



Transport for NSW

Beaches Link and Gore Hill Freeway Connection

3 – Spit West Reserve temporary construction support site (BL9) reconfiguration

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3 Spit West Reserve temporary construction support site (BL9) reconfiguration

3.1 Overview

Temporary construction support sites for the Beaches Link and Gore Hill Freeway Connection project would accommodate construction activities such as construction material and equipment storage and staging areas, spoil handling, component casting facilities, worker amenities and car parking. Several key factors were considered for the identification of potential temporary construction support sites associated with construction activities within Middle Harbour, as outlined in Section 3.2.1 of this preferred infrastructure report.

The Spit West Reserve construction support site (BL9) is described in Table 6-23 and Figure 6-37 of the environmental impact statement. The site would be located in the water west of the Spit West Reserve with an adjoining land-based site. The site would be used to support construction of the immersed tube tunnel units and include a temporary floating casting facility connected to the reserve by jetties. Key activities to be carried out at the site include casting of the immersed tube tunnel units, with space for two units to be cast concurrently, support for dredging works, immersed tube tunnel immersion and cofferdam construction. The footprint of the land-based site was minimised during design development ahead of the environmental impact statement public exhibition. The land-based site included a carpark, storage shed and laydown area.

Mosman Council's submission identified that the Spit West Reserve construction support site (BL9) would impact on recreational users of the land-based area including several groups who utilise the area for junior sport (under 12 years old) (refer to Section B13.3 of the submissions report). No objections were received from the community with regard to impacts to recreational users or organised sport on the land-based area. The main community issues raised in relation to the land-based site were concerning dust, noise and construction traffic.

Through consultation with Transport for NSW on 28 April 2021, Mosman Council provided more detailed information on the location and configuration of soccer playing fields and turf netball courts within Spit West Reserve. Transport for NSW has subsequently considered alternatives to the current location and configuration of the Spit West Reserve construction support site (BL9) with the aim to reduce impacts to recreational users of the reserve.

3.2 Need for an immersed tube tunnel unit casting facility

Corridor alternatives and vertical tunnel alignments through and beneath Middle Harbour were considered during the design development phase as outlined in Chapter 4 (Project development and alternatives) of the environmental impact statement. Design development for the project included a strong focus on evaluation of potential tunnelling methodologies. When considering the performance of each of the potential methodologies against design, constructability, traffic performance, environmental and social criteria, the preferred method for crossing Middle Harbour is via an immersed tube tunnel. As part of construction of the preferred alignment, the Spit West Reserve construction support site (BL9) serves a critical function associated with the casting of the immersed tube tunnels.

The completed immersed tube tunnel units would need to be transported by water into position along the tunnel alignment for immersion. Access into Middle Harbour from Sydney Harbour is a constraining factor in this task because Middle Harbour is shallow, around three to 4.5 metres during low and high tide. There are also large areas of seagrass on the sandbar between Grotto

Point and Wyargine Point. Completed immersed tube tunnel units would travel with a roughly nine metre draft below water with one metre of the immersed tube tunnel being above water. Therefore, if the immersed tube tunnel units were cast outside of Middle Harbour they would be too deep in draft to travel through the sandbar between Grotto Point and Wyargine Point and would require extensive dredging of the sandbar containing seagrass.

In comparison, a partially completed immersed tube tunnel unit would be able to travel through the area successfully without the requirement for dredging. Simulations commissioned by Transport for NSW have demonstrated that steel shell units with the base slab concrete cast into the steel shell at a location outside of Middle Harbour would travel with more stability and have a draft of three metres allowing them to enter Middle Harbour during higher tides. Given the technical challenges associated with manoeuvring the immersed tube tunnels and associated equipment required for construction across the Spit sandbar and through the Spit Bridge a temporary construction support site on the western side of the Spit Bridge is required, allowing for the completion of the immersed tube tunnel units with concrete sides and roof upstream of Grotto Point.

3.2.1 Feasibility of alternative locations for the Spit West Reserve temporary construction support site (BL9)

Both a land support area and an over water area are required at the Spit West Reserve construction support site (BL9). A floating facility made up of work barges and temporary jetties is required in 10 metres of water to allow casting of the immersed tube tunnel units to be completed. Access for plant, labour and materials is necessary for the operation of the temporary construction support site. Access would be provided from the arterial road network and Balgowlah Golf Course construction support site (BL10) which would be used as a shared support site for the project, as described in Table 6-25 of the environmental impact statement. The Balgowlah Golf Course construction support site (BL10) would contain a concrete batch plant to supply the immersed tube tunnel units with high quality concrete, which would minimise the land footprint required at Spit West Reserve. As the immersed tube tunnel units need strict concrete shrinkage requirements to ensure water tightness, timely access to concrete from the Balgowlah Golf Course construction support site (BL10) would ensure the high quality concrete required for low shrinkage requirements is able to be provided. Any delays or longer transportation for ready mixed concrete would significantly impact on concrete quality and immersed tube tunnel unit durability.

Given the land-use and topography at waterfront locations west of the Spit Bridge, the only other potentially suitable location for an alternative temporary construction support site would be under Roseville Bridge. However, access to Warringah Road would be steep and this waterway is considered to be too narrow to accommodate the manoeuvring of 100 metre long immersed tube tunnel units with large tug boats. Other locations in Middle Harbour are not technically suitable and do not have ready access to the arterial road network so would require more extensive barging and/or access through the local road network. Subsequently, there are considered to be no viable alternative locations for the Spit West Reserve construction support site (BL9).

3.3 Existing sporting and recreational use of Spit West Reserve

Mosman Council raised in their submission the Spit West Reserve construction support site (BL9) would impact on recreational users of the area including organised sport (ie summer netball and winter soccer). The facilities potentially impacted during construction include turf netball courts, soccer playing fields and a cricket wicket. The configuration of the soccer playing fields and turf netball courts is updated seasonally based on the requirements of community users and has facilitated a number of configurations over the last five years including:

- Up to two soccer playing fields (about 30 metres x 50 metres)
- Up to six soccer playing fields (about 20 metres x 30 metres) with four playing fields constituting the halves of the two larger playing fields
- Four soccer playing fields (about 20 metres x 30 metres) with two playing fields (about 20 metres x 40 metres) overlapping two of the four playing fields
- Four turf netball courts (about 15 metres x 30 metres).

In most instances, the cricket wicket at Spit West Reserve conflicts with soccer playing fields and turf netball courts. Spit West Reserve is mainly used by junior teams (under 12 years old) and as a backup option for pre-season training when other ovals within the Mosman local government area are fully booked. None of the facilities at Spit West Reserve meet playing field specifications for formal tournament matches.

Should the Spit West Reserve construction support site (BL9) remain in the location outlined within the environmental impact statement there are no alternative options nearby for recreational users other than the main ovals within the Mosman local government area, which are in high demand throughout the year (refer to Figure 3-1). Table 3-1 outlines the usage requirements of Spit West Reserve.

Table 3-1 Recreational users of Spit West Reserve

Recreational user	Activity	Hours of use
Manly Warringah Football Association	Junior soccer	Two to three games per season during winter (usually June/July) Saturday mornings: 8am – 11.30am
Mosman Football Club	Junior soccer	Only used Spit West Reserve once in 2020
Mosman Netball Club	Junior netball	For eight weeks during summer (October to November/early December) Friday afternoons: 3pm – 6pm
Mosman Junior Cricket Club	Junior cricket	Summer season (October to March, excluding school holidays) Saturday mornings: 8am – 11am
Beauty Point Public School	School sport and cross-country	February to April Friday mornings: 9am – 11am
Mosman Parkrun (adults)	Community run around the outskirts of Spit West Reserve along Figtree Lane	Throughout the year Saturday mornings: 6.30am – 8.15am

Spit West Reserve temporary construction support site (BL9) reconfiguration



3.4 Reconfiguration of the Spit West Reserve temporary construction support site (BL9)

In response to Mosman Council and community feedback, and recognising the importance of maintaining recreational uses of the Spit West Reserve during construction when there are no viable alternative locations for the Spit West Reserve construction support site (BL9), Transport for NSW is proposing to reconfigure the layout of the site. The widest portion of Spit West Reserve used for soccer playing fields and turf netball courts is the area southwest of the signalised intersection on Spit Road to the reserve. The area of the reserve northwest of the signalised intersection is also used for soccer playing fields and turf netball courts however is narrower with vegetation along the eastern and western edges of the area. The Spit West Reserve construction support site (BL9) exhibited in the environmental impact statement utilised the majority of the area of the reserve southwest of the signalised intersection, limiting opportunities for the provision of soccer playing fields and turf netball courts in the area of the reserve northwest of the signalised intersection.

Several configurations of the Spit West Reserve construction support site (BL9) were investigated by Transport for NSW following exhibition of the environmental impact statement but were discounted due to impacts to surrounding vegetation, seagrass, subtidal rocky reef and other sensitive marine habitat areas, maritime heritage items, parking and Mosman Rowing Club access as well as proximity to traffic on Spit Road. As a result of these investigations, Transport for NSW has reconfigured the layout of the Spit West Reserve construction support site (BL9) so the land-based portion now occupies the narrower area northwest of the signalised intersection to the reserve. This means the wider area of Spit West Reserve southwest of the signalised intersection would continue to be available for soccer playing fields, turf netball courts and cricket during construction. The reconfigured layout for the Spit West Reserve construction support site (BL9) is provided in Figure 3-2.

The key activities, hours of construction and access arrangements of the Spit West Reserve construction support site would not change from those outlined in Table 6-23 of the environmental impact statement. However, the site area and location would be different to the indicative layout represented in Figure 6-37 of the environmental impact statement. The indicative construction program would remain consistent with the program outlined in Table 6-24 of the environmental impact statement. Table 3-2 below presents key characteristics comparing the site layout presented in the environmental impact statement with the reconfigured site layout provided in Figure 3-2 and proposed as part of this preferred infrastructure report.

Table 3-2 Key characteristics of the Spit West Reserve construction support site (BL9)

	Environmental impact statement site layout	Reconfigured site layout
Over water area	26,000 square metres	28,500 square metres
Land support area	4500 square metres	3600 square metres
Impacts to trees	Up to 4	Up to 5
Impacts to swing moorings	About 45	About 45
Impact to organised sport	Available facilities: <ul style="list-style-type: none"> • Three turf netball courts (about 15 metres x 30 metres) 	Available facilities: <ul style="list-style-type: none"> • Five turf netball courts (about 15 metres x 30 metres)

	Environmental impact statement site layout	Reconfigured site layout
	<ul style="list-style-type: none"> • Two junior soccer fields (about 20 metres x 30 metres) • 2,805 square metres for school sport and cross-country • Mosman Parkrun to follow temporary shared user path diversion 	<ul style="list-style-type: none"> • Three junior soccer fields (about 20 metres x 30 metres) • One soccer field (about 30 metres x 50 metres) • Cricket wicket 3,847 square metres for school sport and cross-country • Mosman Parkrun to follow temporary shared user path diversion
Offset to Mosman Rowing Club	Over water area: about 27 metres Land support area: about 61 metres	Over water area: about 37 metres Land support area: about 131 metres
Offset from d’Albora Marina	About 52 metres	About 46 metres
Length of temporary shared user path diversion	About 220 metres	About 190 metres

The increased size of the over water area for the proposed reconfigured Spit West Reserve construction support site (BL9) is due to the need to accommodate a tighter turning circle for heavy vehicle movements. The tighter turning circle associated with the reconfigured site necessitates the provision of four pontoons oriented northeast to southwest compared to the two pontoons oriented northeast to southwest in the previous site layout outlined in the environmental impact statement. The movement of the temporary construction support site to the west avoids impacts to maritime heritage item Pearl Bay Unidentified No.1 Shipwreck and side scan anomaly 18W-002, described in Section 3.6.4. The movement also minimises impacts to marine ecology including seagrass, subtidal rocky reef and other sensitive marine habitat areas, as described in Section 3.6.5. Despite the increase in the over water area required, this increased footprint is generally within the marine traffic zone for the Spit West Reserve construction support site (BL9) presented in the environmental impact statement.

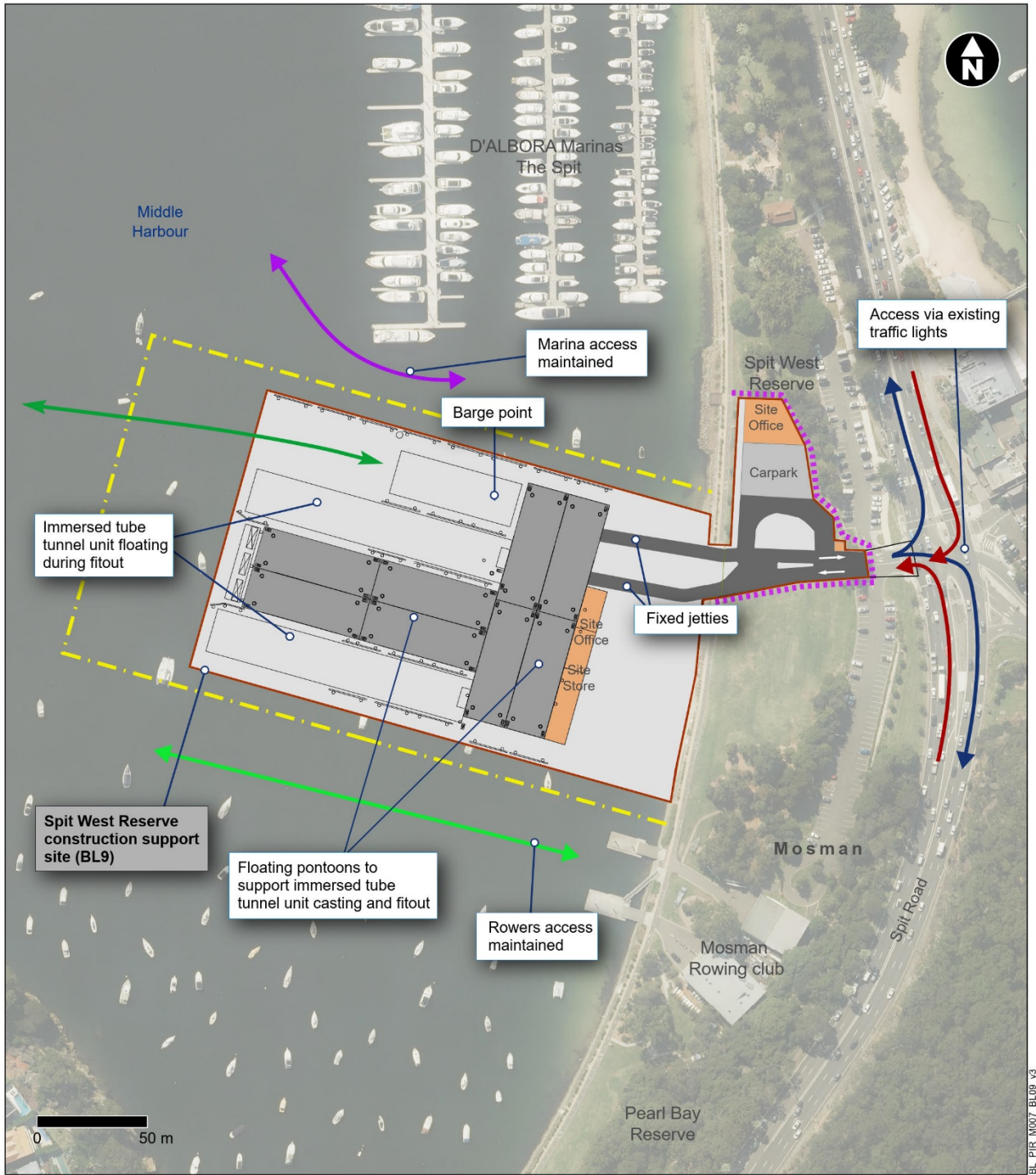
Given the lack of alternative recreational facilities for users, Transport for NSW has considered alternatives for the Spit West Reserve construction support site (BL9) as outlined in Section 3.2.1 with the aim to reduce impacts to the extent possible and allow for the continued use of the reserve by organised sports associations during construction.

Mosman Council has in the past managed reduced flexibility in their ability to provide different configurations of soccer playing fields and turf netball courts. Between July 2017 and August 2020, portions of the Spit West Reserve used by recreational users were occupied by a temporary construction support site associated with the delivery of the B-Line Bus program. During this period, impacts to the area ranged from about 470 square metres to about 600 square metres. The temporary construction support site also impacted between 15 to 32 car parking spaces throughout the delivery of the B-Line Bus program.

The proposed reconfigured site layout has been refined so three junior soccer playing fields (around 20 metres by 30 metres) or one larger soccer playing field or five turf netball courts could be provided (refer to Figure 3-3 and Figure 3-4 respectively). There will still be reduced flexibility in Mosman Council’s ability to provide different configurations of soccer playing fields and turf netball

courts. However, impacts from the Spit West Reserve construction site (BL9) use of the reserve have been minimised to the extent possible.

Mosman Council has expressed support for Transport for NSW's reconfiguration of the Spit West Reserve construction support site (BL9). In considering the proposed site reconfiguration, Mosman Council balanced the need for recreational facilities, open space and parking while acknowledging the necessity for Transport for NSW to use this land during construction. The concerns raised by Mosman Council in their submission identified the potential operational impact on Mosman Rowing Club and through subsequent Transport for NSW engagement with the Club, opportunities to distance the water-based component of the Spit West Reserve construction support site (BL9) were able to be realised.



Indicative only – subject to design development

Legend

- | | | |
|--|--------------------------------------|---|
| Construction footprint | Temporary site access | Site access - in |
| Construction support site | Construction support site buildings | Site access - out |
| Indicative Marine traffic control zone | Temporary shared user path diversion | Marina access |
| | | Mosman rowing club access |
| | | Construction support to immersed tube tunnel site |

Figure 3-2 Reconfigured Spit West Reserve construction support site (BL9)



Legend

- Construction site boundary
- Soccer playing field (~20m x 30m)
- Construction footprint
- Soccer playing field (~30 x 50m)

Indicative only – subject to design development

BL_GIS_M022_SWRSportFields_v3

Figure 3-3 Potential provision of soccer playing fields during project construction (Map A)



Legend

- Construction site boundary
- Turf netball court (~15m x 30m)
- Construction footprint

Figure 3-4 Potential provision of turf netball courts during project construction (Map B)

3.5 Consultation

Mosman Council is a key stakeholder for the Western Harbour Tunnel and Beaches Link program of works. Transport for NSW has regularly engaged and consulted with Mosman Council since the program was first announced in 2017. Following receipt of the Mosman Council submission on the environmental impact statement, Transport for NSW worked collaboratively with Council to determine the recreational needs at Spit West Reserve and explore opportunities for a reconfiguration of the site.

A summary of the consultation carried out in relation to the preferred infrastructure report requirements for the Spit West Reserve construction support site (BL9) is provided in Table 3-3.

Prior to the consultation outlined in Table 3-3, Transport for NSW met with Mosman Rowing Club on 15 April 2021 to discuss and provide information regarding transportation of construction workers, construction vehicle movements, maritime vessel movements, the construction schedule, Mosman Rowing Club's main hours of operation on the water, available space for rowing and safety of water users during construction.

Table 3-3 Consultation regarding Spit West Reserve construction support site (BL9) reconfiguration

Stakeholder	Date	Engagement topics
Mosman Council	28/04/2021	Meeting to discuss: <ul style="list-style-type: none"> Spit West Reserve construction support site (BL9) Temporary impacts on recreational and sporting users Potential design refinements to minimise these impacts.
Mosman Council	12/07/2021 and 14/07/2021	Meeting to discuss: <ul style="list-style-type: none"> Preferred infrastructure report requirements Supply of recreational facilities within the immediate area and the demand for these facilities throughout the year Spit West Reserve construction support site (BL9) reconfiguration Future Transport for NSW and Mosman Council engagement with recreational users of Spit West Reserve.
Mosman Council Mosman Junior Cricket Club Mosman Netball Club Mosman Football Club Mosman Parkrun (adults) Mosman Rowing Club	03/08/2021	Meeting to discuss: <ul style="list-style-type: none"> Beaches Link and Gore Hill Freeway Connection project overview Preferred infrastructure report requirements Spit West Reserve construction support site (BL9) reconfiguration.

Manly Warringah Football Club and Beauty Point Public School were also invited to the meeting held 3 August 2021 however no representatives were available to attend. All stakeholders, including those who were unable to attend the meeting held 3 August 2021, were issued a copy of the presentation and invited to contact the project team if they had further questions or comments.

Feedback provided by stakeholder interest groups during the consultation activities is provided in Table 3-4 and includes the Transport for NSW response.

Table 3-4 Feedback provided during consultation activities

Stakeholder	Feedback provided	Transport for NSW response
Mosman Netball Club	Expressed support for the reconfiguration of the Spit West Reserve construction support site (BL9).	Noted.
	Requested confirmation that access to the amenity facilities for families and young children would be retained, without the need to travel through the carparking area.	Transport for NSW confirmed there will be a temporary shared user path detour around the site. Traffic control will also be in place during periods of high access to and from the site to make sure pedestrians and cyclists navigate this interface safely. An overview of the temporary shared user path detour is provided in Figure 3-2.
Mosman Parkrun	Requested confirmation as to whether the shared user path along the foreshore would be able to remain open when the temporary construction support site was not operating.	Transport for NSW advised this opportunity will be investigated in consultation with a construction contractor/s, once appointed. The safety of pedestrians, cyclists and workforce is paramount so if there is a risk, access through the site even when the site is not operating, may not be possible.
	Requested confirmation on whether workers would arrive at site before 8am on Saturdays and where they would park.	Transport for NSW advised the majority of workers would park at the Balgowlah Golf Course construction support site (BL10) and be transferred to site via shuttle bus. There is limited parking at the Spit West Reserve construction support site (BL9) for supervisory staff and primary workers. Some workers may arrive at site before 8am however works would not commence until 8am on Saturdays.
Mosman Football Club	Confirmed Spit West Reserve was only used by the club once last year, so they are not anticipated to be impacted. The club primarily uses Georges Heights Oval, therefore are unlikely to need to use Spit West Reserve during construction.	Noted.
Mosman Junior Cricket Club	Expressed support for the reconfiguration of the Spit West Reserve construction support site (BL9) as the cricket wicket is no-longer impacted.	Noted.
Mosman Rowing Club	Confirmed the club use the field sparingly and the reconfigured site would accommodate their needs.	Noted.

3.6 Environmental screening assessment

An environmental screening assessment was carried out to determine the need for additional environmental assessment due to the reconfiguration of the Spit West Reserve construction support site (BL9) (refer to Table 3-5). The reconfigured site was assessed against each of the key issues, as set out in the revised Secretary's environmental assessment requirements issued for the project on 22 April 2020 by the Department of Planning, Industry and Environment.

The assessment process involved desktop studies and review of the potential impacts identified at the Spit West Reserve construction support site (BL9) within the environmental impact statement. Additional impacts and mitigation measures proposed are detailed in the following sections of this assessment.

Table 3-5 Screening assessment for the reconfiguration of Spit West Reserve construction support site (BL9)

Key issue	Additional assessment required
Traffic and transport	Y
Noise and vibration	Y
Air quality	N
Human health	Y
Non-Aboriginal heritage	Y
Aboriginal heritage	N
Geology, soils and groundwater	N
Hydrodynamics and water quality	N
Flooding	N
Biodiversity	Y
Land use and property	Y
Socio economics	Y
Urban design and visual amenity	Y
Hazard and risks	N
Resource use and waste management	N
Sustainability	N
Climate change risk and greenhouse gas	N
Cumulative impacts	N

As identified in Table 3-5, potential impacts as a result of the reconfiguration of Spit West Reserve construction support site (BL9) for air quality, Aboriginal heritage, geology, soils and groundwater, hydrodynamics and water quality, flooding, hazard and risks, resource use and waste management, sustainability, climate change risk and greenhouse gas and cumulative impacts are consistent with those identified in the environmental impact statement and no further assessment is required. Therefore, the environmental management measures presented in Appendix C of this preferred infrastructure report would be sufficient to manage these impacts.

The proposed change to Spit West Reserve construction support site (BL9) would have no effect on the operational impacts of the project outlined within the environmental impact statement. Potential construction impacts of the reconfigured site are outlined in the below sections.

3.6.1 Traffic and transport

Impacts on maritime recreational users, community groups and clubs

There would be no change in the overview of maritime movements and activities, and maritime navigation impacts as described in Section 8.4.3 of the environmental impact statement. Consultation will be carried out with surrounding water based users of Middle Harbour to develop reasonable and feasible management measures to minimise construction impacts, as required by revised environmental management measure CTT16 (refer to Appendix C of this preferred infrastructure report).

The reconfigured site would move to the north increasing the distance between the proposed temporary construction support site and Mosman Rowing Club. The increased distance between the Spit West Reserve construction support site (BL9) and Mosman Rowing Club would reduce any potential effects of boat wash on rowers either accessing or egressing the Mosman Rowing Club jetty south of the marine traffic control zone. The reconfigured site would be located closer to d'Albora Marina at Spit Bridge however there would be no disruption in access to the facility. There would still be around 52 metres between the proposed facility and the marina and boats accessing or egressing the marina would not be subject to the same effects of boat wash as rowers otherwise would be. A navigation channel delineated with marker buoys will be formed on the approach to d'Albora Marina at The Spit next to the reconfigured Spit West Reserve construction support site (BL9) as required by new environmental management measure CTT19 (refer to Appendix C of this preferred infrastructure report).

As detailed in Table 3-2, about 45 swing moorings would be temporarily relocated for about 48 months during construction due to the reconfigured site. This is consistent with the information presented in the environmental impact statement and relocation will be in accordance with revised environmental management measure CTT2 (refer to Appendix C of this preferred infrastructure report).

Construction traffic and transport impacts

As there would be no change in the daily maximum construction vehicle volumes and the anticipated routes to and from Spit West Reserve construction support site (BL9), there would be no change to the impacts described in Section 8.4.4 of the environmental impact statement. Similar to the environmental impact statement layout, there would be no loss of parking within the Spit West Reserve carpark due to the reconfiguration of the temporary construction support site.

Significant pedestrian activity occurs along Spit West Reserve, around the marinas at the southern end of Spit Bridge. Temporary adjustments to paths in Spit West Reserve and around the Spit West Reserve construction support site (BL9), specifically Figtree Lane, would be required due to the project. However, access to the viewing platform along Figtree Lane and next to the temporary construction support site would be maintained. The temporary shared user path diversion of Figtree Lane around the site outlined in Section 8.4.4 of the environmental impact statement would decrease by 30 metres with the reconfigured site layout. Although the length of the detour would be shorter, there would still be a minor impact to users consistent with the environmental impact statement. Opportunities to maintain access along Figtree Lane through the site outside of standard construction hours would be explored during further design development. However, the provision of access along Figtree Lane would only be facilitated if the safety of users and construction workers

could be maintained. Impacts to users would be managed by the environmental management measures outlined in Appendix C of this preferred infrastructure report, including:

- Directional signage, barriers and/or linemarking will be used as required to direct and guide users past construction sites (refer to environmental management measure CTT10)
- Direct impacts to existing pedestrian and cycling facilities will be minimised to the extent possible. Any detours and adjustments will be designed with consideration of user safety and convenience (refer to revised environmental management measure CTT15).

3.6.2 Noise and vibration

The scope of activities carried out and hours of operation would not change despite the reconfiguration of the site. During the operation of the Spit West Reserve construction support site (BL9), work would typically take place during standard construction hours. However, some works would take place outside standard hours during extended concrete pours for the immersed tube tunnel fitout and to support tunnel unit immersion at the Middle Harbour crossing, which needs to occur 24 hours a day for safety reasons, as discussed in Table 5-120 of Appendix G (Technical working paper: Noise and vibration). Immersed tube tunnel fitout would last for about 18 months, with tunnel unit immersion occurring over six distinct 24 to 48-hour periods over a period of around nine months. As the location of the reconfigured site is adjacent to the original location, impacts would remain generally consistent with those described in Section 10.6.9 of the environmental impact statement.

Specific impacts due to construction airborne noise, cumulative construction noise and construction related traffic noise are considered to be consistent with the environmental impact statement despite the reconfiguration of the site. As identified in the environmental impact statement, due to the nature of construction works at this site, no physical noise treatment measures are required. However, the altered layout with the site offices at the north of the site would provide some acoustic shielding to the playground within the Spit West Reserve and d'Albora Marina. Impacts to nearby receivers would be managed through implementation of the environmental management measures outlined in Appendix C of this preferred infrastructure report.

Construction ground-borne noise may be generated by vibration intensive works within the Spit West Reserve construction support site (BL9). Although the distance to the closest building to the site would change due to its reconfiguration, it is still considered likely that the airborne noise levels would be greater than ground-borne noise levels at the nearby noise sensitive receivers during construction works.

The most vibration intensive activities at this site would remain unchanged and are likely to be screw pile driving during wharf building works and the use of rock hammers during establishment works. There are no receiver buildings within the minimum working distances for major vibration generating activities. Construction noise and vibration impacts will be monitored periodically throughout all stages of the temporary construction support site, as required by environmental management measure CNV5. Impacts will be managed appropriately as required by the Construction Noise and Vibration Plan identified in environmental management measure CNV1 (refer to Appendix C of this preferred infrastructure report).

Two underwater maritime heritage items are located within the Spit West Reserve construction support site (BL9) footprint and may experience potential direct or indirect impacts from construction. The impact on these items due to the reconfigured site is discussed further in Section 3.6.4. These maritime heritage items were not specifically addressed in Appendix G (Technical working paper: Noise and vibration), due to the submerged nature of these heritage items and as

they are not building structures that require structural integrity for any specific purpose, the standards and limits for managing structural damage are not directly applicable.

3.6.3 Human health

There would be no change to the scope of works at Spit West Reserve construction support site (BL9) due to its reconfiguration, therefore potential impacts to human health remain largely consistent with those outlined in Chapter 13 (Human health) of the environmental impact statement. Contamination risks associated with the construction phase of the project due to the former filling of reclaimed land at Spit West Reserve would remain unchanged.

Spit West Reserve provides the opportunity for a number of formal and informal recreational activities and is likely to attract tourists, weekend visitors and opportunities for photoshoots (eg weddings). During construction, part of the reserve would be unavailable for public use for a period of about 48 months. The amenity of Spit West Reserve would be diminished during construction and may detract from the enjoyment of people visiting accessible parts of the parks or nearby facilities.

Temporary use of parks and open space areas such as Spit West Reserve for temporary construction support sites may result in impacts to community health. Health benefits of open space in urban areas include protection of people from environmental exposures associated with air pollution and extreme temperature, reduced morbidity, improved opportunities for physical activity and exercise, improved mental health and feelings of wellbeing, particularly lower stress levels and improved opportunities for social interactions. However, due to the reconfiguration of the site, access to the area by local sporting clubs and schools will now be facilitated with an area suitable for multiple turf netball courts or soccer playing fields to be maintained throughout the project construction, minimising any potential impacts.

The reconfigured site would move to the north, increasing the distance between the proposed temporary construction support site and Mosman Rowing Club. However, as outlined within the environmental impact statement impacts to water-based recreational activities (such as the Mosman Rowers Club) would require mitigation and management measure to minimise disruption. Amenity and access impacts to users would be managed through implementation of the environmental management measures outlined in Appendix C of this preferred infrastructure report.

3.6.4 Non-Aboriginal heritage

Potential impacts to terrestrial non-Aboriginal heritage items would remain consistent with those described within Chapter 14 (Non-Aboriginal heritage) of the environmental impact statement.

The environmental impact statement identified several maritime heritage items that have the potential to be impacted by the project which are located within the construction footprint of the Spit West Reserve construction support site (BL9), namely:

- Pearl Bay Unidentified No. 1 Shipwreck (18W-01) (known heritage item, unlisted)
- Side scan sonar anomaly 18W-002 (potential heritage item, unlisted).

Pearl Bay Unidentified No.1 Shipwreck comprises the remains of a timber-hulled and copper-sheathed vessel, approximately two metres wide by up to 10 metres long, and extends approximately 700 mm above the bed of the harbour. Side scan sonar anomaly 18W-002 has the potential to be a pile but is more likely a water pipe or similar, or a data anomaly. It should also be noted a wreck of a sunken yacht is located in the same vicinity of Pearl Bay Unidentified No. 1 Shipwreck, but has been identified in Appendix K (Technical working paper: Maritime heritage) as

having no potential heritage significance. The yacht is known to have sunk sometime between July 2017 and December 2017 and it is not known if it is still present on the bed of the harbour.

Potential impacts on maritime non-Aboriginal heritage have been considered and assessed. The proposed reconfiguration of the Spit West Reserve construction support site (BL9) would move the water-based works around 6.5 metres to the north. The layout of the water-based area of the site would also be reconfigured accommodating additional pontoons to facilitate a tighter turning circle for heavy vehicles as a result of the adjustment to the land area of the site. Pontoons within the construction support site would move around 14.5 metres to the north and 15.5 metres to the west encompassing a larger area within the water-based construction footprint, and resulting in a change to the piling arrangement. This adjustment has also been made to avoid any direct impact to maritime heritage item Pearl Bay Unidentified No.1 Shipwreck and side scan anomaly 18W-002. There would however be minimal change in the overall size of the over water area identified as the maritime traffic control zone in the environmental impact statement.

Both maritime heritage items would remain within the construction footprint of the reconfigured site. Figure 3-5 presents the piling arrangement for the reconfigured site in relation to the maritime heritage items. Proposed piling would take place close to Pearl Bay Unidentified No. 1, but is not expected to directly impact the wreck. There remains a possibility that the wreck may be impacted by anchoring during the construction, operation and removal of the temporary construction support site. The proposed works could result in loss of site integrity and reduction in heritage values for the wreck. These potential impact findings and all other potential impacts are consistent with the environmental impact statement. Following implementation of the environmental management measures outlined in Appendix C of this preferred infrastructure report, and the reconfiguration of the site, minor impacts to Pearl Bay Unidentified No. 1 would be minimised.

For side scan sonar anomaly 18W-002, the reconfigured footprint of Spit West Reserve construction support site (BL9) has moved further away from this item. However, the resultant level of impact would remain as minor, which is consistent with the environmental impact statement.

The minor impacts to both maritime heritage items would be managed by the environmental management measures, consistent with the environmental impact statement and as outlined in Appendix C of this preferred infrastructure report, including:

- A Maritime Heritage Management Plan that details the objectives and methodologies to conserve maritime heritage and mitigate impacts will be prepared in consultation with a qualified and experienced maritime archaeologist (refer to environmental management measure NAH3)
- Restricted zone, archival, baseline and periodic monitoring protocol including before and during construction, and final site inspections within three months of completion of works for maritime heritage sites including Pearl Bay unidentified No.1 Shipwreck (refer to environmental management measure NAH3)
- A detailed archival recording of Pearl Bay Unidentified No.1 Shipwreck will be prepared, consistent with relevant NSW Heritage Council approved standards and guidelines (refer to environmental management measure NAH6)
- Further side scan sonar survey of the project construction footprint in the vicinity of the Spit West Reserve construction support site (BL9). A qualified maritime archaeologist will assess the results of the side scan survey to identify any additional potential heritage items requiring investigation and assessment (refer to environmental management measure NAH7).

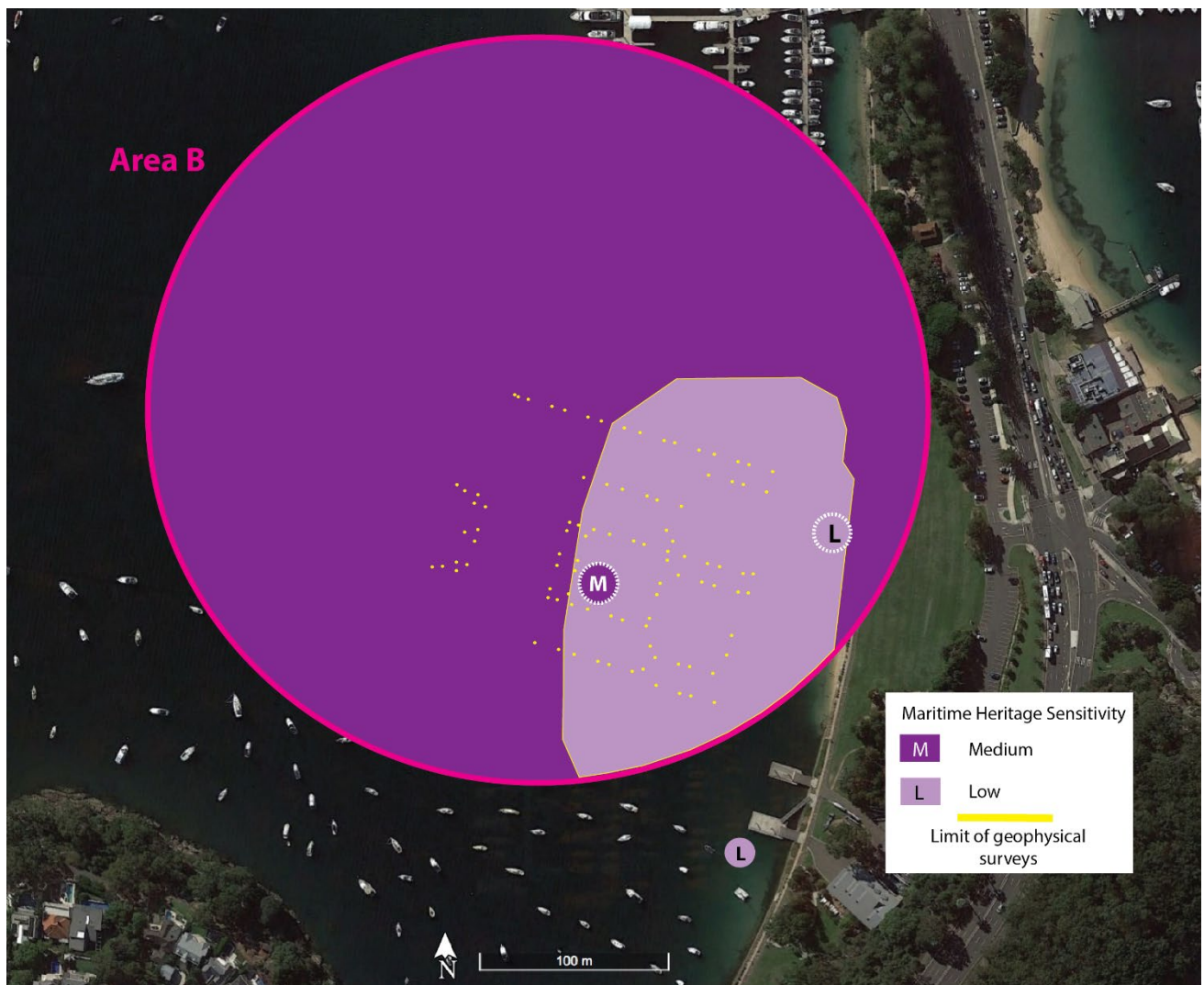


Figure 3-5 Potential impact on maritime heritage sites in Area B (Proposed works in yellow) (update to Figure 8-7 of Appendix K (Technical working paper: Maritime heritage))

3.6.5 Biodiversity

Terrestrial ecology

Up to four trees have been identified for removal in the environmental impact statement due to the Spit West Reserve construction support site (BL9) (refer to Appendix W (Arboricultural impact assessment)). These include two *Allocasuarina littoralis*, one *Casuarina cunninghamiana* and one *Ficus macrophylla*. Due to the reconfiguration of the site, one additional *Ficus macrophylla* would require removal (99552). Despite the removal of an additional tree, impacts would remain consistent with those discussed in the environmental impact statement. Planted native species such as these within landscaped areas that are highly disturbed are unlikely to provide habitat for terrestrial fauna. However, environmental management measures provided in Appendix C of this preferred infrastructure report will be implemented to manage potential risks to terrestrial fauna during clearing, including environment management measures B22 and B23. These measures will include pre-clearing surveys to minimise the risk of injury or mortality and ensure appropriate procedures are implemented to manage fauna found within the construction footprint.

In addition, the mature amenity trees removed as a result of construction will be replaced at a ratio of 2:1 as required by revised environmental management measure V13 (refer to Appendix C of this preferred infrastructure report).

Marine ecology

Both seagrass and subtidal rocky reef have been identified along the foreshore of Spit West Reserve as outlined in Chapter 19 (Biodiversity) of the environmental impact statement, with small patches present within the construction footprint of the over water area of the Spit West Reserve construction support site (BL9). During construction, temporary instream structures would be installed to support construction activities, including temporary jetties and wharves at the Spit West Reserve construction support site (BL9). The project design and construction works have been developed to largely avoid direct impacts to seagrass and other sensitive marine habitat areas in Middle Harbour. The reconfigured site would be about 18 metres further west, away from the shoreline, than the location of the temporary construction support site described in the environmental impact statement.

Impacts to seagrass and other sensitive marine habitat areas in Middle Harbour due to the reconfigured site would remain generally consistent with those outlined in the environmental impact statement:

- The removal of intertidal rocky shore and sand and mudflat habitat at Spit West Reserve construction support site (BL9) would occur along the shoreline of the crossing of Middle Harbour
- Activities at Spit West Reserve construction support site (BL9) have the potential to directly impact seagrass and rocky reef habitat due to scouring from vessels as well as construction of and shading from temporary jetties and wharves
- Temporary construction facilities at Spit West Reserve construction support site (BL9) would reduce currents running along the shoreline. It is not expected that seagrass or rocky reef habitat would be affected given these habitats thrive in many other parts of the study area.

These impacts would remain unchanged due to the reconfiguration of the site, with the impacts moving slightly north along the foreshore of Spit West Reserve.

The reconfigured site would move closer to a small occurrence of artificially created saltmarsh habitat which occurs immediately to the north of Spit West Reserve construction support site (BL9). Inadvertent impacts from vessel and equipment mobilisation may occur, however it is noted that this

patch of saltmarsh is currently protected by rock armour. Consistent with the environmental impact statement, if this patch of saltmarsh were to be removed, the consequence would be considered as minor, as reinstatement would occur, and recovery is likely to occur within one to two years. There is the potential for exposure to localised turbidity and sedimentation as a result of activities at the reconfigured site, consistent with the environmental impact statement. However, saltmarsh habitats are well adapted to suspended sediments (ie turbidity) and sedimentation, similar to mangrove habitats.

Impacts to marine ecology would be managed through implementation of the environmental management measures outlined in Appendix C of this preferred infrastructure report, including:

- Exclusion zones will be implemented to avoid disturbance to sensitive marine habitats not proposed to be directly impacted by the project. These include any intertidal sand and mudflats, intertidal rocky shore, subtidal rocky reef and seagrass habitats with potential to occur within or next to transit routes and vessel movements. Routine inspections and maintenance of exclusion measures will be carried out (refer to environmental management measure B29)
- Intertidal rocky shore, sand and mudflat habitats removed at the Spit West Reserve construction support site (BL9) will be rehabilitated and restored as close as possible to pre-construction conditions in consultation with Department of Primary Industries (Fisheries) (refer to revised environmental management measure B34).

3.6.6 Land use and property

To facilitate the construction of the project, part of Spit West Reserve will be leased for the Spit West Reserve construction support site (BL9). Recreational users of Spit West Reserve would be required to use alternative parts of the reserve, which could include areas to the north and south of the temporary construction support site. The existing shared user path located along the foreshore of Middle Harbour would be temporarily diverted around the site with connectivity along the reserve maintained. The reconfigured site would impact on 900 square metres less land than the configuration described in the environmental impact statement. The impacts would remain the same for the reconfigured site as described in Chapter 20 (Land use and property) of the environmental impact statement. However, a different portion of Spit West Reserve would be leased from Mosman Council. Additionally, the new location would allow for five turf netball courts, or three junior soccer playing fields (around 20 metres by 30 metres), or one larger soccer playing field to be provided.

The impacted portion of Spit West Reserve would be rehabilitated in consultation with Mosman Council and returned at the completion of construction, consistent with Chapter 20 (Land use and property) of the environmental impact statement. The temporary use of this land would not impact on the continued use of the site for open space and public recreational use at the completion of construction. Land subject to temporary use, including areas of public open space, will be rehabilitated as soon as practicable to an appropriate condition, in accordance with environmental management measure LP5 (refer to Appendix C of this preferred infrastructure report).

3.6.7 Socio economics

Spit West Reserve borders Middle Harbour and includes a number of private and commercial moorings. The reserve provides the opportunity for formal and informal recreational activities, including sports fields, barbeque and picnic facilities, fitness equipment and is likely to attract tourists, weekend visitors and opportunities for photoshoots (eg weddings). Waterbased sporting clubs also operate from The Spit, including Mosman Rowing Club, Middle Harbour Yacht Club, Middle Harbour 16 ft Skiff Club and Middle Harbour Amateur Sailing Club, as well as marine safety services such as Marine Rescue Middle Harbour. Spit West Reserve is also near the starting point

of a 10-kilometre coastal walk (Spit to Manly Walk) and includes the Lucinda Federation Memorial, which commemorates the Centenary of Federation.

The reconfigured site would temporarily lease a portion of waterfront open space at Spit West Reserve for use as the temporary construction support site, consistent with the environmental impact statement. Subsequently, community access to space within the construction footprint would be temporarily restricted during construction. The potential impacts of the reconfigured site would remain generally consistent with those outlined in Chapter 21 (Socio-economics) of the environmental impact statement. However, the reconfigured site would move to the north increasing the distance between the proposed temporary construction support site and Mosman Rowing Club reducing any potential effects of boat wash on rowers either accessing or egressing the Mosman Rowing Club jetty south of the marine traffic control zone. Consultation will be carried out with surrounding water based users of Middle Harbour to minimise impacts to maritime users including Mosman Rowing Club to develop reasonable and feasible management measures to minimise construction impacts, as required by revised environmental management measure CTT16.

During construction, part of the Spit West Reserve would be unavailable for public use for a period of about 48 months. The sensitivity of the area affected by the project's construction and the magnitude of the impact are considered moderate. The existing shared user path along the foreshore of Middle Harbour and Spit West Reserve would be temporarily diverted around the temporary construction support site, however access to the viewing platform would be maintained. As a detour to Figtree Lane would be provided around the site, Mosman Parkrun would be able to continue during construction. Opportunities to maintain access along Figtree Lane through the site outside of standard construction hours would be explored further during further design development. However, the provision of access along Figtree Lane would only be facilitated if the safety of users and construction workers could be maintained. The reconfigured site would be closer to amenities and the playground within Spit West Reserve. The amenity of Spit West Reserve would also be diminished during construction and may detract from the enjoyment of people visiting accessible parts of the reserve or nearby facilities. These impacts would be temporary and consistent with the environmental impact statement, with the affected areas of the reserve rehabilitated and landscaped following construction.

The reconfigured Spit West Reserve construction support site (BL9) has minimised the site layout impact such that five turf netball courts could be provided or up to three junior soccer playing fields (around 20 metres by 30 metres) or one larger soccer field (refer to Figure 3-3 and Figure 3-4). The reconfiguration of Spit West Reserve construction support site (BL9) allows for the continued use of facilities at the reserve by Manly Warringah Football Association, Mosman Netball Club, Mosman Junior Cricket Club, Beauty Point Public School and Mosman Parkrun, minimising impacts to these users. Although the reconfigured site would retain facilities for community use, use of the facilities may be impacted by perceived safety risks due to heavy vehicle movements and the proximity of construction works and reduced amenity. Irrespective of whether groups have made a submission during the environmental impact statement exhibition period, Transport for NSW will engage with stakeholders to clearly communicate the impacts of the reconfigured site in accordance with Appendix E (Community Consultation Framework). Consultation and notification will be carried out with Mosman Council, sporting groups, and Beauty Point Public School to facilitate the ongoing use of Spit West Reserve during construction to minimise potential amenity and access impacts in accordance with new environmental management measure SE5 (refer to Appendix C of this preferred infrastructure report).

Businesses at The Spit are destination-services as many customers would drive specifically to the businesses. They also service local residents who visit to enjoy the foreshore and amenity of the area. Impacts to business due to the reconfigured site would remain consistent with those outlined

in the environmental impact statement. The reconfiguration of the site to allow for continued use by existing users such as sporting clubs, may benefit local businesses, particularly local cafes. However, as outlined in the environmental impact statement, any positive effects generated from demand for services or passing trade would be at an individual business level. Overall, construction is not anticipated to effect ongoing centre or business performance.

3.6.8 Urban design and visual amenity

High to moderate visual amenity impacts are expected for foreshore public open space and residential areas near Spit West Reserve construction support site (BL9) as discussed in Chapter 22 (Urban design and visual amenity) of the environmental impact statement. The anticipated visual amenity impacts are due to the increased exposure to built form. In addition, moderate impacts were expected on the Middle Harbour – open water landscape character zone surrounding the temporary construction support sites.

Impacts to urban design and visual amenity due to the reconfiguration of the Spit West Reserve construction support site (BL9) would remain consistent with those described in the environmental impact statement. The additional removal of one tree would not materially alter the potential impacts to surrounding receivers nor would the location of the reconfigured site further north in closer proximity to the viewing platform along Figtree Lane, amenities and the playground within Spit West Reserve. Impacts to users would be managed by implementation of the environmental management measures outlined in Appendix C of this preferred infrastructure report, including:

- Temporary construction support sites will be developed to minimise visual impacts for adjacent receivers where possible (refer to revised environmental management measure V2)
- All areas disturbed by construction and not required for operation of the project will be restored as soon as practicable to their existing condition or in accordance with the urban design and landscape plan where applicable (environmental management measure V1) (refer to environmental management measure V11)
- Where mature amenity trees (other than trees offset under the NSW Biodiversity Offsets Scheme, established under Part 6 of the *Biodiversity Conservation Act 2016*) are removed as a result of construction, they will be replaced at a ratio of 2:1. The replacement trees will consist of local native provenance species from the vegetation community that once occurred in the locality (rather than plant exotic or non-local native trees) where available and subject to the urban design and landscape plan. Where replacement trees cannot be accommodated within the operational footprint of the project, consultation will be carried out with adjacent government land owners and the relevant local council (where appropriate) to determine if they can accommodate the replacement tree(s) (refer to revised environmental management measure V13).

3.7 Additional environmental management measures

The assessment in Section 3.6 has determined that impacts are consistent with impacts described in the environmental impact statement and would therefore be managed through the implementation of the environmental management measures described in Appendix C of this preferred infrastructure report. An additional environmental management measure has been provided to manage social impacts and is included as new environmental management measure SE5 (refer to Appendix C of this preferred infrastructure report):

Consultation and notification will be carried out with Mosman Council, sporting groups and clubs, and Beauty Point Public School to facilitate the ongoing use of Spit West Reserve during construction to minimise potential amenity and access impacts.