



# **Barangaroo Stage 1**

## **Barangaroo Concept Plan Amendment (MP06\_0162 MOD8)**

### **Navigation Impact Assessment**

Prepared for Lend Lease (Millers Point) Pty Ltd

by Haskoning Australia Pty Ltd

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Suite 5, Level 5  
100 Walker Street  
NORTH SYDNEY NSW 2060  
T: +61 (0) 2 8854 5000  
F: +61 (0) 2 9929 0960  
[www.royalhaskoningdhv.com](http://www.royalhaskoningdhv.com)  
ABN 66 153 656 252

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## **1. INTRODUCTION**

### **1.1 Project Background**

Barangaroo is located on the north western edge of the Sydney Central Business District (CBD). It is bounded by:

- Sydney Harbour to the west and north;
- the historic precinct of Millers Point (for the northern half), The Rocks and the Sydney Harbour Bridge approach to the east; and
- a range of development dominated by large CBD commercial tenants to the south.

The Barangaroo site has been divided into three distinct redevelopment areas (from north to south), namely the Headland Park, Barangaroo Central and Barangaroo South respectively.

### **1.2 Concept Plan and Amendments**

On 9 February 2007, the Minister for Planning and Infrastructure approved a Concept Plan (MP06\_0162) for the Barangaroo site, and on 12 October 2007 the land was rezoned to facilitate its redevelopment.

Several Concept Plan Amendments, or Modifications, have since been approved by the Minister pursuant to Section 75W of Part 3A of the *Environmental Planning and Assessment Act 1979*. The most recent proposed modification to the Concept Plan, namely Modification 8 (Mod 8), seeks to:

- relocate the landmark building (Block Y) from the harbour onto the land in the Barangaroo South site in front of the existing Blocks 4A, B and C;
- revise the layout of Blocks 4A-C;
- amend the size and location of the Southern Cove and public domain;
- redistribute the gross floor area (GFA), public domain and land uses across development blocks 1-3, 4A-C, X and Y;
- increase the maximum GFA on the site to provide for additional GFA within the hotel building and redistribution of land uses;
- increase the height of the buildings within modified 'Block 4' and the relocated Block Y; and
- amend the conditions of the Concept Approval to reflect the modifications to development.

It is also proposed to amend Part 12 of Schedule 3 of the Major Development SEPP<sup>1</sup> to reconcile the SEPP with the modifications to the Concept Plan, including amending the location of the RE1 and B4 Mixed Use zone boundaries.

The Mod 8 Concept Plan Amendment relates to Barangaroo South only. The proposed application is the outcome of negotiations between Lend Lease and the NSW Government, including the Barangaroo Delivery Authority, to relocate the approved Landmark Hotel building site from a pier over Sydney Harbour to a location on land elsewhere on the Barangaroo South site. It also incorporates a number of consequent and related changes to the urban design guidelines that are required to maintain an appropriate built form and public domain outcome for the Barangaroo South site.

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<sup>1</sup> *State Environmental Planning Policy (Major Development) 2005*

### **1.3 Purpose of this Report**

The report herein has been prepared to provide an assessment of the potential navigation impacts associated with the proposed development with regard to the Mod 8 Concept Plan Amendment. A Director-General's Requirement (DGR) that has been provided in relation to navigation is as follows:

"Consider the impacts on boating traffic and safety, and the role of Roads and Maritime Services and the Harbour Master of the Port of Sydney."

Navigation impact was previously assessed for the Mod 4 Concept Plan Amendment, in WorleyParsons (2010). This previous report is referred to as the "Mod 4 report" herein.

The Mod 4 report was prepared to address the following DGR:

"Address the cumulative impact on boating activities, including ferries, in the locality and the proposed Landmark Building's impact on navigation and the movement of vessels in consultation with the Harbour Master of the Port of Sydney and NSW Maritime".

An updated assessment of the navigation impact is required for the Mod 8 Concept Plan Amendment, although it is noted that the Mod 8 proposal includes reducing the extent of the overwater pier, with the high-rise Landmark Building proposed to be replaced with a low level building constructed on top of a Public Pier, denoted as the "community building". That is, Mod 8 has relatively less impacts on boating impact and safety than the previously assessed Mod 4.

The assessment herein includes:

- a review of current navigational arrangements, navigation rules, and existing site conditions, to establish the context for assessment of the above DGR;
- details of consultation previously undertaken with the Harbour Master of the Port of Sydney and NSW Maritime<sup>2</sup>; and
- consideration of potential navigational issues during construction of the community building, public pier, future ferry terminals and Globe Harbour as well as the cumulative impact on boating activities both during construction and during operation of the site.

### **1.4 Prior Consultation**

In preparation of the Mod 4 report, a meeting was held with representatives of WorleyParsons, Lend Lease, Sydney Ports Corporation (SPC) and (then) NSW Maritime<sup>2</sup> on 18 May 2010. Subsequent email and telephone correspondence was undertaken with SPC in relation to navigation channels and turning basin details. Subsequent telephone correspondence was also undertaken with both NSW Maritime and SPC regarding the final proposed length of projection of the Landmark Building Public Pier into Darling Harbour contemplated as part of the Mod 4 Concept Plan Amendment.

It is considered that the outcomes of these consultations are still valid with regard to the proposed Mod 8 Concept Plan Amendment. In general, this is based on the reduced scope of the Globe Harbour and Public Pier for the Mod 8 proposal in comparison to the Mod 4 proposal (refer Section 2.3). As such, further consultation with SPC or RMS was not required for the assessment provided herein.

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<sup>2</sup> NSW Maritime now operates as part of the NSW Government Roads and Maritime Services (RMS).



## **2. BACKGROUND TO NAVIGATION RULES, EXISTING SITE AND PROPOSED REDEVELOPMENT**

### **2.1 Navigation Rules**

The *NSW Boating Handbook* (RMS, 2012) provides boating information for operating on NSW waters including:

- basic boat handling;
- water traffic rules;
- navigation marks and signs;
- navigation at night; and,
- other boating activities.

The water traffic rules include guidelines on preventing collision and the interaction of vessels and reference is made to the requirement to comply with the International Regulations for Preventing Collisions at Sea.

In the Boating Handbook, the following is stated relating to Sydney Harbour:

“Sydney Harbour is a unique waterway that is used extensively by a diverse range of recreational and commercial vessels including large ships, ferries and charter boats, private cruisers and yachts, runabouts, sailing skiffs, dinghies, sailboards, rowing shells, kayaks and dragon boats. The Harbour is an extremely busy waterway that requires operators of vessels to be aware of their responsibilities and to take care when boating in busy navigational channels and to make allowances for commercial activity. There is a need to consider paddlers, rowers and sailors as well as accommodating the needs of commercial operators, and those wishing to cruise, ski and fish on the Harbour.”

RMS operates the “You’re the Skipper. You’re Responsible” safety awareness initiative, which is aimed at the boating community. The campaign is designed to encourage all recreational operators to take responsibility for their actions on the water, highlighting that boat operators, or skippers, are responsible for the safety of their vessel and the people on board. The clear message from RMS is that the responsibility for navigational safety rests with individual boat users. Further details regarding this campaign are available on the RMS website<sup>3</sup>.

In addition to recreational boating activities, Darling Harbour experiences a high volume of commercial vessel operations. A commercial vessel is any vessel used for a commercial purpose and includes vessels carrying passengers or goods; vessels that are hired; or vessels used in connection with a business, trade or commerce. Examples of commercial vessels include fishing vessels, tourist or charter boats, workboats, tugs, barges, ferries, water taxis, sailing schools, rescue boats, government vessels, dive boats, thrill rides and “hire and drive” boats.

Commercial vessels operating in Australian Waters are governed under the *International Regulations for Preventing Collisions at Sea 1972*. In Sydney Harbour these rules and regulations are enforced by RMS. As with recreational vessels, it is the duty and responsibility of individuals in charge of any vessel, large or small, to correctly apply these rules and regulations in all circumstances, in a

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<sup>3</sup> Available at <http://www.rms.nsw.gov.au/maritime/index.html>.

seamanlike manner, and in the interests of safety to themselves, their passengers and crew and the safety of others using the Harbour.

## 2.2 Existing Site Conditions

### 2.2.1 Location

The extent of the existing Barangaroo site (as approved) is depicted in Figure 1, which also indicates the position of the Barangaroo South area (as per the Mod 8 Concept Plan Amendment). Barangaroo sits along the western side of the Sydney CDB between Walsh Bay to the north and King Street Wharf to the south.

### 2.2.2 Water Depths

Water depths in the vicinity of Barangaroo, in metres below Chart Datum (CD), are shown in Figure 2. The base mapping in this Figure was derived from the hydrographic chart AUS 202. Chart Datum is zero on the Fort Denison Tide Gauge and is approximately 0.925 m below Australian Height Datum (AHD). Zero metres AHD is approximately equal to mean sea level at present.

Seabed elevations near Barangaroo vary between approximately -10 m and -12 m CD (that is, about -10.9m to -12.9m AHD). These depths are generally consistent along the face of the existing Darling Harbour wharves as this area has been previously dredged and maintained at these depths to suit the former port operations at the site.

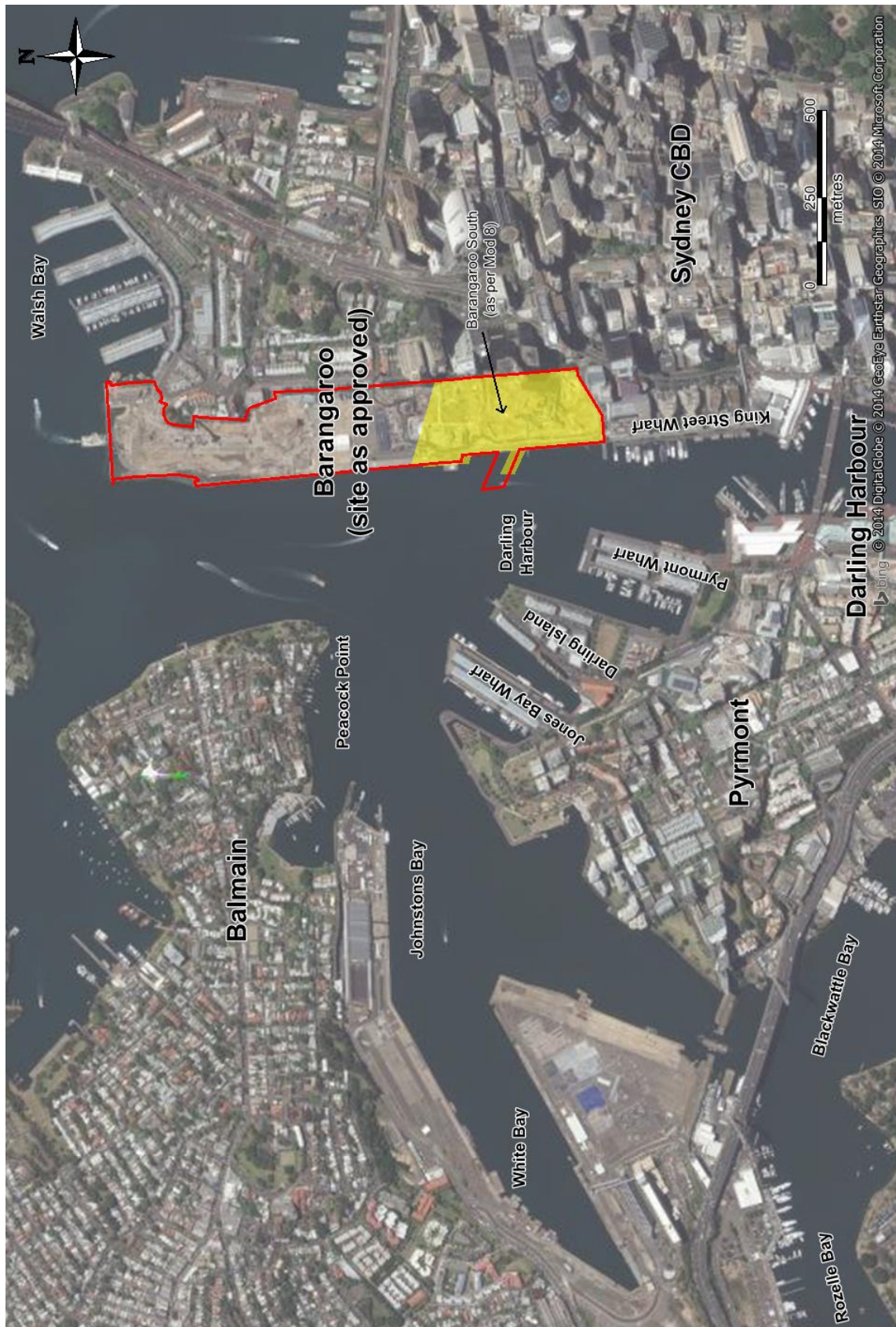
### 2.2.3 Water Levels

Still water levels at the subject site are dependent on a number of factors, including astronomical tide, storm surge and wave setup. The combination of all these factors in storm events causes elevated still water levels. The still water levels in Sydney Harbour are not significantly affected by catchment flood flows at this location. Water levels are further increased above the still water level at the shoreline by the process of wave runup. The magnitude of wave runup is affected by a range of factors including wave height, wave period, beach slope and shoreline type.

Tidal planes in Sydney Harbour from OEH (2013), as apply adjacent to Barangaroo, are presented in Table 1.

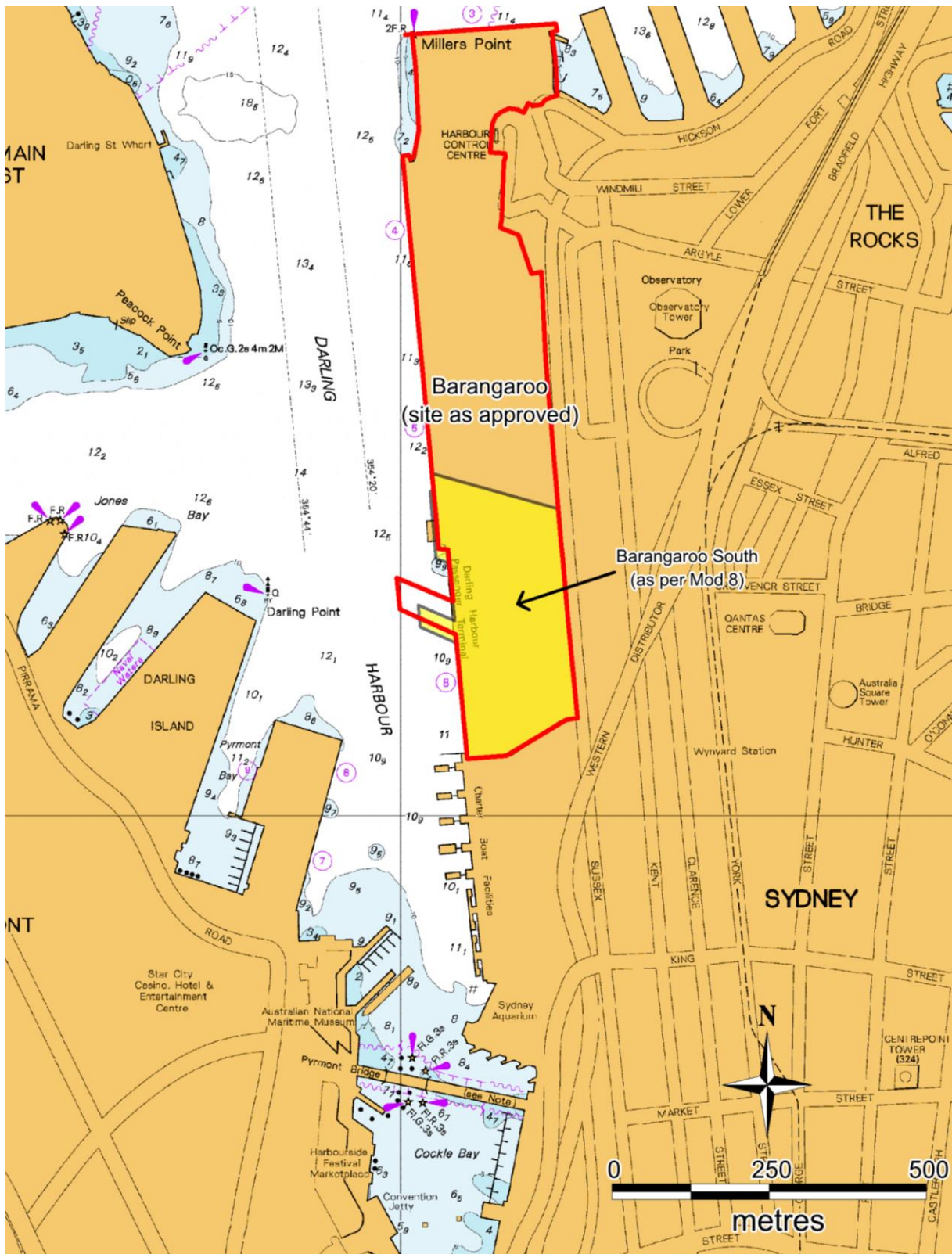
**Table 1 Tidal Planes for Sydney Harbour**

| Tidal Planes            |      | m CD |
|-------------------------|------|------|
| Mean High Water Springs | MHWS | 1.56 |
| Mean High Water         | MHW  | 1.43 |
| Mean High Water Neaps   | MHWN | 1.31 |
| Mean Sea Level          | MSL  | 0.94 |
| Mean Low Water Neaps    | MLWN | 0.56 |
| Mean Low Water          | MLW  | 0.44 |
| Mean Low Water Springs  | MLWS | 0.32 |
| Indian Spring Low Water | ISLW | 0.07 |



**Figure 1: Layout of existing Barangaroo site**





**Figure 2: Water depths (CD) in vicinity of Barangaroo site**

Present day design still water levels for Sydney Harbour are presented in Table 2, based on extreme value analysis of data from the Fort Denison tide gauge data collected between June 1914 and December 2009 (DECCW, 2010). The design still water levels inherently incorporate allowance for all components of elevated ocean water levels (including tides, meteorological influences and other water level anomalies), however they exclude wave setup and wave runup influences. These levels only apply at present, and would need to be increased for future planning periods to take account of climate change (in particular projected sea level rise).

**Table 2 Present day design still water levels for Sydney Harbour**

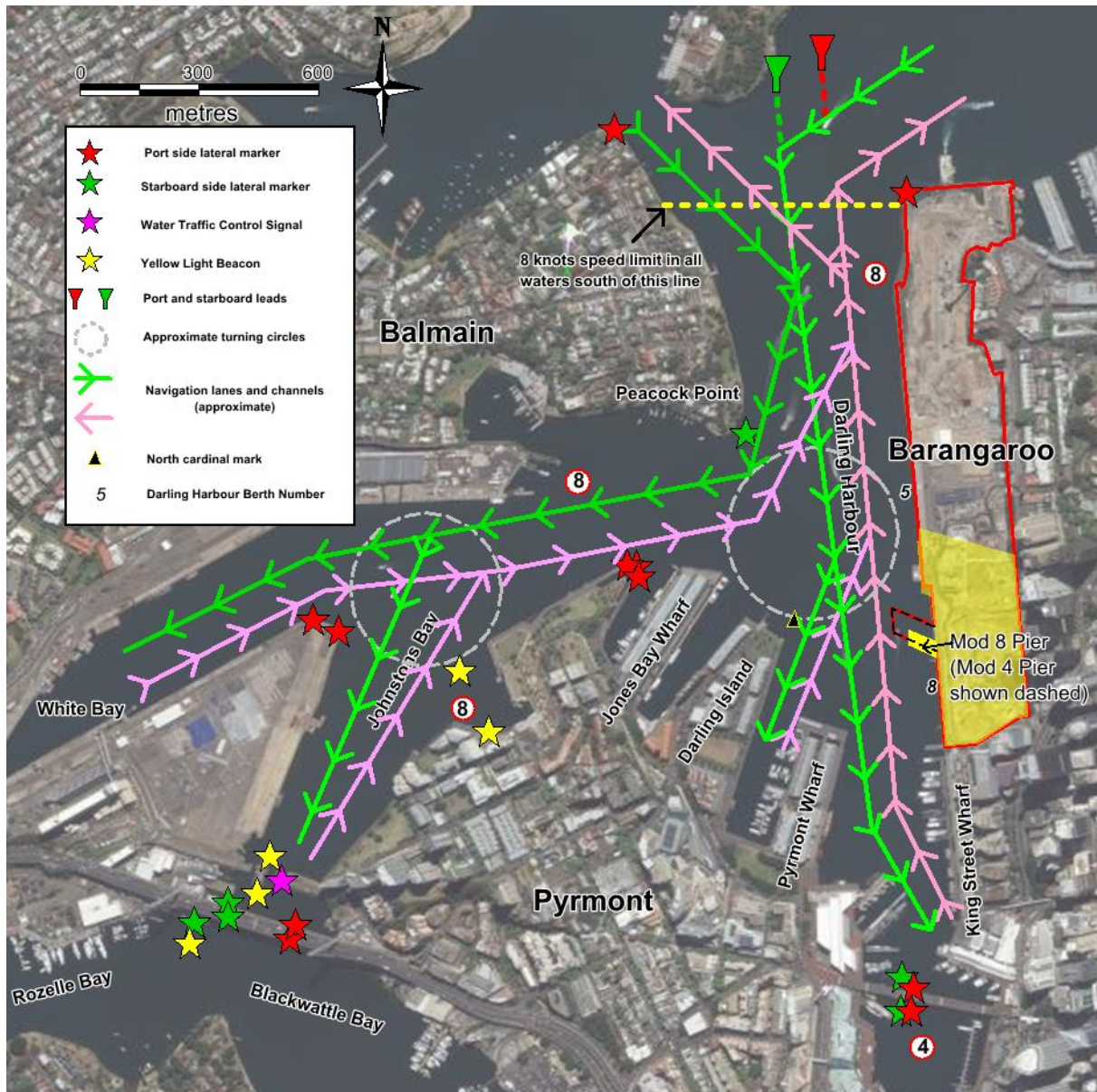
| Average Recurrence Interval (years) | Still Water Level (m CD) |
|-------------------------------------|--------------------------|
| 0.02                                | 1.90                     |
| 0.05                                | 1.98                     |
| 0.1                                 | 1.93                     |
| 1                                   | 2.17                     |
| 10                                  | 2.28                     |
| 50                                  | 2.34                     |
| 100                                 | 2.37                     |

#### 2.2.4 King Street Wharf

The foreshore to the south of the Barangaroo South site is currently occupied by the King Street Wharf charter vessel facility. The King Street Wharf includes four leased wharves, four “common user” wharves and a ferry wharf. The leased wharves are used by charter vessels such as the *Captain Cook Explorer*, the Blue Line Vessels and *Sydney 2000* (which, at 63 m in length, is the largest known vessel to access King Street Wharf). The “common user” berths are used by water taxis, and access by other vessels (typically up to 40 m in length, or 44 m for Wharf 9) can be arranged through RMS’s wharf booking system. The ferry wharf is used by Sydney Ferries for its Rydalmere/Parramatta service that operates 37 m long Rivercat vessels.

Vessels heading into Darling Harbour enter an 8 knot speed limit and travel along the western side of the waterway away from the Barangaroo South site (Figure 3). Vessels heading out of Darling Harbour travel on the eastern side of the waterway and pass the King Street Wharf berths as they approach the Barangaroo South site. The King Street Wharf berths extend approximately 68 m beyond the face of the wharf and vessels exiting these berths are required to sound their horn three times before moving astern into the channel, as per RMS regulations. Vessels passing the King Street Wharf berths typically travel some distance to the west of the berths to provide open water between themselves and any vessels which might depart the wharves. Vessels travelling north past King Street Wharf typically travel within a tapering navigation channel which widens considerably as vessels travel further north (Figure 3).





**Figure 3: Navigation features in the vicinity of Barangaroo**

### 2.2.5 Other Maritime and Recreational Boating Activities

Other maritime and recreational boating activities in the area include vessel movements to and from Darling Harbour to the south and to and from Johnstons Bay, White Bay, Blackwattle Bay and Rozelle Bay to the north and west of the Barangaroo South site (Figure 3).

Vessels accessing facilities south of Barangaroo include the Matilda Cruises fleet of charter vessels berthed near the Aquarium, small private motor cruises berthed at the Darling Harbour Marina, Sydney Ferries First Fleet ferries using the Darling Harbour (Aquarium) and Pyrmont Bay (Casino/Maritime Museum) ferry wharves and other smaller craft such as water taxis and jet boats accessing Darling Harbour south of the Pyrmont Bridge.

Vessels accessing facilities north and west of Barangaroo include large passenger cruise liners and cargo vessels using White Bay<sup>4</sup>, fishing vessels using the Fish Markets, cement carriers using White Bay and Blackwattle Bay, superyachts using the Sydney Superyacht Marina in Rozelle Bay, construction barges and smaller craft using the working maritime precincts in Blackwattle Bay and Rozelle Bay and other smaller private craft visiting the bays or using the Rozelle Bay dry stack facility.

Based on “Sydney Port Passage Planning 2012”<sup>5</sup>, there are designated turning basins in Darling Harbour (360m diameter) and at the entrance to Johnstons Bay (320m diameter), see Figure 3.

The entrance to Johnstons Bay from Darling Harbour is to the north of Barangaroo South, and all but the largest vessels would navigate this stretch of the harbour without regard to the Barangaroo South foreshore (Figure 3). For the largest cruise liners, cargo ships and bulk carriers, navigation into Johnstons Bay and White Bay requires some level of manoeuvring in the Darling Harbour turning basin (Figure 3). Depending on the vessel’s size and operating procedures, large vessels would make way into Darling Harbour as far south as the turning basin, rotate under their own power or be rotated with tugs and either make way or come astern into White Bay. Alternatively, they could make way into Darling Harbour with the bow slightly further south of the turning basin, swing the stern around into Johnstons Bay (either under their own power or with tug boats) and come astern towards White Bay.

## **2.3 Proposed Redevelopment**

### **2.3.1 Key Features Relevant to Navigation**

The Barangaroo South urban mixed use precinct is proposed to feature a public waterfront, shops, supermarket, waterfront restaurants, a library, an international hotel, apartments and commercial offices for Australian and international corporations.

A “Barangaroo South Masterplan” has been prepared by Rogers Stirk Harbour + Partners (2014). A number of images in this document, noted as “illustrative depictions of design concepts only”<sup>6</sup>, provide relevant information on features that may affect navigation.

Based on the concept plan shown on page 62 of the Masterplan, Figure 4 has been developed, with annotations added to show a number of features including:

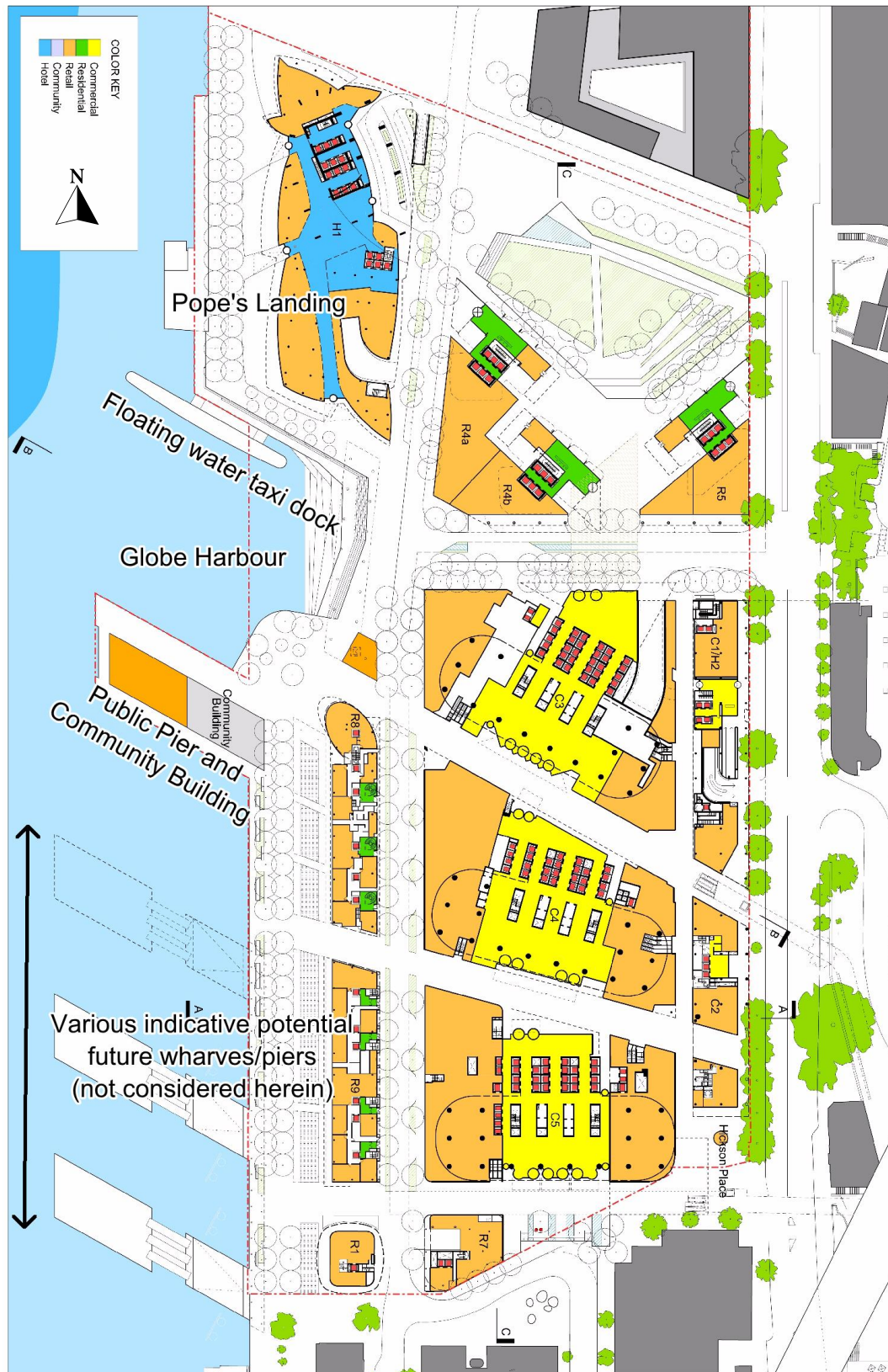
- Pope’s Landing, an existing structure that was formerly a Trans Tasman Line berth. This has been converted to public open space and it is proposed that this continues.
- floating water taxi dock;
- Globe Harbour;
- a Public Pier with Community Building; and
- various indicative potential future wharves/piers located south of the public pier. These wharves/piers shown south of the Public Pier in the Masterplan are proposed by RMS as part of the Barangaroo Ferry Hub and are not part of the current Mod 8 submission, and have therefore not been considered herein.

<sup>4</sup> The cruise ship terminal was formerly located at Darling Harbour Berth 8 prior to temporary relocation to Berth 5 from July 2010 (Figure 3). The White Bay Cruise Terminal commenced operations in April 2013 and caters for cruise liners capable of passing under the Sydney Harbour Bridge and up to 300 m in length.

<sup>5</sup> Online at [http://www.sydneyports.com.au/port\\_operations/navigation\\_and\\_pilotage/passage\\_planning](http://www.sydneyports.com.au/port_operations/navigation_and_pilotage/passage_planning).

<sup>6</sup> The Masterplan does not in itself constitute part of the eventual development approval.





Further illustrative depictions of a variety of these features, as presented in the Masterplan, are provided in Figure 5, Figure 6 and Figure 7.

The entire area extending from Pope's Landing to the floating water taxi dock is depicted in some parts of the Masterplan as "Docks" with wood decking. It has been assumed herein that except for the floating water taxi dock, this area will be public open space only and not used for berthing of vessels.



**Figure 5: Indicative oblique aerial conceptual view of Globe Harbour including Public Pier And Community Building (right) and floating water taxi dock (left)**



**Figure 6: Indicative view of community building from across Globe Harbour**





**Figure 7: Indicative view of Globe Harbour including Public Pier and Community Building (right) and floating water taxi dock (left)**

### 2.3.2 Differences to Mod 4

The approved Mod 4 Concept Plan Amendment included a Landmark Building and associated pier. The pier encroached approximately 100 m into the marine waters of east Darling Harbour (perpendicular to the existing shoreline), see Figure 3.

In the proposed Mod 8 Concept Plan Amendment, the Public Pier has been reduced in size and the high-rise Landmark Building has been relocated. The pier has a reduced footprint, of about 30% of the Mod 4 footprint, extending around 60 m into the harbour (Figure 3). The Landmark Building has been replaced with a low level building.

The approved Mod 4 Concept Plan Amendment included the creation of a new Southern Cove, generally within the footprint of the former Maritime Service Board's berths 6 and 7.

The proposed Mod 8 Concept Plan Amendment consists of a much reduced cove, renamed Globe Harbour, extending only around 20 m into the current foreshore (measured landward from the existing edge of deck).

Globe Harbour is designed to bring people towards the waterfront. Besides the water taxi dock, it does not include any facilities to encourage the set-down/drop-off, mooring or general use of the water within the harbour by any vessels. It is possible that existing piles in this area shall be retained to improve slope stability and some may be cut off well above the bed level to provide ecological enhancement. This would further discourage vessel use in this area.

### **3. ASSESSMENT OF NAVIGATION IMPACTS**

#### **3.1 Preamble**

The proposed Mod 8 Concept Plan Amendment includes the following elements which would have the potential to impact on navigation within Darling Harbour:

- community building and Public Pier; and
- floating water taxi dock (not specifically part of Mod 8 but illustrated in the Masterplan).

The potential impact on navigation and any mitigation measures recommended for each of these is discussed in the following sections. There is also consideration of the methods expected to be employed in the construction/creation of each of the above.

#### **3.2 Community Building and Public Pier**

The Community Building and Public Pier would project out into the waters of Darling Harbour, relative to the existing foreshore alignment (Figure 3). However, as noted previously, the proposed extent of the Community Building and Public Pier into the waterway is significantly less than for the approved Mod 4 Concept Plan Amendment.

Given that the building envelope extends to the near the edge of the Public Pier, the Community Building will present some restriction to lines of sight between vessels travelling up and down Darling Harbour and vessels exiting the existing King Street Wharf or the proposed Barangaroo Ferry Hub Wharves (but less restriction than for the approved Mod 4 Concept Plan Amendment).

The pier would project out approximately 60m from the existing foreshore alignment into the waters of Darling Harbour, less than the 68m length of the berth boxes for the adjacent King Street Wharves, and about 40m shorter than the projection of the pier approved in the Mod 4 Concept Plan Amendment. It should be noted that the pier would not include berthing facilities for any vessels.

The existing open water width of Darling Harbour between King Street Wharf and Pyrmont Wharf is approximately 130m. Allowing for a nominal 15m buffer zone on each side gives a channel width of approximately 100m for active vessel navigation, that is about 50m in each direction.

Following introduction of the proposed 60m long Public Pier at Barangaroo South, the remaining channel width of Darling Harbour in this area would be about 255m. Allowing for a 15m buffer zone on each side, this would leave a channel width of approximately 225m for active vessel navigation, that is about 110m in each direction. Therefore, the introduction of the 60m long Public Pier would not represent a reduction in the width of the navigation channel when compared to the existing channel width at King Street Wharf. Furthermore, the Mod 8 reduction in pier length of 40m compared to the approved Mod 4 Concept Plan Amendment represents an increased (improved) channel width.

It should be noted that no standard channel widths exist in Sydney Harbour; rather the above dimensions are given to illustrate the existing constraints on channel widths.

Vessels travelling past King Street Wharf are within a tapering navigation channel which widens moving north. Given that the proposed 60 m long Public Pier would extend less distance into the harbour than the King Street berth boxes, the navigation paths of these vessels would not need to be deviated further west than is currently required.



As vessels currently navigate out of a relatively narrow and winding channel at the southern end of Darling Harbour into a significantly wider channel to the north of the King Street Wharf, it is considered that the proposed Community Building and Public Pier would not have an adverse impact on navigation in the area.

The proposed Public Pier would not encroach within the maximum turning basin required by SPC at the junction of Darling Harbour and Johnstons Bay (Figure 3). Any vessel encroaching outside this turning basin would currently already be restricted by the three surrounding land masses of Peacock Point, Jones Bay Wharf/Darling Point and Darling Harbour Berth 5 prior to any physical interaction with the proposed Public Pier.

The Community Building and Public Pier would be sited near the location of the former cruise ship terminal (Berth 8) which ceased operations in June 2010. This comprised a 40 m berth box plus a 30 m water-side restricted zone when a cruise liner was berthed, which was a greater restriction on navigation than proposed for the Mod 8 Concept Plan Amendment.

As the Community Building and Public Pier would form a new structure in the harbour, it is proposed to adopt a previous recommendation arising from consultation with (then) NSW Maritime for the approved Mod 4 Concept Plan Amendment, which was for the provision of a port hand lateral mark that is lit at night at the western most end of the Public Pier. The exact positioning and detailing of the port hand lateral mark would be the subject of a future Project Application and further approval from RMS if required.

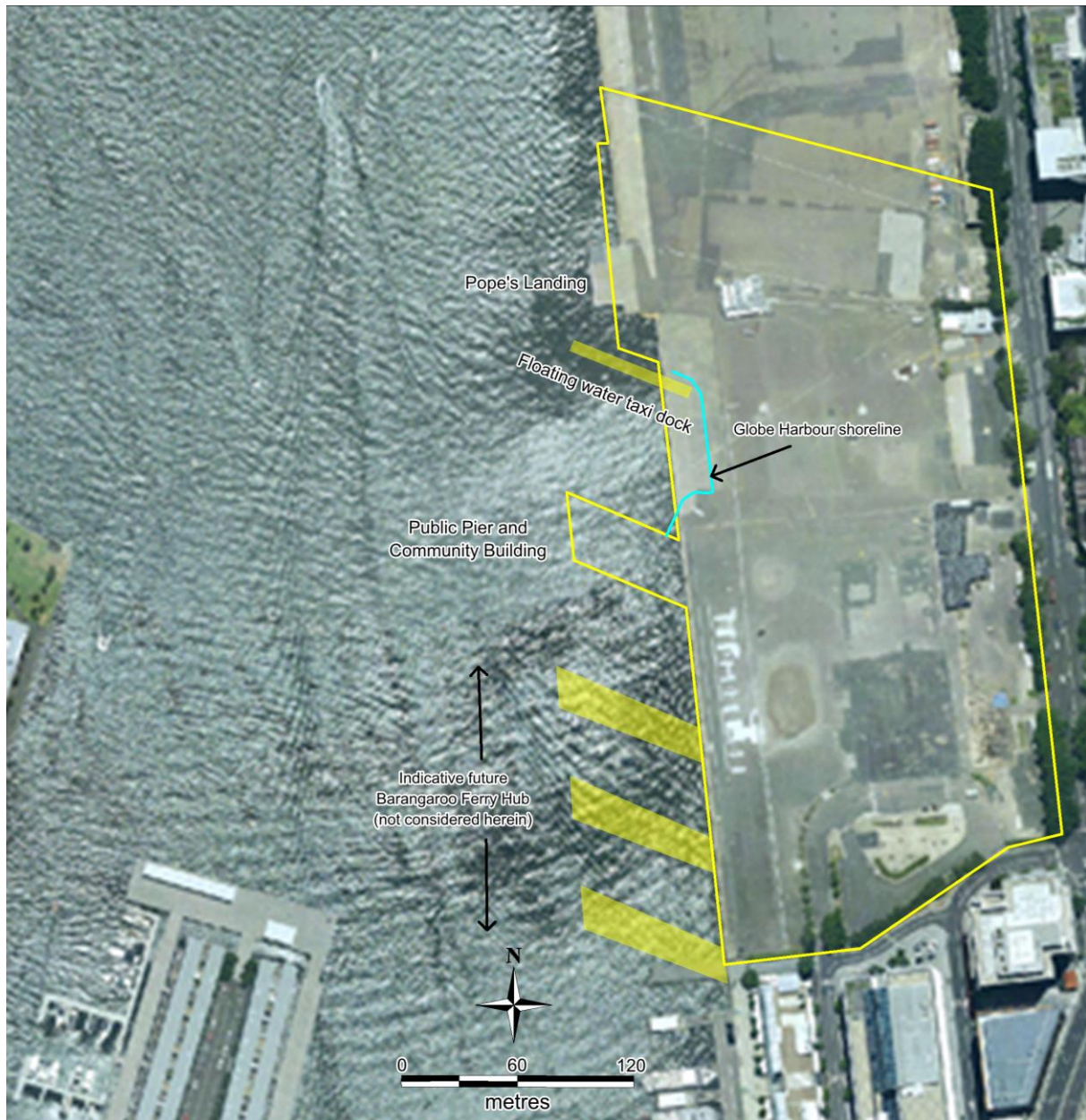
The Community Building and Public Pier would not impact on navigation in relation to Globe Harbour, as Globe Harbour is only proposed to be navigable to smaller vessels such as water taxis.

The Community Building and Public Pier would not impact on navigation in relation to the operation of future Barangaroo Ferry Hub because the ferry wharves would operate as an extension of the King Street Wharf facility and vessels would depart the ferry wharves and navigate past the proposed Public Pier in a widening navigation channel.

### **3.3 Floating Water Taxi Dock**

Based on illustrative plans in the Masterplan, the extent of the floating water taxi dock, and other features such as Globe Harbour and the Barangaroo Ferry Hub, are as depicted in Figure 8 (aerial photograph taken in February 2011).

The water taxi dock would not impact on navigation as it does not extend as far offshore as the Public Pier, and it is located in a wider channel area. It does not encroach within the maximum turning basin required by SPC at the junction of Darling Harbour and Johnstons Bay (Figure 3).



**Figure 8: Proposed plan location of key navigation features over 2011 aerial photograph**

### **3.4 Construction of Public Pier**

The construction phase of the Public Pier may give rise to some temporary navigational effects which have also been considered.

Prior to the undertaking of any works, Lend Lease would develop a detailed work method plan for all water-based construction activities that would form the basis of subsequent detailed consultation between Lend Lease, SPC, RMS and other appropriate stakeholders. No works would commence without the approval of SPC and RMS, where required. The water-based construction work plan

would form part of the documentation informing and supporting the future Community Building/Public Pier Application.

For the purpose of the Mod 8 Concept Plan Amendment, the following indicative water-based construction work planning was developed to allow assessment of navigation impacts during construction.

Prior to the construction of the Public Pier, the area of water required to undertake the works (the works zone) would be established with a floating boom and silt curtain. The boom would typically be continuously floated along its entire length, brightly coloured and would be tethered to temporary buoys anchored to the seabed to retain the silt curtain in position. The position of the boom would only protrude as far beyond the perimeter of the Public Pier as was required for construction purposes, which is likely to be of the order of 30 m and would not likely need to be in excess of 50 m.

The exact details of the plant, equipment and methods to be utilised in the construction of the Public Pier are not yet finalised. They are expected to include the use of barge mounted pin jib cranes servicing specialist piling rigs capable of the driving or screwing of steel casings/liners associated with augured, cast in situ piles through the seabed and into underlying rock strata. For the purpose of installing the piles, piling rigs could either be supported from the existing wharf using a long reach piling rig with an incrementally constructed deck placed progressively out over the water or from a barge or jack-up platform. The crane and piling works would be supported by other smaller work boats.

For the majority of the Public Pier construction period, the works zone required by water-based plant under the various construction options discussed above could be typically managed within a 50 m distance of the northern and southern sides of the Public Pier. This would have no adverse impact on vessels travelling north from Darling Harbour in the proposed relocated navigation channel.

There might be limited instances of works extending out further to the west than the western ends of the Public Pier. On those occasions, a 30 m work zone is expected to be sufficient. If this was required, additional navigation marker buoys could be positioned to clearly show the temporary repositioned navigation channel around the temporary works zone. Prior to the establishment of any temporary change to the navigation channel for the purposes of construction, a detailed program of consultation and communication with stakeholders would be undertaken by Lend Lease. It is considered that the width of the channel adjacent to the proposed Public Pier would be sufficient to accommodate a temporary work zone, for a short period, should it be required.

Once the Public Pier is created, the Community Building could be largely constructed from the pier utilising cranes and other conventional materials handling techniques associated with typical low level building construction, all serviced via access from Barangaroo South landside.

On the basis that the indicative construction work zones discussed above are complied with, and that the Community Building above the Public Pier would mostly be constructed from landside at Barangaroo, the construction of the proposed Community Building and Public Pier would not be expected to impact adversely on navigation in Darling Harbour. Where there were minor impacts, it is perceived that these impacts would be only for short durations (months), which could be readily managed via an appropriate program of consultation with relevant authorities, stakeholders and the general public.

Furthermore, Mod 8 represents a reduced overwater construction extent, with a smaller pier footprint and no jetty, compared to the approved Mod 4 Concept Plan Amendment. Mod 8 thus has a reduced potential construction navigation impact compared to the Mod 4 Concept Plan Amendment.

### **3.5 Construction of Globe Harbour**

Construction of the Globe Harbour would be undertaken entirely from the Barangaroo South landside. As such, there would be no encroachment of plant and equipment into the waters of Darling Harbour west of the existing foreshore alignment during construction. The construction of the proposed Globe Harbour would therefore not impact adversely on navigation in Darling Harbour.

Furthermore, Mod 8 represents a reduced extent to Globe Harbour compared to the approved Mod 4 Concept Plan Amendment. Mod 8 thus has a reduced potential construction navigation impact compared to the Mod 4 Concept Plan Amendment.



#### **4. CONCLUSIONS**

It is considered that the proposed Community Building and Public Pier contemplated under the Mod 8 Concept Plan Amendment would have less impact on navigation than the approved Mod 4 Concept Plan Amendment. These structures would thus not adversely impact on navigation and the movement of vessels in Darling Harbour.

Water-based activities necessary for the construction of these structures and Globe Harbour would be expected to only have temporary and minor impacts on navigation. Furthermore, Mod 8 represents a reduced extent of these structures and Globe Harbour compared to the approved Mod 4 Concept Plan Amendment. Mod 8 thus has a reduced potential construction navigation impact compared to the Mod 4 Concept Plan Amendment.

The indicative floating water taxi dock illustrated as part of the Masterplan would not be expected to adversely impact on navigation and the movement of vessels in Darling Harbour.

## 5. REFERENCES

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