

5 Project description

This chapter describes the M4-M5 Link project (the project), including the project tunnels, interchanges and associated infrastructure, and ancillary facilities. It also describes the design standards and construction activities required to deliver the project.

The Secretary of the NSW Department of Planning and Environment (DP&E) has issued environmental assessment requirements for the project. These are referred to as the Secretary's Environmental Assessment Requirements (SEARs). **Table 5-1** sets out certain SEARs alongside the desired performance outcomes of the project, and identifies where the requirements have been addressed in this environmental impact statement (EIS).

Table 5-1 SEARs – project description

Desired Performance Outcome	SEARs	Where addressed in the EIS
<p>2. Environmental Impact Statement</p> <p>The project is described in sufficient detail to enable a clear understanding that the project has been developed through an iterative process of impact identification and assessment and project refinement to avoid, minimise or offset impacts so that the project, on balance, has the least adverse environmental, social and economic impact, including its cumulative impacts.</p>	<p>1. The EIS must include, but not necessarily be limited to, the following: (b) a description of the project and all components and activities (including ancillary components and activities) required to construct and operate it, including:</p>	
	<p>The proposed route</p> <p>Design of the tunnels, interchanges (inclusive of tunnel portals and entry and exit ramps), and connections to Stage 1 and Stage 2 of WestConnex and other proposals (such as the Western Harbour Tunnel) and road user, pedestrian and cyclist facilities, and lighting</p>	<p>The proposed route is described in section 5.3.1 for the mainline tunnels, section 5.3.2 for the Rozelle interchange and Iron Cove Link tunnels, in section 5.6 for the Rozelle surface works and section 5.7 for the Iron Cove Link surface works.</p> <p>The design of the tunnels is described in section 5.3.1 for the mainline tunnels, section 5.3.2 for the Rozelle interchange and Iron Cove Link tunnels, in section 5.6 for the Rozelle surface works and section 5.7 for the Iron Cove Link surface works.</p> <p>The design of the Rozelle interchange is described in section 5.5.</p> <p>Civil construction of tunnels and entry and exit ramps to enable connections to the proposed future Western Harbour Tunnel and Beaches Link project is outlined in section 5.3.4.</p> <p>Integration with other WestConnex projects is described in section 5.4. Pedestrian and cyclist facilities are described throughout section 5.6 for the Rozelle interchange and in section 5.7.4 for the Iron Cove Link.</p> <p>Lighting, roadside furniture and</p>

Desired Performance Outcome	SEARs	Where addressed in the EIS
		<p>signage for the project is described in section 5.8.9.</p> <p>A description of the iterative process of impact identification and assessment and project refinement relating to the construction of the project is included in Chapter 4 (Project development and alternatives).</p>
	<p>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</p>	<p>Surface road upgrade works are described in section 5.6 for the Rozelle surface works and section 5.7 for the Iron Cove Link surface works.</p> <p>Property access is discussed in section 5.11 and Chapter 12 (Land use and property).</p> <p>Pedestrian and cyclist facilities are described throughout section 5.6 for the Rozelle interchange and in section 5.7.4 for the Iron Cove Link.</p> <p>Changes to bus infrastructure are described in section 5.6.8 for the Rozelle interchange and in section 5.7.6 for the Iron Cove Link.</p>
	<p>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 and ventilation infrastructure) for the M4 East, M5 Motorway and future Western Harbour Tunnel</p>	<p>Ventilation systems and facilities are described in section 5.8.2.</p> <p>Fire and life safety systems are discussed in section 5.8.3.</p> <p>Traffic monitoring and management systems are described in section 5.8.6.</p> <p>Air quality monitoring and management systems are described in section 5.8.7.</p> <p>Motorway tolling infrastructure is described in section 5.8.8.</p> <p>Integration with other WestConnex projects is outlined in section 5.4.</p>
	<p>Location and operational requirements of construction ancillary facilities and access</p>	<p>Location and operational requirements of construction ancillary facilities and access are described in Chapter 6 (Construction work).</p>
	<p>Land use changes as a result of the proposal and the acquisition of</p>	<p>Land use changes and property acquisition are discussed in</p>

Desired Performance Outcome	SEARs	Where addressed in the EIS
	privately owned, Council and Crown lands, and impacts to Council and Crown lands	section 5.11 and Chapter 12 (Land use and property).
	The relationship and/or integration of the project with existing public and freight transport services	The relationship and/or integration of the project with existing public and freight transport services is discussed in Chapter 3 (Strategic context and project need) and Chapter 8 (Traffic and transport).

This chapter describes the key elements of the project, based on the concept design. The concept design defines a constructible concept that provides:

- A definition of property acquisition requirements sufficient to allow construction to proceed
- A general project footprint, including for construction and operation
- A clear description of the design principles, extent of impacts and impact management requirements
- A sound and clear basis for later development of the detailed design to a standard required to support project delivery.

The concept design would continue to be refined where relevant to improve road network and safety performance, minimise impacts on receivers and the environment, and in response to feedback from stakeholders.

5.1 The project

The project would comprise a new multi-lane road link between the M4 East Motorway at Haberfield and the New M5 Motorway at St Peters. The project would also include an interchange at Lilyfield and Rozelle (the Rozelle interchange) and a tunnel connection between Anzac Bridge and Victoria Road, east of Iron Cove Bridge (Iron Cove Link). In addition, construction of tunnels, ramps and associated infrastructure to provide connections to the proposed future Western Harbour Tunnel and Beaches Link project would be carried out at the Rozelle interchange.

Together with the other components of the WestConnex program of works and the proposed future Sydney Gateway, the project would facilitate improved connections between western Sydney, Sydney Airport and Port Botany and south and south-western Sydney, as well as better connectivity between the important economic centres along Sydney's Global Economic Corridor and local communities.

The M4-M5 Link is part of the WestConnex program of works. Separate planning applications and assessments have been completed for each of the approved WestConnex projects. Roads and Maritime has commissioned Sydney Motorway Corporation (SMC) to deliver WestConnex, on behalf of the NSW Government. However, Roads and Maritime is the proponent for the project.

In addition to linking to other WestConnex projects, the M4-M5 Link would provide connections to the proposed future Western Harbour Tunnel and Beaches Link, the Sydney Gateway (via the St Peters interchange) and the F6 Extension (via the New M5).

The WestConnex program of works, as well as related projects, are described in **Table 5-2**.

Table 5-2 WestConnex component projects

Project	Description	Status
WestConnex program of works		
M4 Widening	Widening of the existing M4 Motorway from Parramatta to Homebush.	Planning approval under the <i>Environmental Planning and Assessment Act 1979</i> (NSW) (EP&A Act) granted on 21 December 2014. Open to traffic.
M4 East	Extension of the M4 Motorway in tunnels between Homebush and Haberfield via Concord. Includes provision for a future connection to the M4-M5 Link at the Wattle Street interchange.	Planning approval under the EP&A Act granted on 11 February 2016. Under construction.
King Georges Road Interchange Upgrade	Upgrade of the King Georges Road interchange between the M5 West and the M5 East at Beverly Hills, in preparation for the New M5 project.	Planning approval under the EP&A Act granted on 3 March 2015. Open to traffic.
New M5	Duplication of the M5 East from King Georges Road in Beverly Hills with tunnels from Kingsgrove to a new interchange at St Peters. The St Peters interchange allows for connections to the proposed future Sydney Gateway project and an underground connection to the M4-M5 Link. The New M5 tunnels also include provision for a future connection to the proposed future F6 Extension.	Planning approval under the EP&A Act granted on 20 April 2016. Commonwealth approval under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth) granted on 11 July 2016. Under construction.
M4-M5 Link (the project)	Tunnels connecting to the M4 East at Haberfield (via the Wattle Street interchange) and the New M5 at St Peters (via the St Peters interchange), a new interchange at Rozelle and a link to Victoria Road (the Iron Cove Link). The Rozelle interchange also includes ramps and tunnels for connections to the proposed future Western Harbour Tunnel and Beaches Link project.	The subject of this EIS.
Related projects		
Sydney Gateway	A high-capacity connection between the new St Peters interchange (under construction as part of the New M5 project) and the Sydney Airport and Port Botany precinct.	Planning underway by Roads and Maritime and subject to separate environmental assessment and approval.
Western Harbour Tunnel and Beaches Link	The Western Harbour Tunnel component would connect to the M4-M5 Link at the Rozelle interchange, cross underneath Sydney Harbour between the Birchgrove and Waverton areas, and connect with the Warringah Freeway at North Sydney. The Beaches Link component would comprise a tunnel that would connect to the Warringah Freeway, cross underneath Middle Harbour and connect with the Burnt Bridge Creek Deviation at Balgowlah and Wakehurst Parkway at Seaforth. It would also involve the duplication of the Wakehurst Parkway between Seaforth and Frenchs Forest.	Planning underway by Roads and Maritime and subject to separate environmental assessment and approval.

Project	Description	Status
F6 Extension	A proposed motorway link between the New M5 at Arncliffe and the existing M1 Princes Highway at Loftus, generally along the alignment known as the F6 corridor.	Planning underway by Roads and Maritime and subject to separate environmental assessment and approval.

5.1.1 The completed project

An overview of the completed project is shown in **Figure 5-1**. More detailed illustrations of completed project components are provided in **Figure 5-2** to **Figure 5-9** with corresponding descriptions provided in the following sections.

Key components of the project would include:

- Twin mainline motorway tunnels between the M4 East at Haberfield and the New M5 at St Peters. Each tunnel would be around 7.5 kilometres long and sized to accommodate up to four lanes of traffic in each direction
- Connections of the mainline tunnels to the M4 East project, comprising:
 - A tunnel-to-tunnel connection to the M4 East mainline stub tunnels east of Parramatta Road near Alt Street at Haberfield
 - Entry and exit ramp connections between the mainline tunnels and the Wattle Street interchange at Haberfield (which is currently being constructed as part of the M4 East project)
 - Minor physical integration works with the surface road network at the Wattle Street interchange including road pavement and line marking
- Connections of the mainline tunnels to the New M5 project, comprising:
 - A tunnel-to-tunnel connection to the New M5 mainline stub tunnels north of the Princes Highway, near the intersection of Mary Street and Bakers Lane at St Peters
 - Entry and exit ramp connections between the mainline tunnels and the St Peters interchange at St Peters (which is currently being constructed as part of the New M5 project)
 - Minor physical integration works with the surface road network at the St Peters interchange including road pavement and linemarking
- An underground interchange at Leichhardt and Annandale (the Inner West subsurface interchange) that would link the mainline tunnels with the Rozelle interchange and the Iron Cove Link (see below)
- A new interchange at Lilyfield and Rozelle (the Rozelle interchange) that would connect the M4-M5 Link mainline tunnels with:
 - City West Link
 - Anzac Bridge
 - The Iron Cove Link (see below)
 - The proposed future Western Harbour Tunnel and Beaches Link
- Construction of connections to the proposed future Western Harbour Tunnel and Beaches Link project as part of the Rozelle interchange, including:
 - Tunnels that would allow for underground mainline connections between the M4 East and New M5 motorways and the proposed future Western Harbour Tunnel and Beaches Link (via the M4-M5 Link mainline tunnels)
 - A dive structure and tunnel portals within the Rozelle Rail Yards, north of the City West Link/The Crescent intersection

- Entry and exit ramps that would extend north underground from the tunnel portals in the Rozelle Rail Yards to join the mainline connections to the proposed future Western Harbour Tunnel and Beaches Link
- A ventilation outlet and ancillary facilities as part of the Rozelle ventilation facility (see below)
- Twin tunnels that would connect Victoria Road near the eastern abutment of Iron Cove Bridge and Anzac Bridge (the Iron Cove Link). Underground entry and exit ramps would also provide a tunnel connection between the Iron Cove Link and the New M5/St Peters interchange (via the M4-M5 Link mainline tunnels)
- The Rozelle surface works, including:
 - Realigning The Crescent at Annandale, including a new bridge over Whites Creek and modifications to the intersection with City West Link
 - A new intersection on City West Link around 300 metres west of the realigned position of The Crescent, which would provide a connection to and from the New M5/St Peters interchange (via the M4-M5 Link mainline tunnels)
 - Widening and improvement works to the channel and bank of Whites Creek between the light rail bridge and Rozelle Bay at Annandale, to manage flooding and drainage for the surface road network
 - Reconstructing the intersection of The Crescent and Victoria Road at Rozelle, including construction of a new bridge at Victoria Road
 - New and upgraded pedestrian and cyclist infrastructure
 - Landscaping, including the provision of new open space within the Rozelle Rail Yards
- The Iron Cove Link surface works, including:
 - Dive structures and tunnel portals between the westbound and eastbound Victoria Road carriageways, to connect Victoria Road east of Iron Cove Bridge with the Iron Cove Link
 - Realignment of the westbound (southern) carriageway of Victoria Road between Springside Street and the eastern abutment of Iron Cove Bridge
 - Modifications to the existing intersections between Victoria Road and Terry, Clubb, Toelle and Callan streets
 - Landscaping and the establishment of pedestrian and cyclist infrastructure
- Five motorway operations complexes; one at Leichhardt (MOC1), three at Rozelle (Rozelle West (MOC2), Rozelle East (MOC3) and Iron Cove Link (MOC4) and one at St Peters (MOC5). The types of facilities that would be contained within the motorway operations complexes would include substations, water treatment plants, ventilation facilities, offices, on-site storage and parking for employees
- Tunnel ventilation systems, including ventilation supply and exhaust facilities, axial fans, ventilation outlets and ventilation tunnels
- Three new ventilation facilities, including:
 - The Rozelle ventilation facility at Rozelle
 - The Iron Cove Link ventilation facility at Rozelle
 - The Campbell Road ventilation facility at St Peters
- Fitout (mechanical and electrical) of part of the Parramatta Road ventilation facility at Haberfield (which is currently being constructed as part of the M4 East project) for use by the M4-M5 Link project

- Drainage infrastructure to collect surface and groundwater for treatment at dedicated facilities. Water treatment would occur at:
 - Two operational water treatment facilities (at Leichhardt and Rozelle)
 - The constructed wetland within the Rozelle Rail Yards
 - A bioretention facility for stormwater runoff within the informal car park within King George Park at Rozelle (adjacent to Manning Street). A section of the existing informal car park would also be upgraded, including sealing the car park surface and landscaping. Treated water would flow back to existing watercourses via new, upgraded and existing infrastructure
- Ancillary infrastructure and operational facilities for electronic tolling and traffic control and signage (including electronic signage)
- Emergency access and evacuation facilities, including pedestrian and vehicular cross and long passages and fire and life safety systems
- Utility works including protection and/or adjustment of existing utilities, removal of redundant utilities and installation of new utilities. A Utilities Management Strategy has been prepared for the project that identifies management options for utilities, including relocation or adjustment (**Appendix F** (Utilities Management Strategy)) of the EIS as discussed in **section 5.10**.

The project does not include:

- Site management works at the Rozelle Rail Yards. These works were separately assessed and determined by Roads and Maritime through a review of environmental factors under Part 5 of the EP&A Act (refer to **Chapter 2** (Assessment process))
- Ongoing motorway maintenance activities during operation
- Operation of the components of the Rozelle interchange which are the tunnels, ramps and associated infrastructure being constructed to provide connections to the proposed future Western Harbour Tunnel and Beaches Link project.

5.1.2 Project footprint

The project footprint would include the land above and below ground required to construct the project, as well as for temporary ancillary construction facilities, and the land required above and below ground to accommodate permanent infrastructure and areas of new public open space. An overview of the area required for construction is provided in **Chapter 6** (Construction work). The land required for permanent operational infrastructure is shown in **Figure 5-1** and shown in detail in **Figure 5-2** to **Figure 5-9**.

5.1.3 Staged construction and opening of the project

It is anticipated the project would be constructed and opened to traffic in two stages (as shown in **Figure 5-1**).

Stage 1 would include:

- Construction of the mainline tunnels between the M4 East at Haberfield and the New M5 at St Peters, stub tunnels to the Rozelle interchange (at the Inner West subsurface interchange) and ancillary infrastructure at the Darley Road motorway operations complex (MOC1) and Campbell Road motorway operations complex (MOC5)
- These works are anticipated to commence in 2018 with the mainline tunnels open to traffic in 2022. At the completion of Stage 1, the mainline tunnels would operate with two traffic lanes in each direction. This would increase to generally four lanes at the completion of Stage 2, when the full project is operational.

Stage 2 would include:

- Construction of the Rozelle interchange and Iron Cove Link including:
 - Connections to the stub tunnels at the Inner West subsurface interchange (built during Stage 1)
 - Ancillary infrastructure at the Rozelle West motorway operations complex (MOC2), Rozelle East motorway operations complex (MOC3) and Iron Cove Link motorway operations complex (MOC4)
 - Connections to the surface road network at Lilyfield and Rozelle
 - Construction of tunnels, ramps and associated infrastructure as part of the Rozelle interchange to provide connections to the proposed future Western Harbour Tunnel and Beaches Link project
- Stage 2 works are expected to commence in 2019 with these components of the project open to traffic in 2023.

The total construction period for both stages of the project is expected to be around five years, which includes commissioning that would occur concurrently with the final stages of construction. Further staging details would be confirmed when construction contractors have been engaged.

The potential benefits of a staged opening of the project are detailed in **Chapter 4** (Project development and alternatives). A more detailed description of how the project would be constructed in stages is provided in **Chapter 6** (Construction work). An assessment of the traffic and transport impacts of opening the project in stages is included in **Chapter 8** (Traffic and transport).

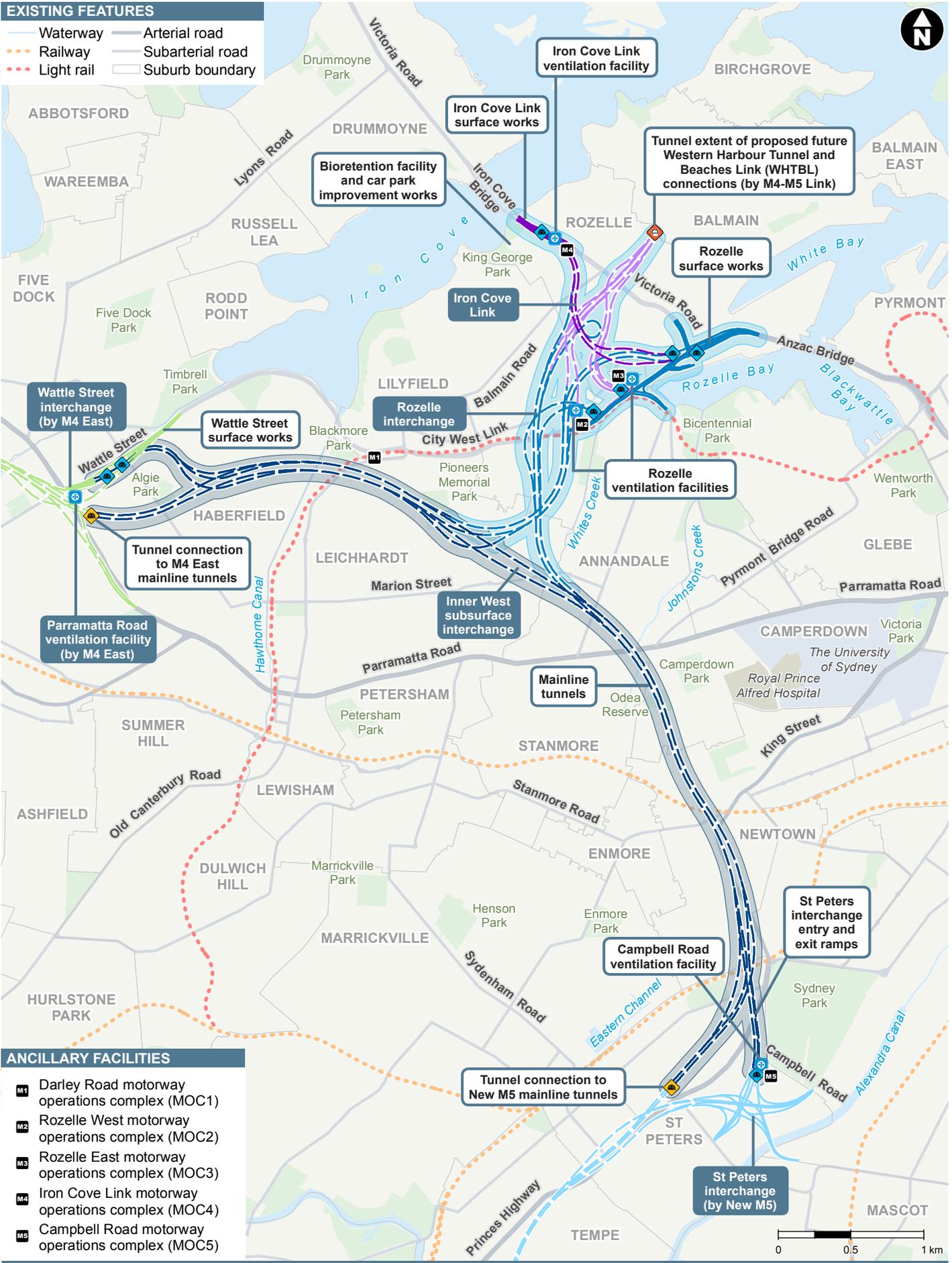
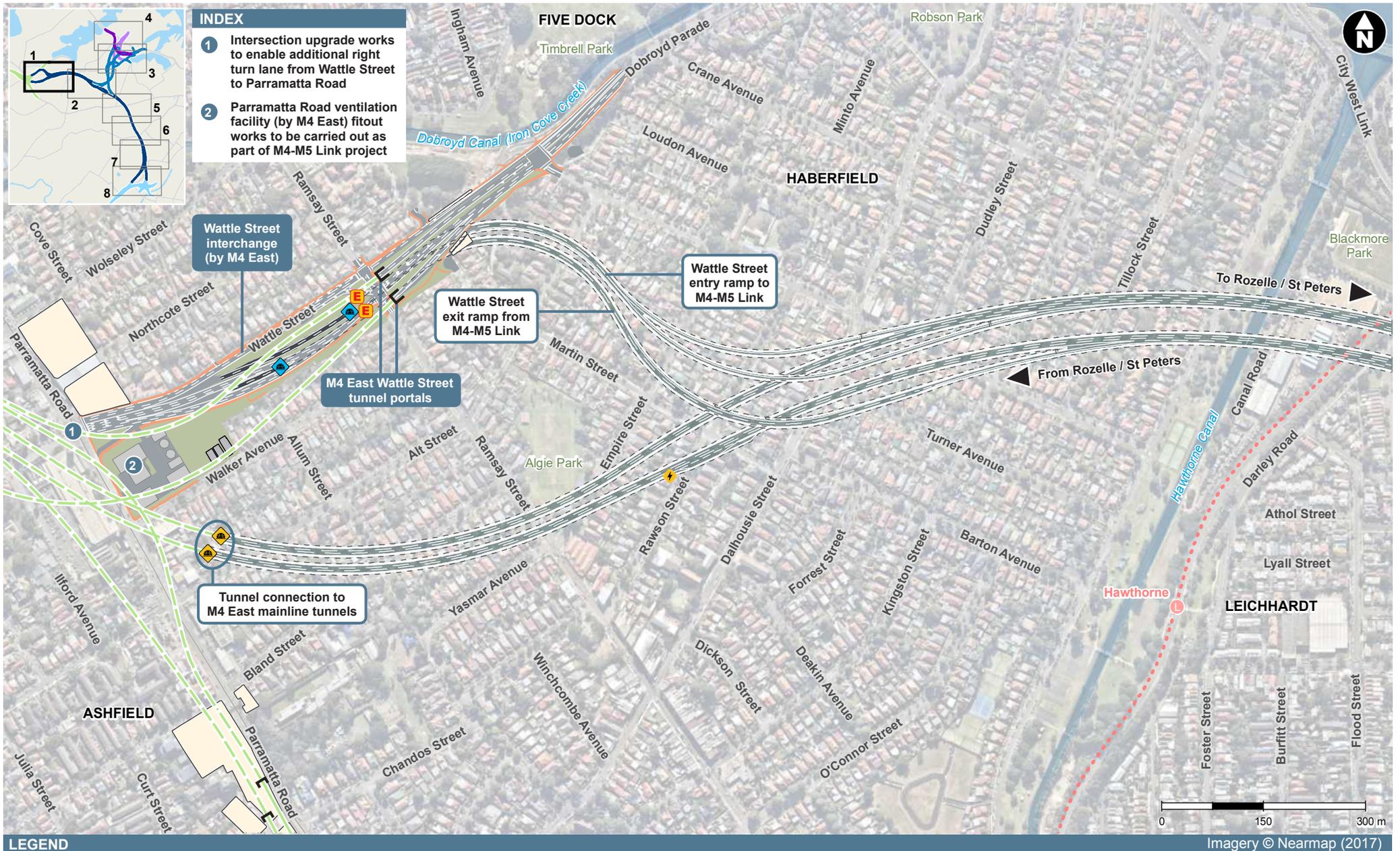


Figure 5-1 Overview of the project



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- 1 Intersection upgrade works to enable additional right turn lane from Wattle Street to Parramatta Road
- 2 Parramatta Road ventilation facility (by M4 East) fitout works to be carried out as part of M4-M5 Link project

LEGEND

Existing features M4 East	M4-M5 Link tunnels	M4-M5 Link surface works	Project features	Ancillary facility
<ul style="list-style-type: none"> --- Light rail ● Light rail stop --- Surface road --- Tunnel --- Surface roads --- Shared path 	<ul style="list-style-type: none"> --- Land subject to M4 East UDLP --- Land subject to M4 East RLMP --- Ventilation facility 	<ul style="list-style-type: none"> --- Mainline tunnel --- Surface road (civil finishing works) 	<ul style="list-style-type: none"> ■ Indicative toll location ◆ Tunnel portal ◆ Tunnel connection 	<ul style="list-style-type: none"> ◆ Underground substation

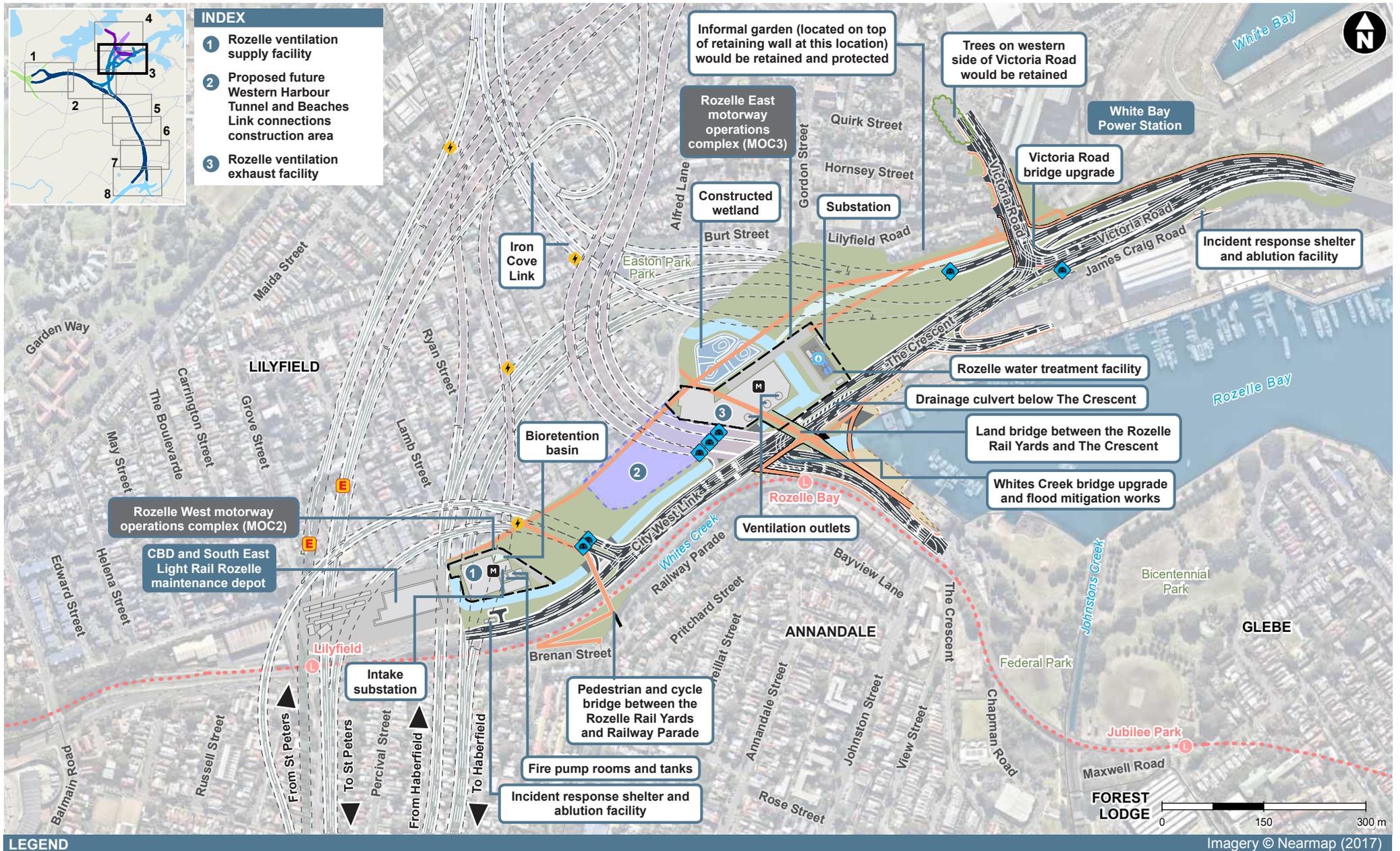
Figure 5-2 Project operational layout – Map 1



LEGEND Imagery © Nearmap (2017)

Existing features	M4-M5 Link tunnels	M4-M5 Link surface works	Project features	Ancillary facility
Light rail	Mainline tunnel	Operational facilities	Indicative toll location	Motorway operations complex
Light rail stop	Rozelle interchange tunnel	Remaining project land		Underground substation
		Land subject to UDLP		Water treatment facility

Figure 5-3 Project operational layout – Map 2

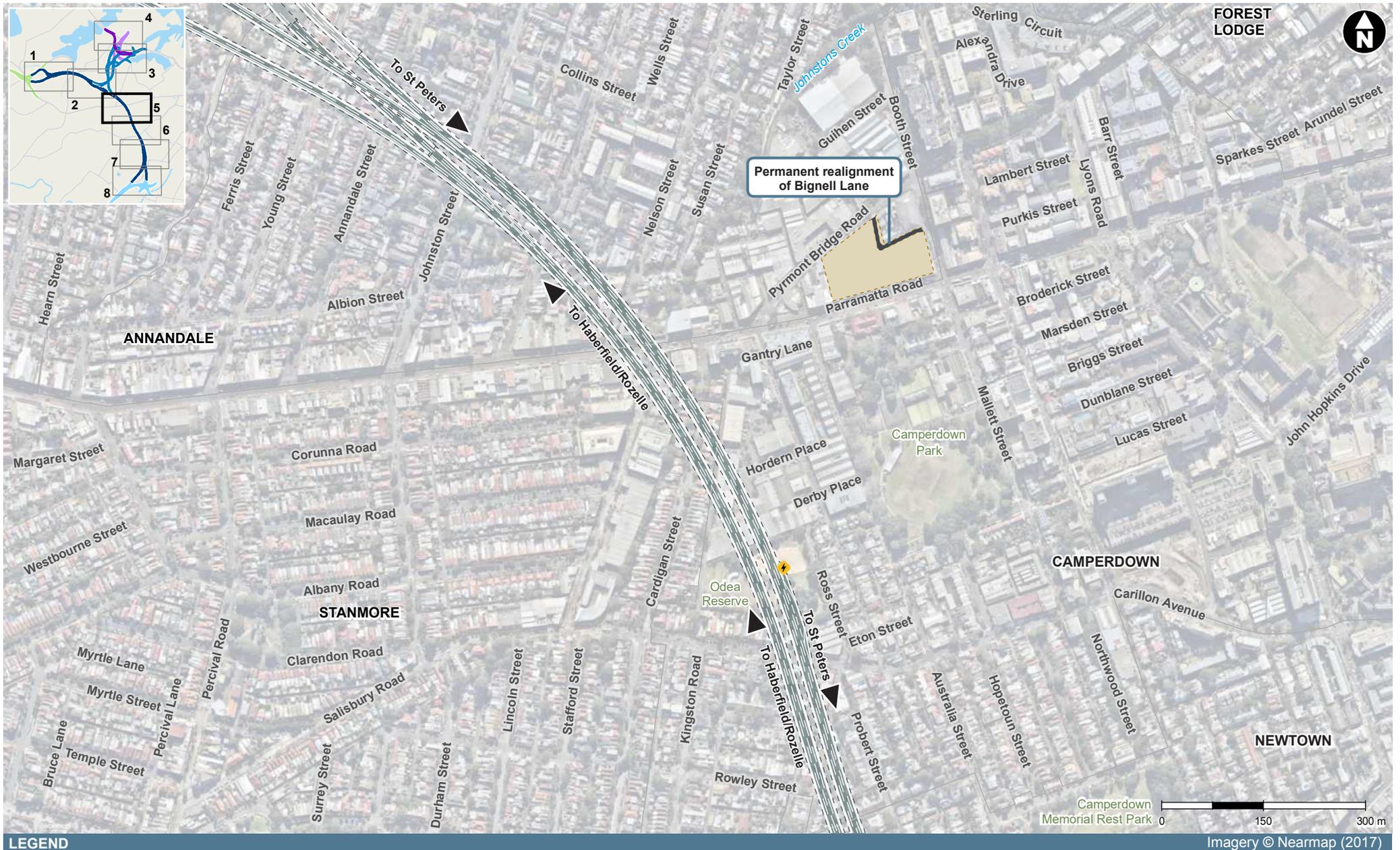


LEGEND		M4-M5 Link surface works		Project features		Ancillary facility	
--- Light rail	■ Rozelle interchange tunnel	■ Surface road	■ Bioswale	■ Bus lane	■ Indicative toll location	■ Motorway operations complex	■
● Light rail stop	■ Iron Cove Link tunnel	■ Operational facilities	■ Drainage channel	■ Shared path	◆ Tunnel portal	⚡ Underground substation	○ Water treatment facility
■ Proposed future WHTBL connections (civil construction only)	■ Remaining project land	■ Constructed wetland	■ Proposed future WHTBL connections construction area				
	■ Land subject to UDLP						

Figure 5-4 Project operational layout – Map 3



Figure 5-5 Project operational layout – Map 4



LEGEND

Mainline tunnel	Remaining project land	Ancillary facility
Rozelle interchange tunnel		Underground substation

Figure 5-6 Project operational layout – Map 5

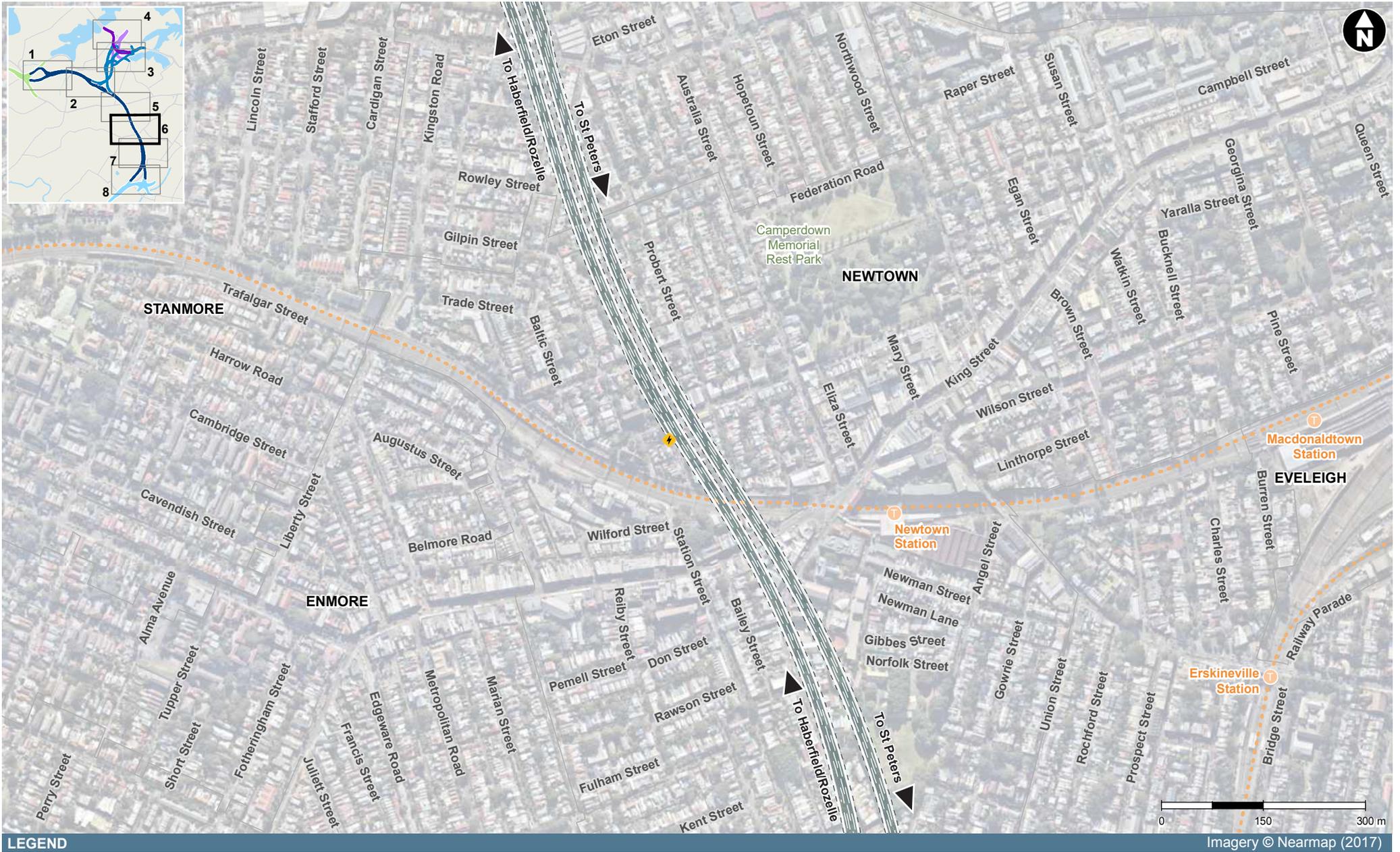
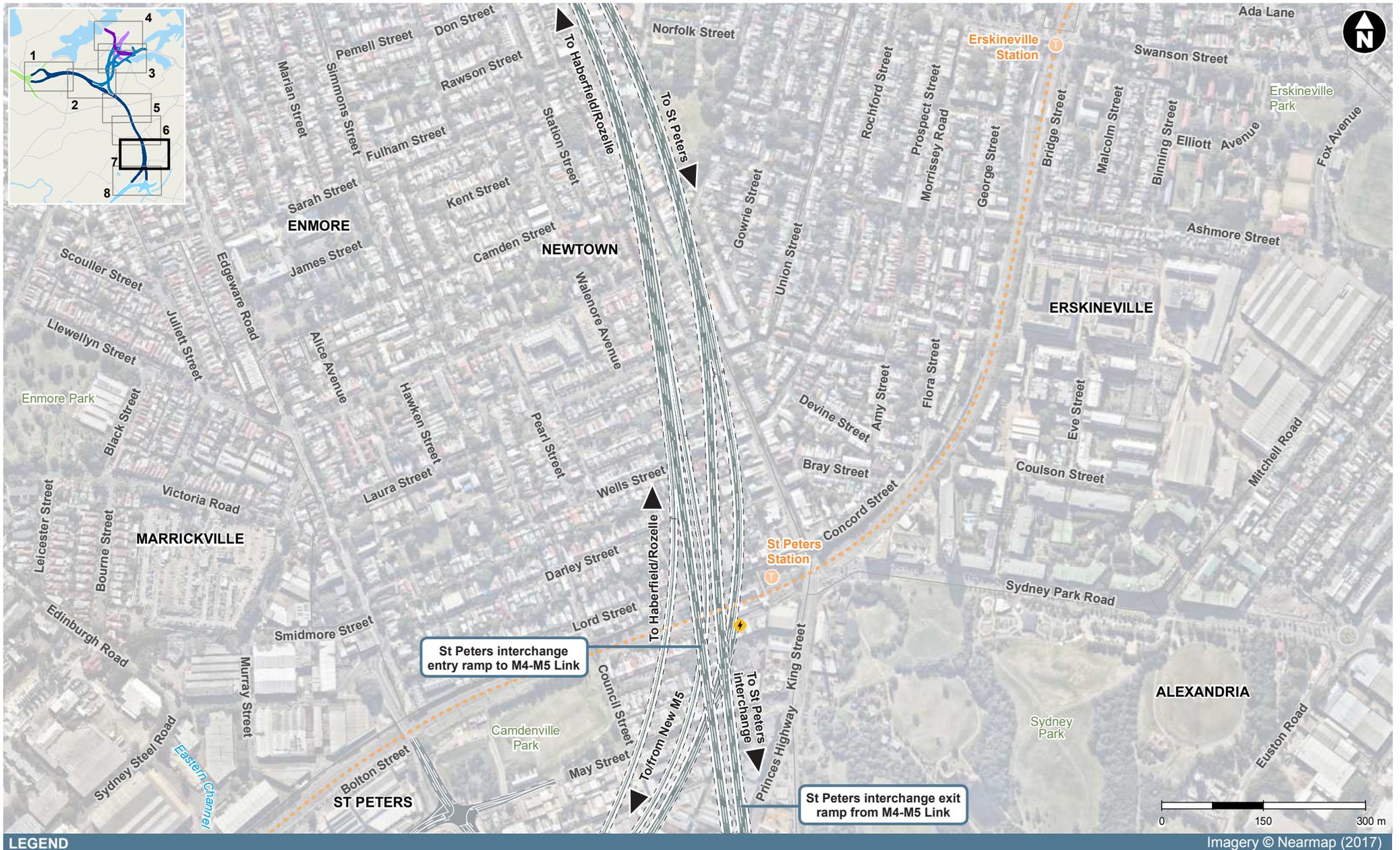


Figure 5-7 Project operational layout – Map 6



LEGEND

Existing features	New M5	M4-M5 Link tunnels	Ancillary facility
--- Railway	▬ Surface road	▬ Mainline tunnel	⚡ Underground substation
Ⓜ Railway station			

Figure 5-8 Project operational layout – Map 7

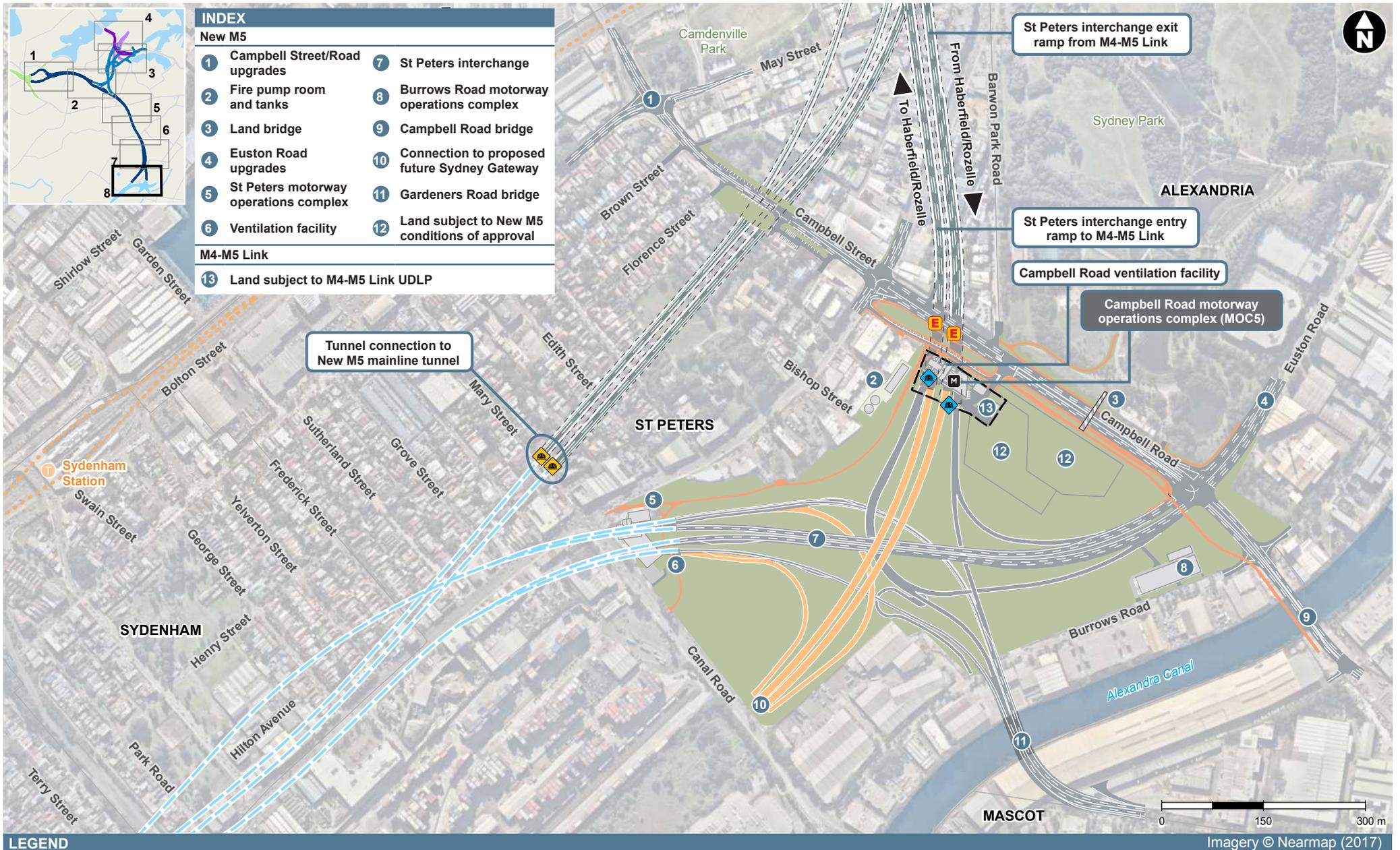


Figure 5-9 Project operational layout – Map 8

5.2 Urban design objectives and principles

Urban design principles have been developed for the project, consistent with the key urban design guidelines and policies including *Beyond the Pavement: Urban Design Procedures and Design Principles* (Roads and Maritime 2014a). The urban design principles applied to the design of the project and the rationale for their use is provided in **Table 5-3**. Further detail is provided in **Chapter 13** (Urban design and visual amenity) and **Appendix L** (Technical working paper: Urban design).

Table 5-3 Urban design objectives and the proposed methodology to achieve these objectives

Urban design objectives	Proposed methodology to achieve the urban design objectives
<p>Integrated and collective approach Create holistic and integrated design solutions generated by collaboration across disciplines, the community, stakeholders and government bodies.</p>	<ul style="list-style-type: none"> • Working across disciplines • Holding regular stakeholder workshops contributing to design outcomes • Prioritising comprehensive community input and consultation • Working with government agencies and considering future plans • Considering all relevant regulatory frameworks.
<p>Environmental vision Create a sustainable and enduring design response which enhances and connects local ecologies and green spaces.</p>	<ul style="list-style-type: none"> • Enhancing waterways, creeks and rivers • Utilising water-sensitive urban design where possible • Connecting fractured green spaces • Enhancing local ecology and vegetation • Utilising durable, sustainable and long lasting materials and robust design.
<p>Cross-scale connection of spaces Prioritise both locally and regionally significant connections that respond to the broader issues of the local neighbourhoods and city.</p>	<ul style="list-style-type: none"> • Enhancing connectivity between streets, facilities, neighbourhoods, green spaces, cyclist and pedestrian connections across the project footprint and city • Integrating and connecting transport modes • Connecting local and regional road, cyclist, public transport and pedestrian links.
<p>A motorway integrated within its context Understand the existing landscape and respond in a respectful manner that seeks to enhance and/or contribute back to its context.</p>	<ul style="list-style-type: none"> • Responding to natural patterns in the landscape • Respecting and working with the local landform • Enhancing the interface between existing open spaces and the proposed motorway.
<p>Place sensitive design Celebrate and work with the character of each place and destination, responding to their unique histories, materiality, architecture, built fabric, cultural context, landform and topography.</p>	<ul style="list-style-type: none"> • Incorporating heritage into the urban design • Respecting and responding to cultural contexts • Complementing the existing built fabric • Increasing the legibility of places, buildings, streets and landmarks.
<p>Multi-dimensional user force Consider holistically how a diversity of users experience space including all ages, abilities and transport modes for a truly inclusive, universally accessible and safe outcome.</p>	<ul style="list-style-type: none"> • Consider Crime Prevention Through Environmental Design (CPTED) principles in the urban design • Creating safe, legible connections with wayfinding for all user types • Ensuring universal design outcomes • Considering the user experience for all modes including drivers, pedestrians, cyclists and public transport users.

Urban design objectives	Proposed methodology to achieve the urban design objectives
<p>Revitalisation, opportunity and economics Establish opportunities for development that supports and connects existing neighbourhoods, complements and stimulates local economies and provides opportunity for growth across existing and future local industries.</p>	<ul style="list-style-type: none"> · Contributing to urban structure and revitalisation · Connecting existing and fragmented spaces through property acquisition · Capitalising on traffic reduction to enhance local streets and increase neighbourhood liveability · Creating opportunities for urban renewal.

A detailed review and finalisation of the architectural treatment of the motorway operational ancillary facilities, including ventilation facilities (see **section 5.8**), portals and all permanent infrastructure, would be carried out during detailed design. The architectural treatment of these facilities would be guided by ventilation facility performance requirements, the outcomes of community consultation and the urban design principles identified in **Appendix L** (Technical working paper: Urban design). Landscaping works would be carried out adjacent to disturbed areas, around operational infrastructure (such as ventilation facilities), and in areas of new open space that would be provided at the Rozelle Rail Yards and adjacent to Victoria Road at Rozelle.

Further details about urban design for the project are provided in **Chapter 13** (Urban design and visual amenity) and **Appendix L** (Technical working paper: Urban design). Urban design concept plans have also been prepared for the Rozelle Rail Yards and the Iron Cove Link surface works in consideration of the urban design objectives described in **Table 5-3**. These would inform the Urban Design and Landscape Plan (UDLP) that would be prepared for the project and are discussed further in **section 5.6.7** and **section 5.7.5**.

In addition, UDLPs have been prepared for the M4 East and New M5 projects. This includes land around the Wattle Street interchange at Haberfield, including the draft concept plans for the M4 East Legacy Project, and the St Peters interchange at St Peters. The project would not impact on the implementation of these plans, but may impact the timing in which they are carried out.

5.3 Tunnels

This section describes the design of the tunnel components of the project, including:

- The mainline tunnels, including the number and width of traffic lanes
- The Rozelle interchange and the Iron Cove Link tunnels, including tunnels to enable connections to the proposed future Western Harbour Tunnel and Beaches Link project
- The location and configuration of tunnel portals
- The tunnel vertical alignments.

5.3.1 Mainline tunnels

The mainline tunnels would be about 7.5 kilometres long and would extend from the underground connection with the M4 East tunnels at Haberfield to the underground connection with the New M5 tunnels at St Peters. The mainline tunnels would connect to the surface road network at four locations:

- The Wattle Street interchange at Haberfield via tunnel portals being built by the M4 East project
- The St Peters interchange at St Peters via tunnel portals being built by the New M5 project
- City West Link and Victoria Road at Rozelle via the Inner West subsurface interchange and the Rozelle interchange
- Victoria Road at Rozelle, east of Iron Cove Bridge, via the Inner West subsurface interchange, the Rozelle interchange and the Iron Cove Link.

Lane configuration in the mainline tunnels

The mainline tunnels would generally be four traffic lanes in each direction in addition to merging lanes and tie-ins (where required). Under the concept design described in this EIS, the configuration of traffic lanes within the mainline tunnels would be provided in five distinct sections as described in **Table 5-4** and shown in **Figure 5-10**. Indicative cross-sections of the mainline tunnels and the entry and exit ramps are shown in **Figure 5-11** and **Figure 5-12**.

Table 5-4 Typical lane configuration and widths for the mainline tunnels

Mainline tunnel section	No. of lanes	Width of lanes (metres)	Width of nearside shoulder (metres)	Width of offside shoulder (metres)	Carriageway width kerb to kerb (min.) (metres)	Design speed (km/h)	Posted speed (km/h)
M4 East mainline connection to merge/diverge of the Wattle Street interchange entry and exit ramps with the mainline tunnels	3	3.5	1.0	1.0	12.5	90	80
Wattle Street interchange entry and exit ramps	2 ¹	3.5	1.0	1.0	9.0	70	60
Merge/diverge of the Wattle Street interchange entry and exit ramps to the M4 East Inner West subsurface interchange connection below Leichhardt	4	3.5	1.0	1.0	16.0	90	80
Between the M4 East and the New M5 connections at the Inner West subsurface interchange	2	3.5	2.5	1.0	10.5	90	80
New M5 Inner West subsurface interchange connection to the merge/diverge of the St Peters interchange entry and exit ramps	4	3.5	1.0	1.0	16.0	90	80
Merge/diverge of the St Peters interchange entry and exit ramps to the New M5 mainline connection	2 ²	3.5	2.5	1.0	10.5	90	80
St Peters interchange entry and exit ramps	3 ³	3.5	1.0	1.0	12.5	70	60

Notes:

¹ The Wattle Street interchange entry ramp would divide into two, one-lane tunnels before joining the southbound mainline tunnel (see **section 5.4.1**).

² The northbound mainline tunnel would divide into two, one-lane tunnels before joining the northbound St Peters interchange entry ramp (see **section 5.4.3**).

³ The St Peters interchange exit ramp would increase to four lanes before surfacing at the St Peters interchange tunnel portal (see **section 5.4.4**).

Inner West subsurface interchange

The Inner West subsurface interchange would be located underground at Leichhardt/Annandale and would link with the mainline tunnels at two locations, enabling free-flow of traffic between the M4 East and New M5 motorways and the Rozelle interchange. The layout of the Inner West subsurface interchange is shown in **Figure 5-3**. The connectivity that would be provided by the Inner West subsurface interchange and the Rozelle interchange is shown in **Figure 5-24**.

For motorists traveling westbound from the Rozelle interchange towards the M4 East Motorway, the three-lane tunnel would divide into two on the approach to the Inner West subsurface interchange. One tunnel with two lanes would travel towards the M4 East mainline tunnels and one tunnel with one lane would travel towards the Wattle Street interchange. These separate tunnels would extend south and southwest for a distance of around one kilometre, joining with the northbound mainline tunnel generally at a point below Norton Street at Leichhardt. Motorists traveling to the M4 East Motorway would join on the right side, and motorists traveling to the Wattle Street interchange would join on the left side. Motorists travelling to the Wattle Street interchange would then be on the correct side of the northbound mainline tunnel on the approach to the Wattle Street interchange exit ramp.

By giving motorists the ability to choose a merge location dependent on their destination, this arrangement would make driving in the tunnel safer by reducing the number of lane changes that motorists may need to carry out. This would also reduce the potential impact on vehicle speeds associated with merging. Further detail on operational traffic is provided in **Chapter 8** (Traffic and transport) and **Appendix H** (Technical working paper: Traffic and transport).

The mainline tunnels at the Inner West subsurface interchange would be built to accommodate up to three lanes in each direction. When the project opens, this section of the mainline tunnels would be marked for two lanes in each direction, with the capacity to increase to three lanes in each direction subject to future traffic demands. The width of the caverns for the mainline tunnels has been designed to allow for this capacity increase without the need for further excavations.

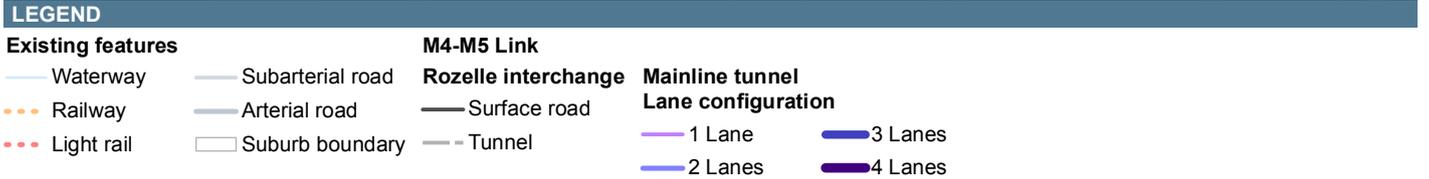
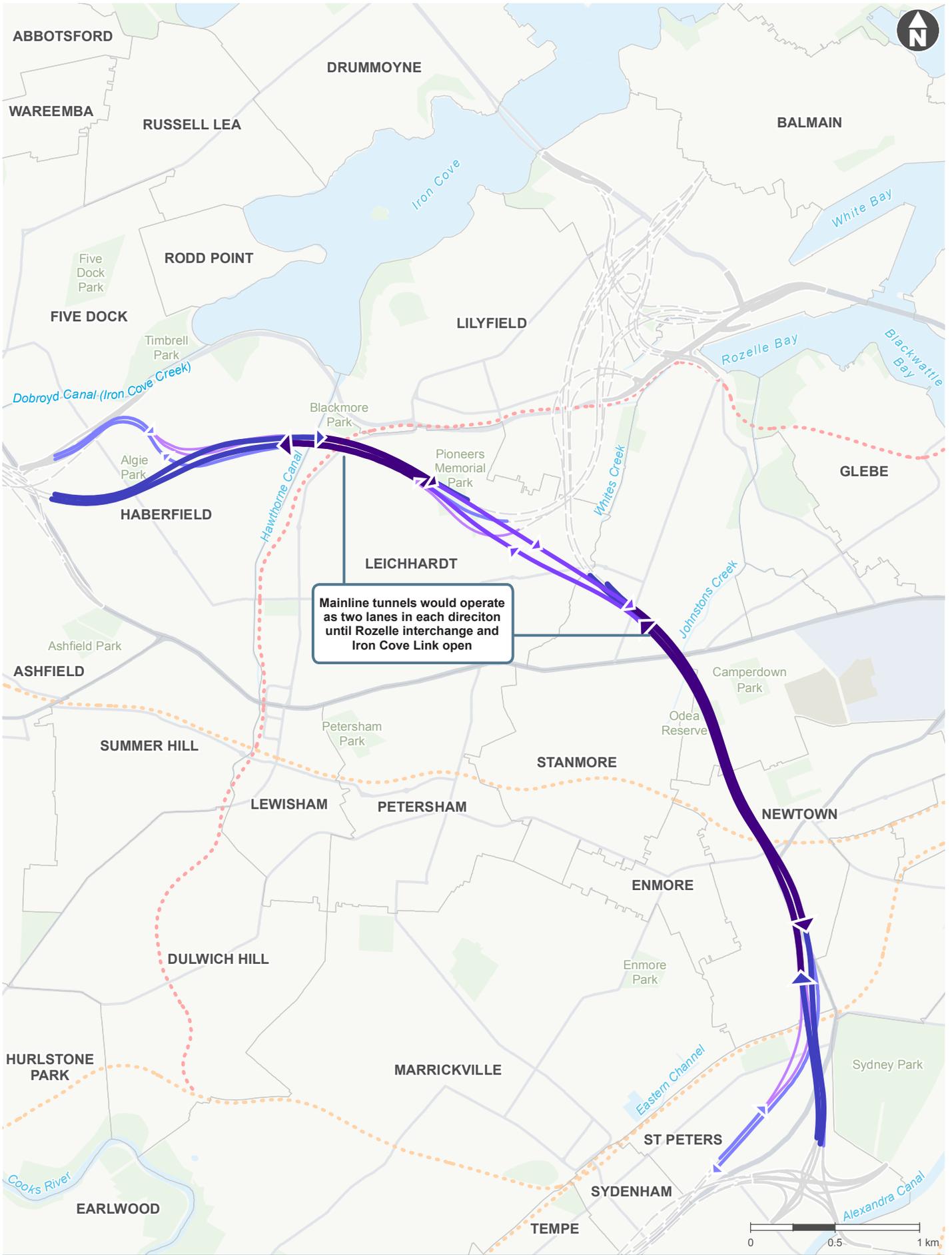
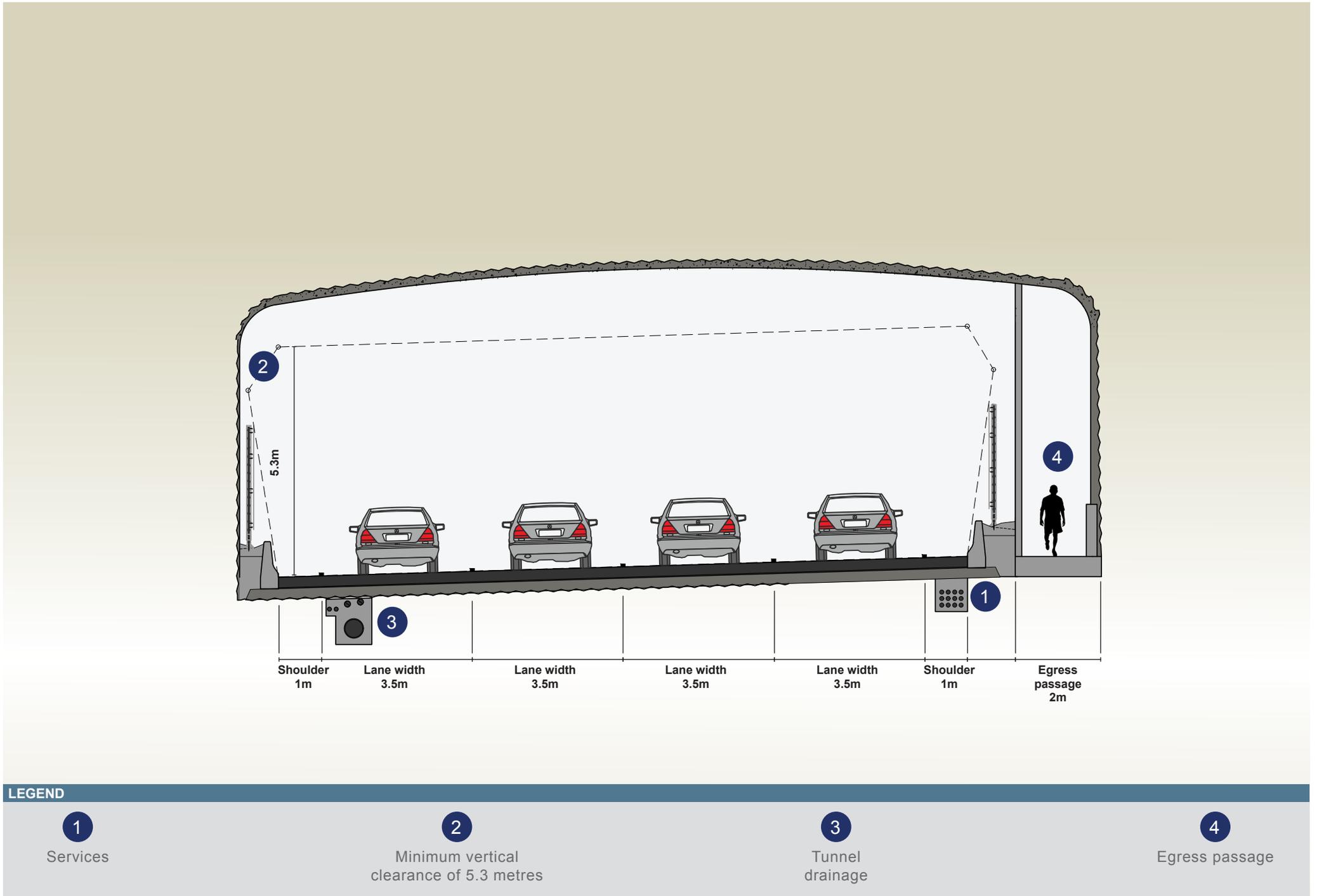
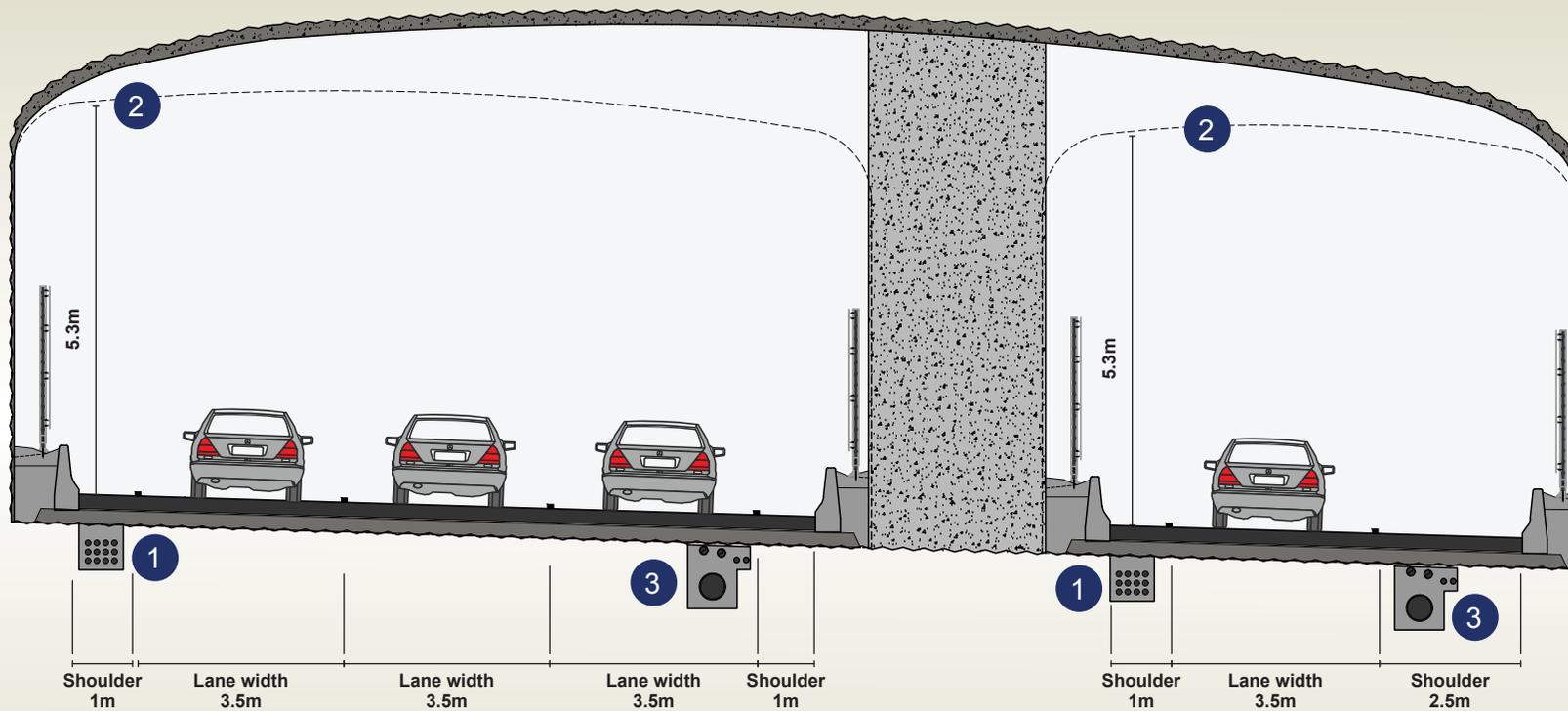


Figure 5-10 Lane configuration - mainline tunnels



LEGEND			
1	2	3	4
Services	Minimum vertical clearance of 5.3 metres	Tunnel drainage	Egress passage

Figure 5-11 Indicative cross-section - mainline tunnels



LEGEND

1
Services

2
Minimum vertical
clearance of 5.3 metres

3
Tunnel
drainage

Figure 5-12 Indicative cross-section - mainline tunnel entry and exit ramps

5.3.2 Rozelle interchange and Iron Cove Link tunnels

Rozelle interchange tunnels

The Rozelle interchange tunnels would connect the mainline tunnels (via the Inner West subsurface interchange) with:

- The existing surface road network at City West Link, The Crescent and Victoria Road
- The Iron Cove Link, which would connect to the existing surface road network at Victoria Road near the eastern abutment of Iron Cove Bridge (see below)
- The proposed future Western Harbour Tunnel and Beaches Link.

A detailed description of project connectivity is provided in **section 5.5**. The layout of the Rozelle interchange is shown in **Figure 5-23**.

Iron Cove Link tunnels

The Iron Cove Link would comprise twin tunnels linking Victoria Road, near the eastern abutment of Iron Cove Bridge, with the Anzac Bridge. The Iron Cove Link tunnels would be two-lanes wide in each direction, with a small section of the eastbound tunnel decreasing to one lane before merging with the M4 East to Anzac Bridge exit ramp. An exit ramp would also diverge from the eastbound tunnel to connect motorists to the New M5 Motorway via the Rozelle interchange. The layout of the Iron Cove Link is shown in **Figure 5-4** and **Figure 5-5**.

5.3.3 Emergency and breakdown facilities

The tunnels would include vehicular cross-passages to allow for emergency traffic switching, as well as pedestrian cross-passages spaced at a maximum of 120 metres that provide emergency pedestrian egress between tunnels in the event of an emergency. An indicative cross-passage layout is shown in **Figure 5-16**. Additional details about fire and life safety provisions for the project are provided in **section 5.8.3**.

Breakdown bays would be spaced around 2.5 kilometres apart and would be large enough to allow a B-double vehicle to pull over into the bay and safely park outside of the nominal tunnel shoulder width away from operational traffic lanes and without blocking traffic flow. The Rozelle interchange tunnels would be widened at this location to accommodate the breakdown bay outside of the shoulders. Breakdown bays would not be required in the Iron Cove Link tunnels due to the short distance of these tunnels. An indicative layout of a mainline tunnel maintenance and breakdown bay is shown in **Figure 5-13**.

Lane configurations in the Rozelle interchange and Iron Cove Link tunnels

A summary of the lane configuration and typical widths of the sections of the Rozelle interchange and Iron Cove Link tunnels is provided in **Table 5-5** and shown in **Figure 5-13**. Indicative cross-sections of the Rozelle interchange and Iron Cove Link tunnels and the entry and exit ramps are shown in **Figure 5-14** and **Figure 5-15**.

Table 5-5 Typical lane configurations and widths for the Rozelle interchange and Iron Cove Link

Rozelle interchange tunnel section	No. of lanes	Width of lanes (metres)	Width of nearside shoulder (metres)	Width of offside shoulder (metres)	In-tunnel barrier to barrier width (metres)	Design speed (km/h)	Posted speed (km/h)
New M5 Inner West subsurface interchange to proposed future Western Harbour Tunnel and Beaches Link	3	3.5	1.0	1.0	12.5	90	80
M4 East from proposed future Western Harbour Tunnel and Beaches Link ramp to Victoria Road/Anzac Bridge Portal	2 ¹	3.5	2.5	1.0	10.5	80	70
The New M5 Inner West subsurface interchange connection to Rozelle	3	3.5	1.0	1.0	12.5	90	80
Proposed future Western Harbour Tunnel and Beaches Link tunnels	3	3.5	1.0	1.0	12.5	90	80
One-lane entry and exit ramps at the Rozelle interchange	1	3.5	2.5	1.0	7.0	70	60
Two-lane entry and exit ramps at the Rozelle interchange	2	3.5	1.0	1.0	9.0	70	60
Iron Cove Link	2 ²	3.5	1.0	1.0	9.0	70	60

Notes:

¹ The three-lane southbound tunnel would divide into two on the approach to the Inner West subsurface interchange, extending south and southwest and joining with the northbound mainline tunnel at a point below around Norton Street at Leichhardt (refer to the description of the Inner West subsurface interchange in **section 5.3.1**).

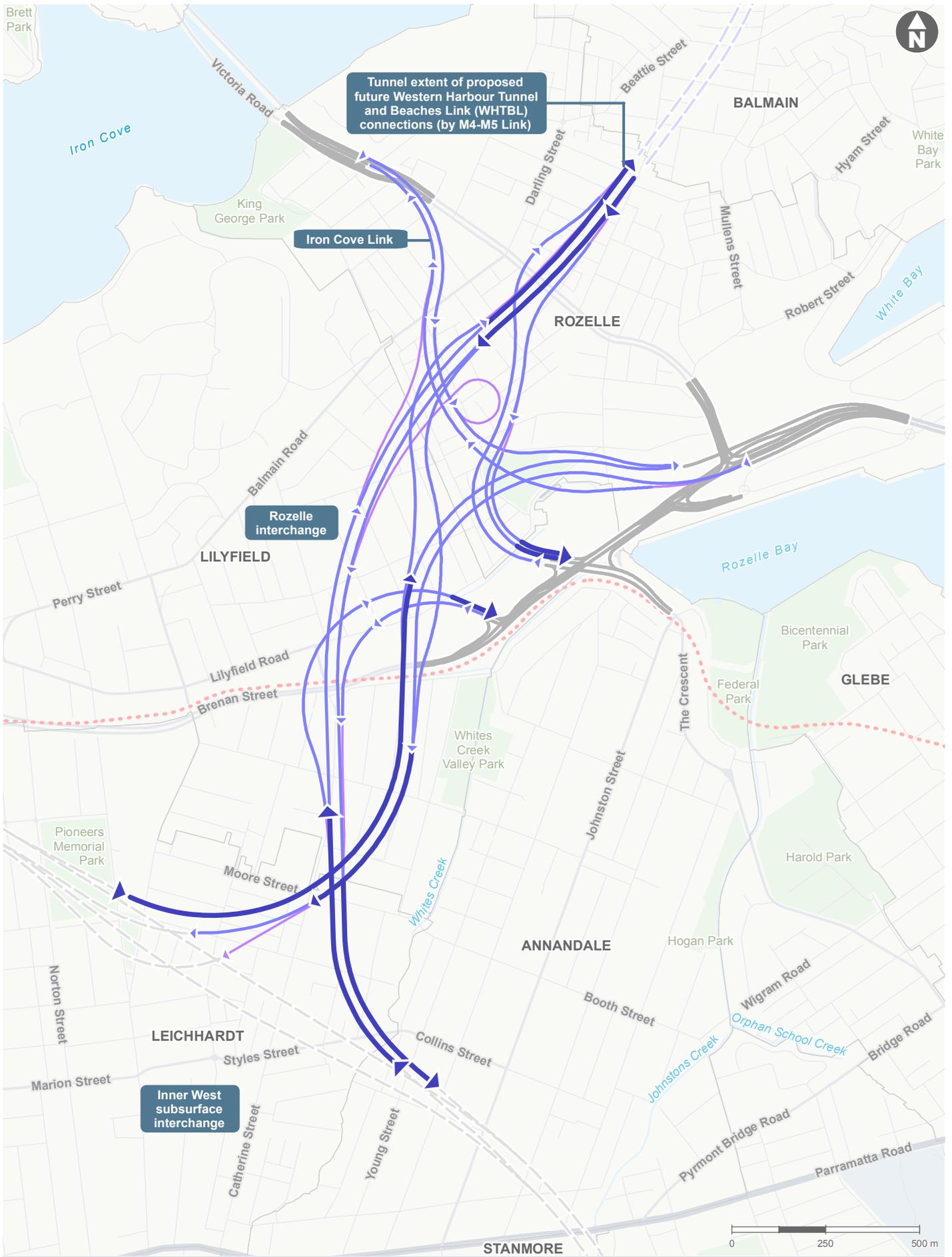
² A section of the eastbound Iron Cove Link tunnel is one lane.

5.3.4 Connections to the proposed future Western Harbour Tunnel and Beaches Link

The project also includes the civil construction of entry and exit ramps, tunnel portals, tunnels and civil infrastructure for connecting to the proposed future Western Harbour Tunnel and Beaches Link. Tunnel sections include:

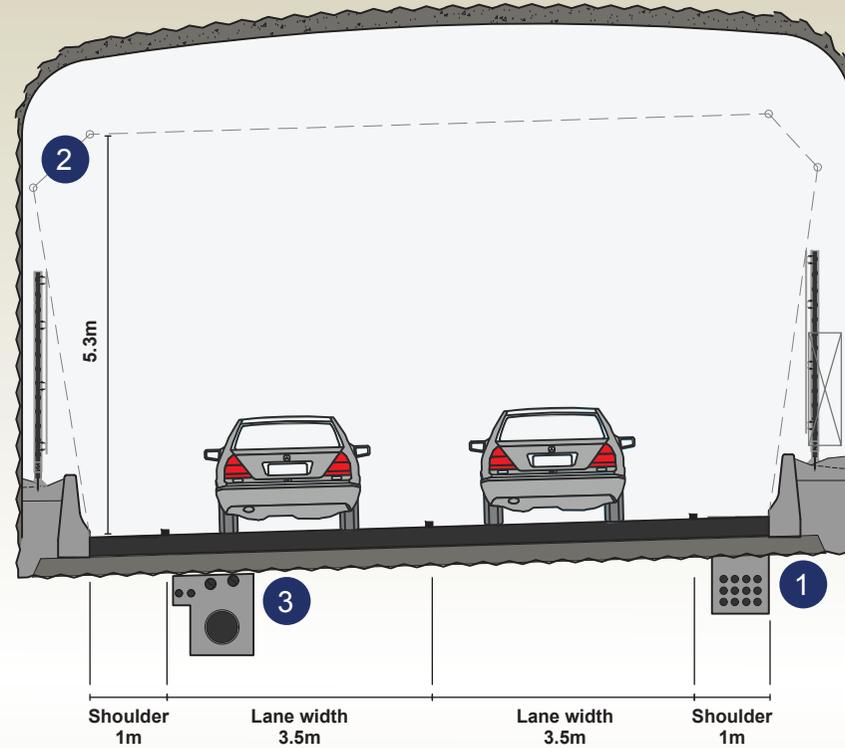
- Mainline connection tunnels that would extend north from the Inner West subsurface interchange, below Leichhardt, Lilyfield and Rozelle, to a point below Rozelle. These would provide a mainline connection between the New M5/St Peters interchange and the proposed future Western Harbour Tunnel and Beaches Link (via the mainline tunnels and the Inner West subsurface interchange)
- Connections between the Rozelle interchange and the mainline connection tunnels described above. These would connect the M4 East/Wattle Street interchange with the proposed future Western Harbour Tunnel and Beaches Link (via the mainline tunnels and the Inner West subsurface interchange)
- Underground entry and exit ramps extending north from the Rozelle Rail Yards, joining the mainline connection tunnels described above at a point below around Victoria Road at Rozelle. These entry and exit ramps would enable future surface connections between the realigned City West Link/The Crescent intersection and the proposed future Western Harbour Tunnel and Beaches Link.

The construction activities for these works are described in **Chapter 6** (Construction work). The construction of the remainder, and operation of, the proposed future Western Harbour Tunnel and Beaches Link does not form part of the M4-M5 Link project, and would be subject to future environmental assessment and planning approval.



LEGEND		M4-M5 Link		Rozelle interchange and Iron Cove Link	
Waterway	Subarterial road	Mainline	Proposed future WHTBL lane numbers to determined	Lane configuration	
Light rail	Arterial road	Tunnel		1 Lane	
Suburb boundary	Suburb boundary	Rozelle interchange		2 Lanes	
		Surface road		3 Lanes	

Figure 5-13 Lane configuration in the Rozelle interchange and Iron Cove Link tunnels



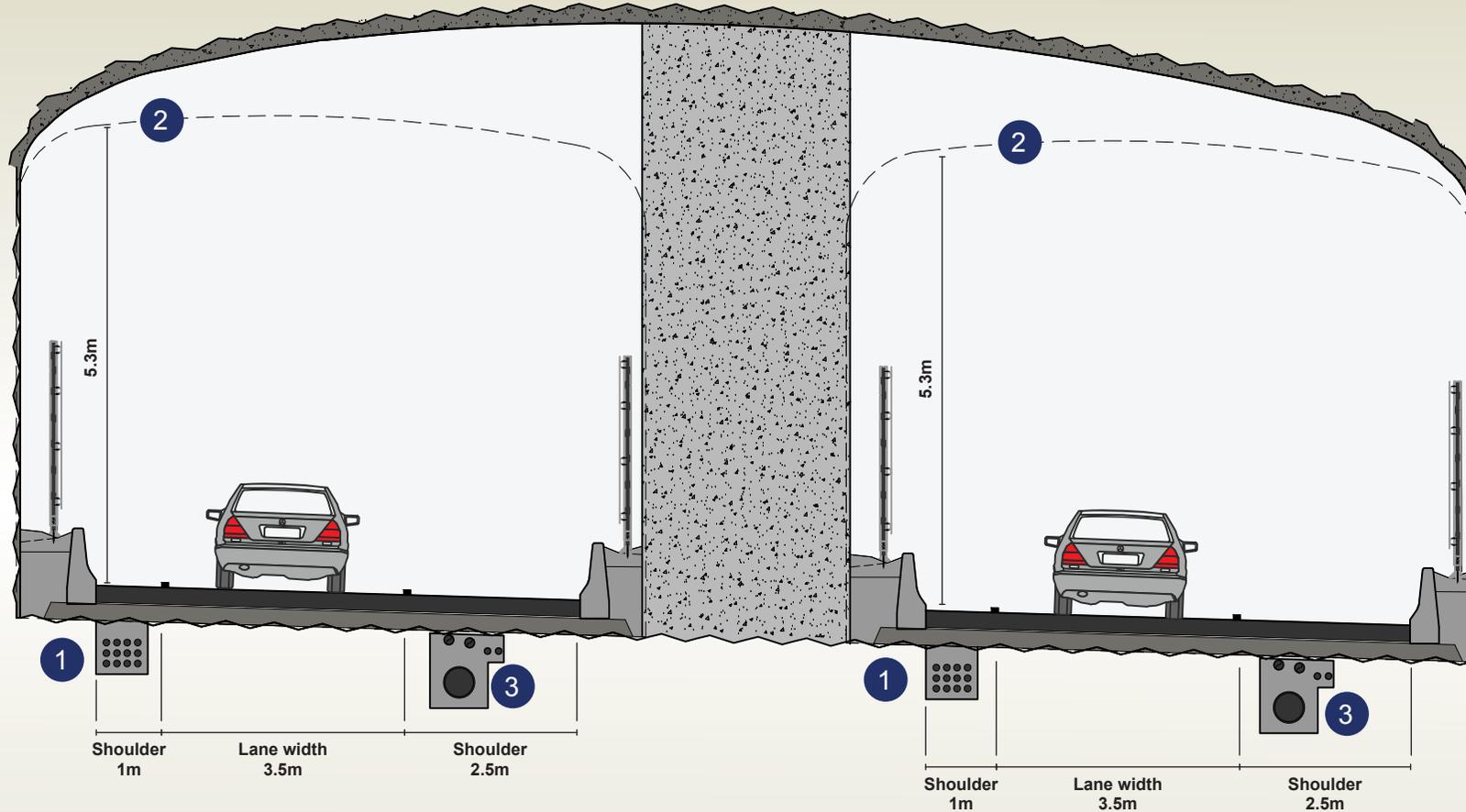
LEGEND

1
Services

2
Minimum vertical
clearance of 5.3 metres

3
Tunnel
drainage

Figure 5-14 Indicative cross-section - Rozelle interchange and Iron Cove Link tunnels



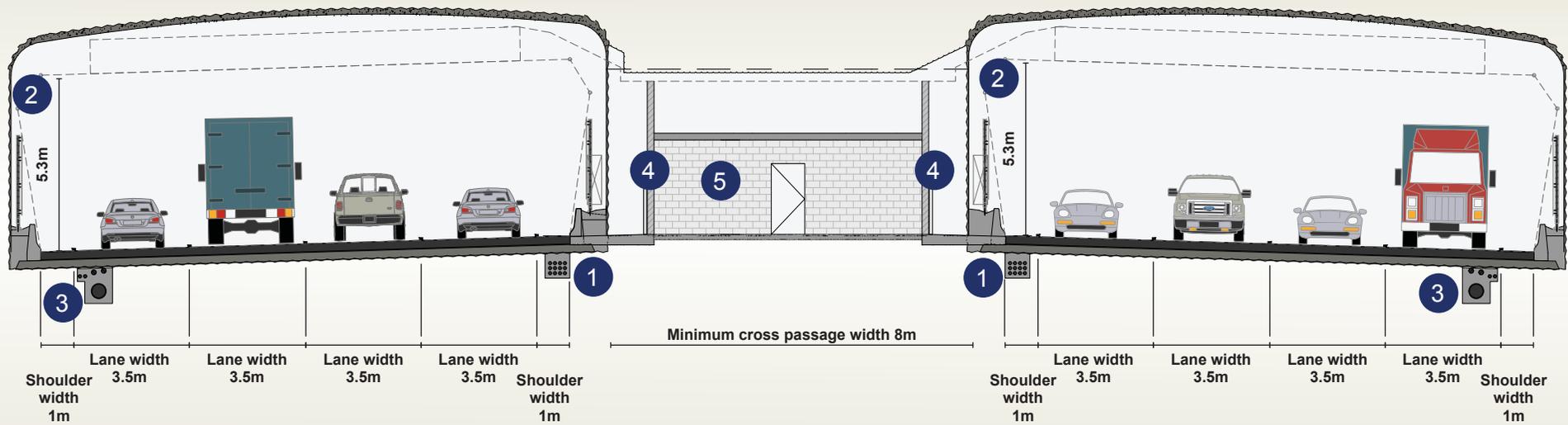
LEGEND

1
Services

2
Minimum vertical
clearance of 5.3 metres

3
Tunnel
drainage

Figure 5-15 Indicative entry and exit ramp tunnel cross-section - Rozelle interchange and Iron Cove Link tunnels



LEGEND

1
Services

2
Minimum vertical
clearance of 5.3 metres

3
Tunnel
drainage

4
Fire - Rated
sliding door

5
Pedestrian cross
passage

Figure 5-16 Indicative cross-passage layout

5.3.5 Tunnel portals

Portals would provide connections between the tunnels and the surface road network. Tunnel portals at the Wattle Street interchange and the St Peters interchange will be built as part of the M4 East and New M5 projects respectively and are shown in **Figure 5-17** and **Figure 5-18**.

The Rozelle interchange and Iron Cove Link tunnel portals are shown in **Figure 5-19** to **Figure 5-22** and would include:

- Rozelle interchange tunnel portals:
 - City West Link to New M5/St Peters interchange portals (via the M4-M5 Link mainline tunnels), via a new intersection along City West Link between Catherine Street and The Crescent
 - Victoria Road/Anzac Bridge to M4 East/Wattle Street interchange/Iron Cove Link portals. These portals would be staggered, with the eastbound portal meeting the surface within the Rozelle Rail Yards and the westbound portal meeting the surface south of the Victoria Road/The Crescent intersection
 - Civil construction only of the proposed future Western Harbour Tunnel and Beaches Link portals. These portals would be located within the Rozelle Rail Yards north of the realigned intersection of City West Link and The Crescent
- Iron Cove Link tunnel portals:
 - Between the eastbound and westbound Victoria Road carriageways, in the vicinity of Terry Street at Rozelle.

Dive and cut-and-cover structures would be constructed at the tunnel portals to create entry and exit ramps to join the surface roads with the tunnels (refer to **Chapter 6** (Construction work) for more detail about the construction of these structures). Entry and exit ramps would vary in size and shape in response to local conditions and would require a number of cuttings and embankments. The portals have been designed to provide for a 5.3 metre vertical clearance.

5.3.6 Tunnel vertical alignments

The tunnels would generally have grades of less than four per cent. However, isolated locations connecting to the surface road network may require short lengths of steeper grades of up to eight per cent. These grades would generally match with existing conditions on local surface roads or are required to ensure appropriate ground conditions with no direct property impacts.

The lowest point of the mainline tunnels would be in the vicinity of Darley Road at Leichhardt, and the lowest points of the Rozelle interchange and the Iron Cove Link would be in the vicinity of the Rozelle Rail Yards. Tunnel drainage would connect to surface water treatment facilities within the Darley Road motorway operations complex (MOC1) and the Rozelle East motorway operations complex (MOC3) (see **section 5.9.2**). In addition, tunnel drainage from about one kilometre of the northbound mainline tunnel and 600 metres of the southbound mainline tunnel would be captured by the New M5 drainage system and conveyed to the New M5 operational water treatment plant at Arncliffe.

The cross-fall of the carriageway in each of the tunnels would generally be around two per cent. This would allow water to drain to the low side of each mainline tunnel for collection and management as part of the tunnel water management system (see **section 5.9**).

Geotechnical long-sections of the mainline tunnels and the Rozelle interchange and Iron Cove Link tunnels are provided in **Appendix E** (Geological long-sections).

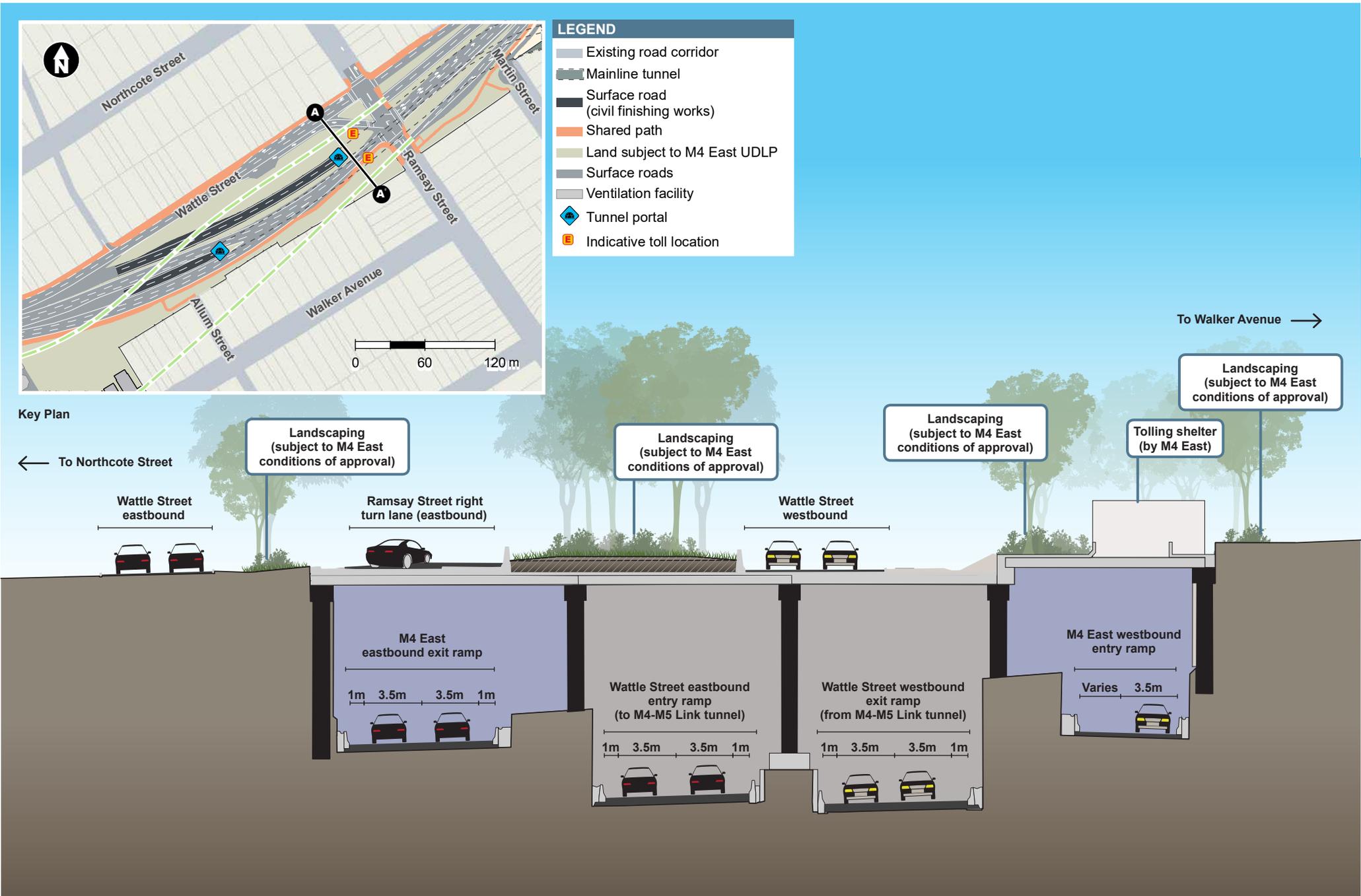
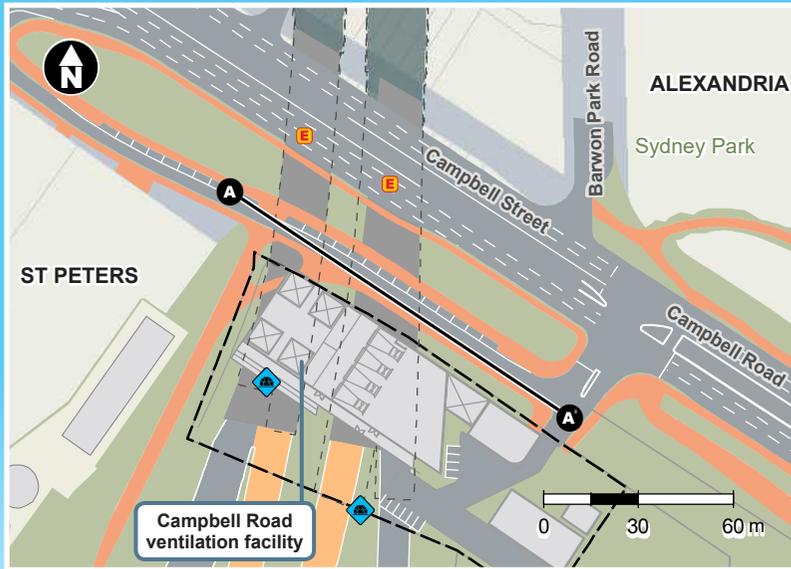


Figure 5-17 Indicative cross-section - Wattle Street interchange tunnel portals



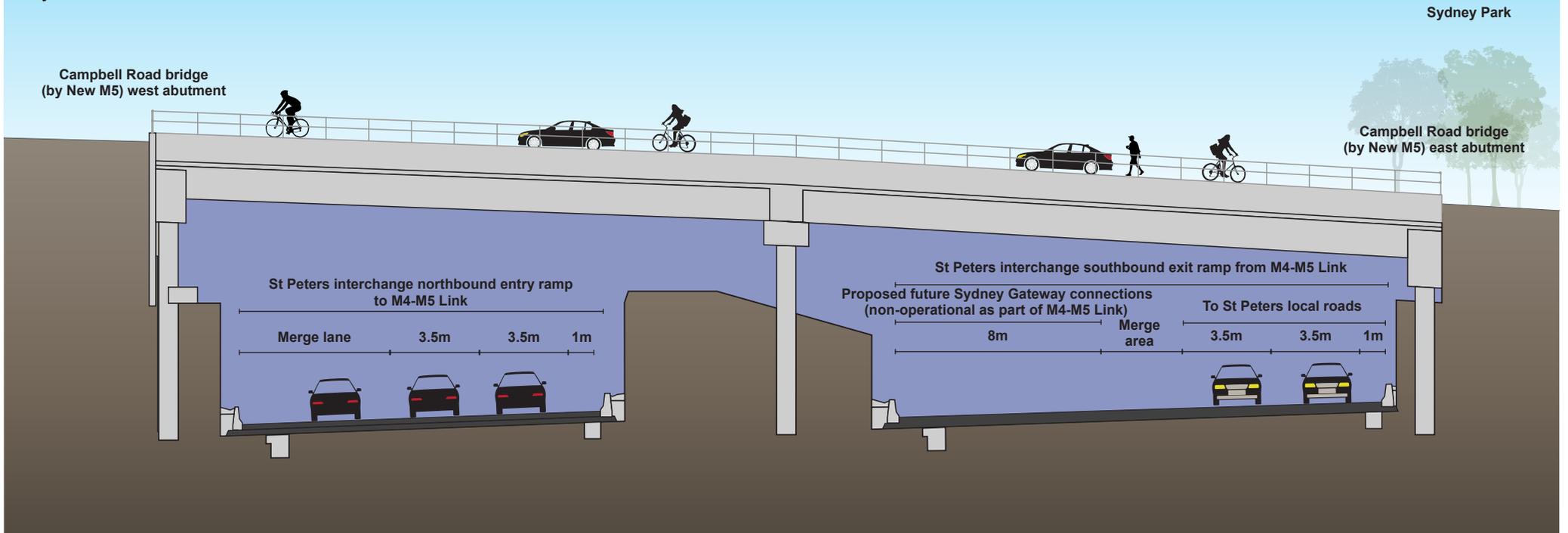
LEGEND

- Existing road corridor
- Mainline tunnel
- Operational facilities
- Car parking
- Tunnel portal
- Indicative toll location

New M5

- Surface road
- Proposed future Sydney Gateway connections (non-operational)
- Building
- Shared path
- Land subject to New M5 UDLP

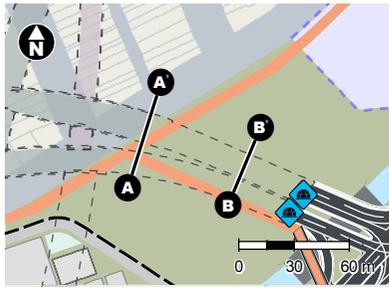
Key Plan



A

Figure 5-18 Indicative cross-section - St Peters interchange tunnel portals

A'



Key Plan

LEGEND

- Existing road corridor
- Proposed future WHTBL (civil construction only)
- Rozelle interchange tunnel
- Surface road
- Operational facilities
- Bioretention basin
- Land subject to UDLP
- Shared path
- Proposed future WHTBL connections construction area
- Tunnel portal

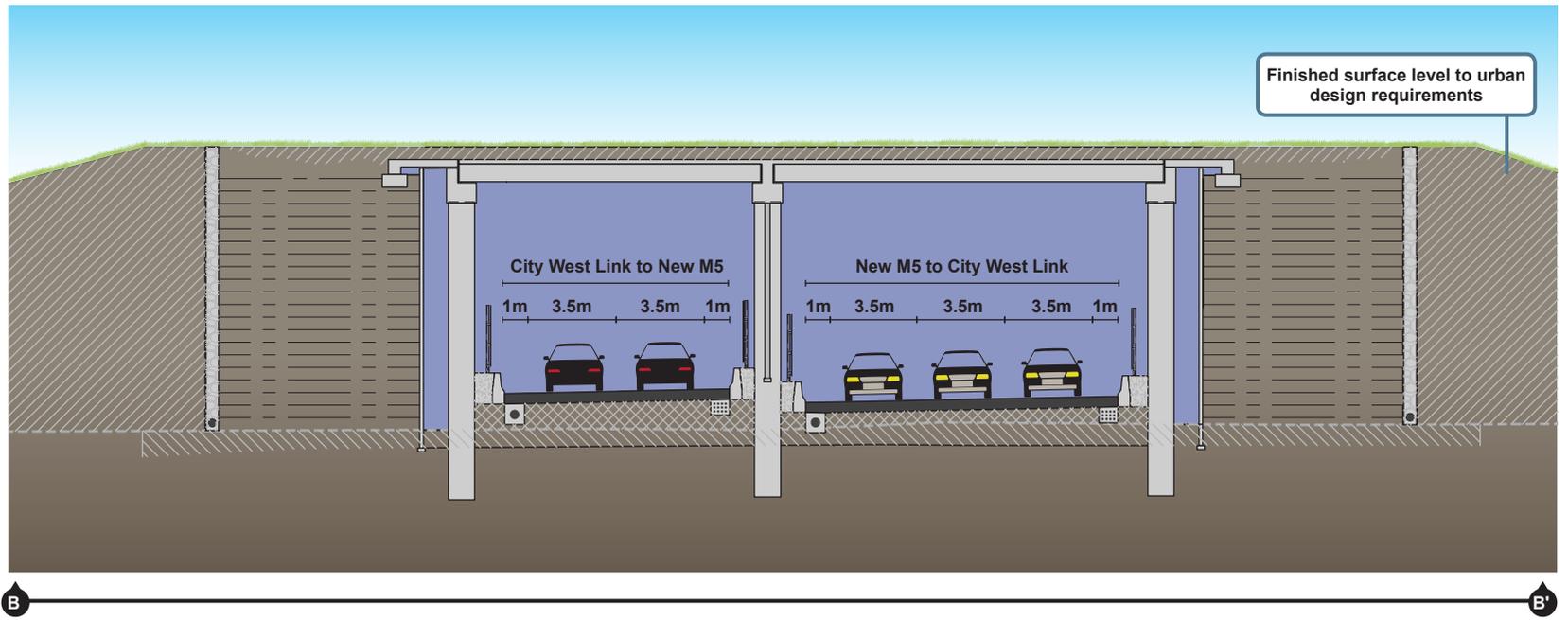
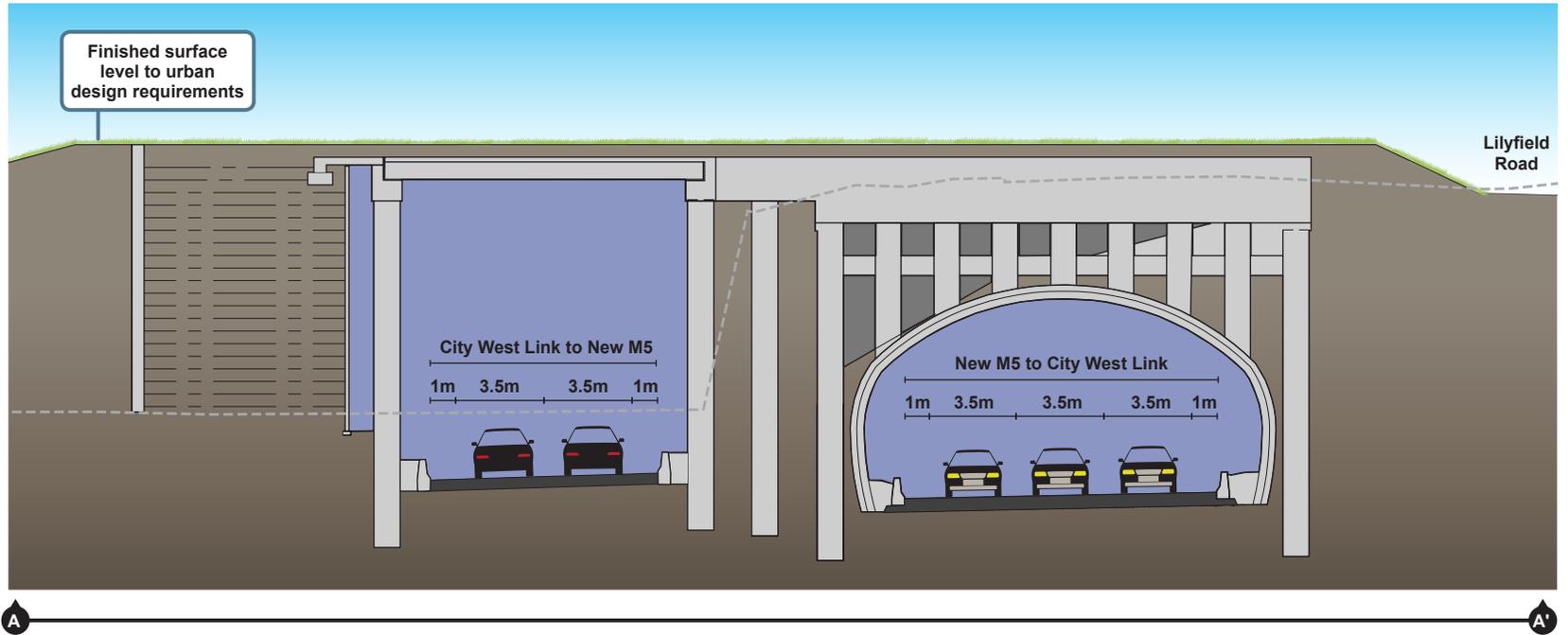


Figure 5-19 Indicative cross-section - City West Link to New M5 / St Peters interchange tunnel portals

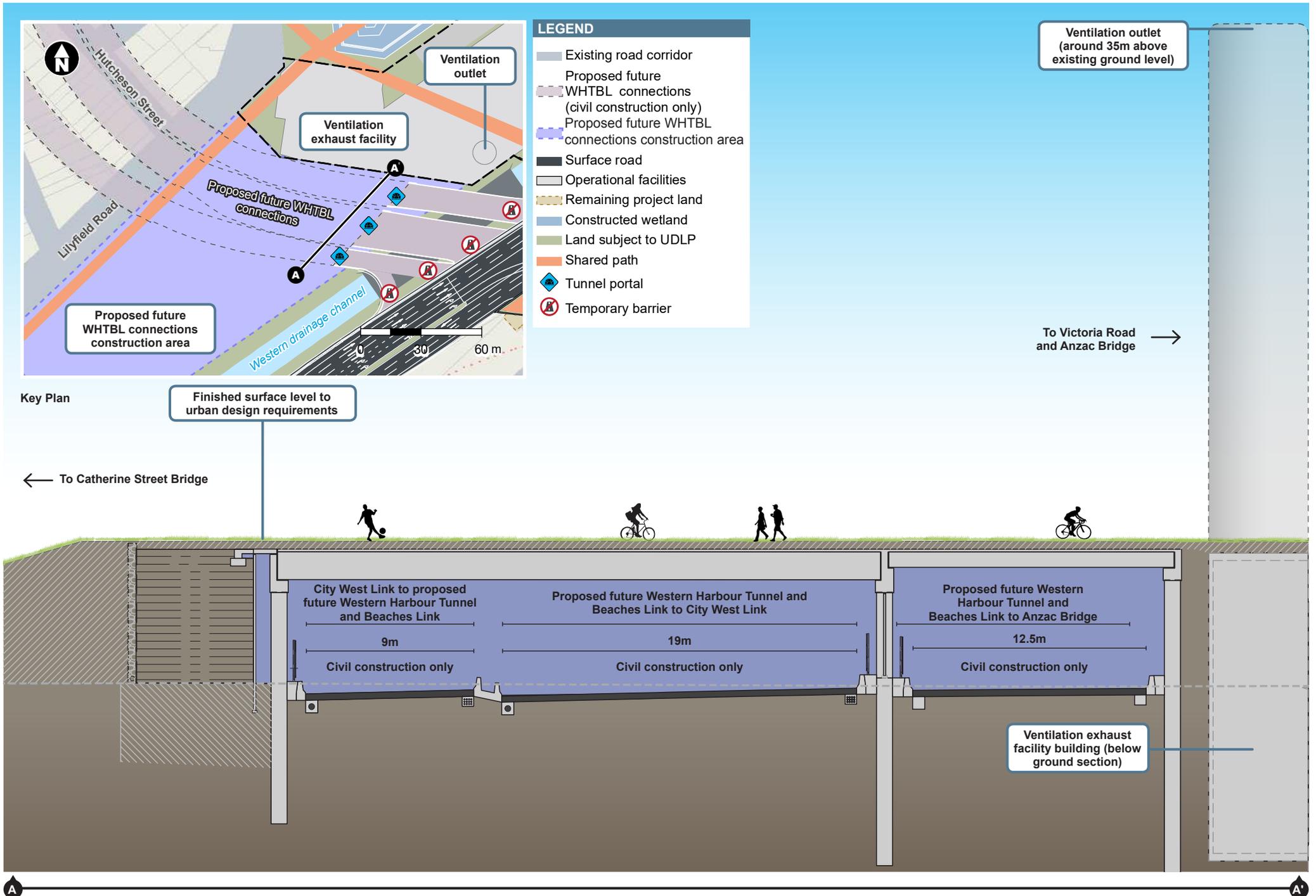
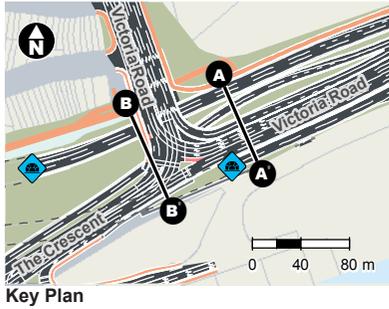
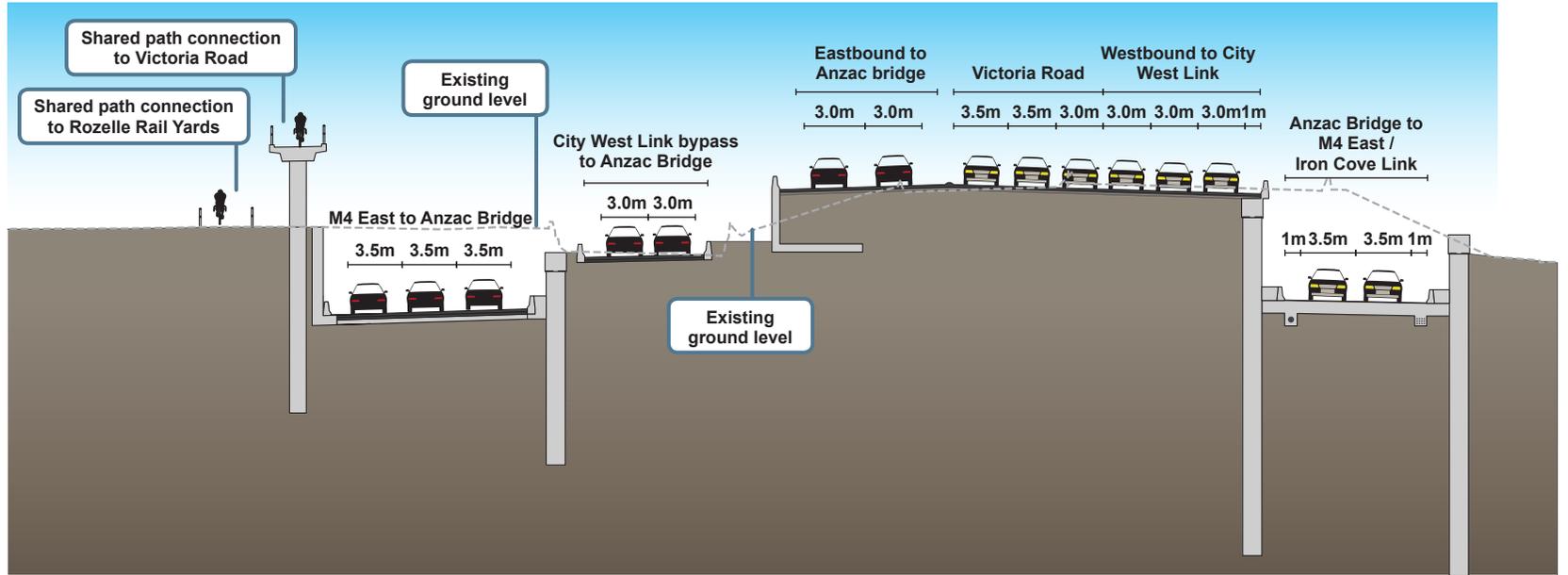


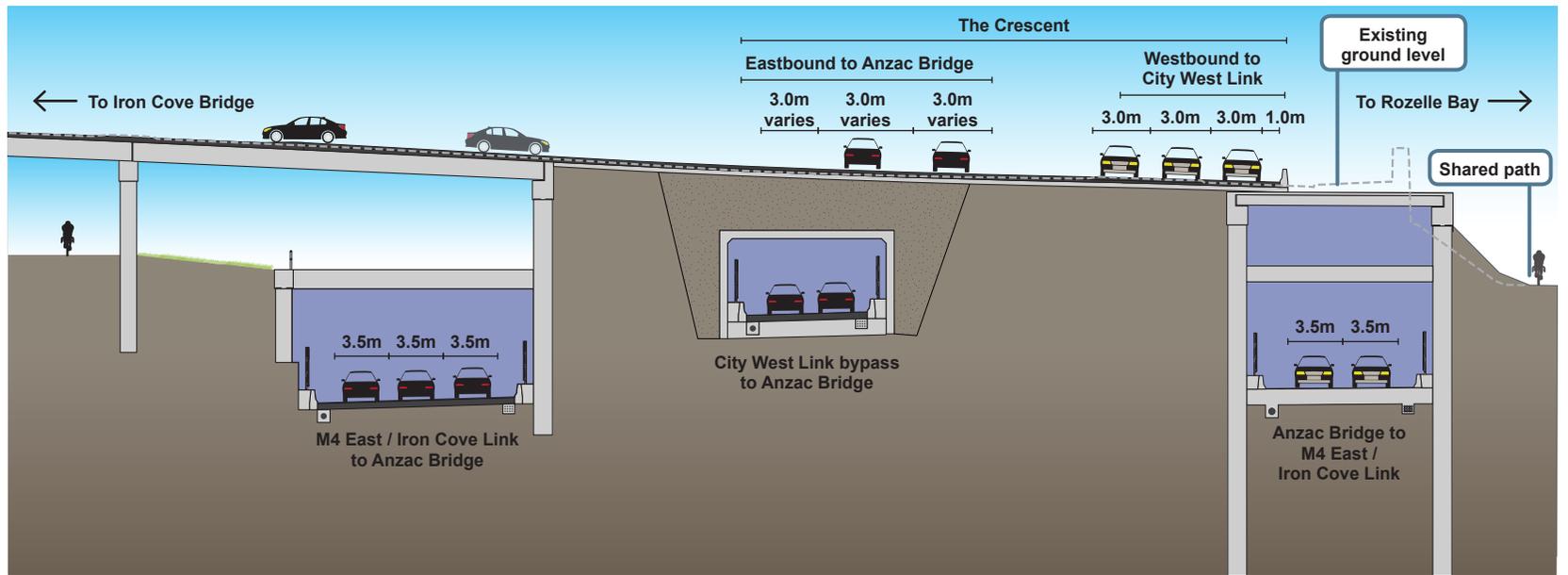
Figure 5-20 Indicative cross-section - City West Link / The Crescent to proposed future Western Harbour Tunnel and Beaches Link portals (civil construction only)



- LEGEND**
- Existing road corridor
 - Rozelle interchange tunnel
 - Surface road
 - Bus lane
 - Land subject to UDLP
 - Drainage channel
 - Shared path
 - Tunnel portal



A ————— A'



B ————— B'

Figure 5-21 Indicative cross-section - Victoria Road / Anzac Bridge to M4 East / Wattle Street interchange portals

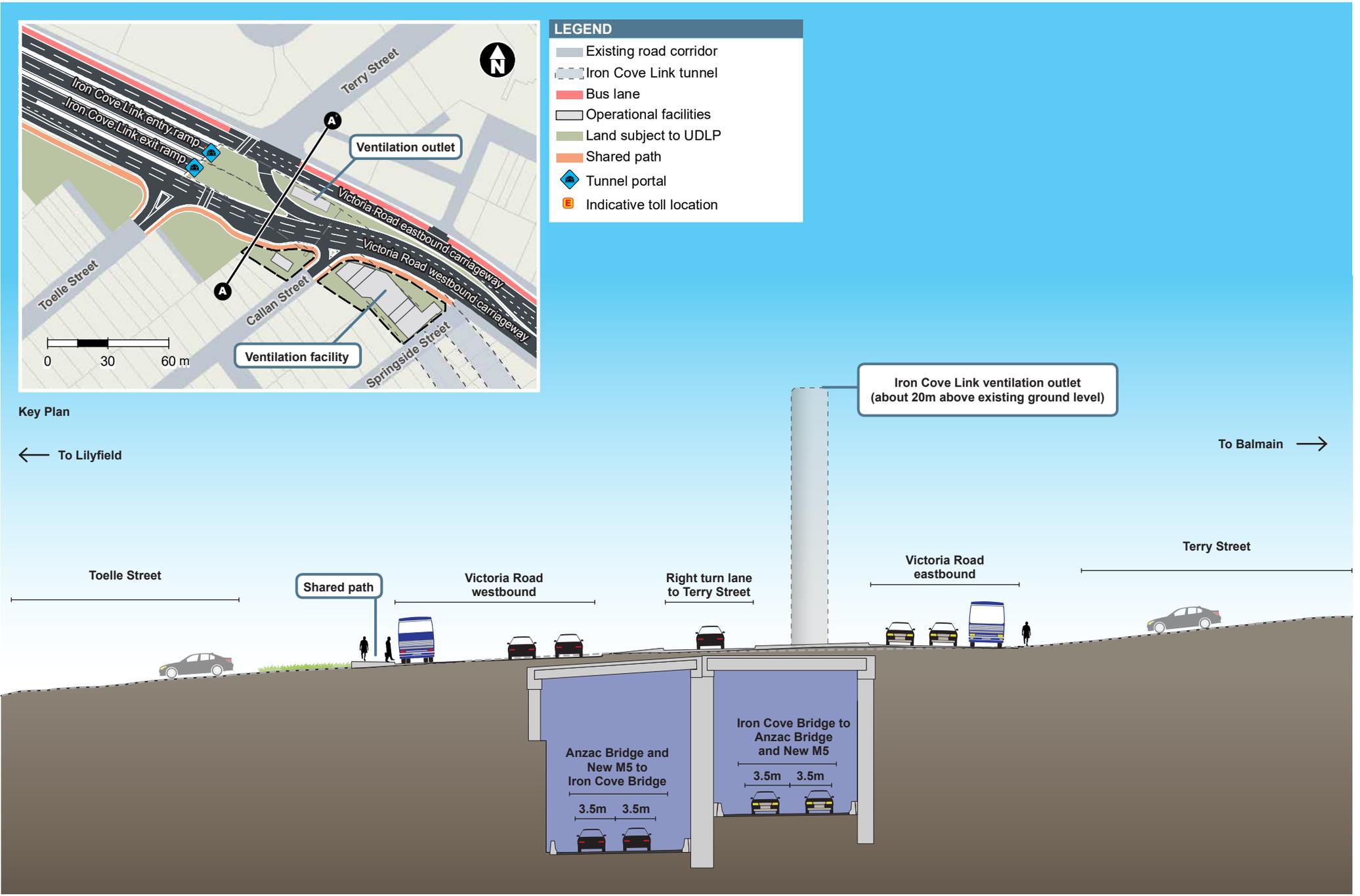


Figure 5-22 Indicative cross-section - Iron Cove Link portals

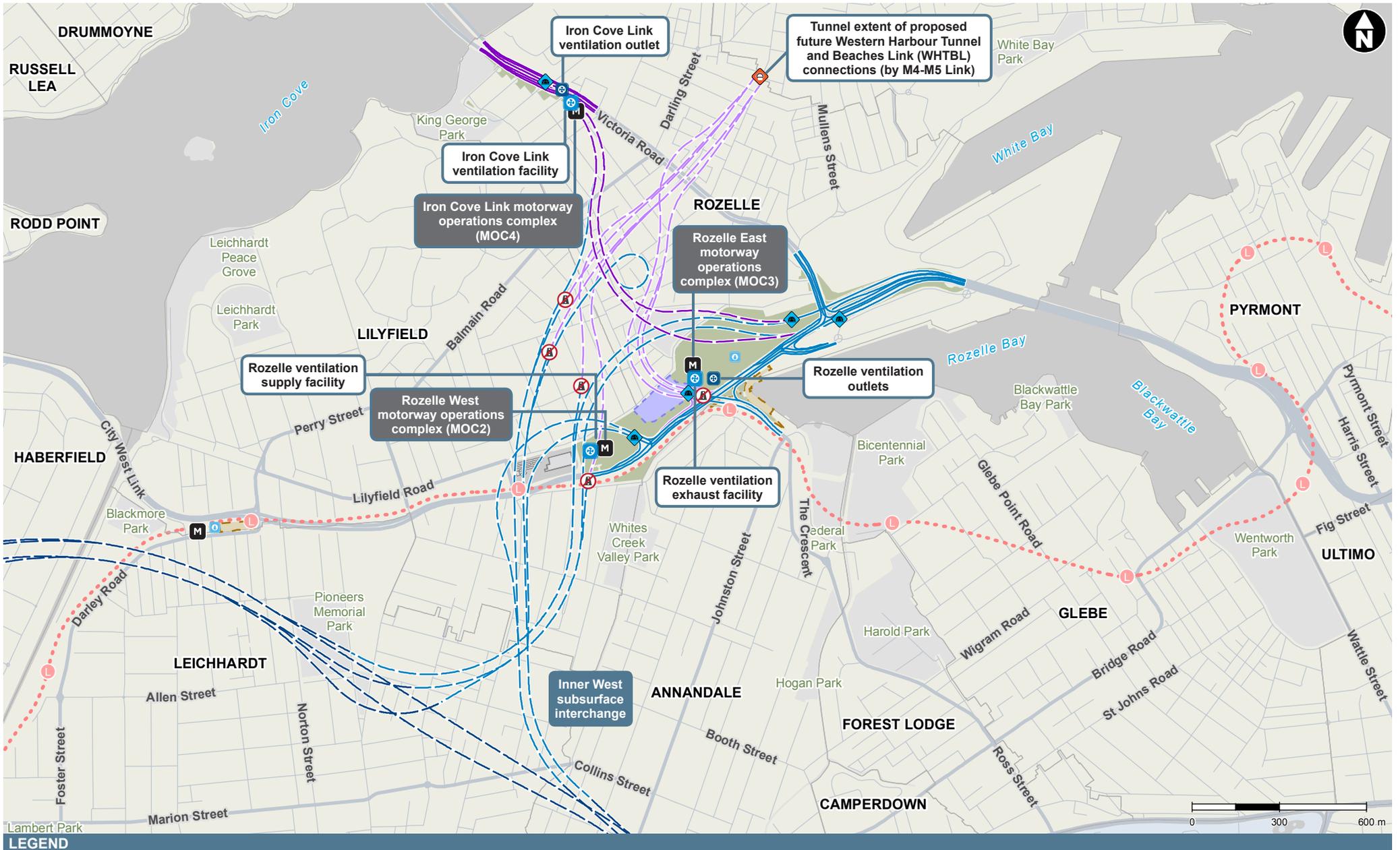


Figure 5-23 Rozelle interchange - M4-M5 Link project operational layout

5.4 Integration with other WestConnex projects

5.4.1 Connection to the M4 East mainline tunnel

The mainline tunnels would connect with the M4 East mainline tunnels underground around Alt Street at Haberfield (see **Figure 5-2**). This would be a tunnel-to-tunnel connection facilitated by stub tunnels that are being constructed as part of the M4 East project, and would provide for travel between the M4-M5 Link and M4 East mainline tunnels. The mainline tunnels would be three-lanes wide in each direction at this connection.

5.4.2 Connection to the Wattle Street interchange

Entry and exit ramps would connect the mainline tunnels with the Wattle Street interchange at Haberfield via tunnel portals and twin, two-lane cut-and-cover tunnels and dive structures being built between the divided Wattle Street carriageways. These ramps are being built as part of the M4 East project. This connection is shown in **Figure 5-2** and an indicative cross-section of these tunnel portals is shown in **Figure 5-17**.

To efficiently manage the merge between the Wattle Street interchange entry ramp and the mainline tunnels and the approach to the Inner West subsurface interchange, the Wattle Street interchange entry ramp would divide into two, one-lane entry ramps about midway along the entry ramp (around Alt Street at Haberfield). These single lane tunnels would then join with the southbound mainline tunnel before the Inner West subsurface interchange. Motorists traveling to the Rozelle interchange would join on the left (northern) side of the southbound mainline tunnel, and motorists traveling to the New M5 Motorway would join on the right (southern) side of the southbound mainline tunnel.

By giving motorists the ability to choose a merge location dependent on their destination, this arrangement would make driving in the tunnel safer by reducing the amount of lane changes that motorists may need to carry out on the approach to the Inner West subsurface interchange. Further detail on operational traffic is provided in **Chapter 8** (Traffic and transport) and **Appendix H** (Technical working paper: Traffic and transport).

5.4.3 Connection to the New M5 mainline tunnel

The M4-M5 Link and New M5 mainline tunnels would connect underground north of the Princes Highway at about the intersection of Mary Street and Bakers Lane (see **Figure 5-9**). This would be a direct tunnel-to-tunnel connection facilitated by stub tunnels that are being constructed as part of the New M5 project. The mainline tunnels would be two lanes wide in each direction at this connection with provision to be increased to three lanes in the future (if required).

The northbound mainline tunnel would divide into two, one-lane tunnels generally below Campbell Road at St Peters, separating Rozelle interchange bound motorists from M4 East Motorway bound motorists. These separate tunnels would extend north before joining the northbound St Peters interchange entry ramp. Motorists traveling to the Rozelle interchange would merge on the right (eastern) side, and motorists traveling to the M4 East Motorway would merge on the left (western) side.

By giving motorists the ability to choose a merge location dependent on their destination, this arrangement would make driving in the tunnel safer by reducing the number of lane changes that motorists may need to carry out on the approach to the Inner West subsurface interchange. Further detail on operational traffic is provided in **Chapter 8** (Traffic and transport) and **Appendix H** (Technical working paper: Traffic and transport).

5.4.4 Connection to the St Peters interchange

Entry and exit ramps would provide a connection between the M4-M5 Link mainline tunnels and the interchange at St Peters, which is being delivered as part of the New M5 project. The ramps would be three to four lanes in each direction and would provide for connections between the M4-M5 Link mainline tunnels, the proposed future Sydney Gateway project and the surface road network at St Peters (Gardeners Road and Campbell Road via the St Peters interchange). This connection is shown in **Figure 5-9**.

The St Peters interchange exit ramp would increase from three to four lanes around 350 metres north of the St Peters interchange tunnel portal (below ground). As the exit ramp approaches the surface at the St Peters interchange, three lanes on the western side would continue straight ahead, forming the connection to the proposed future Sydney Gateway project (via the St Peters interchange). The left lane would divide away on the approach to the surface and would increase to two lanes, forming the exit ramp that would connect the M4-M5 Link with local roads at St Peters (via the St Peters interchange).

To enable the connection between the M4-M5 Link entry and exit ramps and the St Peters interchange, tunnel portals and twin, three-lane cut-and-cover tunnels are being built below a fully-enclosed bridge that extends from around the property line on the north side of Campbell Street to the property line on the south side of Albert Street. These works are being carried out as part of the New M5 project. The M4-M5 Link project would extend the cut-and-cover tunnel of the southbound exit ramp for around 100 metres south of Albert Street (at the St Peters interchange) to support a section of the Campbell Road ventilation facility (see **section 5.8.2** for details about this facility).

Works to complete the entry and exit ramps would be carried out as part of the M4-M5 Link project and would include stabilisation and civil works, including installation of pavement and line marking, drainage, barriers, wall panels and mechanical and electrical works.

Connections between the M4-M5 Link and the proposed future Sydney Gateway at the St Peters interchange would not be open to motorists as part of the M4-M5 Link project. The proposed future Sydney Gateway would be subject to separate environmental assessment and approval and does not form part of this project.

5.5 Connectivity

The project has been designed to provide essential connections between the M4 East and New M5 motorways and the surface road network at Haberfield, Lilyfield, Rozelle and St Peters. The project would also facilitate expansion of a connected motorway network for western and south-western Sydney by enabling future connections to the proposed future Western Harbour Tunnel at Rozelle, and the proposed future Sydney Gateway via the St Peters interchange.

The connectivity that would be provided by the project comprises:

- Free-flow connection (that is, a connection that does not require motorists to travel through or stop at an intersection) between:
 - The M4 East and the New M5, via the mainline tunnels
 - The M4 East and Anzac Bridge, via the Rozelle interchange
 - The M4 East and the proposed future Western Harbour Tunnel and Beaches Link, via the Rozelle interchange (this connection would not be operational as part of the project)
 - The New M5 and the Iron Cove Link, via the Rozelle interchange
 - The New M5 and the proposed future Western Harbour Tunnel and Beaches Link (this connection would not be operational as part of the project)
 - Anzac Bridge and Victoria Road at Rozelle, near the eastern abutment of Iron Cove Bridge (via the Iron Cove Link)
- A connection between the New M5 and the surface road network at Lilyfield and Rozelle, via a new intersection with City West Link between Catherine Street and The Crescent (see **section 5.6.2**)
- A connection between the surface road network and the proposed future Western Harbour Tunnel and Beaches Link, via the realigned intersection of City West Link and The Crescent (see **section 5.6.3**).

The mainline tunnel connection between the M4 East at Haberfield and the New M5 at St Peters is shown in **Figure 5-1**. The connectivity that would be provided by the Rozelle interchange and the Iron Cove Link is shown in **Figure 5-24**.

These planned and proposed connections have been determined based on the strategic road network requirements of the region. Further detail is provided in **Chapter 8** (Traffic and transport) and **Appendix H** (Technical working paper: Traffic and transport).



Figure 5-24 Rozelle interchange connectivity

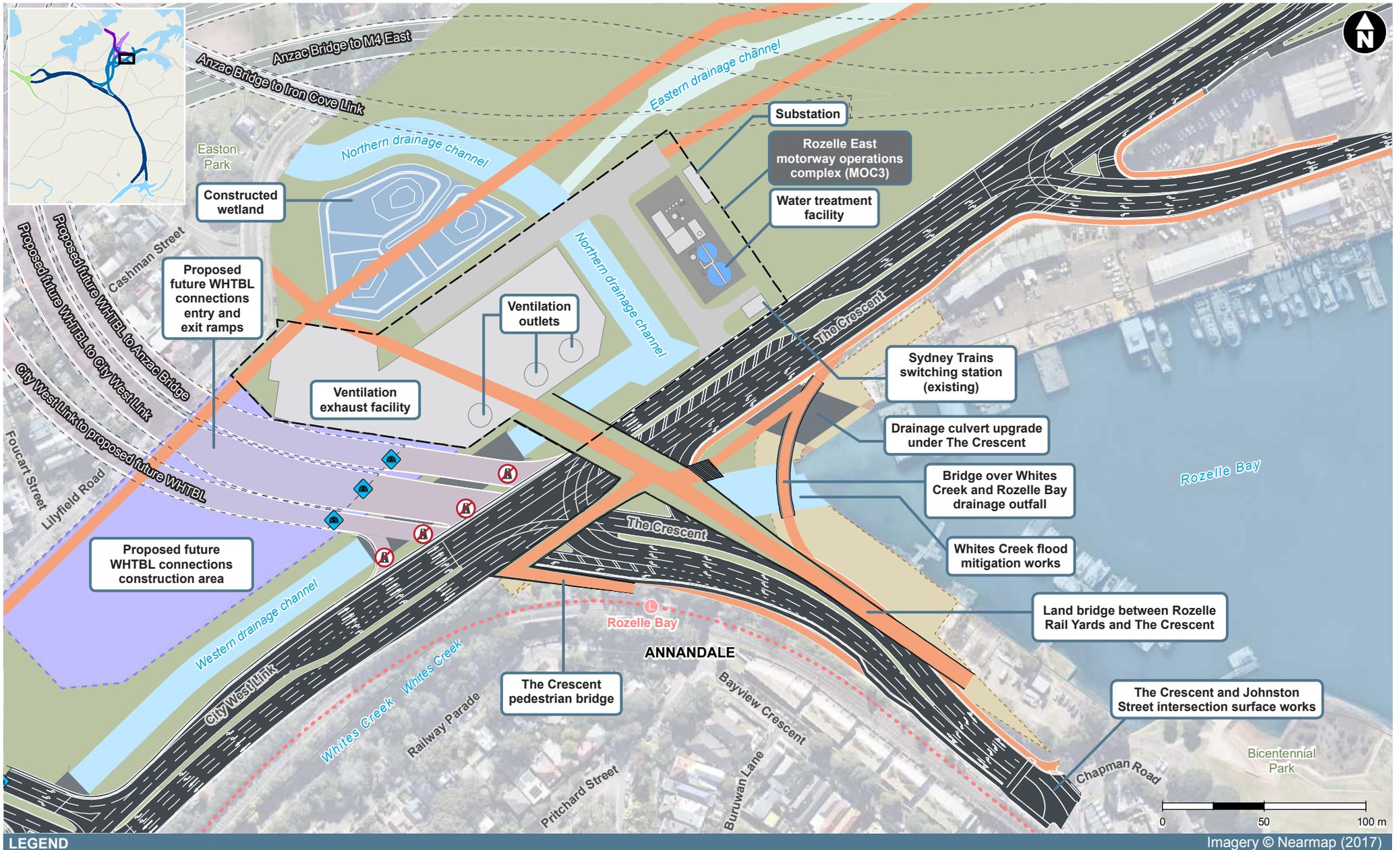
5.6 Rozelle surface works

The surface road network around the Rozelle interchange would be upgraded and modified to ensure safe and efficient connections with the road infrastructure proposed as part of the project, and to cater for additional traffic demands in the future. A detailed analysis of the traffic and transport impacts of the Rozelle surface works is provided in **Chapter 8** (Traffic and transport) and **Appendix H** (Technical working paper: Traffic and transport).

The Rozelle surface works would include:

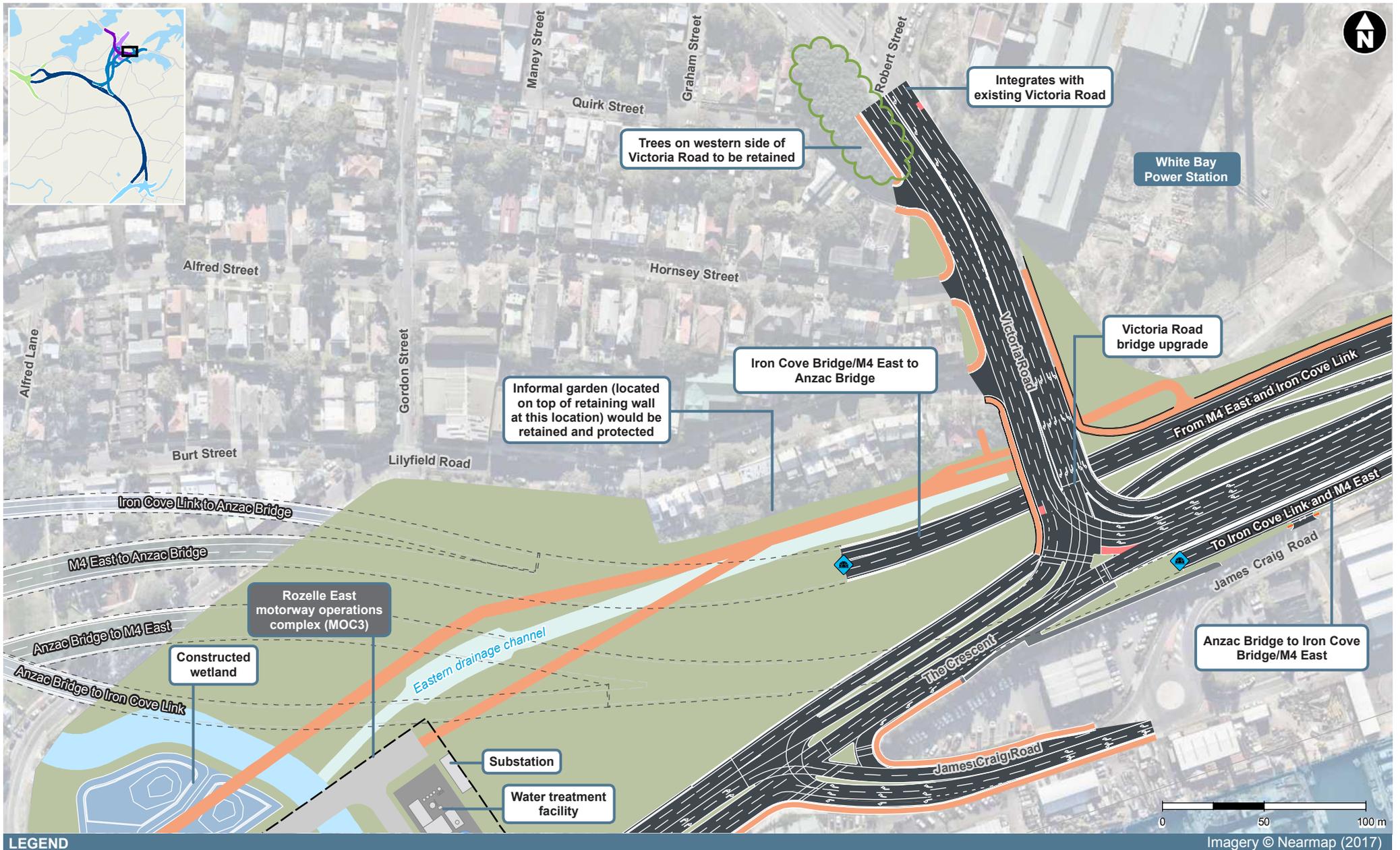
- Realigning and upgrading City West Link and The Crescent between around 300 metres east of Catherine Street at Lilyfield, and The Crescent/Victoria Road intersection
- A new intersection on City West Link between Catherine Street and The Crescent to connect the surface road network to the New M5 St Peters interchange (via the M4-M5 Link mainline tunnels)
- Realigning The Crescent at Annandale, including a new bridge over Whites Creek and modifications to the intersection with City West Link and Johnston Street
- Upgrades to the intersection of City West Link and The Crescent
- Reconstructing the intersection of The Crescent and Victoria Road at Rozelle, including construction of a new bridge at Victoria Road and minor adjustments to Victoria Road north of this intersection
- Widening and adjustments of Victoria Road between The Crescent and Anzac Bridge
- The Rozelle West motorway operations complex (MOC2) including the Rozelle ventilation supply facility and an electrical substation (see **section 5.8** for further detail)
- The Rozelle East motorway operations complex (MOC3) including the Rozelle ventilation exhaust facility, ventilation outlets and the permanent water treatment facility (see **section 5.8** for further detail)
- Drainage infrastructure to collect surface and groundwater for treatment at dedicated facilities (see **section 5.9** for further detail)
- Widening and improvement works to the channel and bank of Whites Creek at Annandale, between around the light rail bridge and Rozelle Bay. These works would be carried out to manage flooding and drainage for the surface road network
- Landscaping adjacent to disturbed areas, and the provision of new open space within the Rozelle Rail Yards
- Two new pedestrian and cyclist bridges over City West Link to connect Lilyfield Road and Victoria Road with Brenan Street at Lilyfield and The Crescent at Annandale, and a new pedestrian and cyclist underpass below Victoria Road to connect Lilyfield Road with Anzac Bridge
- Pedestrian and cyclist paths
- Other minor local road changes (such as tie-in works)
- New and upgraded bridges (see **section 5.6.6**)
- Upgrades and minor changes to public transport infrastructure (see **section 5.6.8**).

An overview of these works is shown in **Figure 5-25** to **Figure 5-28**. Details of the Rozelle surface works are provided in **section 5.6.1** to **section 5.6.9**.



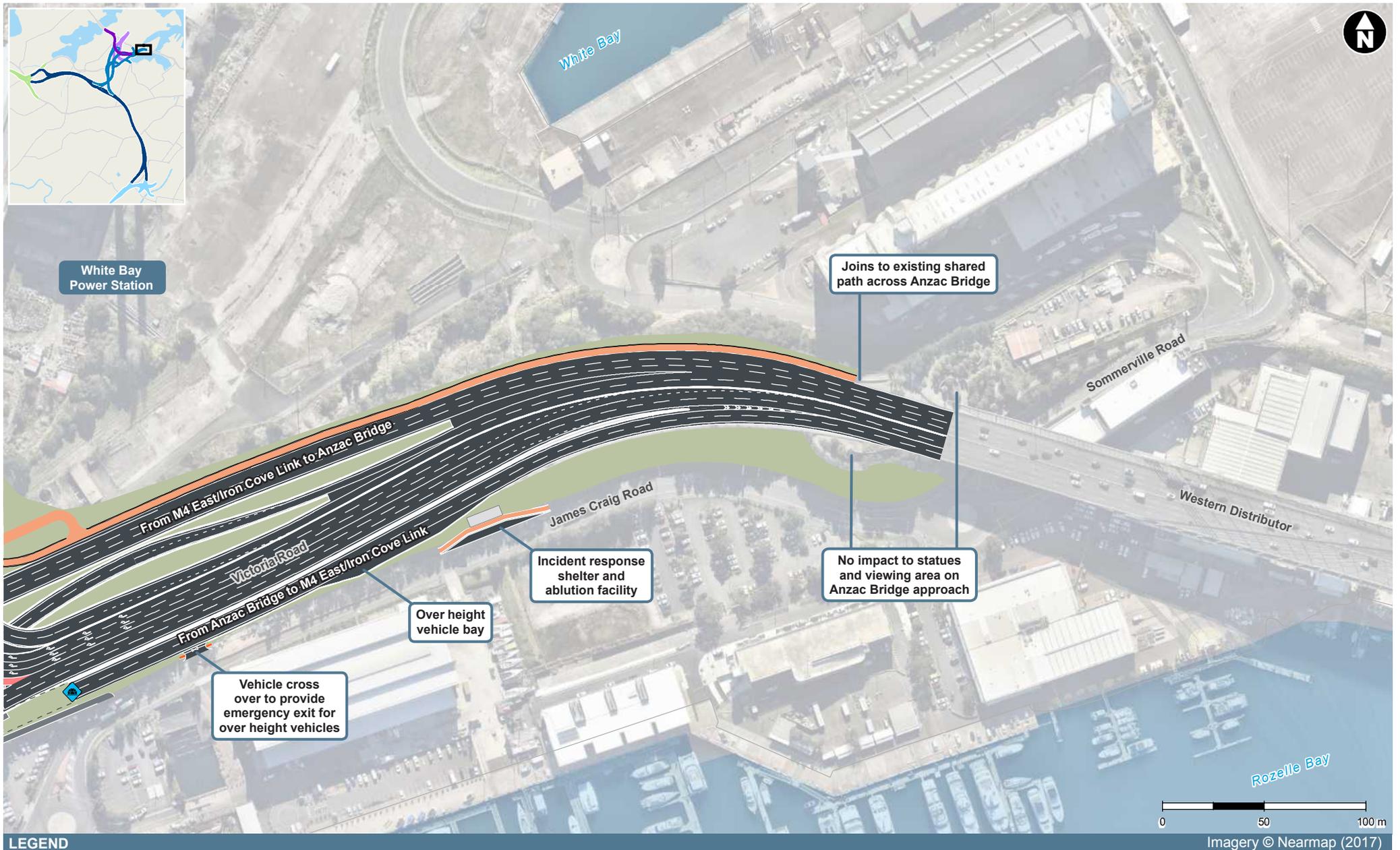
LEGEND		M4-M5 Link surface works		Project features	
--- Light rail	Iron Cove Link tunnel	Surface road	Bioswale	Proposed future WHTBL connections construction area	Tunnel portal
Light rail stop	Rozelle interchange tunnel	Operational facilities	Shared path	Proposed future WHTBL connections	Temporary barrier
	Proposed future WHTBL connections (civil construction only)	Remaining project land	Drainage channel		
		Land subject to UDLP	Constructed wetland		

Figure 5-26 Rozelle interchange surface works overview - Map 2



M4-M5 Link tunnels		M4-M5 Link surface works		Project features	
	Iron Cove Link tunnel		Surface road		Bioswale
	Rozelle interchange tunnel		Operational facilities		Shared path
			Land subject to UDLP		Drainage channel
			Constructed wetland		Bus lane
					Tunnel portal

Figure 5-27 Rozelle interchange surface works overview - Map 3



LEGEND		Project features	
Rozelle interchange tunnel	Surface road	Shared path	Bus lane
Operational facilities	Land subject to UDLP	Tunnel portal	

Figure 5-28 Rozelle interchange surface works overview - Map 4

5.6.1 Upgrade, widening and intersection works along City West Link and The Crescent

City West Link and The Crescent would be realigned and upgraded between around 300 metres east of Catherine Street and The Crescent/Victoria Road intersection (shown in **Figure 5-25** and **Figure 5-26**). The majority of widening works along City West Link would occur north of the eastbound carriageways within the existing road reserve and the adjacent Rozelle Rail Yards. This would allow the existing vegetation and noise wall between City West Link and the Inner West Light Rail line to be retained.

Traffic lanes would be between three and 3.5 metres wide. The eastbound and westbound traffic lanes would be separated by a median, which would vary in width to accommodate turning lanes at intersections.

A section of The Crescent between the upgraded City West Link/The Crescent intersection and James Craig Road would be raised about 0.2 metres (compared to the current level) to provide clearance over a new drainage channel that would direct stormwater from the Rozelle Rail Yards to Rozelle Bay. Further details about this culvert are provided in **section 5.6.6** and **section 5.9.2**.

The realignment of City West Link and The Crescent would require minor upgrade works to the intersection of The Crescent and James Craig Road. All turning movements at this intersection would be retained and the works would occur predominantly within the existing road reserve, and within adjacent Roads and Maritime owned land.

5.6.2 New intersection to connect City West Link to the New M5 and the St Peters interchange

A new intersection would be built on City West Link between Catherine Street and The Crescent to connect City West Link to the New M5 and the St Peters interchange (via the M4-M5 Link mainline tunnels). The layout and configuration of this proposed intersection is shown in **Figure 5-25**.

The new intersection would include traffic signals and would allow motorists to:

- Exit the northbound M4-M5 Link mainline tunnels from St Peters, travel along the exit ramp and either turn left or right onto City West Link
- Enter the southbound M4-M5 Link mainline tunnels to St Peters by turning left or right from City West Link to connect to the entry ramp
- Continue to travel along City West Link.

Additional lanes would be added along City West Link to accommodate right and left turn and slip lanes, comprising:

- One additional lane on the eastbound carriageway that would enable motorists to enter the southbound entry ramp via a slip lane, and exit the northbound exit ramp via traffic signals
- Two additional lanes on the westbound carriageway that would become right turn lanes, to enable motorists to enter the southbound entry ramp. This right turn movement would be via traffic signals.

The works to construct the new intersection between City West Link and the Rozelle interchange would occur within land designated as road reserve and within the Rozelle Rail Yards to the north of City West Link.

5.6.3 Realignment of The Crescent at Annandale

The Crescent at Annandale between City West Link and Johnston Street would be realigned westwards by up to around 75 metres. This section of The Crescent would comprise two northbound lanes, three southbound lanes and a median. Traffic lanes in both directions would be around 3.5 metres wide. A new bridge would be built to allow The Crescent to span Whites Creek (see **section 5.6.6**). The layout and configuration of these works are shown in **Figure 5-26**.

A shared pedestrian and cyclist path would be provided on both sides of The Crescent (southbound and northbound carriageways). A pedestrian and cyclist bridge would also be provided to connect the eastern and western sides of The Crescent and the Rozelle Bay light rail stop. This bridge would also extend over City West Link and into the Rozelle Rail Yards to connect with the pedestrian and cyclist path network to be provided (see **section 5.7.4**).

The majority of works to realign The Crescent would be conducted in land designated as:

- Road reserve
- Open space along the western side of The Crescent (Buruwan Park). Buruwan Park would be replaced by operational road infrastructure
- Land owned by Roads and Maritime between The Crescent and Rozelle Bay.

Widening and improvement works to the channel and bank of Whites Creek at Annandale would also be carried out to manage flooding and drainage for the surface road network. These works are described in **section 5.9.2** and shown in **Figure 5-30**. Land use and property impacts are considered further in **Chapter 12** (Land use and property). Socio-economic impacts associated with changes to land use and property are considered in **Chapter 14** (Social and economic).

The Crescent/City West Link intersection upgrades and modifications

The intersection of The Crescent and City West Link would be upgraded to safely and efficiently manage traffic entering and leaving the surface road network and the Rozelle interchange. The layout and configuration of this intersection is shown in **Figure 5-26**. The upgraded intersection would be integrated with other surface road works at Lilyfield and Rozelle and would allow motorists to:

- Turn left from the northbound carriageway of The Crescent at Annandale onto City West Link
- Turn right from the northbound carriageway of The Crescent at Annandale, to continue along The Crescent eastbound towards Victoria Road/Anzac Bridge
- Turn right from the eastbound carriageway of City West Link to head south along The Crescent at Annandale
- Turn left from the westbound carriageway of City West Link, to continue south along The Crescent at Annandale.

Modification works at this intersection would include:

- Realignment of the intersection to the west of its current location
- Dedicated right and left turn lanes.

The upgraded intersection would also include new lanes that would allow motorists to enter and exit the proposed future Western Harbour Tunnel and Beaches Link to and from The Crescent and City West Link. These road connections would only become operational when connected to the proposed future Western Harbour Tunnel and Beaches Link if approved (which would be the subject of separate future assessment and approval process).

5.6.4 Reconstruction of Victoria Road at Rozelle

Victoria Road surface works

The southbound and northbound carriageways of Victoria Road at Rozelle would be reconstructed between Robert Street at Rozelle and the intersection with The Crescent in generally the same alignment as the existing arrangement, with minor widening to the western side. The works would be conducted on land designated as road reserve and on adjacent land that would be acquired for the project. The buildings on the adjacent land would be demolished as part of the project.

Reconstruction of this section of Victoria Road would be carried out to tie-in with the upgraded intersection with The Crescent and is shown in **Figure 5-27**. The remaining land to the east of Victoria Road would be landscaped to be consistent with the UDLP for the project.

Traffic lanes in both directions would be about 3.5 metres wide. A shared pedestrian and cyclist path would be provided on the eastern and western side of Victoria Road. The northbound carriageway of Victoria Road would include two 80-metre long right-turn lanes to allow motorists to turn right into Robert Street. No changes to the intersection of Victoria Road and Robert Street are proposed as part of the project.

Victoria Road/The Crescent intersection modifications

The intersection of Victoria Road and The Crescent would be reconstructed in generally the same alignment as the existing arrangement. The existing Victoria Road bridge would be replaced to enable the M4 East/Iron Cove Link to Anzac Bridge exit ramp and the new east–west pedestrian and cyclist connection to be accommodated beneath (see **section 5.6.5**). The intersection would be integrated with surface road works along Victoria Road and The Crescent and is shown in **Figure 5-27**.

For motorists travelling eastbound along The Crescent towards Anzac Bridge, two lanes would diverge from the eastbound carriageway before the intersection with Victoria Road, continue east below Victoria Road, and merge with the eastbound carriageway of Victoria Road on the approach to Anzac Bridge.

5.6.5 Victoria Road/Anzac Bridge approaches

The eastbound and westbound Victoria Road carriageways would be modified on the approach to and from Anzac Bridge to incorporate the M4 East/Iron Cove Link entry and exit ramps and tunnel portals. The configuration and layout of these modifications are shown in **Figure 5-27** and **Figure 5-28** and described below:

- The M4 East/Iron Cove Link to Anzac Bridge exit ramp would surface at the tunnel portal west of Victoria Road within the Rozelle Rail Yards, travel below the Victoria Road bridge and merge with the northern (eastbound) carriageway on the approach to Anzac Bridge
- Anzac Bridge to M4 East/Iron Cove Link entry ramp would diverge from the southern (westbound) carriageway of Victoria Road on the approach from Anzac Bridge, extend west adjacent to the westbound carriageway of Victoria Road and enter the tunnel portal south of the intersection of The Crescent and Victoria Road.

5.6.6 Bridges and cut-and-cover structures at the Rozelle interchange

This section describes the replacement of existing bridges and the provision of new bridges and structures as part of the Rozelle surface works. The locations of these are shown in **Figure 5-25** to **Figure 5-28**. Indicative cross-sections are shown in **Figure 5-29**. Bridges and structures at the Rozelle interchange are described in the following sections, and would include:

- Replacement of the bridge at the intersection of Victoria Road and The Crescent. The existing bridge would be demolished
- Replacement of the bridge over Whites Creek along the new alignment of The Crescent. The existing bridge would be demolished
- Two new bridges over the western drainage channel along the southern boundary of the Rozelle Rail Yards at the following locations:
 - City West Link to New M5/St Peters interchange entry and exit ramps
 - The proposed future Western Harbour Tunnel and Beaches Link entry and exit ramps
- A new low-level bridge over a new culvert below City West Link. The culvert would direct water flows from the northern drainage channel within the Rozelle Rail Yards to Rozelle Bay. See **section 5.9.2** for drainage infrastructure detail
- Three new pedestrian and cyclist bridges comprising:
 - A bridge over City West Link linking Lilyfield Road and the Rozelle Rail Yards with Brennan Street and Whites Creek at Lilyfield
 - A bridge over City West Link and The Crescent that would connect Lilyfield Road and the Rozelle Rail Yards with The Crescent, Rozelle Bay light rail stop and Annandale and Glebe

- A bridge over Whites Creek and the Rozelle Bay drainage outfall. Utilities would also be located on the underside of this bridge
- Cut-and-cover tunnels and tunnel portal structures in the Rozelle Rail Yards.

Replacement of the Victoria Road bridge

The bridge at the intersection of Victoria Road and The Crescent would be replaced. During construction, traffic would be switched to a temporary bridge to minimise disruptions to motorists. When construction is complete, traffic would be switched on to the new bridge and the temporary bridge would be removed. Below the new bridge, redundant rail infrastructure (including rail tracks) would be removed.

The location of the Victoria Road bridge is shown in **Figure 5-27** and an indicative cross-section is shown in **Figure 5-29**.

New bridge over Whites Creek at The Crescent

A new bridge would be constructed over Whites Creek at Annandale along the new alignment of The Crescent, which would also facilitate the widening and improvement works to Whites Creek. The bridge would be constructed off-line (that is, next to the existing bridge), which would mean that traffic would continue to use this section of The Crescent during construction). When construction of the new bridge is complete, traffic would be switched onto the new bridge and the existing bridge would be demolished.

The design of the bridge would consider water forces resulting from a major flooding event and account for scour, buoyancy and tie down requirements. Existing retaining walls along City West Link would need to be partially demolished and modified to accommodate the northern abutment of the new bridge.

The location of the new bridge over Whites Creek is shown in **Figure 5-26** and an indicative cross-section is shown in **Figure 5-30**.

New bridge over the drainage channel below City West Link

A new low-level bridge structure would support a section of The Crescent carriageways between the intersection with City West Link and the intersection with James Craig Road. This low-level bridge would span over the northern drainage channel that would convey flows from the Rozelle Rail Yards to Rozelle Bay. A series of box culverts would continue from the culvert structures to facilitate drainage from Rozelle Rail Yards to Rozelle Bay. During construction, a temporary diversion of this section of The Crescent would be established to allow for these works on The Crescent to be carried out while minimising disruption to the surface road network.

The location of this bridge and the associated culvert structure is shown in **Figure 5-26** and an indicative cross-section is shown in **Figure 5-31**.

New bridges over the drainage channels within the Rozelle Rail Yards

New bridges would be built over the western drainage channel within the Rozelle Rail Yards to support the City West Link to New M5 and City West Link to the proposed future Western Harbour Tunnel and Beaches Link entry and exit ramps. The design of these bridges would consider water forces resulting from a major flooding event and account for scour, buoyancy and tiedown requirements.

The locations of drainage channel bridges within the Rozelle Rail Yards are shown in **Figure 5-25** to **Figure 5-27**. An indicative cross-section is shown in **Figure 5-32**.

Pedestrian and cyclist bridges

The project would deliver new pedestrian and cyclist infrastructure at Lilyfield and Rozelle. This infrastructure has been designed to maintain and enhance pedestrian and cyclist accessibility and connectivity, providing new and upgraded east–west connections linking Lilyfield and Rozelle with Anzac Bridge, the future Bays Precinct and Balmain, and north–south connections linking Lilyfield and Rozelle with Annandale and Glebe.

Pedestrian and cyclist bridges are described in the following sections and shown in **Figure 5-25** to **Figure 5-27**. Detailed descriptions of the active transport connections to be provided or enabled by the M4-M5 Link project are also provided in **Appendix N** (Technical working paper: Active transport strategy).

New bridge over City West Link linking Lilyfield Road and Brenan Street

A new bridge would be constructed at the western end of the Rozelle interchange to provide pedestrian and cyclist connectivity between Lilyfield and Annandale, by connecting Lilyfield Road to Brenan Street and the Whites Creek shared path. The bridge would provide a direct and safe grade-separated link over City West Link and the existing light rail tracks near the Lilyfield light rail stop.

At the northern end, the approach ramp of the bridge would connect to the new shared path at the elevated platform above the New M5/City West Link dive structures, and link to the new shared path along Lilyfield Road. At the southern end, it is proposed to locate the approach ramps within the area between the light rail corridor, the existing Whites Creek channel and Brenan Street.

New bridge over City West Link and The Crescent

A new pedestrian and cyclist bridge would extend across City West Link and The Crescent to provide a direct link for pedestrians and cyclists between Lilyfield Road, the Rozelle Rail Yards, City West Link, The Crescent and the Rozelle Bay light rail stop, linking Anzac Bridge, Balmain, Rozelle and Lilyfield with Annandale and Glebe.

The main span of the bridge over City West Link would be a smooth and slender structure with distinctive architectural features. The second span of the bridge would extend over The Crescent and provide a connection to the Rozelle Bay light rail stop. A ramp would continue down to connect to the bus stop on The Crescent.

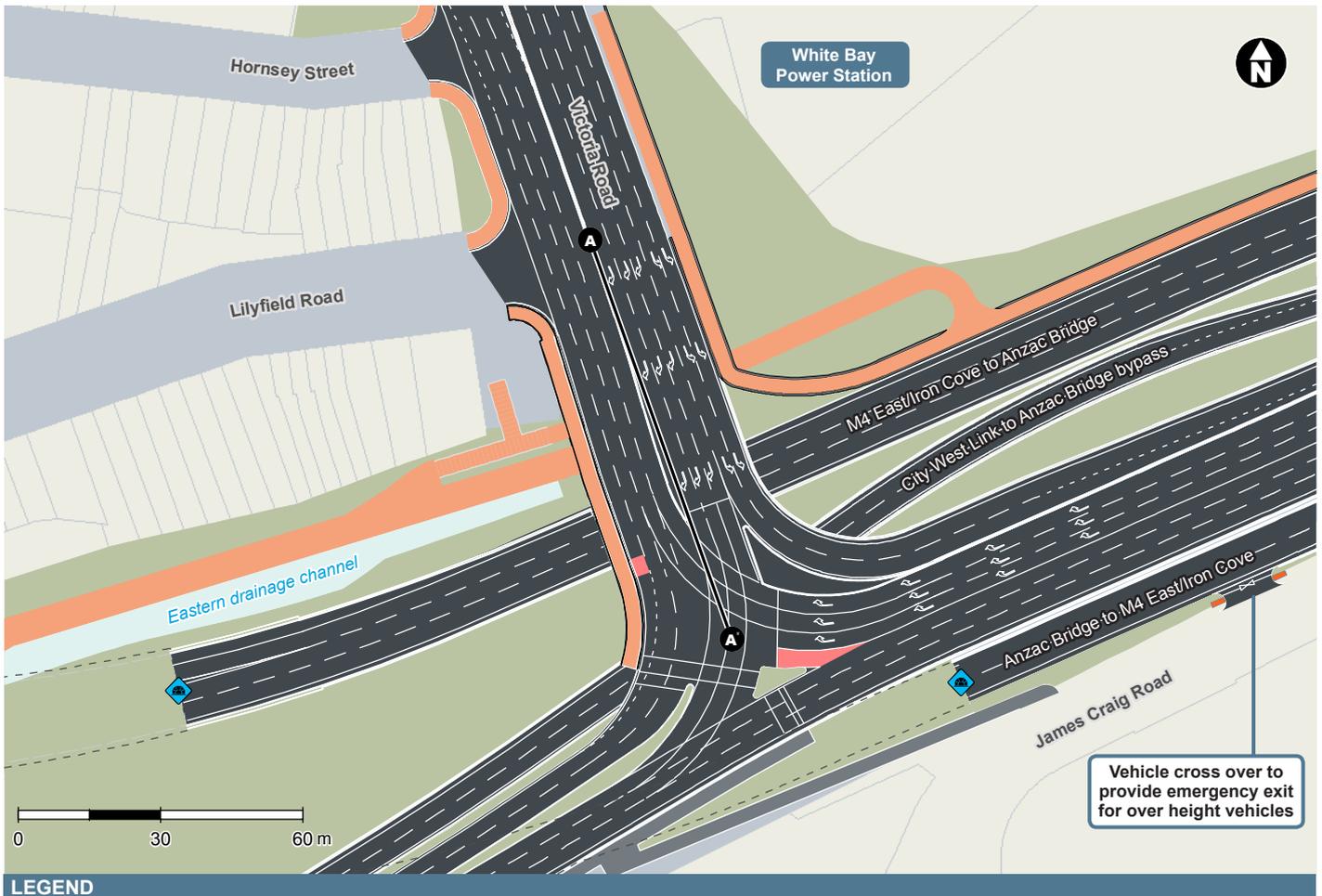
Pedestrian bridge over Whites Creek and the Rozelle Bay drainage outfall

A new bridge would be constructed over the widened Whites Creek channel and the Rozelle Bay drainage outfall to provide a pedestrian connection along The Crescent. This bridge would also incorporate a new utility service corridor for multiple existing utilities running along The Crescent. An indicative alignment of this bridge is shown in **Figure 5-26**.

Cut-and-cover structures within the Rozelle Rail Yards

Cut-and-cover structures would be constructed for the City West Link to New M5/St Peters interchange entry and exit ramps, M4 East/Iron Cove Link to Anzac Bridge entry and exit ramps and proposed future Western Harbour Tunnel and Beaches Link entry and exit ramps, where these ramps approach the surface.

The location of the cut-and-cover structures are shown in **Figure 5-25** to **Figure 5-28**. A description of the construction methodology for cut-and-cover structures is included in **Chapter 6** (Construction work).



LEGEND

- | | | | | |
|-------------------------|----------------------------|---------------------------------|----------|-------------|
| Project features | M4-M5 Link tunnels | M4-M5 Link surface works | | |
| Tunnel portal | Rozelle interchange tunnel | Surface road | Bioswale | Bus lane |
| | | Land subject to UDLP | | Shared path |

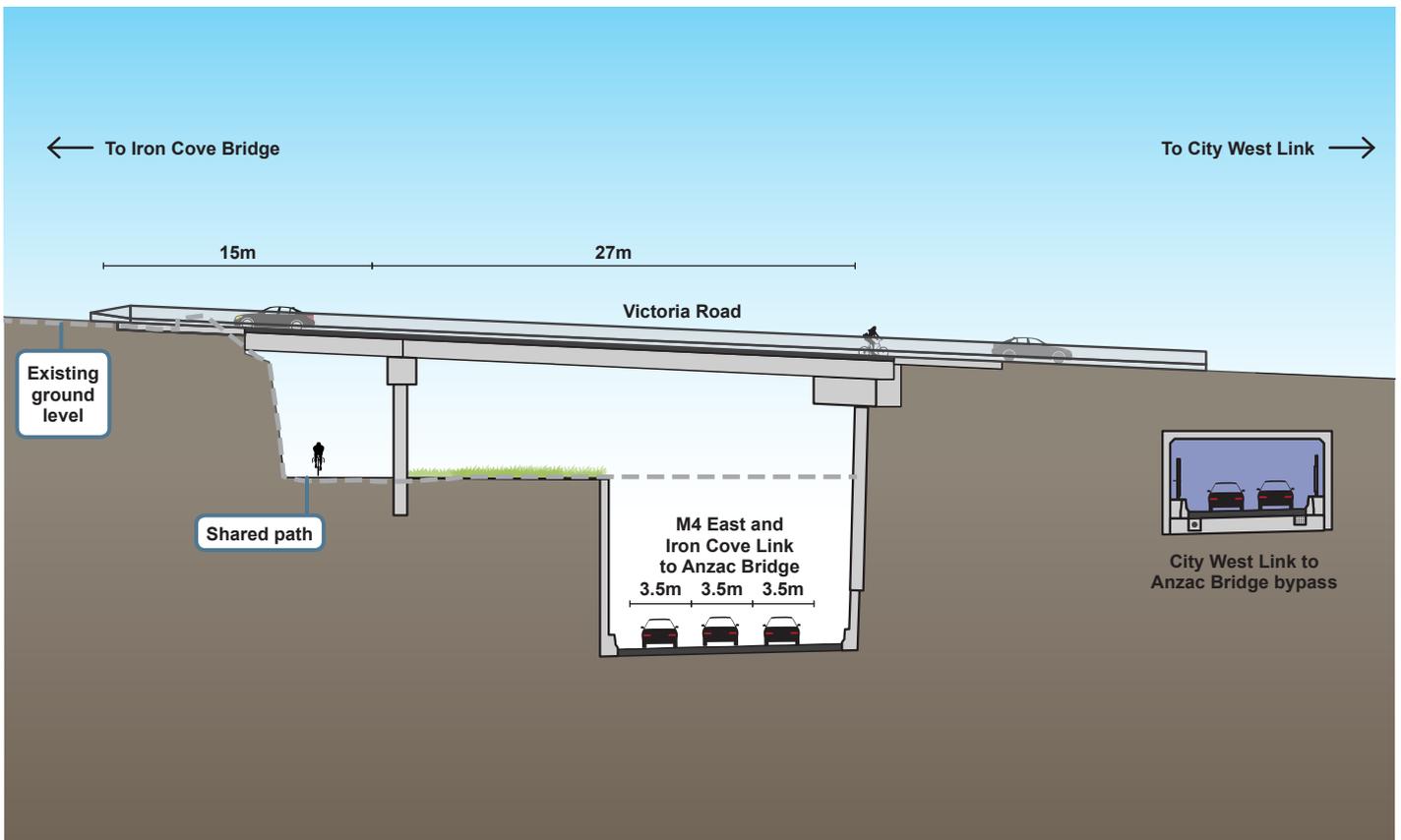


Figure 5-29 Indicative cross-section - replacement of the Victoria Road bridge

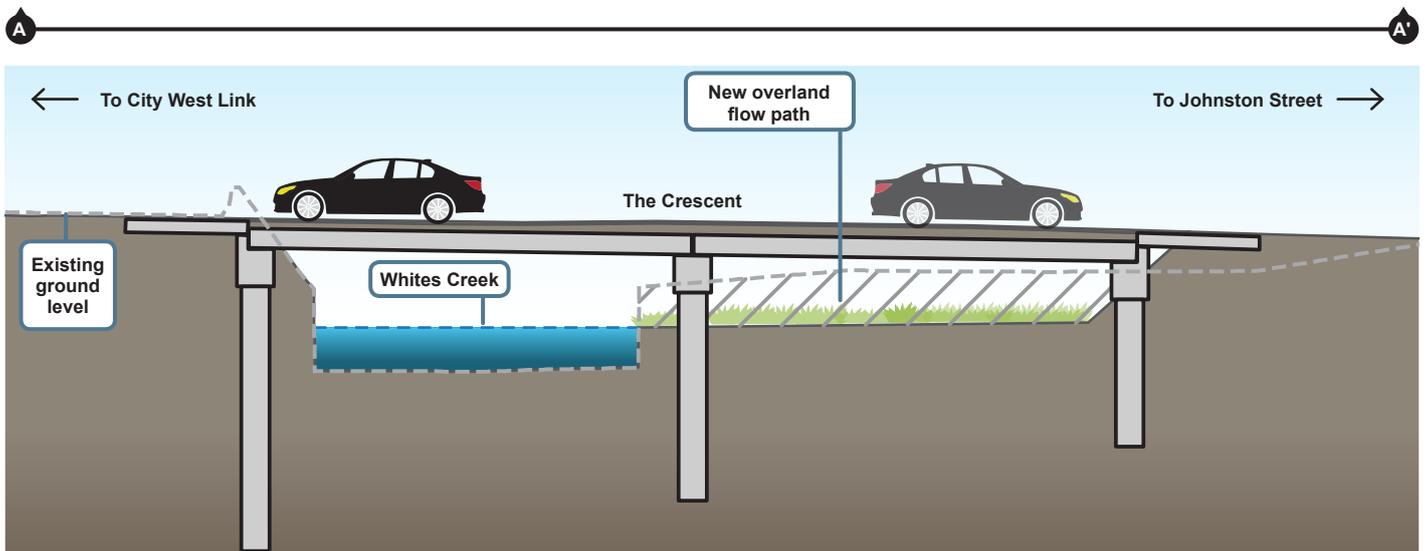
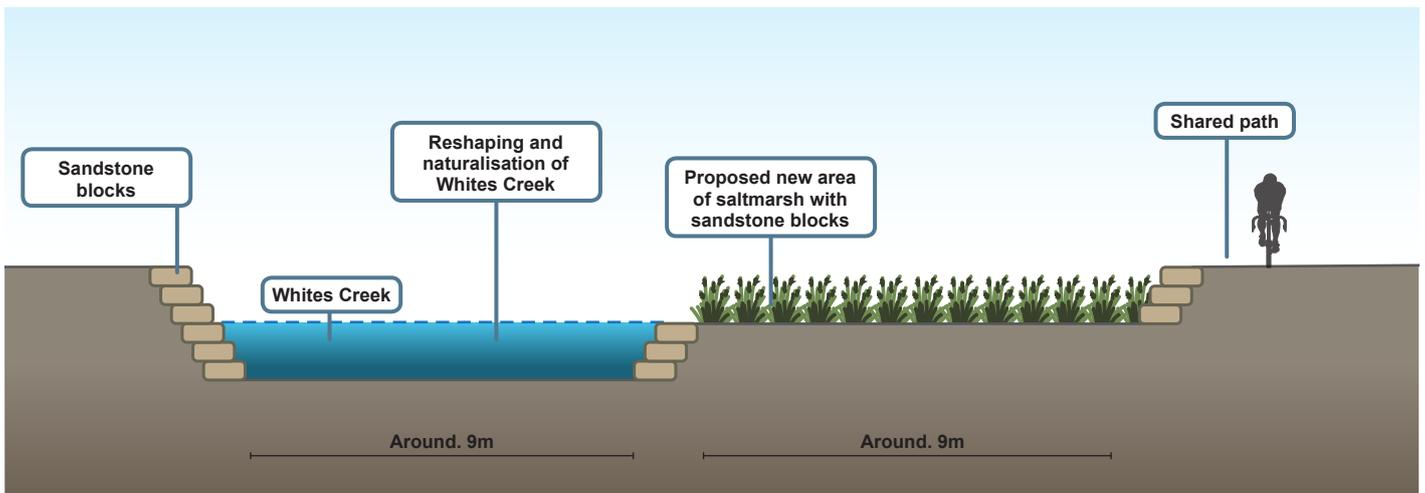
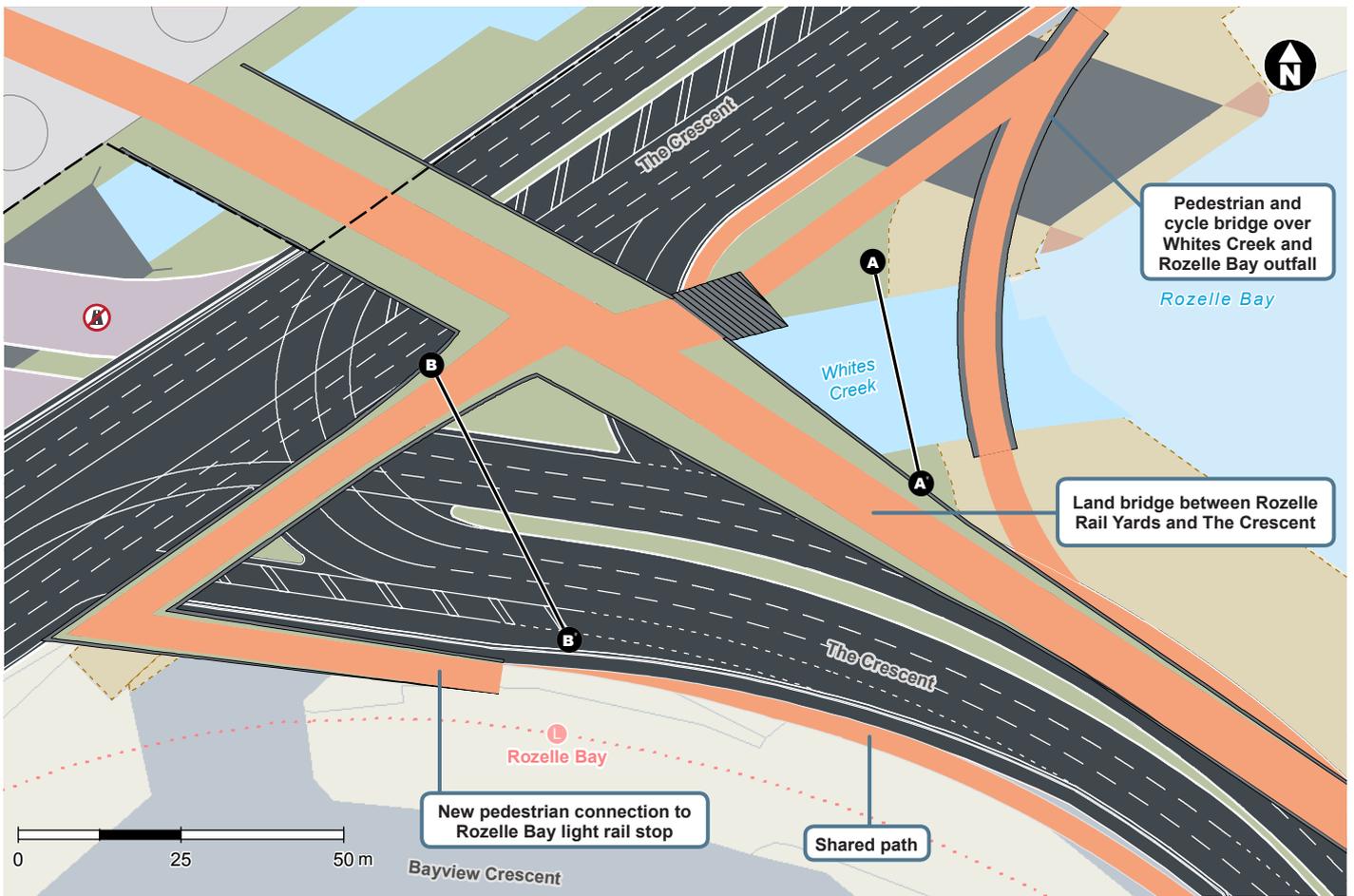
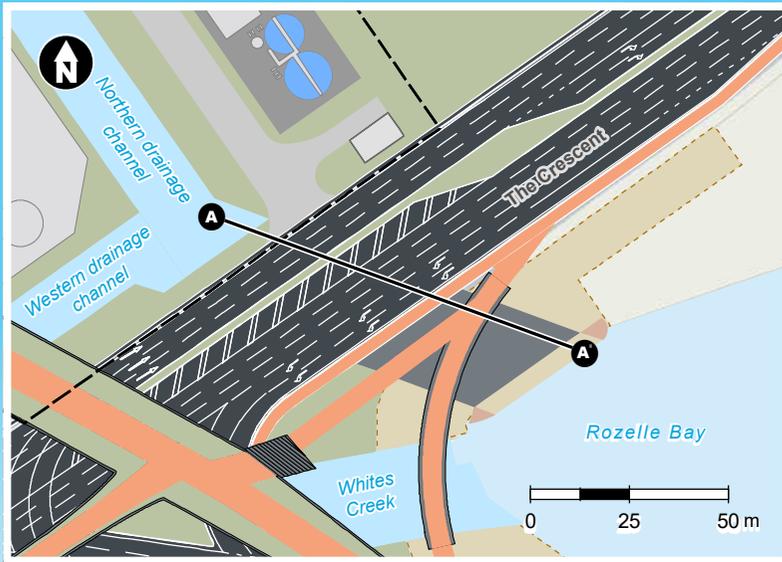


Figure 5-30 Indicative cross-section – new bridge over Whites Creek at The Crescent



LEGEND	
	Surface road
	Operational facilities
	Remaining project land
	Land subject to UDLP
	Shared path

Key Plan

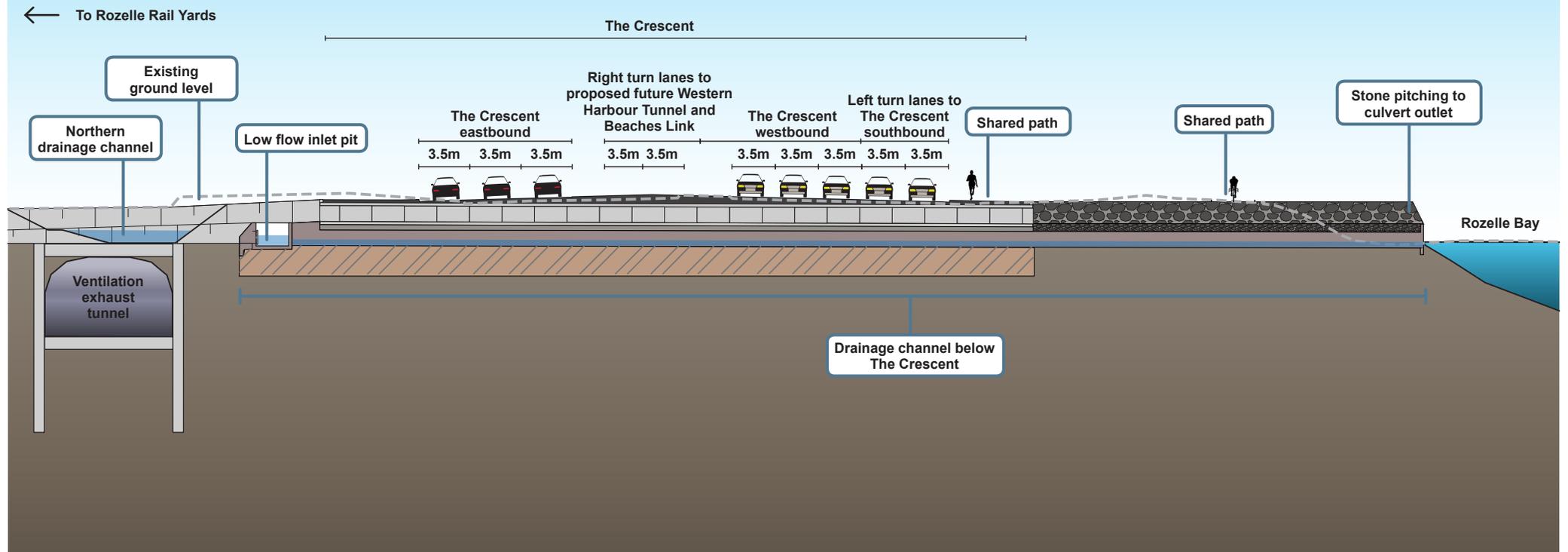
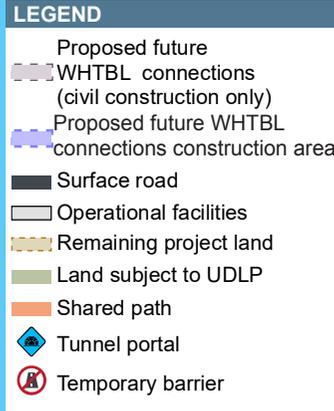
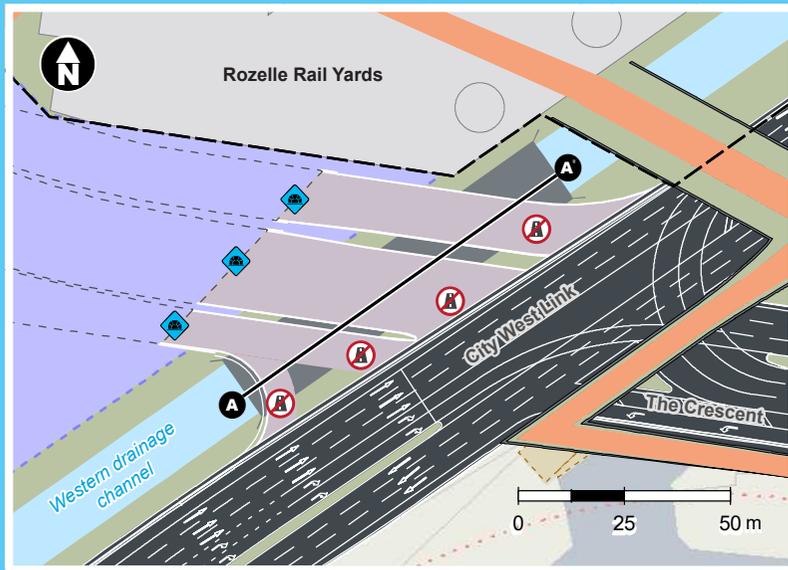


Figure 5-31 Indicative cross-section – new bridge over the northern drainage channel below The Crescent



Key Plan

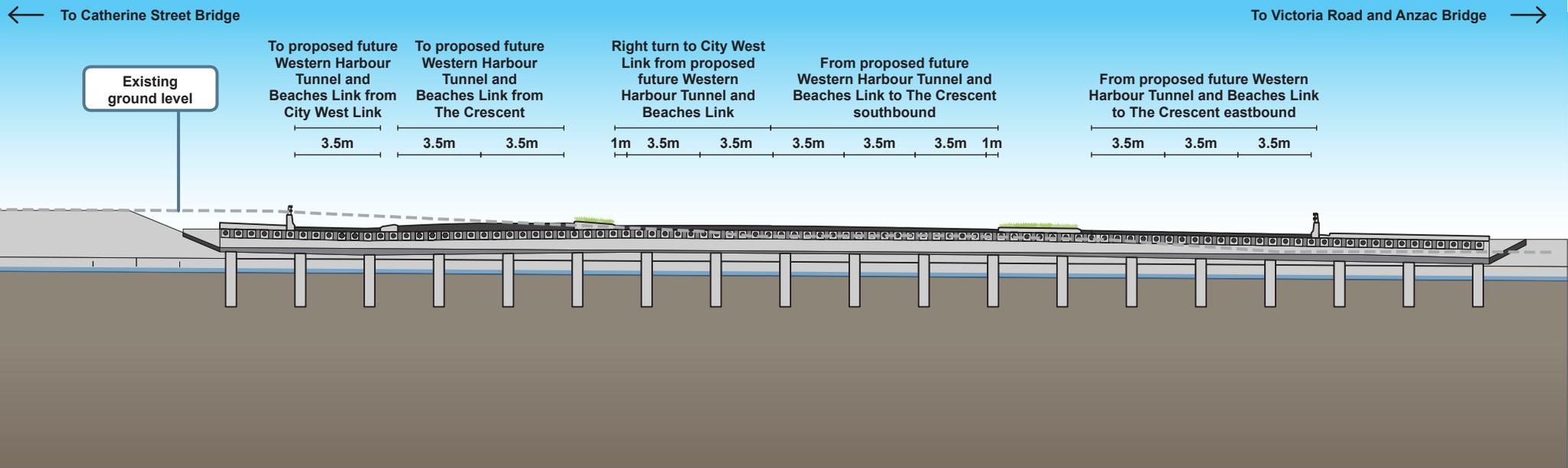


Figure 5-32 Indicative cross-section – new bridge over the western drainage channel within the Rozelle Rail Yards

5.6.7 Urban design and landscape

As part of the project, urban design and landscaping works would be carried out adjacent to disturbed areas associated with the Rozelle surface works, and would include the provision of new open space within the Rozelle Rail Yards. The urban design and landscaping works that would be carried out as part of the Rozelle surface works are shown in **Figure 5-33** and would include (but not be limited to):

- Detailed review and finalisation of the architectural treatment of the operational motorway infrastructure
- Earthworks to reshape the site around the motorway operational infrastructure. Long-sections showing the indicative landform following the construction of the Rozelle interchange are included in **Figure 5-34** to **Figure 5-38**)
- Provision of pedestrian and cyclist paths and bridges
- Provision of new open space within the Rozelle Rail Yards, including landscaping
- Revegetation, including tree planting, at key locations including:
 - Around motorway operational infrastructure such as the ventilation facility
 - Around the constructed wetland, bioretention swale and the drainage channels
 - Adjacent to pedestrian and cyclist paths
 - Around the perimeter of the Rozelle Rail Yards.

Tree planting within the Rozelle Rail Yards would be integrated with street tree planting that would be carried out by the project.

A concept design for these urban design and landscaping works has been prepared having regard to the urban design objectives and principles in **section 5.2**. The concept design is included in **Appendix L** (Technical working paper: Urban design), **Appendix N** (Technical working paper: Active transport strategy) and **Chapter 13** (Urban design and visual amenity). The concept design would be refined during the development of a UDLP, which would be prepared based on the detailed design and in accordance with relevant commitments in this EIS. The UDLP would be prepared in consultation with relevant councils, stakeholders and the community.

A section of the Rozelle Rail Yards around the proposed future Western Harbour Tunnel and Beaches Link entry and exit ramps would be kept as an area of hardstand, in anticipation of it being used to support construction of the proposed future Western Harbour Tunnel and Beaches Link project (if it is approved). Following handover from the project, this area would be physically separated from the remainder of the interchange to restrict access. The possible future use of this area for construction of the proposed future Western Harbour Tunnel and Beaches Link project may mean that landscaping and revegetation works at the Rozelle Rail Yards would need to be staged. Staging of future urban and landscape design works would be outlined in the UDLP.

5.6.8 Integration with public transport

This section describes how the project would integrate with the existing public transport network around the Rozelle interchange, including the Inner West Light Rail line and the bus routes that run along Victoria Road and The Crescent.

Connections to the Inner West Light Rail line

The section of the Inner West Light Rail line around the Rozelle surface works runs north-south between The Crescent and Bayview Crescent at Annandale, and east-west between City West Link and Railway Parade at Annandale. The Rozelle Bay light rail stop is located near the intersection of The Crescent and City West Link and is accessible from Bayview Crescent and The Crescent (via Buruwan Park).

The realignment of The Crescent would include a new pedestrian connection to the Rozelle Bay light rail stop. During construction, a temporary connection for pedestrians would be provided to ensure continued access; cyclists would be diverted via The Crescent/Johnston Street/Bayview Crescent (refer to **Chapter 6** (Construction work) for details on this temporary connection).

The new pedestrian and cyclist bridge that would span City West Link and that would connect The Crescent with the Rozelle Rail Yards would also include a new pedestrian and cyclist connection to the Rozelle Bay light rail stop. Further details on this bridge connection are provided in **section 5.6.6**. The project would not affect the existing connection to the Rozelle Bay light rail stop from Bayview Crescent at Annandale.

Changes to bus infrastructure

The project would require temporary and permanent changes to bus infrastructure around the Rozelle surface works. One bus stop on The Crescent on the western (northbound) side between City West Link and Johnston Street would be relocated during the realignment and upgrade of The Crescent. The northbound bus stop would be permanently relocated around 80 metres south of the existing location. Bus lanes and clearways along Victoria Road would be retained in generally the same configuration as existing.

The project offers a flexible design which does not preclude bus priority measures being included in the future, including along Victoria Road and Anzac Bridge. Roads and Maritime and Transport for NSW will continue to work together to deliver Sydney's Bus Future, which may be extended to the area around the Rozelle interchange in due course, at which point the surface road network can be adapted to include measures identified at a future date.

Temporary changes to bus infrastructure would also be required during construction. These are outlined in **Chapter 6** (Construction work).

5.6.9 Potential future uses of remaining project land around the Rozelle surface works

In most cases, at the completion of construction, land around the Rozelle surface works would be landscaped to be consistent with the UDLP to be prepared for the project.

Land required for construction but not required for operation that does not form part of the UDLP would be rehabilitated at the end of the construction period and made suitable for either return to the previous owner or lessee, or potential development for permissible uses under land use zoning provisions. Where this is the case, potential future development would be subject to separate development assessment and approval and the restrictions of the relevant consent authority. The project would not rezone or consolidate remaining project land and therefore there would be no changes to land use zoning for future development around the Rozelle surface works.

Remaining project land would be subject to the provisions of a Residual Land Management Plan that would be prepared for the project. The Residual Land Management Plan would be prepared in consultation with the relevant council and would identify (and consider), but not be limited to:

- Identification and illustration of all remaining project land, including the location, land use characteristics, size and adjacent land uses
- Identification of feasible uses for remaining project land including justification for the selected use
- Timeframes for implementation of the actions in relation to the identified feasible uses.

Further details about the remaining project land and the Residual Land Management Plan are provided in **Chapter 12** (Land use and property).