

M4-M5 Link

Environmental Impact Statement

August 2017

Appendix A



Since finalisation of the Environmental Impact Statement, the project has been declared by Ministerial Order to be State significant infrastructure and critical State significant infrastructure under sections 115U (4) and 115V of the *Environmental Planning and Assessment Act 1979*. The Ministerial Order also amended Schedule 5 of *State Environmental Planning Policy (State and Regional Development) 2011*. The project remains subject to assessment under Part 5.1 of the *Environmental Planning and Assessment Act 1979* and requires the approval of the Minister for Planning.



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Volume 2A

Appendix

A.....	Project synthesis
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Appendix



Project synthesis



Roads and Maritime Services

WestConnex M4-M5 Link

Environmental Impact Statement

Project synthesis

August 2017

Client: Roads and Maritime Services

ABN: 76 236 371 088

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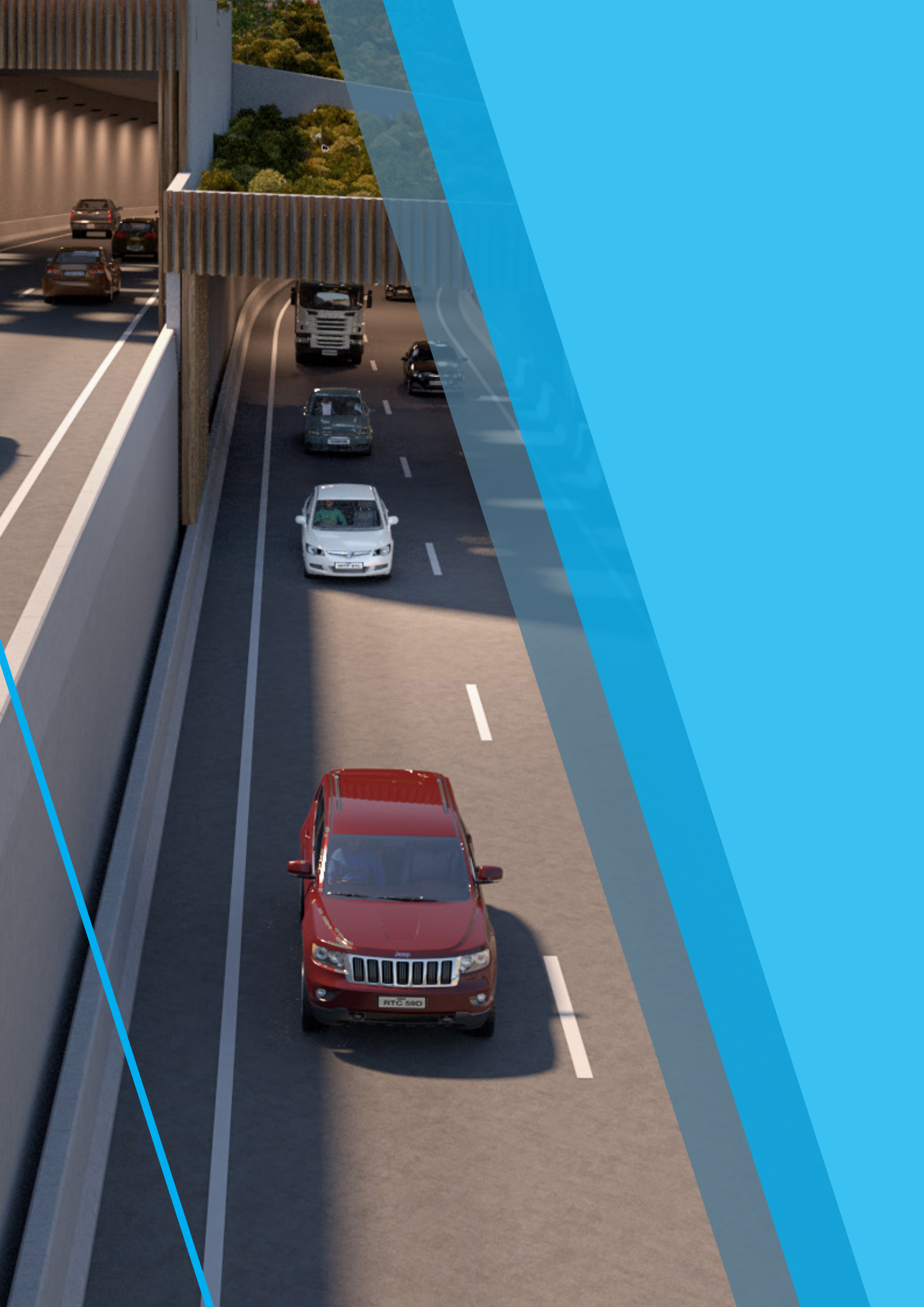
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Introduction





1 Introduction

1.1 Purpose of this document

This project synthesis provides a technical summary of the environmental impact statement (EIS) for the WestConnex M4-M5 Link project (the project). The main body of the EIS should be referred to for further details. This project synthesis has been prepared in response to the Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW Department of Planning and Environment (DP&E) and includes:

- A succinct but full description of the project (see **Chapter 2**)
- A description of key design refinements and how these refinements have minimised or avoided environmental and community impacts (see **Chapter 3**)
- A compilation of the impacts of the project that have not been avoided (see **Chapter 4**)
- A compilation of the proposed measures associated with each impact to avoid or minimise (through design refinements or ongoing management during construction and operation) or offset these impacts (see **Chapter 4**)
- A compilation of the project outcomes (see **Chapter 5**)
- A description of how some aspects of design, construction and/or operational methodologies will be resolved in the next stages of the project (see **Chapter 6**)
- A justification of the project with regard to the biophysical, economic and social considerations, including ecologically sustainable development and cumulative impacts (see **Chapter 7**).

1.2 Overview of the project

NSW Roads and Maritime Services (Roads and Maritime) is seeking approval to construct and operate the project). Key features of the project include:

- Twin mainline motorway tunnels between the M4 East Motorway at Haberfield and the New M5 Motorway at St Peters, including connections of the mainline tunnels to the M4 East project and New M5 project
- 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
- 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, and provide connections to the proposed future Western Harbour Tunnel and Beaches Link
- Twin tunnels that would connect Victoria Road near the eastern abutment of Iron Cove Bridge and Anzac Bridge (the Iron Cove Link)
- Surface works at Rozelle and at the Iron Cove Link
- Associated construction and operational infrastructure including motorway operations complexes, tunnel ventilation systems and facilities, drainage, traffic control, signage and utility treatments
- Urban design and landscaping, including new open space at Rozelle and new and upgraded pedestrian and cyclist infrastructure.

Key components of the project are further described in **Chapter 2**.

1.3 Overview of WestConnex

The project is part of the WestConnex program of works, which consists of five component projects as shown in **Figure 1-1**. Separate planning applications and assessments have been completed for each of the approved WestConnex projects (M4 Widening, M4 East, King Georges Road Interchange Upgrade and New M5). In addition to linking to other WestConnex projects, the project 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) projects. Separate project planning and environmental assessments are currently underway for the proposed future Western Harbour Tunnel and Beaches Link project and the proposed future Sydney Gateway project.

Collectively these projects would form a network of motorways to improve the efficiency of traffic flows between western Sydney, the inner west and the Sydney Airport and Port Botany precinct, with onward connectivity to the south and north of Sydney, as well as providing a bypass of the Sydney central business district (CBD).

1.4 Delivery of the project

The design and construction of the M4-M5 Link differs from the approach adopted for the M4 East and New M5 projects. For the M4 East and New M5 projects, a design and construction contractor was appointed early and had input into the design development process, EIS preparation and construction planning for those projects during the EIS phase. The EISs for the M4 East and New M5 projects assessed the construction contractor's design. For the M4-M5 Link project, design and construction contractors would be appointed to undertake the detailed design and construction planning following project approval. This means the detail of the design and construction approach presented in this EIS is indicative, ie is based on a concept design.

The project would be subject to detailed design and construction planning by the successful contractors once the project has been approved by the NSW Minister for Planning (see **section 1.5**). The design presented by the contractors would be consistent with any environmental management measures, conditions of approval for the project and other requirements identified during the assessment of the project. Issues raised during public consultation on the EIS or in the assessment of the project by DP&E would also be taken into account during the preparation of the preferred infrastructure report and through the detailed design process.

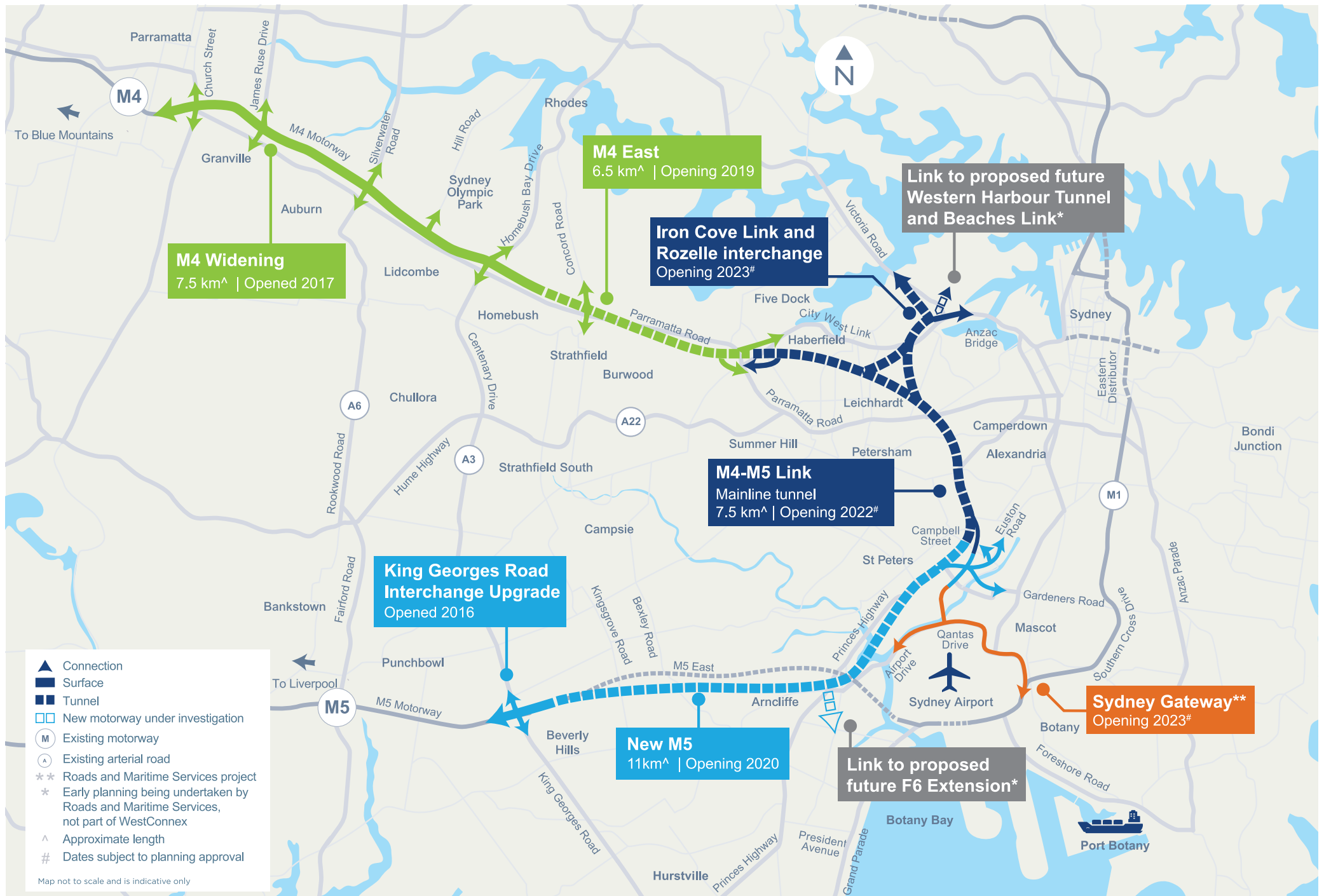


Figure 1-1 Overview of WestConnex and related projects

1.5 Assessment and approval process

The project requires approval from the NSW Minister for Planning under Part 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). A request has been made for the NSW Minister for Planning to specifically declare the project to be State significant infrastructure and also critical State significant infrastructure. The assessment and approvals process under Part 5.1 of the EP&A Act is illustrated in **Figure 1-2**. Further information on the assessment process is available on the DP&E website (www.planning.nsw.gov.au).

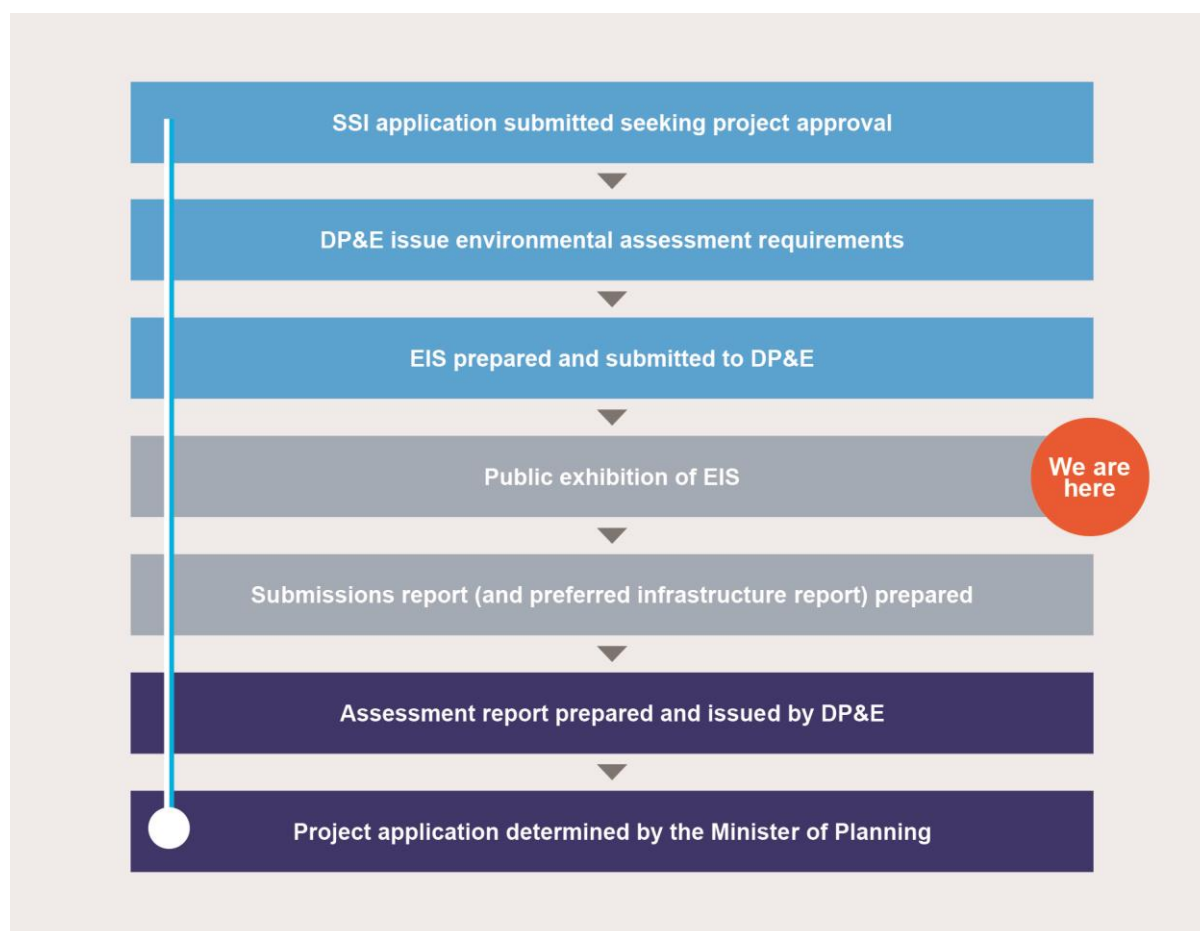


Figure 1-2 Assessment and approval process

1.6 Future consultation

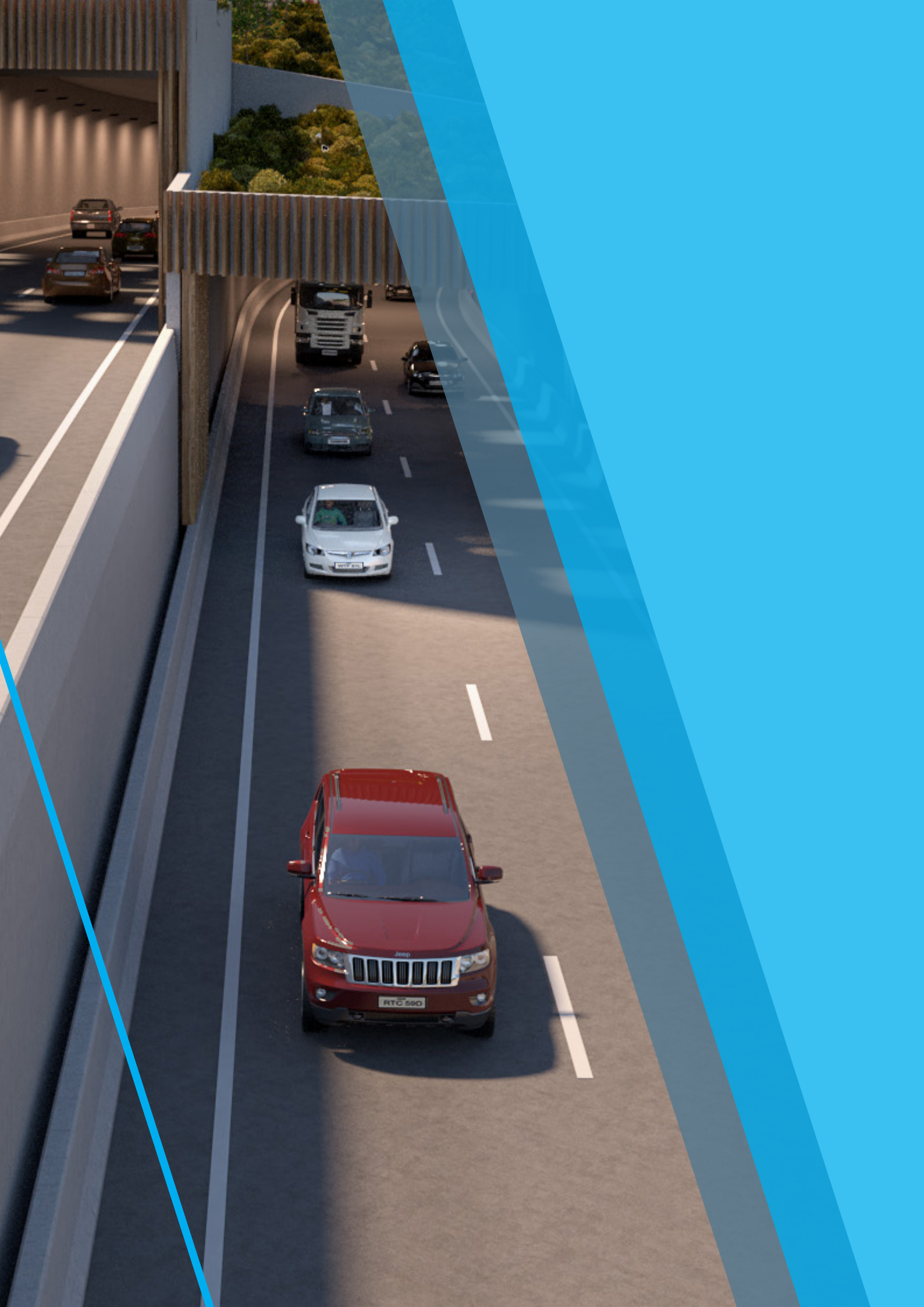
A series of community drop-in information sessions will be held during the public exhibition period to describe the project and the assessment of impacts and mitigation measures identified during the assessment process. During these sessions, stakeholders and community members will have the opportunity to discuss the EIS with technical specialists and learn about the submissions process.

Communication and consultation with stakeholders and the community during construction would focus on providing updates on construction activities and program, responding to enquiries and concerns in a timely manner and minimising potential impacts where possible. A Community Communication Strategy will be developed for implementation during construction and operation (see **section 4.2**).

A photograph of a highway scene, likely a bridge or elevated roadway. A yellow truck with a white trailer is driving in the left lane. A black car is driving in the right lane. The background shows a city street with more cars and buildings. A large, semi-transparent blue diagonal graphic runs from the top left towards the bottom right, partially obscuring the highway scene.

2.0

The Project



2 The project

The project would be generally located within the City of Sydney and Inner West local government areas. The project is located about two to seven kilometres south, southwest and west of the Sydney CBD and would cross the suburbs of Ashfield, Haberfield, Leichhardt, Lilyfield, Rozelle, Annandale, Stanmore, Camperdown, Newtown and St Peters.

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 (the 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.

Key elements of the project are shown in **Figure 2-1**. The operational components of the project are described in this chapter.

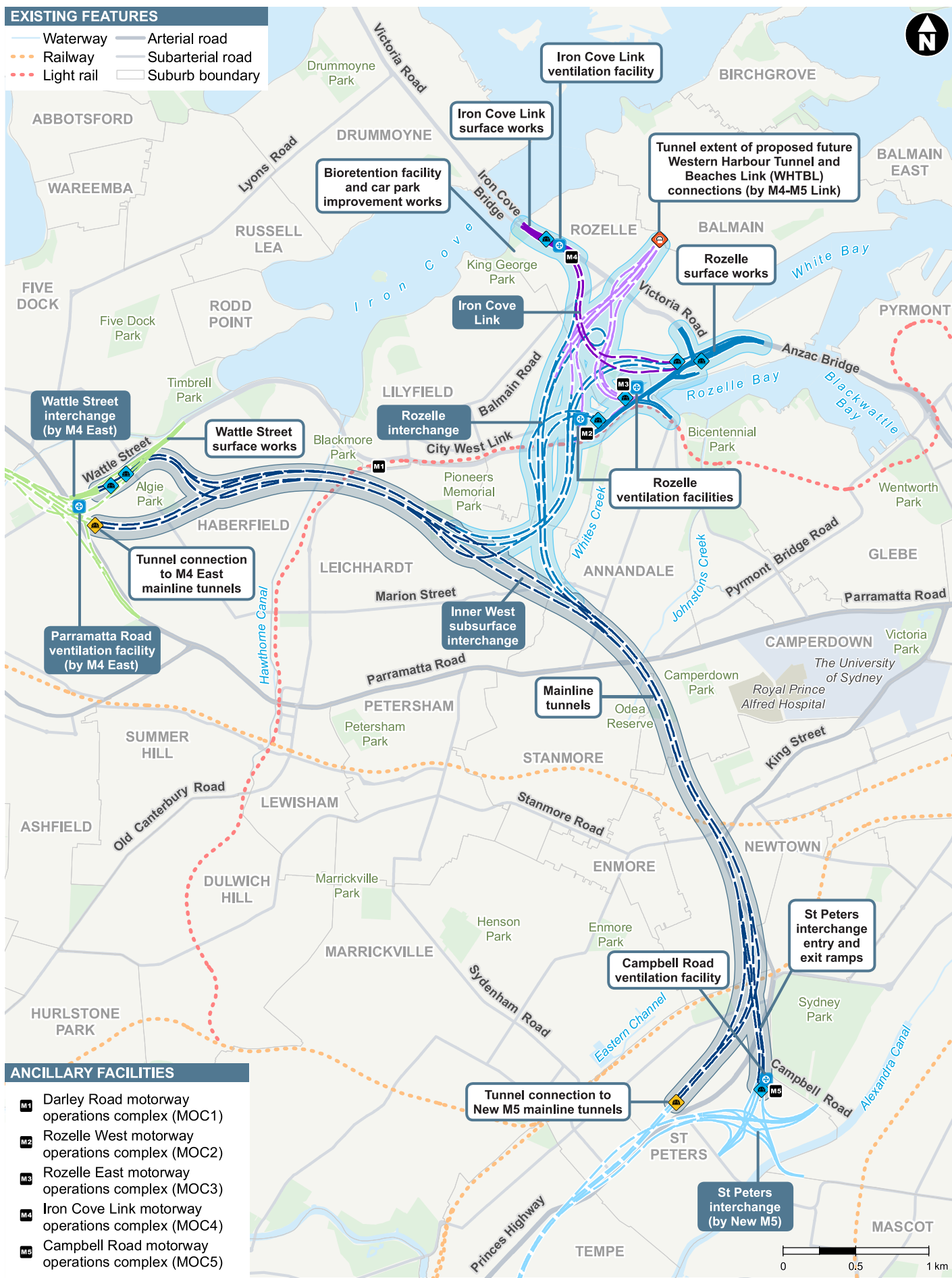


Figure 2-1 Overview of the project

2.1 Project operational components

2.1.1 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 generally be four traffic lanes in each direction (in addition to merging lanes and tie-ins where required) and 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, The Crescent 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.

The Inner West subsurface interchange would be located underground at Leichhardt and Annandale and would allow for free-flow of traffic between the M4 East and New M5 motorways and the Rozelle interchange. The Rozelle interchange tunnels would connect the mainline tunnels with:

- The existing surface road network at the intersection of City West Link, The Crescent and Victoria Road
- Iron Cove Bridge, via the Iron Cove Link
- The proposed future Western Harbour Tunnel and Beaches Link.

The Iron Cove Link would comprise twin tunnels linking Victoria Road, near the eastern abutment of Iron Cove Bridge, with the Rozelle interchange.

Portals would provide connections between the tunnels and the surface road network. Tunnel portals at the Wattle Street interchange and the St Peters interchange are being built as part of the M4 East and New M5 projects respectively. 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. 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.

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.

The tunnel excavation methods would be confirmed by the contractors engaged to construct the project. It is anticipated that the tunnels would be excavated using a heading and bench construction methodology as described in **Chapter 6** (Construction work) of the EIS. Excavation of the heading (top section of the tunnel) would be carried out using roadheaders, launched from the tunnelling sites. A roadheader is an excavation machine consisting of a boom-mounted, rotating cutter head fitted on bulldozer-style tracks (for moving the machine around), and a loader device (usually on a conveyor). A typical roadheader is shown in **Figure 2-2**.

Refer to **Chapter 5** (Project description) of the EIS for further information on tunnels.



Figure 2-2 Example of a typical roadheader

2.1.2 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 connectivity that would be provided by the project comprises connections between:

- The M4 East to the New M5 and the proposed future Western Harbour Tunnel and Beaches Link
- The New M5 to the Iron Cove Link, proposed future Western Harbour Tunnel and Beaches Link and City West Link
- Iron Cove Link to Anzac Bridge and New M5
- The proposed future Western Harbour Tunnel to New M5, M4 East and City West Link.

The connections that would be provided by the Rozelle interchange are shown in **Figure 2-3**. Refer to **Chapter 5** (Project description) of the EIS for further information on connectivity.



Figure 2-3 Rozelle interchange connectivity

2.1.3 Rozelle surface works

The surface road network around the Rozelle interchange would be upgraded and modified to ensure safe and efficient connections, and to cater for traffic demands in the future. The Rozelle surface works would include:

- Acquisition and removal of a number of properties as outlined in **section 2.3**
- 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 to provide connections to the proposed future Western Harbour Tunnel and Beaches Link tunnels. These connections would not be open to motorists as part of the project, however motorists would be able to move between City West Link and The Crescent
- The Rozelle West motorway operations complex (MOC2) including the Rozelle ventilation supply facility, ventilation tunnels and an electrical substation (refer to **section 2.1.5** for further detail)
- The Rozelle East motorway operations complex (MOC3) including the Rozelle ventilation exhaust facility, ventilation outlets and the permanent water treatment facility
- Drainage infrastructure to collect surface and groundwater for treatment at dedicated facilities
- 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
- Widening and improvement works to the channel and bank of Whites Creek at Annandale to mitigate flooding and manage drainage
- 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 cycle underpass below Victoria Road to connect Lilyfield Road with Anzac Bridge
- Active transport links through and within the Rozelle Rail Yards
- Other minor local road changes (such as tie-in works).

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. This new open space, along with new and improved active transport links created by the project, would connect the communities of Rozelle and Annandale that are currently separated by the Rozelle Rail Yards (not publicly accessible), the Inner West light rail corridor and the arterial road network (City West Link and Victoria Road).

On completion of the project, 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). The future urban and landscape design works at the Rozelle Rail Yards would be outlined in the Urban Design and Landscape Plan (UDLP) prepared for the project. **Figure 2-4** shows the concept urban design for the Rozelle Rail Yards, following construction of the proposed future Western Harbour Tunnel and Beaches Link project (subject to approval). The final design outcome would be determined in consultation with the community and stakeholders.

Refer to **Chapter 5** (Project description) of the EIS for further information on the surface works at Rozelle.



Figure 2-4 Visualisation of the indicative operational layout of the project at the Rozelle Rail Yards (looking northwest towards Iron Cove Bridge)

2.1.4 Iron Cove Link surface works

The Iron Cove Link surface works would connect the Iron Cove Link tunnels with Victoria Road around the eastern abutment of Iron Cove Bridge and would include:

- Acquisition and removal of properties along the southern side of Victoria Road between Byrnes Street and Springside Street as outlined in **section 2.3**
- Four new lanes (two eastbound and two westbound) to connect Victoria Road to the Iron Cove Link including dive structure and tunnel portals
- Realignment and modifications to the Victoria Road eastbound and westbound carriageways between the eastern abutment of Iron Cove Bridge and around Springside Street at Rozelle. The Victoria Road surface lanes would travel on the northern and southern sides of the Iron Cove Link lanes
- The Iron Cove motorway operations including the Iron Cove Link ventilation facility, which would include a ventilation exhaust facility and outlet in the middle of the widened Victoria Road carriageway, and ventilation tunnel connections and other ancillary infrastructure on the south side of the carriageway, within the widened Victoria Road corridor (refer to **section 2.1.5** for further detail)
- Modifications to the right turn from Victoria Road into Terry Street. This right turn lane would extend across the cut-and-cover structures for the Iron Cove Link between the eastbound and westbound Victoria Road carriageways
- Closing Clubb Street at Victoria Road, creating a permanent cul-de-sac
- Tie-in works to connect the realigned westbound carriageway of Victoria Road with Toelle and Callan streets
- Landscaping on the southern side of Victoria Road between around Springside and Byrnes streets
- Realignment and improvements to the shared pedestrian and cyclist path that runs along the footpath on the southern side of the westbound carriageway of Victoria Road, including reinstatement of the Bay Run connection to Iron Cove Bridge
- A new stormwater bioretention facility and upgrades to the existing car park within King George Park (adjacent to Manning Street) at Rozelle, to treat stormwater runoff generated by the surface road works associated with the Iron Cove Link. Around 30 car parking spaces would be formalised as part of these works.

Refer to **Chapter 5** (Project description) of the EIS for further information on the Iron Cove Link surface works. A visualisation of the operational layout of the project in this location is shown in **Figure 2-5**.

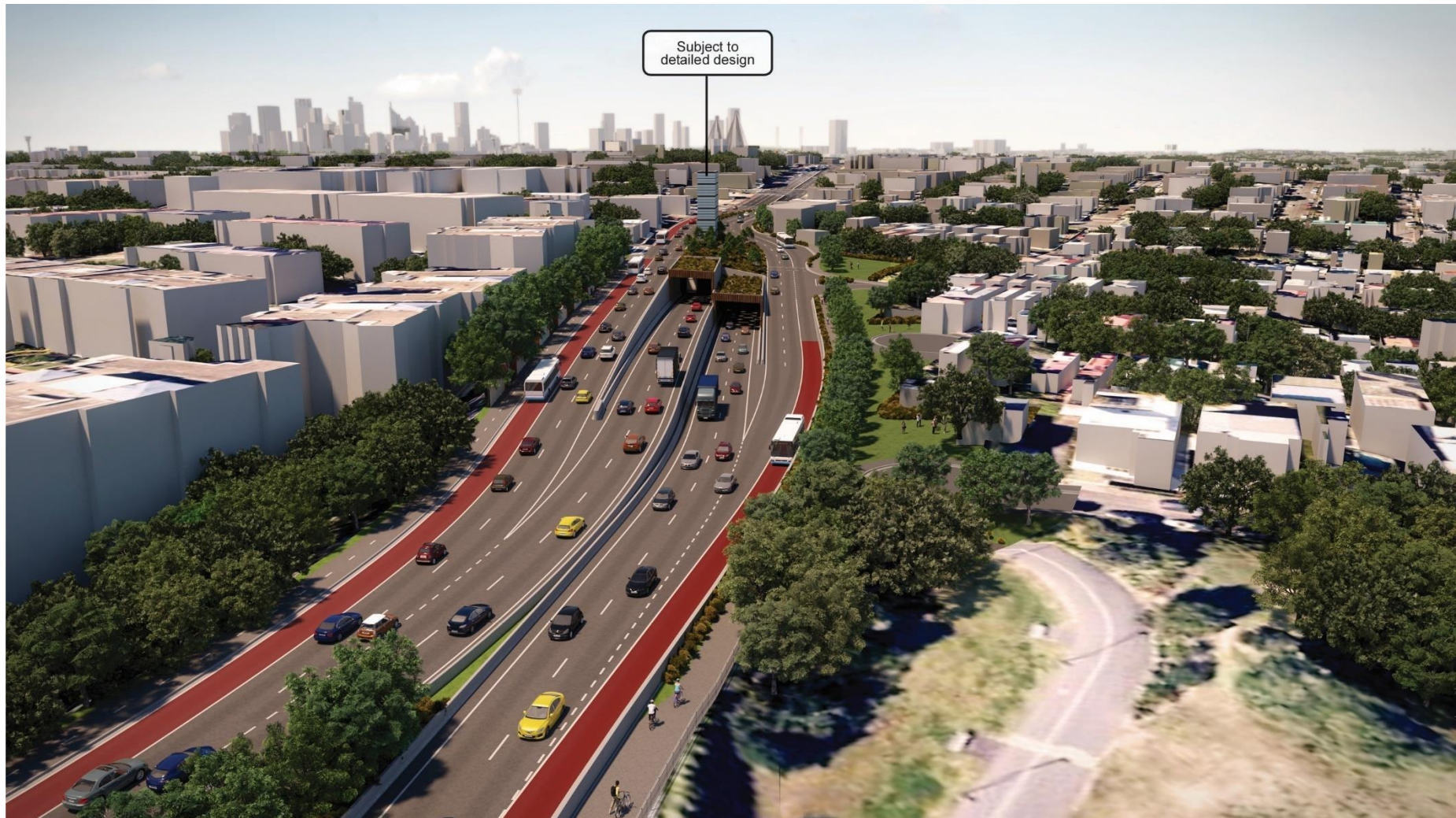


Figure 2-5 Visualisation of the indicative operational layout of the project at the Iron Cove Link (looking east towards the Sydney CBD)

2.1.5 Motorway operational ancillary infrastructure

Motorway operations complexes

Most operational ancillary infrastructure would be established in five motorway operations complexes. The locations of these motorway operations complexes are shown in **Figure 2-7** and would comprise:

- The Darley Road motorway operations complex at Leichhardt (MOC1)
- The Rozelle West motorway operations complex at Rozelle (MOC2)
- The Rozelle East motorway operations complex at Rozelle (MOC3)
- The Iron Cove Link motorway operations complex at Rozelle (MOC4)
- The Campbell Road motorway operations complex at St Peters (MOC5).

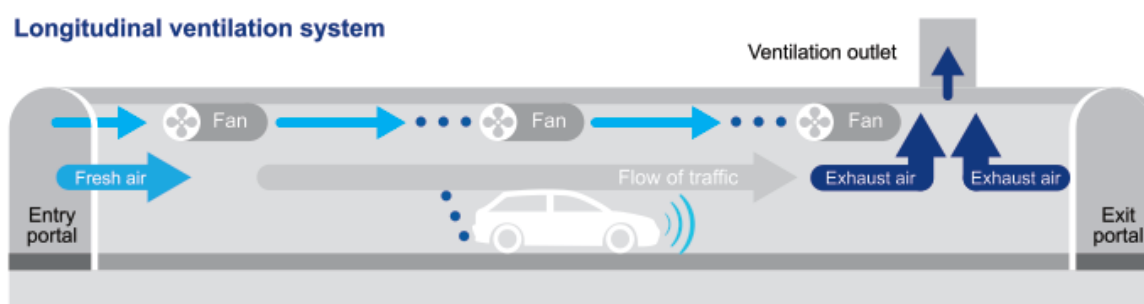
Operational ancillary infrastructure that would be located within each motorway operations complex is summarised in **Table 2-1**.

Table 2-1 Summary of motorway operations complexes and operational ancillary infrastructure

Operational ancillary facilities	Motorway operations complex				
	Darley Road (MOC1)	Rozelle West (MOC2)	Rozelle East (MOC3)	Iron Cove Link (MOC4)	Campbell Road (MOC5)
Ventilation facility		✓	✓	✓	✓
Deluge water tanks		✓			
Car parking	✓	✓	✓	✓	✓
Substation/power supply	✓	✓	✓	✓	✓
Workshop/offices	✓	✓	✓	✓	✓
Storage	✓	✓	✓	✓	✓
Water treatment plant/infrastructure	✓		✓		

Ventilation system and facilities

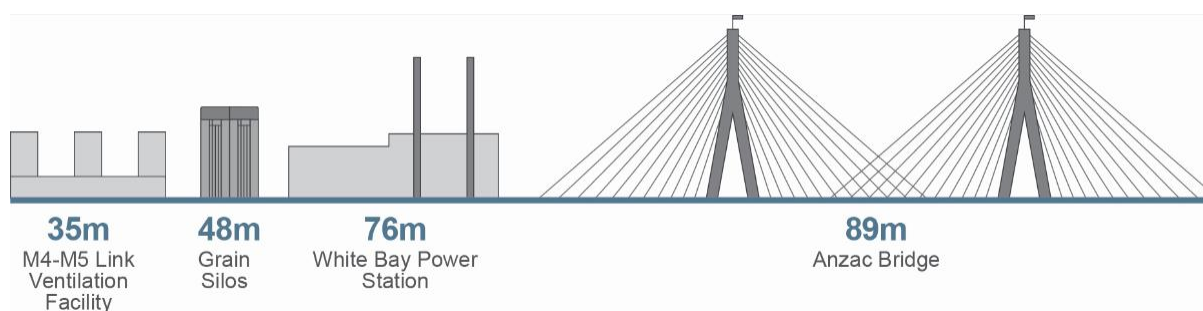
The project would include longitudinally ventilated tunnels in which fresh air is drawn in at the entry portal and passes out through the exit portal with the flow of traffic. For longer tunnels, the air flow is supplemented by fans that are used when traffic is moving too slowly to maintain adequate air flow, or to draw air back from the exit portals against the flow of exiting traffic. This air is then exhausted through an elevated ventilation outlet to maximise dispersion. A well-designed longitudinal ventilation system can maintain acceptable air quality in long tunnels and is considered the most efficient and effective tunnel ventilation system (refer to **Chapter 4** (Project development and alternatives) of the EIS).



Three new ventilation facilities would be provided as part of the project, including:

- The Rozelle ventilation facility at the Rozelle Rail Yards, which would include a ventilation supply facility at the Rozelle West motorway operations complex and a ventilation exhaust facility with three ventilation outlets at the Rozelle East motorway operations complex. The ventilation outlets at Rozelle would have a height of around 35 metres above existing ground level
- The Iron Cove Link ventilation facility at Rozelle, which would comprise a ventilation outlet in the centre of Victoria Road, around 20 metres above existing ground level, and a separate ventilation building on the southern side of Victoria Road
- The Campbell Road ventilation facility at St Peters, within the St Peters interchange site. The ventilation facility at Campbell Road would comprise one building, with four outlets for the M4-M5 Link, around 22 metres above existing ground level.

The ventilation outlets have been designed at these heights to meet specified air quality criteria, urban design and visual amenity objectives, and to avoid impacts to civil air operations. In addition, part of the Parramatta Road ventilation facility at Haberfield, being built as part of the M4 East project, would be fitted out and used by the M4-M5 Link project. The locations and scale of ventilation facilities for the project at the Rozelle Rail Yards and Victoria Road, east of Iron Cove Bridge, are shown in **Figure 2-4** and **Figure 2-5**.



Indicative height comparison of buildings and structures around Rozelle and White Bay

Figure 2-6 shows an indicative artist's impression of the view towards the ventilation facility at the St Peters interchange looking south from the corner of Barwon Park Road and Campbell Road. Further details regarding ambient (external) and in-tunnel air quality are provided in **Chapter 9** (Air quality) and **Appendix I** (Technical working paper: Air quality) of the EIS.



Figure 2-6 Artist's impression of the ventilation facility at the St Peters interchange looking south from the corner of Barwon Park Road and Campbell Road

Water treatment facilities

The operational water treatment facilities would be designed, constructed and operated to treat tunnel water prior to discharge. Operational water treatment facilities would be located at:

- The Darley Road motorway operations complex at Leichhardt
- The Rozelle East motorway operations complex at Rozelle.

The water treatment facilities would consist of:

- A balance tank to regulate flows into the plant
- A bioretention wetland
- A treatment plant, including clarifier and control room, to treat water prior to discharge.

Information regarding the likely treatment methods and wastewater volumes is provided in **Chapter 15** (Soil and water quality) and **Chapter 17** (Flooding and drainage) as well as **Appendix Q** (Technical working paper: Surface water and flooding) of the EIS.

Utility services

Utility services located within proximity of the project be protected, relocated or realigned during construction, particularly in areas of surface or shallow soil disturbance. These services include electricity, telecommunications, sewer, water, stormwater and gas services. The project would also require temporary and permanent connection to electricity, water and wastewater/sewer utilities. A Utilities Management Strategy (refer to **Appendix F** of the EIS) has been prepared for the project and provides information in relation to:

- Utility relocations and adjustments which are currently known and proposed within the project footprint. These have been assessed as part of this EIS

- Utility relocations and adjustments which are currently unknown and/or located outside of the project footprint. The Utilities Management Strategy (**Appendix F** of the EIS) provides the framework for how these utility relocations and adjustments would be managed
- Utility connections required to facilitate construction and operation of the project.

The location of existing utility services and any changes required would be confirmed by the construction contractor during the detailed design of the project in consultation with the relevant utility providers.

Additional infrastructure

Additional operational ancillary infrastructure required for the project includes:

- Management control systems and incident and emergency response infrastructure, including a traffic room located at the WestConnex Motorway Control Centre at St Peters interchange (being built as part of the New M5 project) and a WestConnex Disaster Recovery Site located at Homebush Bay Drive (being built as part of the M4 East project)
- Noise attenuation measures including the application of noise barriers to minimise the levels of traffic noise
- Traffic monitoring and management systems
- Air quality monitoring and management systems
- Motorway tolling infrastructure
- Lighting, roadside furniture and signage.

Refer to **Chapter 5** (Project description) of the EIS for further information on operational motorway ancillary infrastructure.

2.2 Construction

2.2.1 Overview

An overview of the construction activities for the project is provided in **Figure 2-7** and **Table 2-2**.

Table 2-2 Overview of construction activities

Component	Typical activities
Site establishment and enabling works	<ul style="list-style-type: none"> • Vegetation clearing and removal • Utility works • Traffic management measures • Install safety and environmental controls • Install site fencing and hoarding • Establish temporary noise attenuation measures • Demolish buildings and structures • Carry out site clearing • Heritage salvage or conservation works (if required) • Establish construction ancillary facilities and access • Establish acoustic sheds • Supply utilities (including construction power) to construction facilities • Establish temporary pedestrian and cyclist diversions
Tunnelling	<ul style="list-style-type: none"> • Construct temporary access tunnels • Excavate mainline tunnels, entry and exit ramps and associated tunnelled infrastructure and install ground support • Spoil management and haulage • Finishing works in tunnel and provision of permanent tunnel services • Test plant and equipment
Surface earthworks and structures	<ul style="list-style-type: none"> • Vegetation clearing and removal • Topsoil stripping • Excavate new cut and fill areas

Component	Typical activities
	<ul style="list-style-type: none"> • Construct dive and cut-and-cover tunnel structures • Install stabilisation and excavation support (retention systems) such as sheet pile walls, diaphragm walls and secant pile walls (where required) • Construct required retaining structures • Excavate new road levels
Bridge works	<ul style="list-style-type: none"> • Construct piers and abutments • Construct headstocks • Construct bridge decks, slabs and girders • Demolish and remove redundant bridges
Drainage	<ul style="list-style-type: none"> • Construct new pits and pipes • Construct new groundwater drainage system • Connect drainage to existing network • Construct sumps in tunnels as required • Construct water quality basins, constructed wetland, and bioretention facility and basin • Construct drainage channels • Construct spill containment basin • Construct onsite detention tanks • Adjustments to existing drainage infrastructure where impacted • Carry out widening and naturalisation of a section of Whites Creek • Demolish and remove redundant drainage
Pavement	<ul style="list-style-type: none"> • Lay select layers and base • Lay road pavement surfacing • Construct pavement drainage
Operational ancillary facilities	<ul style="list-style-type: none"> • Install ventilation systems and facilities • Construct water treatment facilities • Construct fire pump rooms and install water tanks • Test and commission plant and equipment • Construct electrical substations to supply permanent power to the project
Finishing works	<ul style="list-style-type: none"> • Line mark to new road surfaces • Erect directional and other signage and other roadside furniture such as street lighting • Erect toll gantries and other control systems • Construct pedestrian and cyclist paths • Carry out earthworks at disturbed areas to establish the finished landform • Carry out landscaping • Closure and backfill of temporary access tunnels (except where these are to be used for inspection and/or maintenance purposes) • Site demobilisation and preparation of the site for a future use

2.2.2 Construction ancillary facilities

Twelve construction ancillary facilities are described and assessed in this EIS. To assist in informing the development of a construction methodology that would manage constructability constraints and the need for construction to occur in a safe and efficient manner, while minimising impacts on local communities, the environment, and users of the surrounding road and other transport networks, two possible combinations of construction ancillary facilities at Haberfield and Ashfield have been assessed in this EIS. These are denoted by the suffix a (for Option A) or b (for Option B), as outlined in **Table 2-3**.

Table 2-3 Possible construction ancillary facility combinations at Haberfield and Ashfield assessed in this EIS

Option A	Option B
Wattle Street civil and tunnel site (C1a)	Parramatta Road West civil and tunnel site (C1b)
Haberfield civil and tunnel site (C2a)	Haberfield civil site (C2b)
Northcote Street civil site (C3a)	Parramatta Road East civil site (C3b)

The construction ancillary facilities required to support construction of the project are shown in **Figure 2-7** and include:

- Option A:
 - Wattle Street civil and tunnel site at Haberfield (C1a)
 - Haberfield civil and tunnel site at Haberfield (C2a)
 - Northcote Street civil site at Haberfield (C3a)
- Option B:
 - Parramatta Road West civil and tunnel site at Ashfield (C1b)
 - Haberfield civil site at Haberfield (C2b)
 - Parramatta Road East civil site at Haberfield (C3b)
- Darley Road civil and tunnel site at Leichhardt (C4)
- Rozelle civil and tunnel site at Rozelle (C5)
- The Crescent civil site at Annandale (C6)
- Victoria Road civil site at Rozelle (C7)
- Iron Cove Link civil site at Rozelle (C8)
- Pyrmont Bridge Road tunnel site at Annandale (C9)
- Campbell Road civil and tunnel site at St Peters (C10).

The layout and access arrangements for the construction ancillary facilities are based on the concept design only and would be confirmed and refined during detailed construction planning.

Refer to **Chapter 6** (Construction work) of the EIS for further information on construction ancillary facilities.

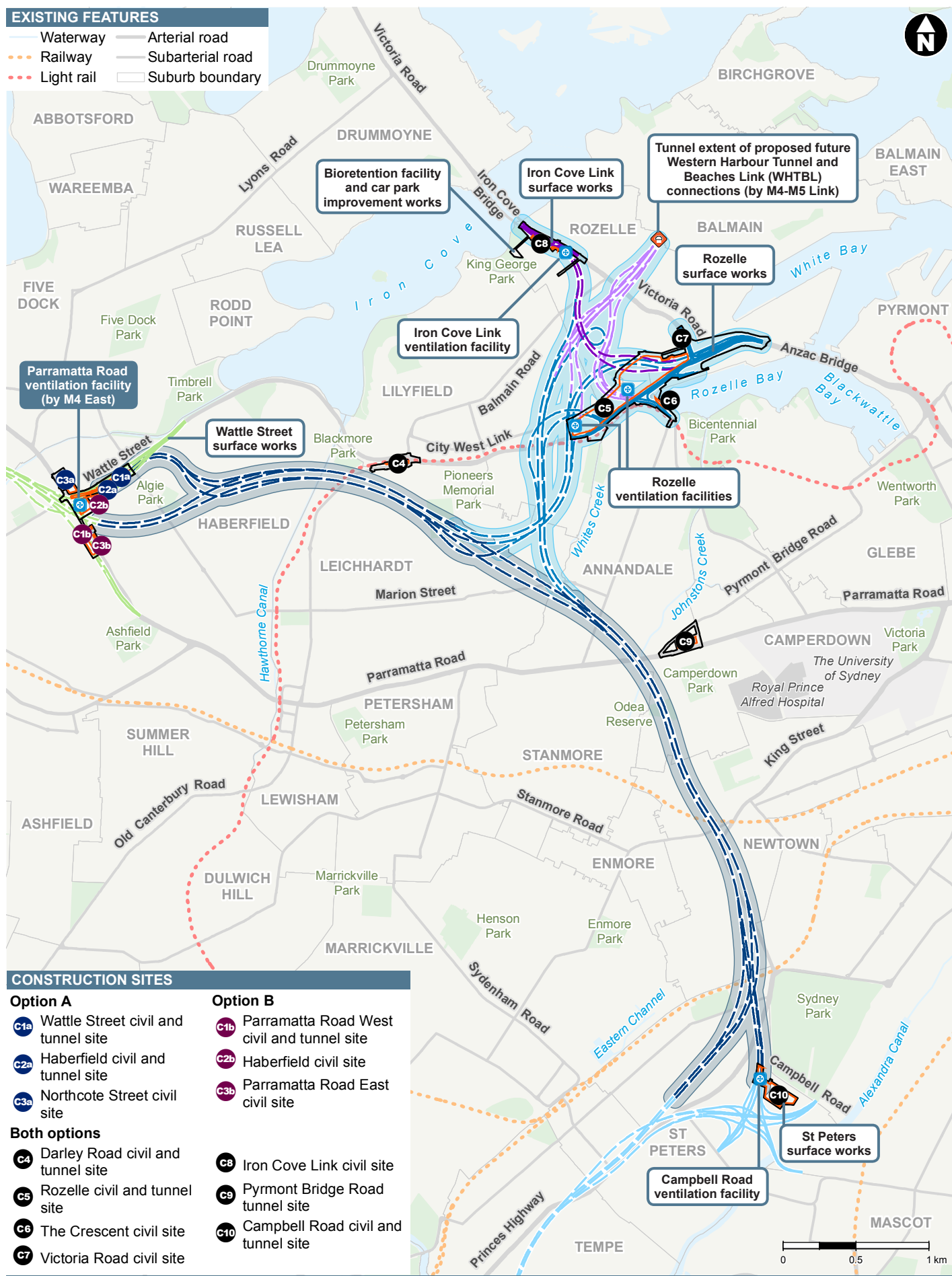


Figure 2-7 Overview of project footprint and ancillary facilities

2.2.3 Construction program

Subject to planning approval, the M4-M5 Link is expected to be constructed and opened to traffic in two stages:

- Stage 1 – construction of the mainline tunnels between the M4 East Haberfield and the New M5 at St Peters, and stub tunnels to the Rozelle interchange (at the Inner West subsurface interchange). 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 – construction of the Rozelle interchange and Iron Cove Link including connections to the stub tunnels at the Inner West subsurface interchange, connections to the surface road network at Lilyfield and Rozelle and civil construction of tunnels, ramps and infrastructure 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 period of construction works for the project is expected to be around five years, with commissioning occurring concurrently with the final stages of construction. An indicative construction program is shown in **Table 2-4**.

Table 2-4 Indicative construction program

Construction activity	Indicative construction timeframe															
	2018				2019				2020				2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Mainline tunnels																
Site establishment and establishment of construction ancillary facilities																
Utility works and connections																
Tunnel construction																
Portal construction																
Construction of permanent operational facilities																
Mechanical and electrical fitout works																
Establishment of tolling facilities																
Site rehabilitation and landscaping																
Surface road works																
Demobilisation and rehabilitation																
Testing and commissioning																

Construction activity	Indicative construction timeframe															
	2018				2019				2020				2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Rozelle interchange and Iron Cove Link																
Site establishment and establishment of construction ancillary facilities																
Utility works and connections and site remediation																
Tunnel construction																
Portal construction																
Construction of surface road works																
Construction of permanent operational facilities																
Mechanical and electrical fitout works																
Establishment of tolling facilities																
Site rehabilitation and landscaping																
Demobilisation and rehabilitation																
Testing and commissioning																

2.2.4 Construction work hours

Proposed construction hours have been developed based on a balanced consideration of reducing the overall length of the construction program and the need to minimise noise and traffic related impacts. A breakdown of construction hours at construction ancillary facilities is outlined in **Table 2-1**.

Table 2-1 Construction hours at construction ancillary facilities

Construction ancillary facility	Type of construction activity	Construction work hours
Wattle Street civil and tunnel site (C1a)	Tunnelling and spoil handling	24 hours a day, seven days a week
	Civil construction ¹	7.00 am to 6.00 pm Monday to Friday 8.00 am to 1.00 pm Saturday
Haberfield civil and tunnel site (C2a)	Tunnelling and spoil handling	24 hours a day, seven days a week
	Civil construction ¹	7.00 am to 6.00 pm Monday to Friday 8.00 am to 1.00 pm Saturday
Northcote Street civil site (C3a)	Civil construction ¹	7.00 am to 6.00 pm Monday to Friday 8.00 am to 1.00 pm Saturday
Parramatta Road West civil	Tunnelling and spoil handling	24 hours a day, seven days a week

Construction ancillary facility	Type of construction activity	Construction work hours
and tunnel site (C1b)	Civil construction ¹	7.00 am to 6.00 pm Monday to Friday 8.00 am to 1.00 pm Saturday
Haberfield civil site (C2b)	Civil construction ¹	7.00 am to 6.00 pm Monday to Friday 8.00 am to 1.00 pm Saturday
Parramatta Road East civil site (C3b)	Civil construction ¹	7.00 am to 6.00 pm Monday to Friday 8.00 am to 1.00 pm Saturday
	Construction workforce parking	24 hours a day, seven days a week
Darley Road civil and tunnel site (C4)	Tunnelling and spoil handling ^{1,2}	24 hours a day, seven days a week
	Civil construction ¹	7.00 am to 6.00 pm Monday to Friday 8.00 am to 1.00 pm Saturday
Rozelle civil and tunnel site (C5)	Tunnelling and spoil handling	24 hours a day, seven days a week
	Civil construction ¹	7.00 am to 6.00 pm Monday to Friday 8.00 am to 1.00 pm Saturday
The Crescent civil site (C6)	Civil construction ¹	7.00 am to 6.00 pm Monday to Friday 8.00 am to 1.00 pm Saturday
Victoria Road civil site (C7)	Civil construction ¹	7.00 am to 6.00 pm Monday to Friday 8.00 am to 1.00 pm Saturday
Iron Cove Link civil site (C8)	Civil construction ¹	7.00 am to 6.00 pm Monday to Friday 8.00 am to 1.00 pm Saturday
Pyrmont Bridge Road tunnel site (C9)	Tunnelling and spoil handling	24 hours a day, seven days a week
	Civil construction ¹	7.00 am to 6.00 pm Monday to Friday 8.00 am to 1.00 pm Saturday
Campbell Road civil and tunnel site (C10)	Tunnelling and spoil handling	24 hours a day, seven days a week
	Civil construction ¹	7.00 am to 6.00 pm Monday to Friday 8.00 am to 1.00 pm Saturday

Notes:

¹Some works outside of standard construction hours may be required.

²Spoil haulage from the Darley Road civil and tunnel site (C4) would occur between 7.00 am and 6.00 pm Monday to Friday and 8.00 am and 1.00 pm on Saturdays.

Activities that would be carried out outside of the standard daytime construction hours would include:

- Work determined to comply with the relevant noise management level at the nearest sensitive receiver
- The delivery of materials outside approved hours as required by the NSW Police or other authorities (including Roads and Maritime) for safety reasons
- Emergency situations where it is required to avoid the loss of lives and property and/or to prevent environmental harm
- Situations where agreement is reached with affected receivers.

With the exception of emergencies, activities would not take place outside standard daytime construction hours without prior notification of the local community affected.

An assessment of potential noise impacts associated with construction of the project as well as management measures, including for works outside of standard construction hours is included in **Chapter 10** (Noise and vibration) of the EIS. Reasonable and feasible work practices and mitigation measures would be implemented to manage potential noise impacts. These would be identified in a Construction Noise and Vibration Management Plan.

Refer to **Chapter 6** (Construction work) for further information on construction work.

2.2.5 Spoil haulage routes

Excess spoil that cannot be reused within the project would require off-site reuse/disposal. Around 95 per cent of uncontaminated spoil would be beneficially reused in accordance with the project spoil management hierarchy and sustainability targets.

It is anticipated that spoil would be hauled using heavy vehicles to reuse and disposal sites as described in **Table 2-5**. Spoil haulage routes have been identified to avoid using local roads where possible.

Table 2-5 Indicative spoil haulage routes

Location		Indicative spoil haulage route
C1a	Wattle Street civil and tunnel site ¹	<ul style="list-style-type: none"> • Entry: via the Wattle Street interchange entry ramp • Exit: via the Wattle Street interchange exit ramp and onto Parramatta Road, heading west
C2a	Haberfield civil and tunnel site ¹	<ul style="list-style-type: none"> • Entry and exit via the M4 East tunnel connection
C3a	Northcote Street civil site	No spoil haulage would occur from this site
C1b	Parramatta Road West civil and tunnel site	<ul style="list-style-type: none"> • Entry: eastbound along the M4 Motorway, southbound along Centenary Drive, eastbound along the Hume Highway, then left onto Parramatta Road heading north • Exit: northbound along Parramatta Road
C2b	Haberfield civil site	No spoil haulage would occur from this site
C3b	Parramatta Road East civil site	No spoil haulage would occur from this site
C4	Darley Road civil and tunnel site	<ul style="list-style-type: none"> • Entry: via City West Link and Darley Road • Exit: via Darley Road and then City West Link
C5	Rozelle civil and tunnel site ¹	<ul style="list-style-type: none"> • Entry: eastbound along City West Link and into the site • Exit: westbound along City West Link

Location		Indicative spoil haulage route
C6	The Crescent civil site	<ul style="list-style-type: none"> • Entry: City West Link, then south along The Crescent and into the site • Exit: northbound along The Crescent (to be facilitated via construction traffic management measures), then City West Link
C7	Victoria Road civil site	No spoil haulage would occur from this site
C8	Iron Cove Link civil site	<ul style="list-style-type: none"> • Entry: northbound along Victoria Road and into the site • Exit: northbound along Victoria Road
C9	Pymont Bridge Road tunnel site ¹	<ul style="list-style-type: none"> • Entry: eastbound along Parramatta Road and into the site • Exit: westbound along Pymont Bridge Road and then Parramatta Road
C10	Campbell Road civil and tunnel site ¹	<ul style="list-style-type: none"> • Entry: southbound along Campbell Road and then into the site • Exit: northbound along Campbell Road, then south along the Princes Highway

Notes:¹ Indicative spoil haulage routes may vary based on the final construction methodology and program.

Where spoil haulage is carried out outside of the standard daytime construction hours, reasonable and feasible work practices and mitigation measures, consistent with the requirements of the *Interim Construction Noise Guideline* (NSW Department of Climate Change and Water (DECCW) 2009a), would be implemented to manage potential noise impacts.

Further details regarding spoil generation and management are provided in **Chapter 23** (Resource use and waste minimisation). Construction traffic and noise impacts that arise from spoil haulage are assessed in **Chapter 8** (Traffic and transport) and **Chapter 10** (Noise and vibration) of the EIS respectively.

Other disposal/reuse sites may be used depending on need at the time spoil is generated. In addition, there is the potential that spoil could be transported by barge to remove truck movements, subject to further investigations.

The proposed haulage routes would not always meet all of the transport requirements of the project and therefore, alternative haulage routes would be available for spoil trucks under exceptional circumstances. These alternative routes are described in **Chapter 6** (Construction work) of the EIS and may vary depending on the final construction methodology. Alternative routes would avoid the use of local roads where practicable. The use of alternative routes would be in accordance with relevant conditions of approval.

2.3 Property access and acquisition

As described in **Chapter 12** (Land use and property) of the EIS, the project has been developed to minimise the need for surface property acquisition and occupation. The need to reduce these impacts has been balanced with maximising opportunities for beneficial re-use of the areas required for construction that would be surplus to the operational needs of the project. Notwithstanding this design intent, construction and operation of the project would result in a mix of temporary and permanent impacts on property.

Where land required for the construction and operation of the project is not currently owned by the NSW Government, discussions are being held with the affected property owners concerning the purchase, lease or licence of the land. As of August 2017, the project would require 51 surface property acquisitions. These identified property acquisitions are summarised in **Table 2-6**. Roads and Maritime would also be required to manage a number of leases on land subject to acquisition.

Table 2-6 Indicative property acquisition requirement for the project

Location	Land use (type)	No. of acquisitions for the project ¹
Wattle Street interchange surface works	Acquisitions were carried out at this location as part of the M4 East project	None ²
Parramatta Road West and East civil and tunnel sites	Mixed use	1
Darley Road surface works	Commercial	1
Rozelle surface works	Commercial/industrial	4
Iron Cove Link surface works	Residential	26
	Commercial/industrial	10
Pymont Bridge Road tunnel site	Commercial/industrial	9
St Peters interchange surface works	Acquisitions were carried out at this location as part of the New M5 project	None ³

Notes:

¹ Multiple strata titles may exist within each parent lot to be acquired

² Refer to the M4 East EIS (AECOM 2015a) for acquisitions that occurred at this location

³ Refer to the New M5 EIS (AECOM 2015b) for acquisitions that occurred at this location

All compulsory acquisition required for the project would be carried out in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW), the *Land Acquisition Information Guide* (NSW Government 2014) and the land acquisition reforms announced by the NSW Government in 2016 (NSW Government 2016), which can be viewed online at:

https://www.finance.nsw.gov.au/sites/default/files/NSW_Government_Response.pdf

The project would also use government owned land. Roads and Maritime would enter into agreements with the relevant government departments regarding the temporary or permanent use of this land – including acquisition or lease arrangements. Where government owned land is required temporarily, this would generally be established through a lease or a Memorandum of Understanding.

Access to properties not acquired, leased or otherwise occupied for project purposes would generally be maintained at all times during construction and operation. Where temporary impacts on existing property access are unavoidable as a result of construction activities (eg footpath and pavement works), consultation would be carried out with the landowner and/or tenant to provide equivalent standards of access.

2.4 Potential future uses of remaining project land

Land that is required for construction of the project and that is not required for permanent operational infrastructure (and that would not be subject to the UDLP that would be prepared for the project) would consist of:

- Land that would be retained by Roads and Maritime for future (separate) road infrastructure projects
- Land that would be considered for separate future development or use.

A flowchart showing the process for identifying remaining project land (land not required during operation of the project) is included in **Figure 2-8**. The potential future development and/or use of this land would be identified in the Residual Land Management Plan (RLMP) that would be prepared for the project. A summary of how land within the project footprint would be used at the end of construction is presented in **Table 2-7**.

Land Use and Property

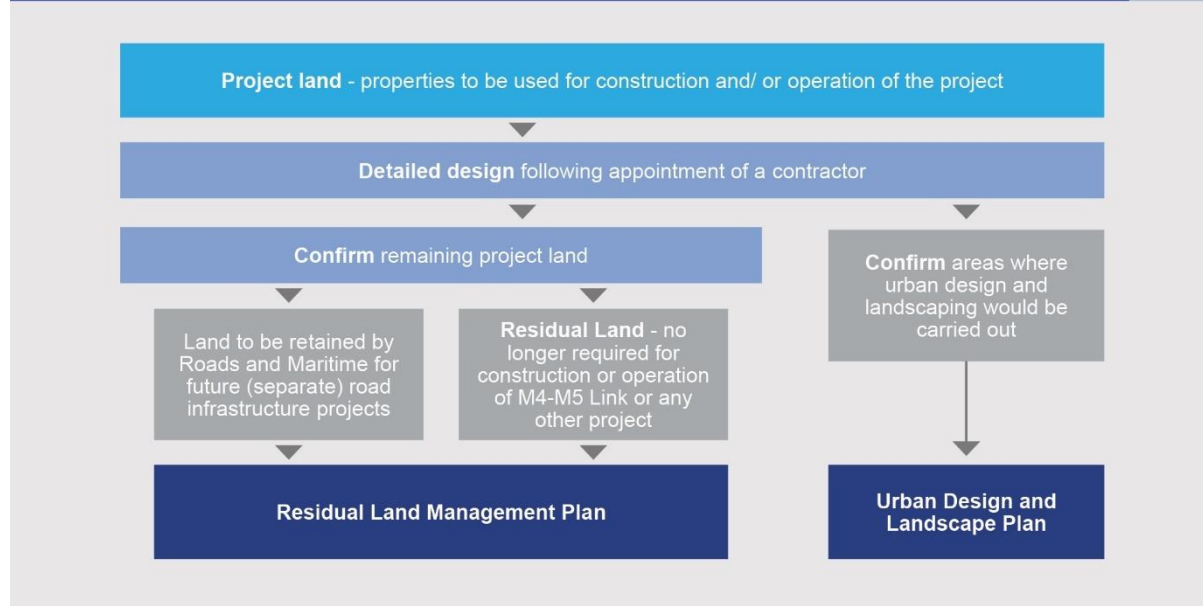


Figure 2-8 Process for identifying remaining project land

Table 2-7 Indicative summary of land uses at the end of construction

Plan	Urban design and landscaping	Remaining project land (subject to the RLMP)	
Location	(as outlined in various project UDLPs)	Retained for future road infrastructure projects	Future separate development and/or use
Wattle Street interchange surface works	As identified in the M4 East UDLP, RLMP and/or the M4 East Legacy Project		As identified in the M4 East RLMP
Parramatta Road West and East civil and tunnel sites			All land following construction
Darley Road surface works	Adjacent to permanent operational infrastructure		Remaining land not required for permanent operational infrastructure
Rozelle surface works	Adjacent to permanent operational infrastructure Provision of new open space within the Rozelle Rail Yards	Adjacent to The Crescent at Annandale	

Plan	Urban design and landscaping	Remaining project land (subject to the RLMP)	
Iron Cove Link surface works	<p>Adjacent to permanent operational infrastructure</p> <p>South of Victoria Road, between around Springside Street and Byrnes Street at Rozelle</p> <p>Adjacent to disturbed areas within King George Park</p>		
Pymont Bridge Road tunnel site			All land following construction
St Peters interchange surface works	<p>Adjacent to permanent operational infrastructure</p> <p>Landscaping on the remaining site would be carried out consistent with the New M5 Urban Design and Landscape Plan and conditions of approval</p>		

The UDLP would be the primary mechanism for identifying and describing the public open space uses (including active and passive recreation), community and social infrastructure and/or other development that would be delivered as part of the project.

Subject to future detailed design and the requirements of the project, parts of the project footprint not required for operational infrastructure and/or landscaping may be contemplated for separate future redevelopment. In some instances, areas of land may also be retained by Roads and Maritime for future (separate) road infrastructure projects. Where this is the case, the land would be rehabilitated and stabilised in preparation for the potential future use.

As part of the project, urban design and landscaping works would be carried out at the Rozelle Rail Yards and Victoria Road, east of Iron Cove Bridge and at the Campbell Road motorway operation complex, including:

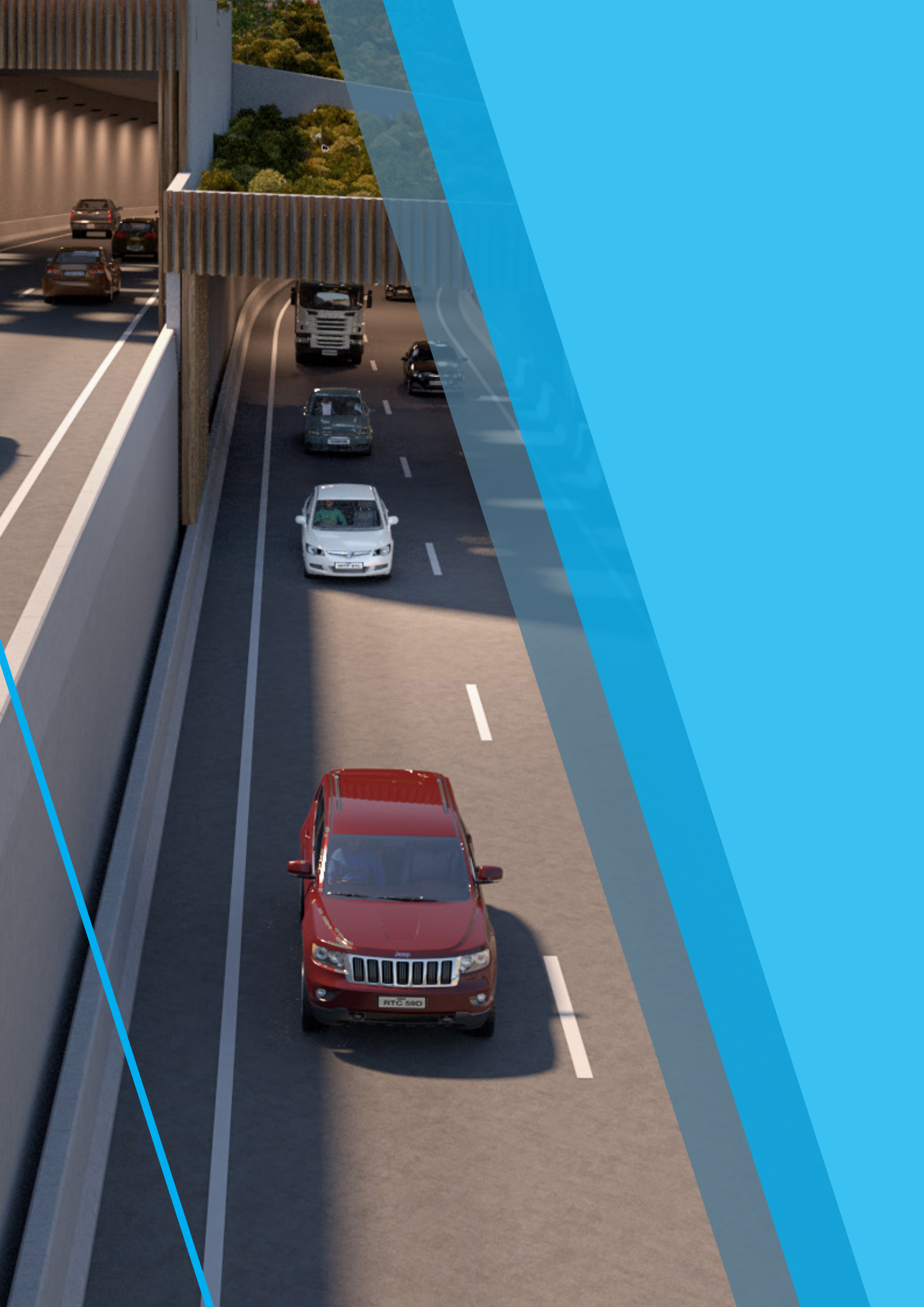
- Detailed review and finalisation of the architectural treatment of the motorway operational ancillary facilities
- Earthworks to reshape the site around the motorway operational infrastructure
- Creation or reinstatement of pedestrian and cycle paths and bridges
- Turfed areas
- Revegetation, including tree planting and replacement.

In most cases following construction, land around the Rozelle Rail Yards and Victoria Road (east of Iron Cove Bridge) would be landscaped to be consistent with the UDLP to be prepared for the project. Further details about the remaining project land and the RLMP are provided in **Chapter 12** (Land use and property) of the EIS.

3.0

Design evolution and impact avoidance





3 Design evolution and impact avoidance

This section summarises the key design refinements that have taken place during the evolution of the concept design and how these refinements have minimised or avoided environmental and community impacts. The design refinement is described, including the associated impact avoidance outcome of the design refinements.

Further detail on the evolution of the project development and the rationale for the design changes can be found in **Chapter 4** (Project development and alternatives) of the EIS. **Chapter 7** (Consultation) of the EIS provides further information on how the project has considered feedback from stakeholders and the community to influence design outcomes.

Table 3-1 Impacts minimised or avoided due to key design refinements

Key design refinement	How design refinement has minimised or avoided impacts
Refinement of the design for the Rozelle interchange to relocate the majority of the interchange underground and to the northwest of the Rozelle Rail Yards.	<ul style="list-style-type: none"> • Minimises impacts to communities associated with surface road traffic, noise and dust generation • Minimises impacts associated with ground settlement and disturbance of contaminated soils • Minimises groundwater intrusion/impact through partial avoidance of the alluvium at Rozelle • Minimises material and energy needs and improved sustainability performance from the removal of a heavy-duty concrete deck structure from the interchange design • Avoids the full and extended closure of Lilyfield Road • Avoids surface impacts at Easton Park including loss of open space, impact on recreational users and impacts to a local heritage item (Sewage Pumping Station No. 6).
Removal of the Camperdown interchange from the project.	<ul style="list-style-type: none"> • Avoids impacts of increased traffic flows on Parramatta Road and Broadway (east of the portals) in comparison to an interchange at this location • Avoids the impact of increased traffic volumes entering the Sydney CBD along Broadway • Avoids impact to heritage conservation areas and heritage items at Camperdown and Forest Lodge, including specifically at Arundel Street • Avoids impacts on residential properties and businesses at Camperdown and Forest Lodge • Avoids property acquisition at Camperdown/Annandale • Avoids removal of street trees at Arundel Street • Avoids impacts on the streetscape and landscape character of the University of Sydney, Arundel Street and Victoria Park.
Realignment of the mainline tunnel to the west.	<ul style="list-style-type: none"> • Avoids vibration impacts on sensitive equipment at the University of Sydney and the Royal Prince Alfred Hospital.
Increase in lanes in the mainline tunnels from three to four lanes in each direction.	<ul style="list-style-type: none"> • Minimises congestion in the mainline tunnels in future years of operation and allows traffic speeds to be maintained.
Inclusion of a pedestrian bridge at the western end of the Rozelle Rail Yards.	<ul style="list-style-type: none"> • Improved active transport connectivity and public access to and across the Rozelle Rail Yards, City West Link and the Inner West Light Rail corridor • Allows for the provision of an additional connection between communities in Lilyfield and Rozelle to those in Annandale • Allows for the provision of a link to active transport networks in the Whites Creek open space corridor.

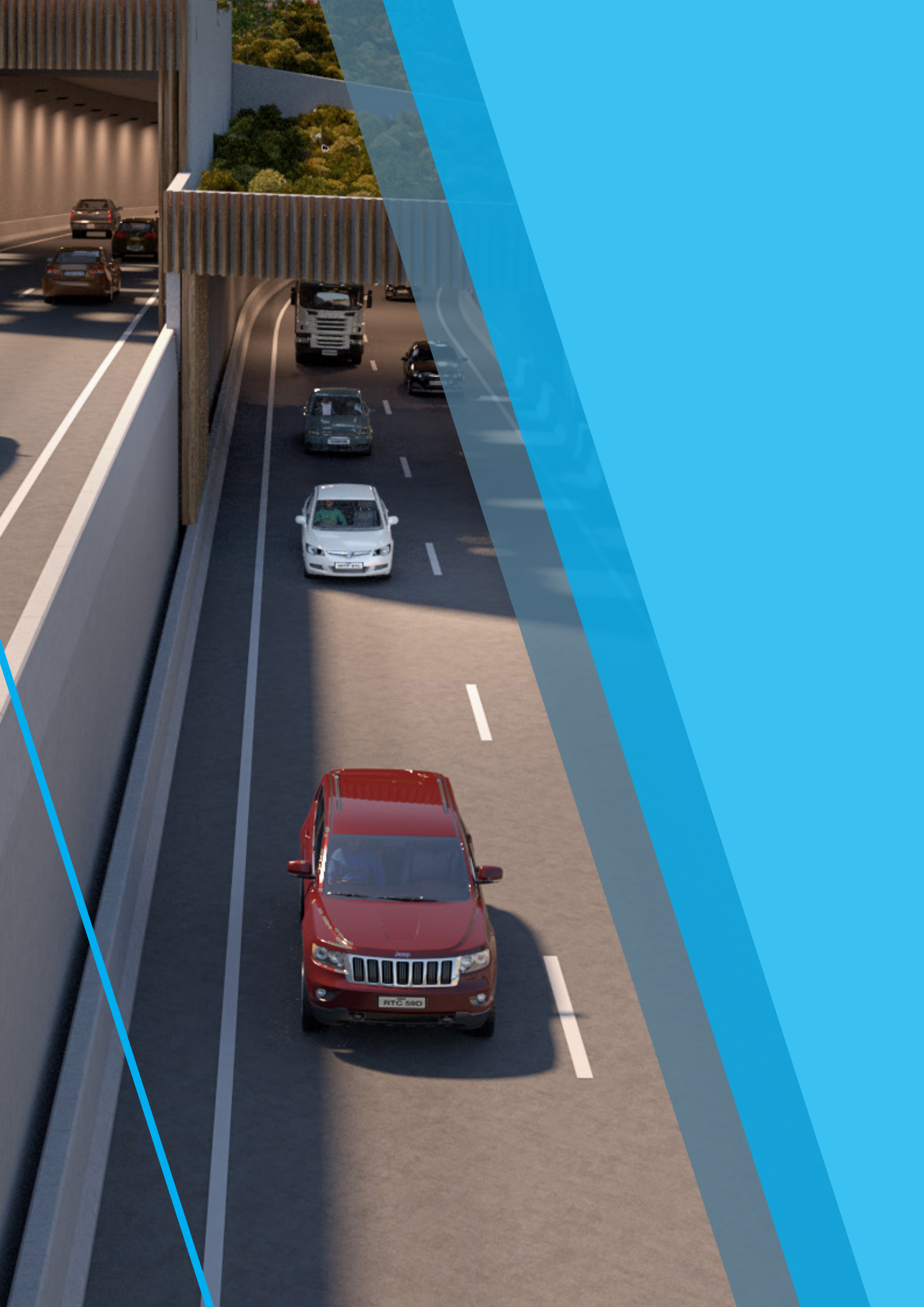
Key design refinement	How design refinement has minimised or avoided impacts
Optimisation of the height and diameter of the ventilation outlets at the Rozelle interchange.	<ul style="list-style-type: none"> Reduces ground level pollutant concentrations at parts of Rozelle while maintaining an outlet height that meets air navigation safety requirements.
Inclusion of the Haberfield/Ashfield Option B construction ancillary facilities (Parramatta Road West civil and tunnel site (C1b) and Parramatta Road East civil site (C3b)) as a potential alternative to Option A construction ancillary facilities.	<ul style="list-style-type: none"> Minimises construction fatigue for receivers at Wattle Street, Walker Avenue and Northcote Street adjacent to the Option A construction ancillary facilities which have also been used by the M4 East project (ie concurrent cumulative impacts).
Bifurcation of tunnel lanes.	<ul style="list-style-type: none"> Minimises weaving and merging behaviour leading to safer and more efficient traffic flow and reduced congestion in the mainline tunnels.
Limiting spoil haulage from the Darley Road civil and tunnel site (C4) to standard (day time) construction hours only.	<ul style="list-style-type: none"> Minimises noise impacts on surrounding receivers at night-time Minimises disruptions from heavy vehicle movements outside standard construction hours.
Removal of Blackmore Park as a tunnel and civil site.	<ul style="list-style-type: none"> Avoids the temporary loss of recreational space during construction Avoids impacts to existing trees/vegetation Avoids impacts on recreational users using Blackmore Park and open space along Hawthorne Canal Avoids disruptions to local traffic movements and minimises the potential for road safety incidents from heavy vehicle access along a constrained and narrow Canal Road Avoids impacts to the local heritage listed Leichhardt (Charles Street) Underbridge restricted height clearance.

Key design refinement	How design refinement has minimised or avoided impacts
Removal of Derbyshire Road as a civil and tunnel site.	<ul style="list-style-type: none"> • Avoids impacts to the Sydney Secondary College Leichhardt Campus related to noise and dust generation, visual amenity, heavy vehicle traffic movements, access/parking disruptions and road safety • Avoids impact on recreational users of the adjacent sports oval and Pioneers Memorial Park • Avoids impact on access to the State Transit – Leichhardt Bus Depot and potential interaction with bus movements • Avoids heavy vehicle movements along local roads • Avoids impacts to off-street parking in areas surrounding the site and the kiss-and-ride facility at the Sydney Secondary College Leichhardt Campus • Avoids demolition of a locally listed heritage item (former State Rail Authority cable store and traffic office).
Relocation of tunnel portal location for the Iron Cove Link on Victoria Road to the east of Terry Street.	<ul style="list-style-type: none"> • Avoids tunnelling conflicts with the reserved CBD Metro corridor, including the proposed underground metro station near Darling Street • Avoids potential conflict with future public transport improvements along Victoria Road • Avoids disruption to the community from the relocation of an existing local utilities substation • Avoids disruption to light industrial land uses which are associated with potential contamination risks • Avoids impact to the right-turn lane from Victoria Road into Terry Street.
Relocation of the ventilation outlet at Victoria Road (east of Iron Cove Bridge) from the southern side of Victoria Road to the centre of Victoria Road.	<ul style="list-style-type: none"> • Minimises ambient air quality impacts on receivers on the southern side of Victoria Road by increasing the distance between the ventilation outlet and receivers • Minimises overshadowing impacts on residential properties • Minimises impacts on ventilation functionality and performance, and the associated impacts on ambient air quality, by having the ventilation outlet closer to the tunnel portals.



4.0

Project impacts and environmental management



4 Project impacts and environmental management

This section summarises the potential impacts that the project is expected to have on the receiving biophysical and socio-economic environment. This section also includes a summary of the environmental management measures to manage these impacts, that were identified through the impact assessment process, as described in **Chapter 8** through to **Chapter 27** and summarised in **Chapter 29** (Summary of environmental management measures) of the EIS.

4.1 Summary of project impacts, management measures and residual impacts

The EIS has assessed the potential environmental impacts that may occur as a result of the project and recommends measures to manage these impacts. An environmental risk analysis has been undertaken following the assessment of likely impacts of the project to determine potential residual impacts ie the impacts remaining after the identified management and mitigation measures are applied. This analysis is included in **Chapter 28** (Environmental risk analysis) of the EIS.

Table 4-1 provides a summary of the potential key impacts of the project that result in a residual impact rating of medium. No key impacts were assessed as having a residual impact rating of high. Potential medium and high residual impacts would be further reviewed during detailed design development and construction planning and where necessary additional measures would be implemented to ensure these impacts are suitably mitigated.

Table 4-1 Summary of key project impacts and management measures

Summary of key impacts	Construction/ Operation	Management and mitigation measures	Residual impact
Traffic and transport – refer to Chapter 8 (Traffic and transport) of the EIS			
Traffic-related safety incidents (involving both workers and road users) during construction.	Construction	<ul style="list-style-type: none"> Construction staging and temporary works to be implemented to minimise conflicts with the existing road network and maximise spatial separation between work areas and travel lanes. 	Medium
Operational road network performance impacts including the potential for increased traffic on some parts of the network as a result of the project.	Operation	<ul style="list-style-type: none"> A review of operational network performance will be undertaken 12 months and five years from the opening of the project to confirm the network operational impacts of the project A network integration strategy will be prepared in consultation with local council regarding optimisation measures. This may include measures to improve traffic flow on areas experiencing higher flow as a result of the project. 	Medium
Air quality - refer to Chapter 9 (Air quality) of the EIS			
Increase in modelled pollutant concentrations on Victoria Road to the north of Iron Cove Link, near Anzac Bridge and Canal Road at Mascot as a result of the general increase in traffic at that location due to the project.	Operation	<ul style="list-style-type: none"> While the project cannot control the general increase in traffic growth over time and related increase in vehicle emissions, the progressive introduction of more stringent vehicle emissions regulations would continue over the life of the project. 	Medium
Noise and vibration - refer to Chapter 10 (Noise and vibration) of the EIS			
Construction noise and vibration impacts upon sensitive receivers around all	Construction	<p>A Construction Noise and Vibration Management Plan (CNVMP) will be prepared for the project. The plan will:</p> <ul style="list-style-type: none"> Identify relevant performance criteria in relation to noise and vibration 	Medium

Summary of key impacts	Construction/ Operation	Management and mitigation measures	Residual impact
construction sites.		<ul style="list-style-type: none"> Identify noise and vibration sensitive receivers and features in the vicinity of the project Include standard and additional mitigation measures from the Construction Noise and Vibration Guideline (Roads and Maritime 2016) and details about when each will be applied Describe the process(es) that will be adopted for carrying out location and activity specific noise and vibration impact assessments to assist with the selection of appropriate mitigation measures Include protocols that will be adopted to manage works required outside standard construction hours in accordance with relevant guidelines Detail monitoring that will be carried out to confirm project performance in relation to noise and vibration performance criteria. <p>The CNVMP will be implemented for the duration of construction of the project.</p>	
Receivers on Victoria Road near Iron Cove Bridge may receive up to 15 dBA increases in noise from road traffic as a result of the project.	Operation	<ul style="list-style-type: none"> The use of low noise pavement to further reduce road traffic noise at the source will be investigated during detailed design taking into account whole-life engineering considerations and the overall social, economic and environmental effects. If low noise pavement is found to be appropriate, it will be considered as a management measure when assessing operation noise impacts based on the detailed design The area in the vicinity of the western portal of the Iron Cove Link, Rozelle, will be assessed further during development of the detailed design to identify appropriate noise mitigation measures to address predicted increases in road traffic noise to the project. The measures that will be considered will include low road noise pavement, noise barriers, at-property treatments and the project design Receivers that qualify for assessment for at receiver treatment in relation to operational noise that are also predicted to experience significant exceedances of noise management levels due to construction will be given priority preference for assessment. When at-receiver treatments are found to be feasible and reasonable, the application of the treatment will be expedited Within 12 months of the commencement of the operation of the project, actual operational noise performance would be compared to predicted operational noise performance. The need for any additional management measures to address any identified operational performance issues and meet relevant operational noise criteria will be assessed and implemented where reasonable and feasible. 	Medium

Summary of key impacts	Construction/ Operation	Management and mitigation measures	Residual impact																				
Land use and property - refer to Chapter 12 (Land use and property) of the EIS																							
Ground settlement resulting in damage to buildings, structures or utility infrastructure.	Construction/ Operation	<ul style="list-style-type: none"> Ground settlement will be managed to comply with the following criteria where possible: <table border="1"> <thead> <tr> <th>Beneath structure/facility</th><th>Maximum settlement</th><th>Maximum angular distortion</th><th>Limiting tensile strain (per cent)</th></tr> </thead> <tbody> <tr> <td>Buildings – Low or non-sensitive properties (ie less than or equal to two levels and carparks)</td><td>30 mm</td><td>1 in 350</td><td>0.1</td></tr> <tr> <td>Buildings – High or sensitive properties (ie greater than or equal to 3 levels and carparks)</td><td>20 mm</td><td>1 in 500</td><td>0.1</td></tr> <tr> <td>Roads and parking areas</td><td>40 mm</td><td>1 in 250</td><td>N/A</td></tr> <tr> <td>Parks</td><td>50 mm</td><td>1 in 250</td><td>N/A</td></tr> </tbody> </table> A Settlement Monitoring Plan will be prepared and implemented. The plan will include provisions for the development of management measures that would be implemented depending on the outcomes of the settlement monitoring results. 	Beneath structure/facility	Maximum settlement	Maximum angular distortion	Limiting tensile strain (per cent)	Buildings – Low or non-sensitive properties (ie less than or equal to two levels and carparks)	30 mm	1 in 350	0.1	Buildings – High or sensitive properties (ie greater than or equal to 3 levels and carparks)	20 mm	1 in 500	0.1	Roads and parking areas	40 mm	1 in 250	N/A	Parks	50 mm	1 in 250	N/A	Medium
Beneath structure/facility	Maximum settlement	Maximum angular distortion	Limiting tensile strain (per cent)																				
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Roads and parking areas	40 mm	1 in 250	N/A																				
Parks	50 mm	1 in 250	N/A																				
Urban design and visual amenity - refer to Chapter 13 (Urban design and visual amenity) of the EIS																							
Impacts to visual amenity and landscape character at and around the Rozelle Rail Yards.	Operation	<ul style="list-style-type: none"> Ancillary facilities, including the locations of visible structures and plant and perimeter fencing and treatments, will be developed to minimise visual impacts for adjacent receivers where feasible and reasonable Regular maintenance of site hoarding and perimeter site areas should be undertaken, including the prompt removal of graffiti Hoarding and temporary noise walls will be erected as early as possible within the site establishment phase to provide visual screening The detailed design will explore opportunities to design acoustic sheds to be visually recessive, such as the use of mid-toned colours and materials to minimise the intrusiveness and potential glare of the sheds, or the use of transparent materials where feasible to minimise potential overshadowing impacts. 	Medium																				
Social and economic - refer to Chapter 14 (Social and economic) of the EIS																							
Impacts to businesses as a result of changes in traffic, access,	Construction	<ul style="list-style-type: none"> Prepare and implement Business Management Plans to reduce the overall effects on potentially impacted businesses and commercial operations. 	Medium																				

Summary of key impacts	Construction/ Operation	Management and mitigation measures	Residual impact
parking and amenity.			
Impacts to the community access and connectivity.	Construction	<ul style="list-style-type: none"> Implement the Construction Traffic and Access Management Plan, which will includes measures aimed at minimising disruptions as a result construction changes to traffic flow, parking and local amenity Implement the Community Communication Strategy, which will include measures: <ul style="list-style-type: none"> Procedures and mechanisms that will be implemented by the in response to the key social impacts identified for the project Property acquisition support services that will be provided Procedures and mechanisms to communicate to project stakeholders (including affected communities), the access and connectivity enhancements and new community and social facilities that will be delivered as part of the project through the Social Infrastructure Plan and to update stakeholders on delivery progress Procedures and mechanisms that will be used to engage with affected business owners to identify potential access, parking, business visibility and other impacts to develop measures to address potential impacts on a case by case basis. 	Medium
Acquisition of property required for the project.	Construction	<ul style="list-style-type: none"> Land acquisition will continue to be undertaken in accordance with the <i>Land Acquisition Information Guide</i> (Roads and Maritime 2014) and the <i>Land Acquisition (Just Terms Compensation) Act 1991</i> (NSW). A property acquisition factsheet that outlines the process and provides further information for concerned residents will continue to be made available online and in hard copy at project information centres Affected households will continue to have access to a counselling service that assists people through the property acquisition process An independent service will continue to be provided to vulnerable households (eg elderly, those suffering an illness) to assist with relocation. Assistance could include finding a suitable house for relocation, arranging removalists, disconnecting services and attending appointments with solicitors or other representatives A community relations support toll-free telephone line will be operated to respond to any community concerns or requests for translation services. 	Medium
Flooding and drainage - refer to Chapter 17 (Flooding and Drainage) of the EIS			
Impacts on flood levels and behaviour due to sea level rise	Operation	<ul style="list-style-type: none"> The detailed assessment of potential climate change related flood risks to the project would be revised for the detailed design and design changes or management measures implemented to limit climate induced risks to flooding and drainage. 	Medium

Summary of key impacts	Construction/ Operation	Management and mitigation measures	Residual impact
and potential increase in rainfall intensity due to future climate change.			
Non-Aboriginal heritage - refer to Chapter 20 (Non-Aboriginal heritage) of the EIS			
Full or partial loss or damage to historical heritage items due to demolition.	Construction	<ul style="list-style-type: none"> Construction Heritage Management Plan (CHMP) will be prepared and implemented as part of the Construction Environmental Management Plan. The CHMP would include: <ul style="list-style-type: none"> Measures that will be implemented to manage potential impacts to items of heritage significance Inclusion of heritage awareness and management training for relevant personnel involved in site works Details regarding the conservation and curation of any historical artefacts recovered during works A Heritage Salvage Strategy will be prepared to identify the salvage potential of the fabric and features from heritage items and potential heritage items that will be demolished to facilitate the project. This could include timber joinery, fireplaces, stained glass, stairs, decorative tiles, bricks, steel truss structures, windows etc. The strategy will also identify options and a process for dissemination of salvaged items to owners, community groups and interested parties. 	Medium
Hazards and risk - refer to Chapter 25 (Hazard and risk) of the EIS			
Impacts associated with fires or other incidents in project tunnels.	Operation	<ul style="list-style-type: none"> The fire and safety systems and measures adopted for the project will be equivalent to or exceed the fire safety measures recommended by NFPA502 (American), PIARC (European), AS4825 (Australian) and Roads and Maritime standards An Incident Response Plan will be developed as part of the Emergency Response Plan for the project and implemented in the event of an accident or incident. The plan would include management and response measures to be implemented in the event of an incident The response to incidents within the motorway will be managed in accordance with the memorandum of understanding between Roads and Maritime and the NSW Police Service, NSW Rural Fire Service, NSW Fire Brigade and other emergency services. 	Medium

4.2 Environmental management plan framework

The implementation of environmental management measures during construction (which includes detailed design and pre-construction) and operation of the project would minimise any potential adverse impacts arising from the proposed works on the surrounding environment.

These environmental management measures would be captured in a Construction Environmental Management Plan (CEMP) and associated sub-plans as well as in standalone construction plans and strategies for the project. These documents would be prepared in accordance with the environmental management plan framework for the project as shown in **Figure 4-1**. An Operation Environmental Management Plan (OEMP) for the project or an Environmental Management System would outline operation plans, strategies and monitoring programs for the project during operations.

The environmental management plan framework would be further revised by the construction contractor during detailed design and construction planning. The framework would be consistent with any conditions of approval for the project.

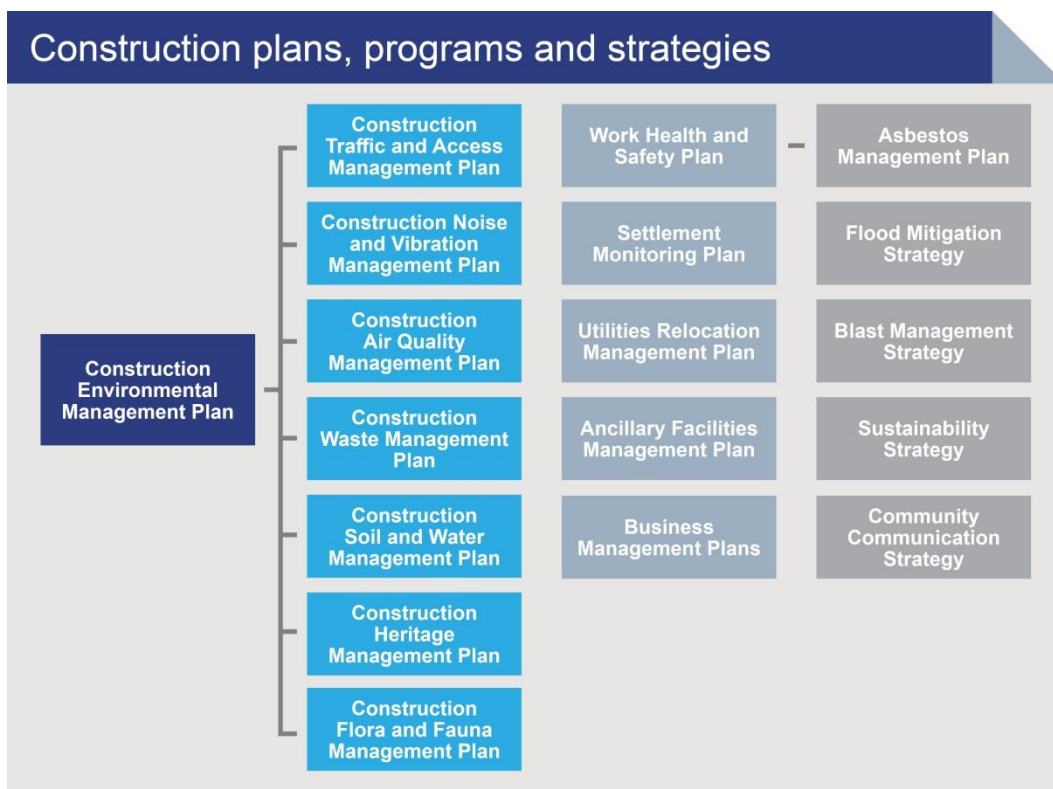

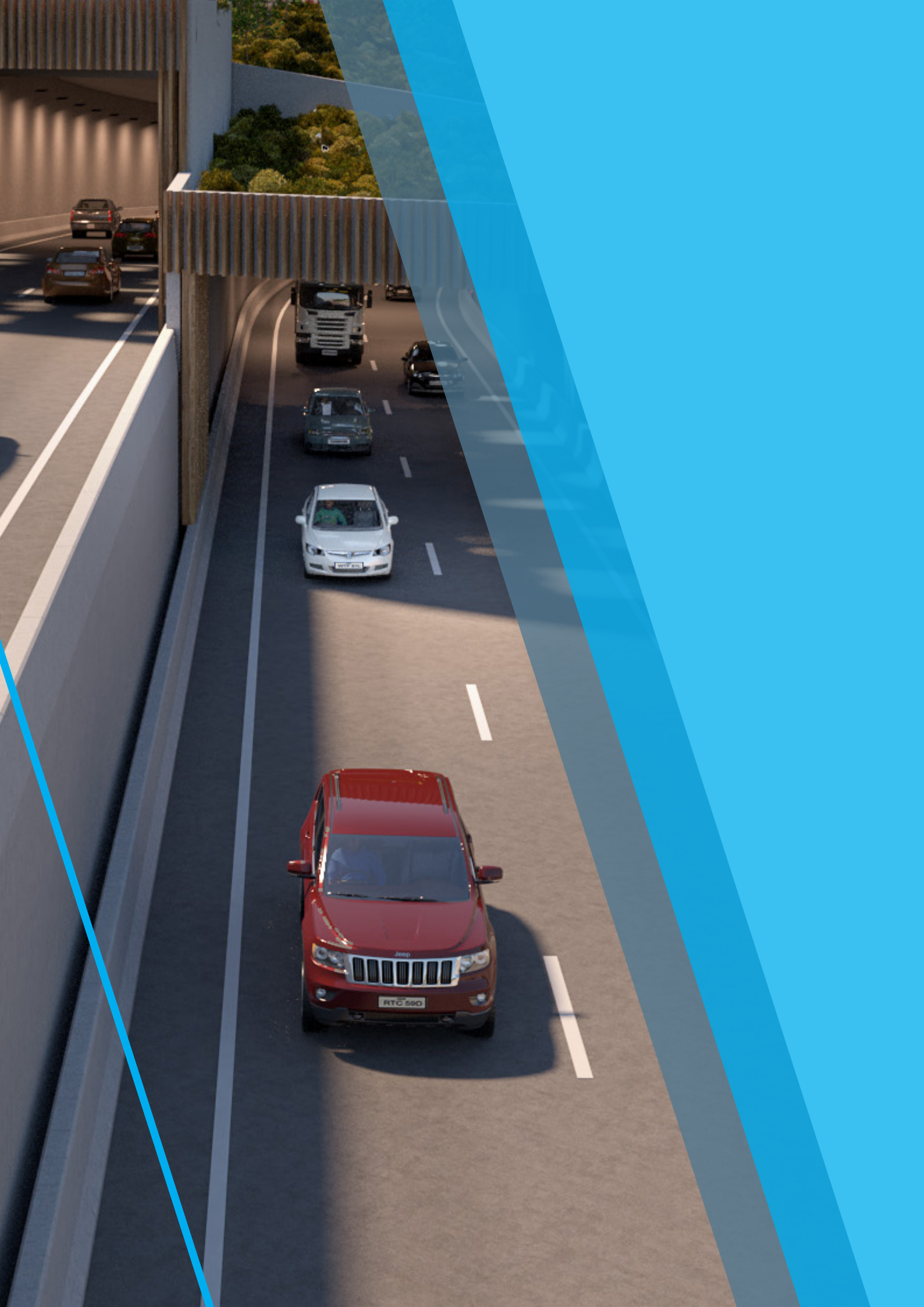


Figure 4-1 Construction and operation environmental management plan framework



5.0





Project performance outcomes










5 Project performance outcomes






The project design has been prepared in consideration of the 'desired performance outcomes' provided in the SEARs. **Table 5-1** outlines how each performance outcome will be achieved by the project.

Table 5-1 Demonstration of how the project will achieve the desired performance outcomes

Desired performance outcome	Project outcome
 Consultation The project is developed with meaningful and effective engagement during project design and delivery.	<ul style="list-style-type: none"> Engaged and informed community and key stakeholders.
 Transport and Traffic Network connectivity, safety and efficiency of the transport system in the vicinity of the project are managed to minimise impacts. The safety of transport system customers is maintained. Impacts on network capacity and the level of service are effectively managed. Works are compatible with existing infrastructure and future transport corridors.	<ul style="list-style-type: none"> Improve performance and capacity of Sydney's road network Provide an efficient motorway link and improve traffic flow on the motorway network Improve traffic conditions and ease future congestion on the inner western and southwestern road network Minimise impacts to local streets from loss of parking, road closures and heavy vehicles Functional connectivity between the subsurface and surface road network Future motorway connections to support a growing Sydney Minimise impacts to road network efficiency during construction Maintain pedestrian and cyclist safety Access to properties would be maintained Deliver significant travel time savings for motorists and freight vehicles Enable long-term development of the motorway network, including facilitating new cross-harbour capacity and connections to Sydney's south.
 Air Quality The project is designed, constructed and operated in a manner that minimises air quality impacts (including nuisance dust and odour) to minimise risks to human health and the environment to the greatest extent practicable.	<ul style="list-style-type: none"> Zero portal emissions during normal operations Effective dispersion of emissions from the tunnels Tunnel ventilation design will maintain in-tunnel air quality in accordance with relevant criteria Effective management of dust, odour and other emissions during construction.
 Health and Safety The project avoids or minimises any adverse health impacts arising from the project.	<ul style="list-style-type: none"> The motorway design achieves safe and efficient road user movements Establish and operate ancillary facilities and construction sites to protect road user and public

Desired performance outcome	Project outcome
The project avoids, to the greatest extent possible, risk to public safety.	<p>safety</p> <ul style="list-style-type: none"> Hazardous materials within project areas will be managed to protect human health Minimise incidents and crashes and risks to public safety during construction.
 <p>Noise and Vibration - Amenity</p> <p>Construction noise and vibration (including airborne noise, ground-borne noise and blasting) are effectively managed to minimise adverse impacts on acoustic amenity.</p> <p>Increases in noise emissions and vibration affecting nearby properties and other sensitive receivers during operation of the project are effectively managed to protect the amenity and well-being of the community.</p>	<ul style="list-style-type: none"> Comply with the relevant criteria from the <i>NSW Industrial Noise Policy</i> Minimise increases in road traffic noise Effective implementation of noise mitigation measures during operation Effective management of construction noise and vibration in accordance with relevant guidelines.
 <p>Noise and Vibration - Structural</p> <p>Construction noise and vibration (including airborne noise, ground-borne noise and blasting) are effectively managed to minimise adverse impacts on the structural integrity of buildings and items including Aboriginal places and environmental heritage.</p> <p>Increases in noise emissions and vibration affecting environmental heritage as defined in the <i>Heritage Act 1977</i> during operation of the project are effectively managed.</p>	<ul style="list-style-type: none"> No damage to features of heritage conservation significance from vibration.
 <p>Biodiversity</p> <p>The project design considers all feasible measures to avoid and minimise impacts on terrestrial and aquatic biodiversity.</p> <p>Offsets and/or supplementary measures are assured which are equivalent to any remaining impacts of project construction and operation.</p>	<ul style="list-style-type: none"> Minimise impact to aquatic biodiversity values Minimise removal of high retention value trees Compensatory tree planting.
 <p>Urban Design and Visual Amenity</p> <p>The project design complements the visual amenity, character and quality of the surrounding environment.</p> <p>The project contributes to the accessibility and connectivity of communities.</p> <p>The project minimises adverse impacts on the visual amenity of the built and natural</p>	<ul style="list-style-type: none"> Provision of open space at Rozelle Rail Yards Connect disconnected communities Sympathetic urban design that integrates with adjacent and historical land uses Establish and operate ancillary facilities to minimise adverse impacts on the visual amenity of the local community New and improved active transport links.

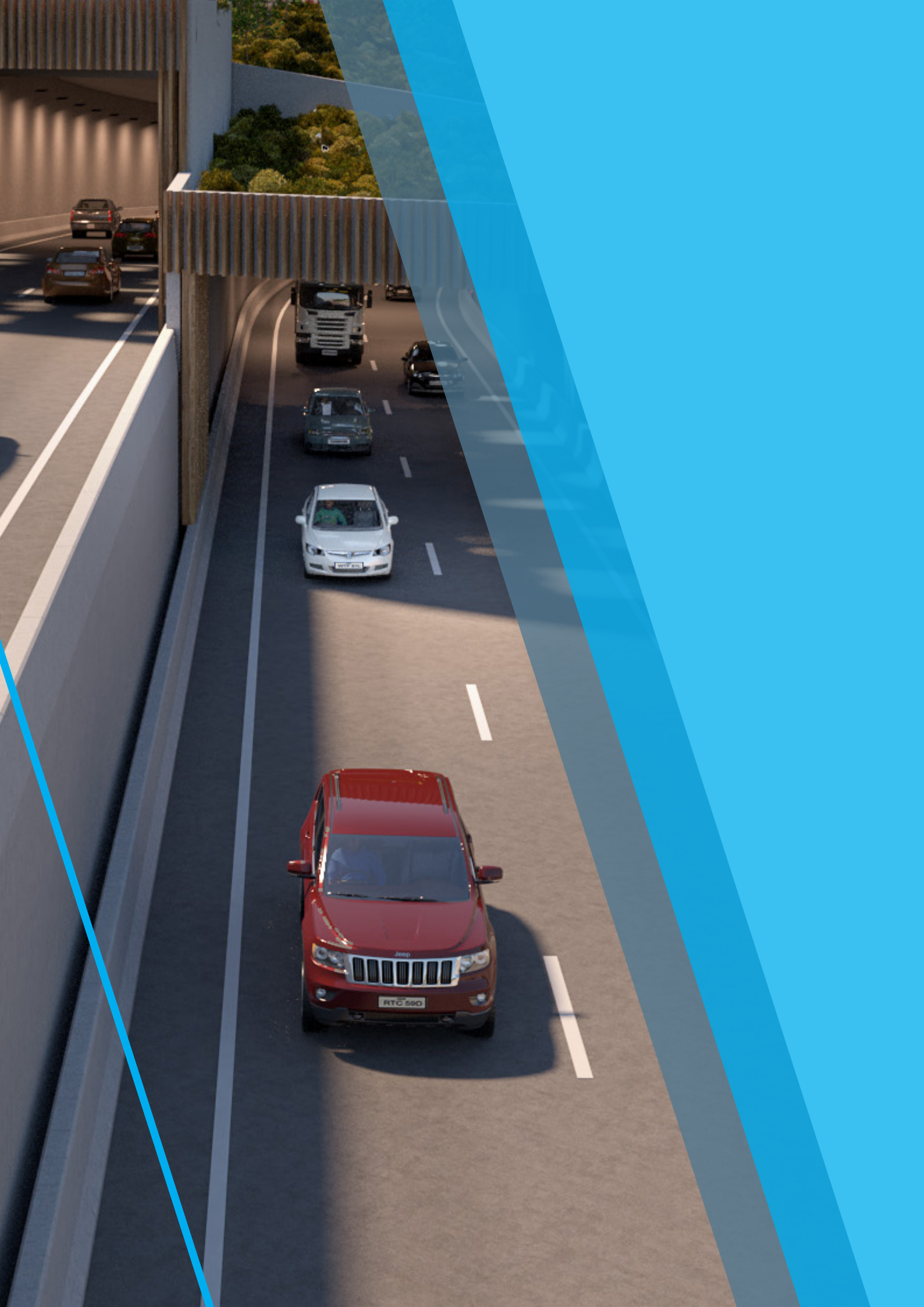
Desired performance outcome	Project outcome
<p>environment (including public open space) and capitalises on opportunities to improve visual amenity.</p>	
 <p>Socio-economic, Land Use and Property</p> <p>The project minimises adverse social and economic impacts and capitalises on opportunities potentially available to affected communities.</p> <p>The project minimises impacts to property and business and achieves appropriate integration with adjoining land uses, including maintenance of appropriate access to properties and community facilities, and minimisation of displacement of existing land use activities, dwellings and infrastructure.</p>	<ul style="list-style-type: none"> • Minimise property acquisition • Manage the property acquisition process to minimise impacts to community • Minimise impacts to businesses during construction • Make provision for social infrastructure • Ease future congestion on the inner western and southwestern road network, supporting future urban regeneration • Improve access to local services and destinations, supporting opportunities for community interaction and social cohesion.
 <p>Water – Hydrology and Quality</p> <p>Long term impacts on surface water and groundwater hydrology (including drawdown, flow rates and volumes) are minimised.</p> <p>The environmental values of nearby, connected and affected water sources, groundwater and dependent ecological systems including estuarine and marine water (if applicable) are maintained (where values are achieved) or improved and maintained (where values are not achieved).</p> <p>Sustainable use of water resources.</p> <p>The project is designed, constructed and operated to protect the NSW Water Quality Objectives where they are currently being achieved, and contribute towards achievement of the Water Quality Objectives over time where they are currently not being achieved, including downstream of the project to the extent of the project impact including estuarine and marine waters (if applicable).</p>	<ul style="list-style-type: none"> • Design and construct tunnels to minimise groundwater inflow • Establish water quality discharge criteria with consideration of NSW Water Quality Objectives • Effectively treat water to meet water quality discharge criteria • Maximise reuse of treated water during construction.
 <p>Flooding</p> <p>The project minimises adverse impacts on existing flooding characteristics.</p> <p>Construction and operation of the project avoids or minimises the risk of, and adverse impacts from, infrastructure flooding, flooding hazards, or dam failure.</p>	<ul style="list-style-type: none"> • Meet flooding criteria determined during project detailed design • Maintain the performance of the downstream drainage network during operation.

Desired performance outcome	Project outcome
 <p>Soils</p> <p>The environmental values of land, including soils, subsoils and landforms, are protected.</p> <p>Risks arising from the disturbance and excavation of land and disposal of soil are minimised, including disturbance to acid sulfate soils and site contamination.</p>	<ul style="list-style-type: none"> • Erosion and sediment controls will be implemented in accordance with <i>Managing Urban Stormwater – Soils and Construction</i>, Volume 1 (Landcom 2004) and Volume 2D (DECCW 2008), commonly referred to as the 'Blue Book' • Manage acid sulfate soils in accordance with good practice measures • Manage contamination to protect environmental values and human health.
 <p>Heritage</p> <p>The design, construction and operation of the project facilitates, to the greatest extent possible, the long term protection, conservation and management of the heritage significance of items of environmental heritage and Aboriginal objects and places.</p> <p>The design, construction and operation of the project avoids or minimises impacts, to the greatest extent possible, on the heritage significance of environmental heritage and Aboriginal objects and places.</p>	<ul style="list-style-type: none"> • Establish archival recording of items of heritage significance that will be demolished • Salvage features and fabric of heritage significance for redistribution to the community • Minimise impacts on heritage items during construction • Incorporate key heritage values and stories into the final urban design and landscaping outcome • Minimise damage to features of heritage conservation significance from vibration • Avoid damage to AHIMS site #45-6-2278.
 <p>Sustainability</p> <p>The project reduces the NSW Government's operating costs and ensures the effective and efficient use of resources.</p> <p>Conservation of natural resources is maximised.</p>	<ul style="list-style-type: none"> • Achieve an Infrastructure Sustainability Council of Australia rating of 'Excellent'.
 <p>Waste</p> <p>All wastes generated during the construction and operation of the project are effectively stored, handled, treated, reused, recycled and/or disposed of lawfully and in a manner that protects environmental values.</p>	<ul style="list-style-type: none"> • Recycle or reuse uncontaminated spoil either on-site or off-site • Manage off-site waste re-use in accordance with relevant NSW Environment Protection Authority resource recovery exemptions and requirements • Dispose of waste at appropriately licensed facilities.
 <p>Climate Change Risk</p> <p>The project is designed, constructed and operated to be resilient to the future impacts of climate change.</p>	<ul style="list-style-type: none"> • Incorporate climate change and sea level rise adaptation measures into the detailed design and construction planning for the project.

6.0

Project uncertainties





6 Project uncertainties

Construction and operational methodologies would be resolved through a variety of mechanisms, including community and stakeholder consultation, refinement during detailed design and construction and operational planning.

Table 6-1 outlines key project components that have been identified as requiring further resolution during detailed design, construction and/or operation of the project and references where these uncertainties are further described in this EIS.

6.1 Process for addressing project uncertainties

The EIS is based on the concept design developed for the project. As such, it is to be expected that some uncertainties exist that will need to be resolved during detailed design and construction and operational planning.

As described in **Chapter 1**, construction contractors (for each stage of the project) would be engaged during detailed design to provide greater certainty on the exact locations of temporary and permanent facilities and infrastructure as well as the construction methodology to be adopted. This may result in changes to both the project design and the construction methodologies described and assessed in this EIS. Any changes to the project would be reviewed for consistency with the assessment contained in the EIS including relevant mitigation measures, environmental performance outcomes and any future conditions of approval.

Table 6-1 Resolution of project uncertainties

Project uncertainties	Proposed resolution	Timing	Where discussed in the EIS
Design detail for the ventilation outlets.	<ul style="list-style-type: none"> Refinement of the design detail for the ventilation outlets will be confirmed during detailed design. A design for the Rozelle ventilation outlets will be developed that aims to incorporate the ventilation outlets as an integral component of the larger parkland composition, with reference and consideration to the Ventilation Facility Design Review (Annexure 2 of Appendix L (Technical working paper: Urban Design) of the EIS). 	Detailed design	Chapter 13 (Urban design and visual amenity)
Confirmed tunnel alignment and depth.	<ul style="list-style-type: none"> Confirmation of the final tunnel alignment and depth will not occur until a design and construction contractor is engaged to deliver the project Future consultation to inform communities and affected stakeholders about the final alignment and depths of the tunnels and to explain differences with the concept design assessed in this EIS Future communication with relevant stakeholders such as Inner West Council, City of Sydney Council, UrbanGrowth NSW, Transport for NSW and Sydney Water. 	Detailed design	Chapter 5 (Project description)
Design detail for the integration of naturalisation works into the widening and upgrade works to Whites Creek at Annandale.	<ul style="list-style-type: none"> Ongoing consultation with Inner West Council and Sydney Water to coordinate a complementary design. 	Detailed design; Construction	Chapter 5 (Project description)
The location and layout of construction ancillary facilities, including entry and exit arrangements.	<ul style="list-style-type: none"> Confirmation of the location and layout of construction ancillary facilities as part of detailed construction planning, following design and construction contractor has been engaged Establish and operate construction ancillary facilities in accordance with the terms of the project approval, including any changes identified in a preferred infrastructure report, and the conditions of approval. 	Detailed design	Chapter 6 (Construction work)
Spoil transport options including haulage routes and the location of spoil disposal facilities.	<ul style="list-style-type: none"> Confirm the locations that will accept spoil from the project for reuse during development of the detailed construction methodology Review spoil transport options identified in the EIS in relation to the confirmed reuse locations and identify any potential inconsistencies Adjust spoil transport options as required and update relevant management plans, in accordance with relevant requirements of the conditions of approval. 	Detailed design	Chapter 6 (Construction work)

Project uncertainties	Proposed resolution	Timing	Where discussed in the EIS
The locations and number of construction workforce parking.	<ul style="list-style-type: none"> Investigate potential offsite areas that could be used for construction workforce parking, including government owned land and other potential areas near to the construction ancillary facilities, and secure them for use during construction where required and possible Develop a workforce car parking strategy as part of the Construction Traffic and Access Management Plan (CTAMP), which would be prepared during detailed design in consultation with relevant councils, emergency services and road user groups. The car parking strategy would be prepared prior to the establishment of construction ancillary facilities and would include identification of areas where there are high levels of existing parking demand around the construction ancillary facilities and works sites and identification of alternative car parking sites for use by the construction workforce. 	Construction	Chapter 6 (Construction work)
Timing of construction staging and traffic diversions from surface works on arterial roads.	<ul style="list-style-type: none"> Traffic staging plans will be prepared by the design and construction contractor, based on the detailed design and construction methodology. The plans will describe how construction sites associated with road works will be established to safely maintain traffic and lane capacity and minimise delays to motorists, public transport, pedestrians, cyclists and will be included in the CTAMP. 	Construction	Chapter 8 (Traffic and transport)
The final suite of noise mitigation options for road traffic noise that will be adopted and implemented.	<ul style="list-style-type: none"> Confirm the detailed design, update the operational road traffic noise model and rerun the model to identify predicted noise levels Determine a preferred noise mitigation option (which may include low noise pavement, noise barrier, architectural treatments, or a combination of these) based on the detailed design, considering whole-of-life engineering considerations and the overall social, economic and environmental effects of noise, and refine the detailed design accordingly Ongoing community and stakeholder consultation to assist in informing and determining appropriate additional noise mitigation. 	Detailed design	Chapter 10 (Noise and vibration)
The exact number of residents in multi-storey buildings included in the noise and vibration assessment.	<ul style="list-style-type: none"> Confirm the precise number of individual receivers likely to be affected by noise during detailed design. 	Detailed design	Chapter 10 (Noise and vibration)
The locations and extent of potential settlement.	<ul style="list-style-type: none"> Carry out further assessment including groundwater and geotechnical modelling based on the detailed design to determine the level of predicted settlement 	Detailed design;	Chapter 12 (Land use and property)

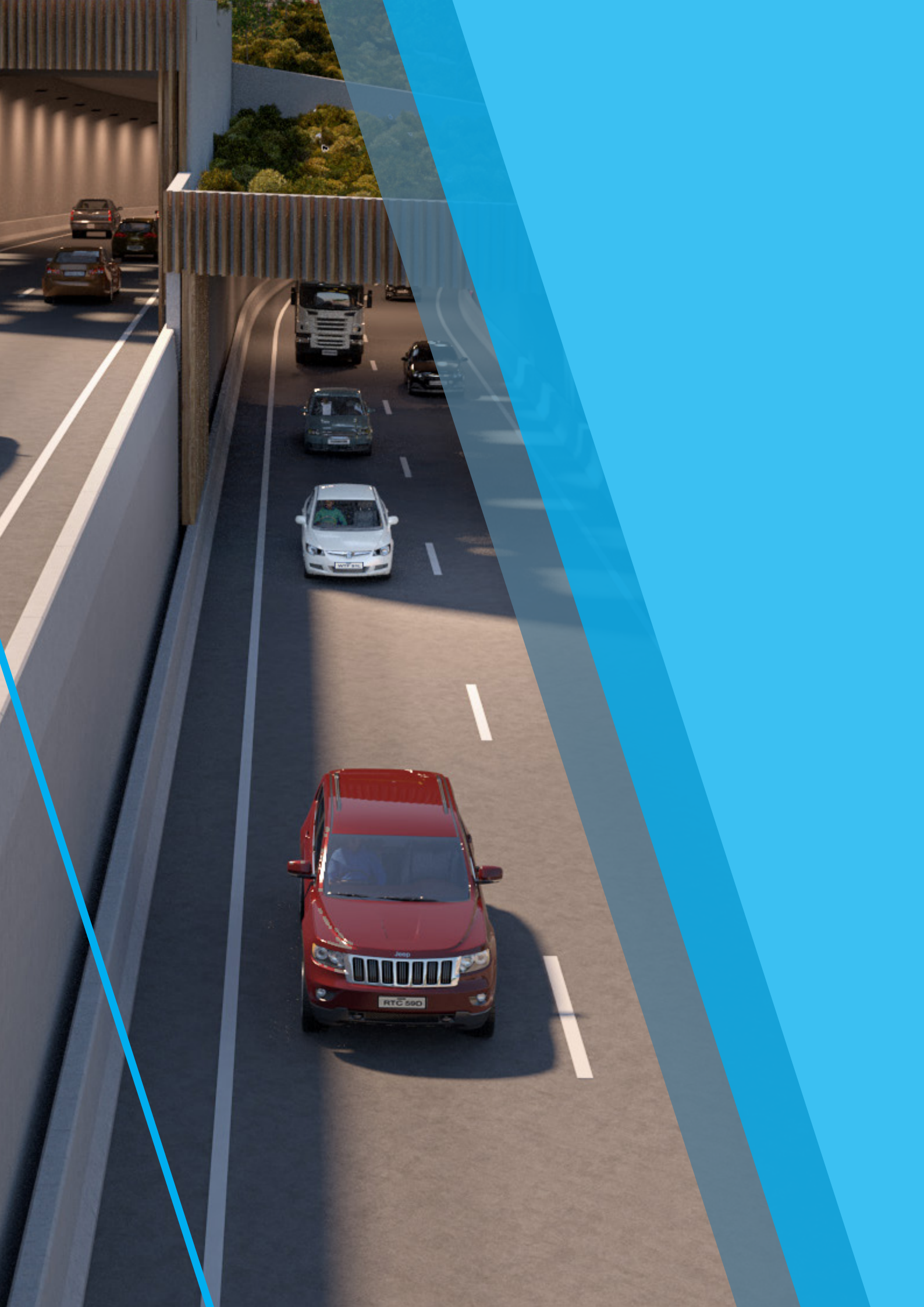
Project uncertainties	Proposed resolution	Timing	Where discussed in the EIS
	impacts <ul style="list-style-type: none"> Minimise impacts in areas where higher ground movement in excess of settlement limits is predicted Carry out building condition surveys as necessary and monitor settlement during construction. 	Construction	
Potential impacts on the Sydney Water Pressure Tunnel and City Tunnel and Sydney Metro tunnels during construction of the mainline tunnels.	<ul style="list-style-type: none"> Before construction begins, enter into an interface agreement with Sydney Water to identify: <ul style="list-style-type: none"> Minimum separation distances and acceptable limits of settlement to be achieved Settlement monitoring requirements during construction and Corrective actions in the event that settlement limits are exceeded. 	Detailed design	Chapter 12 (Land use and property)
Urban design detail of fixed infrastructure (ventilation outlets, substations, portals, water treatment facilities and bridges) and other key features (such as constructed wetlands and bioretention facilities).	<ul style="list-style-type: none"> Refine the urban design detail for project infrastructure and key features in accordance with performance requirements for elements such as the ventilation facilities, the objectives and principles for urban design and landscaping developed for the project, and the outcomes of consultation Prepare a detailed UDLP during detailed design. 	Detailed design	Chapter 13 (Urban design and visual amenity)
The urban design and landscaping outcome for new open space at the Rozelle Rail Yards and around the Iron Cove Link tunnel portals at Rozelle.	<ul style="list-style-type: none"> Refine the urban design and landscaping that would be delivered by the project in accordance with the objectives and principles for urban design and landscaping developed for the project and the outcomes of consultation with the community and stakeholders Integrate with relevant development plans of other agencies and councils Prepare a detailed UDLP during detailed design. 	Detailed design	Chapter 13 (Urban design and visual amenity)
Operational water treatment plant design and development of discharge criteria.	<ul style="list-style-type: none"> Identify the relevant discharge criteria in consultation with relevant agencies and include within the CSWMP Refine the treatment plant design at Rozelle and Darley Road and associated treatment systems/devices (eg the proposed the constructed wetland design at Rozelle) to achieve the adopted discharge criteria (which would be determined during detailed design) Investigate other forms of nutrient treatment at Darley Road. 	Detailed design	Chapter 15 (Soil and water quality) and Appendix Q (Technical working paper: Surface water and Flooding)

Project uncertainties	Proposed resolution	Timing	Where discussed in the EIS
The presence of roosting microbats using the area below Victoria Road bridge.	<ul style="list-style-type: none"> Confirm the presence of microbat roosting habitat below Victoria Road bridge If roosting microbats are identified, develop measures to manage potential impacts in consultation with an appropriate microbat expert. 	Construction	Chapter 18 (Biodiversity)
The presence of, and potential impacts on, a registered AHIMS site at Lilyfield.	<ul style="list-style-type: none"> Prior to construction (and if possible due to property access) a suitably qualified archaeologist would visit AHIMS site #45-6-2278 to verify the site and confirm its current condition. If it is present, further assessment would be carried out to identify location-specific risks and develop appropriate management measures to protect the integrity of the site. 	Construction	Chapter 21 (Aboriginal heritage)
Utility works outside of the project footprint, including arrangements for construction and operational power supply.	<ul style="list-style-type: none"> Utility works will be managed in accordance with the Utilities Management Strategy, which includes future and ongoing consultation with utility providers to effectively stage and manage utility works. 	Construction	Appendix F (Utilities Management Strategy)
Timing and design of the proposed future Western Harbour Tunnel and Beaches Link connections to the surface road network at Rozelle.	<ul style="list-style-type: none"> Consultation with the Western Harbour Tunnel and Beaches Link project team to continue to manage timing and availability of detailed project information to inform the detailed design of the Rozelle interchange. 	Construction	Chapter 5 (Project description)
Future development and use of residual land.	<ul style="list-style-type: none"> Details to be included in the Residual Land Management Plan Integration of the M4 East and New M5 project UDLPs. 	Detailed design; Construction	Chapter 12 (Land use and property)
Integration with the future White Bay Power Station and Rozelle Bay 'Destinations' as part of The Bays Precinct.	<ul style="list-style-type: none"> Ongoing consultation with UrbanGrowth NSW. 	Detailed design; Construction	Chapter 7 (Consultation) and Chapter 13 (Urban design and visual amenity)

7.0

Project justification and conclusion





7 Project justification and conclusion

7.1 Strategic context

The transport network in Sydney is expected to be put under increasing pressure over the next 20 years with population forecast to increase from 4.3 to 5.9 million (*A Plan for Growing Sydney* (NSW Government 2014)). Key corridors currently accommodate high levels of daily traffic including freight, commuter and leisure travel. Users of these corridors frequently experience congestion and delay, particularly during weekday and weekend peak periods.

The project is listed as a 'high priority initiative' in the *Australian Infrastructure Plan: The Infrastructure Priority List* (Infrastructure Australia 2016a). The project is also part of the NSW Government's commitment to deliver WestConnex for Sydney in response to the recommendations from the *State Infrastructure Strategy 2012–2032* (Infrastructure NSW 2012), the *State Infrastructure Strategy Update 2014* (Infrastructure NSW 2014), the *Long Term Transport Master Plan* (Transport for NSW 2012a), the NSW State Priorities announced in September 2015 (NSW Government 2015) and the *NSW Freight and Port Strategy* (Transport for NSW 2013b).

The WestConnex project is one part of a broader solution to these emerging pressures. While public transport is also part of this mix, it is recognised that not all trips in Sydney can be served by public transport, especially trips to dispersed destinations, or commercial trips requiring the movement of large or heavy goods/materials. A congested road network also affects road-based public transport, increased bus travel times and journey time variability.

For these reasons, the NSW Government is also investigating and investing in light rail, metro, bus rapid transit and motorways to provide a multi-modal response to the future challenges. In this context, WestConnex is an enabler of integrated transport and land use planning, supporting the development of initiatives including The Bays Precinct and the *Parramatta Road Corridor Urban Transformation Strategy* (UrbanGrowth NSW 2016).

The WestConnex program of works also has the potential to be a catalyst for major urban renewal, as identified in *A Plan for Growing Sydney* (NSW Government 2014) and the *Draft Central District Plan* (Greater Sydney Commission 2016). In addition, *A Plan for Growing Sydney* (NSW Government 2014) presents a vision for Sydney as a strong global city and the nation's economic and financial powerhouse. It emphasises the need to improve access to major employment hubs and global gateways.

As part of the WestConnex program of works, the project would assist in the delivery of these strategies and plans by:

- Providing a new motorway link between the M4 East at Haberfield and the New M5 at St Peters
- Reducing future traffic volumes on key north–south and east–west surface road corridors
- Enhancing the benefits achieved by the operation of the M4 East and New M5 projects by reducing traffic volumes on existing congested arterial surface roads
- Facilitating enhanced connectivity between the western suburbs and Sydney Airport and Port Botany, and provide links to population and employment growth centres in Parramatta and western Sydney
- Reducing travel times and improving reliability for bus services, business and personal journeys
- Improving efficiencies in the global freight network by providing a motorway alternative for heavy freight trucks
- Improving road safety by reducing traffic congestion on Sydney's arterial roads
- Facilitating opportunities for future urban renewal in precincts adjoining the project
- Enabling future opportunities for improved connectivity in Sydney's transport network to be realised.

As part of the broader WestConnex program of works, the project would support NSW's major sources of economic activity and provide a strategic response to the future transport demands on the already congested road network. With demonstrated consistency with these Australian and NSW government policies there is a clear strategic justification for the project to proceed and a clear strategic need to meet the growing infrastructure requirements of the Sydney Greater Metropolitan Area associated with the provision of a more efficient road network.

7.2 Need and justification

The project is a critical component of the WestConnex program of works, as it links the M4 East at Haberfield with the New M5 at St Peters, and as a result, allows more of the benefits of WestConnex to be realised.

As part of WestConnex, the project delivers on the NSW Government's plans to deliver an integrated transport solution, comprising roads and public transport, to address congestion on Sydney's roads. Public transport alone cannot meet the diverse travel needs of Sydney's growing population. Therefore, improvements to road infrastructure would remain a critical part of the overall solution. Roads and public transport are not opposing or competing alternatives; they are complementary, each serving a valuable but different role.

The key reasons for the project's need and the justifications for its implementation can be summarised into the following categories:

- Economic need and justification (economic viability)
- Need for improved road network connectivity
- Need to ease congestion across the road network, including for key commuter and freight movements
- Need to improve the efficiency of on road public transport, and in doing so allow for, and complement, capacity increases in other forms of public transport
- Support future transport trends, in particular trends associated with increased population growth
- Facilitate urban renewal.

Further information around the areas of key project need is discussed in **Chapter 3** (Strategic context and project need) of the EIS.

7.3 Biophysical, economic and social considerations

The EIS has been prepared with regard to the key issues associated with the project and the integration of biophysical, economic and social considerations. As part of the WestConnex program of works, the project would facilitate improved connections between western Sydney, Sydney Airport and Port Botany and south and southwestern Sydney, as well as better connectivity between important employment centres along Sydney's Global Economic Corridor and local communities. WestConnex is also considered State significant due to the size, economic value and the potential impacts and opportunities that it may have.

The project is subject to assessment under Part 5.1 of the EP&A Act. A request has been made for the NSW Minister for Planning to specifically declare the project to be State significant infrastructure and also critical State significant infrastructure.

While the development of the project would have unavoidable impacts (associated with, for example, property acquisition, construction impacts from heavy vehicle traffic, noise, vibration and dust, access disruptions and visual impacts) and in some areas, reduced road capacity and travel times, overall, the project would deliver a large number of benefits. The economic analysis for the WestConnex program of works, including the project, determined that WestConnex would create benefits that would outweigh the upfront construction costs and ongoing operational costs.

The project would deliver the following key benefits and opportunities:

- Ease congestion on surface roads by providing an underground motorway alternative and allowing for increased use of surface roads by pedestrians and cyclists and for public transport

- Reduce through traffic on sections of major arterial roads including City West Link, Parramatta Road, Victoria Road, King Street, King Georges Road and Sydenham Road, facilitating urban renewal opportunities to be realised along parts of the Parramatta Road and Victoria Road corridors
- Improve network productivity on the metropolitan network, with more trips forecast to be made or longer distances travelled on the network in a shorter time
- Reduce travel times on key corridors, such as between the M4 and M5 motorway corridors and the Sydney Airport/Port Botany precinct
- Deliver up to 10 hectares of new open space at the Rozelle interchange which would provide an open space link between Bicentennial Park at Glebe and Easton Park at Rozelle
- Deliver new north–south and east–west pedestrian and cycleway connections to link Rozelle and Lilyfield with Annandale, Balmain, Glebe and The Bays Precinct
- Facilitate future growth in Sydney’s transport network by allowing for connections to the proposed future Western Harbour Tunnel and Beaches Link project.

7.4 Sustainability considerations

The project has been assessed against the relevant sustainability policies in regards to transport land use within the relevant NSW policy context and the NSW legislative context (refer to **Chapter 27** (Sustainability) of the EIS). With the proposed management measures in place, the project is considered to meet the policy and legislative frameworks for sustainability in NSW.

The project has been designed and assessed in this EIS in accordance with the *WestConnex Sustainability Strategy* (Sydney Motorway Corporation 2015) and would be designed and delivered to achieving ‘Design’ and ‘As Built’ ratings of Excellent under the Infrastructure Sustainability Council of Australia infrastructure rating tool.

7.4.1 Principles of ecologically sustainable development

The principles of ecologically sustainable development have been an integral consideration throughout the design of the project. The four main principles of ecologically sustainable development, including how they would be incorporated throughout the design, construction and operation phases of the project include:



The precautionary principle: applied during the design and development of the project through an assessment of the potential environmental impacts associated with the project, consideration of alternatives and options and identifying opportunities to avoid and minimise surface disturbance



Inter-generational equity: the project would contribute to improving Sydney’s transport network, accommodating forecast traffic growth and improving access to employment centres for people living in western Sydney



Conservation of biological diversity and ecological integrity: the project footprint is entirely modified and disturbed and contains exotic species, weeds and planted native or non-indigenous species. It is considered to be in a poor ecological condition, with little ecological value and unlikely to have any native resilience or recovery potential. However, potential biodiversity impacts would be managed with recommended management measures outlined in **Chapter 18** (Biodiversity) of the EIS



Improved valuation and pricing and incentive mechanisms: the value placed on avoiding and minimising environmental impacts is demonstrated in the design features incorporated into the project, including opportunities for the creation of additional green space and the realignment of the mainline tunnels to avoid impacts on heritage conservation areas and heritage items, as well as the extent of environmental investigations undertaken to inform this EIS.

7.5 Cumulative impacts

When completed, WestConnex is expected to deliver beneficial cumulative impacts including significant increases in travel speeds through sections of the surface road network, increased reliability, and a reduction in average travel times. The methodology adopted for the cumulative impact assessment is outlined in **Appendix C** (Cumulative impact assessment methodology) of the EIS.

Adverse cumulative impacts could be encountered during the construction phases of the different WestConnex projects. In particular:

- The New M5 is expected to be finished in 2020, and may overlap the construction period of the M4-M5 Link project by around 12 months
- The M4 East project is expected to be finished in 2019, and may overlap the construction period of the M4-M5 Link project by around six months.

Construction of the project may also overlap construction of the proposed future Western Harbour Tunnel and Beaches Link project, which is anticipated to be carried out from an area within the Rozelle civil and tunnel site (when no longer needed for M4-M5 Link construction). Cumulative impacts from the concurrent construction of these two projects would predominantly comprise a minor worsening of the performance of the road network along City West Link as a result of spoil haulage and potential noise impacts on nearby receivers from concurrent construction activities. The impact of construction fatigue on local communities is also a key finding of this assessment, including at Haberfield, Rozelle and St Peters.

Significant cumulative impacts with other planned developments in the area are not considered likely. However, consultation would be undertaken with local communities potentially affected by the impacts of multiple projects in addition to the M4-M5 Link project. Where relevant, proponents of other nearby developments would also be consulted to increase the overall awareness of project timeframes and impacts.

Consideration should also be given to the creation of a project working group, or equivalent, with the aim of managing project impacts and disruptions through the sharing of relevant project information (ie timing, duration and location of construction activities). The group mandate would also include how project information would be appropriately disseminated to stakeholders and communities to ensure transparency and adequate prior notification of work activities at a local level (street/suburb level).

7.6 Conclusion

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 southwestern Sydney, as well as better connectivity between the important economic centres along Sydney's Global Economic Corridor and local communities.

The merits of the M4-M5 Link were considered in the context of a range of other strategic alternatives, based on the extent to which they could meet the project objectives and how well they performed with reference to other transport, environmental, engineering, social and economic factors.

The project would support NSW's major sources of economic activity and provide a strategic response to the future transport demands on the already congested road network. With demonstrated consistency with these Australian and NSW government policies there is a clear strategic justification for the project to proceed and a clear strategic need to meet the growing infrastructure requirements of Sydney Greater Metropolitan Area associated with the provision of a more efficient road network.

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