that will be incorporated into the design of the wharves. This may include meaningful artwork integrated into the seating, balustrades and roofs to embed themes of cultural and community heritage, past, present and future. The work by Gujaga Foundation would build on the contents of the Interpretation and Storytelling Plan (Wolfpeak Environment and Heritage, 2020) commissioned by NPWS, which summarises Aboriginal community values associated with Botany Bay.

5.5 Construction works

Various construction methods were considered during the strategic and concept design process. These included:

- Constructing the wharves from a temporary wharf structure, temporary crane platforms (La Perouse) or from a temporary causeway (at Kurnell)
- Constructing the wharves "end-over-end" instead of using temporary structures
- Temporary piling to demarcate the marine construction boundary and provide mooring locations.

The preferred method for constructing the project would include a combination of construction from land and construction from marine vessels. The car parking, footpaths, approach to the wharves and part of the wharf near the foreshore would be built from landside. The section of the wharves over the marine areas would be constructed from marine vessels.

At La Perouse, a temporary crane platform would be used to construct part of the wharf in the intertidal and shallow water areas. The remainder of the wharf in deeper water would be constructed from a marine barge plant. At Kurnell, a temporary causeway would be used to construct part of the wharf. The remainder of the wharf would be constructed from a marine barge.

5.5.1 Construction timeframe and staging

The total construction period is anticipated to take approximately 13 months, starting in the first and second quarter of 2022 with the construction of the two wharves occurring at the same time. This construction timeframe allows contingency for expected delays such as poor weather. Unexpected finds, contractor requirements (such as material procurement) or unforeseen delays could extend this timeframe.

The construction would involve the three steps outlined in Table 5-5. These steps would overlap as both water-side and land-side construction would happen concurrently (ie as elements of the construction are completed, the temporary construction infrastructure would be demobilised).

Table 5-5: Construction steps approximate timing

Step	Activities	
	La Perouse	Kurnell
Step 1: Early works and site establishment	Quarter 2 2022 (1 month)	Quarter 2 - 3 2022 (3 months)
	• Install fencing • Set up compound and laydown areas • Set up site offices and access • Form temporary access roads • Form crane and rig platforms at La Perouse.	• Install fencing • Set up compound and laydown areas • Set up site offices and access • Form temporary access roads • Demolish the existing Kurnell viewing platform • Establish the temporary causeway at Kurnell.
Step 2: Main construction	Quarter 2 - 4 2022 (7 months)	Quarter 2 2022 – Quarter 1 2023 (11 months)
	• Piling • Wharf construction • Car parking reconfiguration and footpaths • Installation of utilities • Installation of wharf furniture • Landscaping.	• Piling • Wharf construction • Installation of utilities • Installation of wharf furniture • Landscaping.
Step 3: Site demobilisation	Quarter 2 2022 – Quarter 1 2023 (8 months)	Quarter 3 2022 – Quarter 2 2023 (7 months)
	• Removal of temporary work areas and site offices.	• Removal of temporary work areas and site offices.

Step 1: Early works and site establishment

Early works take place before construction starts to ‘make ready’ the key construction site as these are considered low impact and may be undertaken before the Construction Environmental Management Plan and subplans are approved (subject to DPIE’s concurrence). The early works are shown on Figure 5-14 and Figure 5-15.

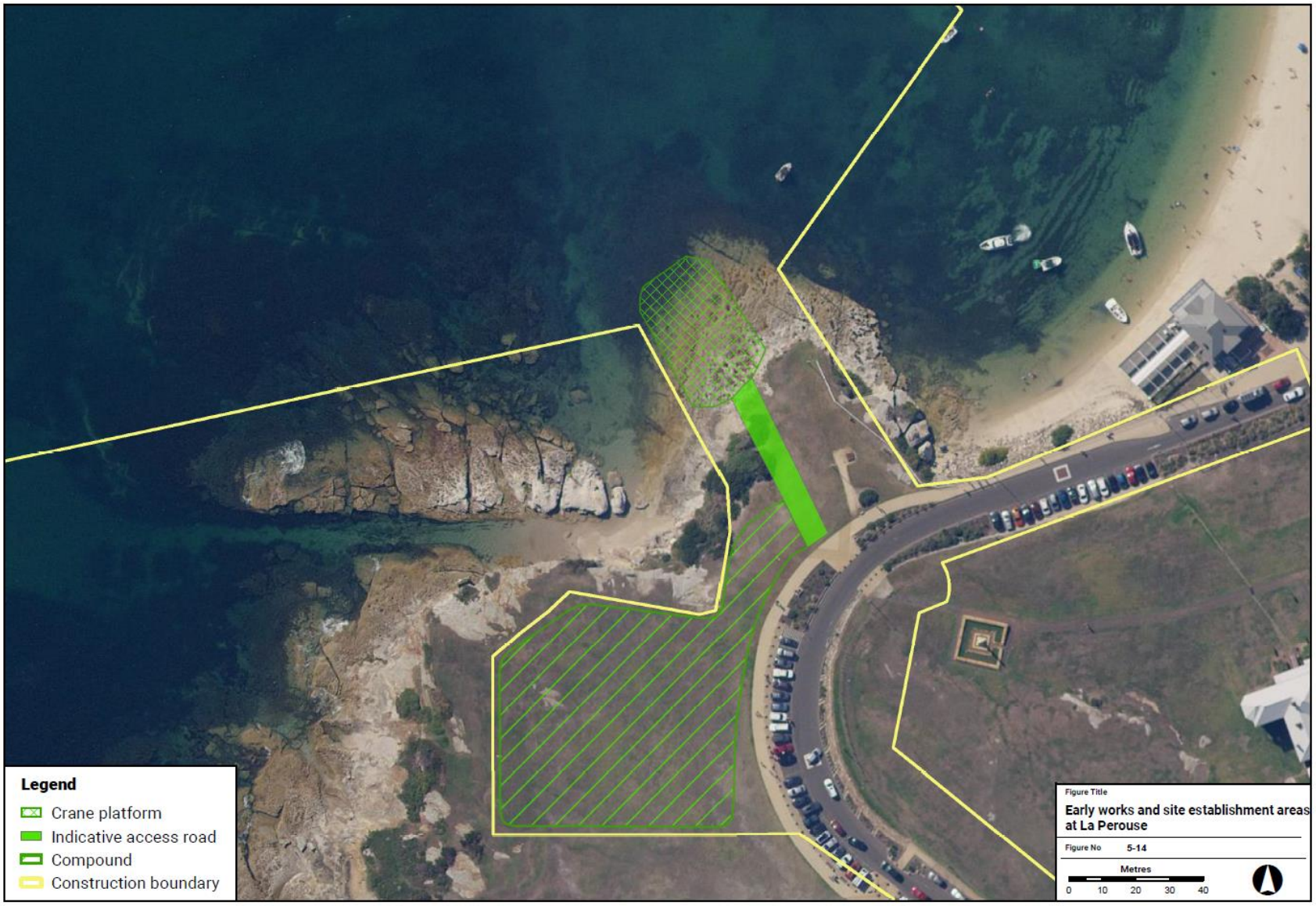

Figure 5-14: Early works and site establishment areas at La Perouse

Figure 5-15: Early works and site establishment areas at Kurnell

Security and exclusion zones

Prior to any works taking place, the landside construction areas would be fenced off to ensure the safety of the public and security of the construction sites.

For the marine based work, an exclusion zone would be established for the duration of marine construction. This area would be marked by navigation buoys with solar lights. The extent of this exclusion zone would be confirmed in consultation with the Harbour Master.

Ancillary facilities

Site offices

Temporary site offices, including toilets, would be established at La Perouse and Kurnell within the designated compound areas, as shown on Figure 5-14 and Figure 5-15. The temporary site offices would occupy an area of around 20 metres by 20 metres.

Plant lay down areas

A plant lay down area would be established at each landside construction site within the designated compound area. The La Perouse plant laydown area would be 2,250 square metres. A crane pad would also be created at the La Perouse wharf tie-in location as shown on Figure 5-14. The Kurnell plant laydown area would be 1,750 square metres. There would be no ground disturbance required at plant lay down areas. Protection matting or similar would be used to protect the ground surface, and tree protection would be established around trees in and near the construction boundary.

Temporary Access

At La Perouse, a temporary road would be constructed to provide access from Anzac Parade to the wharf tie-in area, as shown in Figure 5-14. The road would be about five metres wide and 45 metres long and would be constructed of crushed concrete on top of geotextile material.

At Kurnell, a temporary access road would be constructed from Cape Solander Drive to Monument Track and along Monument Track to the proposed wharf as shown in Figure 5-15. The road would be about five metres wide with a passing bay extending to eight metres for a length of 25 metres and would be constructed of crushed concrete on top of geotextile material.

At the end of construction, these temporary roads would be deconstructed, and materials would be removed for materials recovery or disposal. At La Perouse, the temporary road would be remediated, and the area would form part of the landscaping and footpath area. At Kurnell, the temporary road would be deconstructed, and the Monument Track footpath would be reinstated.

Demolition

The existing Kurnell viewing platform would be removed. The decking would be removed first, followed by steel bracing, and then the piles. The piles would be cut at ground level, rather than completely removed from the ground. As the proposed wharf would be constructed in the same location, no further additional remediation or landscaping work would be required beyond that already proposed.

Temporary crane and rig platform (La Perouse)

A temporary crane platform measuring around 12 metres by 12 metres would be constructed at La Perouse to provide access for the piling plant required to install the closest pile bents to the landside. The crane platform would be constructed using concrete bags and granular material infill wrapped with geotextile on top of the existing rock outcrop. The construction of the temporary crane platform would take two weeks and would be required for around four months. The crane platform would take two weeks to remove.

Temporary causeway (Kurnell)

A temporary causeway would be constructed at Kurnell to provide access for the piling plant which is required to install the inshore shallow water and tidal zone piles. The causeway would extend about 85 metres in length and be eight to 12 metres wide at the base. The height of the causeway would be about 2.6 metres AHD.

Construction of the temporary causeway would start from the landside access point and progress outwards with additional materials being placed in front of the leading (or working) edge by an excavator, enabling the continual extension of structure out from land. Materials would be delivered to the excavator via dump truck reversing down the formed causeway. The construction of the causeway would take about one and a half months and it would be in place for about four months.

As shown in Figure 5-16, the causeway would be formed with an outer ‘skin’ to prevent short term erosion of the structure from occurring. This ‘skin’ would include geotextile bags filled with sand or other suitable materials or the use of larger armour type rocks. The inner ‘core’ would be formed with quarry rock as per temporary works design requirements, with a capping of crushed rock installed for the plant and equipment to traverse along the length of the inner structure and to operate from.

A temporary rock platform would be installed at each pile location to enable the equipment to access the actual pile locations. These temporary platforms off to the side of the causeway would likely be in place for three to five days and then would be removed by an excavator.

At the end of construction, the causeway would be de-constructed, and the material would be removed from site. Deconstruction of the causeway would take about one month.

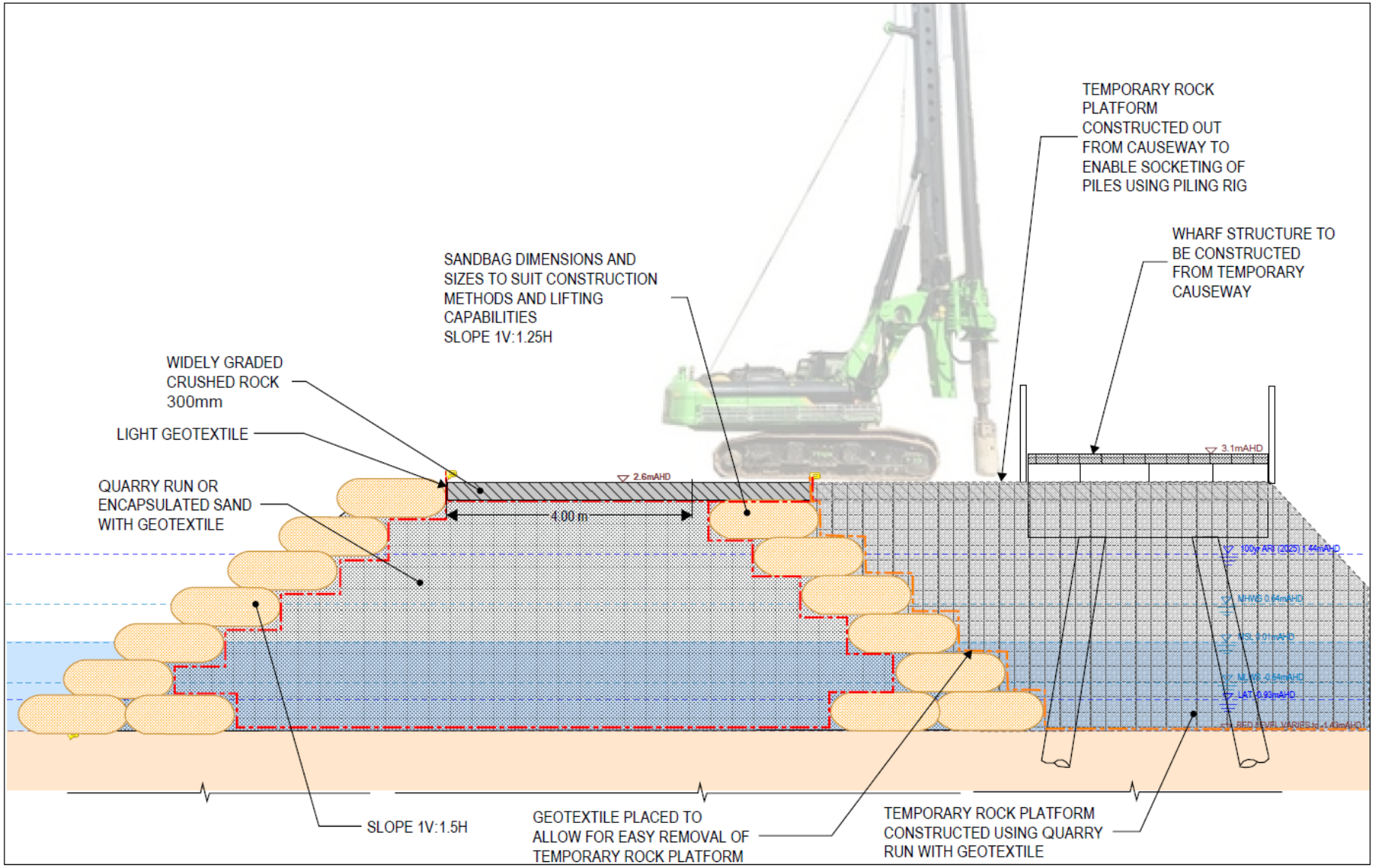

Figure 5-16: Temporary causeway (Kurnell)

Step 2: Main construction

Piling

There are multiple methods that could be employed to install the wharf piles. These methods would be confirmed following further geotechnical investigations. This could include:

- Bored piles – creating a bore hole and placing the pile in and grouting in place
- Screwed or potted piles – screwing the piles into the ground
- Pitch, vibrate and drive – install pile via vibration and impact methods.

Ground disturbance

Land disturbance would be limited to localised excavation and disposal associated with the wharf landside landscaping and paving areas, utilities installation and parking areas. Table 5-6 outlines the ground disturbance volumes required. The location and extent of ground disturbance areas are shown on Figure 5-17 and Figure 5-18.

Table 5-6: Extent of ground disturbance

Activity	Volume (m^3)	
	La Perouse	Kurnell
Landside landscaping and paving	1,315	875
Car parking	1,225	N/A
Utilities installation	1,850	1,850
Piling	Nominal*	Nominal*
Total	**4,390**	**2723**

*Depending on the piling method, it would involve disturbing ground within the pile casing, and either compacting this material or bringing it to the surface as the pile case is removed. The pile would be installed so no backfillng is required.

Figure 5-17: Extent of ground disturbance at La Perouse

Figure 5-18: Extent of ground disturbance at Kurnell

Servicing and utilities

The project may require the removal of two light poles and associated cabling at La Perouse. This would be confirmed during detailed design in consultation with Randwick City Council and the utility provider.

The project would require the installation and extension of electricity, telecommunication and water services as described in section 5.2.5. New routes would be created for the proposed services to avoid impacting the existing services. This would require trenching activities.

Final features for the wharves, such as furniture and handrails, would be installed during this step.

Landscaping

Hard landscaping and planting are proposed at the wharf tie-in areas at both La Perouse and Kurnell. This would be finalised during detailed design, and is likely to include:

At La Perouse:

- Level changes that provide inclusive access and bespoke integrated seating that define a scenic lookout for the headland.
- Surface treatment drawing from the existing context, providing a visual connection to the surrounding local features and footpath connections.
- Scenic lookout furniture would form part of an integrated suite of architectural and landscape treatments, providing consistency and connection to the local character.
- The existing plaque, which holds local community value, would be incorporated within the landscape design through continued engagement with stakeholders.
- Low-lying coastal, native planting palette which responds to the local coastal character of the headland and retains existing views across the bay and environs.

At Kurnell:

- Low-lying native plantings which respond to the local coastal heath character of Kurnell and celebrate the iconic Norfolk Pines that are situated adjacent to the wharf.
- The low-lying vegetation would ensure views towards the surrounding heritage and cultural landmarks are preserved and enhanced where possible.
- The wharf entry would include seating orientated to appreciate views towards surrounding monuments, sculptures and the coastline.

Step 3: Site demobilisation

Periodically throughout construction, as works are completed elements such as the temporary crane platform (La Perouse) and the temporary causeway (Kurnell) would be removed. Lastly, the temporary access roads, site offices, compound areas and site fencing would be removed and the areas returned to the pre-construction condition and the sites rehabilitated in consultation with NPWS.

5.5.2 Traffic management and access

Land-based haulage routes

All land-side traffic would reach the construction sites using existing roads, and then use the proposed temporary access roads to access the wharf locations. At La Perouse, this would be via Anzac Parade, and at Kurnell this would be via Captain Cook Drive.

The key haulage routes are shown on Figure 5-19 and Figure 5-20.

Figure 5-19: Haulage route at La Perouse

Figure 5-20: Haulage route at Kurnell

Landside construction vehicle movements

Construction vehicles required are listed in Table 5-7 and generally include light vehicles, trucks, excavators, drill rigs and cranes. The key landside activities which would generate heavy construction vehicle movements during construction include:

- Establishment of ancillary facilities including the temporary office and compound set up
- Servicing the site offices
- Mobilisation of cranes, piling rigs, excavators
- Concrete pumping operations
- Removal of general waste
- Material delivery and removal
- Removal of temporary office and compound
- Demobilisation of crane, piling rig and excavators.

Over the 13-month construction period at La Perouse, it is expected that around 12 vehicles would arrive and leave the site every day on average. The highest number of vehicles arriving and leaving the site would be around 40 vehicles per day during the site establishment period.

Over the 13-month construction period at Kurnell, it is expected that around 20 vehicles would arrive and leave the side every day on average. The highest number of vehicles arriving and leaving the site would be around 50 vehicles per day during the site establishment period.

Construction worker traffic

The above estimates account for construction worker vehicle movements. At La Perouse, it is anticipated construction workers would travel to site on public transport, by car or by construction vehicles. Due to the limited public transport options at Kurnell, it is expected that most construction staff would arrive by car or construction vehicles.

The construction contractor would be responsible for limiting personal vehicle use by ensuring shared transport is provided and encouraged.

Traffic and access management

Land-side traffic management would be required for specific activities but not constantly throughout the construction period. The main activities requiring traffic management would be during Step 2 (main construction) and would include:

- Modification of the existing car parking areas for the additional car parking proposed at La Perouse
- During deliveries and collection of large construction equipment such as cranes or piling rigs.

Utilities installation and car parking reconfiguration would require traffic management on Anzac Parade, La Perouse and Captain Cook Drive, Kurnell. It is likely that the construction could be staged so that the roads are reduced to one-lane traffic, rather than closed completely.

It is not anticipated that any private property access would be restricted during construction. If private property access restriction is required, it would be for limited duration (for installation of utilities or materials delivery) and affected property owners would be consulted. Vehicle access to the National Park from Cape Solander Drive would be maintained throughout construction. Pedestrian access along Monument Track would be temporarily restricted during construction at Kurnell. This is assessed in Chapter 12 (Traffic and transport) and Chapter 14 (Socioeconomic).

A Traffic Management Plan would be prepared and implemented for the project. Refer to Chapter 12 (Traffic and transport) for the proposed traffic management measures during construction.

Marine routes and vessel movements

The expected marine based construction routes would depend on the contractor's proposed temporary loadout facilities. The routes would either come from outside or inside Botany Bay. Vessel movements would be associated with:

- Mobilisation and demobilisation of marine based equipment
- Movement of equipment due to weather
- Movement of equipment between La Perouse and Kurnell
- Supplying materials to the construction sites
- Construction worker movements from land to the marine construction sites.

Marine based traffic management would be undertaken in consultation with the Harbour Master and is likely to include the demarcation of the marine construction work zone with temporary navigational marker buoys and solar powered lights.

Based on a 13-month construction program, the average daily vessel movements during construction are estimated to be an average of eight vessel movements per day, with a peak of 20 vessel movements per day.

5.5.3 Workforce

The construction of the project would generate about 45 full time equivalent jobs. The average number of construction workers on site each day would be 25 workers, with a peak expected to be 38 workers during the main construction step.

5.5.4 Construction work hours

The overall construction timeframes are outlined in Table 5-5.

Construction would predominantly take place between standard working hours:

- Monday to Friday 7am to 6pm
- Saturday 8am to 1pm
- No work on Sundays or public holidays.

However, being within a marine environment, the project would likely require, on occasion, several activities to be undertaken outside standard working hours for safety reasons. These activities would need to take place at night when the water is calm and the harbour is least busy. These activities would be required at both La Perouse and Kurnell and include:

- Relocating the jack-up barge depending on the tides to maintain enough clearance distance between the vessel and the sea floor
- Completing safety critical activities and movements of vessels prior to forecast weather events
- Setting up of the construction pump for in-situ concrete placing works to ensure concrete can set before warmer temperature rise during the day in the summer months
- Most of the drilling or piling activities would be undertaken during standard working hours, however if required some drilling and piling activities may have to be undertaken outside of these standard hours. Night-time piling activities would adopt the following work schedule:
  - Drilling of piles:
    - Setup: 11pm to 12am
    - Drilling: 12am to 6am
    - Pack up: generally, 6am to 7am
  - Hammering of piles:
    - Setup: 4am to 5am
    - Hammering: 5am to 7am.

Pile drilling or hammering would take place intermittently during the above periods. On average, a pile would be vibrated for about five minutes and then hammered for about 10 to 60 minutes (depending on the ground conditions at the pile locations). For piles that are to be drilled into position, the duration of drilling could be between 20 to 120 minutes. Following these activities,

there would be a relatively quiet period for a couple of hours whilst relocating and/or setting up equipment at the next location.

The hierarchy of working hours would be adopted as described in section 2.2.4 of the draft construction noise guidelines (NSW EPA, 2020). A Noise and Vibration Management Plan would be prepared and implemented for the project, this would include consultation with sensitive noise receivers as appropriate.

5.5.5 Plant and equipment

The plant and equipment needed to build the project would be generally common to both sites. A summary of the likely plant and equipment required for each construction step is provided in Table 5-7.

Table 5-7: Plant and equipment

Type of equipment	Step 1	Step 2	Step 3
Light vehicles	✓	✓	✓
Trucks	✓	✓	✓
Excavators	✓	✓	
Hand tools	✓	✓	✓
Jack-up barge (90 tonnes) A jack-up barge would provide a work platform for overwater construction activities.		✓	
Jack-up barge – piling (250 tonnes) This is a larger sized jack-up barge which can support piling activities overwater.		✓	
Crane (150 tonnes) The crane would be located on the jack-up barge overwater and would be used to lift and install piles. It can also support pre-cast concrete installation		✓	
Drill rig A drill rig would only be needed for the installation of piles if the screwed method is used. This would need to be supported by a separate crane to lift piles into the vertical position to install. This would be used on land and overwater.		✓	
Piling leader frame A piling leader frame would be mounted on to the jack-up barge or crane barge to assist with pile support and positioning during installation. This would only be needed if piles are driven, rather than screwed.		✓	
Crane barge (250 tonnes) This is a crane on a separate barge overwater rather than a jack-up barge. This option provides a longer reach of the crane.		✓	
Crane (50 tonnes) This crane would be located on a jack-up barge overwater.		✓	
Crawler crane (200 tonnes) This is a land-based crane which would be used for inshore piling at La Perouse.		✓	
Piling hammer (7 tonnes) This hammer is used to set the piles into rock if a screwed piling method is used (both on land and overwater).		✓	
Material storage barge This overwater barge would store and deliver materials such as piles, pre-cast concrete units, structures and platforms. It would be about 20 m long.		✓	

5.5.6 Construction materials

The construction materials and the approximate quantities required are provided in Table 5-8.

Table 5-8: Construction material types and approximate quantities

Construction material	Quantity
Crushed rock	1,800 m^3
Piles	2,420 m
Pre-cast concrete headstocks	215 m^3
Pre-cast concrete planks	410 m^3
Insitu concrete for decking slabs	205 m^3
Fibreglass reinforced plastic (FRP) decking	46 m^3
Reinforcement for decking slabs	48 t
Electrical cables and coils	2,330 m
Handrails	900 m
Sand bags (temporary causeway)	1,350 m^3
Gravel layer and core fill rock	2,200 m^3
Car parking asphalt	125 m^2
Concrete for footpaths	765 m^2

The majority of the materials (piles, pre-cast concrete units, planks, roof structures, access trusses) would be delivered to La Perouse and Kurnell by barge (marine), however some materials would need to be delivered by road.

5.5.7 Erosion and sediment control

The project would require limited soil disturbance associated with the activities listed in Table 5-6. An Erosion and Sediment Control Plan would be prepared and implemented for the project in accordance with Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004). The plan would include detailed measures and controls to be applied to minimise erosion and sediment control risks including:

- Runoff, diversion and drainage points
- Scour protection
- Stabilising disturbed areas as soon as possible.

5.5.8 Spoil and waste disposal

The expected wastes generated from the construction of the project which would require disposal would include:

- General waste from the site offices (general office waste, food waste)
- Black and grey water from the temporary site offices
- Excavated material
- Concrete from the piling
- Grout (or concrete) from the piling
- Timber, handrails and steel pile offcuts from the removal of the existing wharf lookout at Kurnell
- Electrical cabling offcuts from services
- Materials from the temporary causeway construction.

The majority of these waste materials should be able to be recycled. The remaining material not able to be recycled would be disposed of at nearby facilities able to accept the waste. A Waste and Energy Management Plan would be prepared and implemented for the project (refer to Chapter 23 (Waste)).