MARITIME HERITAGE PRECINCT - MARINA
TRAFFIC IMPACT ASSESSMENT

NGH ENVIRONMENTAL
## DOCUMENT CONTROL SHEET

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1. **INTRODUCTION**

1.1 **BACKGROUND**

Bitzios Consulting have been engaged by NGH Environmental to prepare a Traffic Impact Assessment (TIA) to accompany the Review of Environmental Factors (REF).

Roads and Maritime Services proposes to construct a Marina consisting of two new wharves, pontoons and a small vessel marina adjacent to the Australian National Maritime Museum (ANMM) in Pyrmont Bay. The Marina (the ‘Proposal’) is proposed to accommodate the Sydney Heritage Fleet (currently located in Rozelle Bay) and the SS South Steyne (currently located in Berrys Bay). The Proposal also aims to increase capacity for visiting vessels of various sizes up to 6,000 tonnes, and to establish a future Maritime Heritage Precinct (in conjunction with the Australian National Maritime Museum) to support the renewal of Darling Harbour as a premium destination for tourists and residents.

The development of the Proposal includes:

- Construction of two new fully serviced high capacity wharves;
- Construction of a Small Vessel Marina and Wharf 7 Pontoon; and
- Reconstruction of sections of the foreshore boardwalks.

The locality of the Proposal is shown in Figure 1.1.

![Figure 1.1: Marina (Proposal) Locality](Source: NGH Environmental)
1.2 **SCOPE**

The purpose of this report is to assess the impact on the local traffic and transport network due to construction activities for the Proposal and potential impacts in the future after its completion.

The report includes:

- a review of existing transport conditions in the vicinity of the site, including any public transport facilities;
- an estimate of construction traffic generation distribution, including peak period vehicle volumes and operation hours across the day;
- suitable haulage routes for land-based concrete and delivery vehicles;
- an assessment of the impacts of construction traffic on the performance of the surrounding road network;
- estimates of post-development traffic generation and distribution during peak periods due to the proposed new wharves and pontoons;
- an assessment of the impacts of the generated post-development traffic on the surrounding road network, including impacts to pedestrian and public transport activity; and
- measures to avoid, minimise any mitigate any potential traffic impacts.

1.3 **REFERENCE DOCUMENTS**

The following documents have been reviewed and referenced in this report:

- State Regional Environmental Plan (Sydney Harbour Catchment) 2005;
- Environmental Planning and Assessment Act 1979; and
2. **EXISTING CONDITIONS**

2.1 **SITE DEVELOPMENT**

The Australian National Maritime Museum (ANMM) currently occupies 2 Murray Street Pyrmont, between Murray Street and Darling Harbour.

Buildings on site consist of a main exhibition hall and the Wharf 7 building (north-west of the main building). Boardwalks and pedestrian walkways surround the site. A number of wharves are located along the eastern side of the exhibition hall.

2.1.1 **The Proposal**

The Proposal is to be constructed primarily over water of Pyrmont Bay, north of the ANMM main exhibition building and east of the Wharf 7 building.

The Proposal development site within the ANMM is shown in Figure 2.1 and detailed in Section 3.

![Development Site](image)

Adapted from NSW SIX Maps

Figure 2.1: Development Site

2.2 **ROAD NETWORK**

The existing road network within the vicinity of the site includes:

- Murray Street;
- Pirrama Road;
- Darling Drive;
- Union Street / Pyrmont Bridge Road; and
- Pyrmont Street.

The local road network relative to the site is shown in Figure 2.2.
2.2.1 Murray Street

Murray Street is a two-way, four lane local road, orientated north-south and forms both northern and southern approaches to the Murray Street / Darling Drive / Union Street intersection. It has the default speed limit of 50 km/h. The northbound kerbside lane opposite the ANMM is used for parking between the hours of 6.00am-6.00pm. The southbound kerbside lane is a turning lane for vehicles turning into Darling Drive. Murray Street provides access to Pirrama Road and The Star. It also fronts the western boundary of the development site.

2.2.2 Pirrama Road

Pirrama Road is a two-way, four lane local/collector road, orientated primarily east-west and joins Murray Street at the eastern end. It has the default speed limit of 50km/h. On the westbound kerbside lane, parking is permitted. The eastbound kerbside lane is a ‘No Stopping’ area around the site. It provides access to The Star and car park facilities, as well as residential and commercial lots within the Pyrmont peninsula.

2.2.3 Darling Drive

Darling Drive is a two-way, five lane collector road orientated primarily north-south and forms the eastern approach to the Murray Street / Darling Drive / Union Street intersection. It has a posted speed limit of 50 km/h. Dedicated turning lanes allow drivers to head northbound and southbound on Murray Street. Vehicles travel eastbound to access the Western Distributor. It fronts the southern boundary of the ANMM site.

2.2.4 Union Street / Pyrmont Bridge Road

Union Street is a two-way, four lane collector/local road orientated primarily east-west and provides a link between Darling Drive, Harris Street and the Western Distributor. There is only a single lane in the westbound direction. A dedicated right turn lane allows access to Murray Road southbound. A separated cycleway is on the northern side of the road which connects cyclists to the Pyrmont Bridge shared path. Pyrmont Bridge Road provides a connection to the Western Distributor, allowing drivers to access the CBD.
2.2.5 Pyrmont Street

Pyrmont Street is a two-way, two-lane road that provides pedestrian and vehicle access to a number of retail, commercial and residential land uses. Parking and pedestrian footpaths are provided in both directions of travel. An on-ramp to the Western Distributor is located at the southern end.

2.3 RESTRICTED ROADS

There are restrictions on some of the roads that surround the site that will affect the access routes of delivery and construction vehicles. These restrictions are shown in Table 2.1.

<table>
<thead>
<tr>
<th>Road</th>
<th>Extent</th>
<th>Restriction</th>
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<tbody>
<tr>
<td>Harris Street*</td>
<td>Scott Street to John Street</td>
<td>3 tonne limit</td>
</tr>
<tr>
<td>John Street</td>
<td>Point Street to Jones Street</td>
<td>3 tonne limit</td>
</tr>
<tr>
<td>Point Street</td>
<td>John Street to Bowman Street</td>
<td>3 tonne limit</td>
</tr>
<tr>
<td>Scott Street</td>
<td>Harris Street to Cross Street</td>
<td>3 tonne limit</td>
</tr>
<tr>
<td>Gadigal Avenue</td>
<td>John Street to Bowman Street</td>
<td>No Construction Vehicles</td>
</tr>
<tr>
<td>Gadigal Avenue</td>
<td>Cul-de-sac</td>
<td>15 tonne gross limit</td>
</tr>
<tr>
<td>Miller Street*</td>
<td>Saunders Street to Harris Street</td>
<td>3 tonne limit</td>
</tr>
<tr>
<td>Saunders Street</td>
<td>Quarry Masters Drive to Miller Street</td>
<td>3 tonne limit</td>
</tr>
<tr>
<td>Quarry Masters Drive</td>
<td>Bank Street to Saunders Street</td>
<td>3 tonne limit</td>
</tr>
<tr>
<td>Murray Street</td>
<td>Right turn onto Union Street</td>
<td>No Right Turn vehicles over 8m**</td>
</tr>
<tr>
<td>Murray Street</td>
<td>Bridge near Pyrmont Street</td>
<td>Low Clearance 3.8m</td>
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* Bus Route
** STA Vehicles Excepted

2.4 ACCESS AND PARKING

2.4.1 On-Site Parking

The Australian National Maritime Museum currently has limited parking on site, which is controlled by boom gate access. This parking is not available to the public, however, there are two Accessible parking spaces that can be pre-booked for use. Total parking on site includes:

- 10 parking spaces;
- 2 Accessible Parking Spaces; and
- 8 bus parking spaces (currently used as car parking, loading and for storage of plant).

2.4.2 Off-Street Parking

A number of public car parks are available near the development site shown in Figure 2.3. These include:

- The Star Car Park;
- Interpark Car Park (Edward Street);
- Wilson Harbourside Car Park (100 Murray Street);
- Secure parking (320 Harris Street); and
- Wilson Jones Bay Wharf Car Park (17 Pirrama Road).
2.4.3 On-Street Parking

There are several locations surrounding the site that accommodate on-street parking. The nearest on-street parking area is opposite the site, on Murray Street. This is a two-hour ticketed area between the hours of 6.00am-6.00pm and is no stopping at other times. On-street parking areas within 250m of the site are listed in Table 2.2.

Table 2.2: On-Street Parking

<table>
<thead>
<tr>
<th>Road</th>
<th>Extent</th>
<th>Direction</th>
<th>Restriction</th>
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<tr>
<td>Murray Street</td>
<td>Darling Drive to Pirrama Road</td>
<td>Northbound</td>
<td>2P Ticket</td>
</tr>
<tr>
<td>Murray Street</td>
<td>Darling Drive to Wilson Harbourside Car Park</td>
<td>Southbound</td>
<td>2P Ticket</td>
</tr>
<tr>
<td>Murray Street</td>
<td>Wilson Harbourside Car Park to Bunn Street</td>
<td>Northbound</td>
<td>2P Ticket</td>
</tr>
<tr>
<td>Murray Street</td>
<td>Bunn Street to Pyrmont Street</td>
<td>Northbound</td>
<td>1P Ticket</td>
</tr>
<tr>
<td>Murray Street</td>
<td>Bunn Street to Pyrmont Street</td>
<td>Southbound</td>
<td>2P Ticket</td>
</tr>
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<td>Pirrama Road</td>
<td>Murray Street to Star Casino Parking</td>
<td>Northbound</td>
<td>2P Ticket</td>
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<tr>
<td>Union Street</td>
<td>Pymont Bridge Road to Edward Street</td>
<td>Westbound</td>
<td>2P Ticket</td>
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<tr>
<td></td>
<td>Edward Street to Pyrmont Street</td>
<td>Eastbound</td>
<td></td>
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<tr>
<td>Edward Street</td>
<td>North of Union Street</td>
<td>Northbound</td>
<td>2P Ticket</td>
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<tr>
<td>Edward Street</td>
<td>Union Street to Pyrmont Bridge Road</td>
<td>Southbound</td>
<td>2P Ticket</td>
</tr>
<tr>
<td>Harwood Street</td>
<td>Pymont Bridge Road to Bunn Street</td>
<td>Northbound</td>
<td>2P Ticket</td>
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### 2.5 PUBLIC TRANSPORT

The local Pyrmont area is well serviced by a number of public transport options, including:

- Bus;
- Light Rail; and
- Ferry.

Public transport routes and associated stops are shown in Figure 2.4

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**Figure 2.4: Public Transport in Pyrmont**

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#### 2.5.1 Bus

The local Pyrmont area is serviced by local bus route 389, Bondi Junction to Pyrmont, with multiple stops along Pirrama Road and Harris Street. It operates at a peak frequency of 7 minutes. The bus stop located within the Australian National Maritime Museum site acts as the bus terminus for route 389, with a large turn around facility.
The 501, West Ryde to Central Pitt Street via Pyrmont and Ultimo, operates in Pyrmont on Miller Street and Harris Street. It provides an easy connection to Pyrmont for people travelling from areas such as West Ryde, Gladesville, Drummoyne and Rozelle. It operates with a peak frequency of around 15 minutes.

A bus stop is located on Murray Street immediately before the intersection with Darling Drive and Union Street, out the front of the ANMM. From observations, tourist buses (hop-on, hop-off sight-seeing buses) use this stop and it is not used by any regular route bus service.

2.5.2 Light Rail
The light rail provides convenient access to the site. A number of light rail stops are within 400m of the development site, including stops:

- Convention Centre;
- John Street Square;
- Pyrmont Bay; and
- The Star.

The Pyrmont Bay light rail stop is the closest to the development site, located directly opposite on Murray Street. It operates at a peak frequency of 8-15 minutes.

2.5.3 Ferry
The Pyrmont Bay Ferry Pontoon is located within the Proposal development site, to the north of the main exhibition building. The F4 Cross Harbour ferry service is currently active at this wharf (as of November 2018) and acts as a terminus for ferry services. Passengers travelling to and from the Darling Harbour precinct board and disembark at this location. The Pyrmont Bay Ferry Pontoon is also designated as a wheelchair accessible ferry wharf. This pontoon will be relocated during construction and operation of the proposed development. Management of this ferry wharf is further discussed in Section 3.2.1.

2.6 Cycling
Situated between Sydney CBD and Anzac Bridge, the local Pyrmont area is a well-established cycling connection, providing a link between the Sydney CBD and inner western suburbs. Based on the Sydney City Bike Map (published by the City of Sydney), a number of cycling routes are located within the vicinity of the development site, including:

- Pyrmont Bridge – off-road shared path;
- Union Street - separated off-road cycleway;
- Murray Street / Pirrama Road – low-traffic on-road cycling route;
- Darling Drive – low-traffic on-road cycling route; and
- Pyrmont Bridge Road - direct route with higher traffic.

Site observations indicated that the eastern kerb of the Union Street/Darling Drive/Murray Street intersection was heavily utilised by cyclists and pedestrians.

The route from Anzac Bridge to Pyrmont Bridge and beyond is designated a regional cycling route, as shown in Figure 2.5.
Figure 2.5: Cycling Routes in Pyrmont and Surrounds

Adapted from Sydney City Bike Map (City of Sydney, 2017)
2.7 PEDESTRIANS

Due to the location and nature of the development site, pedestrian traffic around the site is very high, with significant volumes during AM, PM, evening, and weekend peak periods. A number of pedestrian attractors and generators are located within the vicinity. These include:

- Australian National Maritime Museum;
- Darling Harbour Precinct;
- International Convention Centre (ICC);
- Pyrmont Bridge;
- Sydney CBD;
- The Star Casino;
- Public transport; and
- Other commercial and dining properties.

2.7.1 Pedestrian Crossing Facilities

A signalised mid-block crossing is located at the intersection of Murray Street and Pirrama Road, directly adjacent to the development site.

Other signalised pedestrian crossings are located at the intersection of Darling Road / Murray Street / Union Street and Pirrama Road / Edward Street.

2.8 SPECIAL EVENTS

Some parts of the Pyrmont area are subject to special event conditions during the annual Sydney Morning Herald Half Marathon and Spring Cycle, typically held in May and October each year respectively. Consideration should be given to these recurring events during planning and construction works staging phases of the project. The site-specific Construction Traffic Management Plan (CTMP) is to address the special event conditions.

2.9 TRAVEL PATTERNS

2.9.1 Visitors

Yearly visitor surveys have been used to determine the travel patterns of visitors to the ANMM during the winter, and spring school holidays years 2015 to 2017, and summer holidays in 2017-2018.

The visitor journey data collected by Strategy 8 Consulting determined the main transport mode visitors used to travel to the Museum and/or Darling Harbour. A summary of the data by holiday period is presented in Table 2.3.

Trips considered by car included private vehicle and taxi. Trips by public transport included bus, light rail, ferry and train. Trips by active transport included walking and cycling (which also includes walk up from Darling Harbour).

Table 2.3: Visitor Travel Mode Summary

<table>
<thead>
<tr>
<th>Trip Type</th>
<th>Winter</th>
<th>Spring</th>
<th>Summer</th>
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<tr>
<td>Car / Private Vehicle</td>
<td>19%</td>
<td>17%</td>
<td>11%</td>
</tr>
<tr>
<td>Public Transport</td>
<td>54%</td>
<td>59%</td>
<td>66%</td>
</tr>
<tr>
<td>Active Transport</td>
<td>27%</td>
<td>25%</td>
<td>24%</td>
</tr>
</tbody>
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The data above excludes large tour or school groups travelling by chartered bus or coach. The rounding of percentages in the above table is from the data received.

Table 2.3 shows most visitors to the ANMM travel by public transport or active transport, and a peak average of 19% of visitors travel to the museum by private vehicle or taxi during the winter holidays.
2.9.2 Heritage Fleet Staff and Volunteers

A travel survey of staff and volunteers travelling to the Sydney Heritage Fleet Wharf 7 facility in Pyrmont was conducted by ARUP (commissioned by the NSW Department of Planning) in 2013 as part of the traffic assessment review relating to the proposed Sydney Heritage Fleet Maritime Facility in Blackwattle Bay.

The travel modes of staff and volunteers is presented in Table 2.4.

Table 2.4: Travel Modes of Staff and Volunteers

<table>
<thead>
<tr>
<th>Trip Type</th>
<th>Detail</th>
<th>Proportion</th>
<th>Total Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Transport</td>
<td>Car or otherwise</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>Public Transport</td>
<td>Bus from the City</td>
<td>15%</td>
<td>67%</td>
</tr>
<tr>
<td></td>
<td>Light Rail from City</td>
<td>44%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ferry to Pyrmont Bay</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monorail From City</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Active Transport</td>
<td>Walked from Home</td>
<td>4%</td>
<td>26%</td>
</tr>
<tr>
<td></td>
<td>Walked from Public Transport in City</td>
<td>22%</td>
<td></td>
</tr>
</tbody>
</table>

Based on the amount of public transport options surrounding the Pyrmont site and proximity to the CBD, it can be assumed that the travel mode share will most likely be similar in 2018. Trips taken by monorail are most likely absorbed by other public transport such as the light rail.
3. PROPOSED DEVELOPMENT

3.1 MARINA

Roads and Maritime Services proposes to construct a marina (The Proposal) adjacent to the ANMM in Pyrmont Bay. It is understood the Proposal has been designed in collaboration between Roads and Maritime and the ANMM, with the intention that ANMM would lease the Marina from Roads and Maritime for the establishment of a Maritime Heritage Precinct (MHP) at later date. This includes:

- Opening of the SHF and visiting vessels to the public, including associated public programs (including interpretation and guided tours) which by combination with the ANMM’s national collection, would create the largest fleet of heritage vessels in the southern hemisphere;
- Establishing ANMM operations (ticketed visitation to the vessels and other public programs, events and festivals);
- Operation of the SS South Steyne as a multi-use function centre including functions and events with live music, food and beverage and museum purposes (weddings, education, exhibitions, lectures and events)

Consent for the operation of the Proposal as a Maritime Heritage Precinct, including museum operations by the ANMM and SHF, opening of the vessels to the public and the use of the SS South Steyne for functions, would be sought by separate approvals and is not the subject of this Review of Environmental Factors (REF).

The operation of the Marina includes the intended use of the Marina as a Maritime Heritage Precinct.

The water-based elements include the construction of two wharves and the installation of pontoons to accommodate the combined fleet. The wharves and pontoons will be designed to display, berth and operate the heritage vessels, in conjunction with accommodating a broad range of visiting vessels and maritime festivals.

The proposed Marina development site and future Maritime Heritage Precinct is shown in Figure 3.1.

![Figure 3.1: Proposed Development Site](Image)
3.2 **CONSTRUCTION WORKS**

Proposed works related to the Proposal development include:

- Establishment of site compound within the Wharf 7 Forecourt;
- Establishment of materials staging area and works zone;
- Decommissioning of the existing Pyrmont Bay Ferry Pontoon;
- Relocation of the existing ferry wharf to the new North Wharf;
- Removal of existing piles, concrete structures and ferry bumper guards associated with the Pyrmont Bay Ferry Pontoon;
- Demolition of sections of boardwalk and removal of timber fender piles to enable construction of proposed wharves;
- Construction of two high capacity wharves:
  - North Wharf – approximately 135 metres long by 10 metres wide with a 2,000-tonne capacity close to the Pyrmont Wharf 7 building;
  - South Wharf – approximately 149 metres long by 10 metres wide with a 6,000-tonne capacity next to the ANMM exhibition building;
- Connection of the two wharves to the land structures;
- Installation of a Small Vessel Marina (between the North Wharf and South Wharf) and associated piling;
- Installation of the Wharf 7 Pontoon and associated piles;
- Installation of fenders on wharves and pontoons;
- Installation of wharf furniture including lighting, gates, seating, shade structure, bins and signage;
- Construction of an electrical kiosk in Pyrmont Bay Park connecting to the Proposal; and
- Connection of services (water, power, security, lighting, sewerage) across the plaza area to the wharves and pontoons).

Roads and Maritime Services is responsible for the construction stage of this project. The Museum will remain open during construction work.

The appointed contractor is to confirm the final construction activities, methods and staging in discussion with Roads and Maritime. As such, the activities proposed in this section are indicative only and may vary due to the identification of additional constraints before commencement of work, detailed design refinements, community and stakeholder consultation feedback, and contractor requirements/limitations. Assessment of any changes to above construction activities is to be provided at a later date and are to be detailed within the site-specific Construction Traffic Management Plan.

### 3.2.1 Pyrmont Bay Ferry Pontoon Relocation

In order to minimise disruption to Sydney Ferries services and passenger use, two construction options have been presented:

**Option 1**

This option involves the temporary use of Casino Wharf ferry pontoon during simultaneous construction, shown in Figure 3.2. Proposed work includes:

- Construction of the two wharves simultaneously;
- Site establishment and closure of Pyrmont Bay Ferry Pontoon;
- Temporary use of Casino Wharf Ferry Pontoon (located about 280m west). Although accessible, the Casino Wharf is not Disability Discrimination Act (DDA) compliant and may cause difficulty for people with mobility impairments to travel to and from the Museum;
- Demolition and removal of existing ferry pontoon and all associated water based related facilities;
- Construction of the Proposal and installation of the Pyrmont Bay Ferry Pontoon at the end of the North Wharf by reusing the existing Pyrmont Ferry Pontoon and gangway; and
Site clean-up and recommence Pyrmont Bay Ferry Pontoon services from the relocated Pyrmont Bay Ferry Pontoon.

Figure 3.2:  Option 1 – Simultaneous Construction

Option 2

This option involves staged construction, where the North Wharf is to be constructed first to maintain operation of the existing Pyrmont Bay Ferry Pontoon. Once the North Wharf work is completed, the Pyrmont Ferry Pontoon will be re-installed and opened at the end of the North Wharf. Then the construction of the South Wharf would begin. This is shown in Figure 3.3. Proposed activities include:

- Continue use of the existing Pyrmont Bay Ferry Pontoon from its current location during construction of the North Wharf;
- Following completion of the North Wharf:
  - Temporarily use the Casino Ferry Wharf Pontoon during relocation of the Pyrmont Bay Ferry Pontoon from its current location to the North Wharf
  - Relocate the Pyrmont Bay Ferry Pontoon to the end of the North Wharf and recommence Pyrmont Bay Ferry Pontoon services
  - Following relocation of the Pyrmont Bay Ferry Pontoon, demolish the previous Pyrmont Bay Ferry Pontoon facilities and commence construction of the South Wharf.
3.2.2 Timeline
Construction is expected to take between 12 to 18 months (weather permitting), commencing around April 2019 and finishing in 2020. This is subject to the REF approval and other planning approvals.

3.2.3 Work Hours
All work is expected to be limited to the following standard work hours:
- Monday to Friday 7:00am – 6:00pm; and
- Saturday 8:00am – 1:00pm.

Roads and Maritime Services has proposed the following extended work hours to reduce overall construction time and provide contingency in the event of adverse weather and difficult ground conditions affecting piling:
- Monday to Friday 7:00am – 7:00pm; and
- Saturday 7:00am – 5:00pm.

Out of Hours Work (OOHW) will be required to undertake piling and intricate lifting work from the barge mounted crane during night hours for site safety and to utilise still water conditions. An OOHW Procedure is to be developed by the construction contractor, including notification and ongoing consultation to nearby impacted residents.

3.2.4 Refuse Collection
The majority of refuse generated from the construction work will be handled by barges. A small number of land-based vehicles may be required to handle refuse. Site-specific Construction Traffic Management Plans (CTMPs) must manage the refuse vehicles to ensure minimal impact on the surrounding road network.

3.3 CONSTRUCTION TRAFFIC

3.3.1 Barges
As the proposed construction is situated primarily on the water or along water frontages, a majority of construction plant, equipment, materials, and personnel are to travel to site via barges and/or boats, including barge-mounted cranes. Consultation will be required with Roads and Maritime Services, the Port Authority of NSW, the Australian Maritime Safety Authority and any other relevant government agencies.
3.3.2 **Land Vehicles**

Whilst most construction items are proposed to travel to site via water, some construction traffic movements and deliveries to site may be expected to use the public road network. Typical land-based vehicles likely to be used during construction include:

- Concrete trucks and concrete pump trucks (including boom pump);
- Crane delivery trucks;
- Other delivery vehicles; and
- Light vehicles.

In-situ concrete casting has been estimated to require around 80 truckloads of concrete to construct the wharf deck and pile structures with deliveries to be intermittent across the full duration of wharf construction of approximately 6 months. Concrete deliveries and truck movements will be covered as part of the contractor’s Traffic Management Plan for the site.

All plant and equipment required during construction are pending confirmation during the construction planning stages.

3.3.3 **Crane**

A crane is proposed to be delivered on to site via trucks and is to remain on-site until the construction stages of work are complete. The required capacity of the land crane is expected to be 80 tonnes, which is equivalent to a Heavy Rigid Vehicle (HRV) used for delivery. Site-specific Construction Traffic Management Plans will manage the access of this vehicle to site.

3.3.4 **Traffic Management**

All construction and delivery vehicles are to be managed according to measures outlined in the Construction Traffic Management Plan specific for the site. Traffic Control Plans (TCPs) are to be prepared in accordance with the Roads and Maritime Services *Traffic Control at Work Sites Manual*. Any traffic control devices to be used during construction are also to be implemented into the TCPs in accordance with this manual.

3.3.5 **Pedestrian Management**

Pedestrian management around the work areas will be required during utility adjustments undertaken across the boardwalk and Wharf 7 forecourt. It is expected that pedestrian management will be required over two two-week periods during the installation of sewerage pipework and electricity supply respectively. This will form part of the site specific Construction Traffic Management Plan.

3.3.6 **Proposed Access**

The proposed arrangement of the new wharves and pontoons has been designed to provide direct access for trucks and cranes from existing hardstand areas (i.e. Wharf 7 forecourt) to the wharves and water frontages.

3.3.7 **Site Compound**

Any areas used for the site compound to receive deliveries and act as a material staging area is to be confirmed and included in the site specific Construction Traffic Management Plan. Construction site entry and exit points from both the water and land are to be confirmed and established during initial construction stages.

A primary site compound will be established within the Wharf 7 forecourt, and a secondary site compound will be established to the south of the Southern Boardwalk. The primary site compound will consist of project management offices and an area for the delivery and storage of materials. The secondary site compound will be used for the site plant. Both site compounds will be used between 12 to 18 months during standard construction hours.
The establishment of the site compound and any proposed access are not to interfere with vehicle access to the Sydney Wharf access road to the west of the proposal site.

Traffic control measures, including for vehicles, watercraft, pedestrians and cyclists, shall be established in the site-specific Construction Traffic Management Plan (CTMP). Appropriate way finding signage would be also installed advising of alternative routes for pedestrians.

3.3.8 Construction Personnel

The majority of construction personnel will be brought in via water, however, it can be expected some may travel to the site via land. A total of 12 construction personnel are expected to be on-site during construction activities, extending to both land based and water based construction works.

Management of construction worker travel to site is to be included in the site-specific Construction Traffic Management Plan.

3.4 POST-CONSTRUCTION STAGE

The Marina is proposed to be used for a number of purposes, primarily:

- Berthing of Vessels;
- Museum purposes (future Maritime Heritage Precinct); and
- Other purposes.

The assessment of the operation of the Marina include the intended use as a Maritime Heritage Precinct and has been included in this REF assessment.

3.4.1 Berthing of Vessels

A variety of vessels would be berthed at the Marina, permanently or temporarily. It is intended that the operational vessels of the Sydney Heritage Fleet together with the SS South Steyne would be permanently berthed at the Marina, which includes those vessels used for scheduled fortnightly cruises and charters. Other vessels may visit from time to time such as during maritime festivals and would be berthed on a short term basis.

3.4.2 Museum Purposes

It is proposed to use the marina for museum purposes, to display the vessels of the Sydney Heritage Fleet and the SS South Steyne to the public. The museum would operate ticketed visitation to the SHF vessels and the SS South Steyne for public programs, events and festivals as well as the operation of guided tours.

Consent for the intended use of the Marina for museum purposes will be subject to a separate application.

3.4.3 Function Centre

It has also been proposed to use the SS South Steyne as a function centre, in addition to museum purposes as described above. Expected operation of the SS South Steyne as a multi-use function centre may include functions and events with live music, food and beverage and museum purposes (weddings, education, exhibitions, lectures and events).

Consent for the use of the SS South Steyne as a function centre will be subject to a separate application.
4. **TRAFFIC ASSESSMENT**

4.1 **CONSTRUCTION STAGE**

4.1.1 Traffic and Transport Impacts

*Delivery Vehicles*

It is anticipated that about 80 truckloads of concrete would intermittently access the site over approximately six months when the wharf deck and piles are being constructed. This would result in a small increase in the number of vehicles that travel on the surrounding road network each day and it is not expected to cause noticeable delays on the network.

To mitigate any impacts due to concrete, plant or material deliveries, arrival of vehicles would be timed and scheduled so that queueing is minimised during construction. If necessary, a temporary Works Zone may be established on Murray Street, opposite the site to provide a waiting area in the event of a queue of trucks. Consultation with RMS and the City of Sydney will be required for approval. This temporary works zone would be in operation during the standard work hours and would result in a loss of around seven parking spaces during this time. Figure 4.1 shows the suggested Murray Street Works Zone.

![Figure 4.1: Suggested Murray Street Works Zone](image)

*Figure 4.1: Suggested Murray Street Works Zone*

*Vehicle Access*

Traffic control may be required to allow vehicles to safely enter and exit the sites. This is to be addressed in detail within the site-specific Construction Traffic Management Plan. All site-specific Construction Traffic Management Plans must perform swept path analysis of the largest vehicle using each access as part of the design process. Wherever possible, vehicles are to enter and exit the access points in a forward direction.
Vehicle access points are to be nominated such that minimal impact is created on the Marina Wharf access road adjoining Pirrama Road and associated kerbside parking. The access road is to remain open and operational to local traffic.

Site-specific Construction Traffic Management Plans must be in accordance with the Construction Environmental Management Plan (CEMP).

The site-specific Construction Traffic Management Plans for ancillary facilities must establish traffic control measures (to manage vehicles, watercraft, pedestrians, and cyclists) in accordance with the relevant government requirements. For land-based traffic management, the Roads and maritime Services Traffic Control at Work Sites Manual is to be followed.

**Construction Personnel**

During the proposed construction activities of the development, a total of 12 construction personnel are expected to be on-site, extending to both land based and water based construction works.

Taking the worst case scenario and each construction worker travels to site via road, a total number of 12 vehicle trips will be generated each peak period during construction works. In consideration of the surrounding road network and available off-street and on-street parking facilities, the additional number of vehicles generated by construction workers will not have a significant effect on the road network or parking demand. Construction worker traffic is also expected to affect the PM peak period only, as workers travelling to site would be expected to be travelling before the general AM peak traffic period (7:30 – 8:30 AM). Additionally, it is proposed for construction workers to be transported to site via barges or boats, effectively reducing the number of construction worker vehicle trips to and from site.

In the event where workers are travelling to site over land, the following could be implemented to minimise traffic impacts of construction workers:

- Workers to prioritise utilising public transport where practical, given the availability of a number of public transport options;
- Consideration of establishing a “tool drop” area, where workers can store their tools between shifts to increase the ability of personnel to use public transport options.
- Workers may be restricted to use off-street parking only where possible, the nearest of which are listed in Section 2.4.2.

Management of construction worker travel to site is to be included in the site specific Construction Traffic Management Plan.

**4.1.2 Haulage Routes**

The site-specific Construction Traffic Management Plan is to identify and confirm haulage routes for vehicles accessing and leaving the site. The following haulage routes are indicative only and take into consideration the road restrictions presented in Table 2.1:

- **To/from West:** Anzac Bridge to Western Distributor, onto Pyrmont Bridge Road, onto Murray Street and into site;
- **To/from Southwest:** Bridge Road, onto Pyrmont Bridge Road, onto Murray Street and into site;
- **To/from South:** Broadway, onto Wattle Street, onto Pyrmont Bridge Road, onto Murray Street, into site;
- **To/from East:** Cross City Tunnel, onto Pyrmont Bridge Road, onto Murray Street, into site;
- **To/from North:** East side of Western Distributor, onto Wattle Street, onto Pyrmont Bridge Road, onto Murray Street, into site; and
- **Circulation:** Pirrama Road, onto Jones Bay Road, onto Pyrmont Street, onto Pyrmont Bridge Road.

These indicative haulage routes are shown in Figure 4.2.
Pedestrian Management

Ferry Wharf Relocation

During construction, the walking route from the driveway near the Wharf 7 Pontoon to the northeast corner of the Museum precinct will be closed. With the adoption of construction Option 1, temporary use of the former Casino Ferry Wharf Pontoon will add a walking distance of around 300m to the Museum. This will have the greatest effect on people with mobility impairments. This route is at-grade and will become a primary route for people travelling to this area via ferry.

Alternative routes are limited, as the ramp between the Pyrmont Bridge and the Museum appears to be of an unsuitable gradient to be permitted as a designated accessible friendly detour. A route with acceptable grade is the path that runs parallel to the internal road at the entrance to the Museum. From the top of the path, it is around 100m to the Pyrmont Bridge. Another acceptable path is for people to travel to the Harbourside Shopping Centre and take a series of elevators, resulting in a travel time of around 15 minutes. Figure 4.3 shows the affected and proposed walking routes during construction.

Adapted from NSW SIX Maps

Figure 4.2: Indicative Haulage Routes
Pedestrian Management

The site specific Construction Traffic Management Plans will be required to include a Pedestrian Management Plan to manage pedestrians including those with mobility impairments and consider options such as way-finding for the additional 300 metre distance to Casino Wharf, community notifications, and providing information on alternate bus transport to The Star Casino (one stop) to access the Casino Wharf, to ensure that pedestrians are not severely impacted by construction work.

Additionally, they must safely manage pedestrians around the worksite and must produce Pedestrian Management Plans (PMPs) where pedestrian routes are modified or affected by construction, such as the driveway in front of the Wharf 7 Pontoon or Marina Wharf Access Road adjoining Pirrima Road.

Figure 4.3: Walking Routes During Construction
4.2 **OPERATION (POST-CONSTRUCTION) STAGE**

4.2.1 **Marina and Berthing of Vessels**

A review of existing operations of the Sydney Heritage Fleet indicates the use of the Fleet vessels for ticketed cruise and charter vessels. Upon establishment of the Marina, it is assumed these operations will continue, with all ships berthing from the various wharves and pontoons within the Marina.

Heritage Vessels used for cruise and charter purposes include:

- James Craig (tall ship);
- Lady Hopetoun (steam launch);
- Waratah (steam tug);
- Boomerang (schooner);
- Harman (motor launch); and
- Berrima (motor launch).

Table 4.1 summarises the scheduled cruise operations of Sydney Heritage Fleet vessels (as displayed on the Sydney Heritage Fleet website, November 2018), the maximum number of passengers and expected number of crew. The number of crew are assumed based on the size of the vessel. Vessels Boomerang and Berrima are used infrequently for ‘members only’ cruises and have not been included in the summary below.

<table>
<thead>
<tr>
<th>Vessel</th>
<th>Days of Operation</th>
<th>Boarding and End Time</th>
<th>Frequency</th>
<th>Max Number of Passengers</th>
<th>Number of Crew</th>
</tr>
</thead>
<tbody>
<tr>
<td>James Craig</td>
<td>Saturday, Sunday</td>
<td>Full Day: 9:15am – 4:00pm Half Day: 12:15pm – 6:00pm</td>
<td>Fortnightly*</td>
<td>80</td>
<td>30</td>
</tr>
<tr>
<td>Lady Hopetoun</td>
<td>Saturday, Sunday</td>
<td>11:45am – 3:15pm**</td>
<td>Monthly</td>
<td>27</td>
<td>10</td>
</tr>
<tr>
<td>Waratah</td>
<td>Saturday, Sunday</td>
<td>11:45am – 3:15pm**</td>
<td>Monthly</td>
<td>49</td>
<td>10</td>
</tr>
<tr>
<td>Harman</td>
<td>Tuesday, Thursday</td>
<td>9:30am – 1:00pm</td>
<td>By booking</td>
<td>26</td>
<td>10</td>
</tr>
</tbody>
</table>

* Full-day and half-day cruises occur on alternate weekends or similar
** Scheduled cruises use either Lady Hopetoun or Waratah

Based on a previous project assessment undertaken by The Department of Planning and Infrastructure in 2014 relating to the proposed Sydney Heritage Fleet facility in Blackwattle Bay, 40-50 volunteers are expected to be on-site on a typical weekend, including water-based crew and land based staff. For the purpose of this assessment, 50 volunteers are assumed to travel to site on a typical Saturday or Sunday, with a majority of volunteers arriving prior to 8am to prepare vessels for the planned activities on the day.

4.2.2 **Other Uses**

The assessment of the operation of the Marina as a Maritime Heritage Precinct (Museum) and operation of the SS South Steyne as a multi-use function centre will be subject to separate approvals at a later date and is not assessed as part of this REF.
4.2.3 Future Trip Generation and Traffic Impact

Based on existing operations of the Sydney Heritage Fleet, travel mode information and expected number of visitors and staff, a future trip generation can be estimated and is summarised in Table 4.2.

The trip generation rates presented in Table 4.2 are calculated on a 'worst-case' basis, with the following assumptions made:

- A half-day cruise of the James Craig and cruise on the Waratah is scheduled on the same day;
- the maximum number of passengers per vessel are expected for each cruise;
- all visitors arrive within the same hour (i.e. 11:30am to 12:30pm) to coincide with boarding times of each vessel;
- visitors travel to the Marina via the same travel mode proportions of visitors to the ANMM, with approximately 19% travelling by private vehicle (see Section 2.9.1);
- volunteers and crew travel to the Marina via the same travel proportions of volunteers previously surveyed, with approximately 7% travelling by private vehicle (see section 2.9.2);
- 20% of total volunteers (10 volunteers) arrive within the same hour as visitors, with the remainder of volunteers already on-site at the time of boarding; and
- A car occupancy rate of 1 person per vehicle.

<table>
<thead>
<tr>
<th>Component</th>
<th>Expected Number</th>
<th>Private Travel Proportion</th>
<th>Trips per hour (vph)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visitors</td>
<td>80</td>
<td>19%</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>49</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Staff &amp; Volunteers</td>
<td>10</td>
<td>7%</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>27</td>
</tr>
</tbody>
</table>

*Calculated trips per hour are rounded up to the nearest whole number.

From the calculated trip generation, the Marina is expected to attract a peak trip generation rate of 27$vph$ on a typical Saturday.

Given the finishing times of each cruise are different during the afternoon, the midday peak associated with visitor arrival is taken as the worst case trip generation for a typical Saturday.

In consideration of the local traffic conditions within the study area, an increase of a peak hourly volume increase of 27$vph$ is not expected to significantly impact the local road network as it currently supports a high volume of vehicles, particularly at the Darling Drive, Union Street and Murray Street intersection. Observations show Murray Street / Pirrama Road is not currently at capacity and is expected to accommodate the increase in vehicles.

It should be noted the conclusion of the half-day cruise aboard the James Craig coincides with the start of the typical evening entertainment peak in the surrounding area (i.e. The Star with an evening peak traffic period). However, the additional generated 16 trips associated with passengers aboard the James Craig leaving the area is not expected to cause a significant negative impact on the local road network during these times.

4.2.4 Future Parking Demand

The increase of visitors to the Marina area may put an increased demand on parking in the surrounding area. Based on the assumed increase in vehicles presented in Section 4.2.3 and the total number of volunteers, the expected parking demand is summarised in Table 4.3. As previously assumed, a worst-case scenario of one person per vehicle occupancy rate is used.
Table 4.3: Parking Demand Summary

<table>
<thead>
<tr>
<th>Component</th>
<th>Expected Number</th>
<th>Private Travel Proportion</th>
<th>Parking Demand (vpd)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visitors</td>
<td>80</td>
<td>19%</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>49</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Staff &amp; Volunteers</td>
<td>50</td>
<td>7%</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>

*Calculated demand per day is rounded up to the nearest whole number.

The expected parking demand generated by the Marina under the purposes of vessel berthing and charters is estimated at a total of **30 vehicles per day**.

The Sydney Heritage Fleet currently encourages use of public transport options, but offers ticket holding visitors discounted parking rates at the off-street Harbourside Car Park via ticket validation (located at 100 Murray Street). It can be expected most of the visitors arriving by private vehicle will utilise this large off-street parking facility. Alternatively, the other off-street car parks detailed in section 2.4.2 can be expected to accommodate vehicles parking in the area.

As some of the typical cruise operation times do not coincide with the PM (entertainment) peak period, the demand on The Star car park is not expected to be significant during these peak times and will not severely impact parking capacity or occupancy.

Site observations of the local area show limited on-street parking is available. As parking restrictions are generally two-hours from 6am to 6pm, it is not expected for visitors to park here for extended stays (i.e. three-hour charters or half-day cruises).

In summary, there are a number of off-street parking facilities, in combination with medium turn over on-street parking in the surrounding area that are expected to be able to accommodate the increase in parking demand of 30 vehicles per day.

4.2.5 Impacts to Pedestrians and Public Transport

Pedestrian access will be mostly unaffected during Marina operations. No existing publicly accessible walking routes are expected to be permanently affected by the development. The expanded facilities and pedestrian infrastructure, such as the foreshore boardwalks, are expected to be able to accommodate the increase in visitation.

Based on current travel patterns, public transport will experience a rise in usage after the establishment of the Marina; however, it is not expected to cause a measurable impact on the network. The many public transport options in the area already support multiple large pedestrian generators and attractors and, therefore, the number of visitors and staff travelling to the Marina is not expected to have a significant negative impact on the surrounding network.

The relocation of the Pyrmont Bay Ferry Pontoon to the end of the north wharf will increase pedestrian travel by approximately 130m. The new proposed Pyrmont Bay Ferry Pontoon would be DDA compliant to meet the current standard of the existing Pyrmont Bay Ferry Pontoon.

4.2.6 Visitor Travel Management

To assist in minimising traffic impacts due to visitor travel to the Marina, the use of visitor travel management plans may help reduce the number of visitors arriving by car.

A green travel plan may be further developed to encourage more visitors to travel to the Marina and future Maritime Heritage Precinct using the many forms of public transport available, particularly the use of the ferry and light rail. The plan may encourage public transport use by promoting it as a cheaper and more convenient way to travel to the Marina, considering the short-term parking options available in the surrounding area.
Additionally, installation of bicycle facilities, such as parking/locking racks, may encourage some visitors and staff from the surrounding area to cycle to the Marina and future Maritime Heritage Precinct as it is located adjacent to a major regional cycling route.

Visitor travel information should also be continued to be monitored to provide a snapshot of the number of visitors and staff travelling to site, and their travel modes/patterns to help inform or update any travel management in the future.
5. CONCLUSION

The proposed Marina adjacent to the Australian National Maritime Museum was assessed for traffic and transport impacts as part of developing the REF.

The findings from the above assessment for the construction stage include:

- the majority of material delivery and construction personnel will be via water (barge or boat). The proposed volume of land vehicles accessing the Marina development site is expected to have a negligible impact on the surrounding network; and
- two construction options are presented, with Option 1 resulting in an increase in walking distance of 300m during construction work.

The findings from the above assessment for the post-construction stage include:

- the peak post-development increase in visitation resulting in an increase of around 27 vehicles per day is not expected to have a significant impact on the road network;
- there are sufficient off-street parking facilities to accommodate the expected increase in parking demand of around 30 vehicles per day;
- peak traffic generation and parking demands are not expected to interfere or significantly impact the PM entertainment peak period in the surrounding area;
- the surrounding public transport and pedestrian network currently supports multiple large pedestrian generators and is not expected to be severely impacted by visitors travelling to the Marina; and
- the relocation of the Pyrmont Bay Ferry pontoon will increase pedestrian travel by approximately 130m.

6. RECOMMENDATIONS

Further mitigation measures may be implemented to ensure the Marina related traffic does not have a significant impact on the local road network.

6.1 CONSTRUCTION STAGE

To minimise the impact to the local traffic network and surrounding parking during construction stages, consideration should be given to the following items:

- A site-specific Construction Traffic Management Plan is to be created, which must:
  - include swept path analysis of each proposed access point;
  - include Pedestrian Management Plans (PMPs) of any modification to pedestrian routes;
  - be in accordance with the Construction Environmental Management Plan (CEMP);
  - include management plans for any workers travelling to site over land, including parking restrictions;
  - include detailed haulage routes; and
  - include accessible walking routes;
- encourage workers not travelling to site via water to use public transport where possible (to be detailed in Construction Traffic Management Plan);
- consider implementing an on-site tool drop off facility to make public transport easier for workers;
- time and schedule construction vehicles so queueing on the local road network is minimised; and
- implement a temporary Works Zone on Murray Street (opposite the Museum exhibition building) to accommodate any queueing of delivery vehicles. This may result in up to seven parking spaces being temporarily removed during construction hours.
6.2 **POST-CONSTRUCTION**

To minimise the impact to the local traffic network and surrounding parking after construction, consideration should be given to the following items:

- Implement a visitor travel management plan or green travel plan to encourage greater use of public transport or active transport in the area; and
- Install bicycle parking facilities to encourage more visitors to travel by bicycle, considering the Marina’s location next to a major regional route.

The Marina development proposed by Roads and Maritime Services has been assessed for traffic and transport impacts and was found to have a negligible impact should the aforementioned mitigation measures be implemented.