Chapter 6

Construction work

January 2020

6 Construction work

This chapter describes the proposed approach to construction of the project. It outlines the proposed construction program, footprint, methods, working hours, materials, equipment, traffic management, site access routes, and temporary construction support sites.

The construction works described in this chapter may be refined in response to submissions received during exhibition of this environmental impact statement and/or during further design development and construction planning, once a construction contractor has been appointed.

Detailed construction planning would be carried out before construction of the project begins. This would include further refinement of specific construction methods and the program.

The Secretary's environmental assessment requirements as they relate to construction works, and where in the environmental impact statement these have been addressed, are detailed in Table 6-1.

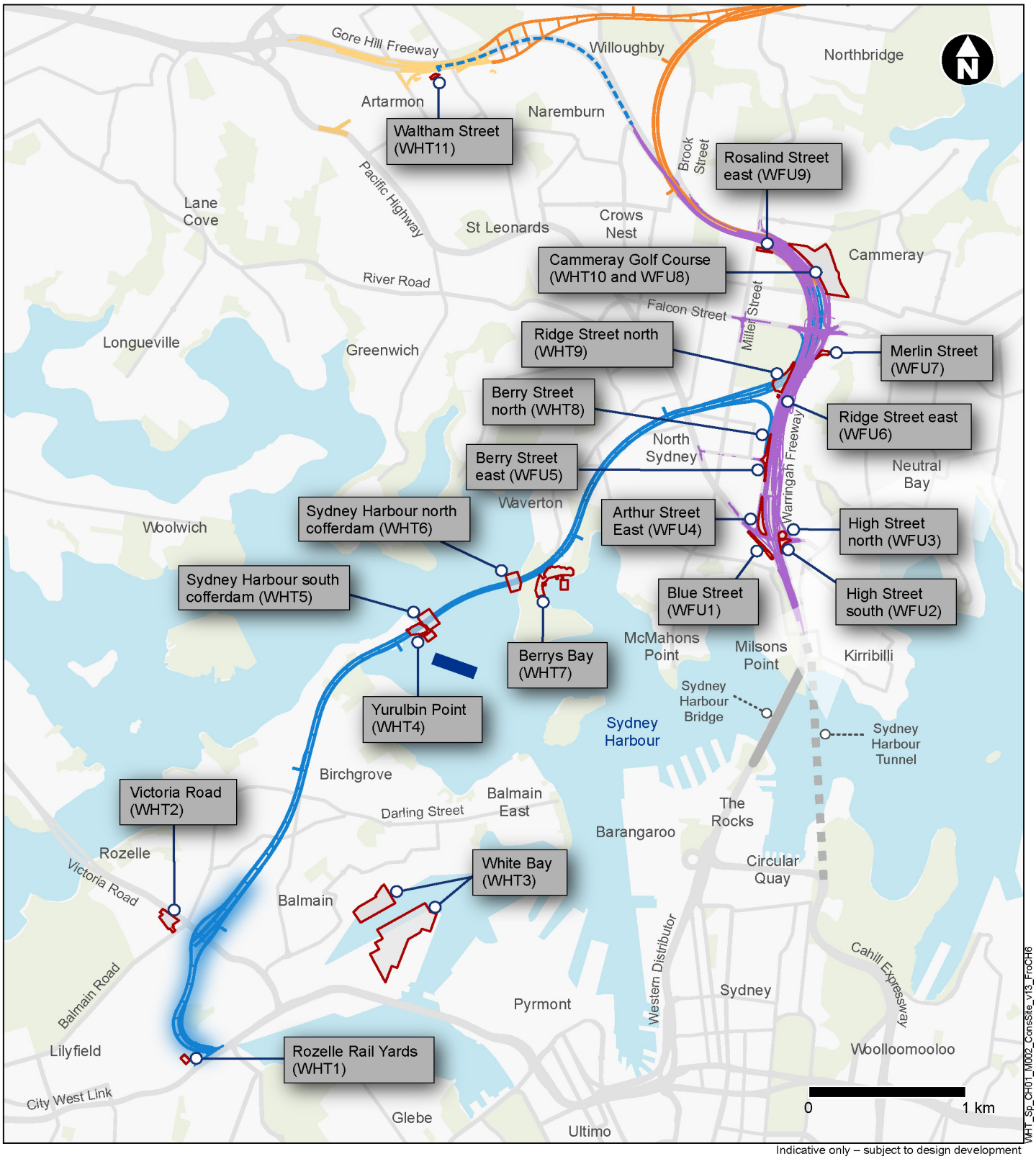
Table 6-1 Secretary's environmental assessment requirements – Construction work

Secretary's requirement	Where addressed in EIS
Environmental impact statement	
1. The EIS must include, but not necessarily be limited to, the following: b. description of the project and all components and activities (including ancillary components and activities) required to construct and operate it, including: - the proposed route;	**Section 6.7** shows the key construction activities and construction support sites along the proposed route. **Chapter 5** (Project description) describes the proposed route.
- Design of the tunnels, interchanges (inclusive of tunnel portals and entry and exit ramps), road user, pedestrian and cyclist facilities, and lighting	**Section 6.4** describes the tunnel construction method. **Section 6.5** describes the construction method for surface road works and associated infrastructure.
- Surface road upgrade works, including road widening, intersection treatment and grade separation works, property access, parking, pedestrian and cyclist facilities (including appropriate locations for overbridges) and public transport facilities	**Section 6.5** describes the construction method for surface road works and associated infrastructure, including bridgeworks and pedestrian facilities. Property access is described in **Chapter 21** (Socio-economics) and **Chapter 20** (Land use and property).
- Ancillary infrastructure and operational facilities, such as operational and maintenance facilities, ventilation structures and systems, and fire and emergency services and infrastructure for the proposal, including (if required) additional infrastructure (such as tolling infrastructure)	**Section 6.7** describes the construction support sites required to construct the project. Construction of operational facilities and ancillary infrastructure is described in **Section 6.4.6**.

Secretary's requirement	Where addressed in EIS
- Location and operational requirements of construction ancillary facilities and access	The location and hours of construction at each construction support site and their respective access arrangements are described in **Section 6.7.2.**
- Land use changes as a result of the proposal and the acquisition of privately owned, Council and Crown lands, and impacts to Council and Crown lands; and	Land use changes as a result of the project are described in **Chapter 20** (Land use and property).
- The relationship and/or integration of the project with existing and proposed public and freight transport services	Site access to the construction support sites and expected vehicle numbers is described in **Sections 6.7** and **Section 6.8**. The integration of the project with existing and public and freight services is described in **Chapter 8** (Construction traffic and transport) and **Chapter 9** (Operational traffic and transport).

6.1 Overview of construction works

An overview of the construction support sites required for the project is provided in Figure 6-1. Further detail on the key activities to be carried out at each site and typical construction hours for each location is provided in Section 6.7. An overview of the types of construction works required for the project is provided in Table 6-2. Detailed descriptions of each construction activity are provided in the sections which follow.



Indicative only – subject to design development

Legend

Construction features

- Western Harbour Tunnel
- Warringah Freeway Upgrade
- Communications cable for motorway control centre
- Fit out and commissioned as part of Western Harbour Tunnel, constructed as part of WestConnex M4-M5 Link
- Construction support sites
- Mooring site

Connecting projects

- Beaches Link
- Gore Hill Freeway Connection

Figure 6-1 Overview of the construction support sites for the project

Table 6-2 Overview of construction works

Component	Typical activities
Early works and site establishment	• Property acquisition and condition surveys • Vegetation clearing, earthworks and demolition of structures • Utilities installation, protection, adjustment and relocation • Land remediation and heritage salvage and/or conservation works (where required) • Installation of site fencing, environmental controls (including noise attenuation and project erosion and sediment controls) and traffic management controls • Construction of minor access roads and the provision of property access including the temporary relocation of pedestrian and cycle paths and adjustments to existing intersections, where required • Temporary relocation of swing moorings, where required • Relocation of bus stops • Establishment of construction support sites (including temporary site accesses) and acoustic sheds, where required.
Construction of Western Harbour Tunnel component	• Excavation of tunnel construction accesses • Construction of driven tunnels and surface connections • Construction of cut and cover and trough structures • Cofferdam construction and dredging activities in preparation for the installation of immersed tube tunnels • Casting and installation of immersed tube tunnels (crossing of Sydney Harbour) • Civil finishing works and tunnel fitout • Construction of operational facilities including: – A motorway control centre at Artarmon – Motorway facilities, tunnel support facilities and ventilation outlet at Cammeray for the Western Harbour Tunnel component. The civil construction of the Beaches Link ventilation outlet at the Warringah Freeway would be carried out as part of the project to minimise future disruption to the Warringah Freeway corridor and maximise construction efficiency. Fitout of the Beaches Link ventilation outlet would form part of the Beaches Link and Gore Hill Freeway Connection project (subject to separate environmental assessment and approval) – Construction and fitout of the Western Harbour Tunnel operational facilities that form part of the M4-M5 Link Rozelle East Motorway Operations Complex – A wastewater treatment plant at Rozelle – Installation of motorway tolling infrastructure.
Surface road works	• Earthworks • Bridgeworks • Construction of retaining walls • Construction and installation of stormwater and cross drainage • Pavement works and linemarking

Component	Typical activities
	• Utilities installation and relocation • Tolling gantries and associated infrastructure • Installation of road furniture, lighting, signage and noise barriers.
Testing, commissioning and site rehabilitation	• Testing of plant and equipment • Commissioning of the project • Backfill of access declines and shafts • Removal of construction support sites • Landscaping and rehabilitation of disturbed areas • Removal of temporary environmental and traffic controls.

6.2 Construction program

6.2.1 Program overview

Subject to planning approval, construction of the Western Harbour Tunnel and Warringah Freeway Upgrade project is planned to commence in 2020, with completion of construction in 2026. Early works and site establishment would be the first works carried out for the project, with substantial construction starting in 2021.

Construction associated with the Warringah Freeway upgrade component comprises early works and site establishment, surface works and bridgework activities, which would run concurrently from 2020 to 2025. The indicative construction program of the project, including the Warringah Freeway Upgrade component, is shown in Table 6-3.

Table 6-3 Western Harbour Tunnel and Warringah Freeway Upgrade project indicative construction program

Construction activity	Indicative construction program																							
	2020				2021				2022				2023				2024				2025				2026			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Western Harbour Tunnel and Warringah Freeway Upgrade early works and site establishment																												
Construction of the Warringah Freeway Upgrade component																												
Construction of driven tunnels																												
Immersed tube tunnel preparatory works, construction, installation, fitout and reinstatement works																												
Tunnel fitout and finishing																												
Construction of operational facilities																												
Testing and commissioning																												
Site clean-up and demobilisation																												

The final construction program for the project would depend on future project procurement and packaging decisions. It is possible that some aspects of the Western Harbour Tunnel component of the project could be delivered by the Warringah Freeway Upgrade construction contractor to minimise disruption to the Warringah Freeway.

It is assumed that the project would commence construction before the Beaches Link and Gore Hill Freeway Connection project, which is subject to separate assessment and approval. Should timeframes for the Beaches Link component of the Beaches Link and Gore Hill Freeway Connection project be advanced, some elements of the Beaches Link component may be delivered as part of the Western Harbour Tunnel and Warringah Freeway Upgrade project to safeguard delivery of either surface connections or tunnel-to-tunnel connections, maximise construction efficiency and minimise ongoing disruption in particular areas.

6.3 Enabling works and site establishment

6.3.1 Enabling works

Enabling works for major infrastructure projects are carried out prior to substantial construction in order to prepare sites to facilitate the main construction activities. Some early works would take place prior to the formal approval of construction management plans, and would include:

- Property acquisitions
- Carrying out existing condition surveys of buildings and infrastructure
- Land remediation (where required)
- Relocation, adjustment and protection of utilities and services affected by the project
- Carrying out of heritage investigations, protections, salvage and/or conservation works
- Temporary relocation of about 10 swing moorings at Berrys Bay, as close to their existing position as possible (refer to Chapter 8 (Construction traffic and transport) for more information)
- Relocation of the historic *Baragoola* and *M.V. Cape Don*, with reasonable notice for the vessel owners to find a suitable alternate berth within Sydney Harbour prior to the start of construction.

6.3.2 Site establishment

Site establishment would occur prior to the major construction activities commencing and would include:

- Vegetation clearing, chipping and mulching where required
- Installation of site environmental management controls (including site fencing, noise attenuation measures and erosion and sediment controls)
- Traffic management controls, including adjustments to road signage where required (showing changes to traffic movements and speed limits)
- Construction of minor access roads and the provision of property access including the temporary relocation of pedestrian and cycle paths and bus stops
- Earthworks to level the construction support sites in preparation for site work and installation of site facilities
- Building construction support sites (including temporary site access), acoustic sheds and associated access decline acoustic enclosures, where required
- Demolition of existing structures which require removal to enable construction of the project.

During site establishment works at the White Bay construction support site (WHT3), some piling would be required at the immersed tube tunnel casting facility (refer to Section 6.7.2 for more information about this construction support site).

6.4 Construction of Western Harbour Tunnel

Construction of the Western Harbour Tunnel component would involve the following activities:

- Excavation of the tunnel construction access declines or shafts
- Construction of driven tunnels
- Construction of cut and cover and trough structures
- Construction of transition structures between driven tunnel and immersed tube units
- Construction of immersed tube tunnel units
- Dredging to form trench for installation of immersed tube tunnel units
- Installation of immersed tube tunnels for the crossing of Sydney Harbour
- Civil finishing and fitout of the tunnels, including pavement works to tie-in to surface roads in Rozelle, North Sydney and Cammeray
- Construction of operational facilities
- Testing and commissioning.

More information on each of these activities is provided in the following sections.

6.4.1 Excavation of tunnel construction accesses

To enable construction of the driven tunnels, construction accesses need to be created from construction support sites to the mainline tunnel alignment. Tunnel construction access can be via an access shaft or an access decline.

Access shaft

A vertical access shaft would be required at the Yurulbin Point construction support site (WHT4), and would be constructed within a purpose-built acoustic shed. Excavation of the shaft would be carried out by excavators and rock hammers, with spoil removed using excavators and cranes. The top of the shaft would be supported with piles driven down to rock level. A gantry crane is typically installed over the shaft to deliver and remove plant, equipment and spoil from the tunnel. Temporary tunnel ventilation and services such as compressed air, potable water and drainage return lines would also be installed through the shaft. The permanent structure of the shaft would be backfilled at the completion of construction. A typical tunnel access shaft is shown in Figure 6-2.

Figure 6-2 Typical tunnel access shaft (Bexley Road New M5, 2017)

An acoustic shed is an enclosed noise mitigation structure constructed over access declines or shafts that access the tunnel for construction. Any noisy works required to support out of hours tunnelling, including spoil handling, would take place within the acoustic shed, reducing impacts on nearby receivers. Acoustic sheds would be designed with consideration of the activities that would occur within them and the noise management levels applicable at nearby receivers. They would also be designed to accommodate stockpiled tunnel spoil within the shed to prevent haulage during non-standard hours. An example of an acoustic shed is shown in Figure 6-3.

Figure 6-3 Example from within an acoustic shed constructed for the New M4 Tunnels

Excavated access decline

Excavated access declines would be required at the Victoria Road (WHT2), Berrys Bay (WHT7) and Cammeray Golf Course (WHT10) construction support sites and would be constructed within purpose-built acoustic sheds.

The access decline provides access for workers, equipment, material supply, and spoil removal, and would be big enough for construction vehicles, including roadheaders, concrete trucks, spoil removal trucks and other equipment to drive in and out of the tunnel. The temporary tunnel ventilation and services such as compressed air, potable water and drainage return lines would also be installed through the decline.

The decline would typically be sized to allow for two-way vehicular traffic and a separated walkway for construction workers. An example of an access decline is shown in Figure 6-4.

The access declines at Berrys Bay construction support site (WHT7) and Victoria Road construction support site (WHT2) would be backfilled at the completion of construction. The access decline at Cammeray Golf Course construction support site (WHT10) would be used for permanent ventilation tunnels connecting to the motorway facilities at the Warringah Freeway.

Figure 6-4 Example tunnel access decline (Arncliffe, 2017)

6.4.2 Construction of driven tunnels

The project would involve the construction of two mainline tunnels, as well as on and off ramps, cross passages and ventilation tunnels. The majority of this tunnelling work is expected to be carried out in Hawkesbury sandstone using electrically powered machines known as roadheaders.

A roadheader is an excavation machine that has a rotating, rock-cutting head on the front, mounted to a boom. When the underground rock is cut using a roadheader, a loading device typically transfers the rock onto a conveyor belt which runs the spoil onto haulage trucks. An example of a roadheader working underground to construct the New M4 tunnels is shown in Figure 6-5.

Ground support for tunnels excavated using roadheaders would typically consist of cement grouted rock anchors and/or rock bolts and shotcreting as shown in Figure 6-6. In areas which require control of higher levels of groundwater ingress, the permanent tunnel lining would include a thicker reinforced concrete lining and waterproofing membrane. Ground support would be installed progressively following tunnel excavation.

In addition to the mainline tunnels and on and off ramp tunnels, pedestrian cross passages would be excavated between the mainline tunnels at intervals to facilitate emergency egress. These cross passages would be excavated using small roadheaders or controlled blasting.

Figure 6-5 Example of a roadheader in the New M4 tunnels loading tunnel spoil into a spoil haulage truck

Figure 6-6 Example of tunnel shotcreting

It is anticipated that tunnel excavation would be carried out using a number of roadheaders, supported from multiple sites, including:

- Victoria Road (WHT2)
- Yurulbin Point (WHT4)
- Berrys Bay (WHT7)
- Cammeray Golf Course (WHT10).

Each of these construction support sites would require additional surface infrastructure to support tunnel construction, such as acoustic sheds, air intake facilities, power and water supply and wastewater treatment plants.

Temporary construction wastewater treatment plants would be designed to treat wastewater generated from tunnel construction activities and groundwater inflow (refer to Chapter 17 (Hydrodynamics and water quality) for more detail).

Rock hammering (see Figure 6-7) may be used in some areas for excavation of the mainline tunnels, cross passages and areas of sandstone within the cut and cover structures.

(Source: Transport for NSW (2016))

Figure 6-7 Example of rock hammering

Controlled underground blasting may also be used to improve the efficiency of excavation activities and shorten the overall excavation program. Areas likely to require controlled blasting would be confirmed during detailed construction planning.

6.4.3 Construction of cut and cover and trough structures

Cut and cover tunnels would typically be constructed at locations where the tunnel alignment connects to and from the surface and does not have enough rock cover for construction using roadheaders. Cut and cover is a tunnel excavation methodology that generally involves excavating downwards from the surface of the ground, and installing a tunnel structure including a base, walls and a roof. Once the roof is in place, the structure is generally covered over with soil and revegetated. These structures can also be constructed by installing the walls and roof and subsequently excavating out the material below from underneath the roof.

Cut and cover structures typically transition to open trough structures which connect to and from the surface (see Figure 6-8). Construction of trough structures is similar to cut and cover, except a cover is not installed (see Figure 6-9).

Figure 6-8 New M4 tunnel cut and cover structures

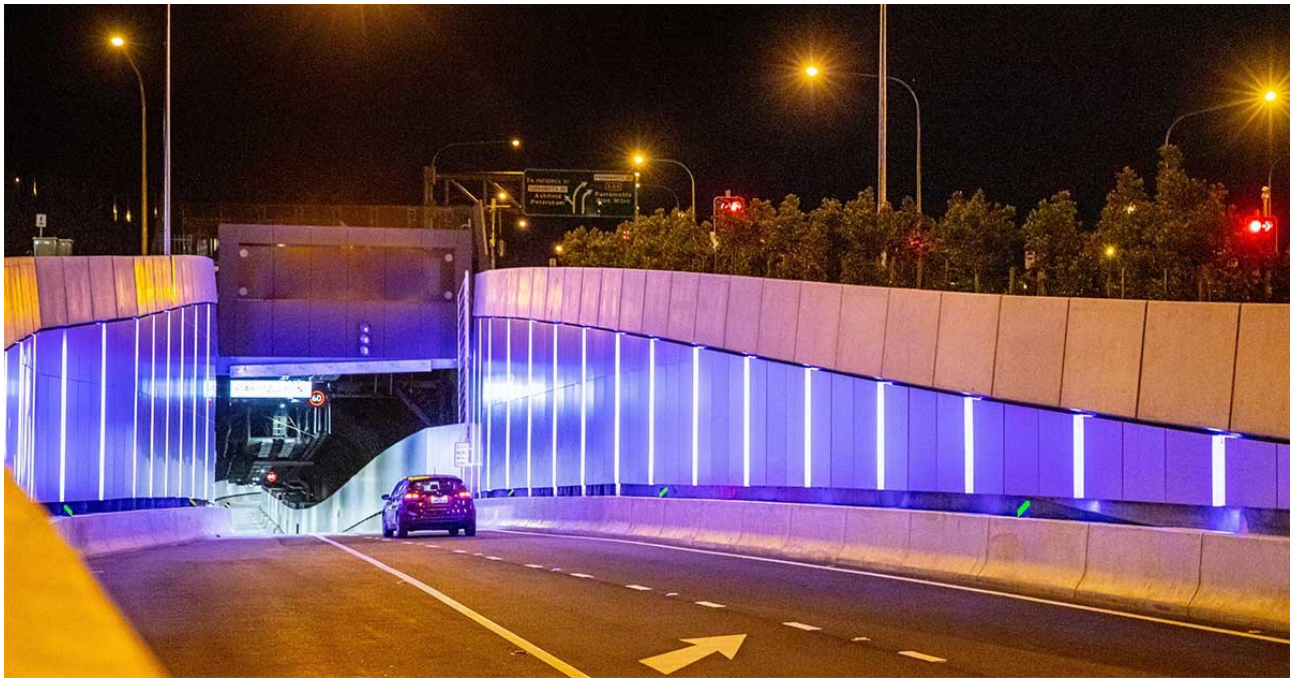


Figure 6-9 Trough structure for New M4 tunnel ramp at Haberfield

Cut and cover tunnels and trough structures are anticipated to be constructed at the following locations:

- Where the Western Harbour Tunnel connects to the Warringah Freeway, to the north of the Ernest Street overbridge
- The Western Harbour Tunnel off ramp to Falcon Street, beneath the south-eastern corner of St Leonards Park
- The on ramp to the Western Harbour Tunnel from the Berry Street ramp to the Warringah Freeway, North Sydney
- The Warringah Freeway to Beaches Link ramp, near the Ernest Street overbridge
- The Beaches Link to Warringah Freeway ramp, near the Ernest Street overbridge.

The Warringah Freeway Upgrade component of the project would provide the structural works for the cut and cover and trough structures for the Western Harbour Tunnel and Beaches Link ramps to and from the Warringah Freeway. The structural works would largely comprise the construction of the 'roof' and supporting piles for these structures. These works would be completed as part of the Warringah Freeway Upgrade component of the project to allow maximum utilisation of the road corridor to minimise disruption. The excavation of these structures would then be completed as part of the Western Harbour Tunnel tunnelling works.

The Western Harbour Tunnel component of the project would include the excavation and fitout (including pavement works to tie-in to the Warringah Freeway Upgrade) for the Western Harbour Tunnel on and off ramps to the Warringah Freeway. The Beaches Link and Gore Hill Freeway Connection project, which is subject to separate assessment and approval, would include the excavation and fitout (including pavement works to tie-in to the Warringah Freeway Upgrade) of the on and off ramps between the Beaches Link mainline tunnels and the Warringah Freeway.

6.4.4 Construction process for immersed tube tunnels

An overview of the construction process for the immersed tube tunnel crossing of Sydney Harbour is shown in Figure 6-10 and Figure 6-11.

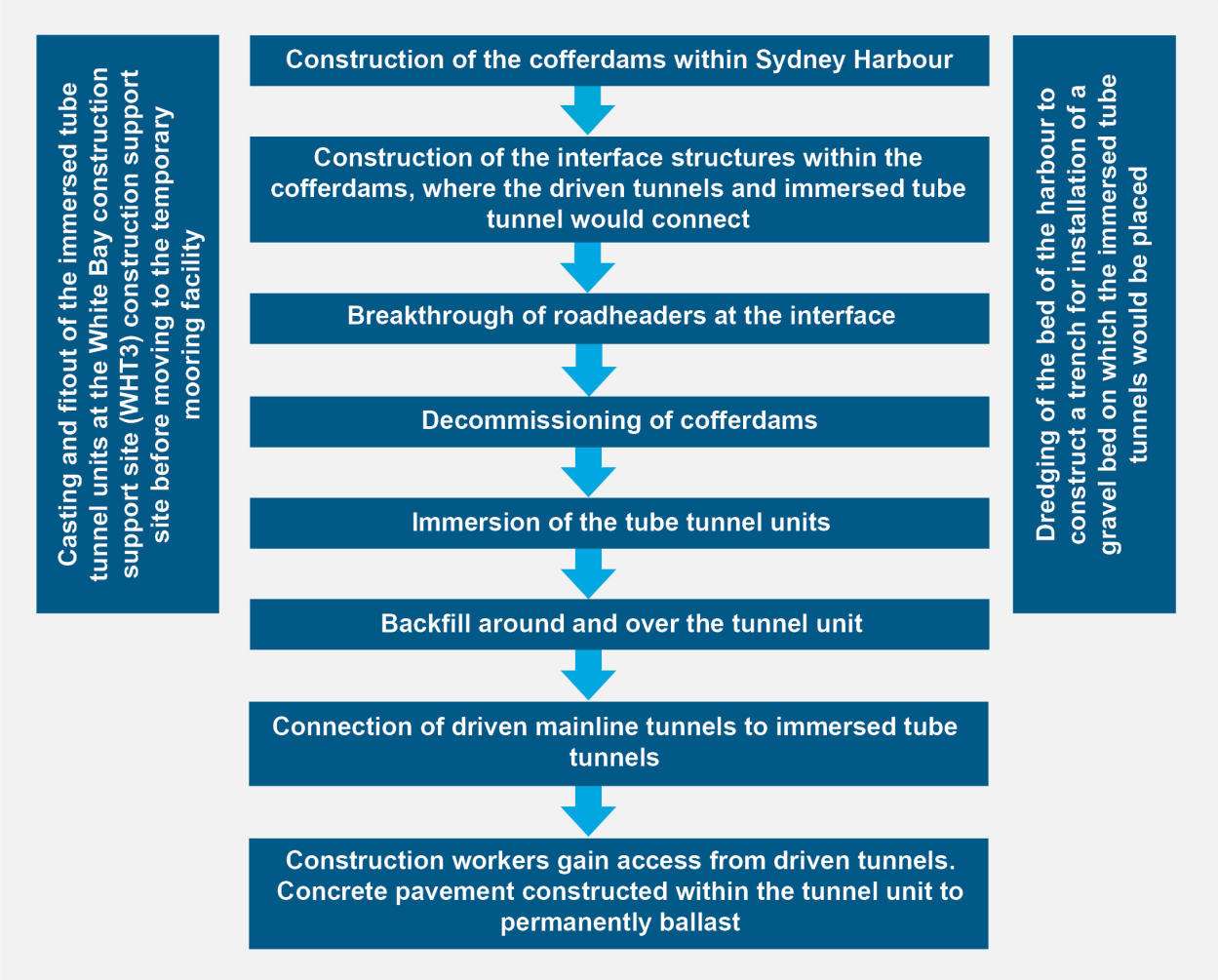
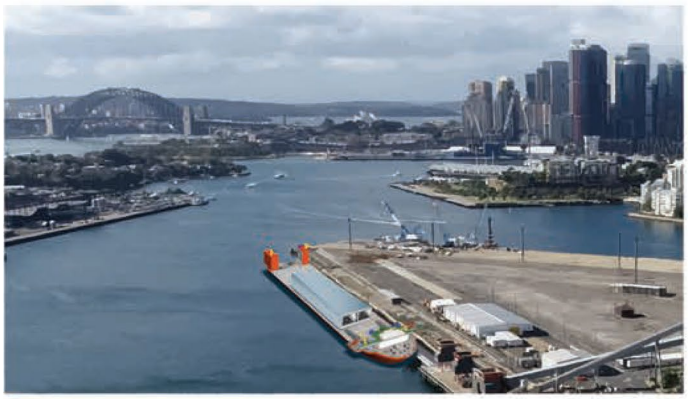
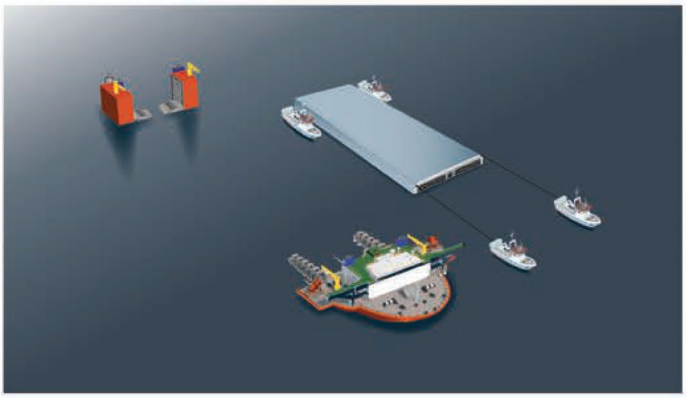


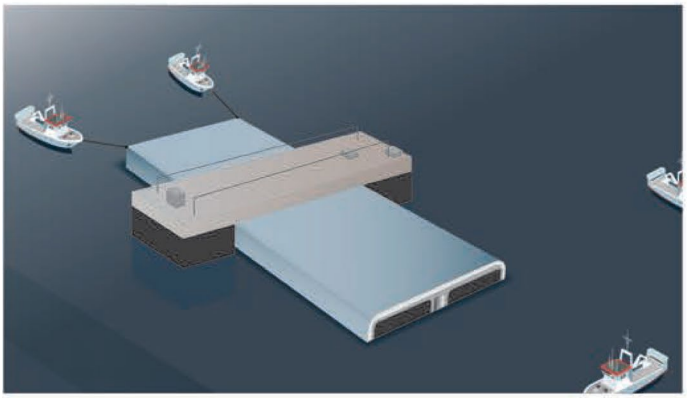
Figure 6-10 Indicative construction process for the immersed tube tunnels



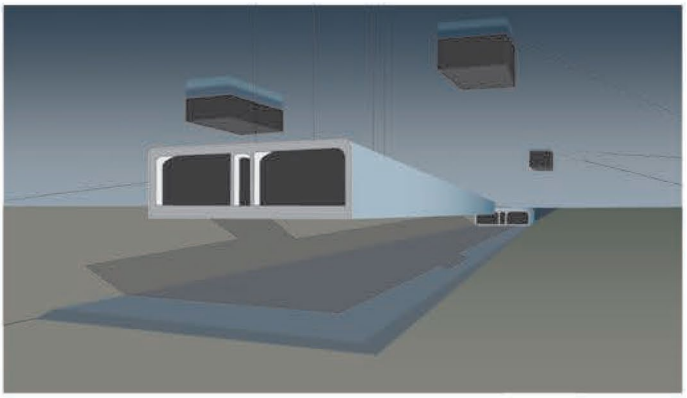
Construction and fitout of immersed tube tunnel units at White Bay



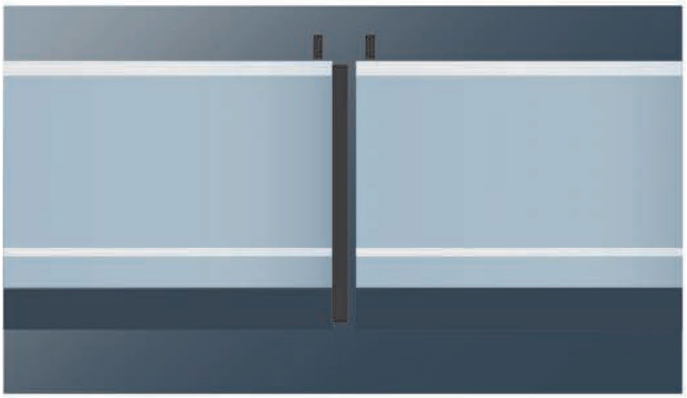
Tunnel unit floated in deep water in preparation for installation



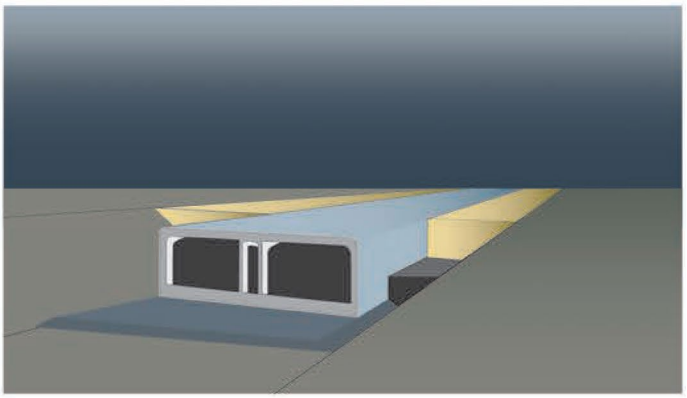
Tunnel unit transported to site by tug boats



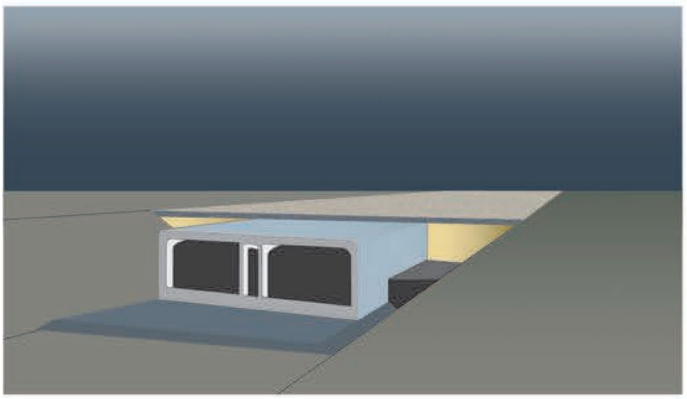
Immersion of tunnel unit



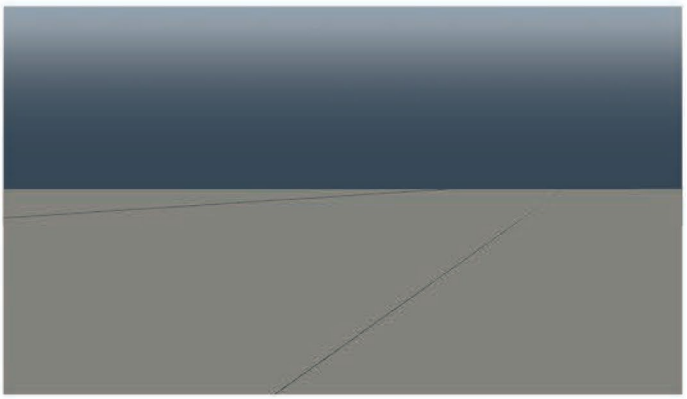
Water tight seal between tunnel units



Backfilling of trench



Rock armour placement over unit



Seabed restored following completion of immersed tube tunnel

Figure 6-11 Indicative construction sequence for the immersed tube tunnels

Cofferdam construction

A cofferdam is a temporary enclosure within a body of water that is constructed to allow dewatering of an enclosed area. The purpose of the cofferdams is to create a dry environment to allow the construction of the interface structures at each end of the Sydney Harbour crossing which would connect the driven tunnel and the immersed tube tunnel.

Two temporary cofferdams would be constructed to facilitate the connection of the immersed tube tunnel to the driven tunnels at Birchgrove and Waverton. The cofferdams would be about 50 metres wide and 25 metres long. The location and indicative layout of the Sydney Harbour cofferdams are shown on Figure 6-30. These cofferdams would be supported (with labour, plant, materials) from the construction support sites at White Bay (WHT3), Yurulbin Point (WHT4) and Berrys Bay (WHT7).

The method for the construction of the cofferdams within Sydney Harbour is summarised below:

- Ground treatment – before the construction of the cofferdam can occur, the upper layer of the bed of the harbour would be injected with a permanent grouting material to improve its strength and make water-tight. Ground treatment would be carried out by drilling holes into the bed of the harbour. These holes would then be injected with grout by a grouting machine located on a flat top barge. An example of a flat top barge is shown in Figure 6-12
- Piling – the cofferdam structure would be made up of a series of interlocking, tubular piles. Each pile would be driven into the underlying sandstone within the areas that were subject to ground treatment. Piling would take place from a flat top barge (or similar barge) using a crane fitted with a hydraulic vibrating hammer, offshore pile driving hammer and/or a similar piece of construction equipment
- Dewatering and installation of structural support – once all piles have been installed, the water level within the cofferdam would be progressively lowered (dewatered). Structural steel supports would be installed within the cofferdams from a flat top barge so the cofferdams remain structurally sound.

Figure 6-12 Example of a flat top work barge and cofferdam

Construction of the interface structures within the cofferdams

The immersed tube tunnels would be connected to the mainline driven tunnels by an interface structure, which would be built within the cofferdams. The interface structure is essentially a structural adaptor between the driven tunnel cross section and the rectangular immersed tube tunnel cross section. Construction of the interface structures within the cofferdams would require excavation of rock from within the cofferdam.

Excavation works within the cofferdams would be carried out using excavators, fitted with hydraulic hammers that would be lowered into the cofferdam to fracture the rock. The rock would be placed into bins within the cofferdam, and lifted out by a crane, which would be located on the cofferdam work platform. An application for offshore disposal of dredged material has been submitted to the Commonwealth Department of the Environment and Energy. It is proposed that suitable dredged material would be placed in a hopper barge and transported to the designated offshore disposal site (refer to Chapter 24 (Resource use and waste management) for further information). Any material not suitable for offshore disposal would be transferred by barge to the White Bay construction support site (WHT3).

Construction of the interface structure would be supported by work barges that would be moored at the cofferdams for the duration of construction works (refer to Section 6.7.2). A ferry barge would be used to transport the construction materials, plant and workforce from the White Bay construction support site (WHT3) for the construction of the interface structure.

The construction sequence of the interface structure is provided in Figure 6-13.

Decommissioning of cofferdams

Following completion of the interface structures the cofferdams would then be filled with water pumped in from Sydney Harbour. As the cofferdams are filled with water, the structural support within the cofferdams would be removed. Once the water levels inside the cofferdams match the water level outside, the tubular piles would be removed, and the marine environment rehabilitated, where required. Where the tubular piles remain fixed in the bed of the harbour they would be cut off at the harbour bed level and the marine environment rehabilitated where required.

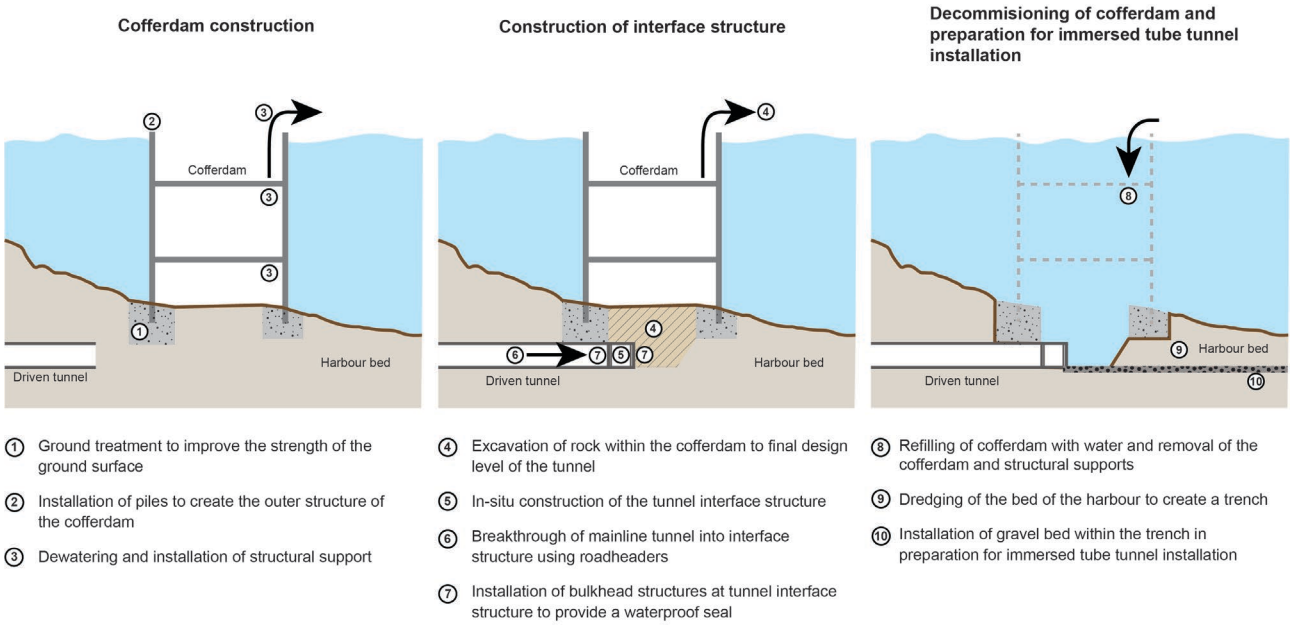


Figure 6-13 Indicative process for constructing the tunnel interface structures

Dredging

The construction of the immersed tube tunnels would require dredging of the bed of the harbour to create a trench for the installation of the immersed tube tunnel. The tunnel trench would be designed to provide a solid foundation for placement of the immersed tube tunnel units.

Dredging is a relatively common activity within New South Wales ports and coastal waters for capital and maintenance projects, with specialised contractors and equipment designed to meet project and environmental requirements in a variety of conditions. The method of dredging would depend on the material being dredged and would be carried out for the project using a combination of methods (refer to Table 6-4).

During dredging works, floating silt curtains would be used to minimise impacts on the surrounding marine environment. Dredging operations would be carried out within a floating silt curtain enclosure to a depth of two to three metres. An additional shallow silt curtain would also be installed adjacent to ecologically sensitive areas to provide additional protection.

Table 6-4 Dredging methods for installation of the immersed tube tunnels

Type of material to be dredged	Type of dredge to be used	Description
Soft sediments not suitable for offshore disposal (anticipated to be the top 1.5 metres of the bed of the harbour, subject to	Backhoe dredge with a closed environmental clamshell	A backhoe dredge consists of a hydraulic excavator that is fixed to a pontoon or work barge (refer to Figure 6-14). A closed environmental clamshell is a closed bucket which is used to avoid the spread of material into the water column (refer to Figure 6-15). This material would be loaded into hopper barges positioned next to the

Type of material to be dredged	Type of dredge to be used	Description
further testing (refer to Chapter 16, Geology, soils and groundwater))		dredge (with no overflow allowed), and transported to White Bay. This material would be made spadable through addition of a polymer or lime additive and loaded onto trucks and then disposed of at a land-based licensed facility.
Soft ground materials suitable for offshore disposal	Trailer suction hopper dredger	This type of dredge has one or two suction tubes which extend from the bottom of the dredge vessel. A pump system sucks up a mixture of sand, soil and water and discharges it into the 'hopper' or hold of the vessel. Once fully loaded, the vessel would dispose of the dredged material at the designated offshore disposal site.
Stiff ground materials suitable for offshore disposal	Backhoe dredge with clamshell or open bucket	A clamshell (or open bucket) would be used to bring stiff ground materials to the surface. This material would be loaded into hopper barges positioned next to the dredge and then disposed of at the designated offshore disposal site.
Rock layer suitable for offshore disposal	Backhoe dredge and cutter suction dredge	The underlying soft rock would be removed using a backhoe dredge with standard open bucket. A cutter suction dredge is a dredge vessel equipped with a rotating cutter head for cutting and fragmenting rock or hard materials. As material is cut using the cutter head, a backhoe dredge would be used to excavate the dredged materials and load them into a barge, which would dispose of the dredged material at the designated offshore disposal site.

Figure 6-14 Example of backhoe dredger with an open bucket working within Sydney Harbour

(Source: supplied by Royal Haskoning DHV, 2018)

Figure 6-15 Example of an excavator fitted with a closed environmental clamshell loading into a hopper barge

Construction of the immersed tube tunnel units

The immersed tube tunnel would be about 630 metres long and would consist of five individual units fabricated at the White Bay construction support site (WHT3). Refer to Figure 6-16 for an example of a completed immersed tube tunnel unit.

The immersed tube tunnel units would be fabricated on a submersible vessel moored at White Bay. Fabrication would include casting (ie concrete pouring into formwork for the units) and fitout works.

Once the casting and fitout of the immersed tube tunnel units is complete, the units would be towed by tug boats to the temporary mooring location at Snails Bay in Sydney Harbour (refer to Figure 6-21). The temporary mooring location would enable storage of the immersed tube tunnel units prior to installation.

(Source: (ITA n.d.))

Figure 6-16 Example of completed immersed tube tunnel unit for the Amsterdam Metro moored ahead of installation

Immersion of tube tunnels

The immersion of the immersed tube tunnel units would be performed using pontoons. Temporary anchors would be placed prior to the immersion process to position the tunnel units (refer to Figure 6-17).

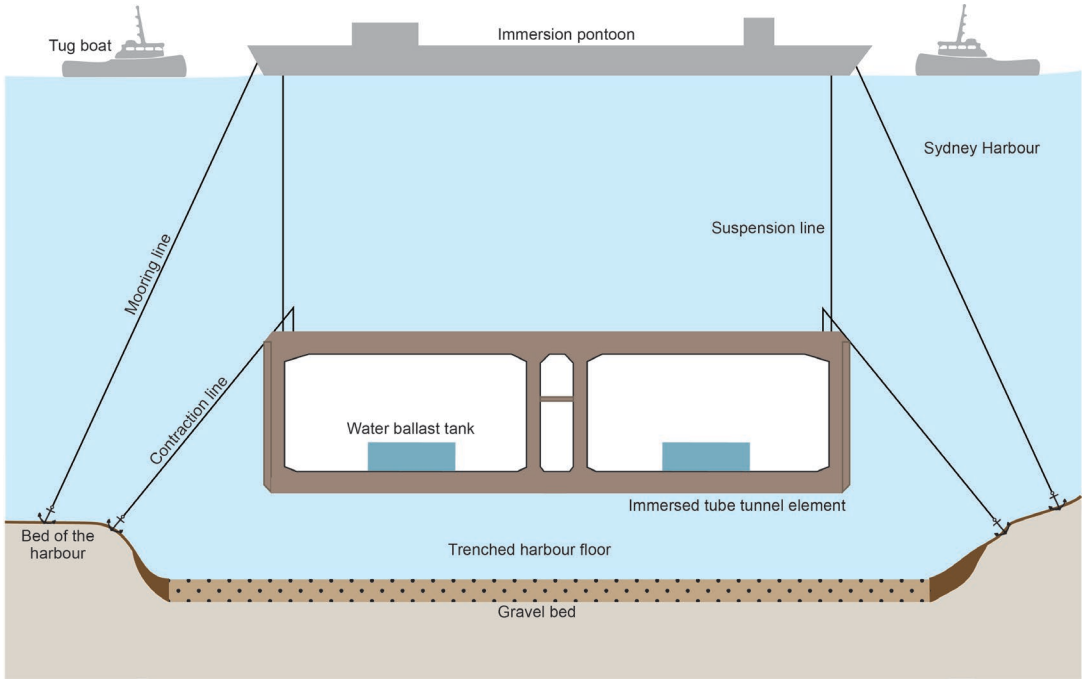


Figure 6-17 Positioning of immersed tube tunnel units in Sydney Harbour

Immersion is carried out by pumping water into temporary ballast tanks within the immersed tube tunnel unit. The water ballast tank is used to control the buoyancy (ie the amount they float) and balance of each unit. A guidance system would be installed on the pontoon deck to guide the immersed tube tunnel unit to the previous immersed unit and/or to the interface structure.

Once the immersed tube tunnel unit has been placed into its final location within the trench, locking fill would be placed around the tunnel units to provide initial stability and to prevent it from moving.

Following immersion, construction workers gain access to the immersed unit through the mainline tunnel. Concrete pavement is cast within the immersed tube tunnel unit to replace the weight provided by the temporary ballast tanks allowing them to be removed.

Backfill is installed to close the remainder of the void between the tunnel unit and the dredged trench. A rock protection layer would be installed to protect the concrete surface of the immersed tube tunnels from activities during operation, including falling or dragging anchors. The level of protection for the immersed tube tunnel units would be similar to that of the existing Sydney Harbour Tunnel. This configuration is shown schematically in Figure 6-18.

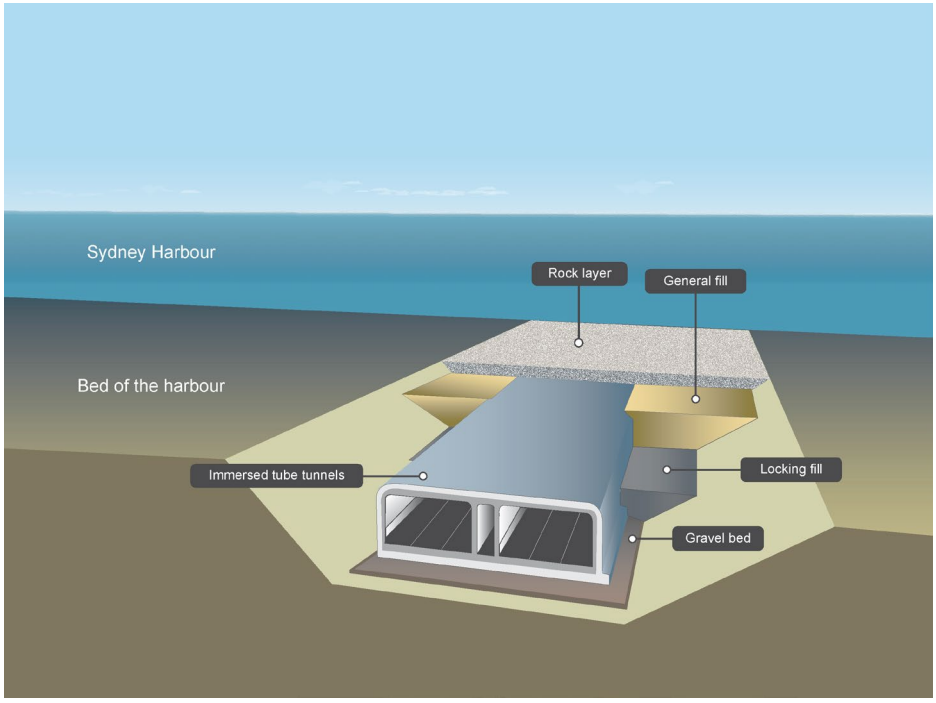


Figure 6-18 Example of an immersed tube tunnel

A typical immersion process for one immersed tube tunnel unit would take 24 to 48 hours. Partial harbour closures in the vicinity of the site would be required while each unit is immersed.

The installation sequence for the immersed tube tunnels is shown in Figure 6-19.

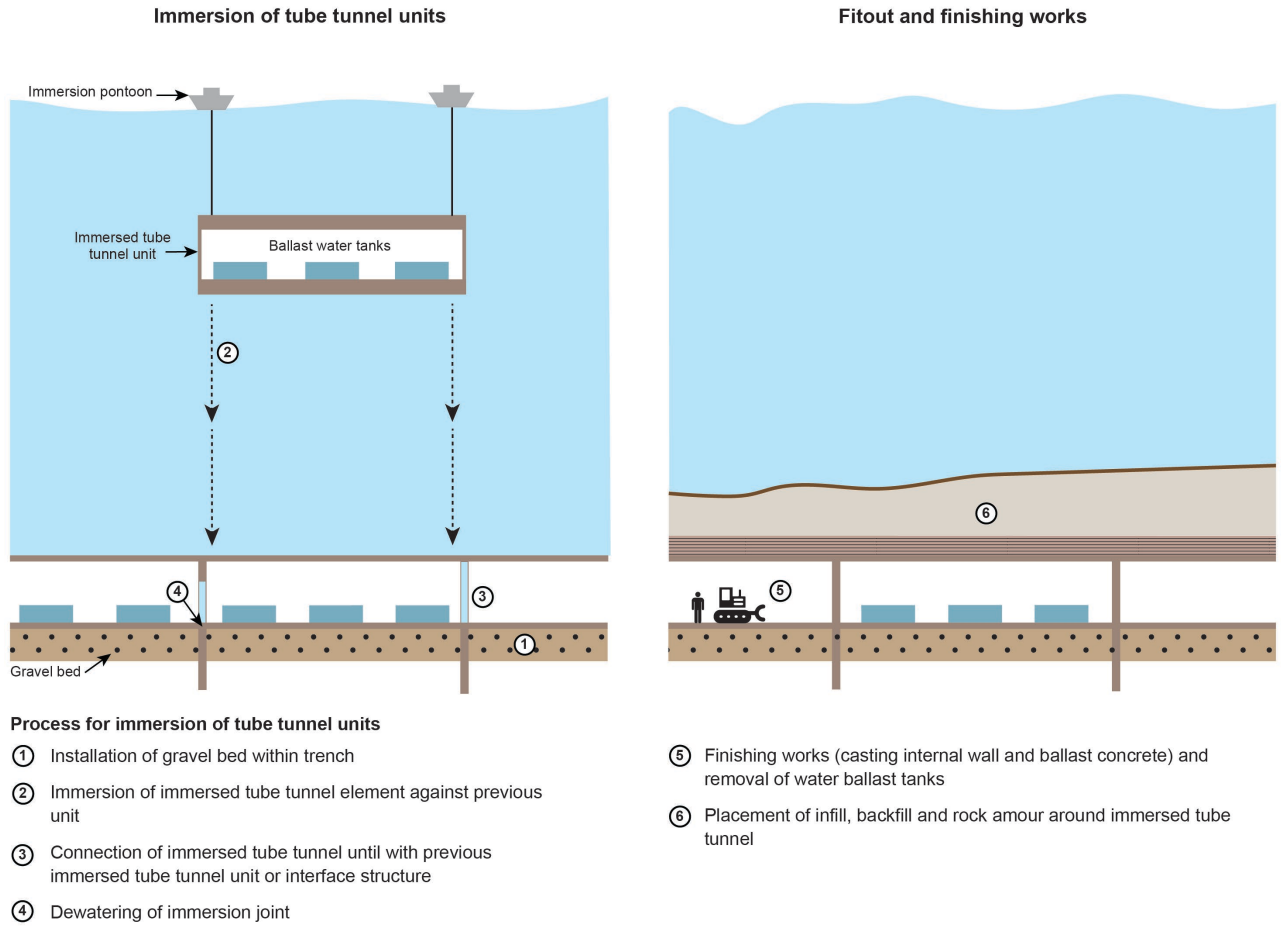


Figure 6-19 Indicative immersed tube tunnel installation sequence

6.4.5 Tunnel fitout and finishing works

On completion of the tunnelling works, a variety of fitout and finishing works would be required.

Fitout refers to the construction works that need to be carried out after excavation of the mainline tunnels. Fitout and finishing works to be completed within the mainline tunnels are described in Table 6-5.

Table 6-5 Tunnel fitout and finishing works

Construction activity	Description
Service conduits	Trenches would be constructed along the inner wall of the mainline and ramp tunnels under the shoulder of the roadway using a saw mounted on an excavator. Rock would be broken up by an excavator with a hydraulic hammer and loaded out for disposal. Conduits would then be installed within the trench and then backfilled to cover the conduits.
Roadway drainage	Trenches would be constructed in the same way as the service conduits but positioned on the low side of the road pavement where water runoff would be directed during operation. Drainage pipes would be placed within the trench and held in place, and the trench would then be backfilled with concrete.
Pavement works and asphalting	Continuously reinforced concrete pavement would be installed within the mainline tunnels and caverns.
Traffic barriers	Constructed from concrete using a specialised barrier placement machine or alternative methods where the machine is unable to access that location.
Mechanical and electrical infrastructure	This would include the installation of: • Tunnel lighting and surveillance cameras • Operations management and traffic management equipment • Toll points within the mainline tunnels • Cross passages and equipment rooms, including lighting, power, exit lights and signage • Emergency and surveillance systems • Fire systems and protection equipment • Underground pump stations • Ventilation system, jet fans and support frames • Cabling including high voltage and low voltage cables, power supply cables from substations, power and control cables from jet fans to substations and communications cables • Substation equipment.
Finishing works	Finishing works within the mainline tunnels would include: • Testing and commissioning all equipment and systems • Installation of architectural wall panels above the concrete traffic barriers • Painting of all other sections of the mainline tunnels and ramps not covered by a traffic barrier or wall panel with black paint • Linemarking.

6.4.6 Construction of operational facilities and ancillary infrastructure

Permanent operational infrastructure would be required for the ongoing management and operation of the project. Operational infrastructure would be mainly located near the surface connections at Rozelle, Cammeray and Artarmon. The typical construction method for operational facilities and ancillary infrastructure is summarised in Table 6-6.

Table 6-6 Construction of operational facilities and ancillary infrastructure

Operational facilities	Construction method
Tunnel ventilation systems	Construction of the tunnel ventilation systems would involve: • Excavation and fitout of the ventilation tunnels to the mainline tunnels • Construction and fitout of the Western Harbour Tunnel motorway facilities building at the Warringah Freeway, which would include erecting precast concrete panels, block walls and an enclosed roof • Construction of ventilation outlets (including the Beaches Link and Gore Hill Freeway Connection project ventilation outlet at the Warringah Freeway) • Internal fitout of plant areas and motorway facilities, equipment installation and commissioning. The project would construct the Beaches Link and Gore Hill Freeway Connection project ventilation outlet at the Warringah Freeway. Fitout of the ventilation outlet would be carried out as part of the Beaches Link and Gore Hill Freeway Connection project, which is subject to separate assessment and approval. The construction of the ventilation outlet and motorway facilities for the project at the Rozelle Interchange is to be carried out as part of the M4-M5 Link project. The excavation of ventilation tunnels to the motorway facilities and ventilation outlet would be carried out as part of this project. The project would also be responsible for the internal fitout of the motorway facilities and ventilation outlet.
Motorway control centre	Construction of the motorway control centre at Artarmon would include: • Excavation, footing and base slab installation • Erection of concrete columns, deck and roof • Enclosure of the building • External architectural treatments • Internal fitout of control rooms, computer rooms, offices and workshop and associated staff amenities • Utilities connections including power, potable water, sewerage • Security fencing. A communication cable would be required between the Western Harbour Tunnel mainline tunnel at Cammeray and the motorway control centre at Waltham Street, Artarmon. The preferred construction method would be through the use of existing conduits within the Warringah and Gore Hill Freeway corridors. Where the use of existing conduits is not feasible, trenching within the road corridor may be required.

Operational facilities	Construction method
Tunnel support facilities	Construction of the tunnel support facilities at Cammeray would include: • Excavation, footing and base slab installation • Construction of columns and deck to the first floor • Construction of columns to support the roof • External architectural treatments • Utilities connections including power, potable water, sewerage • Internal fitout of control rooms, computer rooms, offices and workshop and associated staff amenities • Security fencing.
Wastewater treatment plant	The operational wastewater treatment plant would be constructed at the Rozelle Interchange using prefabricated components which would be assembled as follows: • Mechanical assembly of operational wastewater treatment plant components, including rising main from tunnel and discharge pipework • Complete electrical connections between the operational wastewater treatment plant components and incoming power supply • Commission the operational wastewater treatment plant • Connection of the wastewater treatment plant to the local stormwater network.
Substations	The above ground substation required for the operation of the Western Harbour Tunnel component of the project would be located at the Rozelle Interchange, and would be constructed using predominantly prefabricated components where feasible.

6.5 Surface road works

Surface road works are required to connect and integrate the new tunnels with the existing road network. The main areas of surface road works for the project include:

- Connection and integration to City West Link Road at the Rozelle Interchange
- Connections of the Western Harbour Tunnel to Falcon Street and Berry Street, North Sydney
- The Warringah Freeway Upgrade.

The construction of the surface road works would involve the following activities:

- Demolition of existing kerbs, structures and pavements
- Earthworks
- Relocation and/or protection of utilities
- New operational equipment and signage
- Bridgeworks at North Sydney and Cammeray
- Construction of noise barriers
- Construction of retaining walls

- Stormwater drainage
- Road pavement works
- Surface finishing works (eg landscaping).

Further information on these activities is provided in the following sections.

6.5.1 Earthworks

Earthworks would be required for the above ground sections of the project including:

- Upgrading local and arterial roads connecting to the Warringah Freeway Upgrade
- Widening works on the Warringah Freeway
- High Street intersection with Pacific Highway and Alfred Street North
- Site establishment works at various construction support sites, to achieve the desired level across the site.

Earthworks would include bulk excavation, excavation for new pavement or pavement widening, and placement and compaction of general fill and select fill. Excavation work would generally be carried out using excavators.

Where earthworks are required, excavated material would be loaded directly into trucks and removed from site or stockpiled for future reuse on the project.

It is expected that excavated material would consist of a combination of:

- Virgin excavated natural material
- Roadbuilding materials from within existing road corridors, such as concrete and asphalt.

Material required for filling and compaction works would typically be imported to construction support sites as this material is required to have specific engineering properties. There is the potential that tunnelling spoil may be used as fill material if it is available at the time required for surface earthworks.

Should excavated tunnel spoil be available for use in the earthworks and pavement construction of the surface roads, material would require crushing and screening in order to meet specified geotechnical parameters, including material grading. Crushing and screening activities for the project, should they occur, would be carried out within an acoustic shed located on the Cammeray Golf Course construction support site (WHT10) (refer to Section 6.7.2 for more information).

Fill material imported to site would be placed directly from trucks and would be spread with a grader and/or excavator and compacted using vibratory rollers. Watercarts would be used to add moisture during compaction and control the generation of dust.

6.5.2 Bridgeworks

Bridgeworks required for the project include:

- New, modified and widened road bridges at:
  - High Street in North Sydney
  - Mount Street in North Sydney
  - Falcon Street in North Sydney
  - Ernest Street in Cammeray
- New underpasses beneath Mount Street in North Sydney and Ernest Street in Cammeray
- New overpass bridges at:
  - Alfred Street North connection to Mount Street and High Street in North Sydney
  - Brook Street/Miller Street on ramp to Warringah Freeway southbound in Cammeray
- Construction of new and upgraded shared user bridges at Ridge Street and Falcon Street in North Sydney, and Ernest Street in Cammeray. Demolition of existing structures at Ridge Street and Falcon Street would be required.

Typical bridge construction methods are described in Table 6-7. The construction of new bridges would require the implementation of detours or lane closures along the Warringah Freeway, typically for short-term periods (for example nights or weekends), to allow the bridgeworks to be constructed in a safe and efficient manner. The majority of demolition works for bridge modification works would also need to be carried out at night (refer to Section 6.8.1 for more information about construction hours). Chapter 5 (Project description) provides more information on the types of new, modified and relocated bridges.

Table 6-7 Bridge construction methods

Bridgeworks	Construction method
Bridge modification and widening works (Mount Street bridge, Falcon Street bridge)	Bridge modification works would require: • Relocation of utilities as required • Existing bridge lane closures as required • Demolition of road pavement and bridge barriers down to the existing slab, at locations where bridges are to be upgraded and/or widened • Existing asphalt removed from the bridge deck • New precast sections positioned with the use of cranes and fixed to the bridge deck • Cast in-situ concrete deck over new precast section and to tie into the existing concrete deck • Asphalt applied to the bridge deck to form the roadway surface and associated linemarking carried out • Installation of any required barriers, drainage infrastructure and road furniture • Bridge lanes reopen to traffic.
Construction of new bridges, widened and replacement bridges (High Street bridge widening, Mount Street underpass, Alfred Street North overpass, Ernest	Construction of new bridges for the project would require: • Preparation works, including utilities protection and/or relocation, establishment of traffic pedestrian and cyclist diversions and installation of traffic and environmental controls • Demolition of existing structure, in stages, where bridge is being completely removed and replaced (in some cases the demolition would occur after the new bridge is substantially complete)

Bridgeworks	Construction method
Street underpass, Brook Street/Miller Street on ramp bridge, Ridge Street shared user bridge, Falcon Street shared user bridge, Ernest Street shared user bridge)	• Construction of bridge foundations and footings • Construction of bridge abutments and piers • Construction and/or installation of bridge spans • Construction of the cast in-situ reinforced concrete deck • Installation of bridge barriers and safety screens • Installation of road furniture • Finishing works, including asphalting and linemarking • Removal of detours and environmental and traffic controls • Opening/reopening of bridges.

6.5.3 Retaining walls

A number of retaining walls would be required for the project particularly for the Warringah Freeway Upgrade component.

The type of retaining wall required would depend on the location and the ground conditions and would be determined during detailed design development, and would consider the urban design principles and objectives developed for the project. The type of retaining wall could include:

- Piled retaining wall – generally used in areas where the face of the retaining wall is within an area of softer ground that has been excavated or is to be excavated
- Reinforced soil wall – used where retaining walls would be constructed in areas of fill
- L-shape retaining wall – used where retaining walls are lower in height and reinforced soil walls are not suitable for structural and/or geometric reasons
- Soil nail retaining wall – used in areas with stable ground conditions and installed to provide additional stabilisation and support other project structures, such as bridge abutments.

The method for constructing retaining walls would vary depending on the type of wall required but could include:

- Excavation
- Piling, installation of concrete footings, provision of structural support (ie rock anchors or soil nails)
- Shotcreting
- Drainage at the base or behind the retaining wall
- Installation of either pre-cast or cast in-situ panels or segments
- Backfilling of the retaining walls and architectural finishes.

6.5.4 Stormwater drainage

The project would require construction of new drainage infrastructure and alterations to existing drainage infrastructure, including:

- Construction of new pits, pipes and culverts for the surface roads
- Adjustment of existing pits to suit new road alignments on existing surface roads
- Alterations to the existing drainage infrastructure near tunnel connections to the Warringah Freeway
- Upgrade of the two existing box culverts which cross beneath the Warringah Freeway between ANZAC Park and the Cammeray Golf Course site
- Upgrade or capacity improvements of other cross drainage structures which cross underneath the Warringah Freeway
- Upgrade and capacity improvements to the drainage pipelines along the on and off ramps connecting the Warringah Freeway with the existing culvert crossing near Brook Street at Cammeray/Crows Nest.

Stormwater drainage would generally consist of precast concrete pipes or culverts which would be placed in trenches that would then be backfilled with select material that meets engineering specifications. Where pipes and culverts need to be installed under existing roadways, underboring or pipejacking may be used to avoid the need to trench across live traffic lanes, where this work cannot be feasibly carried out in stages across existing carriageways. In this instance, a trench would be excavated to one side of the roadway, and the drainage pipes installed by drilling horizontally underneath the roadway. Floodwalls would be constructed to prevent the ingress of water into the tunnels during significant storm events.

Indicative construction methods for stormwater drainage are outlined in Table 6-8.

Table 6-8 Indicative stormwater drainage construction methods

Drainage type	Construction method
Drainage pipes	• Excavation of a trench in the existing ground surface • Installation of precast concrete pipes placed in sections onto a bedding layer • Placement and compaction of select material around the pipes using hand-propelled compaction equipment, such as rammers or vibrating plates.
Installation of drainage pits and lids	• Excavation of pit location • Installation of precast concrete pits, or casting the pit in-situ • Connection of pipes into concrete pits, which would be backfilled similar to the drainage pipes • Lids and inlets would be installed onto the pits and later incorporated into the kerbs and slabs.
Construction of box culverts	• Excavation of a trench in the existing ground surface • Concrete casting of culvert base slab in-situ • Installation of precast culvert units • Backfilling, where required, using select material around the culverts and hand-propelled compaction equipment, such as rammers or vibrating plates.

Drainage type	Construction method
Installation of flood walls	• Excavation of a foundation for the floodwall • Pour concrete foundation • Form, reinforce and pour concrete floodwall in panel sections.

North Sydney Council stormwater harvesting scheme

As part of the rehabilitation works, a new, relocated storage dam within the Cammeray Golf Course would be constructed to replace the existing storage dam which forms part of the North Sydney Council stormwater harvesting scheme. The indicative location and description of the storage dam is provided in Section 5.3.9 of Chapter 5 (Project description).

6.5.5 Road pavement works

In areas where existing road pavements would be widened, pavements would be constructed to consist of similar pavement types to the existing road, and to meet Transport for NSW design standards.

Construction of areas of new surface roads would generally consist of flexible or rigid pavements. Flexible pavements generally comprise the installation of an upper asphalt base layer (including an asphalt wearing course), placed on a granular or concrete sub-base. Installation of the sub-base pavement layer would involve the placement of material using trucks, excavators and graders, and compacted by vibratory rollers. A sprayed bitumen seal would be sprayed onto this layer of material, and aggregate would then be spread and rolled on top of the sprayed bitumen to create a waterproof seal.

Asphalt would be laid on top of the aggregate. Hot asphalt material would be transported to site in trucks from an off-site batching plant. Asphalt would be unloaded into paving machines, which would spread the asphalt to the required thickness. The asphalt surface is then compacted and cooled.

Rigid pavements generally comprise a concrete base (this may also include an asphalt wearing course), placed on a granular sub-base or concrete sub-base. The base or sub-base could be constructed using concrete pavers or they could be formed, with fixed forms set at the required pavement levels. Reinforcement would also be placed if required by the design. The concrete would be poured directly from agitator trucks into the concrete paver or into the forms.

Existing road pavements would be modified to integrate with the project where required. This may require milling and resurfacing of the existing pavements to tie-in with new road surfaces. These works are often required to be carried out at night when traffic numbers are reduced to enable the required lane closures.

Shared user path and cycleway pavements would be constructed to consist of similar pavement types to the existing paths, and to meet Transport for NSW design standards.

6.5.6 Surface finishing works

Surface finishing works would be carried out towards the completion of construction and would include:

- Linemarking of new road pavement
- Installation of directional signage and other roadside furniture
- Final landscape treatments and rehabilitation works.

6.6 Testing, commissioning and demobilisation

Testing and commissioning works would be carried out towards the completion of construction to validate the correct operation and integration of tunnel systems prior to road opening.

Site clean-up and demobilisation works would be carried out once construction activities have been completed at that location. This would include:

- Site demobilisation and rehabilitation of construction support sites
- Post construction condition surveys
- Removal of construction-related signage
- Removal of construction-related environmental controls and traffic management infrastructure.

Remaining lands (also referred to as surplus lands) are those lots that would be wholly or partially occupied during construction of the project but would not be required for operational infrastructure or other operational activities. Where land is leased for construction of the project, reinstatement and rehabilitation of the site would be carried out as part of demobilisation works, in consultation with and to meet the requirements of the relevant landowner.

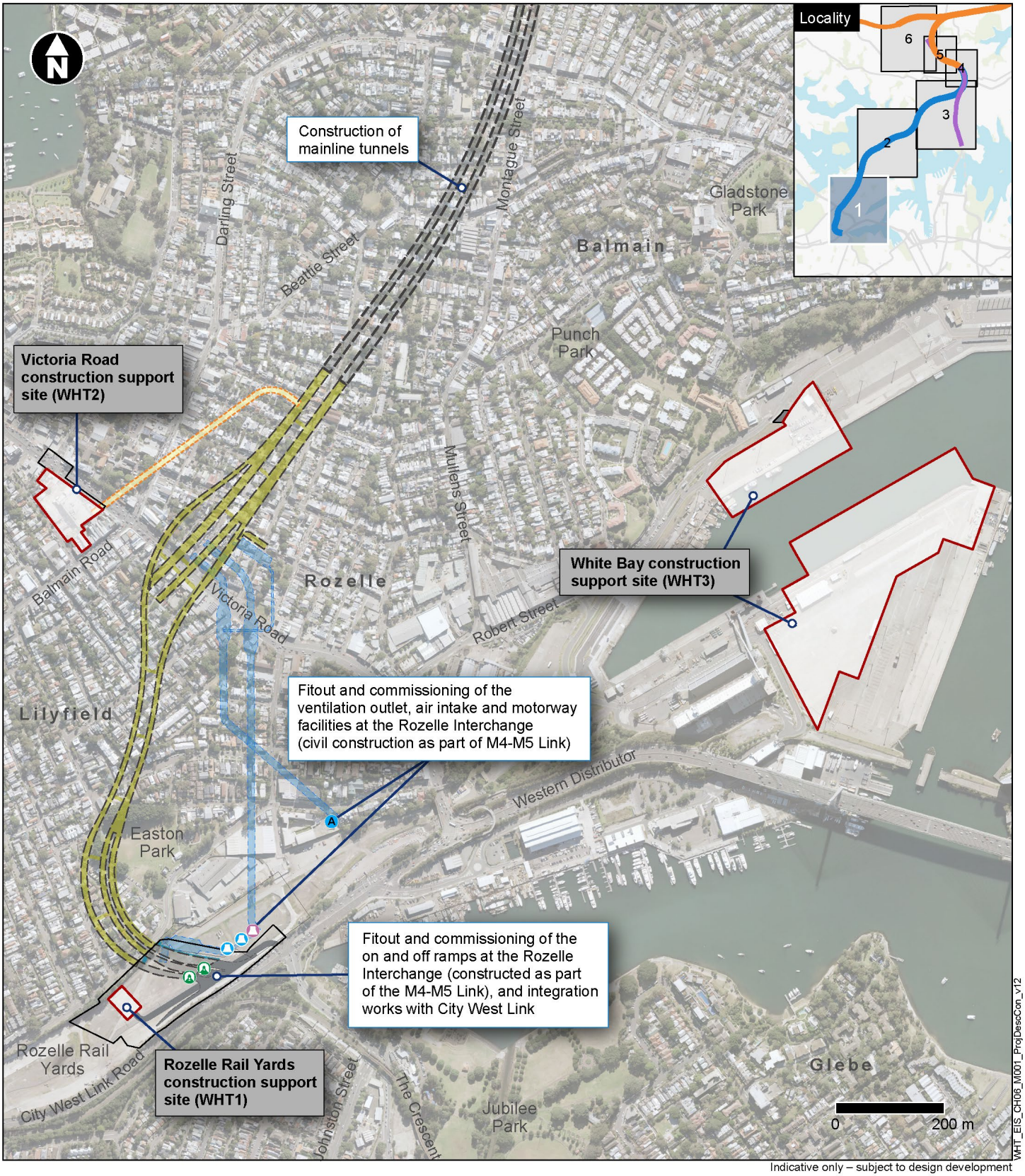
Any future development of remaining lands would be subject to separate assessment and approval in accordance with the *Environmental Planning and Assessment Act 1979*. Additional detail about remaining lands not required following construction of the project and anticipated future treatment of the land is provided in Chapter 20 (Land use and property).

6.7 Construction footprint and construction support sites

6.7.1 Construction footprint

The total area required for construction of the project is referred to as the construction footprint. The construction footprint consists of the anticipated area needed for the project and includes construction support sites and additional areas where work would be required to construct the project. Construction support sites required for the project are discussed in Section 6.7.2 and Section 6.7.3.

Most of the construction would be underground (the mainline and ramp tunnels). However, surface areas would be required to support tunnelling activities and to construct the surface connections, tunnel portals, surface road works, active transport facilities (pedestrian and cyclist facilities) and operational facilities. An overview of construction activities and the construction footprint is shown in Figure 6-20 to Figure 6-25.



Legend

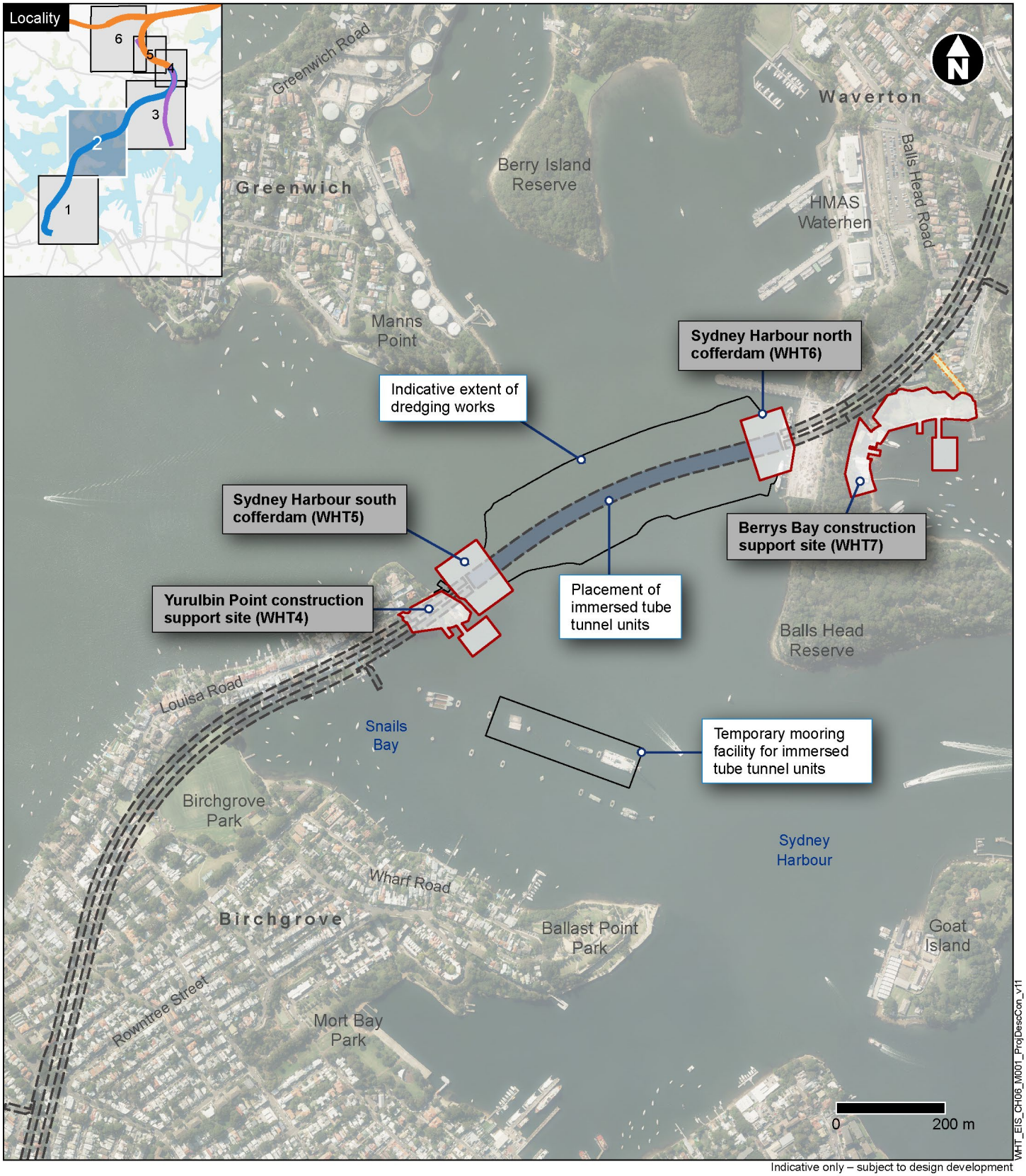
Construction
- Construction footprint
- Construction support site
- Access decline
- Ventilation tunnel

Alignment
- Surface connections
- Driven tunnel
- M4-M5 Link driven tunnel (fitout only)
- Surface works

Permanent features
- Ventilation outlet

M4-M5 Link project
- Ventilation outlet
- Air intake facility

Figure 6-20 Overview of construction activities and construction footprint (map 1)



Legend

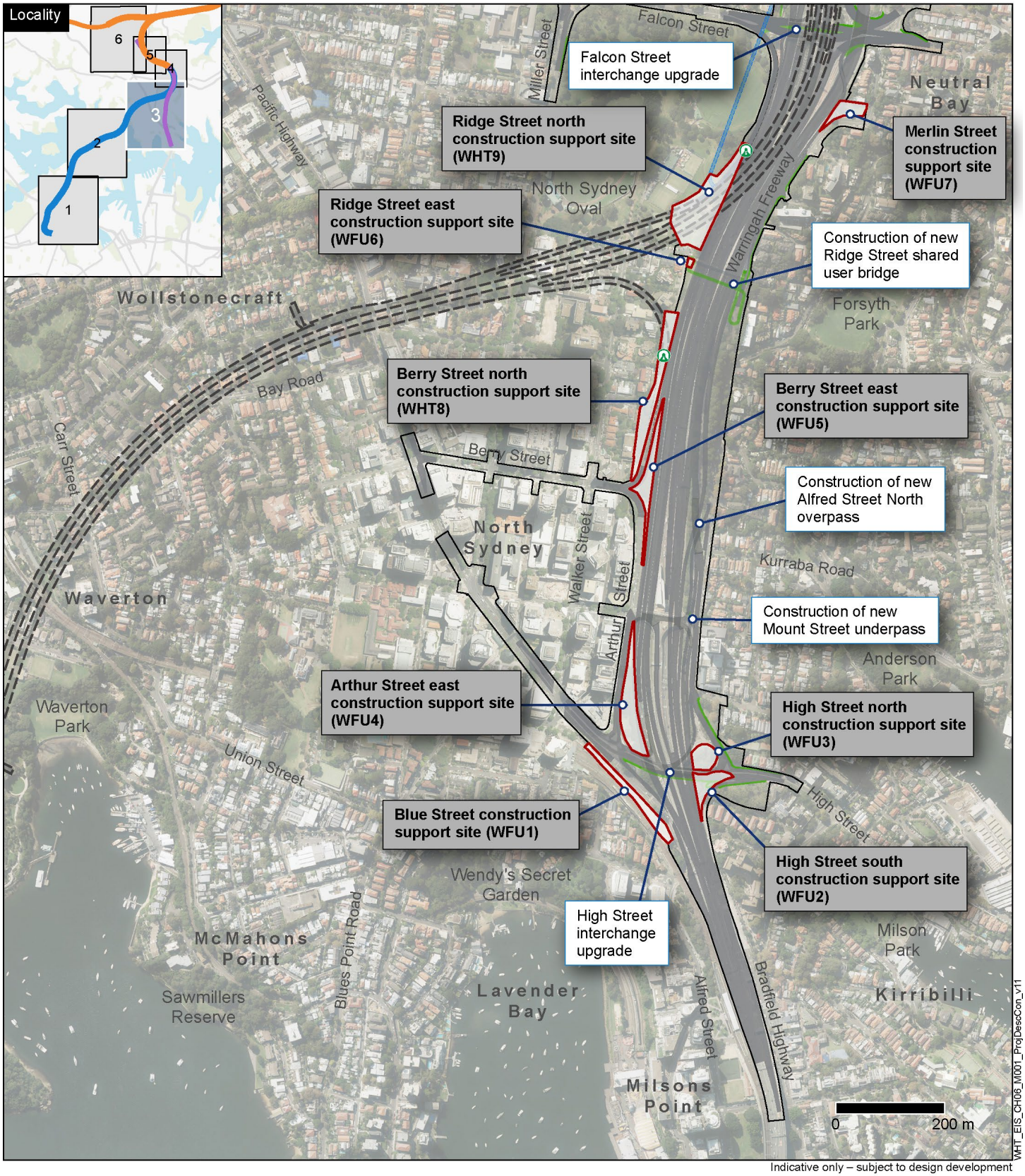
Construction

- Construction footprint
- Construction support site
- Access decline

Alignment

- Driven tunnel
- Immersed tube tunnel

Figure 6-21 Overview of construction activities and construction footprint (map 2)



Indicative only – subject to design development

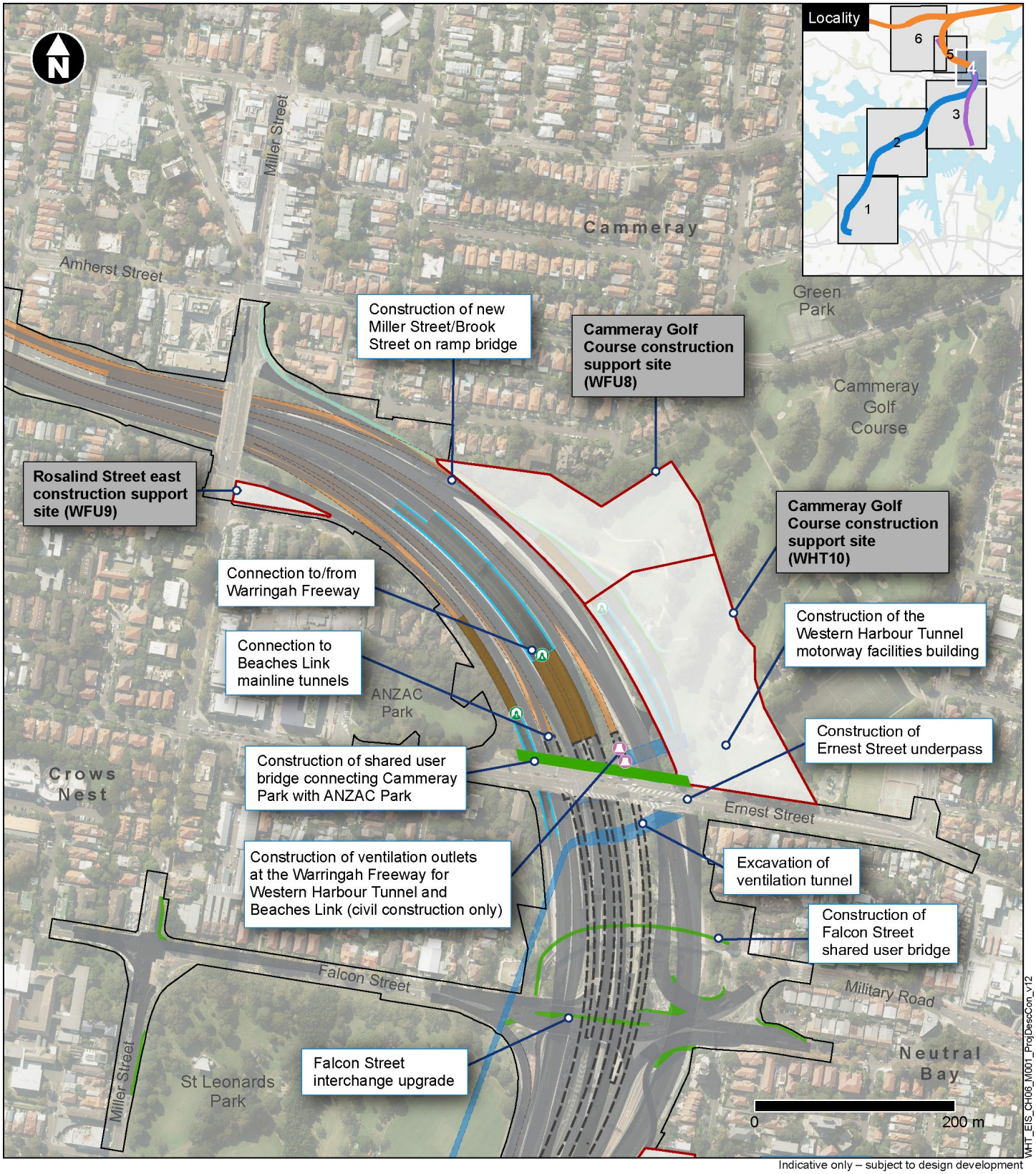
Legend

Construction
- Construction footprint
- Construction support site

Alignment
- Surface connections
- Driven tunnel
- Surface works

Permanent features
- Ventilation tunnel
- Pedestrian / shared user path

Figure 6-22 Overview of construction activities and construction footprint (map 3)



Legend

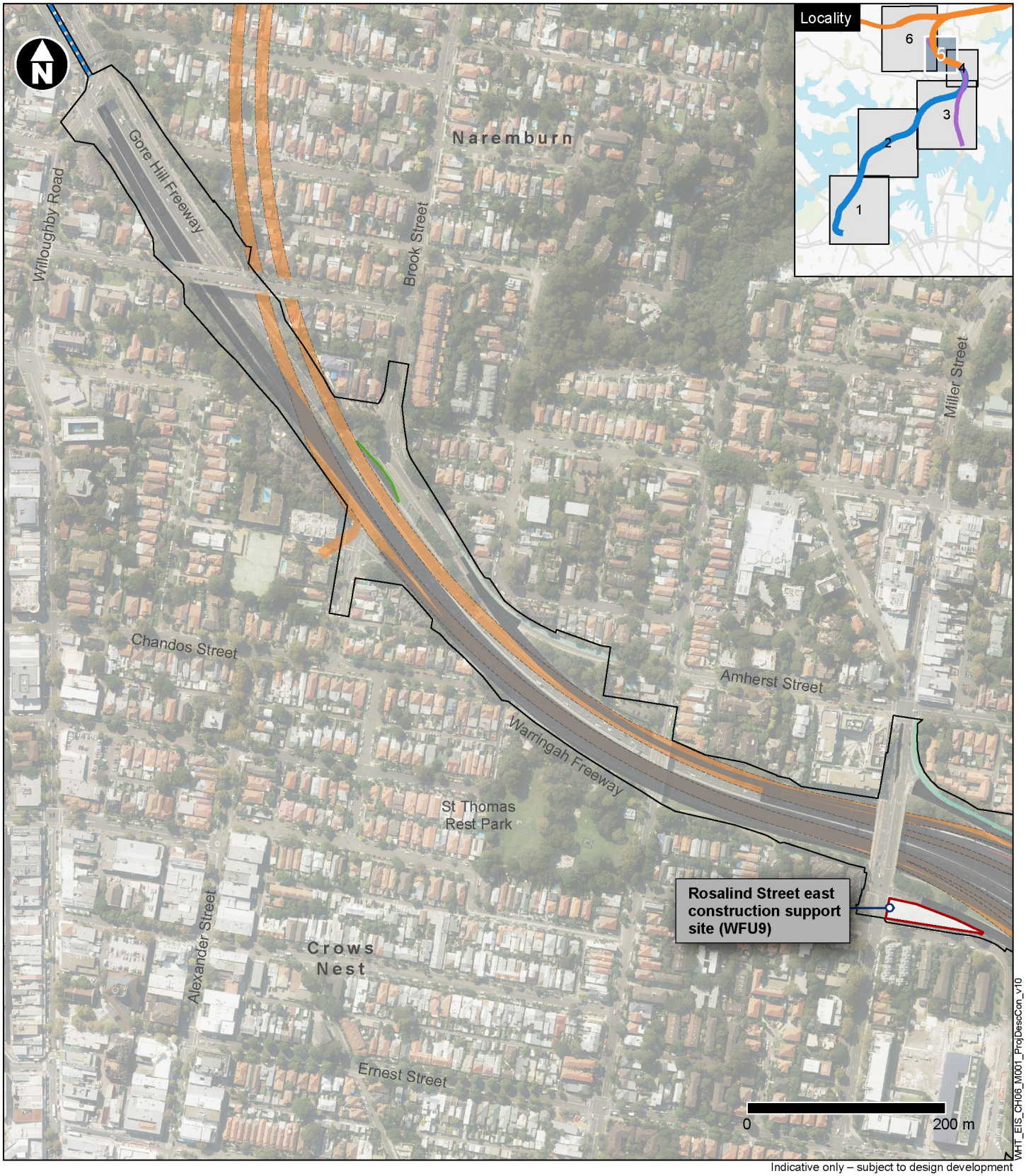
Construction
- Construction footprint
- Construction support site

Alignment
- Surface connections
- Driven tunnel
- Trough structure
- Cut and cover
- Surface works

Permanent features
- Pedestrian / shared user path
- Cycleway
- Western Harbour Tunnel ventilation tunnel
- Ventilation outlet

Connecting projects
- Beaches Link and Gore Hill Freeway Connection project

Figure 6-23 Overview of construction activities and construction footprint (map 4)



Indicative only – subject to design development

Legend

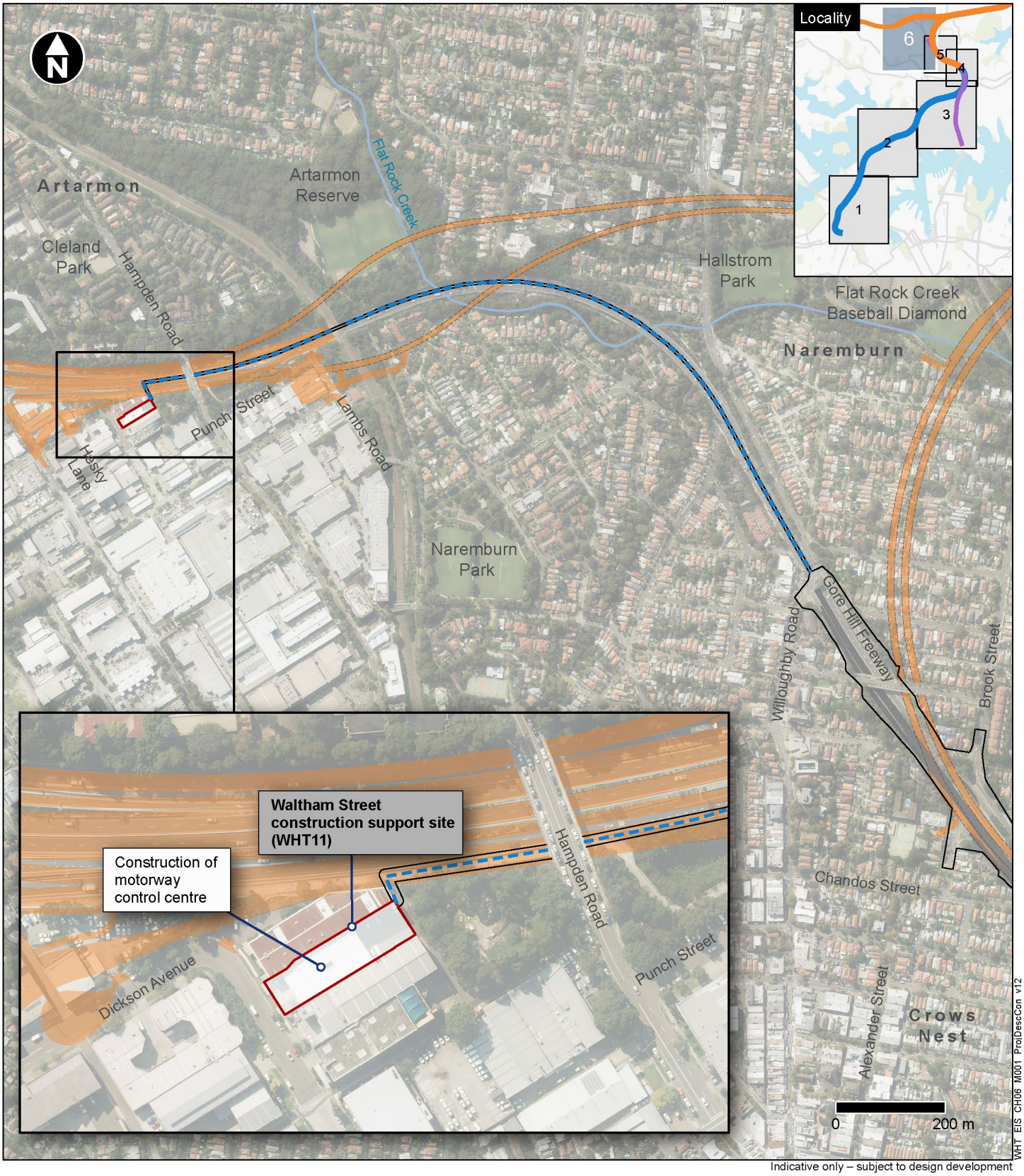
Construction
- Construction footprint
- Construction support site

Alignment
- Surface works

Permanent features
- Pedestrian / shared user path
- Cycleway
- Communications cable for motorway control centre

Connecting projects
- Beaches Link and Gore Hill Freeway Connection project

Figure 6-24 Overview of construction activities and construction footprint (map 5)



Legend

Construction
- Construction footprint
- Construction support site

Alignment
- Surface works

Permanent features
- Communications cable for motorway control centre

Connecting projects
- Beaches Link and Gore Hill Freeway Connection project

Figure 6-25 Overview of construction activities and construction footprint (map 6)

6.7.2 Western Harbour Tunnel construction support sites

Temporary construction support sites for the Western Harbour Tunnel component of the project would include tunnelling and tunnelling support sites, surface civil works sites, cofferdams, mooring sites, wharf and berthing facilities, construction storage (laydown) areas, parking and workforce amenities.

All construction support sites would have appropriate boundary fencing. This would be typical construction hoarding or security fencing. Where required, temporary noise barriers would be installed on the site boundary (where this is proposed it is shown on the construction support site figures).

To support operation of the sites, high voltage power, potable water supply and a suitable connection for water discharge would be required (refer to Section 6.8.4).

Construction hours at construction support sites would vary depending on the type of construction activity being carried out. Proposed hours for each construction support site are outlined below and construction work hours associated with specific activities are detailed in Section 6.8.1.

The following sections describe the proposed Western Harbour Tunnel construction support sites and their anticipated functions during construction. Construction support sites required for the Warringah Freeway Upgrade component are discussed in Section 6.7.3.

Rozelle Rail Yards (WHT1)

A summary of the key features of the Rozelle Rail Yards construction support site is included in Table 6-9. An indicative layout for the construction support site, and construction site access routes, is shown in Figure 6-26. An indicative program for construction activities is provided in Table 6-10.

Construction works at the Rozelle Rail Yards construction support site may overlap with construction of the approved M4-M5 Link, which uses part of the Rozelle Rail Yards. Should this occur, construction works for the project at this location would be carried out in coordination with the construction contractors of the approved M4-M5 Link to ensure all interfaces are effectively managed, including the construction and operation of M4-M5 Link operational infrastructure.

Table 6-9 Key features of the Rozelle Rail Yards construction support site (WHT1)

Key feature	Summary
Site area	1000 m^2
Site description	Located within the Rozelle Rail Yards at Rozelle, which is bound by Lilyfield Road to the north and the City West Link to the south. The western extent of the site borders a proposed ramp for the approved M4-M5 Link and vacant, cleared land located to the east. The nearest residences are located immediately north of the construction support site on the northern side of Lilyfield Road. The site is relatively flat and largely vacant. Vegetation across the site comprises a mixture of urban exotic/native species as well as weed species. The vegetation across the site is located within the area assessed for the M4-M5 Link, and vegetation would be removed under that approval prior to the construction of the project. As such, no vegetation clearance would be required at this site for the project.

Key feature	Summary
Key activities	The construction support site would support mechanical and electrical fitout of the mainline tunnels. The site would also support construction and fitout of the ventilation outlet and motorway facilities, as well as surface roads connecting the ramp tunnels to the City West Link. Key activities that would occur on, or be supported by this site would include: • Construction of operational facilities for the Western Harbour Tunnel component at the Rozelle Interchange, including a water treatment plant, as well as construction and fitout of the Western Harbour Tunnel motorway facilities at the Rozelle Interchange, including tunnels (located underground) • Fitout of the ventilation outlet and air intake facilities for the project (constructed as part of the M4-M5 Link Rozelle East Motorway Operations Complex) • Mechanical and electrical fitout of the ramp tunnels • Treatment of wastewater from construction activities • Integration works to connect the on and off ramps at the Western Harbour Tunnel component to City West Link. These integration works would involve pavement works, linemarking and road furniture adjustments.
Hours of construction	Spoil haulage would be carried out during standard construction hours (7am to 6pm Monday to Friday, 8am to 1pm Saturday and no construction works on Sundays or public holidays). Underground works and deliveries to the tunnel would be carried out up to 24 hours per day, seven days per week.
Access arrangements	Access in and out of the site would be via City West Link Road.

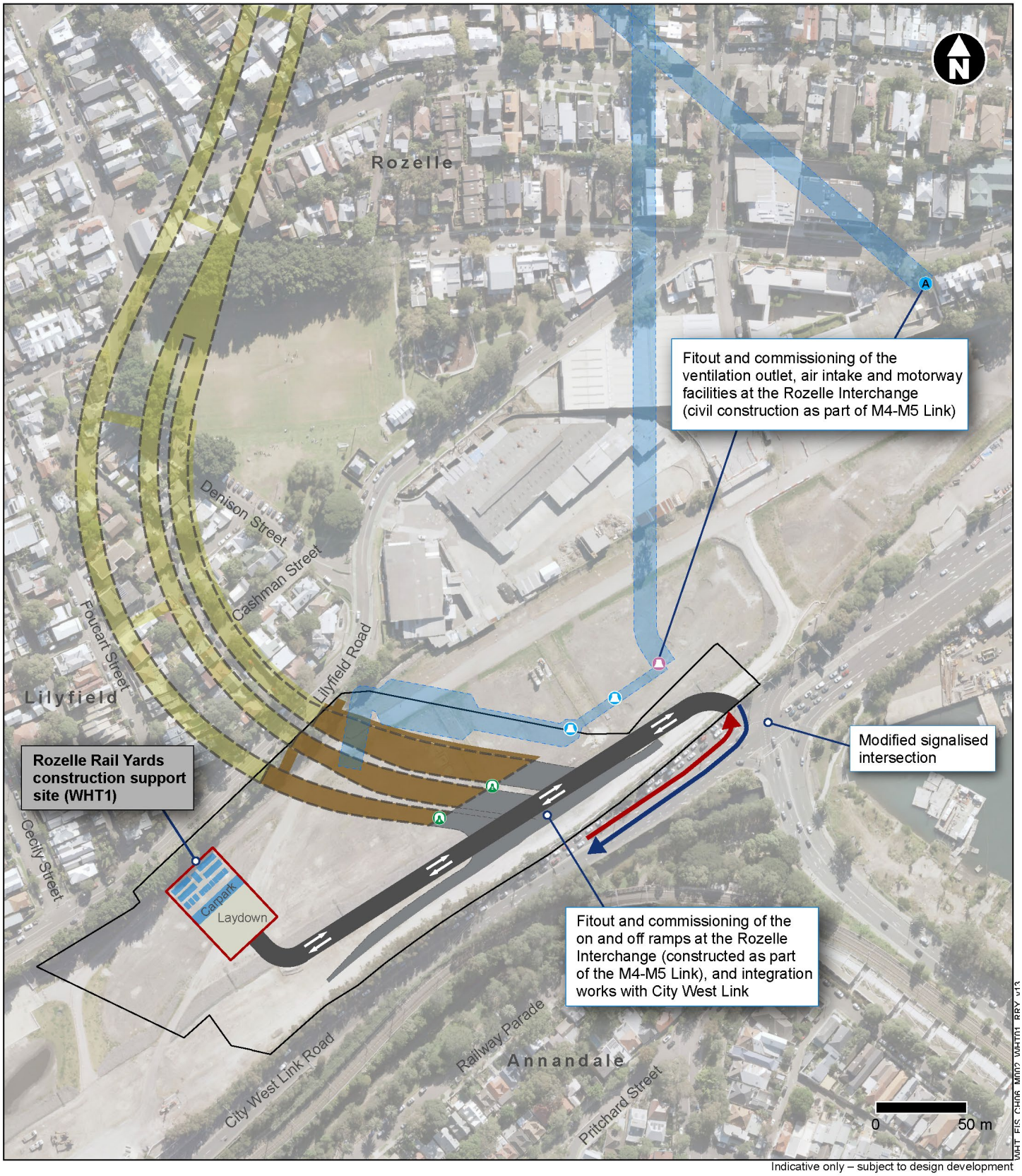


Figure 6-26 Indicative layout – Rozelle Rail Yards construction support site

Table 6-10 Rozelle Rail Yards construction support site indicative construction program

Construction activity	Indicative construction program															
	2023				2024				2025				2026			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Early works and site establishment																
Tunnel fitout and finishing																
Testing and commissioning																
Connection to the Rozelle Interchange																
Site clean-up and demobilisation																

Victoria Road (WHT2)

A summary of the key features of the Victoria Road construction support site is included in Table 6-11. An indicative layout for the construction support site and construction site access routes is shown in Figure 6-27. An indicative program for construction activities is provided in Table 6-12.

Table 6-11 Key features of the Victoria Road construction support site (WHT2)

Key feature	Summary
Site area	8500 m^2
Site description	Located within the former Balmain Leagues Club site at Rozelle, bound by Victoria Road to the north-east and Waterloo Street to the south-west. The eastern and western extents of the construction support site border a mixture of commercial properties. Residential properties are located immediately south-west of the construction support site along Waterloo Street. Rozelle Public School is located north-east of the construction support site on the north-eastern side of Victoria Road, and a number of commercial and retail premises are to the north-west and south-east of the construction support site. A number of vacant commercial premises as well as a residence currently occupy the site, which slopes downward towards the north.
Key activities	The construction support site would support excavation of the mainline tunnels. Access for plant and equipment required to excavate the tunnels would be via an access decline constructed in the south-east corner of the site. The mainline tunnels would be excavated in both directions from this site. Key activities that would occur on, or be supported by this site would include: • Demolition of existing vacant structures on the construction support site during early works and site establishment • Excavation of an access decline for tunnel construction access to connect the construction support site at the surface to the mainline tunnels • Excavation of driven mainline tunnels, including cross passages • Treatment of wastewater from tunnelling activities • Excavation, handling and stockpiling of tunnel spoil (within acoustic shed) • Tunnel civil, mechanical and electrical fitout.

Key feature	Summary
Hours of construction	Spoil haulage would be carried out during standard construction hours (7am to 6pm Monday to Friday, 8am to 1pm Saturday and no construction works on Sundays or public holidays). Tunnel construction and fitout would be carried out up to 24 hours per day, seven days per week either within an acoustic shed or underground. Night time deliveries would be required to support the tunnelling activities.
Access arrangements	Access in and out of the site would be via Victoria Road.

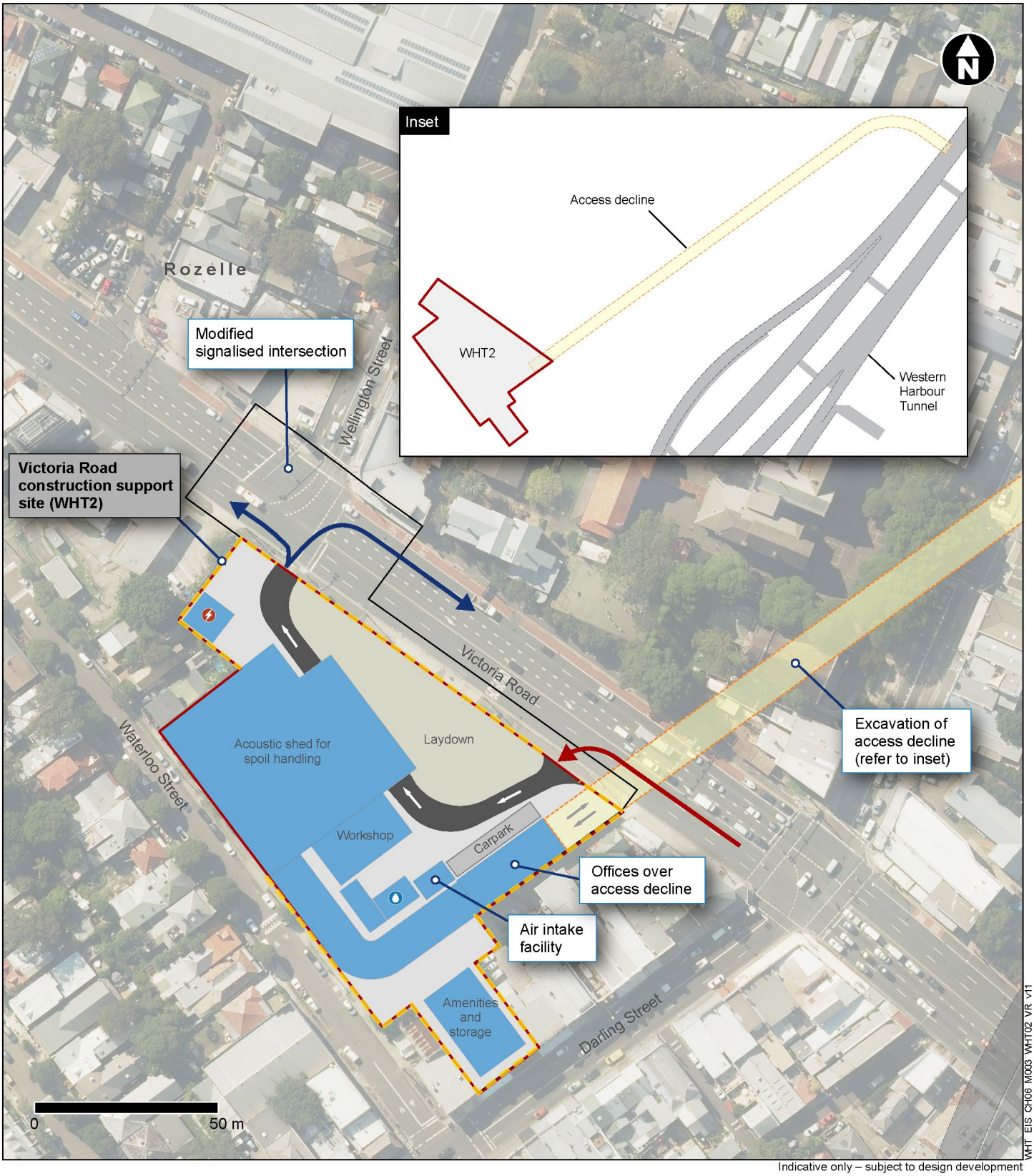


Figure 6-27 Indicative layout – Victoria Road construction support site

Table 6-12 Victoria Road construction support site indicative construction program

Construction activity	Indicative construction program																			
	2021				2022				2023				2024				2025			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Early works and site establishment																				
Construction of tunnel access decline																				
Tunnel construction																				
Tunnel fitout and finishing																				
Testing and commissioning																				
Site clean-up and demobilisation																				

White Bay (WHT3)

A summary of the key features of the White Bay construction support site is included in Table 6-13. An indicative layout for the construction support site, and construction site access routes, is shown in Figure 6-28. An indicative program for construction activities is provided in Table 6-14.

Table 6-13 Key features of the White Bay construction support site (WHT3)

Key feature	Summary
Site area	112,000 m^2
Site description	Located in White Bay at Rozelle, the site is bound by a mixture of industrial and high density residential properties to the north, Jones Bay/Johnstons Bay to the east, Rozelle Bay/Blackwattle Bay to the south and a mixture of industrial and high density residential properties to the west. The northern part of the site is next to the White Bay Cruise Terminal. The construction support site would consist of a combined land and water-based site, and would make use of the existing wharf areas to the north and south of White Bay as well as the berthing facilities. The construction support site is currently an operating port facility.
Key activities	The northern portion of White Bay would primarily support dredging activities for the construction of the immersed tube tunnels. The southern area of White Bay would be used to support the casting and fitout of the immersed tube tunnel units, and the handling and transport of spoil from the Yurulbin Point (WHT4) and Berrys Bay (WHT7) construction support sites, along with providing ancillary facilities and support to works on the southern side of the harbour, for the harbour crossing works, and the Berrys Bay site. This site would also be used to store plant and equipment until it is required at the Yurulbin Point (WHT4) and Berrys Bay (WHT7) construction support sites. Key activities that would occur on, or be supported by this site would include: • Early works and site establishment, which would include demolition of structures within the boundary of the construction support site, piling to establish a wharf structure and moorings, as part of the establishment of the casting and fitout facility and establishment of a

Key feature	Summary
	treatment area for dredged material that is not suitable for offshore disposal • Casting and fitout of the immersed tube tunnel units • Transport of immersed tube tunnel units to the mooring location at Snails Bay • Spoil handling, treatment and transport of dredged material not suitable for offshore disposal within the designated offshore disposal site • Spoil handling and transport of excavated material from tunnelling at the Yurulbin Point (WHT4) and Berrys Bay (WHT7) construction support sites • Storage and transport of major plant and equipment for the Yurulbin Point (WHT4) and Berrys Bay (WHT7) construction support sites as well as the harbour crossing works.
Hours of construction	General site activities (including casting and fitout of the immersed tube tunnel units) and spoil haulage would be carried out during standard construction hours (7am to 6pm Monday to Friday, 8am to 1pm Saturday and no construction works on Sundays or public holidays). Some deliveries to and from the site would be required during the evening and night time to support casting of immersed tube tunnel units and construction activities at the Yurulbin Point (WHT4) and Berrys Bay (WHT7) construction support sites.
Access arrangements	Access in and out of the northern portion of the site would be via Port Access Road and access in and out of the southern portion of the site would be via James Craig Road. Robert Street would not be used to access the construction support site.

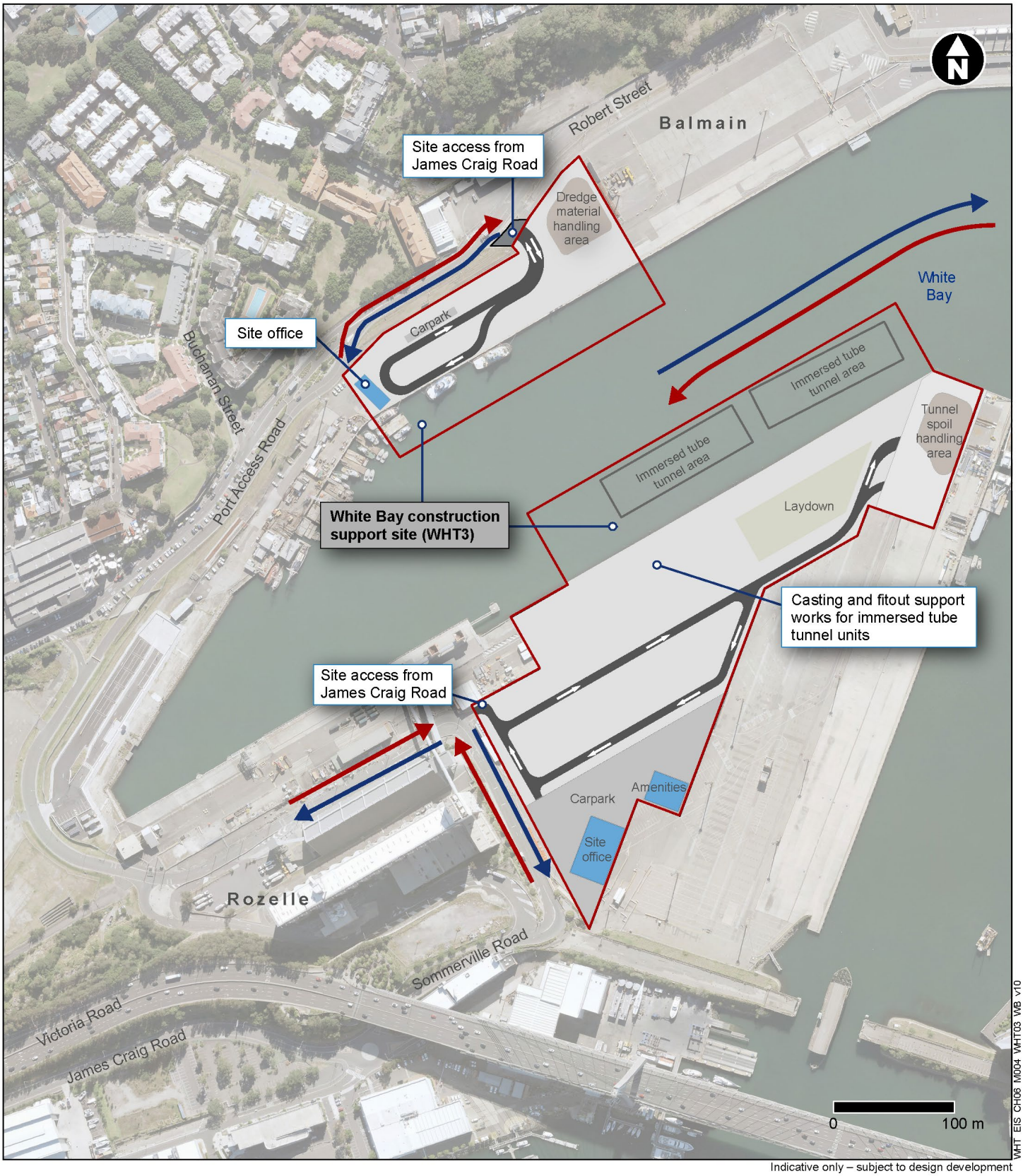


Figure 6-28 Indicative layout – White Bay construction support site

Table 6-14 White Bay construction support site indicative construction program

Construction activity	Indicative construction program																			
	2021				2022				2023				2024				2025			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Early works and site establishment																				
Casting of immersed tube tunnel units																				
Spoil handling and treatment																				
Site clean-up and demobilisation																				

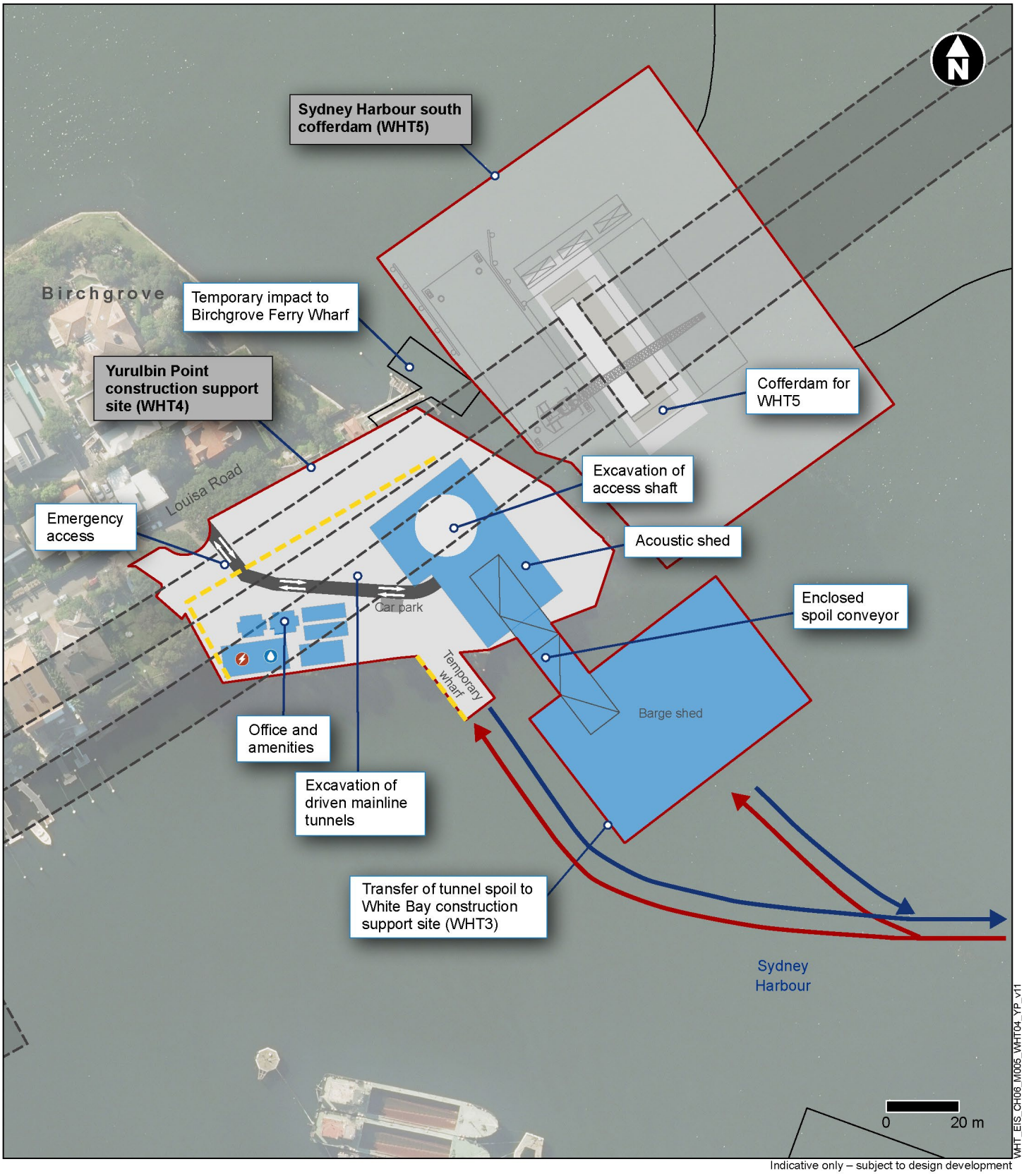
Yurulbin Point (WHT4)

A summary of the key features of the Yurulbin Point construction support site is included in Table 6-15. An indicative layout for the construction support site is shown in Figure 6-29. An indicative program for construction activities is provided in Table 6-16. Marine transport routes are shown in Figure 6-38.

Table 6-15 Key features of the Yurulbin Point construction support site (WHT4)

Key feature	Summary
Site area	9100 m^2
Site description	This site would consist of a combined land and water-based site, located at the end of Louisa Road in Yurulbin Park, Birchgrove. The site is bound by Sydney Harbour to the south and east and Yurulbin Park to the north and west. Residential properties are located north and west of the construction support site on Numa Street and Louisa Road, respectively. Areas of Yurulbin Park within the construction footprint, as well as an existing carpark would be closed during construction. This would also result in the temporary (around two years) closure of access to Birchgrove Wharf (ferry customers would be notified of alternative travel arrangements in advance of the temporary wharf closure (refer to Chapter 8 (Construction traffic and transport) for additional information).
Key activities	The construction support site would support excavation of the mainline tunnels (including for connection to the immersed tube tunnel crossing). Access for plant and equipment required to excavate the tunnels would be via an access shaft constructed on the lower portion of the site. The mainline tunnels would be excavated in both directions from this construction support site. Key activities that would occur on, or be supported by, this site would include: • Vegetation clearing and earthworks as part of early works and site establishment • Construction of temporary wharves for transport of tunnel spoil material, to avoid heavy vehicle movements on Louisa Road • Excavation of access shaft • Excavation of driven mainline tunnels, including cross passages and breakthrough into the Sydney Harbour south cofferdam for connection to

Key feature	Summary
	the immersed tube tunnel • Treatment of wastewater from tunnelling activities • Tunnel civil, mechanical and electrical fitout • Transfer of spoil from the mainline tunnels excavations to barges, for transfer to the White Bay construction support site (WHT3) • Reinstatement of the site on completion of construction. To minimise the size of this construction support site, an area at the White Bay construction support site (WHT3) would be used for the storage of plant and equipment until it is required at the Yurulbin Point construction support site (WHT4).
Hours of construction	Shaft construction, spoil haulage and major deliveries would be carried out during standard construction hours (7am to 6pm Monday to Friday, 8am to 1pm Saturday and no construction works on Sundays or public holidays). Spoil handling and loading of the barges within the acoustic shed on the site would be carried out outside of standard construction hours. Tunnel construction would be carried out up to 24 hours per day, seven days a week either within an acoustic shed or underground. There would be limited deliveries to site at night, via barge, to support the tunnelling works.
Access arrangements	Access to the site would be via Sydney Harbour only. Marine transport between the site and White Bay would be the primary transport mode for this site, and would be used for site establishment works, spoil haulage, material and construction equipment delivery. An access route to Louisa Road has been provided for emergency use only.



Legend

- Construction footprint
- Construction support site
- Construction site buildings
- Driven tunnel
- Temporary site access
- Wastewater treament plant
- Aboveground substation
- Indicative temporary noise barrier
- Site access - in
- Site access - out

Figure 6-29 Indicative layout – Yurulbin Point construction support site

Table 6-16 Yurulbin Point construction support site indicative construction program

Construction activity	Indicative construction program																			
	2021				2022				2023				2024				2025			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Early works and site establishment																				
Shaft construction																				
Tunnel construction																				
Tunnel fitout and finishing																				
Testing, commissioning and site rehabilitation																				

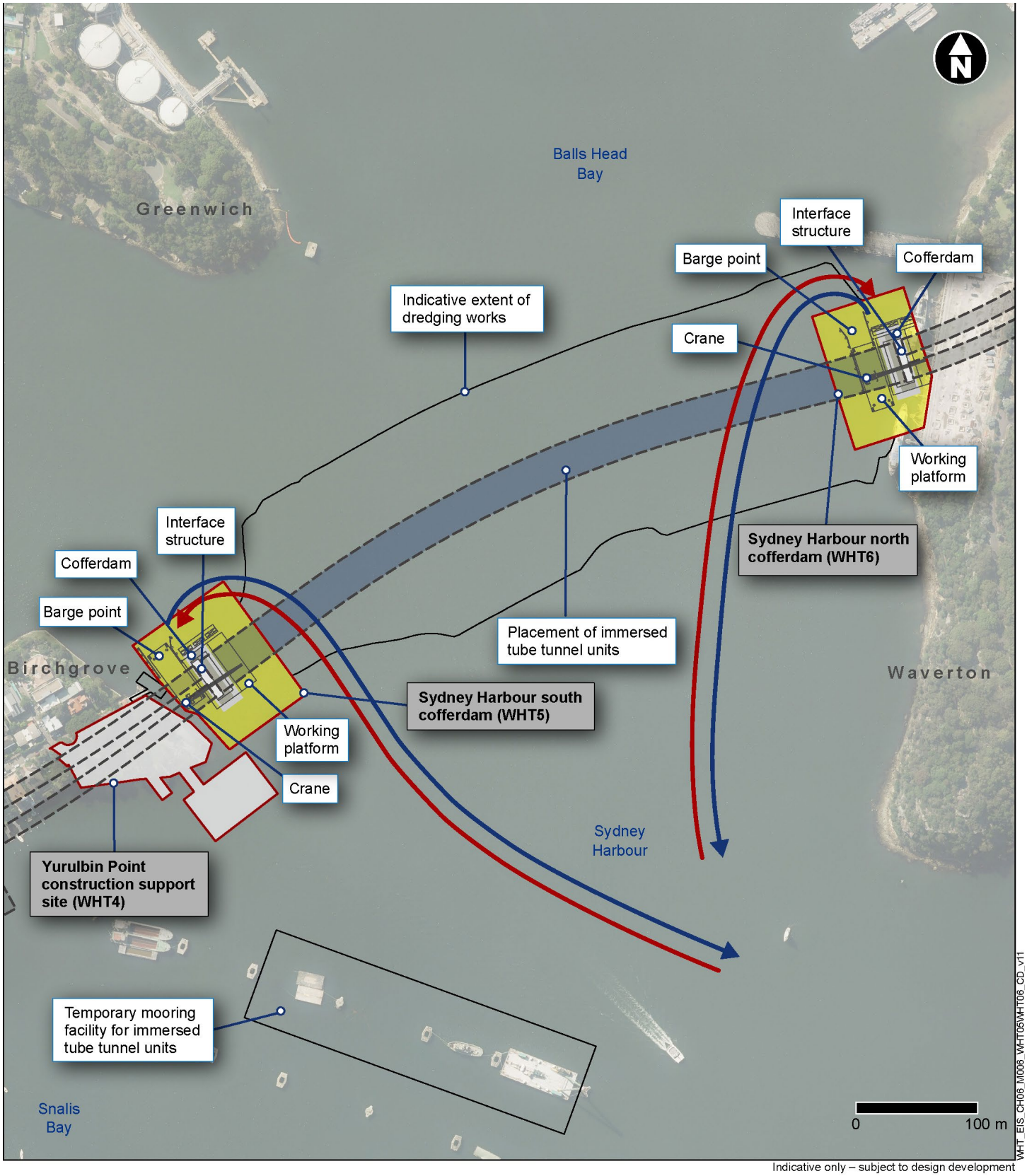
Sydney Harbour south cofferdam (WHT5), Sydney Harbour north cofferdam (WHT6) and Sydney Harbour crossing

A summary of the key features of the Sydney Harbour cofferdams is included in Table 6-17. An indicative layout for the cofferdams is shown in Figure 6-30. An indicative program for construction activities at this site is provided in Table 6-18. Marine transport routes are shown in Figure 6-38.

Table 6-17 Key features of the Sydney Harbour cofferdams (WHT5 and WHT6) and Sydney Harbour crossing

Key feature	Summary
Site area	WHT5 10,000 m^2 and WHT6 9000 m^2
Site description	Temporary cofferdams would be located at either end of the immersed tube tunnel crossing of Sydney Harbour, at Yurulbin Point, Birchgrove next to Yurulbin Park in the west, and at Waverton, next to the disused Balls Head coal loader in the east. The closest residential properties to the cofferdams are: • Along Louisa Road, Birchgrove • Along Balls Head Road, Wood Street and Larkin Street, Waverton. The closest commercial property to the site is the Coal Loader Café, located to the north-east of Sydney Harbour north cofferdam (WHT6). The cofferdams have been located offshore to minimise landside and shoreline impacts. Deliveries and spoil handling for these sites would be via water to minimise road haulage through narrow harbourside streets.
Key activities	The cofferdams are temporary structures that would facilitate construction of the underwater interface structures between the driven mainline tunnels and the immersed tube tunnel elements. Key activities that would occur on, or be supported by these sites would include: • Construction of temporary cofferdam structure, including ground treatment, piling, dewatering and excavation • Construction of the interface structure (connection between the driven tunnels and the immersed tube tunnels, refer to Section 6.4.4) within the cofferdams • Removal of cofferdam structure and site rehabilitation • Construction support from the water, including the use of moored work

Key feature	Summary
	barges (such as a flat top barge as shown in Figure 6-12), as well as barge movements for removal and transfer of dredged marine sediment and rock, deliveries and staff transport • Dredging and gravel placement • Installation of immersed tube tunnel units.
Hours of construction	Construction would be carried out primarily during standard construction hours (7am to 6pm Monday to Friday, 8am to 1pm Saturday and no construction works on Sundays or public holidays). Certain activities may be carried out up to 24 hours per day, seven days per week. These activities would include: • Dewatering of cofferdams • Dredging • Removal of cofferdam structure • Immersed tube tunnel installation (immersed tube tunnel installation would take between 24 to 48 hours for each unit). Rock hammering and piling would be carried out during standard construction hours only.



Legend

- Construction footprint
- Construction support site
- Driven tunnel
- Immersed tube tunnel
- Indicative marine exclusion zone
- Site access - in
- Site access - out

Figure 6-30 Indicative layout – Sydney Harbour cofferdams

Table 6-18 Sydney Harbour cofferdams and other activities indicative construction program

Construction activity	Indicative construction program																			
	2021				2022				2023				2024				2025			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Site establishment and installation of temporary cofferdam structure																				
Excavation of rock within cofferdams																				
Construction of interface structures																				
Reinstatement works to cofferdam areas																				
Dredging of trench for the immersed tube tunnels																				
Installation of immersed tube tunnel units																				

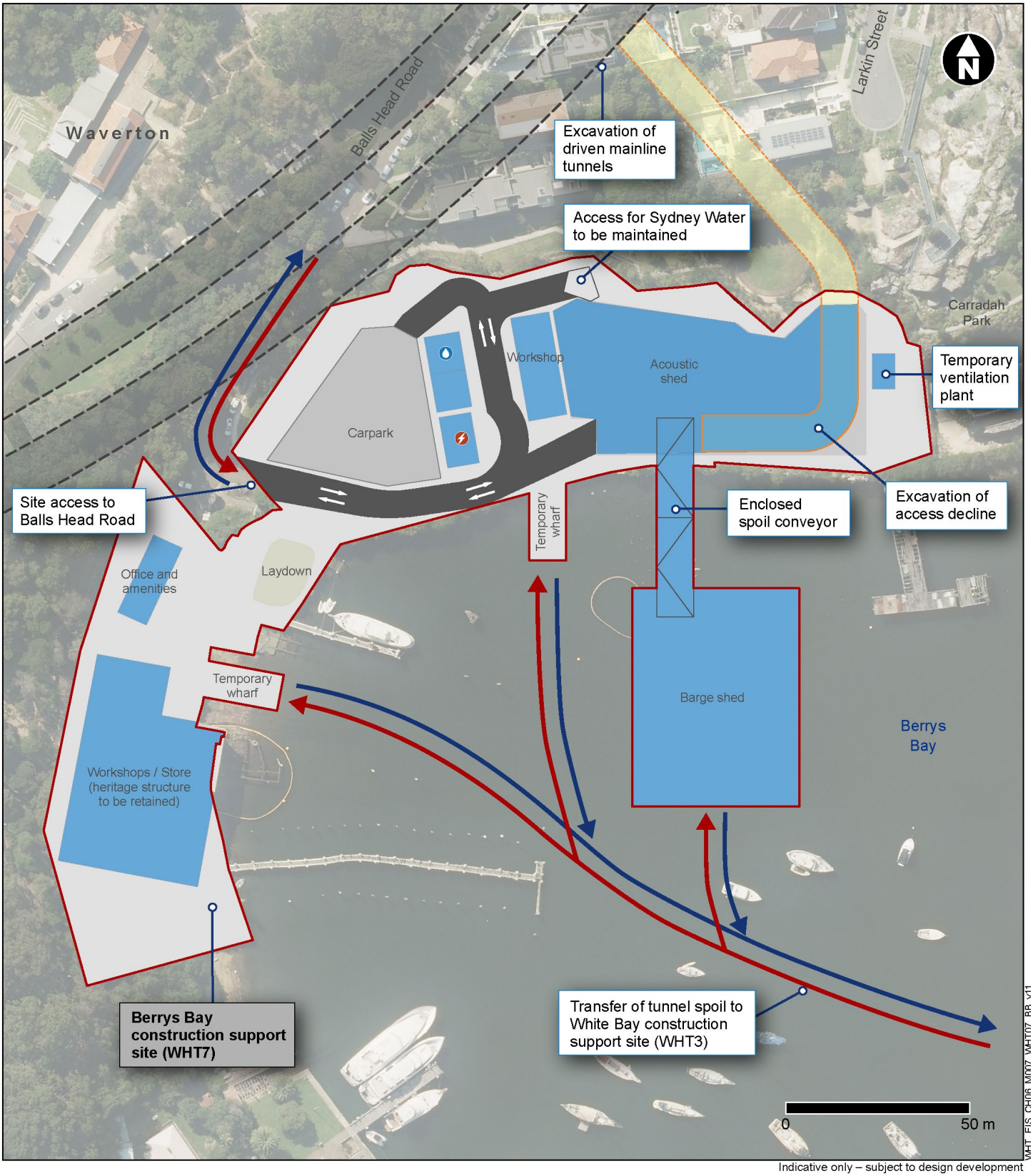
Berrys Bay (WHT7)

A summary of the key features of the Berrys Bay construction support site is included in Table 6-19. An indicative layout for the construction support site, and construction site access routes, is shown in Figure 6-31. An indicative program for construction activities at this site is provided in Table 6-20.

Table 6-19 Key features of the Berrys Bay construction support site (WHT7)

Key feature	Summary
Site area	19,000 m^2
Site description	This would be a combined land and water-based site at Berrys Bay, Waverton. The site is bound by Sydney Harbour (Berrys Bay) to the south and residential properties and parkland to the north, east and west. The construction support site is relatively level with a large rock cutting along the northern boundary. The following items are currently located within the construction support site: • A number of commercial buildings and sheds in the southern half of the site. Where feasible, the existing structures within the construction support site would be retained and reused. These structures include a number of locally listed heritage structures, including Woodley's Shed and a stone retaining wall. Where feasible, the construction support site has been designed to retain and protect these structures (refer to Chapter 14 (Non-Aboriginal heritage) for additional information) • Vacant open space in the northern area of the site • An existing Sydney Water asset. Access to this by Sydney Water would need to be retained throughout construction.
Key activities	The construction support site would be used to establish a tunnel construction access decline to support excavation of the mainline tunnels (including for connection to the immersed tube tunnel crossing). The mainline tunnels would be excavated in both directions from this site. Key activities that would occur on, or be supported by this site would include:

Key feature	Summary
	• Vegetation clearing and earthworks as part of early works and site establishment • Construction of temporary wharves for transport of tunnel spoil material, to minimise vehicle movements on Balls Head Road • Excavation of an access decline for tunnel construction • Excavation of driven mainline tunnels and cross passages • Treatment of wastewater from tunnelling activities • Tunnel civil and mechanical and electrical fitout • Transfer of tunnel spoil from the mainline tunnels to barges, for transfer to the White Bay construction support site (WHT3) • Reinstatement works at the completion of construction. The Berrys Bay construction support site would require the temporary relocation of about 10 swing moorings in Sydney Harbour which would be impacted by the works. Relocations would be required for the duration of construction.
Hours of construction	Spoil haulage via barge would be carried out during standard construction hours only (7am to 6pm Monday to Friday, 8am to 1pm Saturday and no construction works on Sundays or public holidays). Spoil handling and loading of the barges within the acoustic shed on the site would be carried out outside of standard construction hours. Tunnel construction would be carried out up to 24 hours per day, seven days a week either within an acoustic shed or underground. There would also be limited deliveries to the site at night, via Balls Head Road.
Access arrangements	Access to the site would be via Balls Head Road for road traffic and Sydney Harbour for marine construction vessels used for major deliveries and spoil haulage.



Legend

- Construction footprint
- Construction support site
- Construction site buildings
- Driven tunnel
- Temporary site access
- Access decline
- Wastewater treament plant
- Aboveground substation
- Site access - in
- Site access - out

Figure 6-31 Indicative layout – Berrys Bay construction support site

Table 6-20 Berrys Bay construction support site indicative construction program

Construction activity	Indicative construction program																			
	2021				2022				2023				2024				2025			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Early works and site establishment																				
Construction of tunnel access decline																				
Tunnel construction																				
Tunnel fitout and finishing																				
Testing and commissioning and site rehabilitation																				

Berry Street north (WHT8)

A summary of the key features of the Berry Street north construction support site is included in Table 6-21. An indicative layout for the construction support site, and construction site access routes, is shown in Figure 6-32. The Berry Street north construction support site is expected to be used for the duration of construction.

Table 6-21 Key features of the Berry Street north construction support site (WHT8)

Key feature	Summary
Site area	5600 m^2
Site description	The site is located within the Warringah Freeway corridor at North Sydney between the Berry Street on ramp and Warringah Freeway to the east and high rise residential buildings to the west. The site slopes from the west down towards the Warringah Freeway and comprises a mixture of planted native vegetation and maintained grass verges.
Key activities	The site would provide support for construction of the Berry Street on ramp to the Western Harbour Tunnel, including cut and cover structures, tunnel portal and widening of the northbound carriageway of the Warringah Freeway. Its use in conjunction with the Cammeray Golf Course construction support site (WHT10), would allow the size of this site to be minimised.
Hours of construction	The majority of construction activities at this site would be carried out during standard construction hours (7am to 6pm Monday to Friday, 8am to 1pm Saturday and no construction works on Sundays or public holidays). Some construction activities supported by this site would require out of hours work (eg during connection of new works to the existing road). This means that there would be limited periods throughout the construction program where construction would occur outside of standard construction hours.
Access arrangements	Access into the site would be via Berry Street and out of the site via Warringah Freeway.

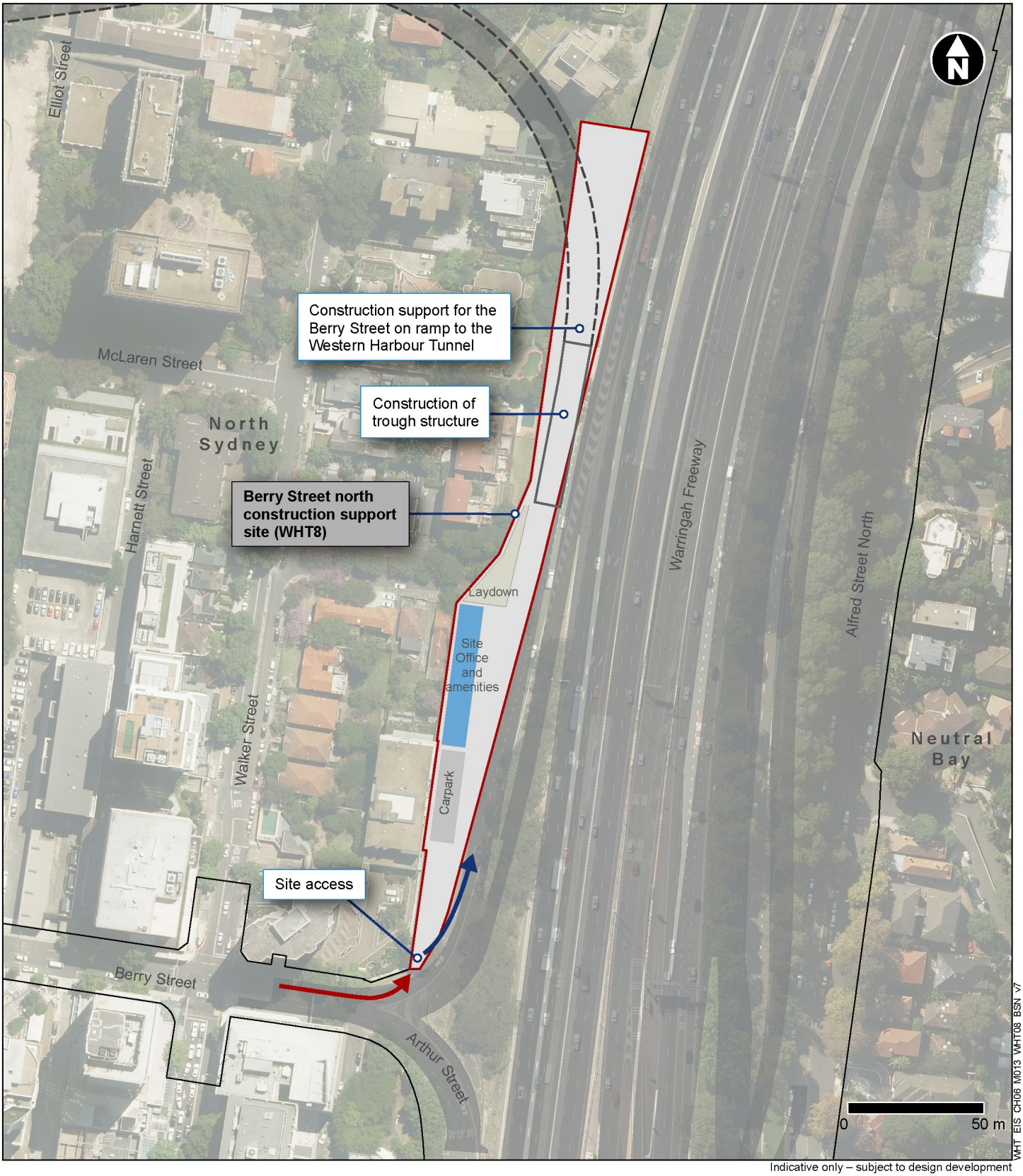


Figure 6-32 Indicative layout – Berry Street north construction support site

Ridge Street north (WHT9)

A summary of the key features of the Ridge Street north construction support site is included in Table 6-22. An indicative layout for the construction support site, and construction site access routes, is shown in Figure 6-33. The Ridge Street north construction support site is expected to be used for the duration of construction.

Table 6-22 Key features of the Ridge Street north construction support site (WHT9)

Key feature	Summary
Site area	10,200m^2
Site description	The site is located in the south-eastern corner of St Leonards Park, North Sydney and is bound by the Warringah Freeway to the east and Ridge Street to the south. The site is heavily sloped from west to east towards the Warringah Freeway and incorporates some planted trees as well as large areas of maintained lawn. The nearest residential properties are located on Ridge Street, about 30 metres from the southern boundary of the construction support site. Other sensitive receivers nearby include the North Sydney Bowling Club, St Mary's Catholic Primary School, Wenona Girls School, and the general public using the park for recreational purposes. The construction support site is within St Leonards Park which is listed as a State significant heritage item (refer to Chapter 14 (Non-Aboriginal heritage) for additional information).
Key activities	The site would enable construction of: • The cut and cover and trough portion of the Western Harbour Tunnel off ramp to Falcon Street • Surface works required to integrate the Falcon Street off ramp • Ridge Street shared user bridge. The construction support site would connect with the Ridge Street east construction support site (WFU6) (refer to Section 6.7.3 for more information about Warringah Freeway Upgrade construction support sites), which would allow the movement of construction equipment and materials between the sites. Utilisation of this site in conjunction with the Cammeray Golf Course construction support site (WHT10), would allow the size of this site to be minimised.
Hours of construction	Cut and cover construction would generally be carried out during standard construction hours (7am to 6pm Monday to Friday, 8am to 1pm Saturday and no construction works on Sundays or public holidays). Some construction activities supported by this site would require out of hours work on occasion (eg connection of new works to the existing network). This means that there would be discrete periods throughout the construction program where construction works at this site occur outside of standard construction hours.
Access arrangements	Access in and out of the site would be primarily via Warringah Freeway. Access to the site via Ridge Street would be provided for light vehicles and used during establishment of the site. There would be limited use of this access once the site is established.

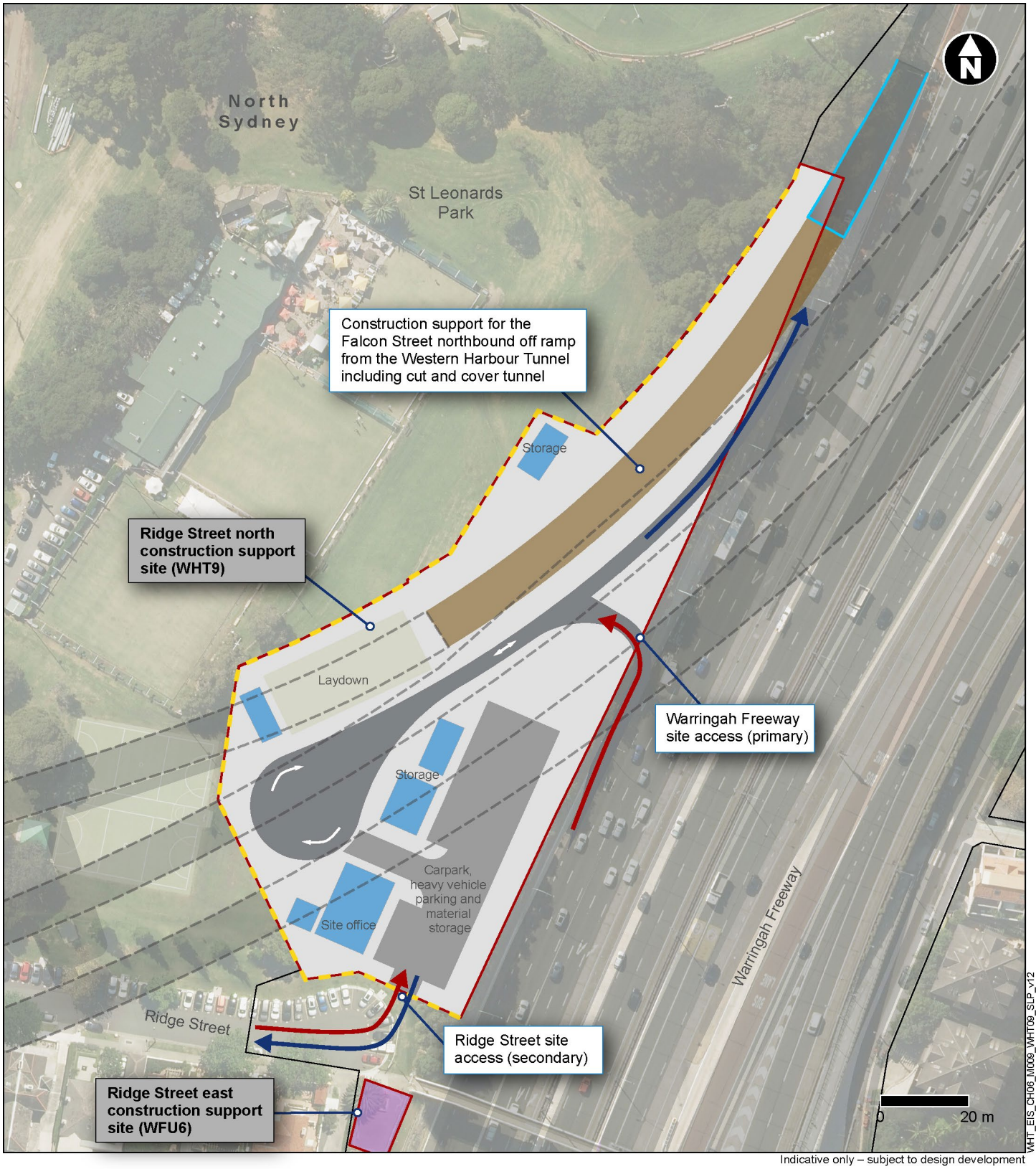


Figure 6-33 Indicative layout – Ridge Street north construction support site

Cammeray Golf Course (WHT10)

A summary of the key features of the Cammeray Golf Course construction support site is included in Table 6-23. An indicative layout for the construction support site, and construction site access routes, is shown in Figure 6-34. An indicative program for construction activities is provided in Table 6-24.

Table 6-23 Key features of the Cammeray Golf Course construction support site (WHT10)

Key feature	Summary
Site area	30,300 m^2
Site description	The site is located within the south-west portion of the Cammeray Golf Course at Cammeray. The construction support site is bound by residential properties to the north, Cammeray Golf Course and Cammeray Park to the east, Warringah Freeway to the west and Ernest Street to the south. Residential properties are located to the north of the construction support site on Warringah Road and Morden Street and to the south across Ernest Street. The Cammeray Golf Course site would be located next to a separate construction support site for the Warringah Freeway Upgrade works (WFU8 refer to Section 6.7.3). The construction support site has been designed to avoid impacts to the football pitch, skate park, croquet club and tennis courts at Cammeray Park. These would all remain open during construction. The golf course would also remain operational during construction. Additional information around the use of the golf course and sports fields during construction and operation is discussed in Chapter 20 (Land use and property).
Key activities	This site would support the majority of tunnel excavation north of Sydney Harbour for the Western Harbour Tunnel. This would include excavation of a tunnel construction access decline, ramp tunnels, mainline tunnels and ventilation tunnels. Key activities that would occur on, or be supported by, this site would include: • Excavation of an access decline • Excavation of driven mainline tunnels from Cammeray towards Sydney Harbour • Excavation of ramp tunnels • Excavation of shafts and ventilation tunnels for the ventilation outlet and motorway facilities at the Warringah Freeway • Construction and fitout of the Western Harbour Tunnel motorway facilities • Civil construction only of the Beaches Link ventilation outlet at the Warringah Freeway (fitout to be completed as part of the Beaches Link and Gore Hill Freeway Connection project (subject to separate assessment and approval)) • Construction of the substation and operational support facilities • Treatment of wastewater from tunnelling activities • Excavation, handling and stockpiling of tunnel spoil • Tunnel civil and mechanical and electrical fitout • Crushing of materials for filling and compaction works

Key feature	Summary
	• Decommissioning and replacement of existing water harvesting dam within the Cammeray Golf Course which forms part of the North Sydney Council stormwater harvesting scheme • Utility relocations.
Hours of construction	Spoil haulage would be carried out during standard construction hours (7am to 6pm Monday to Friday, 8am to 1pm Saturday and no construction works on Sundays or public holidays). Tunnel construction and fitout would be carried out up to 24 hours per day, seven days per week either within an acoustic shed or underground. Night time deliveries would be required to support the tunnelling activities. Crushing and screening activities would also be carried out within the acoustic shed.
Access arrangements	Access in and out of the site would be primarily via Warringah Freeway, a secondary access would be provided at Ernest Street.

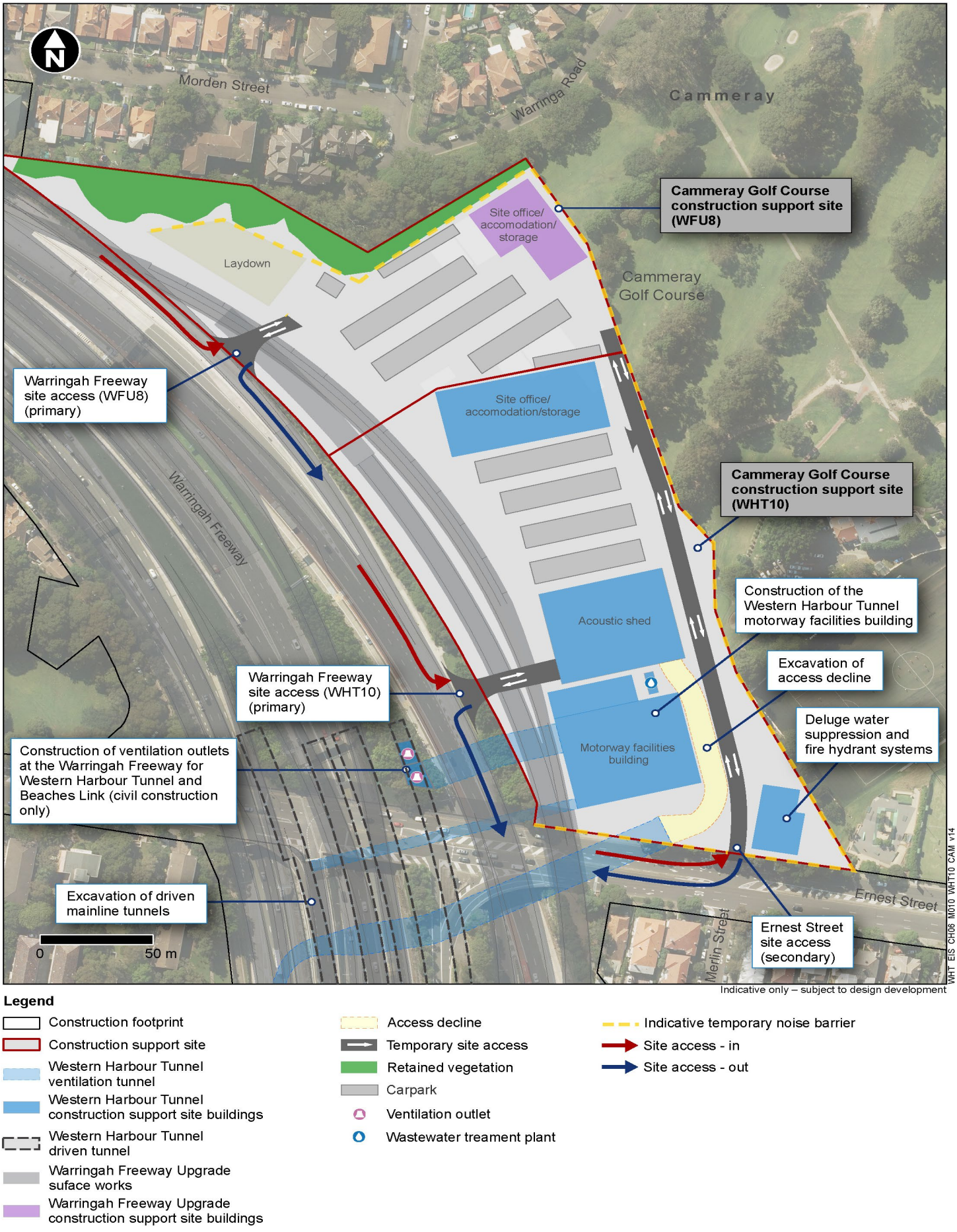


Figure 6-34 Indicative layout – Cammeray Golf Course construction support site

Table 6-24 Cammeray Golf Course construction support site indicative construction program

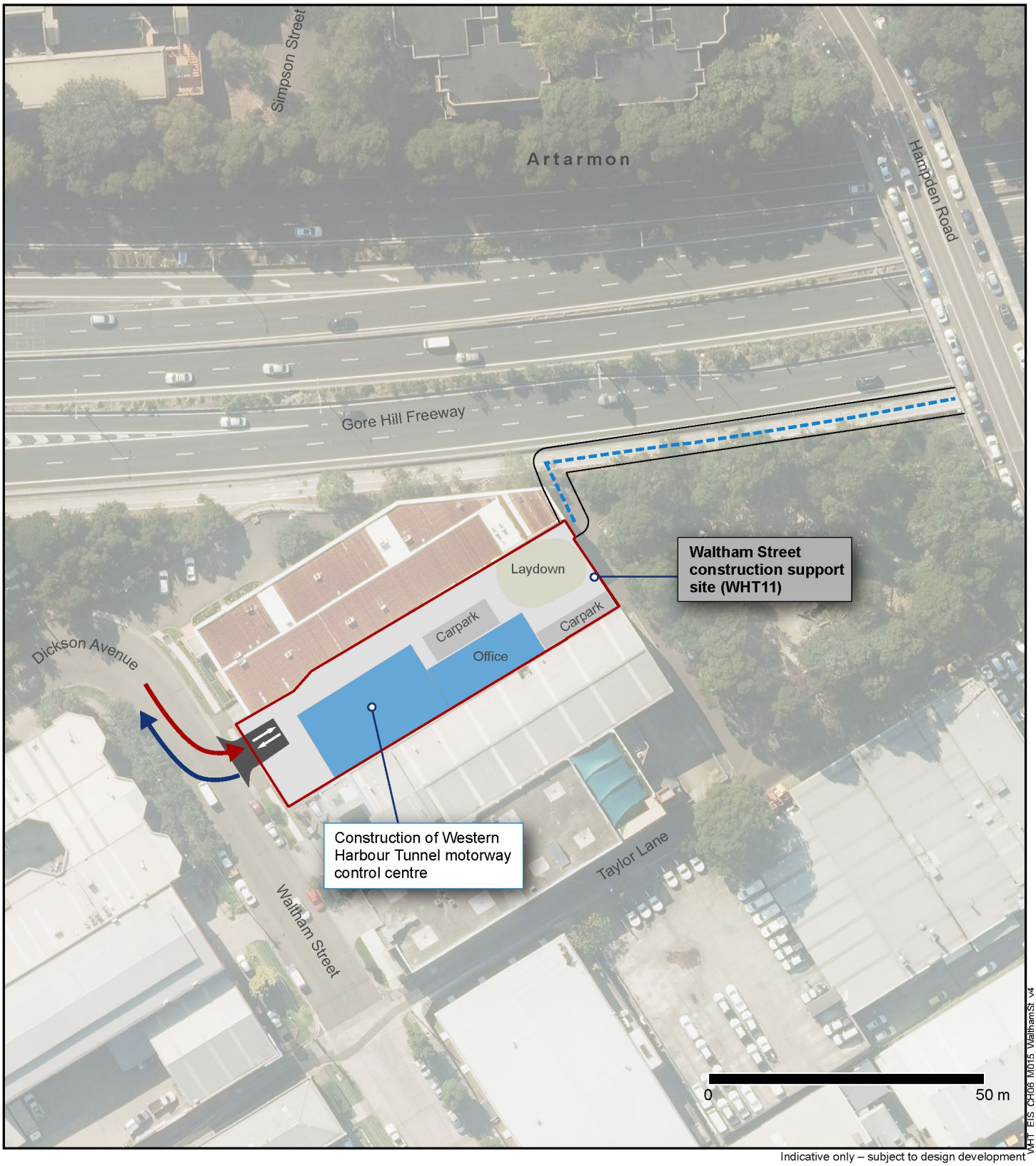
Construction activity	Indicative construction program																			
	2021				2022				2023				2024				2025			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Early works and site establishment																				
Construction of tunnel access decline																				
Tunnel construction																				
Tunnel fitout and finishing																				
Construction of operational facilities																				
Testing, commissioning and site rehabilitation																				

Waltham Street (WHT11)

A summary of the key features of the Waltham Street (WHT11) construction support site is included in Table 6-25. An indicative layout for the construction support site, and construction site access routes, is shown in Figure 6-35. An indicative program for construction activities is provided in Table 6-26.

Table 6-25 Key features of the Waltham Street construction support site (WHT11)

Key feature	Summary
Site area	1300 m^2
Site description	Located within the Artarmon industrial area, between Waltham Street to the west, Gore Hill Freeway to the north, Hampden Road to the east and industrial buildings to the south. The site is currently occupied by industrial buildings.
Key activities	The site would be used to construct the motorway control centre for Western Harbour Tunnel. The site would also be used for equipment laydown, car parking for construction workers and temporary site office buildings.
Hours of construction	Where feasible, works would be scheduled to be carried out during standard construction hours (7am to 6pm Monday to Friday, 8am to 1pm Saturday and no construction works on Sundays or public holidays).
Access arrangements	Access in and out of the site would be via Waltham Street.



Legend

- Construction footprint
- Construction support site
- Construction support site buildings
- Communications cable for motorway control centre
- Temporary site access
- Site access - in
- Site access - out

Figure 6-35 Indicative layout – Waltham Street construction support site

Table 6-26 Waltham Street construction support site indicative construction program

Construction activity	Indicative construction program											
	2023				2024				2025			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Early works and site establishment												
Construction of operational facilities												
Testing and commissioning and site rehabilitation												

6.7.3 Warringah Freeway Upgrade construction support sites

Temporary construction support sites for construction of the Warringah Freeway Upgrade would include sites required for activities such as surface earthworks, bridgeworks, construction of retaining walls, utilities relocation and protection works, noise barrier construction, traffic staging, installation of motorway facilities, installation of stormwater drainage, and pavement construction. The location of construction support sites for the Warringah Freeway Upgrade are shown in Figure 6-36 and Figure 6-37 and described in the following sections.

To support the use of the Warringah Freeway construction support sites, high voltage power, potable water supply and a suitable connection for water discharge would be required at some sites (refer to Section 6.8.4).

Construction hours at construction support sites would vary depending on the type of construction activity being carried out. Some construction works would be required outside of standard construction hours to reduce construction duration, disruption to critical road corridors, and to ensure the safety of both construction works and the public along the Warringah Freeway.

The following sections describe the proposed Warringah Freeway Upgrade construction support sites and their uses during construction. Construction support sites required for the Western Harbour Tunnel component are discussed in Section 6.7.2.

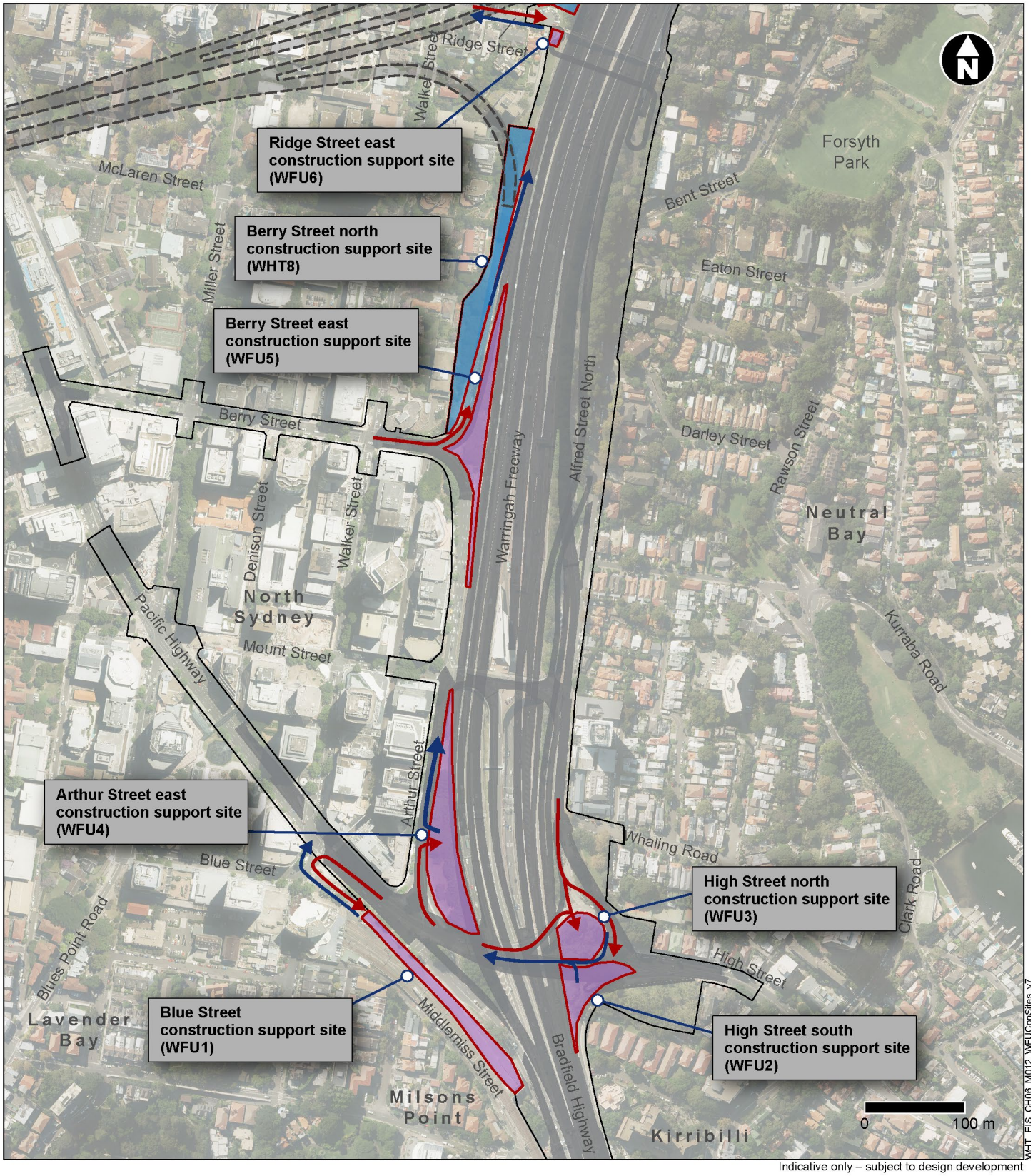
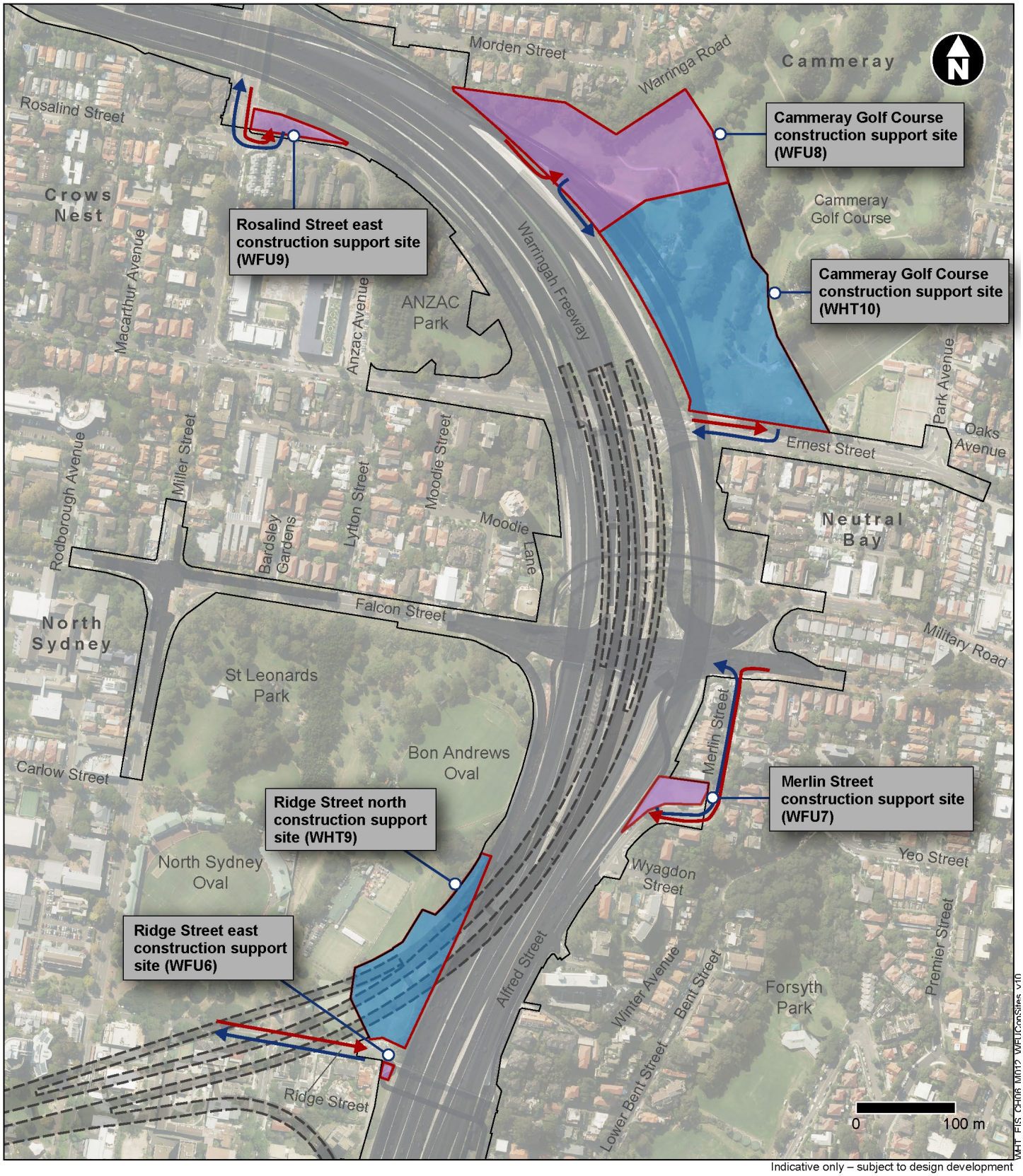


Figure 6-36 Warringah Freeway Upgrade construction support sites (map 1)



Indicative only – subject to design development

Legend

- Construction footprint
- Warringah Freeway Upgrade construction support site
- Western Harbour Tunnel construction support site boundary
- Warringah Freeway Upgrade surface works
- Western Harbour Tunnel driven tunnel
- Site access - in
- Site access - out

Figure 6-37 Warringah Freeway Upgrade construction support sites (map 2)

Blue Street (WFU1)

The location of the Blue Street construction support site (WFU1) is shown in Figure 6-36. A summary of the key features of the Blue Street construction support site is included in Table 6-27.

The Blue Street construction support site would be used for the duration of construction of the Warringah Freeway Upgrade.

Table 6-27 Key features of the Blue Street construction support site (WFU1)

Key feature	Summary
Site area	3300 m^2
Site description	The Blue Street construction support site is located in North Sydney. It is bound by the Pacific Highway to the east and south, North Shore railway line to west and Blue Street to the north. The construction support site currently comprises a flat, asphalted surface surrounded by security fencing. It is located next to local and State significant heritage items associated with the Sydney Harbour Bridge approaches, arches and viaducts and Milsons Point Railway Group (refer to Chapter 14 (Non-Aboriginal heritage)). The nearest residential properties are located on Middlemiss Street, about 60 metres to the south-west of the construction support site.
Key activities	The site would support various construction activities at the southern end of the Warringah Freeway Upgrade, including bridgeworks and surface and pavement works.
Hours of construction	General site activities would be carried out during standard construction hours (7am to 6pm Monday to Friday, 8am to 1pm Saturday and no construction works on Sundays or public holidays). Some construction activities (eg bridgeworks and surface works) supported by this site would require out of hours work. This means that there would be periods throughout the construction program where works at this site would occur outside of standard construction hours.
Temporary facilities	Site offices, project management compound, staff amenities, car park, laydown facilities.
Access arrangements	Access to the construction support site would be per the existing access to this site, via the Pacific Highway and a left or right turn into Blue Street. Vehicles leaving the site travelling north and/or south would be able to turn directly off Blue Street onto the Pacific Highway. The construction support site would maintain access to the rail corridor for all Sydney Trains contractors during the construction period.

High Street south (WFU2)

The location of the High Street south construction support site (WFU2) is shown in Figure 6-36. A summary of the key features of the High Street south construction support site is included in Table 6-28.

The High Street south construction support site would be used for the duration of construction of the Warringah Freeway Upgrade.

Table 6-28 Key features of the High Street south construction support site (WFU2)

Key feature	Summary
Site area	2100 m^2
Site description	The High Street south construction support site is located within the Warringah Freeway corridor at North Sydney on land bound by the Cahill Expressway to the west and south, the High Street off ramp to the east, and High Street to the north. The construction support site currently consists of a mixture of planted native vegetation and maintained grass verges. The nearest residential receivers are located 40 metres north of the construction support site on High Street and 60 metres south on McDougall Street.
Key activities	The construction support site would be used to support construction activities for the High Street interchange upgrade, including bridge and surface works, as well as for the widening and surface works in the southern portion of the Warringah Freeway Upgrade.
Hours of construction	General site activities would be carried out during standard construction hours (7am to 6pm Monday to Friday, 8am to 1pm Saturday and no construction works on Sundays or public holidays). Some construction activities (eg bridgeworks and surface works) supported by this site would require out of hours work. This means that there would be periods throughout the construction program where works at this site would occur outside of standard construction hours.
Access arrangements	Access in and out of the site would be via High Street.

High Street north (WFU3)

The location of the High Street north construction support site (WFU3) is shown in Figure 6-36. A summary of the key features of the High Street south construction support site is included in Table 6-29.

The High Street south construction support site would be used for the duration of construction of the Warringah Freeway Upgrade.

Table 6-29 Key features of the High Street north construction support site (WFU3)

Key feature	Summary
Site area	1800 m^2
Site description	The High Street north construction support site is located within the Warringah Freeway corridor at North Sydney on land bound by Alfred Street North/Cahill Expressway to the west and High Street to the north, south and east. The construction support site currently consists of a mixture of planted vegetation and maintained grass verges. The nearest residential receivers are located 40 metres east of the construction support site on High Street and 60 metres south on Whaling Street.

Key feature	Summary
Key activities	The construction support site would be used to support construction activities for the High Street interchange upgrade, including bridgeworks, as well as for the widening and surface works in the southern portion of the Warringah Freeway Upgrade.
Hours of construction	General site activities would be carried out during standard construction hours (7am to 6pm Monday to Friday, 8am to 1pm Saturday and no construction works on Sundays or public holidays). Some construction activities (eg bridgeworks and surface works) supported by this site would require out of hours work. This means that there would be periods throughout the construction program where works at this site would occur outside of standard construction hours.
Access arrangements	Access in and out of the site would be via Alfred Street North to the north or Pacific Highway via High Street to the west.

Arthur Street east (WFU4)

The location of the Arthur Street east construction support site (WFU4) is shown in in Figure 6-36. A summary of the key features of the Arthur Street east construction support site is included in Table 6-30.

The Arthur Street east construction support site would be used for the duration of construction of the Warringah Freeway Upgrade.

Table 6-30 Key features of the Arthur Street east construction support site (WFU4)

Key feature	Summary
Site area	5100 m^2
Site description	The Arthur Street east construction support site is located within the Warringah Freeway corridor at North Sydney and is bound by the Warringah Freeway to the east, Arthur Street to the west, Mount Street to the north and High Street in the south. The construction support site currently consists of a mixture of planted vegetation and maintained grass verges. The Meriton Suites North Sydney Hotel and Serviced Apartments is located across the road from the construction support site on Arthur Street.
Key activities	The construction support site would be used to support construction activities for the widening of the Warringah Freeway, and local road and intersection works along and near Arthur Street.
Hours of construction	General site activities would be carried out during standard construction hours (7am to 6pm Monday to Friday, 8am to 1pm Saturday and no construction works on Sundays or public holidays). Some construction activities (eg bridgeworks and surface works) supported by this site would require out of hours work. This means that there would be periods throughout the construction program where works at this site would occur outside of standard construction hours.

Key feature	Summary
Access arrangements	Access in and out of the site would be via Arthur Street to the west. Pedestrian access for construction workers would be provided from Arthur Street.

Berry Street east (WFU5)

The location of the Berry Street east construction support site (WFU5) is shown in Figure 6-36. A summary of the key features of the Berry Street east construction support site is included in Table 6-31.

The Berry Street east construction support site would be used for the duration of construction of the Warringah Freeway Upgrade.

Table 6-31 Key features of the Berry Street east construction support site (WFU5)

Key feature	Summary
Site area	3200 m^2
Site description	The Berry Street east construction support site is located within the Warringah Freeway corridor at North Sydney on land bound by the Warringah Freeway to the east, Arthur Street and Berry Street/Warringah Freeway on ramp to the west and Doris Fitton Park to the south along Arthur Street to the west. The site slopes heavily from the west down towards the Warringah Freeway and comprises a mixture of planted vegetation and maintained grass verges. High density residential apartments are located to the north-west of the construction support site (Ridgemont Apartments) on the opposite side of Berry Street.
Key activities	The construction support site would be used to support construction activities for the widening of the Warringah Freeway and surface road works associated with the Berry Street on ramp to the Western Harbour Tunnel.
Hours of construction	General site activities would be carried out during standard construction hours (7am to 6pm Monday to Friday, 8am to 1pm Saturday and no construction works on Sundays or public holidays). Some construction activities (eg surface works) supported by this site would require out of hours work. This means that there would be periods throughout the construction program where works at this site would occur outside of standard construction hours.
Access arrangements	Access in and out of the site would be via Berry Street to the west and vehicles exiting the site would be able to travel north via an access onto the Warringah Freeway.

Ridge Street east (WFU6)

The location of the Ridge Street east construction support site (WFU6) is shown in in Figure 6-36 and Figure 6-33. A summary of the key features of the Ridge Street east construction support site is included in Table 6-32.

The Ridge Street east construction support site would be used for the duration of works associated with the Ridge Street shared user bridge.

Table 6-32 Key features of the Ridge Street east construction support site (WFU6)

Key feature	Summary
Site area	300 m^2
Site description	The Ridge Street east construction support site is located within the Warringah Freeway corridor at North Sydney on land bound by the Warringah Freeway to the east, residential properties on Ridge Street to the south and west and St Leonards Park to the north. The construction support site currently consists of a combination of vegetated and paved surfaces. The closest residential properties are next to the southern and western boundaries of the construction support site along Ridge Street.
Key activities	The construction support site would be used to support construction activities for the demolition of the existing Ridge Street pedestrian bridge and construction of an upgraded Ridge Street shared user bridge.
Hours of construction	General site activities would be carried out during standard construction hours (7am to 6pm Monday to Friday, 8am to 1pm Saturday and no construction works on Sundays or public holidays). Some construction activities (eg bridgeworks) supported by this site would require out of hours work. This means that there would be periods throughout the construction program where works at this site would occur outside of standard construction hours.
Access arrangements	Access in and out of the site would be via Ridge Street to the north. Pedestrian and cyclist access across the Warringah Freeway would be maintained via the old bridge, until the new upgraded crossing is completed.

Merlin Street (WFU7)

The location of the Merlin Street construction support site (WFU7) is shown in Figure 6-37. A summary of the key features of the Merlin Street construction support site is included in Table 6-33.

The Merlin Street construction support site would be used for the duration of construction of the Warringah Freeway Upgrade.

Table 6-33 Key features of the Merlin Street construction support site (WFU7)

Key feature	Summary
Site area	1700 m^2
Site description	The Merlin Street construction support site is located in Neutral Bay on the eastern side of Warringah Freeway within Merlin Street Reserve (owned by Transport for NSW). The site is bound by residential properties to the north, Merlin Street to the east, Alfred Street to the south and McIntosh Lane and Warringah Freeway to the west. The site slopes from north-west to south-east towards Merlin Street and is covered in a mixture of planted native vegetation and areas of maintained lawn. A public footpath runs along the east and south of Merlin Street reserve and an electrical substation is located on the southern boundary. The nearest residences are located next to the construction support site

Key feature	Summary
	along Merlin Street to the north, and Wyagdon Street to the south.
Key construction support activities	The construction support site would be used to support construction activities for the realignment of Alfred Street North and construction of the new southbound bus lane bridge off Falcon Street.
Hours of construction	General site activities would be carried out during standard construction hours (7am to 6pm Monday to Friday, 8am to 1pm Saturday and no construction works on Sundays or public holidays). Some construction activities (eg bridgeworks and surface works) supported by this site would require out of hours work. This means that there would be periods throughout the construction program where works at this site would occur outside of standard construction hours.
Access arrangements	The site would be accessed via Military Road and Merlin Street. Some construction works associated with the construction of the new southbound bus lane bridge would result in temporary disruptions to access to the residential property at 1 McIntosh Lane (refer to Chapter 8 (Construction traffic and transport) for more information about construction traffic impacts).

Cammeray Golf Course (WFU8)

The location of the Cammeray Golf Course construction support site (WFU8) is shown in Figure 6-37 and Figure 6-34. A summary of the key features of the Cammeray Golf Course construction support site is included in Table 6-34. The indicative layout of the Cammeray Golf Course construction support site is shown in Figure 6-34.

The Cammeray Golf Course construction support site would be used for the duration of construction of the Warringah Freeway Upgrade.

Table 6-34 Key features of the Cammeray Golf Course construction support site (WFU8)

Key feature	Summary
Site area	18,000 m^2
Site description	The Cammeray Golf Course construction support site is located within the north-west portion of the Cammeray Golf Course, next to the Warringah Freeway at Cammeray. The construction support site is bound by residential properties to the north, Cammeray Golf Course to the east, Warringah Freeway to the west and the Cammeray Golf Course construction support site (WHT10) (for the Western Harbour Tunnel) to the south. The construction support site currently consists of an operational nine-hole golf course. The golf course would remain operational during construction. The nearest residences are located to the north of the construction support site on Warringah Road and Morden Street and along the eastern edge of Cammeray Golf Course on Park Avenue.
Key activities	The construction support site would act as the main construction compound for the Warringah Freeway Upgrade. It would support the use of the other Warringah Freeway Upgrade construction

Key feature	Summary
	support sites, and would also provide a temporary bus layover area during the construction period when the existing Warringah Freeway bus layover area is removed and relocated.
Hours of construction	General site activities would be carried out during standard construction hours (7am to 6pm Monday to Friday, 8am to 1pm Saturday and no construction works on Sundays or public holidays). Some construction activities (eg bridgeworks and surface works) supported by this site would require out of hours work. This means that there would be periods throughout the construction program where works at this site would occur outside of standard construction hours.
Access arrangement	Two access points would be established at the site: • Western access would be directly off the southbound lanes of Warringah Freeway • Southern access would be directly off Ernest Street.

Rosalind Street east (WFU9)

The location of the Rosalind Street east construction support site (WFU9) is shown in Figure 6-37. A summary of the key features of the Rosalind Street east construction support site is included in Table 6-35.

The Rosalind Street east construction support site would be used for the duration of construction of the Warringah Freeway Upgrade.

Table 6-35 Key features of the Rosalind Street east construction support site (WFU9)

Key feature	Summary
Site area	1300 m^2
Site description	The Rosalind Street east construction support site is located within the Warringah Freeway corridor at Cammeray. The site is bound by the Warringah Freeway northbound off ramp at Miller Street to the north and east, Rosalind Street to the south and Miller Street to the west. The site is situated on flat land and comprises a mixture of planted native vegetation and maintained grass verges. The nearest residential receivers are located to the south on Rosalind Street.
Key activities	Construction of the northern portion of the Warringah Freeway Upgrade, as well as local road and intersection upgrades and changes near Miller Street and Amherst Street.
Hours of construction	General site activities would be carried out during standard construction hours (7am to 6pm Monday to Friday, 8am to 1pm Saturday and no construction works on Sundays or public holidays). Some construction activities (eg surface works) supported by this site would require out of hours work. This means that there would be periods throughout the construction program where works at this site would occur outside of standard construction hours.
Access arrangements	The site would be accessed via Miller Street (to the east) and then Rosalind Street to the south. No access to the site would be permitted via Anzac Avenue.

6.8 Construction management and resources

6.8.1 Construction workforce and hours

Construction workforce

The project would be expected to support up to 7500 full time equivalent jobs (direct employment) during the five years of construction. About 2600 full time equivalent jobs (2000 for Western Harbour Tunnel and 600 for Warringah Freeway Upgrade) would be expected to be supported during peak construction.

Construction work hours

Construction work hours required for the project would generally fall within the following categories:

- Early works and site establishment
- Tunnelling, tunnelling support and underground activities
- Construction traffic for material supply and spoil movement
- Surface construction activities (not covered by the other categories)
- Blasting and rock breaking
- Other activities.

The proposed construction hours for various construction activities are provided in Table 6-36. Standard construction hours are:

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

Indicative timeframes for construction activities are provided in Table 6-3. The proposed construction hours at each of the construction support sites are summarised in Section 6.7.

Table 6-36 Proposed construction hours

Activity	Construction hours	Comments or exceptions
Tunnelling, tunnelling support and underground activities		
Tunnelling, underground excavation and tunnel fitout	Up to 24 hours per day, seven days per week	Activities that support tunnelling works and fitout, including above ground work supporting underground activities, may need to occur 24 hours per day, up to seven days per week. Tunnel excavation and spoil handling outside of standard construction hours would be carried out within acoustic sheds at tunnel construction support sites.
Dredging and excavation of the bed of the harbour, and barge movements for associated marine spoil transportation	Up to 24 hours per day, seven days a week	Backhoe dredging and gravel placement would occur during standard construction hours. Trailer suction hopper dredges would operate on a 24-hour basis. Some transport by barge to the designated

Activity	Construction hours	Comments or exceptions
		offshore disposal site may take place outside of standard construction hours.
Piling works in Sydney Harbour	Standard construction hours	Required for construction of the cofferdams.
Barge movements for transport of immersed tube tunnel units	24 hours per day, for discrete periods	Barges to transport immersed tube tunnel units from the casting facility in White Bay to a temporary mooring location in Snails Bay.
Immersed tube tunnel installation	24 hours per day, for discrete periods	Carried out during localised closures of Sydney Harbour. About seven partial closures at the crossing location, each for a period of 24 to 48 hours. Minor increases in travel times are possible during immersed tube tunnel installation (refer to Chapter 8 (Construction traffic and transport) for further details).
Construction traffic for material supply and spoil removal		
Construction traffic for material deliveries and spoil removal	Standard construction hours	Spoil haulage would be carried out during standard construction hours. Some deliveries to and from the construction support sites would be required outside of standard construction hours to support construction activities.
Barge movements for terrestrial spoil transportation and disposal (from Berrys Bay and Yurulbin Point)	Up to 24 hours per day, seven days per week	Loading of hopper barges for the purpose of spoil transportation may be carried out at night within a barge shed.
Surface construction activities (not specified elsewhere)		
Warringah Freeway Upgrade	Up to 24 hours per day, seven days per week	Works would be required outside of standard construction hours to ensure the safety of both construction workers and the public and to minimise operational impacts to critical road corridors.
Demolition and surface construction activities including major surface road upgrades (including major traffic switches), infrastructure construction and utility relocations.	Standard construction hours where feasible	Non-disruptive (low noise intensive activities) preparatory work, repairs or maintenance may be carried out outside standard construction hours. Activities requiring the temporary possession of roads, or to accommodate road network requirements would at times need to be carried out outside of standard construction hours.

Activity	Construction hours	Comments or exceptions
Early works and site establishment activities	Standard construction hours where feasible	Non-disruptive (low noise intensive activities) preparatory work, repairs or maintenance may be carried out outside standard construction hours.
Blasting and rock breaking		
Controlled blasting (driven tunnels)	9am to 5pm Monday to Friday 9am to 1pm Saturdays No blasting on Sundays or public holidays	Controlled blasting may be used for cross passage excavation and bench removal in mainline and ramp tunnels. Controlled blasts would be limited to one single detonation in any one day per receiver group, unless otherwise agreed with the NSW Environment Protection Authority.
Rock breaking (with potential for impulsive or tonal noise impact at a sensitive receiver)	Standard construction hours, and outside standard construction hours when required as part of approved surface construction activities	Respite periods would be provided and scheduled to minimise the frequency and duration of extended rock breaking activities with the potential for impulsive or tonal noise emissions. Rock breaking and other high impact noise activities could also occur outside standard construction hours if authorised by an environment protection licence.
Other activities		
Minor activities	At any time	Includes activities that do not lead to an exceedance of the applicable noise management level at a noise sensitive receiver.
Activities authorised by an Environment Protection Licence	As specified in the Environment Protection Licence	Construction activities would be managed as required by the Environment Protection Licence issued by the NSW Environment Protection Authority.
Out of hours works for safety and public infrastructure operational reasons (ie to minimise traffic disruptions)	At any time, subject to individual requirements	Specific management measures would be developed for each relevant activity or group of activities to manage potential impacts on sensitive receivers. This would include use of respite periods.
Emergency or directed activities	At any time	Activities carried out if required to prevent an imminent loss of life or environmental damage.

6.8.2 Traffic management and access

Road transport

The construction of the project would be subject to comprehensive traffic management measures to ensure the ongoing functionality of surrounding roads, and the safety of members of the public, motorists and construction workers.

A number of stages of traffic management and traffic switches would be required around the tunnel connections and for the Warringah Freeway Upgrade to facilitate the construction of the on and off ramps and tie-ins to arterial and local roads.

At locations where temporary and/or permanent road closures are required, access to properties would be maintained or alternative arrangements made in agreement with the affected stakeholder(s). Signage would be installed for road closures or detours where required, to facilitate traffic movement.

To facilitate the use of the Cammeray Golf Course construction support sites (WHT10 and WFU8), as part of the early works and site establishment for the project, the Ernest Street/Merlin Street intersection would be modified with the addition of a north approach to allow construction vehicle access (refer to Figure 6-34).

The project would also necessitate the temporary alteration of cyclist and pedestrian facilities. Appropriate detour routes would be established, utilising existing cycle routes and paths where feasible.

The proposed access points to and from the construction support sites are described in Section 6.7.2 and Section 6.7.3 and shown in figures for each construction support site.

Where feasible, construction access is proposed to be to and from major arterial roads. No heavy vehicle road access to Yurulbin Point construction support site (WHT4) is proposed during major construction, though there may be a requirement for some heavy vehicle movements during the early works and site establishment phase (refer to Section 6.3 for more information regarding early works and site establishment). Night time spoil haulage from Yurulbin Point would not be required; however, loading of the barges may be carried out at night within an acoustic barge shed. There would also be limited deliveries to site at night, via barge, to support the tunnelling works. Additional information about marine vessel movements is provided in Table 6-38 and Figure 6-38.

During the early works and site establishment phase (refer to Section 6.3 for more information), vehicle movements would be required along Ridge Street for access and egress to the Ridge Street north construction support site (WHT9). These movements would be for the duration of the early works and site establishment phase, until the Warringah Freeway site access and egress point can be used. Following completion of this phase of the project, construction site access along Ridge Street, as shown in Figure 6-9, would be restricted and only used in instances where the Warringah Freeway access was either blocked, not suitable, or during the demobilisation works where the access is removed. The use of the Ridge Street site access point would be managed in accordance with a traffic management plan to minimise impacts on nearby sensitive land uses, including schools and residences. Additional information about the management of construction traffic impacts is provided in Chapter 8 (Construction traffic and transport).

Over-size and over-mass vehicles would be required for the delivery and removal of large plant and equipment on discrete occasions. There would be a higher proportion of these movements during site establishment and site closure, as large plant and equipment (such as roadheaders) are moved to and from site respectively.

Worst case daily light vehicle and heavy vehicle numbers associated with spoil and waste removal, material deliveries and arrival and departure of construction works are summarised in Table 6-37.

Temporary lane closures on the Warringah Freeway

Construction of the Warringah Freeway Upgrade component of the project would be carried out in four main stages, including tie-in works with the Western Harbour Tunnel component of the project and the separate Beaches Link and Gore Hill Freeway Connection project (if approved). Each stage would have a series of different lane arrangements to enable the required construction activities. Additionally, there would be an enabling works stage prior to the main construction works commencing. Full and partial closures of the Warringah Freeway during construction would require careful traffic planning, management and control. The traffic and demand management measures to be implemented would be consistent with management measures that are currently employed to mitigate the impacts of regular closures to the Warringah Freeway and Bradfield Highway/Cahill Expressway as part of scheduled maintenance works for the Sydney Harbour Bridge and Sydney Harbour Tunnel. Further construction traffic planning would be carried out to address potential impacts on local and collector roads as a result of signposted detour routes (refer to Chapter 8 (Construction traffic and transport)).

Table 6-37 Peak construction vehicle movements and access

Site	Proposed access route	Daily heavy vehicle movements[1]	Daily light vehicle movements	Construction vehicle movements during AM peak hours (6am to 10am)		Construction vehicle movements during PM peak hours (3pm to 7pm)	
				Heavy vehicles	Light vehicles	Heavy vehicles	Light vehicles
Western Harbour Tunnel sites							
Rozelle Rail Yards (WHT1)	City West Link Road	165	305	42	134	43	137
Victoria Road (WHT2)	Victoria Road	420	230	111	62	111	128
White Bay (WHT3)	James Craig Road/Port Access Road	700	530	189	205	189	255
Yurulbin Point (WHT4)	Louisa Road	Nil	Nil	Nil	Nil	Nil	Nil
Sydney Harbour south cofferdam (WHT5)	No road access	Nil	Nil	Nil	Nil	Nil	Nil
Sydney Harbour north cofferdam (WHT6)	No road access	Nil	Nil	Nil	Nil	Nil	Nil
Berrys Bay (WHT7)	Balls Head Road	55	210	11	101	12	69

Site	Proposed access route	Daily heavy vehicle movements[1]	Daily light vehicle movements	Construction vehicle movements during AM peak hours (6am to 10am)		Construction vehicle movements during PM peak hours (3pm to 7pm)	
				Heavy vehicles	Light vehicles	Heavy vehicles	Light vehicles
Berry Street north (WHT8)	Berry Street off ramp and Warringah Freeway	30	130	10	20	6	18
Ridge Street north (WHT9)	Warringah Freeway	200	165	51	64	51	67
Cammeray Golf Course (WHT10)	Ernest Street, Warringah Freeway	485	480	128	198	130	212
Waltham Street (WHT11)	Waltham Street	66	180	18	86	18	86
Warringah Freeway Upgrade sites							
Blue Street (WFU1)	Blue Street	10	315	4	96	2	92
High Street south (WFU2)	Pacific Highway, High Street	15	80	6	17	2	13
High Street north (WFU3)	Pacific Highway, Alfred Street North	10	65	4	14	2	8

Site	Proposed access route	Daily heavy vehicle movements[1]	Daily light vehicle movements	Construction vehicle movements during AM peak hours (6am to 10am)		Construction vehicle movements during PM peak hours (3pm to 7pm)	
				Heavy vehicles	Light vehicles	Heavy vehicles	Light vehicles
Arthur Street east (WFU4)	Arthur Street	10	135	4	28	2	23
Berry Street east (WFU5)	Berry Street, Warringah Freeway	30	30	4	9	2	5
Ridge Street east (WFU6)	Ridge Street	20	70	4	17	2	9
Merlin Street (WFU7)	Merlin Street	Nil	150	Nil	40	Nil	35
Cammeray Golf Course (WFU8)	Ernest Street, Warringah Freeway	40	865	12	238	7	250
Rosalind Street east (WFU9)	Rosalind Street	15	205	4	46	2	47
ANZAC Park (construction access)	Ernest Street eastbound and Cammeray Avenue intersection	30	75	10	27	4	19

Note 1: Vehicle movements are each way (ie a heavy/light vehicle arriving at a site and leaving a site counts as two movements).

Construction workforce car parking

A portion of the project's labour force would be required to drive and park at construction support sites. The numbers of construction workers requiring parking would vary over the duration of the construction program.

Due to the generally constrained nature of construction support sites, only limited car parking for construction workers would be available on site. Some car parking areas would be provided at the following construction support sites:

- White Bay (WHT3)
- Berrys Bay (WHT7)
- Berry Street north (WHT8)
- Ridge Street north (WHT9)
- Cammeray Golf Course (WHT10/WFU8)
- Waltham Street (WHT11)
- Blue Street (WFU1)
- High Street south (WFU2)
- High Street north (WFU3)
- Arthur Street east (WFU4)
- Berry Street east (WFU5)
- Merlin Street Reserve (WFU7)
- Rosalind Street east (WFU9).

The number of car parking spaces at the construction support sites would be determined during construction planning. Shuttle bus transfers between construction support sites would also be provided, where required.

The construction workforce would be encouraged to use public transport (except where construction workers are required to travel to site with construction-related tools and equipment). The following public transport provisions are available near the project to provide access to construction support sites:

- Key bus corridors along Victoria Road, Pacific Highway, Warringah Freeway, Falcon Street, Miller Street and Military Road have multiple bus routes which travel along these road corridors, with bus stops near construction support sites
- The Inner West Light Rail line runs along the southern side of City West Link, with stops near the Rozelle Rail Yards
- The Northern and Western Line on the Sydney Trains suburban train network would provide access to some of the Warringah Freeway Upgrade construction support sites with the closest railway station at North Sydney.

Measures to manage any potential parking impacts during construction are discussed in Chapter 8 (Construction traffic and transport).

Property access

Construction of the Warringah Freeway Upgrade would result in some residents along Alfred Street North southbound temporarily losing vehicular access for short periods of time for discrete construction activities. Temporary disruptions to access to the residential property at 1 McIntosh Lane may also occur during construction of the new southbound bus lane bridge off Falcon Street. Residents may also need to be escorted through the works when accessing properties on foot, to

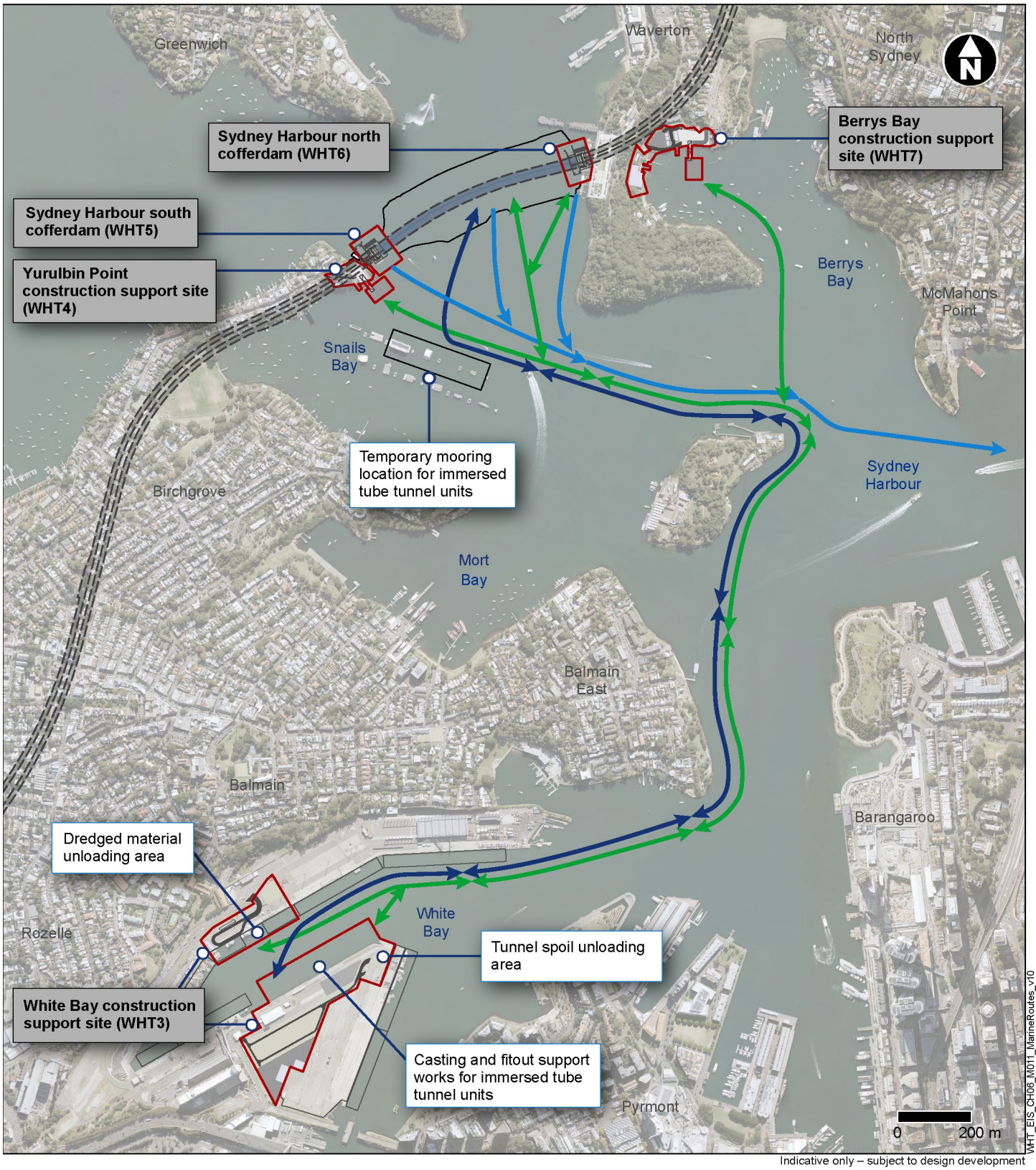
ensure safe passage. Specific engagement with affected properties during further design development would be required to determine appropriate mitigation measures.

Marine transport

Marine construction vessels would also be required during construction. Figure 6-38 shows the main routes which would be travelled across Sydney Harbour during construction. Table 6-38 details the indicative type and number of marine transport and construction vessels likely to be used during construction.

Table 6-38 Marine-based construction vessel movements

Site	Indicative vessel movements per day
White Bay (WHT3)	• Twenty-two small boat movements for transporting the construction workforce to and from harbourside and on-water sites. Shift changes requiring these movements would be carried out up to 24 hours per day, seven days per week • Fourteen barge movements for spoil removal during standard construction hours • Thirty-four barge movements for deliveries, to be carried out up to 24 hours per day, seven days per week.
Yurulbin Point (WHT4)	• Eight small boat movements for transporting the construction workforce. Shift changes requiring these movements would be carried out up to 24 hours per day, seven days per week • Four barge movements for spoil removal during standard construction hours • 12 barge movements for deliveries, to be carried out up to 24 hours per day, seven days per week.
Sydney Harbour north and Sydney Harbour south cofferdams (WHT5 and WHT6)	• Eight small boat movements for transporting the construction workforce. Shift changes requiring these movements would be carried out up to 24 hours per day, seven days per week • Two barge movements for cofferdam spoil and four barge movements for spoil dredged from the harbour crossing would be required per day to the designated offshore disposal site and may be required out outside of standard construction hours • Sixteen barge movements for deliveries, to be carried out up to 24 hours per day, seven days per week.
Berrys Bay (WHT7)	• Six small boat movements for transporting the construction workforce. Shift changes requiring these movements would be carried out up to 24 hours per day, seven days per week • Six barge movements for spoil removal during standard construction hours • Six barge movements for deliveries, to be carried out up to 24 hours per day, seven days per week.



Legend

- Driven tunnel
- Immersed tube tunnel
- Construction footprint
- Construction support site
- Immersed tube tunnel transportation route
- Marine construction traffic routes for dredging, tunnel spoil, cofferdams and permanent structures
- Route for offshore disposal

Figure 6-38 Marine transport and construction vessel routes in Sydney Harbour

6.8.3 Construction plant and equipment

The plant and equipment listed in Table 6-39 are likely to be used during construction of the project. The final list of plant and equipment required for each construction activity would depend on the final construction methodology developed by the construction contractor.

Table 6-39 Indicative construction plant and equipment

Plant and equipment	Early works	Site establishment	Construction of driven tunnels	Construction of the immersed tube tunnels	Construction of operational facilities	Tunnel fitout and finishing works	Surface road works	Testing, commissioning and demobilisation
Vacuum truck	X						X	
Grader, excavator, excavator with rock hammer	X	X	X	X	X		X	
Bulldozer	X						X	
Backhoe, bobcat, front end loader		X	X		X	X	X	X
Chainsaw[1]		X					X	
Grinder, mulcher[1]		X					X	X
Forklift		X	X			X		
Elevated work platform, scissor lift		X		X	X	X	X	X
Light tower[2]				X			X	
Mobile crane[2]	X	X	X	X	X	X	X	X
Light vehicle	X	X	X	X	X	X	X	X
Dump truck, concrete agitator	X	X	X	X	X	X	X	X
Truck	X	X	X		X	X	X	X
Linemarking truck		X					X	
Pavement laying machine							X	
Vibratory roller, compactor							X	
Power generator				X	X	X	X	X

Plant and equipment	Early works	Site establishment	Construction of driven tunnels	Construction of the immersed tube tunnels	Construction of operational facilities	Tunnel fitout and finishing works	Surface road works	Testing, commissioning and demobilisation
Compressor		X	X	X	X		X	
Jackhammer[1]				X			X	
Rock crusher[1]							X	
Concrete saw[1]	X						X	
Concrete pump, concrete vibrator		X	X	X	X	X	X	
Hand tools, welding equipment	X	X	X	X	X	X	X	X
Piling rig (bored)[1]		X	X		X		X	
Piling rig (impact)[1]				X			X	
Drilling machine (diesel)			X					
Pneumatic hammer/vibrator[1]			X			X		
Shotcrete rig			X				X	
Air track drilling rig[1]							X	
Roadheader			X					
Dust scrubber			X					
Ventilation fan		X	X					
Water cart							X	X
Road sweeper							X	X
Barge, small boat, tugboat			X	X				
Flat top work barge				X				
Mooring pontoon				X				
Dredging equipment				X				

Note 1: high noise generating equipment
Note 2: plant and equipment likely to generate a visual impact

6.8.4 Construction resources and waste management

Construction resource use

Construction would require various resources and materials. The main construction materials required would include:

- General fill and select fill for earthworks (sourced from within the project cutting and from tunnel spoil where the material is available and of suitable quality)
- Pavement materials, cement, concrete and steel
- Materials for lining drainage channels
- Aggregate used for concrete and asphalt
- Water
- Pre-cast concrete including pipes, culvert segments, bridge elements, retaining wall elements and roadside barriers
- Structural steel
- Plastics used for drainage, piping and conduits
- Pre-fabricated steel and road furniture units
- Wood for use in formwork and other temporary structures.

Construction material would generally be sourced from off-site suppliers. Where feasible, local sources of construction materials would be preferred to minimise haulage distances.

Indicative quantities of the main sources of materials required for construction are provided in Chapter 24 (Resource use and waste management).

Construction power requirements

Power supply would be required during the construction works at the majority of construction support sites. In particular, high voltage power would be required at the tunnel support sites. Prior to the connection of mains power supply to the tunnel support sites, roadheaders would be powered by diesel generators.

The power supply for each site would be sourced from outside the project area. The power supply requirements for construction support sites is described in Chapter 24 (Resource use and waste management). Potential supply source, supply route and power demand is described in Appendix D (Utilities management strategy).

Construction water requirements

Tunnelling works would require substantial volumes of water for excavation and would generate wastewater requiring treatment and disposal.

Construction water supply would also be required for tunnel connection construction and surface activities, including earthworks, concreting, building construction and dust suppression. Construction of the project would require about 837 kilolitres of potable water and 490 kilolitres of non-potable water per day. Additional information about construction water requirements is provided in Chapter 24 (Resource use and waste management).

Suitable connections for water discharge from wastewater treatment plants at construction support sites would be required at:

- Rozelle Rail Yards (WHT1) – to either Rozelle Bay or Whites Creek
- Victoria Road (WHT2) – to a drainage pit on Victoria Road
- Yurulbin Point (WHT4) – to a drainage pit within the construction support site

- Berrys Bay (WHT7) – to a drainage pit within the construction support site
- Cammeray Golf Course (WHT10) – to a drainage pit within the construction support site.

Further details are provided in Chapter 17 (Hydrodynamics and water quality).

Spoil and waste management

The project is estimated to generate about 2.1 million cubic metres of spoil, about 760,000 cubic metres of dredged material suitable for disposal at the designated offshore disposal site and about 140,000 cubic metres of material not suitable for offshore disposal. Spoil generation and dredged material from each construction support site is provided in Chapter 24 (Resource use and waste management).

Excess spoil that cannot be reused within the project would require offsite disposal. The final destination(s) for excess spoil from construction of the project would be confirmed prior to construction commencing.

The vast majority of the spoil generated by the project will be Virgin Excavated Natural Material (VENM) – typically consisting of crushed sandstone and shale. VENM is generally considered a desirable material for clean and stable fill in development sites and major earthworks projects across Greater Sydney. Recent examples include the use of crushed sandstone from Sydney Metro to construct runway pavements for the new Western Sydney Airport, and reuse of crushed sandstone from the WestConnex tunnels for numerous development projects.

An application for offshore disposal of suitable dredged material has been submitted to the Commonwealth Department of the Environment and Energy. It is proposed that suitable dredged material would be transported by barge and disposed of at a designated offshore disposal site (in accordance with legislative requirements). Dredged material unsuitable for offshore disposal would be loaded into adjacent hopper barges before being transported to White Bay, before being made spadable and then disposed of at a land-based licensed facility.

Other waste streams which would be generated during construction include:

- Demolition waste from existing structures and properties
- Contaminated soil and dredged material which may be encountered during construction
- General construction waste such as concrete, steel and timber formwork off-cuts
- Vegetation waste from clearing and grubbing
- Plant and vehicle maintenance waste such as oils and lubricants
- General office waste such as paper, cardboard, plastics and food waste
- Sewage waste.

Further details are provided in Chapter 24 (Resource use and waste management).

Chapter 7

Stakeholder and community engagement

January 2020

7 Stakeholder and community engagement

This chapter provides an overview of the stakeholder and community engagement activities carried out during the project's development and during the preparation of this environmental impact statement. An overview of activities which would be carried out to support the public exhibition of this environmental impact statement and during program delivery is also provided.

The Secretary's environmental assessment requirements as they relate to stakeholder and community engagement, and where in the environmental impact statement they have been addressed, are detailed in Table 7-1.

Table 7-1 Secretary's environmental assessment requirements – Stakeholder and community engagement

Secretary's requirement	Where addressed in EIS
Consultation	
1. The project must be informed by consultation, including with relevant local, State and Commonwealth government agencies (including the Harbour Master where disturbance of seabeds, shipping channel closures or marine movement of materials/spoil are proposed), infrastructure and service providers, special interest groups (including Local Aboriginal Land Councils, Aboriginal stakeholders, and pedestrian and bicycle user groups), affected landowners, businesses and the community.	A summary of consultation carried out to date is provided in **Section 7.1** and **Section 7.2**. A summary of feedback received is provided in **Section 7.3**. A summary of project refinements in response to feedback is provided in **Section 7.4**. Project refinements have also been considered in **Chapter 5** (Project description).
2. The Proponent must document the consultation process and demonstrate how the project has responded to the inputs received.	The consultation process is documented in **Section 7.1** and **Section 7.2**. A summary of the feedback received and how the feedback has been addressed is provided in **Section 7.3**. A summary of project refinements in response to feedback is also provided in **Section 7.4**. Project refinements have also been considered in **Chapter 5** (Project description).
3. The Proponent must describe the timing and type of community consultation proposed during the design and delivery of the project, the mechanisms for community feedback, the mechanisms for keeping the community informed, and procedures for complaints handling and resolution.	Community and stakeholder engagement during the public exhibition of the environmental impact statement is outlined in **Section 7.2**. Ongoing and future engagement for the project is outlined in **Section 7.5**. A detailed Community Communication Strategy would be developed and implemented during delivery of the project. This would be based on the consultation framework provided in **Appendix E**.

Secretary's requirement	Where addressed in EIS
4. The Proponent must assess the potential for complaint fatigue to occur during construction of the project and describe how mitigation measures, complaint handling procedures and community consultation mechanisms will mitigate complaint fatigue. The assessment must consider the cumulative impacts from the project and other major projects in the area.	The potential for complaint fatigue to occur and proposed mitigation measures and complaint handling procedures are described in **Section 7.5**. Complaint management tools are outlined in **Appendix E** (Community consultation framework) Potential cumulative impacts from the project are considered in **Chapter 27** (Cumulative impacts).
Socio-economic, Land Use and Property	
6. A draft Community consultation framework must be prepared identifying relevant stakeholders, procedures for distributing information and receiving/responding to feedback and procedures for resolving stakeholder and community complaints during construction and operation. Key issues that must be addressed in the draft Framework include, but are not limited to: a. traffic management (including property access, pedestrian access); b. landscaping/urban design matters; c. construction activities including out of hours work; and d. noise and vibration mitigation and management.	A draft Community consultation framework is provided at **Appendix E**. The content of the Framework is summarised in **Section 7.5**.

7.1 Engagement and consultation process

7.1.1 Engagement objectives and strategy

The engagement process aimed to provide opportunities for community and stakeholder involvement throughout the development of the project. To achieve this, the following engagement objectives have been applied:

- Provide clear, consistent and timely information about the project to stakeholders and the community
- Provide communication in a variety of mediums
- Promote and raise awareness of the project and engagement activities being carried out
- Foster and develop relationships with stakeholders and the community
- Identify opportunities for community and stakeholder groups to be involved in the project

- Collaborate with the community and stakeholders to help shape the design of the project at each key development phase
- Address and respond to community and stakeholder issues raised
- Meet the statutory requirements for consultation under the *Environment Planning and Assessment Act 1979*
- Meet the Secretary's environmental assessment requirements.

Community and stakeholder engagement has been an integral component in the development of the project and the Western Harbour Tunnel and Beaches Link program more widely. The engagement program has proactively informed and involved stakeholders and community members during project development. This approach aimed to increase public understanding of the project, encourage participation in the development process, and promote the benefits of the project to local communities and stakeholders. The project has benefitted from the input of local knowledge, insight, experience, goals and priorities, which has helped to identify issues, potential mitigation strategies and opportunities to improve project outcomes.

Consultation forms a component of engagement. For the purpose of this document, the definitions of consultation and engagement are provided in Table 7-2, in line with International Association of Public Participation (IAP2) definitions.

Table 7-2 Engagement and consultation definitions

Term	Definition
Engagement	In this document, engagement refers to any type of interaction with the community or stakeholders and is also used to refer to the community and stakeholder engagement program holistically. Engagement includes communication, consultation, notification and education.
Consultation	In this document, consultation refers to the level of engagement of a specific activity. Specifically where the term consultation has been used, this describes the process where the aim of the engagement is to obtain public and community feedback on a matter and use this information for project development.

7.1.2 Engagement timeline

Engagement for the Western Harbour Tunnel and Warringah Freeway Upgrade project was carried out by Transport for NSW (formerly Roads and Maritime) as part of the engagement process for the wider Western Harbour Tunnel and Beaches Link program of works. Engagement with key government and other project stakeholders, including NSW Ports Authority, Sydney Metro, Infrastructure NSW, Sydney Coordination Office and Northern Beaches B-Line, has occurred since early 2016 to develop the design and plan investigations. Engagement with the public and broader stakeholders commenced in March 2017 and has continued through to the preparation of this environmental impact statement.

Community and stakeholder engagement has been carried out in accordance with the Secretary's environmental assessment requirements. A summary of the community and stakeholder engagement process and timeline for the project is shown in Figure 7-1.

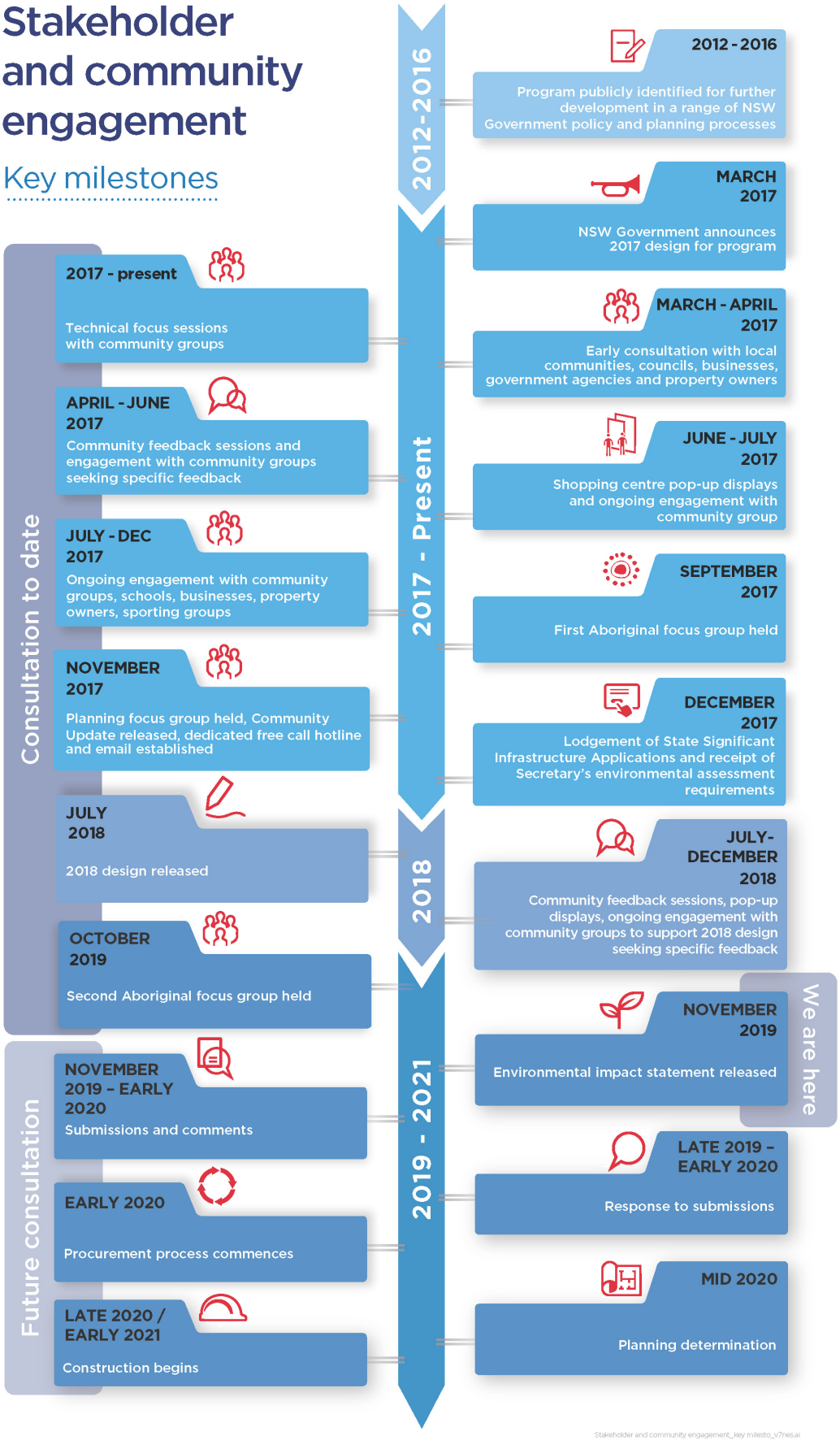


Figure 7-1 Western Harbour Tunnel and Beaches Link program of works community and stakeholder engagement process

7.1.3 Stakeholders

Stakeholders were identified through consideration of the project's potential direct and indirect impacts and from records of previous correspondence with relevant government bodies, business groups and community groups. Engagement has included ongoing liaison and consultation with the following stakeholder groups:

- Government Ministers and elected representatives
- Federal and State Government agencies
- Local councils
- Property owners and residents along and near the alignment
- Members of the community
- Community service providers
- Business and industry groups
- Education, health and sporting facilities along or near the alignment
- Local precinct committees and/or resident action groups
- Marine stakeholders and waterway users
- Aboriginal groups and the Local Aboriginal Land Council (LALC)
- Pedestrians and cyclists
- Service and utility providers.

7.1.4 Engagement and Consultation tools

A variety of two-way consultation and communication tools have been used to provide information to the community, providing a range of opportunities for the community to be consulted and involved throughout the project's development. Communication and consultation tools established for the project include:

- Toll free community information line (1800 931 189)
- Project email (whtbl@rms.nsw.gov.au)
- Project website (https://nswroads.work/whtbl)
- Interactive web feedback map (https://nswroads.work/whtbl)
- Project database to record correspondence relevant to the project, including contact details and issues raised during the life of the project
- Community update newsletters and letters to residents
- Community information sessions, information displays and staffed pop-ups
- Registered stakeholder database email updates
- Stakeholder briefings, meetings, workshops and presentations
- Interest group correspondence including letters and phone calls
- Face-to-face meetings and doorknocks with individual property owners and residents of properties which may be affected by the project
- Advertisements and proactive media articles in the local press
- Letterbox drops
- Media events at key milestones of the project.

7.2 Engagement activities to date

An extensive community engagement process has been carried out for the project before exhibition of the environmental impact statement. This has included two rounds of formal public consultation for the Western Harbour Tunnel and Beaches Link program of works:

- Between April and June 2017 following the announcement of the design
- Between July and December 2018 following the publishing of further development of the design.

In addition to these formal engagement periods, consultation and engagement with stakeholders has been ongoing throughout the project's development, with the project team holding numerous workshops and meetings with councils, community groups and other stakeholders. The following provides a summary of engagement activities carried out to date.

7.2.1 Commonwealth, State and local government agencies

Engagement and consultation has been carried out with key Commonwealth, State and local government agencies as summarised in Table 7-3. Feedback on specific environmental, technical and socio-economic matters provided by government stakeholders has informed the design development of the Western Harbour Tunnel and Warringah Freeway Upgrade project.

Table 7-3 Consultation with Commonwealth, State and local government agencies

Stakeholder	Timeframe	Engagement topics/activities
Other divisions of Transport for NSW	2016 – present	• Various project updates to different functional areas across the transport cluster to ensure coordinated planning across projects and operations • Northern Beaches B-Line and bus service coordination and future network planning post completion of the Western Harbour Tunnel and Beaches Link program of works • Coordination with the Transport Management Centre and Sydney Coordination Office for site investigations • Coordination and planning sessions with the Sydney Coordination Office and Transport Management Centre to plan traffic management during construction and operation • Site visit to the Traffic Management Centre to discuss and observe existing operation of the Warringah Freeway, the Sydney Harbour Bridge, Western Distributor, ANZAC Bridge and other critical road links • Birchgrove Ferry Wharf upgrade – planning and coordination of upgrade and future works by the program • North Sydney public transport integration and transport planning • Transport integration working group • North Sydney integrated transport planning working group • Rozelle precinct cumulative traffic working group to coordinate construction and operational traffic across projects in this area

Stakeholder	Timeframe	Engagement topics/activities
		• Health, safety and environmental briefings • Marine construction overview to understand implications for marine traffic.
Sydney Trains	2016 – present	• Various project updates to different functional areas across transport cluster to ensure coordination across projects and operations • T1 North Shore and Northern rail line underground interface.
Sydney Metro	2016 – present	• Sydney Metro City & Southwest tunnel design and construction coordination • Sydney Metro West planning and construction strategy coordination • Spoil haulage and reuse: opportunities for consideration • Rozelle precinct coordination • North Sydney public transport integration and precinct planning.
NSW Crown Lands	2017 – present	• General project overview and updates.
Metropolitan Local Aboriginal Land Council (LALC)	2017 – present	• Regular meetings and correspondence to provide project briefings and seek feedback • Correspondence with CEO, Metropolitan LALC, regarding location of sites near Manly Dam and Balgowlah • Involvement of site officers in archaeological surveys and field surveys • Involvement of site officers in survey, recording and condition assessment of cultural heritage close to the project corridor, including site adjacent to the Wakehurst Parkway.
Federal Department of the Environment and Energy	2017 – present	• General project overview and updates • Consultation regarding the potential for offshore disposal of dredged material at the designated offshore disposal site • Development of testing plans and permit applications.
Federal Department of Infrastructure, Transport, Cities and Regional Development	2017	• General project overview and update.
Infrastructure Australia	2017 – present	• General project overview and updates.

Stakeholder	Timeframe	Engagement topics/activities
Department of Planning, Industry and Environment	2017 – present	• General project overview and updates • Warringah Freeway and Gore Hill concept overview presentation • Frenchs Forest precinct planning and transport integration • Planning focus session on lodgement of State Significant Infrastructure Application • Western Harbour Tunnel and Beaches Link program of works site tour to understand design and key challenges • Western Harbour Tunnel and Beaches Link program of works construction methodology, noise, vibration and spoil management presentation.
Greater Sydney Commission	2017 – present	• Multiple project overview and update meetings • North Sydney precinct and transport planning sessions • Frenchs Forest precinct planning • Land use and employment assumptions for design development.
Government Architect NSW	2017 – present	• Project overviews and updates • North Sydney Integrated transport planning • Reference Design Urban Design review panel.
Port Authority of NSW	2017 – present	• Regular project updates and briefings • Stakeholder sessions prior to geotechnical investigations in Sydney Harbour and Middle Harbour • Multiple planning sessions for White Bay construction support site (WHT3), including footprints and operations • Simulation training for Pilots at Brisbane facility for moving immersed tube tunnel units around the harbour, cruise terminal operations and Gore Bay terminal operations during Western Harbour Tunnel immersed tube tunnel construction, and transporting immersed tube tunnel units into Middle Harbour through the Spit Bridge • Development of Harbour Master's conditions for proposed dredging, cofferdams, immersed tube tunnel construction and general marine logistics within Sydney Harbour • Engagement on the Harbour Master's conditions for potential temporary relocation of the *Cape Don* and *Baragoola* vessels • Planning focus meeting on lodgement of State Significant Infrastructure submission.
NSW Urban Growth (now Infrastructure NSW from July 2019)	2016 – present	• Project overviews and updates • Interactive sessions to coordinate Glebe Island/White Bay construction and development activities • Consultation on The Crescent/City West Link intersection

Stakeholder	Timeframe	Engagement topics/activities
		options and pedestrian bridge alignments • Engagement via representation at the Bays Precinct coordination group • Consultation on White Bay spoil beneficial reuse options • Planning focus meeting on lodgement of State Significant Infrastructure submission.
NSW Small Business Commissioner	2018	• Project briefing/update.
Department of Planning, Industry and Environment (Regions, Industry, Agriculture and Resources)	2017 – present	• General project overview and updates • Agency briefings on terrestrial biodiversity, freshwater and contamination, marine water (hydrodynamics and dredging) • Marine ecology survey and water quality testing • Planning focus meeting on lodgement of State Significant Infrastructure submission • Consultation for the development of the Western Harbour Tunnel application for offshore disposal of dredged material • Planning focus meeting on lodgement of State Significant Infrastructure submission.
Department of Premier and Cabinet (Heritage)	2017	• Planning focus meeting on lodgement of State Significant Infrastructure submission • Agency briefings on non-aboriginal heritage and aboriginal heritage • Agency briefings on terrestrial biodiversity, freshwater and contamination, marine water (hydrodynamics and dredging).
NSW Environmental Protection Authority (EPA)	2017 – present	• General project overview and updates • Marine ecology survey and water quality testing • Planning focus meeting on lodgement of State Significant Infrastructure submission • Western Harbour Tunnel and Beaches Link program of works construction methodology, noise, vibration and spoil management presentation • Consultation for the development of the Western Harbour Tunnel application for offshore disposal of dredged material • Briefing to the Advisory Committee on Tunnel Air Quality. Members of the committee were provided the air quality technical report and health impact assessment for review and comment.

Stakeholder	Timeframe	Engagement topics/activities
Infrastructure NSW	2016 – present	• Multiple project overview and update sessions • Multiple reviews by Infrastructure NSW on various aspects on the design and construction aspects of the project • Reviews of environmental and community impacts, mitigations and assessment process • Bays precinct construction, development and port operation review • Planning focus meeting on lodgement of State Significant Infrastructure submission.
NSW National Parks and Wildlife Services	2017	• Planning focus meeting on lodgement of State Significant Infrastructure submission.
NSW Department of Premier and Cabinet	2016 – present	• Multiple project overview and update sessions • Planning focus meeting on lodgement of State Significant Infrastructure submission.
NSW Treasury	2016 – present	• Planning focus meeting on lodgement of State Significant Infrastructure submission • Multiple project overview and update sessions • Regular engagement via Western Harbour Tunnel and Beaches Link program of works steering committees.
Sydney Harbour Federation Trust	2017	• Meeting to discuss potential options for temporary mooring or dry-dock availability for the *Cape Don* and *Baragoola* vessels • Planning focus meeting on lodgement of State Significant Infrastructure submission.
Ministry of Health	2017 – present	• Planning focus meeting on lodgement of State Significant Infrastructure submission • Project update during environmental impact statement development • Briefing to the Advisory Committee on Tunnel Air Quality. Members of the committee were provided the air quality technical report and health impact assessment for review and comment.
NSW Chief Scientist	2017 – present	• Planning focus meeting on lodgement of State Significant Infrastructure submission • Project overview and update session • Joint public consultation on approach to Western Harbour Tunnel and Beaches Link air quality and ventilation outlet locations • Briefing to the Advisory Committee on Tunnel Air Quality. Members of the committee were provided the air quality technical report and health impact assessment for review and comment.

Stakeholder	Timeframe	Engagement topics/activities
Defence – HMAS Waterhen	2017	• Project briefing ahead of geotechnical investigations • General project update, including construction methodology, interface with HMAS Waterhen, environmental impact assessment process and temporary relocation of the *Cape Don* and the *Baragoola* vessels.
M4-M5 Link Project Team	2016 – present	• Coordinated design and technical specification development to ensure integrated and efficient design and construction planning • Regular coordination meetings on construction method, delivery program, environmental impact statement development, cumulative traffic assessments and procurement.
Willoughby City Council	2017 – present	• Project updates on geotechnical work planning, potential project impacts, temporary construction support sites, noise, air quality, future land use after the project is complete and the development of the environmental impact statement • Discussion of feedback from the local community • Planning focus meeting on lodgement of State Significant Infrastructure submission.
Mosman Council	2017 – present	• Project updates on the project design, potential project impacts and temporary construction support sites, noise, air quality, and the development of the environmental impact statement • Planning focus meeting on lodgement of State Significant Infrastructure submission.
Lane Cove Council	2017 – present	• Project updates on the development of the design, construction methodology, active transport connections, motorway facilities, ventilation outlets, tunnel entry and exit points, spoil transport, tunnel depth and alignment, potential community impacts, air quality, and environmental impact statement development • Planning focus meeting on lodgement of State Significant Infrastructure submission.
North Sydney Council	2017 – present	• Updates on tunnel design, project justification, urban design, community engagement process, public transport integration, Warringah Freeway Upgrade, ventilation outlet locations, air quality and monitoring, impacts to St Leonards Park and Cammeray Golf Course, active transport and pedestrian connections, opportunities and impacts to the North Sydney area, environmental impact statement development • Multiple north Sydney precinct and transport planning workshops • North Sydney urban design workshops to discuss

Stakeholder	Timeframe	Engagement topics/activities
		proposed impacts and potential mitigation measures – particularly at and around temporary construction support sites and permanent facilities • Planning focus meeting on lodgement of State Significant Infrastructure submission.
City of Sydney Council	2017	• General project overview and update.
Inner West Council	2017 – present	• Updates on project development, proposed temporary and permanent impacts, construction method in Sydney Harbour, Yurulbin Park temporary impacts, noise and vibration, geotechnical work, community feedback, tunnel depths, construction parking, Victoria Road construction support site (WHT2), Glebe Island and White Bay construction support site (WHT3), spoil transport and cumulative traffic considerations, and submission process • Consultation ahead of geotechnical investigations to refine borehole locations to minimise community impacts • Planning focus meeting on lodgement of State Significant Infrastructure submission.

7.2.2 Service and utility providers

Engagement and consultation has been carried out with service and utility providers through activities including briefings, meetings and ongoing technical engagement. These activities provided:

- An overview of the Western Harbour Tunnel and Beaches Link program of works including the proposed design and construction method
- Discussions about the possible impact on utility assets
- Discussion and development of potential relocation and protection strategies
- An opportunity to provide feedback and discuss any issues or concerns.

Providers that have been engaging with the Western Harbour Tunnel project team include:

- Ausgrid
- Jemena
- NBN
- Optus
- UeComm
- Telstra
- TPG
- Sydney Water
- Verizon
- AARNet
- Vocus
- Vodafone.

Feedback from these service and utility providers has informed the design for service and utility relocation and/or protection, where applicable.

7.2.3 Aboriginal stakeholders

Consultation with the Aboriginal community was carried out in accordance with requirements outlined in Chapter 15 (Aboriginal cultural heritage) of this environmental impact statement.

Table 7-4 provides a summary of engagement and consultation activities carried out. Refer to Appendix L (Technical working paper: Cultural heritage assessment report) for further details on Aboriginal stakeholder engagement.

Table 7-4 Consultation with Aboriginal stakeholders

Stakeholder	Summary
National Native Title Tribunal	Contacted to identify any registered native title claimants of native title holders for the options assessment area. No registered native title claimants were identified in relation to the study area.
Aboriginal Site Officers	Aboriginal Site Officers nominated by the Metropolitan LALC were present for archaeological surveys.
• Department of Premier and Cabinet (Heritage) • The New South Wales Aboriginal Land Council • The Metropolitan LALC • The Aboriginal Heritage Office • The Registrar appointed under the Aboriginal Land Rights Act 1983 • The National Native Title Tribunal • The Native Title Services Corporation Limited • Inner West Council • North Sydney Council.	Organisations were written to during June and July 2017 seeking the details of Aboriginal people who may have an interest in the project and who may hold cultural knowledge about objects and places in the study area.
Aboriginal Focus Groups	Identified Aboriginal stakeholders (registered Aboriginal parties) were contacted by letter and advertisement, and invited to attend focus group meetings to discuss the project and received comment on the draft archaeological survey methodology. The first Aboriginal Focus Group was held in September 2017. A second Aboriginal Focus Group was held in October 2019 to outline the findings of the Aboriginal cultural heritage assessment and seek feedback from registered Aboriginal parties.
Aboriginal Site Officers	Aboriginal site officers were engaged for archaeological fieldwork.

7.2.4 Engagement with business stakeholders

A business survey was carried out to gain a better understanding of the main issues, perceptions and concerns of businesses in regard to construction and operation of the project. Surveys were conducted during a three-week period in November 2017 in nine local centres that may be more susceptible to direct or indirect effects of construction and/or operation. Businesses were approached at random within these local centres, with every effort made to survey a range of business types across the study area.

More than 182 businesses participated in the survey. The results of the business survey are provided Appendix U (Technical Working Paper: Business impact assessment) and discussed in Chapter 21 (Socio-economics).

Local business owners also attended community information sessions. Further engagement with business stakeholders would be carried out during the environmental impact assessment exhibition period.

7.2.5 Directly impacted landowners and residents

In March 2017, property owners affected by the early design were notified. In July 2018, property owners affected by the further developed design were notified. Residential property owners were provided the opportunity to start the acquisition process (at owner discretion). Further engagement would be carried out with affected property owners as the project progresses.

All acquisition required for the project is carried out in a manner consistent with the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW) (Just Terms Act), the *Land Acquisition Information Guide* and the land acquisition reforms announced by the NSW Government in 2016.

Transport for NSW has appointed a Personal Manager Acquisition to help land owners who may be affected by acquisition for the project. The Personal Manager Acquisition is in regular contact with these individuals to provide updates on the project and respond to questions and queries. Should acquisition for the project be confirmed for a particular property, the Personal Manager Acquisition would work with the affected land owners and residents to offer assistance and support throughout the acquisition and relocation process (refer to Chapter 20 (Land use and property)).

7.2.6 Community

Community engagement was carried out for the Western Harbour Tunnel and Beaches Link program of works as a whole by Transport for NSW (formerly Roads and Maritime). The following section describes the community feedback received during the 2017 and 2018 consultation periods for the program of works, in addition to engagement carried out with key community and interest groups.

2017 design community engagement

In March 2017, the NSW Government announced the Western Harbour Tunnel and Beaches Link program of works design. Feedback on the design was invited between 16 March 2017 and 31 July 2017, supported by community engagement activities summarised in Table 7-5.

Table 7-5 2017 design – community engagement activities

Activity	Details
General program information and feedback channels	
Program website	http://www.rms.nsw.gov.au/whtbl
Program email address	Over 700 emails were sent to the program email account: motorwaydevelopment@rms.nsw.gov.au
Program 1800 number	Over 1000 telephone calls were received via the program information line: 1800 789 297.
Letterbox drops	More than 330,000 program fact sheets and community feedback session information flyers delivered.
Online community engagement map	More than 1700 comments posted on specific topics by members of the community.
Subscribers to program updates	Over 2300 subscribers to receive ongoing program updates.
Ministerial	About 90 customer enquiries issued as ministerial inquiries.
Hosted events	
Community Feedback Sessions attended by program team and technical specialists	Sixteen sessions attended by more than 2100 people at the following locations: • The Mosman Club (two sessions) • McMahons Point Community Centre (two sessions) • Chatswood Club (two sessions) • Balmain Town Hall (two sessions) • Manly-Warringah Leagues Club (two sessions) • Northbridge Bowling Club (two sessions) • North Sydney Oval Function Centre (two sessions) • Seaforth Community Centre (one session) • Fred Hutley Hall, North Sydney Council Chambers (one session).
Pop up information displays	Twelve displays in major shopping centres attended by more than 800 people including: • Birkenhead Point Shopping Centre (two sessions) • Warringah Mall (four sessions) • Balgowlah Stockland (two sessions) • Chatswood Westfield (four sessions).
Direct engagement with individual stakeholders	
Meetings with residents and stakeholders	More than 25 meetings were attended by more than 1000 people.
Door knocks	More than 1500 residences.

Activity	Details
Notifications of investigation work	
Marine geotechnical notifications	More than 170 notifications to properties in the vicinity of the proposed harbour crossings.
Land based geotechnical notifications	More than 5500 notifications and more than 1200 doorknocks.
Noise monitoring installation notifications	More than 590 notifications and more than 470 doorknocks.
Air quality monitoring station installations	More than 50 notifications and more than 40 doorknocks.
Media	
Newspaper advertisements	89 half page advertisements, placed in the local media in the weeks preceding the community feedback sessions.
Media releases	One media release was issued by the NSW Government to coincide with the announcements of the preferred corridor and start of field investigation works.
Facebook	More than 169,000 people reached through two direct program related Facebook posts on the Roads and Maritime Facebook page, as well as a broadly targeted Facebook advertising campaign.

2018 further developed design community engagement

In July 2018, the NSW Government announced a further developed design for the Western Harbour Tunnel and Beaches Link program of works. Feedback on the proposed design was invited between 26 July 2018 and 1 December 2018, supported by community engagement activities summarised in Table 7-6.

Feedback from this period helped to inform the design which has been included in this environmental impact statement. A summary of this feedback and where it has been addressed is provided in Table 7-8.

Table 7-6 2018 further developed design – community engagement activities

Activity	Detail
General program information and feedback channels	
Program website	http://www.rms.nsw.gov.au/whtbl
Program email address	Around 2320 emails were sent to the program email account: whtbl@rms.nsw.gov.au
Program 1800 number	More than 300 telephone calls were received via the program information line: 1800 931 189.

Activity	Detail
Letterbox drops	About 400,000 program fact sheets and community feedback session information flyers delivered.
Online community engagement map	More than 4000 comments posted on specific topics by members of the community.
Feedback forms	More than 530 written feedback forms received at community sessions.
Subscribers to program updates	Over 3300 subscribers to receive ongoing program updates.
Ministerial	Over 90 customer enquiries issued as ministerial inquiries.
Hosted events	
Community Feedback Sessions attended by program team and technical specialists	Twenty sessions attended by more than 2600 people at the following locations: • Balgowlah Club Totem (one session) • Balgowlah Golf Club (one session) • Crows Nest Centre (two sessions) • Mosman RSL (two sessions) • North Sydney Council – Fred Hutley Hall (two sessions) • Waverton Bowling Club (two sessions) • Balgowlah RSL (three sessions) • Manly Warringah Leagues Club (two sessions) • Balmain Town Hall (two sessions) • Northbridge Golf Club (two sessions) • Cammeray Golf Club (one session).
Pop up information displays	Six displays in major shopping centres attended by more than 590 people including: • Birkenhead Point Outlet Centre (three sessions) • Balgowlah Stockland (three sessions).
Direct engagement with individual stakeholders	
Stakeholder meetings	More than 88 meetings were held with local precinct committees, schools and school Parents & Citizens (P&C) Associations, resident groups, special interest groups, sporting associations, Government agencies and local councils.
Door knocks	More than 3890 residences.
Notifications of investigation work	
Land based geotechnical notifications	More than 132 notifications and more than 20 doorknocks.
Media	
Newspaper	Eighteen half page advertisements, placed in the local media in the

Activity	Detail
advertisements	weeks preceding the community feedback sessions.
Media releases	One media release was issued by the NSW Government to coincide with the announcements of the further developed design.

Community and interest groups

Engagement and consultation has been carried out with key community and interest groups through activities such as briefings, meetings, presentations and workshops. These activities provided:

- An overview of the Western Harbour Tunnel and Beaches Link program of works, including the proposed design and construction method
- Information on potential impacts during construction and operation including air quality, noise and vibration, traffic and transport, flora and fauna, and maritime issues
- Further detail on options considered and their advantages and disadvantages
- The opportunity to provide feedback and discuss any issues or concerns
- The opportunity to present community options for analysis by the technical and environmental team.

Engagement and consultation has occurred with the following community and interest groups:

- Artarmon Progress Association
- Naremburn Progress Association
- North Sydney Precinct Committees
- Plateau Precinct (Cammeray)
- Waverton Precinct Committee
- Waverton Progress Association
- Willoughby Progress Association
- Willoughby South Progress Association
- Wollstonecraft Precinct Committee
- Bays West Projects
- Crows Nest Rotary Club
- North Sydney Rotary Club
- Mosman Rotary Club
- Marist College North Shore
- North Sydney Boys
- St Mary’s Primary School
- Anzac Park Public School
- Anzac Park Public School P&C Association
- Cammeray Public School
- Cammeray Public School P&C Association
- Monte Sant' Angelo Mercy College
- Wenona School
- Cammeray Golf Club
- Balmain Leagues Club (Balmain Tigers)

- MV Cape Don Society Inc.
- Glebe Island & White Bay Community Liaison Group
- Western Harbour Tunnel Action Group
- WestProtects Rozelle
- Aboriginal Focus Group
- Bruce Mackenzie AM
- The Greens North Sydney.

7.3 Feedback received

Feedback and issues identified during the engagement program by stakeholders and the community have informed the environmental assessment and the ongoing development of the project. A summary of these issues and where they have been addressed is provided in the following section.

7.3.1 Summary of feedback received

Feedback received was recorded and considered during the preparation of this environmental impact statement and throughout the development of the project.

Table 7-7 provides a summary of the feedback received during the 2017 and 2018 engagement periods for the Western Harbour Tunnel and Beaches Link program of works, and where this has been considered, for the Western Harbour Tunnel and Warringah Freeway upgrade project, in the environmental impact statement.

Table 7-7 Summary of stakeholder and community feedback

Feedback topic	Number of comments 2017	Number of comments 2018	Environmental impact statement reference
Air quality impacts, location and operation of tunnel ventilation system, potential impact on health	1068	4729	Air quality impacts are assessed in Chapter 12 (Air quality) Location and operation of tunnel ventilation outlets and motorway facilities is described in Chapter 5 (Project description) and Appendix H (Technical working paper: Air quality) – In-tunnel ventilation report) Assessment of potential human health impact is provided in Chapter 13 (Human health) and Appendix I (Technical working paper: Health impact assessment)
Design – tunnel entry and exit portals, alignment, road connections, depth, project description, suggested design changes, motorway features	928	1566	Chapter 4 (Project development and alternatives), Chapter 5 (Project description) and this chapter in Section 7.4

Feedback topic	Number of comments 2017	Number of comments 2018	Environmental impact statement reference
Transport mode, public transport alternatives, network integration, connectivity, integration with other key projects and proposed infrastructure (eg B-Line, Sydney Metro)	547	1974	Chapter 3 (Strategic context and project need) Chapter 4 (Project development and alternatives) Chapter 5 (Project description) Chapter 8 (Construction traffic and transport), Chapter 9 (Operational traffic and transport) and Appendix F (Technical working paper: Traffic and transport)
Potential property impact on directly and indirectly affected properties, including property value and potential increase in urban density, property condition surveys, property access, property acquisition	501	1756	Chapter 20 (Land use and property) and Appendix U (Technical working paper: Socio-economic assessment)
Construction impact, location of construction support sites, temporary impact on support construction, hours of work, night work, spoil transport, cumulative impacts, light spill	383	3475	Chapter 6 (Construction work)
Potential impact on local streets, rat runs, local road safety, construction traffic, impact on parking spaces, congestion, road network performance, local road connections, increased traffic, cumulative traffic impact, travel time	398	4023	Chapter 8 (Construction traffic and transport), Chapter 9 (Operational traffic and transport) and Appendix F (Technical working paper: Traffic and transport) Chapter 27 (Cumulative impacts)
Traffic modelling	273	312	Chapter 8 (Construction traffic and transport) Chapter 9 (Operational traffic and transport)
Satisfaction with engagement	151	86	This chapter provides an overview of the engagement and consultation process feedback received.
Impact on fauna, flora, vegetation, green spaces, National Parks	177	1676	Chapter 19 (Biodiversity) and Appendix S (Technical working paper: Biodiversity development assessment report)

Feedback topic	Number of comments 2017	Number of comments 2018	Environmental impact statement reference
Need for land bridges and open space	1	2175	Chapter 22 (Urban design and visual amenity)
Drainage and flooding	2	133	Chapter 18 (Flooding) and Appendix R (Technical working paper: Flooding)
Project cost, cost benefit ratio and tolling	97	437	A description of tolling infrastructure is provided in Chapter 5 (Project description). Tolling cost modelling is not subject to this environmental impact assessment
Support for project	89	184	This chapter provides an overview of the engagement and consultation process feedback received
Dissatisfaction with engagement process, need for further project detail, consideration of different ways to engage with the community and stakeholders including different mediums	81	232	Consultation has been adapted as the project progresses. The project has endeavoured to provide information in a variety of different mediums for stakeholders as detailed in this chapter
Noise impact, construction noise, cumulative noise impact, road traffic noise changes, noise walls, noise monitoring	73	2646	Chapter 10 (Construction noise and vibration), Chapter 11 (Operational noise and vibration) and Appendix G (Technical working paper: Noise and vibration)
Cycling, cycleway facilities, active transport	61	336	Chapter 8 (Construction traffic and Transport), Chapter 9 (Operational traffic and transport) and Appendix F (Technical working paper: Traffic and transport)
Oppose project	59	2243	This chapter provides an overview of the engagement and consultation process and feedback received
Visual amenity, visual impact of temporary/permanent structures, overshadowing, urban design	21	306	Chapter 22 (Urban design and visual amenity), Chapter 21 (Socio-economics) and Appendix U (Technical working paper: Socio-economic assessment)
EIS process and project approval	18	58	Chapter 2 (Assessment process)

Feedback topic	Number of comments 2017	Number of comments 2018	Environmental impact statement reference
Aboriginal and non-Aboriginal heritage	14	486	Chapter 15 (Aboriginal cultural heritage), Appendix L (Technical working paper: Cultural heritage assessment report), Chapter 14 (Non-Aboriginal heritage) and Appendix J (Technical working paper: Non-Aboriginal heritage)
Impact on community amenity during construction/operation, neighbourhood character, local business impact	8	39	Chapter 21 (Socio-economics) and Appendix U (Technical working paper: Socio-economic assessment)
Project timing	6	80	Chapter 5 (Project description)

7.3.2 Issues raised by government agencies and local government

A list of government stakeholders consulted and details on engagement activities and topics is provided in Section 7.2.1. Feedback from government stakeholders has informed the design development of the Western Harbour Tunnel and Warringah Freeway Upgrade project, and is addressed throughout the chapters of this environmental impact statement.

7.3.3 Issues raised by the community

All questions, comments and issues raised by the community have been recorded in the project's database. Feedback received during both consultation periods has been considered and addressed as part of the environmental assessment and, wherever possible, has been incorporated into the design.

Feedback from the 2017 consultation period was addressed in the Western Harbour Tunnel and Warringah Freeway Upgrade scoping report (Roads and Maritime, 2017a), submitted to the former Department of Planning and Environment (now Department of Planning, Industry and Environment) in October 2017. This feedback informed the development of the proposed reference design, as discussed further in Section 7.4.

Feedback from the 2018 consultation period, including key issues raised by community members, stakeholder interest groups and local businesses are provided in Table 7-8. To consolidate the feedback received by the community, feedback has been grouped by issue category and summarised where appropriate. This table also provides the Transport for NSW response and/or the reference to where this feedback has been addressed in this document.

7.3.4 Issues raised by Aboriginal stakeholders

Feedback from Aboriginal stakeholders, including key issues, and how they have been addressed are provided in Chapter 15 (Aboriginal cultural heritage) and Appendix L (Technical working paper: Cultural heritage assessment report). Results from the Aboriginal Focus Group are provided in Appendix A of Appendix L (Technical working paper: Cultural heritage assessment report).

Table 7-8 Issues raised by the community

Issue category	Issue raised	Response to issue and where addressed
Strategic justification and project need	Project viability studies, including the business case, should be released to public.	An overview of the strategic context and project need are provided in Chapter 3 (Strategic context and project need). An overview of the development process and options considered are provided in Chapter 4 (Project development and alternatives).
	Requested more information on whether increased private vehicle road capacity would impact the future development of the North District and Northern Beaches employment centres.	The project would provide increased capacity, connectivity, resilience and result in a decrease in travel time between employment centres. This is anticipated to have a positive impact and encourage future development in the business centres. Refer to Chapter 9 (Operational traffic and transport) and Appendix F (Technical working paper: Traffic and transport) for further information. The potential social and economic impacts of the project are considered and assessed in Chapter 21 (Socio-economics).
	Consider design issues resulting in congestion at the intersection of the City West Link and the ANZAC Bridge related to WestConnex Stages 1 and 3. Concern that the Western Harbour Tunnel is now required to alleviate this choke-point, demonstrating poor planning and inconsistency of WestConnex and the Western Harbour Tunnel. Concern that the key purpose of the Western Harbour Tunnel and F6 projects are to feed traffic into WestConnex to improve profitability and in the interests of enhancing the viability of private tollway projects.	The Western Harbour Tunnel would create a western bypass of the Sydney CBD, taking pressure off the heavily congested Sydney Harbour Bridge, ANZAC Bridge and Western Distributor, which are nearing capacity, and delivering travel time savings across the transport network. The project has been planned and designed in a coordinated manner with the WestConnex network to deliver the motorway network Sydney needs for the future. The project's integration into the wider road network is discussed in Chapter 3 (Strategic context and project need).

Issue category	Issue raised	Response to issue and where addressed
Project development and alternatives	Further investigations into other transport mode options should have been carried out prior to choosing a road option.	An overview of the strategic context and project need are provided in Chapter 3 (Strategic context and project need). An overview of the development process and options considered are provided in Chapter 4 (Project development and alternatives).
	Preference for public transport over motorways.	The project has been planned as part of an integrated transport network to meet the diverse travel and transport needs of Sydney. This includes a well-developed road, rail, bus, ferry, walking and cycling network. An overview of the strategic context and project need are provided in Chapter 3 (Strategic context and project need). The project would provide significant improvements to the efficiency and connectivity of the southbound bus lane on the Warringah Freeway from Miller Street to Sydney Harbour Bridge and direct access to North Sydney to enable interchange with the new Sydney Metro and Sydney Trains. This has also been designed to provide high quality access for express bus services expected to travel via the proposed Beaches Link tunnels in the future – providing a significant improvement in public transport travel times and reliability. More information on public and active transport connections can be found in Chapter 3 (Strategic context and project need) and Chapter 5 (Project description). An overview of the development process and alternatives is provided in Chapter 4 (Project development and alternatives). Public transport is also addressed in Chapter 9 (Operational traffic and transport).
	Project should be replaced by a metro or heavy rail.	
	Consideration should be given to a dual rail/road.	
	Concerns about toll prices.	A description of tolling infrastructure is provided in Chapter 5 (Project description). The potential social and economic impacts of the project are considered and assessed in Chapter 21 (Socio-economics). Tolling cost modelling is not subject to this environmental impact assessment.
	Consideration of alternative routes for the tunnel including changing the Western Harbour Tunnel	An overview of the strategic context and project need are provided in Chapter 3 (Strategic context and project need). An overview of the development

Issue category	Issue raised	Response to issue and where addressed
	crossing to Rhodes to link to the M4.	process and alternatives are provided in Chapter 4 (Project development and alternatives).
Design	Lack of pedestrian and cyclist access to Glebe Island Bridge.	The project would not be making any adjustments to the existing surface network in Rozelle, including at Glebe Island Bridge. Any surface works in the area would be due to other projects. Refer to Chapter 5 (Project description) for a description of the project alignment.
	Preference for a new bike and pedestrian path through Jeaffreson Jackson Park Reserve to St Leonards Park.	Replacement and/or upgrade of active transport infrastructure would occur around and through the Falcon Street interchange, including replacement of Falcon Street shared user bridge. Refer to Chapter 5 (Project description) for a description of active transport infrastructure delivered by the project.
	Suggestion to build ramps at: • Brook Street St Leonards, on ramp exit to the north-west • Brook Street St Leonards, off ramp exit from the north-west.	Further information on the project alignment, including ramp location, is included in Chapter 5 (Project description).
	Preference for Ernest Street ramps to remain.	The ramps at Ernest Street would remain. Further information on the project alignment is included in Chapter 5 (Project description).
	Would like a cycleway included along the length of the tunnel and surface road corridor.	Pedestrians and cyclists would be excluded from the tunnels for safety reasons. More information on permanent cycleway connections can be found in Chapter 5 (Project description).

Issue category	Issue raised	Response to issue and where addressed
Construction	Proximity of construction support sites to homes, businesses and schools.	Construction support sites have been selected to support safe and efficient construction. Their locations have been chosen to minimise the need for residential properties, provide direct access to the arterial road or water transport network, allow for recreational use to continue on green space wherever possible and meet the project requirements. More information on the sites can be found in Chapter 6 (Construction work).
	Potential hours of operation and impacts of construction activities carried out up to 24 hours per day seven days a week.	Above ground construction work would generally be carried out between the following standard construction hours: • 7am to 6pm Monday to Friday • 8am to 1pm Saturday • Generally, no work on Sundays or public holidays. Activities that support tunnelling works and fitout, including aboveground work supporting underground activities, may need to occur 24 hours per day, up to seven days per week. Tunnel excavation and spoil handling outside of standard construction hours would be carried out within acoustic sheds at tunnel construction support sites. Construction hours at construction support sites along the Warringah Freeway Upgrade would vary depending on the type of construction activity being carried out. Some construction works would be required outside of standard construction hours to reduce construction duration, disruption to critical road corridors, and to ensure the safety of both construction works and the public along the Warringah Freeway. Spoil haulage would be limited to standard construction hours. More information can be found in Chapter 6 (Construction work).

Issue category	Issue raised	Response to issue and where addressed
	Cofferdam construction hours.	Construction at the Sydney Harbour cofferdams would be carried out primarily during the following standard construction hours (including rock hammering and piling activities): • 7am to 6pm Monday to Friday • 8am to 1pm Saturday • Generally, no work on Sundays or public holidays. Certain activities may be carried out outside of standard construction hours, including dewatering of cofferdams, dredging, removal of cofferdam structure, and immersed tube tunnel installation. More information can be found in Chapter 6 (Construction work).
	Duration of construction work and potential for long program delays.	Significant effort has been invested in understanding the key construction activities, their durations, key delay risks and mitigation strategies. More information can be found in Chapter 6 (Construction work).
	Future use of construction support sites including proposed rehabilitation and/or use during operation.	Proposed construction support sites are temporary and would be returned to the community as open space wherever possible. The project team are working with councils, communities and stakeholders to ensure the best possible use of this space. More information can be found in Chapter 6 (Construction work).
	Opposition to temporary relocation of the Birchgrove Wharf after it was recently re-opened after renovations.	Opportunities to relocate the Birchgrove Ferry Wharf would be investigated during construction planning. Ferry customers would be notified of alternative travel arrangements in advance of the wharf closure. Potential impacts due to temporary closure of access to Birchgrove Ferry Wharf are considered and assessed in Chapter 8 (Construction traffic and transport).
	Objections to the proposed site locations.	Proposed construction support sites have been selected to support safe and efficient construction. Their locations have been chosen to minimise the need for residential properties, provide direct access to the arterial road or water

Issue category	Issue raised	Response to issue and where addressed
		transport network, and allow for recreational use to continue on green space wherever possible and meet the project requirements. More information on the sites can be found in Chapter 6 (Construction work).
	Potential impacts to property due to tunnel depth.	Potential impacts to property due to tunnel depth is considered and assessed in Chapter 16 (Geology, soils and groundwater).
	Opposed to the use of the Balmain Leagues Club as a construction support site at Victoria Road for spoil removal due to the possible result of significant construction impacts. The use of this site would result in a re-development delay of this site and would eliminate the possibility of a Tigers Leagues Club being established in the new development.	The Victoria Road construction support site (WHT2) would be located within the former Balmain Leagues Club site at Rozelle, and would be temporarily used as a construction support site (either acquired or leased). The temporary occupation would not affect the existing land use zoning or development controls. If the site is leased, it would be returned to the land owners upon completion of construction, for development in accordance with land use zoning and planning controls. Refer to Chapter 20 (Land use and property) for further information.
	Requested more information on the justification for using the narrowest parts of the harbour for the tunnel crossing.	The construction methodology would ensure that there would be an open navigational channel available at all times. More information on the construction methodology can be found in Chapter 6 (Construction work).
Consultation process	Inadequate consultation and dissatisfaction with the process.	This chapter provides an overview of the communication and engagement activities carried out to date, and activities which would be carried out to support the public exhibition of this environmental impact statement and during program delivery. A detailed Community Communication Strategy would be developed prior to the start of construction pending project approval. This would be based on the framework developed and included in Appendix E (Community consultation framework).
	Lack of transparency and community involvement as part of the early project development.	
	Timing and inadequacy of available project information and distribution.	
	Lack of trust in the validity of the information	

Issue category	Issue raised	Response to issue and where addressed
	provided.	
	Dissatisfaction with project team response timeframes.	
	Accessibility, location selection and timing of community information sessions.	
Air quality	Effectiveness of the proposed tunnel ventilation system.	A description of the ventilation systems and facilities is provided in Chapter 5 (Project description), Chapter 12 (Air quality) and Appendix H (Technical working paper: Air quality). Ventilation outlet locations have been carefully selected to make sure they operate efficiently and there would be minimal changes to local air quality. The air quality assessment has demonstrated that the emissions from the ventilation outlets of the Western Harbour Tunnel have a negligible impact on existing ambient pollutant concentrations and would pose a very low risk to human health. In this context, there is no basis to justify the cost and energy use associated with installation and operation of filtration systems. Operation of these facilities would be carried out in accordance with strict guidelines and would be monitored closely by the relevant authorities.
	Locations of ventilation outlets.	
	Proximity of ventilation outlets to sensitive receivers including schools and recreational facilities.	
	Air quality impacts would be more around the ventilation outlets and portals than at other locations.	
	Concern five kilometres of tunnel would then place five kilometres “worth” of emissions into a single local area.	
	Cumulative air quality impacts when multiple ventilation outlets were present in a single area/suburb.	
	Locations of new air quality monitoring stations. Questions why these were not placed in areas	

Issue category	Issue raised	Response to issue and where addressed
	where the tunnels were proposed.	
	Preference for the ventilation system to include filtration.	
	Multiple citations of use of ventilation outlets overseas and suggestion this is best and standard practice.	
	Potential impacts during construction including exposure to emissions and carcinogens produced from processing of sandstone and granite producing silica dust.	Potential construction air quality impacts are considered and assessed in Chapter 12 (Air quality) and Appendix H (Technical working paper: Air quality).
	Potential air quality impacts as the result of road widening.	
	Impacts from contaminants and dust from construction work and spoil haulage.	
	Request for accurate on-going air quality monitoring.	Ongoing air quality monitoring would occur during both construction and operation. Refer to Chapter 12 (Air quality) for further information.
	Climate change impacts.	Chapter 26 (Climate change risk and greenhouse gas) assesses the potential impacts of climate change on the project, and greenhouse gas emissions generated by the construction and operation of the project.
Odour	Odours from treatment of contaminated materials at White Bay.	Assessment of odour impacts is provided in Chapter 12 (Air quality) and Appendix H (Technical working paper: Air quality).

Issue category	Issue raised	Response to issue and where addressed
Operational traffic	New motorway would result in increased traffic on local streets and key arterial routes.	Potential operational traffic and transport impacts have been assessed and considered in Chapter 9 (Operational traffic and transport) and in Appendix F (Technical working paper: Traffic and transport).
	New motorway would create new rat runs.	
	Increased vehicles on local streets trying to access the new portals.	
	Increased commuter traffic creating parking needs in local street which cannot accommodate the demand.	
	Additional traffic congestion on Miller Street, Ridge and Berry Street area as the result of the project.	
	Project will encourage the use of private vehicles for longer trips.	Refer to Appendix F (Technical working paper: Traffic and transport) for an assessment of likely induced traffic due to the project.
	Concern that the Western Harbour Tunnel will increase traffic across Sydney through the induced traffic effect once operational. Particular concern that traffic will increase along Johnson Street and The Crescent at Annandale – the main feeder roads to the Western Harbour portal at the Rozelle Interchange.	There would be some level of increased traffic as a result of the project, which may potentially result in a small level of increased traffic on Johnson Street and The Crescent. Modelling shows that the project would generally have a positive impact on operational traffic performance in the Rozelle area. Potential operational traffic and transport issues are considered and assessed in Chapter 9 Operational traffic and transport and Appendix F (Technical working paper: Traffic and transport).
	Requested more information on the cycle connections near Warringah Freeway into North Sydney.	There would be a new green connection for pedestrians and cyclists along at Ernest Street, Cammeray. There would also be a new Ridge Street overpass and connection at High Street, North Sydney. The project team is working with North Sydney Council on aspirations of a connection on both the west

Issue category	Issue raised	Response to issue and where addressed
		and east side of the highway. Where the project impacts existing walking and cycling infrastructure, they would be reinstated after construction. As much as possible, the project would enhance connectivity within the project footprint. Public and active transport infrastructure that would be provided as part of the project is detailed in Chapter 5 (Project description). Also refer to Chapter 9 (Operational Traffic and transport) on potential impacts on active transport links.
	Requested details on the potential for the program to deliver long term traffic reduction benefits for Military Road and whether a local road improvements program will be delivered as part of the program.	It is expected that there would be traffic reductions on alternative routes like Military Road due to the Western Harbour Tunnel project. As part of the project, no adjustments would be made to Military Road; however, the project would provide the opportunity for agencies (e.g. Councils and Transport for NSW network management teams) to consider other opportunities for local road improvements. Operational traffic impacts and benefits are outlined in Chapter 9 (Operational traffic and transport) and in Appendix F (Technical working paper: Traffic and transport).
Construction traffic	Increased traffic on local streets around construction support sites.	Construction support sites have been selected to provide direct access to the arterial road network, dedicated parking for construction workers (where possible) and would keep trucks and vehicles off local streets during construction, wherever possible. During construction, the main priority is to ensure the public can move safely around the area. Vehicle access to and from construction support sites would be managed to ensure pedestrian, cyclist and motorist safety. Assessment of construction traffic impacts including potential benefits is provided in Chapter 8 (Construction traffic and transport) and in Appendix F (Technical working paper: Traffic and transport). Potential construction traffic and transport impacts have been assessed and considered Chapter 8 (Construction traffic and transport) and Appendix F (Technical working paper: Traffic and transport).
	Reduced safety on local streets as the result of increased heavy vehicles.	
	Access to construction areas from residential roads and residents impacted along truck haulage routes.	
	Loss of residential parking on local streets as the result of project staff parking.	

Issue category	Issue raised	Response to issue and where addressed
	Increased rat running down local streets by both construction staff and community avoiding areas under construction.	
	Reduced road safety around schools as the result of increased heavy vehicle traffic. Particularly in areas where children are required to cross roads alone and during peak periods including drop off and collections.	
	Heavy vehicle use of narrow local streets and impacts to adjacent residents.	
	Increased traffic congestion on already congested roads like Victoria Street and Darling Street, Balmain.	Traffic modelling has demonstrated that traffic congestion impacts in the Rozelle area would be relatively low. Assessment of potential construction traffic impacts is provided in Chapter 8 (Construction traffic and transport) and Appendix F (Technical working paper: Traffic and transport).
	Impact from construction vehicles on traffic flow and parking in Louisa Road.	Construction support sites have been selected because they have direct access to the arterial road network or direct access to the harbour to keep trucks and construction vehicles off local streets during construction, wherever possible. Yurulbin Park has been selected as it enables the use of barges to transport spoil, equipment and construction materials. This enables delivery of this critical infrastructure project whilst minimising construction traffic and property impacts. Access to the Yurulbin Point construction support site (WHT4) would be via Sydney Harbour only. An access route to Louisa Road has been provided for emergency use only. More information can be found in Chapter 6 (Construction work) and in Chapter 8 (Construction traffic and transport) and in Appendix F (Technical working paper: Traffic and transport).

Issue category	Issue raised	Response to issue and where addressed
	Local traffic impacts from worker parking around Balls Head Road and the Coal Loader.	Local traffic impacts from worker parking around Balls Head Road and the Coal Loader would be mitigated through the inclusion of some on-site parking within the Berrys Bay construction support site (WHT7). Traffic impacts would be further minimised through restricting road haulage of tunnel spoil from the Berrys Bay construction support site to barge transportation from the site to White Bay. Assessment of potential construction traffic impacts is provided in Chapter 8 (Construction traffic and transport) and Appendix F (Technical working paper: Traffic and transport).
	Identify and assess the potential construction challenges of the Warringah Freeway such as access, road closures, change of speed limits, night work.	Construction methodology and staging for the Warringah Freeway Upgrade component is included in Chapter 6 (Construction work). Potential changes and impacts to traffic during construction are considered and assessed in Chapter 8 (Construction traffic and transport). Potential noise impacts from night work are considered and assessed in Chapter 10 (Construction noise and vibration).
	Impacts to Ridge Street residents from heavy truck traffic and worker parking.	Ridge Street at North Sydney would provide light vehicle access during construction and heavy vehicle access during early works at the Ridge Street north construction support site (WHT9) and Ridge Street east construction support site (WFU6). The Ridge Street north construction support site (WHT9) has dedicated parking for construction workers and would keep trucks and vehicles off local streets during construction, wherever possible. Following initial site establishment, heavy vehicle access in and out of the Ridge Street north construction support site (WHT9) would be primarily via Warringah Freeway, with light vehicle access provided via Ridge Street. Access for the Ridge Street east construction support site (WFU6) would be via Ridge Street. Assessment of potential construction traffic impacts is provided in Chapter 8 (Construction traffic and transport) and Appendix F (Technical working paper: Traffic and transport).

Issue category	Issue raised	Response to issue and where addressed
	Access to Ridge Street pedestrian bridge for local residents, cyclists and pedestrians.	The existing Ridge Street shared user bridge would remain operational until the new upgraded shared user bridge is suitable for pedestrian traffic. Refer to Chapter 5 (Project Description) and Chapter 6 (Construction work) for further information.
	Request Robert Street is not used for trucks servicing White Bay and are restricted to James Craig Road. Refers to “it is appropriate that the WestConnex Stage 3 approval has ruled out use of Robert Street”.	Access in and out of the northern portion of the White Bay construction support site (WHT3) would be via Port Access Road and access in and out of the southern portion of the site would be via James Craig Road. Refer to Section 6 (Construction work) for further information.
	Request parking be provided at White Bay/ Glebe Island for all Western Harbour Tunnel workers and ensure workers do not park on surrounding streets such as Rozelle Rail Yards site, Victoria Road and Yurulbin Point due to existing parking demands.	The White Bay construction support site (WHT3) has dedicated parking for construction workers. Construction workers would also be encouraged to use public transport where possible. Refer to Chapter 6 (Construction work) for further information.
	Concern that the traffic and congestion caused by the Victoria Road construction support site will negatively affect the multiple bus services in operation.	Project construction would result in additional construction vehicles travelling on the road network around Rozelle which may increase bus travel times at some locations during certain hours. However, traffic modelling has demonstrated that traffic congestion impacts in the Rozelle area would be relatively low. Ongoing consultation would be carried out with relevant authorities, including local councils, emergency services and bus operators to minimise traffic and transport impacts during construction. Refer to Chapter 8 (Construction traffic and transport) and Appendix F (Technical working paper: Traffic and transport) for further details on potential traffic impacts during construction.
	Concerns around any traffic blockages on the water or roads around HMAS Waterhen.	The immersed tube tunnel crosses immediately south of HMAS Waterhen defence site. The impacts of the works may include minor increases to transit

Issue category	Issue raised	Response to issue and where addressed
		time (as a result of reduced speed limits and partial closures) past the works area. Construction vessel movements would be managed such that they minimise interference with larger navy ship operations. Refer to Chapter 8 (Construction traffic and transport) and Appendix F (Technical working paper: Traffic and Transport) for further information.
	Request that a truck stabling area at White Bay be carefully coordinated using GPS tracking and communication technology. No ad-hoc stabling on streets and queuing of trucks entering sites is to be avoided.	The locations of construction spoil haulage trucks would be monitored in real time. Construction environmental management plans would be developed, which would identify haulage routes which spoil haulage vehicles would be required to adhere to. The White Bay construction support site (WHT3) configuration also allows for truck marshalling within the site if required, to minimise queuing on public roads. Potential traffic and transport impacts are considered and assessed in Chapter 8 Construction traffic and transport and Appendix F (Technical working paper: Traffic and transport) for further details.
Traffic	Concern access from Berry Street exit will be blocked.	Assessment of potential traffic impacts is provided in Chapter 8 (Construction traffic and transport), Chapter 9 (Operational traffic and transport) and Appendix F (Technical working paper: Traffic and transport).
	Additional traffic congestion on Miller Street, Ridge and Berry Street area.	
Public transport	Potential impacts to bus routes during construction and operation.	Assessment of potential impacts to public transport is provided in Chapter 8 (Construction traffic and transport), Chapter 9 (Operational traffic and transport) and in Appendix F (Technical working paper: Traffic and transport).
	Preference for public transport dedicated bus lanes on ANZAC Bridge.	No changes to ANZAC Bridge with respect to bus lanes would occur as part of this project. Public transport is addressed in Chapter 9 (Operational traffic and transport). An overview of the strategic context and project need is provided in Chapter 3 (Strategic context and project need).

Issue category	Issue raised	Response to issue and where addressed
	Preference for dedicated express bus lanes in current road infrastructure.	Refer to Chapter 5 (Project description) for a description of public and active transport delivered by the project. Also refer to Chapter 9 (Operational traffic and transport) and Appendix F (Technical working paper: Traffic and transport). An overview of the strategic context and project need are provided in Chapter 3 (Strategic context and project need).
Noise and vibration	Potential damage to property as a result of tunnelling activities.	Minimum working distances for vibration intensive construction activities and vibration monitoring would be implemented where applicable to manage potential vibration impacts to property during construction. Ground movement impacts would be managed through predictive settlement models, building condition surveys (including for heritage assets) and the establishment of an Independent Property Impact Assessment Panel. Refer to Chapter 10 (Construction noise and vibration), Appendix G (Technical working paper: Noise and vibration) and Chapter 16 (Geology, soils and groundwater) for further information.
	Potential damage to property as the result of underground blasting activities.	
	Conservation of heritage homes and potential for cosmetic damage as a result of tunnelling activities, underground blasting and heavy vehicle movements.	
	Noise during construction activities.	Potential noise impacts are considered and assessed in Chapter 10 (Construction noise and vibration) and Appendix G (Technical working paper: Noise and vibration).
	Noise as the result of 24 hour tunnelling activities.	Potential noise and vibration impacts from tunnelling activities are considered and assessed in Chapter 10 (Construction noise and vibration) and Appendix G (Technical working paper: Noise and vibration).
	Vibration issues as the result of tunnelling activities.	
	Hours of work and potential noise impacts.	Ongoing engagement would be carried out with schools about the timing and

Issue category	Issue raised	Response to issue and where addressed
	Duration of activities and subsequent duration of noise impacts.	duration of construction works and management of potential impacts. Proposed hours of work are discussed in Chapter 6 (Construction works). Potential construction noise impacts are considered and assessed in Chapter 10 (Construction noise and vibration) and Appendix G (Technical working paper: Noise and vibration).
	Potential impacts of noise at sensitive receivers like schools during peak exam periods.	
	Noise impacts during construction.	
	Noise from heavy vehicle traffic.	Heavy vehicle traffic is considered as part of the noise assessment and is addressed in Chapter 10 (Construction noise and vibration) and Appendix G (Technical working paper: Noise and vibration).
	Low frequency noise and vibration during construction and operation.	Potential noise and vibrations impacts are considered and assessed in Chapter 10 (Construction noise and vibration), Chapter 11 (Operational noise and vibration) and Appendix G (Technical working paper: Noise and vibration).
	Potential noise impacts as the result of road widening.	Potential noise impacts during construction are considered and assessed in Chapter 10 (Construction noise and vibration) and Appendix G (Technical working paper: Noise and vibration).
Open space	Loss of open space during construction for recreational and leisure activities.	Potential social and economic issues are considered and assessed in Chapter 21 (Socio-economics). Also refer to Chapter 22 (Urban design and visual amenity).
	Change in use of the Cammeray Golf Course during construction and operation.	The project is working with the Cammeray Golf Club to reconfigure the course to meet the needs of the club, members and visitors during construction and operation. After construction, areas of the golf course not required for permanent project infrastructure would be reinstated and rehabilitated, including replacement trees and landscaping. Where feasible and reasonable, the extent of permanent impact on Cammeray Golf Club would be minimised
	Viability of Cammeray Golf Course during operation if no longer able to operate as a 9 hole course.	

Issue category	Issue raised	Response to issue and where addressed
		during further design development. Refer to Chapter 21 (Socio-economics) for further information.
	Loss of open space at Yurulbin Park, Birchgrove during construction.	Ongoing engagement would be carried out with Council about the timing and duration of construction works and management of potential impacts at Yurulbin Park. The park would be reinstated and rehabilitated after construction. Refer to Chapter 21 (Socio-economics) for further information.
	Damage to Yurulbin Park, Birchgrove given this was recently upgraded by council.	
	Loss of access to Yurulbin Park during construction.	
	Impact to Birchgrove Oval.	There is no proposal to use Birchgrove Oval to support the construction of Western Harbour Tunnel.
	Damage to Carradah Park and Balls Head Reserve – especially after previous damage from oil terminals.	Carradah Park is outside the disturbance footprint of the project. There are no surface works either within, or that are planned to impact, Balls Head Reserve.
	Permanent impact on St Leonards Park after construction.	Construction at St Leonards Park would be temporary. Kerb and footpath adjustment works would occur on Miller Street southbound around the intersection with Falcon Street. These works would provide a new dedicated lane for left turning traffic from Falcon Street westbound to Miller Street southbound. Further review of the impacts in this area is currently being carried out and permanent impacts to St Leonards Park would be minimised or, where possible, eliminated. The proposed ramp from Western Harbour Tunnel to Falcon Street would be constructed using the cut and cover method. Following construction of this tunnelled ramp, the park would be reinstated over the top of the structure. The existence of this underground ramp is expected to have no permanent impact on the park.

Issue category	Issue raised	Response to issue and where addressed
	Impacts to local schools using the green space for play and sport, especially Wenona School.	Construction at St Leonards Park would be largely temporary. There would be limited impact on the bowling club or netball courts. The Ridge Street north construction support site (WHT9) would have dedicated parking, and has been located to enable access from the freeway, rather than the local road network. The park would be reinstated upon construction completion. Refer to Chapter 21 (Socio-economics) for further information.
	Impacts to park users including families, sports groups, dog owners and visitors to The Greens Bowling Club.	
Visual amenity	Obstruction to views as the result of the temporary cofferdams and attenuation shed at Yurulbin Park, Birchgrove during construction.	Construction support sites, including at Yurulbin Point (WHT4) and the Sydney Harbour cofferdams (WHT5 and WHT6), would be temporary and would be developed to minimise visual impacts for adjacent receivers where feasible and reasonable. Refer to Chapter 22 (Urban design and visual amenity) for further information.
	Design and visual amenity of the ventilation outlets.	A description of ventilation systems and facilities is provided in Chapter 5 (Project description). Consideration and assessment of urban design and visual amenity is provided in Chapter 22 (Urban design and visual amenity).
	Light pollution from compounds and work during construction.	Site lighting would be designed to minimise glare issues and light spillage into adjoining properties. Refer to Chapter 22 (Urban design and visual amenity) for further information.
	Visual impacts for residents living adjacent to construction compounds.	Hoardings and temporary noise walls would be erected to provide visual screening where appropriate. Refer to Chapter 22 (Urban design and visual amenity) for further information.
	Visual impacts of the noise attenuation sheds on adjacent residents.	Acoustic sheds would be designed to be visually recessive and to minimise potential overshadowing impacts where possible. Refer to Chapter 22 (Urban design and visual amenity) for further information.
	Permanent loss of amenity.	Potential visual amenity impacts are considered and assessed in Chapter 22 (Urban design and visual amenity).

Issue category	Issue raised	Response to issue and where addressed
	Impacts to views of Sydney Harbour, Fort Denison and the Eastern Suburbs.	Construction support sites would be temporary and would be developed to minimise visual impacts for adjacent receivers where feasible and reasonable. Refer to Chapter 22 (Urban design and visual amenity) for further information. Carradah Park is not within the proposed construction footprint of the project.
Flora and fauna (on land)	Potential impacts to fauna including the Waverton Flying Fox colony, possums, birds and echidnas.	Adaptive management strategies would be developed in consultation with the Department of Planning, Industry and Environment (Environment, Energy and Science) and/or an appropriately qualified expert in microbat biology and behaviour and implemented to minimise potential adverse impacts as required to the Eastern Bentwing-bats at Waverton. Refer to Chapter 19 (Biodiversity) and Appendix S (Biodiversity development assessment report) for further information.
	Loss of native fauna around the Cammeray Golf Course	Potential impacts to flora and fauna, including at Cammeray Golf Course, have been considered and assessed in Chapter 19 (Biodiversity) and Appendix S (Biodiversity development assessment report).
	Removal of mature/historic trees in the park and adjacent streets in St Leonards Park.	The project has limited vegetation removal wherever possible and replanting would be carried out as part of rehabilitation work. The project is working with North Sydney Council to develop a masterplan for the rehabilitation of St Leonards Park. More information on vegetation removal and potential impacts can be found in Appendix W (Technical working paper: Arboricultural impact assessment).
Flora and fauna (marine)	Damage to marine environments.	An immersed tube tunnel has been selected as the preferred tunnelling method for the Sydney Harbour crossing. The dredging methodology has been designed to minimise impacts on the marine environment and is detailed in Chapter 6 (Construction works). This includes use of appropriate environmental controls to minimise the risk of sediment and contaminants within the sediments being mobilised into the water. There are significant
	Marine damage from 'dredging' of toxic material in the harbour.	
	Objection to using Immersed Tube Tunnelling	

Issue category	Issue raised	Response to issue and where addressed
	and ‘dredging’ of the harbour floor because of impacts on marine ecology.	precedents for successful and environmentally sensitive dredging and immersed tube tunnel construction in significantly more sensitive marine environments than that found at the Sydney Harbour crossing. Furthermore, dredging of material with elevated levels of contaminants is not uncommon within Sydney Harbour – with appropriate technology and methodologies available to carry out this work in an environmentally responsible manner. Industry experts with direct experience in such work have been engaged to develop the appropriate methodology, equipment and controls. For further information refer to: • Chapter 16 (Geology, soils and groundwater) • Chapter 17 (Hydrodynamics and water quality) • Chapter 19 (Biodiversity) and Appendix T (Technical working paper: Marine ecology).
	Request to change construction methodology from Immersed Tube Tunnelling to underground tunnelling to protect ecology.	
	Marine life and sea grasses in Sydney Harbour.	
	Impacts caused by changing tidal flow and disturbance of sediments.	
Hazards and waste	Safety of adjacent residents during treatment of contaminated material at White Bay.	Dredged material unsuitable for offshore disposal would be treated at White Bay construction support site (WHT3) to be made suitable to allow transport to a suitably licensed waste disposal facility. This process is widely understood and had been applied on recent projects in Sydney Harbour, including Garden Island dredging works completed in 2010 and 2019. The 2019 project transported material unsuitable for offshore disposal to Glebe Island for initial stabilisation and haulage to a licenced landfill facility as per the methodology proposed for the Western Harbour Tunnel. Refer to Chapter 24 (Resource use and waste management) for further information.
	Asbestos contamination.	Asbestos handling and management would be carried out in accordance with relevant legislation, codes of practice and Australian standards. Potential asbestos contamination issues are considered and assessed in Chapter 16 (Geology, soils and groundwater).

Issue category	Issue raised	Response to issue and where addressed
Social amenity	Reduction in property values as the result of construction activities including noise, pollution concerns, dust, presence of tunnels underneath homes, the proximity of ventilation outlets and tunnel ramps, increased traffic and parking issues. Loss of open space would result in reduction of property prices.	Property values are driven by a range of economic, social and amenity factors, for example housing supply and demand, interest rates, economic growth, local amenity and accessibility to such things as employment and social infrastructure. It is likely that broader external factors would influence property values more than perceived or actual impacts resulting from the project. Furthermore, improvements to transport access, reduced travel times and reduced congestion on surface arterial roads delivered by the project are likely to improve liability in many areas. Refer to Chapter 21 (Socio-economics) and Appendix U (Technical working paper: Socio-economic assessment) for further information.
	Impacts to social amenity because of construction vehicles in nearby residential streets.	Construction support sites have been selected to provide direct access to the arterial road network or water transport, dedicated parking for construction workers (where possible) and would keep trucks and vehicles off local streets during construction wherever possible. Potential traffic impacts are considered and assessed in Chapter 8 (Construction Traffic and transport). Also refer to Chapter 21 (Socio-economics) for information on potential impacts on socio-economic issues.
	Impacts to access of Carradah Park and views at Woodley's boat shed.	Construction support sites would be temporary and would be developed to minimise visual impacts for adjacent receivers where feasible and reasonable. Refer to Chapter 22 (Urban design and visual amenity) for further information. Carradah Park is not within the proposed construction footprint of the project.
Cumulative impacts	Cumulative impacts from WestConnex, Sydney Metro, Bays Precinct developments and the Overseas Passenger Terminal.	Multi-party engagement and cooperation would be established prior to construction to ensure all contributors to impacts are working together to minimise adverse impacts or enhance benefits of multiple projects occurring concurrently or consecutively. Potential cumulative construction impacts are assessed and considered in Chapter 27 (Cumulative impacts). For further details, also refer to:
	Cumulative noise and dust pollution from construction activities and spoil haulage at Glebe Island and White Bay.	

Issue category	Issue raised	Response to issue and where addressed
	Cumulative traffic impacts from construction vehicles and worker parking at Glebe Island and White Bay.	• Chapter 6 (Construction work) • Traffic and transport: Chapter 8 (Construction traffic and transport) and Appendix F (Technical working paper: Traffic and transport) • Noise and vibration: Chapter 10 (Construction noise and vibration) and Appendix G (Technical working paper: Noise and vibration) • Air quality: Chapter 12 (Air quality) and Appendix H (Technical working paper: Air quality) • Human health: Chapter 13 (Human health) and Appendix I (Technical working paper: Health impact assessment) • Chapter 19 (Biodiversity) • Chapter 21 (Socio-economics). The WestConnex program of works has been considered in the operational modelling scenarios for the environmental impact assessment.
	Cumulative construction traffic impacts as the result of multiple projects active in the area.	
	Potential for construction fatigue as a result of ongoing construction activities.	Cumulative impacts are considered in Chapter 27 Cumulative impacts, construction fatigue is considered in Section 7.5 of this chapter.
	Cumulative impacts on traffic from Metro construction.	The project team would work closely with the Metro project team to manage and minimise any potential cumulative traffic impacts. Assessment of potential construction traffic impacts is provided in Chapter 8 (Construction traffic and transport) and Appendix F (Technical working paper: Traffic and transport). Cumulative impacts are considered in Chapter 27 Cumulative impacts.
Heritage	Impacts to the heritage listed brick tower.	There would be no direct impacts to the North Sydney Sewer Vent. For further information on potential heritage impacts refer to Chapter 14 (Non-Aboriginal heritage) and Chapter 16 (Geology, soils and groundwater).

Issue category	Issue raised	Response to issue and where addressed
Health	General concerns about health as the result of air quality.	During construction, the priority would be to ensure public health and safety. Potential air quality impacts would be managed through Construction Air Quality Management Plans, which would include dust suppression measures, selection of construction equipment and/or materials handling techniques that minimise dust generation, minimisation of exposed areas during construction and monitoring activities. Emissions from plant and equipment would be minor and localised. Assessment of construction and operational air quality impacts is provided in Chapter 12 (Air quality) and Appendix H (Technical working paper: Air quality). Potential impacts to health are addressed in Chapter 13 (Human health risk).
	Potential adverse impacts to health as the result of existing medical conditions like asthma and allergies.	
	Environmental and health concerns and risks around contaminated harbour spoil.	An immersed tube tunnel has been selected as the preferred tunnelling method for the Sydney Harbour crossing. The dredging methodology has been designed to minimise impacts on the marine environment and is detailed in Chapter 6 (Construction works). This includes use of appropriate environmental controls to minimise the risk of sediment and contaminants within the sediments being mobilised into the water. There are significant precedents for successful and environmentally sensitive dredging and immersed tube tunnel construction in significantly more sensitive marine environments than that found at the Sydney Harbour crossing. Furthermore, dredging of material with elevated levels of contaminants is not uncommon within Sydney Harbour – with appropriate technology and methodologies available to carry out this work in an environmentally responsible manner. Industry experts with direct experience in such work have been engaged to develop the appropriate methodology, equipment and controls. For further information refer to: • Chapter 16 (Geology, soils and groundwater) • Chapter 17 (Hydrodynamics and water quality) • Chapter 19 (Biodiversity) and Appendix T (Technical working paper: Marine ecology).

Issue category	Issue raised	Response to issue and where addressed
	Potential impacts to health of stakeholder using sporting facilities adjacent to construction support sites.	A comprehensive and robust environmental assessment has been carried out for the project which assesses the potential risks to health and safety as a result of the project. Assessment of construction and operational air quality impacts is provided in Chapter 12 (Air quality) and Appendix H (Technical working paper: Air quality). Potential impacts to health are addressed in Chapter 13 (Human health risk).
	Potential increases in population, and associated issues, in the Northern Beaches due to increased access due to the Western Harbour Tunnel.	The potential social and economic impacts of the project are considered and assessed in Chapter 21 (Socio-economics). Also refer to Chapter 9 (Operational traffic and transport) and Chapter 13 (Human health risk).
Surface water	Requested more information about the impacts of the Warringah Freeway redesign on water treatment at Cammeray Golf Course.	Refer to Chapter 17 (Hydrodynamics and water quality) for details on Cammeray Golf Course stormwater storage dam, and Cammeray Golf Course wastewater treatment plant. Transport for NSW is currently in negotiations with Cammeray Golf Course as to the future location of the water storage facility.

7.4 Summary of project refinements in response to feedback

A summary of how community and stakeholder feedback has been incorporated into the project is provided in Table 7-9 and Table 7-10 below.

Table 7-9 2017 design – considerations in response to feedback

Stakeholder and community feedback	Response
Ventilation outlets should be located to minimise community concerns, environmental and property impact.	Permanent ventilation outlets would be placed in the Warringah Freeway corridor allowing the motorway facilities for Western Harbour Tunnel and Beaches Link to be co-located, simplifying long-term operational and maintenance activities and allowing for design synergies and reduced property impact. The air quality assessment has demonstrated that operation of the ventilation outlets of the Western Harbour Tunnel would have a negligible impact on existing ambient pollutant concentrations and would pose a very low risk to human health.
The project at North Sydney should integrate with other major programs, like Sydney Metro, and other government initiatives such as the Sydney Harbour Bridge northern access ramp.	The North Sydney Precinct Transport Program has been established by Transport for NSW to provide a framework for integration across all transport programs in the North Sydney precinct.
Council and community concerns about the impact on the Coal Loader Wharf.	The mainline tunnels have been located so as to avoid impacts to the Coal Loader Wharf. No change to the Coal Loader Wharf is proposed as part of this project.
Council, community and interest groups concerns about impact on St Leonards Park.	Construction at St Leonards Park would be temporary. There would be limited impact on the bowling club or netball courts. The construction support site has been located to enable access from the freeway, rather than the local road network for spoil haulage. The park would be reinstated upon construction completion. Kerb and footpath adjustment works would occur on Miller Street southbound around the intersection with Falcon Street. These works would provide a new dedicated lane for left turning traffic from Falcon Street westbound to Miller Street southbound. Further review of the impacts in this area is currently being carried out and permanent impacts to St Leonards Park would be minimised or, where possible eliminated.
Do not use Birchgrove Oval for construction purposes.	There is no proposal to use Birchgrove Oval to support the construction of the project.

Stakeholder and community feedback	Response
Options for alternative construction methodologies, construction support sites, and routes to minimise the project impact.	The current construction methodologies proposed for the project have been developed in conjunction with a team of national and international experts with direct experience in the design and construction of major infrastructure within urban environments. These methods have considered the following key factors: • Ability to deliver the required project scope and connectivity • Minimise environmental impacts • Minimise impacts to communities • Ensure safety for construction workers and the public • Minimise the time and cost risks associated with construction • Maximise value for money • Maximise efficiency of construction and future operations of the asset to minimise energy use and operational costs. Construction support sites have been located so as to minimise: • The number of private properties impacted • Haulage through local streets – the majority of construction support sites have direct access to the motorway, the arterial road network, or the harbour for transport via water • Impacts to the environment • Impacts to heritage items • Impacts to the functionality of open space. Refer to Chapter 4 (Project development and alternatives) and Chapter 6 (Construction work) for further information.
Northern Toll Plaza Removal REF submissions: • Request to remove the bus lane cross over that is permitted under the new southbound tolling gantry as it causes delays • Request not to remove the crossover point as it would make access to the main deck of the Sydney Harbour Bridge more difficult.	The proposed Warringah Freeway Upgrade component design would remove the need for merging between buses and general traffic on the Warringah Freeway between Miller Street and the Sydney Harbour Bridge by changing the location of the bus lane and through physical separation of lanes.
Keep heavy construction traffic off the streets of Balmain and Birchgrove.	Tunnel spoil from the construction support site at Yurulbin Park Birchgrove is proposed to be barged from the construction support site to White Bay. The Victoria Road construction support site (WHT2) provides direct access to and from an arterial road. This would eliminate tunnel spoil haulage on local roads through Birchgrove and Balmain.

Stakeholder and community feedback	Response
Concern regarding proximity to schools in the Cammeray and North Sydney area, in particular in relation to ventilation outlets.	The design of the ventilation systems, including ventilation outlet locations, has been carefully developed to make sure they operate efficiently and there would be minimal changes to local air quality. The air quality assessment has demonstrated that the emissions from the ventilation outlets of the Western Harbour Tunnel have a negligible impact on existing ambient pollutant concentrations and would pose a very low risk to human health. Operation of these facilities would be carried out in accordance with strict guidelines and would be monitored closely by the relevant authorities. Refer to Chapter 12 (Air quality), Appendix H (Technical working paper: Air quality), Chapter 13 (Human health), Appendix I (Technical working paper: Health impact assessment), Chapter 10 (Construction noise and vibration) and Appendix G (Technical working paper: Noise and vibration) for details on construction management measures.
Perception that ventilation outlet is to be located in St Leonards Park	The ventilation outlet is not located in St Leonards Park – it is proposed to be located just north of Ernest Street within the Warringah Freeway road corridor.
Minimise the impact on St Leonards Park and ANZAC Park.	Construction at ANZAC Park would be required to augment the existing drainage network in the vicinity of the park to reduce flooding risk in this area. Construction would be temporary, and there would be no permanent impacts. Construction at St Leonards Park would be temporary. The Ridge Street north construction support site (WHT9) has been located to enable heavy vehicle access primarily from the Warringah Freeway, rather than the local road network. Kerb and footpath adjustment works would occur on Miller Street southbound around the intersection with Falcon Street. These works would provide a new dedicated lane for left turning traffic from Falcon Street westbound to Miller Street southbound. Further review of the impacts in this area is currently being carried out and permanent impacts to St Leonards Park would be minimised or, where possible eliminated.
Concerns about air quality and the proposed location of a ventilation outlet in Rozelle.	The proposed ventilation outlet is located at the Rozelle Interchange, the civil construction of which was approved as part of the M4-M5 Link. Air quality has been assessed as part of the M4-M5 Link environmental impact statement and is also being addressed in Chapter 12 (Air quality). No additional outlets are proposed for the project in Rozelle.
Desire for improved active transport connections.	There are a number of active transport upgrades and improvements proposed as part of the project. These include: • A new shared user path along the southern side of the

Stakeholder and community feedback	Response
	High Street bridge at North Sydney • Signalised pedestrian crossings at the intersection of High Street and Alfred Street North at North Sydney • Replacement and upgrade of the existing Ridge Street shared user bridge at North Sydney/Neutral Bay with a wider, dedicated pedestrian footpath and bicycle lanes • A new shared user bridge to the north of Ernest Street at Cammeray, to connect the Cammeray Golf Course site with ANZAC Park • Upgraded pedestrian crossings at the Falcon Street on and off ramps, at North Sydney/Cammeray/Neutral Bay • Replacement of the Falcon Street shared user bridge • Removal of the existing pedestrian underpass beneath Falcon Street at Cammeray • Provision of a new pedestrian footpath along the median through the centre of the Falcon Street interchange upgrade • A new dedicated bicycle path along the eastern side of the Warringah Freeway between Miller Street at Cammeray and Ernest Street. Further detail is provided in Chapter 5 (Project description).

Table 7-10 2018 further developed design – considerations in response to feedback

Stakeholder and community feedback	Response
Retain the Ernest Street ramps at Cammeray.	Ernest Street ramps would be retained at Cammeray. Functionality would change in that access would be facilitated to and from the Sydney Harbour Tunnel instead of the Harbour Bridge.
Reduce the impacts at Warringah Freeway as the result of the proposed night work.	Work would be carried out in stages to maximise the amount of construction work carried out during standard construction hours. Further detail is provided in Chapter 6 (Construction work) and Chapter 10 (Construction noise and vibration). If the project is approved, Transport for NSW would work closely with the project's contractor to further reduce the potential impacts, based on the construction staging methodology.

7.5 Future engagement

A comprehensive Community consultation framework (Appendix E) has been prepared to guide the planning and delivery of communication and stakeholder engagement activities across the project.

The objective of ongoing communication and stakeholder engagement program for the project, guided by the Community consultation framework, is to provide the community with:

- Accurate and accessible information about the processes and activities associated with the project
- Information in a timely manner
- Appropriate avenues for providing comment or raising concerns, and to ensure the community is aware of the avenues
- A high level of responsiveness to community feedback and concerns throughout development and delivery of the project.

The Community consultation framework informs the delivery of the communication and stakeholder engagement in line with the requirements of the Secretary's environmental assessment requirements. The framework addresses key issues of concern to the community, including:

- Enquiries and complaints handling procedures
- Monitoring, reporting and evaluation procedures
- Mechanisms for distributing information and seeking feedback
- Specific issues management including:
    - Traffic management (including property access and pedestrian access)
    - Landscaping and urban design
    - Construction activities including out of hours work
    - Noise and vibration mitigation and management.

7.5.1 Submissions Report

Following exhibition of this environmental impact statement, the Secretary would provide copies of submissions from the community and stakeholders to Transport for NSW as the project proponent. Transport for NSW would then prepare a submissions report to respond to the feedback received in submissions. The Secretary may also require Transport for NSW to prepare a preferred infrastructure report to outline any proposed changes to the project. This report may be made publicly available if significant changes to the project are proposed.

The Secretary would prepare an environmental assessment report and provide it to the Minister for Planning, who would then decide whether to approve the project and, if approved, identify a set of conditions or approval for Transport for NSW to adhere to during construction and operation of the project.

Community involvement would continue as part of the project's construction, should the project be approved. A construction contractor would be engaged to carry out detailed design and construction. Together with the proponent, the construction contractor would be responsible for communication and engagement and a detailed communications and engagement strategy would be developed and implemented. This would be based on the framework provided in Appendix E (Community consultation framework).

Community liaison would also continue during the operation phase of the project. A communication plan would be developed to support maintenance and operations of the motorway as a key part of the operational environmental management plan framework.

7.5.2 Managing consultation fatigue

The extent and impacts of consultation fatigue would be assessed by:

- Identifying potentially impacted stakeholders and community members by both previous/current projects (including the M4-M5 Link) and the project
- Analysing the type, extent and timing of consultation – for other projects and the project – that has been/would be received by these community members
- Determining whether consultation for the project is likely to result in overload or disinterest for community members.

The community relations team would build a working relationship with the project teams for other major projects in the area to identify those persons or organisations who may be susceptible to consultation fatigue.

The project team would work to develop an integrated approach to contacting persons or organisations which may experience consultation fatigue, and would determine which communication mechanisms stakeholders prefer.

7.5.3 Managing construction fatigue

The extent and impact of construction fatigue would be assessed by:

- Identifying where the project would have sustained impacts to stakeholders or community members
- Identifying whether the project would result in similar or overlapping impacts with other projects, to the same stakeholders or community members
- Analysing whether the project would increase the magnitude and intensity of overlapping impacts on any stakeholders or community members
- Analysing the extension of duration of impacts for stakeholders or community members.

A preliminary assessment was completed to identify areas where the project would potentially have sustained impacts to stakeholders or community members who may be susceptible to construction fatigue. Project activities which could lead to construction fatigue, potentially impacted groups, and a summary of management measures proposed to address these issues is provided in Chapter 21 (Socio-economics).

During construction of the project, the community relations team would build a working relationship with the project teams for other major projects to identify stakeholders or community members who may be susceptible to construction fatigue. The project team would ensure the expectations of these stakeholders or community members are managed for the project.

The management measures for the project would be aligned with the M4-M5 Link project management measures. The potential for construction fatigue would be taken into account when finalising the management measures for the project, and the project team would ensure the timely implementation of these measures.

7.5.4 Managing complaint fatigue

The extent and impact of complaint fatigue would be assessed by:

- Identifying regular complainants from previous and current projects close to the construction support sites
- Analysing the cause and solution to each complaint

- Determining whether the project would result in similar or overlapping impacts with other projects, which are likely to result in a complaint.

A complaints management system would be implemented for the duration of construction. This would include the recording of complaints and how the complaint has been addressed (within a complaints register). Complainants would be contacted within 24 hours to follow up and respond to their complaint. A Community Complaints Commissioner (an independent specialist) would oversee the system and follow up on any complaint where the public is not satisfied with the response.

The community relations team would build a working relationship with the project teams for other major projects which would be under construction at the same time as the project to identify stakeholders and community members who may be susceptible to complaint fatigue.

Transport for NSW would ensure a number of different complaint mechanisms are provided to cater to different needs and preferences. Complaint management tools for the project are outlined in Appendix E (Community consultation framework).

7.5.5 Interface management

The project's Communication and Stakeholder Engagement team would work closely with its counterparts in different divisions and adjacent projects. This is to ensure the various State Government projects are releasing and/or consulting on projects in collaboration with each other and to reduce consultation and construction fatigue in local communities.

At present there are two formal groups consisting of members from other projects, as summarised in Table 7-11, which meet regularly to manage potential cumulative impacts. Additional coordination groups would be developed as required and Transport for NSW would continue to work closely with its internal departments.

Table 7-11 Interface groups

Group	Description
The Bays West Communications Group	Communication and stakeholder engagement leads from various projects and agencies which have an interface with the "Bays Precinct". This includes any project on the water or foreshores either side of Anzac Bridge. Attendance at meetings varies depending on the work and activities being carried out at the time and includes: • Infrastructure NSW • Transport for NSW Rozelle Interchange • West Metro • Transport for NSW • NSW Ports Authority.
Intergovernmental Working Group – Northern Beaches/Mosman	Engagement leads from agencies which have an interface around the Northern Beaches/Mosman precinct. Attendance at meetings varies depending on the work and activities being carried out at the time and includes: • Mosman Council • Northern Beaches Council • Manly MP office • Pittwater MP office • Northern Beaches Council • Transport for NSW.

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